Environmental Assessment
DOI-NV-W010-2017-0009-EA

East Pershing Complex Gather Plan

February 2017

Prepared by:

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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
ARPA	Archaeological Resources Protection Act of 1979
AUM	Animal Unit Month
AVMA	American Veterinary Medical Association
BLM	Bureau of Land Management
BRRMP	Black Rock Resource Management Plan
CAWP	Comprehensive Animal Welfare Policy
CFR	Code of Federal Regulations
CRMP	Carson City Consolidated Resource Management Plan
EPM	Environmental Protection Measure
FLPMA	Federal Land Policy and Management Act
FMUD	Final Multiple Use Decision
GHMA	General Habitat Management Area
HA	Herd Area
HMA	Herd Management Area
IBLA	Interior Board of Land Appeals
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NGB-RAC	Northeastern Great Basin Resource Advisory Council
NHPA	National Historic Preservation Act of 1966 as Amended
NNHP	Nevada Natural Heritage Program
OHMA	Other Habitat Management Area
PHMA	Priority Habitat Management Area
PMU	Population Management Unit (Greater sage-grouse)
PZP	Porcine Zona Pellucida fertility control agent
SFNGB-RAC	Sierra Front-Northwestern Great Basin Resource Advisory Council
TNEB	Thriving Natural Ecological Balance
TGA	Taylor Grazing Act of 1934
USFWS	U.S. Fish and Wildlife Service
WDRMP	Winnemucca District Resource Management Plan
WFRHBA	Wild Free Roaming Horses and Burros Act of 1971
WH&B	Wild Horse and Burro
WSA	Wilderness Study Area

Chapter 1. Introduction

1.0 Identifying Information

Title: East Pershing Complex Gather Plan

NEPA Document Number: DOI-BLM-NV-W010-2017-0009-EA

Location of Proposed Action: Pershing, Humboldt, Churchill, and Lander Counties.

Name and Location of Preparing Office: Humboldt River Field Office, Winnemucca Nevada

Subject Code/Case File/Serial Number: 4700

Applicant: BLM

1.1 Background

This Environmental Assessment (EA) specifically considers methods to be used to manage wild horses that reside in the East Pershing Complex (Complex). The Bureau of Land Management (BLM) is preparing this EA to analyze and disclose the environmental consequences of the methods used to manage wild horses in the Complex in compliance with the National Environmental Policy Act (NEPA). BLM's Wild Horse and Burro (WH&B) Program protects, manages, and controls wild horses and burros under the authority of the Wild Free-Roaming Horses and Burros Act of 1971 (WFRHBA) (Public Law (PL) 92-195), as amended by the Federal Land Policy and Management Act (FLPMA) of 1976 (PL 94-579) and the Public Rangelands Improvement Act of 1978 (PL 95-514). The WFRHBA directs the DOI's Secretary to

> "maintain a current inventory of wild free-roaming horses and burros on given areas of the public lands. The purpose of such inventory shall be to: make determinations as to whether and where an overpopulation exists and whether action should be taken to remove excess animals; determine appropriate management levels of wild free-roaming horses and burros on these areas of the public lands; and determine whether appropriate management levels should be achieved by the removal or destruction of excess animals, or other options (such as sterilization, or natural controls on population levels)" (WFRHBA, 16 U.S.C. 1333(b)(1)). "For the purpose of furthering knowledge of wild horse and burro population dynamics," the WFRHBA provides direction to conduct research, 16 U.S.C. 1333(b)(2)(C)(3)).

For the purpose of this document, "gathers" refers to rounding up animals and "removals" refers to taking them off the range permanently (or temporarily due to fire, etc.). There are management actions evaluated in this document that would involve gathering wild horses for fertility control, spaying, or gelding that do not involve permanently removing the animals from the range.

In the last several years, BLM has documented severe utilization, by both livestock and wild horses, of riparian vegetation and extreme degradation of many springs located in the upper and lower elevation areas of the Complex. Many of the water sources utilized by wild horses within the Complex consist of wells on private property. There is not adequate water on the public lands within the Complex to continue supporting the increasing number of wild horses. Due to these findings, BLM has determined excess wild horses are present on the range and implementing management actions is necessary.

Any excess animals which are removed would be managed in short-term corral facilities where they are prepared for adoption or sale, or in long-term off-range pasture facilities where they live out the remainder of their lives (Government Accountability Office (GAO), 2008). When adoption demand is not sufficient to place into private care all the animals removed, the WFRHBA, as amended, directs BLM to either destroy the remaining healthy animals in the most humane and cost-efficient manner possible or, under certain circumstances, sell them without limitation. The BLM has not destroyed excess unadoptable animals since January 1982, when a former BLM director issued a moratorium to end the destruction of excess unadoptable animals. Congress prohibited the use of appropriated funds for the purpose of euthanizing healthy unadoptable horses and sale without limitation between 1987 and 2004 and again in 2010 and all years since then. Unless or until such time as Congress removes the appropriations prohibition, destruction of unadoptable animals or sale without limitations is not allowed, notwithstanding the plain language of the WFRHBA. To manage for the growing number of unadoptable animals, BLM began procuring additional long-term off-range pasture facilities (GAO, 2008).

The Complex (Figure 1) consists of approximately 2,191,650 total acres (Table 1. East Pershing Complex Information). The Complex encompasses three Herd Management Areas (HMAs), four Herd Areas (HAs), and non-HMA areas where wild horses migrate back and forth. The Complex configuration was based on the HMAs that would be managed under this proposal and areas where wild horses have been observed outside of the HMAs. The HMAs consist of:

- North Stillwater Range (NV-229)
- Tobin Range (NV-231)
- Augusta Mountains (NV-311)

The HAs within the Complex are:

- Humboldt Range (NV-224)
- East Range (NV-225)
- Sonoma Range (NV-223)
- Augusta Mountains (NV-221)

HAs are not managed for WH&B populations; however animals that migrate from HMAs are occasionally removed from these areas. BLM staff has recorded wild horses in the Humboldt, East, Augusta, and Sonoma HAs during aerial census and on-the-ground monitoring.

Grazing allotments within the Complex include Boyer Ranch, Buffalo Valley, Carico Lake, Clear Creek, Coal Canyon-Poker, Copper Kettle, Cottonwood, Diamond S, Dolly Hayden, Goldbanks, Harmony, Hole in the Wall, Home Station Gap, Humboldt House, Jersey Valley, Klondike, Mississippi Canyon, Pleasant Valley, Prince Royal, Pumpernickel, Rawhide, Rock Creek, Ryepatch, Sonoma, Rochester, Star Peak, Thomas Creek, and White Horse (see Figure 2. Allotment Map).

Table 1. East Pershing Complex Information

HMA/HA Name	Acreage			AML Range	2017 Estimate[2]	Last Gather	Last Census
	Public Land[1]	Private Land	Total				
North Stillwater HMA	176,854	2,081	178,935	Allotments: Boyer Ranch (CC) 10 Copper Kettle (CC) 49 Jersey Valley 0 Mississippi Canyon 0 Pleasant Valley 0 Rawhide 0 South Buffalo (BM) 9-20 South Rochester 70-126 White Cloud (CC) 0 **Total for HMA 138-205**	759	Jul 2008	12/2014
Tobin HMA	186,621	11,616	198,237	Allotments: Goldbanks 0 Pleasant Valley 0 Pumpernickel 13-17 South Buffalo 9-25 **Total for HMA 22-42**	30	Nov 2009	1/2015
Augusta Mountain HMA	176,225	1,346	177,571	Allotments: Hole-In-the-Wall 42-71 Home Station Gap 34-56 Cottonwood (BM) 20-33 Jersey Valley 89-148 **Total for HMA 185-308**	115	Feb 2011	1/2015
Augusta Mountain HA	135,263	3,024	138,287	**0**	563		
Humboldt HA	220,402	211,140	431,542	**0**	49	Feb 2015	5/2014
East Range HA	321,401	130,505	451,906	**0**	70	Nov 2001	1/2015
Sonoma Range HA	150,092	62,496	212,588	**0**	267	Apr 1987	1/2015
East Pershing Complex Totals	1,366,858	422,208	**1,789,066 ***	**345-555 horses**	**1,853 H** *(total including 2017 foal crop)*		

[1]Bureau of Indian Affairs and Reclamation acres included
[2] Population based on previous aerial and ground surveys plus 2017 foal crop (20% H). Estimated number of horses for Augusta HMA and Augusta Mountain HA is based on proportion of animals observed in those areas during January 2015 survey (17% in HMA, 83% in HA).
[3] Horses (H)
[4] (CC) means managed by Carson City BLM office
[5] (BM) means managed by Battle Mountain BLM office
*This does not include lands outside the HMAs and HAs (Total Complex Acres = 2,191,650)

The current Appropriate Management Levels (AMLs) for the HMAs within the Complex were established either through Final Multiple Use Decisions (FMUD) or Land Use Plans and were based on monitoring data. *Table 2. AML & Decision Documents* lists the NEPA and decision documents which supported the initial forage allocations and then established AMLs on the basis of available monitoring data.

The AML is defined as the number of wild horses that can be sustained within a designated HMA which achieves and maintains a "thriving natural ecological balance" (TNEB) in keeping with the multiple-use management concept for the area. 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 v. Clark, 600 F. Supp. 585, 594 (D. Nev. 1984), "the benchmark test" for determining the suitable number of wild horses on the public range is "thriving ecological balance." In the words of the conference committee which adopted this standard: "[T]he goal of wild horse and burro management * * * should be to maintain a thriving ecological balance between wild horse and burro populations, wildlife, livestock, and vegetation, and to protect the range from the deterioration associated with overpopulation of wild horses and burros." (Animal Protection Institute of America v. Nevada BLM 1989).

Changes to the AML are appropriate only if multiple use allocations are being adjusted through the land-use planning process, or if monitoring data demonstrates that the AML is either set too high or too low within the existing multiple use allocations and after BLM conducts the appropriate environmental analyses and provides opportunities for public input through a public decision-making process. BLM is mandated to manage wild horses at the established AMLs and remove animals in excess of the established AML range. Establishing AML as a population range is designed to allow for the periodic removal of excess animals to the low range of AML and allows for subsequent population growth up to the high range of AML between gathers.

Table 2. AML & Decision Documents

PLAN DOCS	PLAN DOCS	PLAN DOCS
Name	**Decision**	**AML (wild horses)**
Winnemucca District Resource Management Plan (WDRMP)	May 2015	No Change From Previous Land Use Plan (345-555)

FMUDs	FMUDs	FMUDs
Grazing Allotment	**Decision**	**AML**
Boyer Ranch FMUD	1994	10
Copper Kettle FMUD	1994	37 - 49
Cottonwood FMUD	1994	395
Pumpernickel FMUD	1996	13-17
Hole-in-the-Wall FMUD	1997	42-71
South Rochester Allotment FMUD	1998	448 horses, 73 burros

GATHER PLANS & DECISIONS	GATHER PLANS & DECISIONS
Document Name	**EA Number & Decision Date**
Implementation of Paradise-Denio Wild Horse Gathering Plan and EA	NV-020-5-26, FONSI and DR, 4/22/85
Winnemucca District Wild Horse and Burro Removal Programmatic EA	NV-020-7-24, FONSI and DR 8/4/87
Wild Horse Control Research Programmatic EA	NV-020-00-02, 11/1999
Tobin Range HMA and Sonoma HA Wild Horse Capture Plan and EA	DOI-BLM-NV-WO10-2009-0007-EA, FONSI 10/2/09, DR 10/2/09
Augusta Mountains HMA Wild Horse Gather Plan and EA	DOI-BLM-NV-WO10-2010-0013-EA, FONSI 11/22/10, DR 11/22/10

1.2 Purpose and Need for Action

The purpose of the Action Alternatives is to reduce the wild horse population to low AML and maintain the wild horse population within the AML ranges over longer periods; to prevent undue or unnecessary degradation of the public lands by protecting rangeland resources from deterioration associated with excess population of wild horses within and outside the HMAs within the Complex; and to restore a thriving natural ecological balance and multiple use relationship on the public lands.

The need for the Action Alternatives is based on BLM's obligations established by the provisions of Section 1333 (a) of the WFRHBA which mandates management of wild horses in a manner that is designed to achieve and maintain a thriving natural ecological balance on the public lands and to prevent the unnecessary death of wild horses resulting from excess numbers on the range and the lack of water and forage to support those excess numbers.

1.3 Decision to be Made

The authorized officer would make the determination of whether or not to implement any or all of the population control measures. Factors that would influence the selection of any given alternative for implementation include space and funding on a national level. Short and long-term holding space fluctuates depending on national priorities, births/deaths, and the Bureau's ability to secure contracts for holding space and/or establish new BLM facilities.

The decision to be made would not set or adjust AMLs, which were set through previous decisions as identified in *Table 2. AML & Decision Documents* and are still in effect. Future decisions regarding long-term management within the East Pershing Complex would continue to be accomplished through a Herd Management Area Plan or other activity level management plans specific to the Complex. Additionally, the decision would not adjust livestock use, which has been established through prior planning-level decisions which have complied with NEPA requirements and provided opportunity for public review and input as identified in *Table 2. AML & Decision Documents*.

A decision to select the No Action Alternative for implementation would be contrary to the requirement under the WFRHBA that the Secretary remove excess wild horses from the range and manage wild horse populations within identified boundaries of HMAs. It would also not be in conformance with regulatory provisions for management of wild horses as set forth in 43 CFR § 4700.

1.4 Scoping, Public Involvement and Issues
Internal scoping was conducted by an interdisciplinary team in 2017. Based on scoping, the following issues were identified:

- How would cultural resources be affected? How would the placement and design of temporary gather sites, including water/bait trapping sites, and holding sites impact cultural resources or Native American sacred sites, the Stillwater Range Area of Critical Environmental Concern (ACEC), or Traditional Cultural Properties (TCPs)?

- How would the removal of wild horses impact cultural resources, Native American sacred sites, Stillwater Range ACEC, or TCPs?

- How would the use of vehicles, including helicopters, impact the Stillwater Range ACEC, TCPs, or Native American sacred sites?

- How would sage grouse habitat be affected?

- How would the use of helicopters and the placement and design of temporary gather and holding sites impact the health, habitat, and activity of sage grouse, threatened and endangered species, fisheries, migratory birds, special status species, and general wildlife?

- How would bait/water trap sites impact the health, habitat, and activity of sage grouse, threatened and endangered species, fisheries, migratory birds, special status species, and general wildlife?

- How would the removal of wild horses impact the health, habitat, and activity of sage grouse, threatened and endangered species, fisheries, migratory birds, special status species, and general wildlife?

- How would water quality, including sedimentation, nitrogen levels, water temperature, and bacteria population levels, be impacted by water trapping, helicopter drive trapping, or other activities?

- How would water trapping, helicopter drive trapping, or other activities impact riparian function?

- How would reduction of wild horse populations to low AML affect water quality and riparian condition?

- How would livestock grazing be affected?

- Would recreationists be affected?

- How would trap and holding sites associated with wild horse gather activities affect vegetation communities and associated soils?

- How would gather activities impact the distribution and density of non-native or noxious plants?

- How would past and future treatments from Emergency Stabilization and Rehabilitation (ES&R)/wildland fire restoration areas be affected?

- Would any individual component, or collective components, of the proposed gather operations impair the suitability of Wilderness Study Areas to become wilderness?

- Would any individual component, or collective components, of the proposed gather operations impact the wilderness character of untrammeled, undeveloped, or natural? Are there any unique or supplemental features in the wilderness that would be impacted by gather operations?

Native American Consultation

Letters requesting consultation on the Action Alternatives were sent out on February 27, 2017 to the following tribes: Battle Mountain Band of the Te-Moak Tribe of Western Shoshone Indians, Fallon Paiute and Shoshone Tribe, Lovelock Paiute Tribe, and Winnemucca Indian Colony. Additionally, copies of the preliminary EA were sent out for review to all interested tribes.

USFWS Coordination

The BLM received the official species list for the project area on February 16, 2017 from the U.S. Fish and Wildlife Service (USFWS).

Chapter 2.0 Action Alternatives

This chapter of the EA describes the Action Alternatives, including any that were considered but eliminated from detailed analysis. The Action Alternatives A and B have been developed to consider different reasonable paths to take to accomplish the goal of achieving and maintaining AML ranges to ensure a thriving natural ecological balance, prevent further deterioration to the range, and ensure the long-term health of animals within the East Pershing Complex. The No Action Alternative would not achieve the identified purpose and need; however, it is analyzed in this EA to provide a basis for comparison with the other action alternatives, and to assess the effects of not conducting a gather at this time.

The preferred alternative is Alternative B. Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding. This alternative allows for the most flexibility to meet the purpose and need.

Since the passage of the WFRHBA, knowledge regarding management of wild horse population levels has increased. For example, population data shows that wild horses are capable of increasing their numbers by 18% to 25% annually (Wolfe 1980, Garrott and Taylor 1990, Eberhardt et al. 1982), resulting in the doubling of wild horse populations about every four to five years. This has resulted in the BLM shifting program emphasis beyond just establishing AML and removing excess wild horses through gathers to include a variety of management actions that further facilitate the achievement and maintenance of stable wild horse populations and a thriving natural ecological balance. Management actions resulting from this shifting program emphasis include: increasing fertility control, adjusting sex ratio, sterilization treatments, and collecting genetic baseline data to support genetic health assessments.

2.1 Summary of Alternatives

Alternatives to be described in this chapter and analyzed in detail in this EA are listed in *Table 3. East Pershing Complex Gather EA Alternatives.* For the purpose of this document, “gathers” refers to rounding up animals and “removals” refers to taking them off the range permanently. There are management actions evaluated in this document that would involve gathering wild horses for implementing fertility control vaccine, spaying, or gelding; that do not involve permanently removing the animals from the range.

Table 3. Table of Alternatives

East Pershing Complex Gather EA Alternatives	East Pershing Complex Gather EA Alternatives
Alternative A	• Fertility Control Vaccine and/or Spaying, with or without Gathers • Once low AML achieved, Fertility Control Vaccine only to maintain AML ranges
Alternative B	• Multiple Gathers and Removals with Fertility Control Vaccine and/or Spaying/Gelding • Once low AML achieved, subsequent Gathers, Removals, and/or Fertility Control Vaccine to maintain AML ranges
Alternative C	• No Management Action would be taken • AML would not be achieved

2.2 Project Descriptions Common to Alternatives A-B

The BLM plans to reduce excess wild horse numbers within the Complex (Figure 1) to low AML and to thereafter maintain AML ranges under all of the action alternatives. The Complex map (Figure 1) was based on the HMAs that would be gathered under this proposal, and areas where wild horses have been observed outside of the HMAs. This plan would be implemented in accordance with Comprehensive Animal Welfare Program (CAWP) and the environmental protection measures (EPMs) presented in this section. Operations are planned to occur throughout the year within the time restrictions set by the CAWP and the EPMs presented later in this chapter.

Wild horses have moved outside of the HMAs in search of forage, water, and space due to the current over-population of wild horses in this area and in response to the previous drought conditions. The Complex includes areas outside of the HMAs to which wild horses have moved.

<u>Gather Mechanisms</u>

Due to the number of excess wild horses as well as a large operational area the primary gather mechanism(s) would consist of a helicopter drive-trap and/or bait/water trap. The contractor would be required to conduct all helicopter operations in a safe manner and in compliance with Federal Aviation Administration (FAA) regulations 14 CFR § 91.119 and BLM IM No. 2010-164. All gather and handling activities would be conducted in accordance with the CAWP set forth in

Appendix A. The following items are national policy and found online in the H-4700-1 Wild Horses and Burros Management Handbook (Public) and provide further clarification of gather and handling activities:

- BLM policy prohibits the gathering of wild horses with a helicopter (unless under emergency conditions) during the period of March 1 to June 30 which includes and covers the six weeks that precede and follow the peak of foaling (mid-April to mid-May).
- Bait/water trapping can occur throughout the year.

- The use of saddle horses to herd and/or rope from horseback could also be used when necessary.

- All wild horses identified to remain in or to be removed from the East Pershing Complex population would be selected to maintain a diverse age structure, herd characteristics, and body type (conformation).

Trapping and Holding

- Multiple temporary trap sites (gather sites), including helicopter drive-trapping and water/bait trapping sites, as well as temporary holding sites, would be used to accomplish the goals of the Proposed Action. In addition to public lands, private property may be utilized for gather sites and temporary holding facilities due to greater accessibility and/or prior disturbance or, if necessary to ensure successful gathers. Use of private land would be subject to the CAWP set forth in Appendix A and would require written approval/authorization of the landowner.

- Helicopter drive-trapping and temporary holding sites would be in place while active trapping is occurring to gather wild horses. Bait or water trapping sites could remain in place up to one year for periodic use. The exact location of the gather sites and holding sites would not be determined until immediately prior to the gather because the location of the animals on the landscape is variable and unpredictable.

- If gather efficiencies utilizing helicopter drive-trapping do not achieve the desired goals of the alternative selected, or if a helicopter gather has to be delayed, water and/or bait trapping may be utilized during the time period analyzed in this EA as a supplemental or interim measure to assist in the removal or treatment of sufficient numbers of wild horses to achieve the management targets in selected areas, to relieve resource concerns, and/or concentrated groups of wild horses both inside and adjacent to the Complex.

  For example, water or bait trapping could be used when trying to remove wild horses from a small distinct geographic area or when weather or environmental conditions are not conducive to helicopter gather techniques. Any water/bait 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. Existing watering sites would be preferred if located outside of riparian areas. In rare instances new troughs may be used and would be subject to the Standards and Guidelines for Nevada's Sierra Front-Great Basin Area and

Northeastern Great Basin Area (e.g. installation of bird ladders). Locations of water/bait trap sites are subject to the same criteria discussed above for gather (trap) sites.

Water/Bait 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 wild horses to acclimate to the trap and/or decide to access the water/bait.

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.

When actively trapping wild horses, the trap would be manually closed by BLM or contractor staff or if designed to allow the animals to self-trap using spring gates, 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.

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 applying population controls at a given location, which can also relieve the resource pressure caused by too many wild horses.

- Gathered and removed wild horses would be transported to BLM holding facilities where they would be prepared for adoption and/or sale to qualified individuals who can provide them with a good home or for transfer to off-range pastures.

Herd Data Collected

- AML for the combined East Pershing Complex is a population range of 345-555 wild horses (*Table 2. AML & Decision Documents*). Based on 2014 and 2015 aerial census, the USGS data analysis, and adding the 2015, 2016, and 2017 foal crops; the East Pershing Complex has approximately 1,853 wild horses. Current populations as of January 2018 are estimated to exceed the low AML of the entire Complex by approximately 1,508 wild horses and high AML by 1,298 wild horses. Refer to *Chapter 3 Wild Horses section* for more information regarding population counts and growth rates.

- Herd health and characteristics data would be collected as part of continued monitoring of the wild horse herds. Other data, including sex and age distribution, condition class information (using the Henneke rating system), color, size and other information may also be recorded for all gathered wild horses.

- Hair samples would be collected during the proposed gather and sent to Dr. E. Gus Cothran at Texas A&M Veterinary Medicine and Biomedical Sciences' for genetics analysis to determine current variability and genetic diversity of the population. Following analysis of samples collected during the gather, if necessary, the Winnemucca District would work with resulting recommendations to develop plans to maintain and further improve genetic health.

Decisions to humanely euthanize animals in field situations would be made in conformance with BLM policy (Animal Health, Maintenance, Evaluation and Response IM 2015-070). Conditions requiring humane euthanasia occur infrequently and are described in more detail in *Chapter 3 Wild Horses section*. Current policy reference: http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2015/IM_2015-070.html.

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

<u>Public Observation</u>

Opportunities for public observation of the gather activities on public lands would be provided when helicopters are used and would be subject to observation protocols intended to minimize potential for harm to members of the public, to government and contractor staff, and to the wild horses being gathered, and is consistent with BLM IM 2013-058 and in compliance with protocol found in *Appendix B. East Pershing Complex Wild Horse Observation Protocol*. Public observation sites would be established in locations that reduce safety risks to the public, 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.

The protocol found in *Appendix B. East Pershing Complex Wild Horse Observation Protocol* provides the public with the opportunity to safely observe the gather operations. Every attempt would be made to identify one or more observation sites at the gather location that offer good viewing opportunities, although there may be circumstances (flat terrain, limited vegetative cover, private lands, etc.) that require viewing locations to be at greater distances from the gather site due to public visitor access or to ensure safe gather operations.

<u>Environmental Protection Measures (EPMs)</u>

These EPMs apply to each of the action alternatives described in detail below.

Areas of Critical Environment Concern (ACEC)

The BLM would place temporary gather and holding sites outside of the Stillwater Range ACEC boundary. Additionally, the BLM would not conduct helicopter drive-trapping operations in the view shed of TCPs within the Stillwater Range ACEC from August 15 to October 31, during which time Native American tribes visit and camp at the ACEC to gather pine nuts, hunt, and conduct ceremonies.

Cultural, Paleontological & Native American Consultation Resources

The BLM would make every effort to place temporary gather and holding sites in previously disturbed areas and in areas that have been inventoried and have no cultural resources, TCPs, sacred sites or paleontological sites. If a new gather or holding site is needed, a cultural inventory would be completed prior to using the new sites. If cultural resources are encountered, the location of the gather/holding site would be adjusted to avoid all cultural resources. No trap or holding sites would be set up along or adjacent to segments of the Applegate Trail rated as Class I, II, or III. Additionally, between August 15 and October 31, any temporary gather or holding sites would be placed outside the view shed of any TCPs within the Stillwater Range ACEC so as to not be visible from those TCPs.

Once the specific locations of proposed gather and holding sites are identified, BLM staff would check the paleontological database for paleontological localities in the vicinity, survey gather or holding areas for paleontological localities if necessary, and ensure that all known paleontological localities are avoided.

Invasive, Non-native Species

The BLM would make every effort to place gather sites outside of areas known to contain noxious weed species.

Noxious weed monitoring at trap sites and temporary holding facilities would be conducted prior to and following gather activities by BLM resource specialists. Treatment would be provided, if necessary, consistent with the Integrated Weed Management Plan for the HRFO. In order to minimize noxious weed spread, on-road use would be promoted and off-road travel would be limited. Any off-road equipment exposed to weed infestations would be cleaned before moving into weed-free areas. Only certified weed-free hay would be utilized for bait-trapping and feeding captured wild horses on BLM managed lands.

Rangeland Management

Gather or holding sites would be located at least a half mile from key monitoring areas. An inventory of key monitoring areas would be completed prior to using the sites. If a key monitoring area is encountered, the location of the gather/holding site would be adjusted at least a half mile to avoid the area.

Wildlife (including Migratory Birds, T&E, and SSS)

The BLM will make every effort to place trap sites outside of Greater sage-grouse PHMA, GHMA, and OHMAs. If the site cannot be placed in non-habitat, then the gather/trap sites would be located in the least suitable habitat for GRSG. Additionally, an effort will be made to locate gathering sites outside of areas containing potential habitat for threatened and endangered species as well as any known occurrence of identified special status species. The necessary required design features (RDFs) will be put into place to act as EPMs (See Appendix G).

Water Quality / Wetlands & Riparian

No trap or holding sites would be set up near properly functioning or functioning at risk riparian areas. To the extent possible, wild horses would not be driven through properly functioning or functioning at risk riparian areas during gather operations.

Wilderness Study Areas

No trap or holding sites would be set up within designated Wilderness Study Areas (WSAs). No motorized vehicle use or helicopter landings would occur off of designated routes within WSAs except in case of emergency.

2.3 Alternative A. Fertility Control and/or Spaying, with or without Gathers

Alternative A would use population growth suppression methods only; eliminating the need to remove wild horses from the range or place into short and long-term holding. These methods are designed to be implemented immediately upon approval followed by active maintenance over a 20 year period. Once low AML is achieved, fertility control only would be utilized to maintain AML ranges. Population Growth Control using Native PZP or the most effective fertility control formulation would be utilized with or without gathering, and/or spaying selected mares that have contributed their genetic diversity to the herd; i.e. field observations showing a mare has a foal at least one year-old. In addition to mares treated with fertility control vaccine such as PZP, this alternative is proposed to manage for a non-breeding component of 50 mares which equates to approximately 15% of low AML. Once AML is achieved and subsequent monitoring is accomplished, the non-breeding component percentage would be examined to determine if an adjustment up or down is needed.

A number of factors were considered in determining the timeframe to reach AML:

- size and expanse of this Complex
- number of mares
- with or without gathers
- volunteer base

Greater use of the gather component and having a substantial volunteer base may shorten the timeframe needed to reach AML.

BLMs Use of Contraception in Wild Horse and Burro Management

Expanding the use of population growth suppression (PGS) to slow population growth rates and reducing the number of animals removed from the range is a BLM priority. The WFRHBA of 1971 specifically provides for contraception and sterilization (section 3.b.1). No finding of excess animals is required for BLM to pursue contraception in wild horses.

Contraception has been shown to be a cost-effective and humane approach to slow increases in wild horse populations or, when used with other techniques, to reduce horse population size (Bartholow 2004, de Seve and Boyles-Griffin 2013). All fertility control methods in wild animals are associated with potential risks and benefits, including effects of handling, frequency of handling, physiological effects, behavioral effects, and reduced population growth rates (Hampton et al. 2015). Contraception by itself does not remove excess horses from an HMA's population, it merely reduces future reproduction.

Successful contraception would be expected to reduce the frequency of horse gather activities, as well as wild horse management costs to taxpayers. Bartholow (2007) concluded that the application of 2 or 3-year contraceptives to wild mares could reduce operational costs in a project area by 12-20%, or up to 30% in carefully planned population management programs. He also concluded that contraceptive treatment would likely reduce the number of horses that must be removed in total, with associated cost reductions in the number of adoptions and total holding costs. If applying contraception to horses is done in a way that entails capturing and handling horses, the risks and costs associated with capture and handling of horses may be comparable to those of gathering for removal, but with expectedly lower adoption and long-term holding costs. Population suppression becomes less expensive if fertility control is long-lasting (Hobbs et al. 2000). Although contraceptive treatments may be associated with a number of potential physiological, behavioral, demographic, and genetic effects, detailed in Chapter 4, Environmental Effects, those concerns do not generally outweigh the potential benefits of using contraceptive treatments in situations where it is a management goal to reduce population growth rates (Garrott and Oli 2013).

PZP Vaccine

PZP vaccines have been used on dozens of horse herds by the National Park Service, US Forest Service, Bureau of Land Management, and Native American tribes and its use is approved for free-ranging wild horse herds. Taking into consideration available literature on the subject, the National Research Council concluded in their 2013 report that PZP was one of the preferable available methods for contraception in wild horses and burros (NRC 2013). PZP use can reduce or eliminate the need for gathers and removals (Turner et al. 1997). PZP vaccines meet most of the criteria that the National Research Council (2013) used to identify promising fertility control methods, in terms of delivery method, availability, efficacy, and side effects. It has been used extensively in wild horses (NRC 2013), and in feral burros on Caribbean islands (Turner et al. 1996, French et al. 2017). PZP is relatively inexpensive, meets BLM requirements for safety to mares and the environment, and is produced as ZonaStat-H, an EPA-registered commercial product (EPA 2012, SCC 2015), or as PZP-22, which is a formulation of PZP in polymer pellets that can lead to a longer immune response (Turner et al. 2002, Rutberg et al. 2017). 'Native' PZP proteins can be purified from pig ovaries (Liu et al. 1989). Recombinant ZP proteins may be produced with molecular techniques (Gupta and Minhas 2017, Joonè et al. 2017a) and may be used in PZP vaccines in the future. PZP vaccine can easily be remotely administered in the field in cases where mares are relatively approachable. Use of remotely delivered (dart-delivered) vaccine is generally limited to populations where individual animals can be accurately identified and repeatedly approached within 50 m (BLM 2010).

Both current 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 mares would return to fertility, though some mares treated repeatedly may not (see *Chapter 4, Environmental Effects*). Once the population is at AML and population growth seems to be stabilized, BLM could use population planning software (Vortex 10, WinEquus II, or the most adequate population planning software available) to determine the required frequency of re-treating mares with PZP.

The BLM currently uses two PZP formulations for fertility control of wild horse mares, ZonaStat-H (PZP Native) and PZP-22. As other formulations are approved for use by BLM, they may be applied through future gathers or darting activities. For the purpose of this management plan, field or remote darting refers to applying the vaccine using a dart. Darting can be implemented when animals are gathered into corrals or opportunistically by applicators near water sources or along main wild horse trails out on the range. Blinds may be used to camouflage applicators to allow efficient treatment of as many mares/jennies as possible. PZP can also be applied via hand injections using plastic syringes when animals are gathered into corrals and chutes.

ZonaStat-H known as Native PZP, (or currently most effective formulation) would be administered by PZP certified and trained applicators in the one year liquid dose inoculations by field darting the mares. Prior to actually darting, an inventory of the wild horses would be conducted. This would include a photo catalog with descriptions of the animals to assist in identifying which animals have been darted and which need to be darted.

When applying Native PZP, first the primer with modified Freund's Complete adjuvant is given and then the booster with modified Freund's Incomplete adjuvant is given 2-6 weeks later, but no later than 1-2 weeks prior to the onset of breeding activity. Following the initial 2 inoculations, only annual boosters are required. Since PZP has been federally approved (EPA reg. no. 86833-1), certification through the Science and Conservation Center in Billings Montana is required to either receive and/or apply the vaccine to equids. For maximum effectiveness, PZP would be administered within the December to February timeframe. The procedures to be followed for application of PZP are detailed in *Appendix C. Standard Operating Procedures for Population-level Porcine Zona Pellucida Fertility Control Treatments.*

For the PZP-22 formulation administered during gathers, each released mare would receive a single dose of the two-year PZP contraceptive vaccine at the same time as a dose of the liquid PZP vaccine with modified Freund's Complete adjuvant. The pellets are applied to the mare with a large gauge needle and jab-stick into the hip. Although PZP-22 pellets have been delivered via darting in trial studies (Rutberg et al 2017), BLM does not plan to use darting for PZP-22 delivery in this Complex until more studies demonstrate reliable delivery via dart. Therefore, wild horses must be gathered for each application of this formulation.

The NRC (2013) criterion by which PZP is not a good choice for wild horse contraception was duration. The ZonaStat-H formulation of the vaccine tends to confer only one year of efficacy per booster dose. Some studies have found that a PZP vaccine in long-lasting pellets (PZP-22) can confer multiple years of contraception (Turner et al., 2007), particularly when boostered with subsequent PZP vaccination (Rutberg et al., 2017). Other trial data, though, indicate that the pelleted vaccine may only be effective for one year (J. Turner, University of Toledo, Personal Communication to BLM).

It is anticipated that the use of bait/water and periodic helicopter trapping would be necessary to continue to implement fertility control treatments to mares born on the range and re-treat previously treated mares to achieve and maintain the established AML ranges.

Under Alternative A, the BLM would return to the Complex as needed to re-apply PZP and initiate new treatments in order to maintain contraceptive effectiveness in controlling population growth rates. 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 (*see Chapter 4, Environmental Effects*).

Spaying Procedures

Spaying is proposed as a tool to assist in achieving low AML and maintaining the AML ranges within the Complex. As there is a level of uncertainty surrounding the behavioral and physical effects on free-roaming WH&Bs, any new information collected over the life of this plan would be applied to the implementation of this tool. For example, the BLM has solicited the USGS to convene a panel of veterinary experts to assess the relative merits of various candidate spay methods for use on wild horses. A table summarizing their discussions and referring to published accounts in the literature was sent to the BLM (Bowen 2015) and provides a concise comparison. Information from management on the East Pershing Complex may contribute to BLM's future management activities elsewhere, although this management decision does not include a research component.

Here, and throughout this EA, the word 'spay' is used to mean ovariectomy; in dogs and cats spaying is actually more invasive. Spaying is a contraception technique that requires an animal to be handled only once and could reduce long-term population growth rates if spayed mares were included as part of a population. Decreasing the numbers of excess WH&Bs removed while also reducing population growth rates and ensuring the welfare of WH&Bs on the range are all consistent with findings and recommendations from the National Academy of Science (NRC 2013), American Horse Protection Association (AHPA), the American Association of Equine Practitioners (AAEP), Humane Society of the United States (HSUS), GAO, OIG, and current BLM policy.

This management action is proposed to manage for a non-breeding component of 50 mares present in the Complex at any one time, which equates to approximately 30% of the mares at low AML for the entire Complex. Having 30% of mares spayed could reduce the growth rate by roughly 30%, independent of the effects of fertility control vaccines. The actual reduction would depend on the ratio of spayed to unspayed mares present in the Complex at any given time. To allow for flexibility within the management action, mares would be spayed over the 20-year period.

The choice of safest method to use for a given mare would be at the discretion of the attending veterinarian, with consideration given to the health and safety of both horse and veterinarian. If it is determined that surgery is not feasible for any reason, no surgery would be conducted.

Licensed veterinarians would spay mares that BLM believes to have reproduced and therefore inserted their genetic diversity, i.e. field observations showing a mare has a foal approximately one year-old. Mares selected for spaying would have a body condition score of 4 or above. No animals which appear to be distressed, injured, or in failing health or condition would be selected for spaying. Mares would not be spayed within 36 hours of capture. The surgery would be performed in aseptic conditions at either a temporary holding facility at the gather location or at a BLM-managed holding center by a licensed veterinarian using appropriate anesthetic agents and surgical techniques. Specific anesthetic agents used would be determined by the on-site veterinarian. The final decision of which specific animals would be spayed would be the Authorized Officer’s, guided by the professional opinion of the attending veterinarian. Spayed animals would be observed in holding after surgery to ensure recovery before released.

When spaying procedures are done in the field, mares would be released near a water source, when possible. When the procedures are performed at a BLM-managed facility, selected mares would be shipped to the facility, spayed, held in a separate pen to minimize risk for disease transmission, and returned to the range within 30 days.

For both procedures, feed would be withheld from mares for 24 hours prior to surgery for maximum evacuation of the bowels, allowing adequate room in the abdomen for surgery with minimal interference from the intestines. Holding mares off feed minimizes the negative impact of distended intestines near the surgical region. Water would not be withheld. Surgery would take place with horses standing in a squeeze chute, prepared as aseptically as possible. Veterinary surgeons would wear caps, masks, and gowns and use sterile gloves.

After recovering from the procedure these mares would be released back onto the Complex.

2.4 Alternative B. Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding

Alternative B consists of a wide range of management actions which may be used individually or in combination. These methods are designed to be implemented immediately upon approval and meet low AML and maintain AML ranges within approximately 20 years. The number of animals subjected to each treatment would depend on the management priorities and current on-the-ground conditions. This alternative is proposed to manage for a non-breeding component of 50 mares and 50 stallions. This equates to approximately 30% (approximately 15% females & 15% males) of low AML. Once AML is achieved and subsequent monitoring is accomplished, the non-breeding component percentage would be examined to determine if an adjustment up or down is needed. Under this alternative, the proposed multiple removals and population growth control treatments would be necessary to achieve and maintain the AML and sustain reduced population growth rates. Per the Winnemucca RMP, the Tobin Range HMA would be managed entirely as a non-breeding herd, although the East Pershing Complex as a whole would would still contain breeding animals.

Alternative B consists of the following:

- gather wild horses via multiple gathers
- remove and transport wild horses
- treat and release mares with fertility control (PZP)
- spay and/or geld wild horses

The BLM would be able to decrease the population and with multiple gathers of varying sizes, treat an increased number of mares with fertility control and ultimately remove fewer wild horses. Gradually removing excess wild horses would help alleviate holding capacity limitations within short and long-term holding facilities. To help reduce population growth rates, all mares released back to the HMAs would be treated with the most effective formulation of fertility control. Refer to Alternative A for a detailed description of PZP use.

Wild horses removed from the range would be transported to the receiving short-term holding facility in a goose-neck stock trailer or straight-deck semi-tractor trailers. Trucks and trailers used to haul the wild horses would be inspected prior to use to ensure wild horses can be safely transported. Wild horses would be segregated by age and sex when possible and loaded into separate compartments. Mares and their un-weaned foals may be shipped together. Transportation of recently captured wild horses is limited to a maximum of 12 hours.

Upon arrival, recently captured wild horses are off-loaded by compartment and placed in holding pens where they are provided good quality hay and water. Most wild horses begin to eat and drink immediately and adjust rapidly to their new situation (see CAWP). Once wild horses arrive at short-term holding facilities, removal operations are considered complete.

GonaCon
The immune-contraceptive GonaCon-B (which is produced under the trade name GonaCon-Equine for use in feral horses and burros) was found by the NRC (2013) to be one of the most preferable available methods for contraception in wild horses and burros. GonaCon-Equine is approved for use by authorized federal, state, tribal, public and private personnel, for application to wild and feral equids in the United States (EPA 2013, 2015). GonaCon-Equine has been used on feral horses in Theodore Roosevelt National Park and on wild horses in one BLM-administered HMA (BLM 2015). GonaCon-Equine can be remotely administered in the field in cases where mares are relatively approachable, using a customized pneumatic dart (McCann et al. 2017). Use of remotely delivered (dart-delivered) vaccine is generally limited to populations where individual animals can be accurately identified and repeatedly approached within 50 m (BLM 2010).

GonaCon is an immunocontraceptive vaccine which has been shown to provide multiple years of infertility in several wild ungulate species including horses (Killian et al., 2008; Gray et al., 2010). GonaCon uses the gonadotropin-releasing hormone (GnRH), a small neuropeptide that performs an obligatory role in mammalian reproduction, as the vaccine antigen. When combined with an adjuvant, the GnRH vaccine stimulates a persistent immune response resulting in prolonged antibody production against GnRH, the carrier protein, and adjuvant (Miller et al., 2008). The most direct result of successful GnRH vaccination is that it has the effect of decreasing the level of GnRH signaling in the body, as evidenced by a drop in luteinizing hormone levels, and a cessation of ovulation (see Chapter 4, Environmental Effects). As anti-GnRH antibodies decline over time, concentrations of available endogenous GnRH increase and treated animals usually regain fertility (Power et al., 2011).

Spaying
Spaying activities would be the same as described in Alternative A.

Gelding Procedures
Stallions and jacks selected for gelding would be between 10-20 years of age and have a body condition score of 4 or above per the Henneke Scale. No animals which appear to be distressed, injured, or in failing health or condition would be selected for gelding. Stallions would not be gelded within 36 hours of capture. The surgery would be performed at either a temporary holding

facility at the gather location or at a BLM-managed holding center by a licensed veterinarian using appropriate anesthetic agents and surgical techniques (see Gelding SOPs in Appendices). Specific anesthetic agents used would be determined by the on-site veterinarian. The final decision of which specific animals would be gelded would be the Authorized Officer's, guided by the professional opinion of the attending veterinarian.

When gelding procedures are done in the field, geldings would be released near a water source, when possible, approximately 24 to 48 hours following surgery. When the procedures are performed at a BLM-managed facility, selected stallions would be shipped to the facility, gelded, held in a separate pen to minimize risk for disease, and returned to the range within 30 days.

BLM would attempt to monitor gelded animals periodically for complications for approximately 7-10 days post-surgery and release. This monitoring would be completed either through aerial recon if available or field observations from roads and trails. It is not anticipated that all the geldings would be observed but the goal is to detect complications if they are occurring and determine if the horses are freely moving about the Complex. Gelded animals may be freeze marked with an identifying marker high on their neck to minimize the potential for future recapture and to facilitate post-treatment and routine field monitoring.

Population inventories and future gather statistics would assist BLM in determining if managing a portion of the herd as non-breeding animals is an effective approach to slowing the annual population growth rate and extending the gather cycle when used in conjunction with other population control techniques. As there is a level of uncertainty surrounding the effects of gelding on free-roaming wild horses, any new information collected over the life of this plan would be applied to the implementation of this tool.

This alternative proposes to use gelding in conjunction with the other tools described above to meet the purpose and need. By itself, it is unlikely that sterilization (gelding) would allow the BLM to achieve its WH&B population management objectives since a single stallion is capable of impregnating multiple mares. Population modeling by Garrott and Siniff (1992) indicated that adequate reduction of population growth may only result if a large proportion of male wild horses in the population are sterile because of their social behavior.

2.5 Alternative C. No Action Alternative

Under the No Action Alternative, there would be no active management to control the size or growth of the wild horse population or to bring the wild horse population to AML at this time. Wild horse population in the East Pershing Complex would double within four to five years.

Alternatives Considered but not Analyzed in Detail

2.6 Gathering and Removing Excess Wild Horses to High AML

Gathering wild horses to achieve a post-gather population size at the upper level of the AML would result in AML being exceeded with the next foaling season. This would be problematic for several reasons.

The upper levels of the AML established for a HMA represent the maximum population for which a thriving natural ecological balance can be maintained. Low AML represents the number of animals that should remain in the HMA following a wild horse gather and removal in order to prevent the population from exceeding the established AML between gathers or fertility control treatments. The need to gather below the upper range of AML has been recognized by the IBLA, which has held that:

> . . . the term AML within the context of the statute to mean[s] that "optimum number" of wild horses which results in a thriving natural eco- logical balance and avoids a deterioration of the range (Animal Protection Institute of America v. Nevada BLM. 1989b).
>
> Proper range management dictates removal of horses before the herd size causes damage to the range land. Thus, the optimum number of horses is somewhere below the number that would cause damage. Removal of horses before range conditions deteriorate ensures that horses enjoy adequate forage and an ecological balance is maintained (Animal Protection Institute of America et al. v. Rock Springs District BLM 1991).

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

2.7 Control of Wild Horse Numbers by Natural Means

This alternative would use natural means, such as natural predation and weather, to control the wild horse population. This alternative was eliminated from further consideration because it would be contrary to the WFRHBA which requires the BLM to protect the range from deterioration associated with an overpopulation of wild horses. The alternative of using natural controls to achieve a desirable AML has not been shown to be feasible in the past. Wild horse populations in the East Pershing Complex are not substantially regulated by predators, as evidenced by the 15-25% annual increase in the wild horse populations within this Complex. In addition, wild horses are a long-lived species with documented foal survival rates exceeding 95% and, like other large mammals (Wolff, 1996), are not a true self-regulating species. This alternative will allow for a steady increase in the wild horse populations which will continue to exceed the carrying capacity of the range and will cause increasing damage to the rangelands until severe range degradation or natural conditions that occur periodically – such as blizzards or extreme drought – cause a catastrophic mortality of wild horses in the Complex.

2.8 Raising the Appropriate Management Levels for Wild Horses

This alternative was not brought forward for detailed analysis because it would be outside of the scope of the analysis, and would be inconsistent with the WFRHBA which directs the Secretary to immediately remove excess wild horses and to manage for multiple uses. This document and subsequent Decision Record is not the appropriate mechanism for adjusting the AML of an HMA. Available data shows that excess wild horses are present on the range and that there is insufficient water and forage within the Complex to support an increase in the wild horse AML.

2.9 Remove or Reduce Livestock within the East Pershing Complex

This alternative would involve no removal of wild horses and would instead address the excess wild horse numbers through the removal of livestock or reductions in livestock grazing allocations within the East Pershing Complex. This alternative was not brought forward for analysis because it would be inconsistent with the current land use plans and/or Final Multiple Use Decisions (FMUDs) for the Boyer Ranch, Buffalo Valley, Coal Canyon-Poker, Copper Kettle, Cottonwood, Dolly Hayden, Gold Banks, Hole-In-The-Wall, Klondike, Pumpernickel, Rock Creek, South Buffalo and South Rochester allotments and with multiple use management. This document and subsequent Decision Record is not the appropriate mechanism for adjusting the authorized livestock use within the allotments associated with the Complex in order to reallocate forage to wild horses.

The proposal to reduce livestock would not meet the purpose and need for action identified in *Chapter 1.2 Purpose and Need for Action*:

> "to remove excess wild horses from within and outside the HMA, to manage wild horses at the established AML ranges for the HMA, to reduce the wild horse population growth rate in order to prevent undue or unnecessary degradation of the public lands by protecting rangeland resource from deterioration associated with excess population of wild horses within and outside the HMA boundaries, and to restore a thriving natural ecological balance and multiple use relationship on the public lands…
>
> 1333(a) of the Wild Free-Roaming Horses and Burros Act of 1971 which mandates management of wild horses in a manner that is designed to achieve and maintain a thriving natural ecological balance on the public lands."

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

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

While the BLM is authorized to remove livestock from HMAs "if necessary to provide habitat for wild horses, to implement herd management actions, or to protect wild horses from disease, harassment or injury" (43 CFR§ 4710.5). Management activities affecting wild horses and burros, including the establishment of herd mangement areas, shall be in accordance with approved land use plans prepared pursuant tp part 1600 of this title (43 CFR § 4710.1).

For the reasons stated above, this alternative was dropped from detailed analysis. To modify long-term multiple use management, changes in forage allocations between livestock and wild horses would have to be re-evaluated and implemented through the appropriate public decision-making processes to determine whether a thriving natural ecological balance can be achieved at a higher AML and in order to modify the current multiple use relationship established in the land-use plans.

2.10 Make Individualized Excess Wild Horse Determinations Prior to Removal

An alternative whereby BLM would make on-the-ground and individualized excess wild horse determinations prior to removal of wild horses from any HMA has been advocated by some members of the public. Under the view set forth in some comments during public commenting for wild horse gathers nationwide, a tiered or phased removal of wild horses from the range is mandated by the WFRHBA. Specifically, this alternative would involve a tiered gather approach, whereby BLM would first identify and remove old, sick or lame animals in order to euthanize those animals on the range prior to gather. Second, BLM would identify and remove wild horses for which adoption demand exists, e.g., younger wild horses or ones with unusual and interesting markings. Under the WFRHBA(1333(b)(2)(iv)(C)), BLM would then destroy any additional excess wild horses for which adoption demand does not exist in the most humane and cost effective manner possible, although euthanasia has been limited by Congressional appropriations.

This proposed alternative could be viable in situations where the project area is contained, the area is readily accessible and wild horses are clearly visible, and where the number of wild horses to be removed is so small that a targeted approach to removal can be implemented. Under the conditions present within the Complex and the significant number of excess wild horses both inside and outside of the Complex, this proposed alternative is impractical, if not impossible, as well as less humane for a variety of reasons. The BLM does euthanize old, sick or lame animals on the range when such animals have been identified. This occurs on an as-needed basis and is not limited to gathers. During a gather, if old, sick or lame animals are found and it is clear that an animal's condition requires the animal to be put down, that animal is separated from the rest of the group that is being herded so that it can be euthanized on the range. However, wild horses that meet the criteria for humane destruction because they are old, sick or lame usually cannot be identified as such until they have been gathered and examined up close, e.g., so as to determine whether the wild horses have lost all their teeth or are deformed. Old, sick and lame wild horses meeting the criteria for humane euthanasia are also only a small fraction of the total number of wild horses to be gathered, comprising on average about 0.5% of gathered wild horses. Thus, in a gather of over 1,000 wild horses, about five of the gathered wild horses might meet the criteria for humane destruction over an area of nearly two million acres. Due to the size of the Complex, access limitations associated with topographic and terrain features and the challenges of approaching wild horses close enough to make an individualized determination of whether a wild horse is old, sick or lame, it would be virtually impossible to conduct a phased culling of such wild horses on the range without actually gathering and examining the wild horses.

Similarly, gathering and removing wild horses for which an adoption demand exists, before gathering any other excess wild horses, would be both impractical and much more disruptive and traumatic for the animals. The size of the Complex, terrain challenges, difficulties of approaching the wild horses close enough to determine age and whether they have characteristics (such as color or markings) that make them more adoptable, the impracticalities inherent in attempting to separate the small number of adoptable wild horses from the rest of the herd, and the impacts to the wild horses from the closer contact necessary, makes such phased removal a much less desirable method for gathering excess wild horses. This method would create a significantly higher level of disruption for the wild horses on the range and would also make it much more difficult to gather the remaining excess wild horses.

This alternative would be impractical to implement, cost-prohibitive, and would be unlikely to result in the successful removal of excess wild horses or application of population controls to released wild horses. This approach would also be less humane and more disruptive and traumatic for the wild horses. This alternative was therefore eliminated from any further consideration.

2.11 Use of Alternative Capture Techniques Instead of Helicopter Capture

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

Use of wrangler on horseback drive-trapping to remove excess wild horses can be fairly effective on a small scale. Given the number of excess wild horses, the large geographic size of the East Pershing Complex, and difficulties in approaching some of the herds this technique would be ineffective and impractical. Horseback drive-trapping is also very labor intensive and can be very dangerous to the domestic horses and the wranglers used to herd the wild horses. Domestic horses can easily be injured while covering rough terrain and the wrangler could be injured if he/she falls off. For these reasons, this alternative was eliminated from further consideration.

2.12 Designation of the HMAs to be Managed Principally for Wild Horses (Sanctuaries)

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

2.13 Sex Ratio Adjustments

Research indicates that on isolated HMAs, modest changes in herd sex structure can slow the growth rate of the herd comparable to contraceptives. When small alterations in sex ratio are combined with fertility control, even greater reductions are seen. In contrast, herd sex ratios favoring males higher than the natural norm of 50/50 may cause increasing stress in the herd. In the Pryor Mountain Wild Horse Range, Singer and Schoeneker (2000) found that increases in the number of males lowered the breeding male age, but did not alter the birth rate. Because existing females were distributed among many more small harems, estimates of genetic effective population size increased. Bachelor males will likely continue to seek matings, thus increasing the overall level of male-male aggression (Rubenstein, 1986).

2.14 Conformance

The proposed action and alternatives described are in conformance with the *Winnemucca District Resource Management Plan* (WDRMP), May 2015; the Carson City CRMP, May 2001; and the *Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment,* (GRSG Plan Amendment) September 2015.

The wild horse and burro sections of the Winnemucca RMP and ROD states:

> Objective WHB 1: Administer HMAs to support healthy populations and achieve land health standards for WHB where a TNEB and multiple-use relationship can be achieved and maintained.
>
> WHB-5: Horses and burros will be gathered from the HMAs to maintain horses and burros within the AML as funding permits. Aircraft will continue to be used for the management of, and when necessary, removal of wild horses and burros. Gather activities will be scheduled to avoid high visitor use periods whenever possible.
>
> Objective WHB 5: Maintain AML Levels within HMAs.
>
> WHB-5.4: Allow for the use of non-reproductive animals, in part or whole, for population management of HMAs within the WD. Depending on the population growth suppression (PGS) method that is used per the specific HMA, the percentage of the non-reproductive animals within managed the herd may vary between HMAs.
>
> (1) Criteria for managing a portion of a HMA's or HMA complex's population as non-reproducing:
>
> Any HMA with low AML greater than 100 head.
>
> HMAs where gather efficiencies have been consistently below 80%. (Fertility control requires 80 percent gather efficiency to be effective).
>
> (2) Manage the Tobin Range HMA as a totally non-reproducing herd.

The sections of the GRSG Plan Amendment state:

2.2.1 Special Status Species (SSS)

> Objective SSS 1: Manage land resource uses to meet GRSG habitat objectives, as described in Table 2-2 (of the GRSG Plan Amendment). The habitat objectives will be used to evaluate management actions that are proposed in GRSG habitat. Managing for habitat objectives will ensure that habitat conditions are maintained if they are currently meeting

objectives or if habitat conditions move toward these objectives in the event that current conditions do not meet these objectives.

Objective SSS 4: In PHMAs and GHMAs, apply the concept of "avoid, minimize, and compensatory mitigation" for all human disturbance in areas not already excluded or closed, so as to avoid adverse effects on GRSG and its habitat. The first priority will be to avoid new disturbance; where this is not feasible, the second priority will be to minimize and mitigate any new disturbance (Appendices F and I).

2.2.5 Wild Horses

Management Decisions (MD)

MD WHB 1: For WHB management activities (e.g., gathers), review Objective SSS 4 and apply MDs SSS 1 through SSS 4 when reviewing and analyzing projects and activities proposed in GRSG habitat.

MD WHB 2: Manage herd management areas (HMAs) in GRSG habitat within established AML ranges to achieve and maintain GRSG habitat objectives (Table 2-2 of the GRSG Plan Amendment).

MD WHB 4: Prioritize gathers and population growth suppression techniques in HMAs in GRSG habitat, unless removals are necessary in other areas to address higher priority environmental issues, including herd health impacts. Place higher priority on herd areas not allocated as HMAs and occupied by wild horses and burros in SFA, followed by PHMAs.

MD WHB 9: When conducting NEPA analysis for wild horse/burro management activities, water developments, or other rangeland improvements for wild horses, address the direct and indirect effects to GRSG populations and habitat. Implement any water developments or rangeland improvements using the criteria identified for domestic livestock.

MD WHB 10: Coordinate with professionals from other federal and state agencies, researchers at universities, and others to utilize and evaluate new management tools (e.g., population growth suppression, inventory techniques, and telemetry) for implementing the WH&B Program.

2.2.2 Vegetation (VEG)

Objective VEG 1: The ARMPAs contain an overall habitat management objective that "[i]n all Sagebrush Focal Areas and Priority Habitat Management Areas, the desired condition is to maintain all lands ecologically capable of producing sagebrush (but no less than 70 percent) with a minimum of 15 percent sagebrush canopy cover, consistent with specific ecological site conditions." To move toward this goal, the ARMPA specify GRSG habitat objectives to be incorporated into land management programs, including wild horses, grazing, and habitat restoration. These habitat objectives were developed for each of the GRSG's life history stages within each ARMPA's sub-region. These objectives will be used to meet the applicable land health standard in GRSG habitats.

2.15 Relationship to Laws, Regulations and other Plans
The Action Alternatives are in conformance with the WFRHBA, applicable regulations at 43 CFR § 4700, and BLM policies. Included are:

43 CFR § 4710.4 Constraints on Management

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

43 CFR § 4720.1 Removal of excess animals from public lands

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

43 CFR § 4740.1 Use of motor vehicles or aircraft

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

In addition to the above referenced regulations, the Wild Horses and Burros Management Handbook H-4700-1 provides the following guidance in relevant part:

- H-4700-1, 4.5.3 Reduce Population Growth Rates; "Additional management alternatives (tools) may be considered in the future, pending further research (see Chapter 8)".

- H-4700-1, 8.1 Strategic Research Plan - "Research results will be used to improve management practices within the WH&B Program."

- H-4700-1, 8.3.2 Other Possible Fertility Control Tools - "Other possible fertility control tools that could potentially be considered in the future include: spaying mares …"

- H-4700-1, 8.3.2.1 Spaying (Mares) - "Spaying mares involves major abdominal surgery, is risky, and requires good post-operative care. Spaying mares could be considered in the future if safe, effective and humane surgical methods and post-operative care procedures can be perfected for use on wild horses".

2.16 Conformance with Rangeland Health Standards and Guidelines

The Sierra Front-Northwestern Great Basin Resource Advisory Council (SFNGB-RAC) Standards and Guidelines for Rangeland Health were approved by the Secretary of the Interior in 1997. RAC Standards and Guidelines for the Management of Wild Horses and Burros were later approved by the BLM's Nevada State Director in 2007. The SFNGB-RAC Standards and Guidelines can be accessed at: http://www.blm.gov/nv/st/en/res/resource_advisory/sierra_front-northwestern.html.

The Northeastern Great Basin Resource Advisory Council (NGB-RAC) Standards and Guidelines for Rangeland Health were approved by the Secretary of the Interior in 1997. The Standards and Guidelines for Wild Horse & Burros were approved in 2000. The NGB-RAC Standards and Guidelines can be accessed at:
http://www.blm.gov/nv/st/en/res/resource_advisory/northeastern_great/s_gs/wild_horses.html.

Alternatives A and B are in conformance with both the Standards and Guidelines for Rangeland Health and for Management of Wild Horses and Burros.

Chapter 3. Affected Environment:

General Description of the Affected Environment

The East Pershing Complex is located from Winnemucca south to Lovelock and east of I-80 to just east of the Tobin HMA. Pershing County covers the majority of the Complex; however small portions extend into Humboldt, Churchill, and Lander Counties. Southern sections of the Augusta and North Stillwater HMAs are situated within the administrative boundaries of the Battle Mountain, Carson City, and Winnemucca Districts; however the Winnemucca District, Humboldt River Field Office is the administrative lead for this Plan. The entire Complex spans a distance of approximately 67 miles long and 70 miles wide. The East Pershing Complex totals approximately 2,191,650 acres in size, with roughly 50% of the land identified as checkerboard land (Table 1).

The majority of the Complex contains areas of moderate potential for fossils under the BLM's potential fossil yield classification system; however, it also contains areas of very low, low, high, and very high potential.

The East Pershing Complex is located in the Great Basin within the Basin and Range Physiographic Province, a region characterized by a series of generally north-trending mountain ranges separated by alluvial valleys. The north-south trending mountain ranges are typically 5-15 miles wide separated by low intervening valleys or basins that range from 10-20 miles wide. These features were created by extensional tectonism and block faulting that resulted in horst and graben structures that began in the middle Tertiary and has continued into the present. Valley bottoms within the Complex range from about 3450 to 4500 feet in elevation and mountain ranges have elevations from 5000 to over 8200 feet above mean sea level. The principle mountain ranges within the Complex are the Humboldt, West Humboldt, East, Sonoma, Tobin, North Stillwater, and Augusta Mountain Ranges.

In general, these ranges are composed of a complex assortment of sedimentary, metamorphic, and igneous rocks that range in age from Mesozoic to the present. Basins between the ranges are filled with sediments shed from surrounding mountain ranges and minor volcanic and ash flows. Many of the basins periodically contained prehistoric lakes or were branches of one large lake (Lake Lahontan) during the Pleistocene, consequently pluvial deposits are common in the basins.

The mountains and hills are typically drained by short perennial, intermittent and ephemeral streams that disappear into the broad alluvial fans at the foot of the mountain ranges. Rivers or ephemeral streams are generally present in the center of the valleys or basins. These rivers and streams may be connected, but all basins eventually are closed basins, meaning that the streams and rivers end in the basin, generally by creating a playa, rather than flowing to the sea.

Vegetative types found within the East Pershing Complex include juniper-sage types in the higher elevations, to sagebrush-grass types at moderate elevations, to shadscale-shrub and greasewood types in the valley bottoms.

The climate is arid, characterized by warm, dry summers and moderately wet, cold winters. Elevation changes generally result in more rain and snow falling on the mountains than in the intervening valleys. In the Great Basin high desert of Nevada the average annual precipitation is often less than 11 inches (which defines the term desert). Drought conditions occur as frequently as 6 out of every 10 years. Drought is defined by the Society for Range Management as "…prolonged dry weather when precipitation is less than 75% of the average amount" (SRM 1989). Meteorological and climate data for the project area are available from the Western Regional Climate Center (WRCC – http://www.wrcc.dri.edu/). Monthly climate summaries for several towns and population centers (Imlay, Lovelock, and Rye Patch) at the edges of the Complex indicate that the average maximum and minimum annual temperatures range from 68.2 and 33.3 °F, respectively, and the average annual precipitation ranges from 7.77 inches to 4.87 inches in the valleys. Snowfall in the valleys ranges from 11.5 inches to 1.9 inches.

Since 1984, 163 wildfires have burned approximately 559,106 acres, or 22% of the Complex. Table 4 contains a summary of the fire history within the East Pershing Complex since 1984.

Table 4. Notable Fires within the East Pershing Complex

FIRE NAME	YEAR	ACRES*
Dixie	1985	529,593
Rose Creek	1987	14,338
Cosgrave	1999	26,155
Dun Glen Complex	1999	22,200
Lang Syne	1999	24,340
Cain Mountain	2000	714,330
Clear Creek	2000	153,246
Prince	2000	14,029
Spaulding	2000	175,137
All Other Fires	1984-2016	185,736

* The total acres burned in all fires equals 1,859,104. Some areas burned more than once resulting in 559,106 unique acres.

Affected Resources

The BLM is required to consider specific elements of the human environment that are subject to requirements specified in statute or regulation or by executive order. Tables 5 and 6 outline the elements that must be considered in all environmental analyses, as well as additional resources deemed necessary for evaluation by the BLM. In these tables, marking a resource as "Present/Not Affected" does not necessarily mean that no impacts would occur to that resource, but rather, that impacts to the resource are not expected to be substantial enough to require detailed analysis.

Table 5. Supplemental Authorities

Supplemental Authorities	Not Present	Present Not Affected	Present/ May Be Affected	Rationale/Comments
Air Quality		X		Actions considered would have negligible effects on air quality.
Areas of Critical Environmental Concern (ACECs)			X	Stillwater Range ACEC is present in the North Stillwater HMA and East Range HA. Refer to EPMs in Chapter 2.
Cultural Resources			X	See EPMs in Chapter 2
Environmental Justice		X		Disproportionately high and adverse human health or environmental effects to low-income, minority, and tribal populations would not occur based on the 6 principles.
Floodplains	X			
Invasive, Nonnative Species			X	See EPMs and CAWP; only affected by no action alternative
Migratory Birds			X	
Native American Religious Concerns			X	
Prime or Unique Farmlands	X			
Public Health and Safety			X	See Chapter 3 and Appendix B
Threatened & Endangered Species			X	
Wastes, Hazardous or Solid		X		Fueling operations would be conducted on public/private lands. SOPs apply.
Water Quality (Surface and Ground)			X	Groundwater would be unaffected. Gather sites would generally not be located near surface water sources. For surface water, see Chapter 3.
Wetlands and Riparian Zones			X	See Chapter 3.
Wild and Scenic Rivers	X			
Wilderness	X			

Table 6. Additional Affected Resources

Additional Affected Resources	Not Present	Present Not Affected	Present/May Be Affected	Rationale/Comments (Optional)
ES&R		X		See EPMs and SOPs
Fisheries			X	
Lands and Realty		X		
Lands with Wilderness Characteristics		X		See Lands with Wilderness Characteristics section for detailed rationale.
Paleontology		X		See 2.2 for EPMs. By following EPMs, significant paleontological resources would not be impacted, therefore further analysis of paleontological resources is not necessary.
Rangeland Management			X	
Recreation			X	
Soils			X	
Special Status Species (SSS)			X	
Vegetation			X	
Water Quantity		X		Water used by wild horses is a small % of total water available. Improved riparian function may increase hot season discharge, but increased evapotranspiration would counterbalance this effect.
Wild Horses			X	
Wilderness Study Areas			X	
Wildlife (general)			X	

Supplemental Authorities

3.1 Areas of Critical Environmental Concern (ACEC)

In order to meet the criteria to be designated as an Area of Critical Environmental Concern (ACEC), an area must contain important historical, cultural, scenic, wildlife habitat, or other natural values. Furthermore, the area's importance must extend beyond the local level. The East Pershing Complex contains one ACEC—the Stillwater Range ACEC—within its boundary, as shown on Figure 1. Approximately 54,491 acres of the Stillwater Range ACEC are within the North Stillwater HMA, with another 831 acres to the north within the East Range HA.

The Stillwater Range ACEC was established through the WD RMP because of its "significant historic, cultural, religious, and scenic values important to Native Americans" (Bureau of Land Management 2015a:12). The Stillwater Range ACEC consists of 55,322 acres covering the pinyon-juniper zone of the Stillwater Range in southeast Pershing County and the southeast portion of the Humboldt River Field Office. The Stillwater Range ACEC contains National Register quality archaeological sites and TCPs: it has been documented as being a culturally important place for Native American tribes in Northern Nevada who have visited the area for generations to hunt, gather pine nuts and other traditional foods and medicines, and conduct traditional ceremonies. Currently, impacts from wild horses grazing at populations above the high range of AML consist of impacts to springs considered sacred to Native Americans, impacts to vegetation used as traditional foods and medicines, and trampling and displacement of some of the unique cultural resources and TCPs that played a role in the designation of the ACECs.

There are no trapping or holding areas for the gather located within the Stillwater Range ACEC.

3.2 Cultural Resources

A range of prehistoric and historic sites are located within the East Pershing Complex and adjoining territory. The Complex contains a complex array of cultural resources representing the remains of human habitation dating from perhaps 10,000 years ago to recent historic times. In addition to the vast depth of time represented by these resources, a wide breadth of prehistoric and historic behaviors are also indicated including hunting and gathering, trade and exchange, mining, ranching, and transportation. While archaeologists have studied some aspects of these activities, many more are not well understood.

The evaluation of known archaeological sites indicates that many contain information that can be used to address questions that can aid in our understanding of these lesser-known aspects of past human behavior. Further inventory would undoubtedly reveal the existence of many more properties of important research value. In most cases, these sites are the only sources of information available to archaeologists in their efforts to understand the past and are, thus, valuable non-renewable resources.

Many of the cultural sites in the Complex were initially recorded decades ago. Many additional sites remain to be discovered and recorded in the future. All National Register of Historic Places eligible or unevaluated sites would be avoided under all alternatives.

3.3 Invasive, Nonnative Species

Several federal laws, regulations, and policies guide BLM management activities to control noxious weeds and invasive non-native species on public lands. Laws applicable to control invasive vegetation include: the Federal Land Policy and Management Act (FLPMA) 1976; Carlson-Foley Act of 1968; Plant Protection Act of 2000; Federal Noxious Weed Act of 1974; The Federal Insecticide, Fungicide and Rodenticide Act of 1972; and the Noxious Weed Control Act of 2004. To comply with these Laws, BLM policy directs the agency to inventory and control invasive vegetation utilizing integrated weed control management techniques.

Nevada Revised Statutes, Chapter 555. 005 defines "noxious weeds" and mandates landowners and land management agencies to include control of noxious weeds on lands under their jurisdiction.

Nevada has listed 47 non-native invasive plant species that require control; see Appendix D, Noxious Weed List. These weeds usually occur in a variety of habitats including road side areas, rights-of-way, wetland meadows, as well as undisturbed upland rangelands. Russian knapweed (*Acroptilon repens*), hoary cress (*Cardaria draba*), musk thistle (*Carduus nutans*), yellow starthistle (*Centaurea solstitialis*), spotted knapweed (*Centaurea maculosa*), squarrose knapweed (*Centaurea virgate*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), poison hemlock (*Conium maculatum*), perennial pepperweed (*Lepidium latifolium*), Scotch thistle (*Onopordum acanthium*), sow thistle (*Sonchus arvensis*), medusahead rye (*Taeniatherum caput-medusae*), saltcedar (*Tamarix ramosissimsa*), and puncture vine (*Tribulus terrestris*) have been chemically treated within the Complex.

ES&R monitoring crews have observed that infestations of exotic annual forbs and grasses are prevalent in areas of the Complex that have been previously overgrazed or have burned from wildfire. Additonal exotic species present include clasping pepperweed (*Lepidium perfoliatum*), tumble mustard (*Sisymbrium altissimum*), halogeton (*Halogeton glomerata*), Russian olive (*Eleagnus angustifolia*) and Russian thistle (*Salsola tragus*). Cheatgrass (*Bromus tectorum*) is the dominant annual grass in the Complex (Peterson 2006). However, the entire project area has not been inventoried for the presence of invasive non-native species.

3.4 Migratory Birds

The protection of birds is regulated by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668 (a))

The U.S. Fish and Wildlife Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

The U.S. Fish and Wildlife Service identified twenty-one (21) species in the East Pershing Complex categorized as Birds of Conservation Concern which may be affected by the project. Birds designated with an asterisk (*) are also BLM Special Status Species.

These birds and their seasonal occurrence are listed below:

Brewer's Sparrow* (*Spizella breweri*)	Breeding
Burrowing Owl* (*Athene cunicularia*)	Breeding
Calliope Hummingbird (*Stellula calliope*)	Breeding
Eared Grebe (*Podiceps nigricollis*)	Breeding
Fox Sparrow (*Passerella liaca*)	Breeding
Green-tailed Towhee* (*Pipilo chlorurus*)	Breeding
Lewis's Woodpecker* (*Melanerpes lewis*)	Breeding
Long-Billed curlew (*Numenius americanus*)	Breeding
Sage Thrasher* (*Oreoscoptes montanus*)	Breeding
Snowy Plover* (*Charadrius alexandrinus*)	Breeding
Swainson's hawk* (*Buteo swainsoni*)	Breeding
Virginia's Warbler (*Vermivora virginiae*)	Breeding
Western grebe (*Aechmophorus occidentalis*)	Breeding
Willow Flycatcher (*Empidonax traillii*)	Breeding
Bald eagle* (*Haliaeetus leucocephalus*)	Wintering
Black Rosy-Finch* (*Leucosticte atrata*)	Year-round
Greater sage-grouse* (*Centrocercus urophasianus*)	Year-round
Loggerhead Shrike* (*Lanius ludovicianus*)	Year-round
Peregrine Falcon* (*Falco peregrinus*)	Year-round
Pinyon Jay* (*Gymnorhinus cyanocephalus*)	Year-round
Short-eared Owl (*Asio flammeus*)	Year-round

* BLM Special Status Species

This list is only those species identified by the U.S. Fish and Wildlife Service which could become listed under the Endangered Species Act without further protective measures. It is not an exhaustive list of migratory birds found in the area. All migratory birds are protected under the MBTA and eagles further protected under the BGEPA.

3.5 Native American Religious Concerns

Numerous laws and regulations require consideration of Native American concerns. These include the National Historic Preservation Act of 1966 as Amended (NHPA), the American Indian Religious Freedom Act of 1978 as amended, Executive Order 13007 (Indian Sacred Sites), Executive Order 13175 (Consultation and Coordination with Tribal Governments), the Native American Graves Protection and Repatriation Act of 1990, the Archaeological Resources Protection Act of 1979 (ARPA), as well as NEPA and FLPMA.

Horses are believed to have been introduced into the Paiute and Shoshone societies from trade with the Comanche and other Plains groups (Shimkin 1986), though some Native Americans argue that wild horses have been in Nevada since time immemorial. By the mid-19th century, the horse had made a substantial impact on the political organization, subsistence, and trade patterns of the Northern Paiute and Shoshone tribes. The ethnographic literature presents no clear cut trend on whether horses were used as food by the Northern Paiutes and Shoshone.

Multiple resources important to Native Americans are present within the Complex that could be adversely affected by domestic and wild horses. Many varieties of plants within the project area are used by Native Americans for medicinal, ceremonial, and other purposes. Additionally, numerous springs—which are considered to be sacred—are located within the Complex.

Letters requesting comments on the Action Alternatives were sent out on February 16, 2017 to the following tribes: Battle Mountain Band of the Te-Moak Tribe of Western Shoshone Indians, Fallon Paiute and Shoshone Tribe, Lovelock Paiute Tribe, and Winnemucca Indian Colony.

The preliminary EA was sent to the above-mentioned tribes. As of the publishing of this EA, no issues or comments on the Action Alternatives have been received from any of the tribes contacted. Data related to the Native American consultation process is described in *Chapter 7.2 Native American Consultation.*

3.6 Public Health and Safety

Members of the public travel to the public lands to observe BLM's gather operations. Public observers have ranged in number from a handful of individuals to 15-25. At these numbers, BLM has determined that the current level of public visitation to gather operations falls below the threshold of an "open air assembly" under 14 CFR § 91.119.

The BLM is committed to allowing access by interested members of the public to the fullest possible degree without compromising safety or the success of operations. To minimize risks to the public from helicopter operations, a gather Contractor is required to conduct all helicopter operations in a safe manner, and to comply with FAA regulations 14 CFR § 91.119 and BLM IM No. 2010-164.

The East Pershing Complex Wild Horse Gather Observation Protocol found in *Appendix B. East Pershing Complex Wild Horse Observation Protocol* provides the public with the opportunity to safely observe gather operations.

3.7 Threatened and Endangered Species

BLM is required by the Endangered Species Act of 1973, as amended (ESA) to ensure that no federal action jeopardizes a threatened, endangered, or proposed species. A species list was requested from the United States Fish and Wildlife Service (USFWS) for the proposed project area, per their online version (2-16-2017; https://ecos.fws.gov/ipac/). The Nevada USFWS responded on February 16, 2017 with an electronic version of the official species list. The species list showed the following listed, proposed and candidate species which may occur within the project area:

Lahontan cutthroat trout (*Oncorhynchus clarkia henshawi*) a threatened species.

Lahontan cutthroat trout (LCT) is native to lakes and streams throughout the physiographic Lahontan Basin of northern Nevada, eastern California, and southern Oregon. Current populations exist in approximately 155 streams and six lakes in the Lahontan Basin. The current populations within the BLM Winnemucca District exist in approximately 23 streams and one lake. Potential habitat has been identified within the LCT Recovery Plan (USFWS 1995), and more potential LCT habitat may be identified in the future. The principle threats to the LCT include livestock grazing, urban and mining development, water diversions, poor water quality, hybridization with non-native trout, and competition with other species of non-native trout.

The population recovery strategy for LCT includes managing populations for genetic variation, establishing metapopulations, and increasing distribution and abundance through reproduction and reintroductions. The strategy also includes habitat management that involves many BLM land uses and management strategies. Habitat provision strategies include providing adequate water, water quality, and cover for spawning and rearing through streamside management, monitoring, and research. Rock Creek, in the Sonoma Range, is the only stream LCT are found within the Complex.

3.8 Water Quality (Surface and Ground)

Hydrology in the Complex consist of springs and surface water in small drainages that are part of five hydrologically-defined geographic sub-basins, groundwater in shallow alluvium, and groundwater in bedrock. The Complex is located within portions of the following sub-basins as defined by the hydrologic unit codes (HUC)-8.

Table 7. HUCs within the East Pershing Complex

Sub-basin Name	HUC-8
Middle Humboldt	16040105
Reese	16040107
Lower Humboldt	16040108
Carson Desert	16050203
Dixie Valley	16060001

Additional information about the surface water sub-basins can be found at the USGS website http://water.usgs.gov/wsc/index.html titled *Science in Your Watershed*.

Although the northern and western borders of the Complex follow the perennial Humboldt River, at no point does the Complex include the river or its floodplain. There are many intermittent and a number of perennial streams in the Complex, including about 2 dozen named perennial streams, according to the National Hydrographic Dataset (NHD). Generally, the perennial portions of the streams occur in short reaches in the mid-altitudes of the mountain ranges, confined in narrow canyons. The upper reaches tend to become dry during the summer, while at the downstream end streamflow tends to go subsurface as the channel moves onto alluvial fan surfaces.

The NHD lists 1,438 springs and seeps within the Complex, while the WD has catalogued 2,173. While there are many springs present, the majority are small and ephemeral, yielding little to no water during the hot season. During periods of drought, many of the springs may not be present.

Water quality data for springs and seeps is limited. Persistence of surface water is highly variable annually depending on climatic variations. Grazing at springs and along the associated streams by large ungulates (livestock, wild horses, and native wildlife species) typically leads to decreases in water quality due to increased nutrient loading, water temperature, bacterial contamination and sediment loading. When faced with limited water sources, large ungulates and wildlife will paw with their hooves in springs attempting to acquire more water. Surface disturbance, removal of vegetation, trampling, compaction, and deposition of manure associated with this hoof action result in reduced water quality.

3.9 Wetlands and Riparian Zones

Riparian areas include seeps, springs, aspen stands and perennial and intermittent drainages. The Complex contains few wetland and riparian resources, including both lentic zones consisting of areas with low flows or standing water such as ponds, seeps, and meadows and lotic zones with running water such as creeks, streams and springs. These riparian zones often provide the only available source of water for many miles, and are used by wild horses, livestock, birds, and many types of wildlife.

Where livestock, wild horses, and wildlife have access to riparian areas, conditions are generally degraded, especially during periods of drought. Most impacts occur to seeps and springs in the form of overutilization of riparian forage, trailing, bank alteration, and soil erosion from trampling. Within the Complex many riparian areas may no longer be in functional condition due to their reduced vegetation and high degree of disturbance (Belsky et al. 1999). Riparian functions improve forage availability, stabilize soils, protect water quality, and can increase hot season water availability.

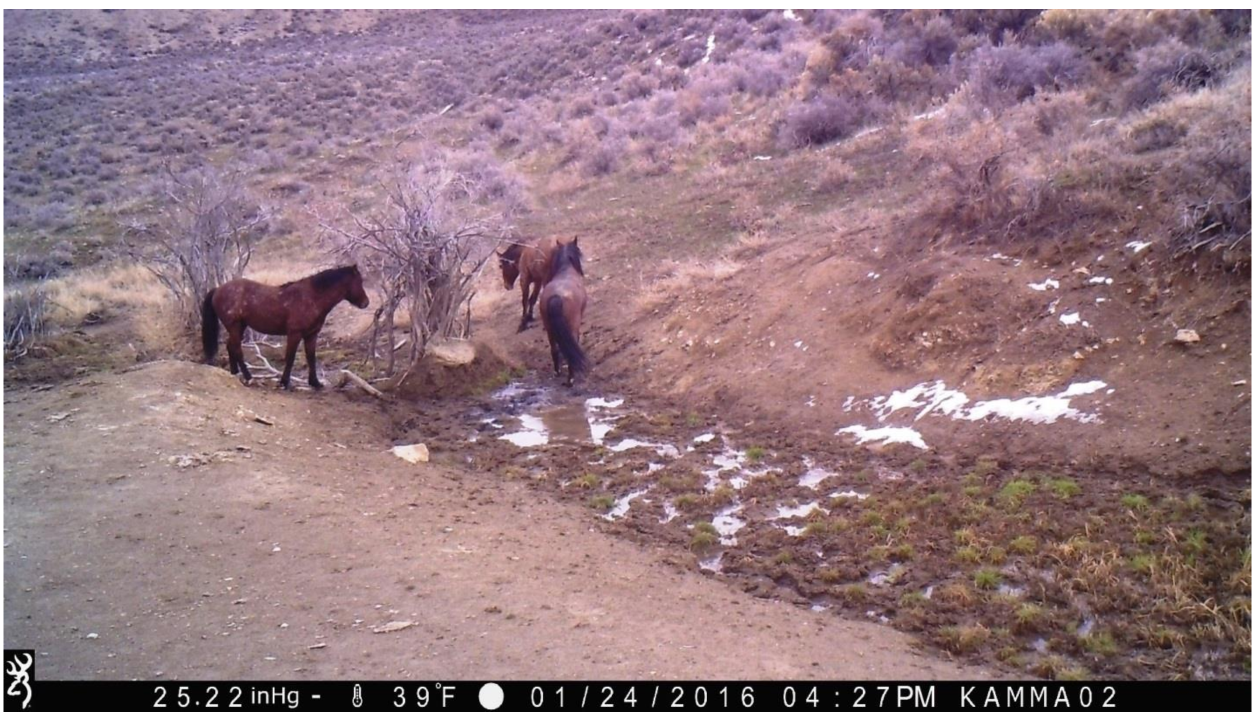


Photo 1. Erosion at Spark Plug Spring in the Humboldt HA. The photo above demonstrates soil alteration and vegetation utilization at a spring within the Complex. Livestock and wild horses both use this area. Wild horses have been observed during aerial population surveys conducted in January 2015 and onsite visits from mid-2013 through late-2016.

Riparian habitat conditions are good or improving where prescriptive livestock grazing protocols have been employed, however, damage to livestock management fences by wild horses and cattle is an on-going concern. Grazing practices for domestic livestock are regulated under the Taylor Grazing Act of 1934 (TGA). Stocking rates, grazing systems, and range improvements are implemented by BLM to maintain riparian function. Wild horses are not subject to this legislation; therefore maintaining wild horse populations within AML is the primary horse-specific tool for maintenance and recovery of wetlands and riparian areas within HMAs and HAs.

Additional Affected Resources

3.10 Fisheries

In addition to Lahontan cutthroat trout (section 3.2.6), other populations of salmonids also occur in parts of the East Pershing Complex. The other populations include rainbow trout (*Oncorhynchus mykiss*), brook trout (*Salvelinus fontinalis*), and brown trout (*Salmo trutta*). These species may be found in some streams within the East pershing Complex such as Buena Vista Creek, Cottonwood Creek, Coyote Creek, Indian Creek, Rocky Canyon Creek, Sonoma Creek, Thomas Canyon Creek, Water Canyon Creek, and Clear Creek.

3.11 Lands with Wilderness Characteristics

Two units were identified having Lands with Wilderness Characteristics. Both of these lands are within the East Pershing Complex. The WDO RMP identifies these 2 units; Fencemaker Area of the Stillwater Range (50,282 acres); and a portion of the Tobin Range between the China Mountain WSA and the Mount Tobin WSA (33,854 acres). In the Complex, 57 units were identified. Units were inventoried using the 1980 BLM Manuals 6300-1 and 6300-2 *Wilderness Inventory.* Since the original 1980 inventory, new BLM Manual 6310 *Conducting Wilderness Characteristics Inventory* and BLM Manual 6320 *Considering Lands with Wilderness Characteristics in the Land Use Planning Process* provides new guidance addressing the aspects of land use planning. A re-inventory of these 57 units has not been done since the reissuance of the new guidance. This action would not likely impair the wilderness characteristics; instead this action would likely be an enhancement of multiple-use benefits which include protection of watershed, wildlife habitat, plant communities and similar natural values.

LWC Units NV-020-234 and NV-020-418 cover all of the checkerboard lands and do not meet Lands with Wilderness Characteristics due to their limited size not equaling 5000 acres of contiguous federal lands. It has been determined that these do not meet the criteria for Lands with Wilderness Characteristics and no further analysis is recommended. Guidance is provided by BLM Manual 6310 Conducting Wilderness Characteristics Inventory on BLM Lands.

The proposed action or any of the alternatives would not have appreciable impacts to wilderness characteristics. No further analysis is necessary.

3.12 Rangeland Management

Twenty-eight allotments within the Complex are managed for livestock grazing. Portions of these allotments overlap with the HMAs, HAs or the Complex boundary. Sixteen allotments overlap HMAs and are managed concurrently with livestock and wild horses.

The Allotment Map in Figure 2 shows grazing allotments in the Complex. *Table 8. HMA Acres within Allotments, Table 9. HA Acres within Allotments* and *Table 10. Complex Acres within Allotments/Non HMA & HA* identifies the amount of overlap between grazing allotments and the Complex. As shown, allotments acreages do not correspond with HMA, HA or Complex acreages, as these areas do not share identical boundaries.

Table 8. HMA Acres within Allotments

HMA	Allotment	Allotment acreage in Complex	HMA acreage in allotment	% Allotment overlapped by HMA
Tobin Range	Buffalo Valley*	93,068	24,845	27%
	Goldbanks*	40,957	19,669	48%
	Pleasant Valley*	185,318	81,952	44%
	Pumpernickel*	151,370	7,481	5%
	South Buffalo*	152,078	64,309	42%
Total		***622,791***	***198,256***	***32%***
Augusta Mountains	Cottonwood*	44,792	44,783	100%
	Hole In The Wall*	77,977	77,950	100%
	Home Station Gap*	10,986	10,985	100%
	Jersey Valley*	68,249	40,255	59%
Total		***202,004***	***173,973***	***86%***
North Stillwater	Boyer Ranch Cottonwood Valley*	33,985	30,992	91%
	Copper Kettle*	24,969	23,441	94%
	Jersey Valley*	68,249	10,371	15%
	Pleasant Valley*	185,318	17,212	9%
	Rawhide*	157,956	4,523	3%
	South Buffalo*	152,078	17,255	11%
	South Rochester*	218,893	72,204	33%
Total		***841,448***	***175,998***	***21%***

*Some allotments contain acreage within an HMA and an HA.

Table 9. HA Acres within Allotments

HA	Allotment	Allotment acreage in Complex	HA acreage in allotment	% Allotment overlapped by HMA
Sonoma Range	Clear Creek	60,729	57,953	95%
	Diamond S	31,376	31,374	100%
	Dolly Hayden	104,440	9,570	9%
	Harmony	6,017	6,012	100%
	Pumpernickel	151,370	34,501	23%
	Rock Creek	40,953	40,930	100%
	Sonoma	40,229	20,283	50%
	Thomas Creek	11,900	11,891	100%
Total		***447,014***	***212,514***	***48%***
East Range	Dolly Hayden	104,440	81,281	78%
	Goldbanks	40,957	21,264	52%
	Klondike	112,405	107,932	96%
	Pleasant Valley	185,318	84,846	46%

HA	Allotment	Allotment acreage in Complex	HA acreage in allotment	% Allotment overlapped by HMA
	Rawhide	157,956	49,276	31%
	Star Peak	171,519	66,700	39%
	White Horse	37,830	37,830	100%
Total		***810,425***	***449,129***	***55%***
Humboldt Range	Coal Canyon-Poker	84,323	84,321	100%
	Humboldt House	24,349	24,349	100%
	Prince Royal	20,817	20,817	100%
	Rawhide	157,956	50,409	32%
	Rye Patch	18,445	18,441	100%
	South Rochester	218,893	131,119	60%
	Star Peak	171,519	80,774	47%
Total		***832,216***	***410,248***	***49%***
Tobin Range	Buffalo Valley	93,068	24,830	27%
	Goldbanks	40,957	19,669	48%
	Pleasant Valley	185,318	81,946	44%
	Pumpernickel	151,370	7,478	5%
	South Buffalo	152,078	64,305	42%
Total		***683,520***	***198,233***	***29%***
Augusta Mountains	Buffalo Valley	173,728	80,637	46%
	Carico Lake	57,551	57,551	100%
	Copper Canyon	87	87	100%
	Cottonwood	44,792	44,791	100%
	Hole In The Wall	77,977	77,950	100%
	Home Station Gap	10,986	10,986	100%
	Jersey Valley	68,249	40,254	59%
Total		***433,370***	***312,256***	***72%***
North Stillwater	Boyer Ranch Cottonwood Valley	32,526	30,992	95%
	Copper Kettle	23,509	23,441	100%
	Jersey Valley	68,249	10,370	15%
	Mississippi Canyon	2,919	2,919	100%
	Pleasant Valley	185,318	17,211	9%
	Rawhide	157,956	4,523	3%
	South Buffalo	152,078	17,253	11%
	South Rochester	218,893	72,199	33%
Total		***841,448***	***178,908***	***21%***

Table 10. Allotments/Non-HMA & HA Areas within Complex

Allotment	Allotment Acres	Complex Acres	% Allotment overlapped by the Complex
Boyer Ranch Cottonwood Valley	32,526	928	3%
Buffalo Valley	174,222	68,755	39%
Clear Creek	60,729	2,769	5%
Dolly Hayden	104,440	13,589	13%
Jersey Valley	68,249	17,625	26%
Klondike	112,405	4,468	4%
Pleasant Valley	185,318	1,314	1%
Pumpernickel	151,370	109,391	72%
Rawhide	157,956	53,749	34%
Sonoma	40,229	19,857	49%
South Buffalo	152,078	70,496	46%
South Rochester	218,893	15,574	7%
Star Peak	171,519	24,046	14%
Total	***1,653,443***	***402,617***	***24%***

There are a total of 52 livestock operators (permittees) currently authorized to graze livestock in these allotments annually. The total permitted use for these permittees is a combined total of 98,038 Animal Unit Months (AUMs) yearly in the 28 allotments (including on non-HMA lands). An AUM is the amount of forage needed to sustain one cow/calf pair with a calf less than 6 months or its equivalent for one month (43 CFR 4100). These allotments consist of various pastures that are grazed seasonally following established grazing systems; however, the season of use may vary (by one to two weeks) annually based upon forage availability, fire, drought conditions and other management criteria.

The WD RMP management actions that are relevant identified the level of livestock grazing authorized for the allotments within the Complex. Several management decisions have guided the multiple use management of allotments in the Complex. The allotment specific FMUDs established the AML for wild horses in the allotments in the Complex. There have not been any AUM reductions in livestock grazing use due to wild horses in this Complex.

Table 11. Livestock AUMs illustrates the total permitted livestock AUMs compared to the actual use. Actual use is based on paid bills or submitted actual use forms for each grazing fee year (March 1st to February 28th).

Table 11. Livestock use by allotment

Allotment	Total Permitted AUMs	Actual Use 2014	Actual Use 2015	Actual Use 2016
Boyer Ranch Cottonwood Valley 03006	1790	No Data	919	No Data

Allotment	Total Permitted AUMs	Actual Use 2014	Actual Use 2015	Actual Use 2016
Buffalo Valley 10021	7183	4677	6572	3307
Carico Lake 10003	24954	No data	No data	No Data
Clear Creek 00109	3009	2017	2042	No data
Coal Canyon-Poker 00104	3144	2128	2251	2686
Copper Kettle 03013	2333	No Data	1653	No Data
Cottonwood 20015	5683	No Data	No Data	No Data
Diamond S 00144	2145	563	525	1157
Dolly Hayden 00121	1067	853	No Data	1014
Goldbanks 00105	2486	1784	1782	962
Harmony 10111	423	245	245	190
Hole in the Wall 03030	1488	1290	1178	986
Home Station Gap 10064	602	258	No Data	401
Humboldt House 00112	728	231	700	721
Jersey Valley 00148	2256	409	809	1213
Klondike 00124	4610	1788	2157	0
Pleasant Valley 00114	13250	5363	7365	2396
Prince Royal 00115	153	60	119	159
Pumpernickel 00116	10914	2432	2763	2395
Rawhide 00119	4351	1364	1742	1760
Rock Creek 00101	2392	1691	1567	1896
Ryepatch 00106	2811	1553	1947	1981
Sonoma 10102	1970	1184	1195	1534
South Buffalo 00142	14691	5168	2003	5254
South Rochester 00117	3186	362	285	122
Star Peak 00118	5078	3047	2723	3265
Thomas Creek 10107	591	807	804	470
White Horse 00143	3053	1042	1276	1948
Total	126341	40316	44622	35817

Grazing Allotments

Boyer Ranch Cottonwood Valley
The most recent grazing system for the Boyer Ranch Cottonwood Valley allotment was implemented through the FMUD in 1994. The Boyer Ranch Cottonwood Valley allotment has one cattle operator. Permitted use dates are from 5/1-9/30 and 10/01-2/28. This allotment overlaps the Stillwater HMA in the North West region.

Buffalo Valley
The current grazing system for the Buffalo Valley allotment was implemented through an Environmental Assessment (NV060-EA07-080) and subsequent FMUD in 2007. Two livestock operators are permitted on the allotment, one cattle and one sheep. Cattle are permitted from 03/01 to 02/28 and sheep are permitted from 03/31 to 04/30 and 11/01 to 02/28. The Jersey Valley HI pasture, South Buffalo pasture, and the Fish Creek Use Area pasture are entirely within the Augusta Mountains HMA. The Buffalo Valley Use pasture is bisected east to west by the complex boundary and non-HMA/HA with the exception of the southwestern corner and westernmost portion. The southwest corner is within the Augusta Mountains HMA and the westernmost portion is within the Tobin HMA.

Carico Lake
The current grazing system for the Carico Lake allotment was implemented through an Environmental Assessment (NV-062-EA05-61) and subsequent FMUD in 2005. This allotment overlaps the eastern side of the Augusta HA.

Clear Creek
The current grazing system for the Clear Creek allotment was implemented through a 2006 grazing decision. One livestock operator runs cattle on the allotment. Permitted use is year round. Clear Creek is overlapped by the Sonoma HA on the eastern half. There is no HMA overlap.

Coal Canyon – Poker
The current grazing system for the Coal Canyon – Poker allotment was implemented through an Allotment Management Plan (AMP) in 1971, season of use for the allotment is year round with a two pasture rest rotation system and a winter, summer, spring use area for the cattle permittees and a use area system for the sheep which is mainly winter use. Three livestock operators run livestock on the allotment (two cattle, one sheep producer). The allotment has a total of three pasture use areas, Poker pasture (west of I-80), Coal Canyon pasture (east of I-80) and river bottom pasture. Only the Coal Canyon pasture is a part of the Complex and includes portions of the Humboldt HA, no HMA is present within the Coal Canyon-Poker allotment. Sheep use is only authorized in the Coal Canyon pasture.

Copper Kettle
The current grazing system for the Copper Kettle allotment was implemented through the FMUD in 1994. One livestock operator runs cattle on the allotment. Permitted use dates are 3/01-2/28. Copper Kettle overlaps the North Stillwater HMA on the eastern portion of the allotment.

Cottonwood
The current grazing system for the Cottonwood allotment was implemented through a 1994 FMUD. Two livestock operators run livestock on the allotment, one cattle, and the other sheep. One preference allows grazing from 09/01 to 02/28 and Permitted use dates are from 11/01 to 03/31. The north western portion of the Cottonwood allotment overlaps the Augusta HA and HMA.

Diamond S
The Diamond S allotment has one permitted livestock operator. Cattle use is permitted from 04/01 to 09/15. The allotment consists of two pastures, one native and one seeding. The seeding pasture is bisected by interstate-80 and only the southern half is within the East Pershing Complex. The native pasture is checkerboard ownership within the Sonoma Range HA.

Dolly Hayden
The current grazing system for the Dolly Hayden allotment was implemented through the FMUD in 2000. One cattle producer operates on the allotment. Permitted use is from 12/01 to 01/31. The northern portion of the allotment is mainly private ground and becomes checkerboard the further south you go. Some private fence lines restrict cattle access to all public acres, but no official BLM pastures have been developed. Much of the allotment is in the East Range HA except for the eastern portion which is non-HMA/HA.

Goldbanks
The current grazing system for cattle was implemented through a 2011 notice of final decision. Two operators hold grazing preferences, one runs cattle, and the other sheep. Cattle permitted use dates are grazing cattle from 03/16 to10/31, and from 12/01 to 01/01. The sheep preference allows grazing from 01/01 to3/31. The sheep operator has taken non-use due to drought since 2013. The Goldbanks allotment overlaps the Tobin HMA/HA on the eastern half of the allotment. The western half overlaps the East Range HA.

Harmony
There are two cattle operators on this allotment. This allotment is overlapped by the Sonoma HA. There is no HMA overlap.

Hole in the Wall
The current grazing system for the Hole in the Wall allotment was implemented through a 2010 grazing decision. The grazing preference is assigned to one operator. The livestock operator runs cattle on the allotment. Permitted use dates are 11/01-04/30. The Hole in the Wall allotment is completely overlapped by the Augusta HMA and HA.

Home Station Gap
The current grazing system for the Home Station Gap allotment was implemented through a 2010 grazing decision. The grazing preference for these allotments is assigned to one cattle operator. Permitted use dates are from 05/01-06/30. Home Station Gap is completely overlapped by the Augusta HMA and HA.

Humboldt House
The Humboldt House allotment has three livestock operators, two cattle and one sheep. Cattle use is permitted beginning 10/15 thru 4/30. Sheep are permitted from 07/16 to 08/05. The Humboldt House allotment is bisected by Interstate-80. The southern half of the allotment is within the Humboldt HA of the East Pershing Complex. The northern half of the allotment is outside the Complex boundary. The southern half of the allotment functions as two pastures due to the Florida Canyon Mine.

Jersey Valley
The current grazing system for Jersey Valley allotment was implemented through a 2010 grazing decision. The grazing preference is assigned to one operator. The livestock operator runs cattle on the allotment from 07/01-10/31. The eastern half of the Jersey Valley Allotment overlaps the Augusta HMA and HA.

Klondike
The most recent grazing system for the Klondike allotment was implemented through the FMUD in 1998. The Klondike allotment has one cattle operator. Permitted use is from 03/15 to 11/30. The allotment is divided into two pastures, Klondike and Klondike Addition. The Klondike Addition pasture is located in Spaulding Canyon (northeast portion of the allotment) and was formerly part of the Dolly Hayden allotment until the Dolly Hayden 2000 FMUD changed the allotment boundary. A small portion of the eastern side of the allotment is non-HMA and non-HA. The rest of the allotment is in the East Range HA.

Pleasant Valley
The Pleasant Valley allotment has two livestock operators, both cattle. Permitted use is from 03/01 to 11/30. There are four pastures within the allotment that are used at different times during the grazing season. The southern portion of the allotment encompasses the northernmost part of the North Stillwater HMA. The Tobin HMA encompasses the entire eastern portion of the Pleasant Valley allotment. The East Range HA covers much of the western portion of the allotment.

Prince Royal
The Prince Royal allotment has two livestock operators, one cattle and one sheep. Cattle use is permitted during the winter and early spring from 11/01 to 4/30 and sheep is permitted from 06/05 to 06/14.

Pumpernickel
The current grazing system for the Pumpernickel allotment was implemented through a 1996 FMUD. Five livestock operators run on the allotment, 2 sheep and 3 cattle. Season of use is year round. Pumpernickel overlaps the Sonoma HA on the south west portion of the allotment. The allotment overlaps the Tobin HMA on the south east portion of the allotment.

Rawhide
The Rawhide allotment has four livestock permittees, three cattle and one sheep. Cattle are permitted from 01/01 to 12/31. Sheep are permitted from 04/01 to 04/24 through an exchange-of-use (EOU) agreement. There are no pastures in the Rawhide allotment, but the west side of the allotment is checkerboard ownership. The west side is the Humboldt HA, the east side is East

Range HA, the extreme southeastern corner is the North Stillwater HMA and the central portion of the allotment is non-HMA/HA.

Rock Creek
The current grazing system for the Rock Creek allotment was implemented through a 1997 FMUD. One livestock operator runs cattle on the allotment. Permitted use dates are from 04/01 to10/31. Rock Creek allotment does not overlap with an HA or HMA.

Rye Patch
The current grazing system for the Rye Patch allotment was implemented through an Allotment Management Plan, season of use for the allotment is primarily winter through spring. Three livestock operators (two cattle and one sheep producer) run livestock on the allotment. The allotment has a total of two grazing pastures; just the east Rye Patch pasture is within the Humboldt HA as well as the only pasture part of the allotment in the Complex. Cattle grazing occurs in the winter and early spring from 11/01 to 04/30 and the sheep grazing occurs in the late summer from 08/06 to 08/31.

Sonoma
The Sonoma allotment has one cattle operator. Cattle use is permitted from 04/22 to 08/20. The east side of the allotment is predominantly public ground and is within the Sonoma Range HA. The west side is nearly all private and is non-HMA/HA.

South Buffalo
The current grazing system for the South Buffalo allotment was implemented through an Environmental Assessment (NV060-EA07-080) and subsequent FMUD in 2007. One livestock operator is permitted on the allotment. Cattle are permitted from 03/01 to 02/28. The allotment consists of three pastures. The northernmost pasture is the Tobin Use Area within the Tobin Range HMA. A small area at the north part of the pasture is non-HMA/HA. The middle pasture is in the South Buffalo pasture and consists of mainly non-HMA/HA with the exception of the westernmost portion that is within the Tobin Range HMA. The southern pasture is called the McCoy Use Area where much of the pasture is non-HMA/HA. The southwestern portion of the pasture is within the North Stillwater HMA.

South Rochester
The current grazing system for the South Rochester allotment was implemented through a FMUD in 1998. The South Rochester allotment has three livestock permittees, two cattle and one sheep. Cattle are permitted from 01/01 to 12/31. Sheep are permitted from 03/01 to 02/28. There are no pastures in the South Rochester allotment, but the west side of the allotment is checkerboard ownership and falls in the Humboldt HA. The east side of the allotment is the North Stillwater HMA and the north central portion of the allotment is non-HMA/HA.

Star Peak
The Star Peak allotment has four livestock operators, three cattle and one sheep. Cattle use is permitted from 04/01 to 10/31. Sheep are permitted on the allotment from 04/25 to 06/04 and 06/15 to 09/30. There are no pastures in the Star Peak allotment, but livestock tend to congregate in Spring Valley which is the southernmost part of the allotment. Spring Valley and the entire west

side of the allotment lies within the Humboldt HA. The northeastern portion of the allotment is in the East Range HA. The south eastern portion of the allotment does not overlap and HMA or HA.

Thomas Creek
The Thomas Creek allotment has two operators, both run cattle. Thomas Creek is overlapped by the Sonoma HA. There is no overlap by an HMA.

White Horse
The White Horse allotment has one cattle operator. Cattle use is permitted yearlong, from 03/01 to 02/28. This allotment is in the East Range HA.

All of the 28 grazing allotments within the Complex have livestock water developments (e.g., wells, troughs and dirt reservoirs), most authorized by the BLM are maintained under a cooperative agreement with the livestock permittees who are held responsible for the maintenance and upkeep. There are also a handful that are developed on private property in and near both HMAs and HAs as well as areas outside of these boundaries. These water developments are important sources of water for livestock, wild horses and wildlife. In the past, these developed water sources have also been insufficient to maintain wild horses in excess of AML. The ones that are privately developed outside of wild horse designated areas are becoming increasingly used by wild horses as we see an excess of AML. Livestock are currently experiencing direct competition by wild horses for available forage and water, both within HMAs and HAs.

3.13 Recreation
Recreation resources that exist in the area are primarily hunting; however other dispersed outdoor recreation opportunities include wildlife watching/photography, wild horse watching/photography, rock hounding, and off-highway vehicle use (outside of WSAs) as discussed in the Final EIS for the WD RMP (Vol 2).. Use levels peak in the fall during hunting seasons with season opening weekends having the highest visitation of the year and range from extremely low in winter, low to moderate in the summer.

The Complex falls within four NDOW Hunt Units and from August through early November there are two big game hunting seasons that would be in progress (NDOW): Mule Deer, Pronghorn Antelope, and Desert Bighorn Sheep.

The upland game season for Chukar, Hungarian partridge, Greater Sage-Grouse, and quail is scheduled to begin October 8th and runs through February 5th. The upland game season for blue and ruffed grouse is scheduled to begin September 1st and runs through December 31st (NDOW 2017, Upland).

3.14 Soils
The majority of soils contained in the Complex are cold desert soils developed under low precipitation with minimal topsoil development – Aridisols and Entisols are dominant soil orders with Mollisols found on table tops and elevated valleys where higher precipitation values promote higher percentages of soil organics and greater soil formation. Some of these soils are fine textured with severe wind and water erosion potentials when disturbed. These soils typically have a mesic or frigid temperature regime and aridic soil moisture regime. Isolated patches of hydric soils may be present near water resources. Loss of topsoil from these cold desert soils leads to severe

reductions in soil productivity, and thus ability to regain natural plant communities once lost. Detailed information for these soils can be found in applicable U.S. Department of Agriculture soil survey publications and are available at:
http://websoilsurvey.nrcs.usda.gov/app/homepage/htm.

A specific analysis of soil quality for this project has not been completed due to the large geographic area encompassed, however it can be assumed that a wide variety of soil conditions exist. These soils are impacted by a variety of natural and anthropogenic influences.

Erosion hazard potential for water and wind are grouped into broad classes based on landforms. Erosion hazard potential is slight for water and moderate for wind in lake plains and lake terraces soils; moderate for water erosion and slight for wind in fan piedmonts soils; and moderate or high for water and slight for wind in mountain soils.

Potential for biological soil crusts occurrence is highest on the upper lake plain terraces. Potential biological soil crusts occurrence is lowest on the lower lake plains terrace and mountain slopes. Fan piedmonts have moderate occurrence of biological soil crusts.

Current monitoring indicates heavy and increasing trailing by wild horses between limited water sources and foraging areas. Areas occupied by wild horses have a significantly higher soil penetration resistance than areas without wild horses (Beever and Herrick 2006). This can affect a variety of other ecosystem processes, such as decreasing water infiltration rates, inhibiting digging by burrowing mammals, limiting plant establishment, and restricting root growth (Beever et al. 2003).

The relative quantity of vegetative cover removed by grazing also affects soil properties. In general, vegetative cover provides shading for soils, which increases their ability to retain moisture, reduces soil erosion by intercepting precipitation and reducing surface wind velocities, and provides organic input into the soil (Beever and Herrick 2006).

3.15 Special Status Species

Threatened, Endangered Species (addressed previously), and Sensitive Species (addressed in this section) are considered Special Status Species (SSS). The Nevada Natural Heritage Program (NNHP) database (August 2012) and the NDOW Diversity database (August 2012) were consulted for the possible presence of endangered, threatened, candidate and/or sensitive plants or animal species. NDOW data show observations of greater sage-grouse, golden eagle, bald eagle, ferruginous hawk, burrowing owl, and pygmy rabbit within the Complex. The NNHP data shows observations of Windloving Buckwheat (*Eriogonum anemophilum*), and Obscure scorpionflower (*Phacelia inconspicua*), as well as other species that are not currently recognized as priorities.

The following is a representative list of designated BLM special status species, based upon confirmed observations or suitable habitat for these species existing in the Complex.

Greater sage-grouse

On September 22, 2015 the Greater sage-grouse was determined to be not warranted for ESA listing. Sage-grouse are still considered a sensitive species and fall under SSS. This species is considered an “umbrella species” where positive or negative impacts to their habitat generally affect the habitat for other sagebrush-obligate species or other species that utilize similar upland and riparian/meadow habitat on a seasonal or yearlong basis (Rowland et al. 2006).

The East Pershing Complex contains the Humboldt and East Range sage-grouse Population Management Units (PMUs) in their entirety; the majority of Sonoma PMU and portions of Battle Mountain, Clan Alpine, and Fish Creek PMUs. These PMUs were identified by the Governor's *Nevada Sage-grouse Conservation Strategy* (October 2001). Shrub cover and associated herbaceous plants in the understory are vital forage and cover components for sage-grouse. Evaluation of habitat values and the possibilities to improve them are considered through these conservation efforts.

The Complex contains key sage grouse habitat including approximately 570,000 acres of summer habitat, 117,000 acres of nesting habitat and 980,000 acres of winter habitat. Approximately 177,000 acres of particularly important habitat for sage-grouse, known as priority habitat management area (PHMA), has been identified. Approximately 248,000 acres of generally important habitat for sage-grouse, known as general habitat management area (GHMA), has been identified. Habitat identified as other habitat management area (OHMA) totals approximately 577,000 acres within the Complex. See Figure 3 for a map of sage-grouse habitat areas in and around the Complex.

There are thirty-nine (39) known leks within the Complex; eleven (11) of which are known to be active. Leks are communal breeding ground for sage-grouse and are commonly considered to be the center of nesting activity. Nesting and brood rearing usually occur up to two miles of the lek site.

Sage-grouse require large expanses of sagebrush with good under stories of forbs and grasses. Sagebrush provides nesting and hiding cover and forage for much of the year. Forbs provide spring nutrition and grasses provide visual screening for nests.

Additionally, wet meadows are needed to provide green forbs when other sites dry out and provide water and insects for the chicks during the hot summer months. Forbs are an essential part of the diet of young sage-grouse. Hen sage-grouse move their broods considerable distances seeking riparian/meadow areas that provide succulent forbs.

Recent wildfires have negatively impacted sage-grouse habitat in this complex. However, these burn areas have been, and are being, seeded with native shrub, grass and forb species as part of wildlife habitat rehabilitation efforts to maintain suitable habitat.

<u>Chiroptera (Bat Species)</u>

Species of SSS bats may occur in this area– see *Appendix F. Wildlife Species List – North-central Nevada* for a complete list. Most bats in Nevada are year-round residents. In general terms, bats eat insects and arthropods during the warmer seasons and hibernate in underground structures during the cooler seasons. The cliffs, talus, shallow caves, rock crevices (including those surrounding some of the vegetated playas), trees, ephemeral, intermittent and perennial drainages, and mine shafts and adits provide potential bat roost sites within the East Pershing Complex. Bats eat flies, moths, beetles, ants, scorpions, centipedes, grasshoppers, and crickets. Bats thrive where plant communities are healthy enough to support a large population of prey (Bradley et al. 2006).

Healthy riparian communities with high water tables and tall vegetation leading to high flying insect populations creates favorable foraging habitat for bats.

Western Burrowing Owl
Western burrowing owls are known to occur within the East Pershing Complex. Burrowing owls prefer open, arid, treeless landscapes with low vegetation. They are dependent upon burrowing mammal populations for maintenance of nest habitat and choose nesting areas based on burrow availability (Floyd et al. 2007). These birds are highly adaptable and readily nest in open disturbed areas such as golf courses, runways, and industrial areas that border suitable habitat (Neel 1999). Dense stands of grasses and forbs within owl home ranges support populations of rodent and insect prey. Urbanization is the biggest threat to this species as suitable habitat is converted to non-habitat for human use (Floyd et al. 2007).

Pygmy Rabbit
In the Great Basin, the pygmy rabbit (*Brachylagus idahoensis*) is typically restricted to sagebrush-grass communities located on deep loamy soils. However, they may also occur in dense patches of rabbitbrush (*Chrysothamnus* sp.) and greasewood (*Sarcobatus* sp.). Preferred locations for burrows include broad valley floors, drainage bottoms, alluvial fans, and other areas with friable soils. A dietary study of pygmy rabbits showed dependence on sagebrush year round. Sagebrush made up about 51% of the diet in summer and 99% in the winter. Grasses and forbs were also consumed in the summer (Green and Flinders 1980).

Raptors
Golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), ferruginous hawks (*Buteo regalis*), prairie falcon (*Falco mexicanus*), and Swainson’s hawk (*Buteo swainsoni*) have either been observed or have the potential to be found in the Complex.

Golden eagles are primarily cliff nesters and would utilize the area to nest and forage for prey species such as jackrabbits and other small mammals. Golden eagles are protected under the Bald and Golden Eagle Protection Act. Nevada’s Golden eagle population is thought to be stable to increasing. They are widespread and frequently encountered (Floyd et al. 2007).

Brewer’s Sparrow
Brewer’s sparrow (*Spizella breweri*) may be found in this area since it typically inhabits sagebrush communities. These sparrows tend to favor areas dominated by shrubs rather than grass. They thrive where extensive areas of sagebrush habitat are maintained with shrubs occurring in tall, clumped, and vigorous stands. They place their nests low in sagebrush (preferred), other shrubs, or cactus, from a few centimeters to about one meter from ground. They would also place nests higher in taller sagebrush (Rich 1980). The Brewer’s sparrow mainly forages for insects on the ground.

Loggerhead Shrike
Loggerhead shrikes (*Lanius ludovicianus*) may be found in sagebrush/bunchgrass and salt desert scrub vegetative communities, so it is possible that they occur on these allotments. Loggerhead shrikes tend to favor arid, open country with just a few perches or lookouts. They nest in isolated trees and large shrubs and feed mainly on small vertebrates and insects. The species is relatively common and well distributed across the state (Neel 1999). These birds benefit from habitat with

diverse structure and species composition. Healthy sagebrush communities provide these habitat characteristics. According to Paige and Ritter (1999), "Long-term heavy grazing may ultimately reduce prey habitat and degrade the vegetation structure for nesting and roosting. Light to moderate grazing may provide open foraging habitat."

Sage Thrasher

Sage thrashers (*Oreoscoptes montanus*) may be found in the project area as well. They thrive where sagebrush habitat is maintained, with shrubs occurring in tall, clumped, and vigorous stands. They tend to prefer tall shrubs for nesting or song perches. Since they primarily forage on the ground, foraging success may be reduced by continuous cover of crested wheatgrass (*Agropyron cristatum*), cheatgrass (*Bromus tectorum*), or other non-native grasses (Paige and Ritter 1998).

Windloving buckwheat

Windloving Buckwheat (*Eriogonum anemophilum*) at higher elevations this buckwheat is found on dry, exposed, relatively barren and undisturbed, gravelly, limestone or volcanic ridges and ridgeline knolls, on outcrops or shallow rocky soils over bedrock. At lower elevations windloving buckwheat is found on dry, relatively barren and undisturbed knolls and slopes of light-colored, platy volcanic tuff weathered to form stiff clay soils, on all aspects. Windloving Buckwheat is typically found between 4500 ft and 9800 ft of elevation.

Obscure scorpionflower

Obscure scorpionflower (*Phacelia inconspicua*) is found on fairly steep, concave, north to northeast facing slopes with relatively deep, undisturbed, organic-rich soils where snow drifts persist well into spring. These flowers are usually found on small, otherwise barren soil terraces in small clearings in shrub fields dominated by mountain big sagebrush (*Artemisia tridentata vaseyana*). Obscure scorpionflower is typically found between 4900 ft and 8400 ft of elevation.

Bighorn Sheep

Approximately 168,000 acres of occupied bighorn sheep (*Ovis canadensis*) habitat is within the Complex on the East Pershing Complex. Bighorn sheep occur in mesic to xeric, alpine to desert grasslands or shrub-steppe in mountains, foothills, or river canyons. Access to naturally occurring mineral licks may be important for Rocky Mountain and desert bighorns, especially in spring. Topography is the primary source of cover for bighorns. Suitable escape terrain (cliffs, talus slopes, etc.) is an important feature of the habitat. Bighorns primarily graze on grass and forbs, but diet can also include significant amounts of shrubs (NatureServe 2012). Three characteristics are common to quality forage: abundance, continuous distribution, and low stature. Grasses have high importance in bighorn sheep diets, but forbs and shrubs are also important. Desirable bighorn habitat consists of sagebrush/bunchgrass communities, wet meadows, and riparian areas adjacent to rock outcrops and rimrock.

3.16 Vegetation

Vegetation varies from salt desert shrub communities at lower elevations to big sagebrush/bunch grass communities at higher elevations. Typical species at lower elevations include shadscale saltbush (*Atriplex confertifolia*), bud sage (*Picrothamnus desertorum*), winter fat (*Krascheninnikovia lanata)*, black greasewood (*Sarcobatus vermiculatus*), squirreltail (*Elymus elymoides*), and Sandberg's bluegrass *(Poa secunda)*. Species typical in mid to higher elevations include Basin big sagebrush (*Artemsia tridentate tridentata),* Wyoming big sagebrush (*Artemsia* *tridentata wyomingensis*), mountain big sagebrush *(Artemisia tridentata vaseyana),* low sagebrush (*Artemisia arbuscula*) bitterbrush *(Purshia tridentata)*, rabbitbrush *(Chrysothamnus spp.),* Utah juniper (*Juniperus osteosperma*), bluebunch wheatgrass (*Pseudoroegneria spicata*), basin wildrye (*Leymus cinereus*) and long leaf phlox *(Phlox longifolia)*.

Cheatgrass (*Bromus tectorum*) occurrence is common within the Complex. Cheatgrass dominance increases on fan piedmonts, generally ranging from 11 to 30 percent cover. Cheatgrass cover decreases on the lake plains (greasewood sites), generally ranging from 0 to10 percent. Higher elevations cheatgrass cover is generally 0 to 5 percent.

Increasing wild horse utilization and trailing due to accelerating numbers is occurring in the East Pershing Complex and may reduce vegetative cover and vigor, particularly, in those areas immediately adjacent to water sources. Reduction of vegetative cover and increased trampling, resulting from higher wild horse numbers, may lead to increased soil compaction and surface disturbance leading to potential accelerated run off and subsequent soil erosion.

Wild horses are uneven grazers, meaning that they do not always graze an area in its entirety before moving on to another. Areas where they do graze have been noted to have a lower abundance of cover grasses, lower shrub cover, lower total vegetative cover, lower species richness, and less continuous shrub canopy (Beever and Herrick 2006).

3.17 Wild Horses

AML for the HMAs within the Complex was established as a population range of 345-555 wild horses through Allotment Evaluations and FMUDs following in-depth analysis of monitoring data collected.

Since 1977, BLM has conducted 25 gathers in the East Pershing Complex and approximately 7,125 wild horses have been removed during these management operations. Refer below to *Table 13. East Pershing Complex Gather History* for the Complex gather history. Events such as euthanasia as an act of mercy when a wild horse was injured due to vehicle collision or exhibited an injury with a fatal prognosis are not included in the table below. Another instance which was not included in the table is the occasional removal of a wild horse from private land at the owner's request. Since 1977, there have been approximately 25 wild horses removed or euthanized due to the above mentioned causes.

The most recent gather within the Complex occurred in 2011 when 103 excess wild horses were removed from the range in and around the Augusta Mountains HMA. During this gather, 139 wild horses were released, and 1 was euthanized.

Table 12. East Pershing Complex Gather History

Year	HMA(s) Gathered	Gathered	Removed	Released	Died or Euthanized
1977	East Range HA	296	296	*	*
1980	Humboldt HA	239	239	*	*
1980	East Range HA	374	374	*	*
1981	East Range HA	557	557	*	*
1981	Humboldt HA	247	247	*	*

Year	HMA(s) Gathered	Gathered	Removed	Released	Died or Euthanized
1982	Humboldt HA	554	554	*	*
1985	East Range HA	77	77	*	*
1985	Humboldt HA	665	665	*	*
1986	Sonoma Range HA	442	442	*	*
1986	East Range HA	587	587	*	*
1991	Augusta Mountains HMA	497	497	0	0
1993	Humboldt HA	173	131	37	5
1994	Augusta Mountains HMA	140	62	**	*
1997	Augusta Mountains HMA	36	2	***	0
1999	Augusta Mountains HMA	604	355	**	0
2002	East Range HA	49	48	0	1
2003	North Stillwater HMA	192	190	1	1
2003	Augusta Mountains HMA	380	312	67	1
2007	Augusta Mountains HMA	267	214	39	14
2008	North Stillwater HMA	336	330	1	5
2009	Tobin Range HMA	375	370	0	5
2009	Augusta Mountains HMA	183	44	139	0
2009	Augusta Mountains HA	60	59	0	1
2010	Tobin Range HMA	375	370	0	5
2011	Augusta Mountains HMA	243	103	139	1
	Total	7,948	7,125	423	39

***** Represents gathers where numbers were not separated out in gather summary reports.

****** Represents only horses 5 years and older were removed.

******* Represents horses gathered for an emergency to collect blood samples for a criminal investigation regarding an alleged WFRHBA violation.

BLM has determined that based on AML and aerial censuses, approximately 1,853 wild horses (including 2017 foal crop) are currently present within the Complex. As the overpopulation of wild horses increase, BLM staff have observed wild horses migrating onto private and public lands that fall outside of designated HMA boundaries (See Table 1).

Forage and spring or stream flow productivity are two of the elements evaluated when conducting drought monitoring. Based on the US Drought Monitor, the Complex experienced “exceptional” drought conditions from 2012 through 2015; however is not currently experiencing drought conditions. Field monitoring data shows forage in the lower elevations is still expressing drought stress. In higher elevations, forage in many portions of the Complex exhibited minimal to negligible drought stress. This data is based on monitoring results for 2014 through 2017. The 2018 Water Year data shows the Complex is at 50% normal precipitation at this time.

Water and Forage
Water is an extremely limited resource in the three HMAs within the Complex and consequently water becomes a limiting factor when wild horse populations exceed high AML. Water availability is inconsistent across the Complex. There are springs, seeps, and perennial streams in the Complex; some of these water sources are experiencing decreased flows and it may take a couple years for recharge to occur provided drought conditions do not return. If springs do not recover and flow continues to decrease, wild horses may have to travel twenty miles or more one-way to water from adequate forage. During dry summer months when less water is available from seasonal sources, wild horses remain slightly closer to perennial water sources than in the winter and spring (Ganskopp and Vavra 1986, Hansen et al. 1977). Some studies show wild horses prefer to drink during the first part of daylight or the last and were not observed to linger at the water source (Ganskopp and Vavra 1986).

There are range improvements (wells and troughs) developed within the Complex; however BLM does not have water rights on most of them. The natural and developed water sources available on public land within the Complex are insufficient for the excess numbers of wild horses above the AML, and this situation has been further exacerbated by previous drought conditions. The Photos 4 and 5 illustrate conditions of two springs in the Complex; one is outside an HMA boundary.

Photo 4.

Photo 5.

Photos 6 and 7. Muddy conditions at Mustang Spring on 3/17/2017 (left) and a spring south of Home Station Wash on 8/17/2015 (right). Both of these springs are in the Augusta HMA.

Due to the number of wild horses over AML utilizing limited available water sources the available forage is being negatively impacted. This is reflected in degraded range conditions inside and outside HMAs and HAs within the East Pershing Complex.

Currently, in the portions of the Complex which are drier, vegetation is being heavily impacted by wild horse and livestock use up to 2 miles from water sources. This radius is growing as additional wild horse use increases in proximity to springs and wells. Additionally, heavy trailing into water sources may create extreme dust conditions which can contribute to respiratory illness in wild horses.

The photos below show decreased flow from June to August during the hottest portion of the year when wild horses need more water to weather the extreme summers in the desert environment. These photos also exhibit the difference in available forage.

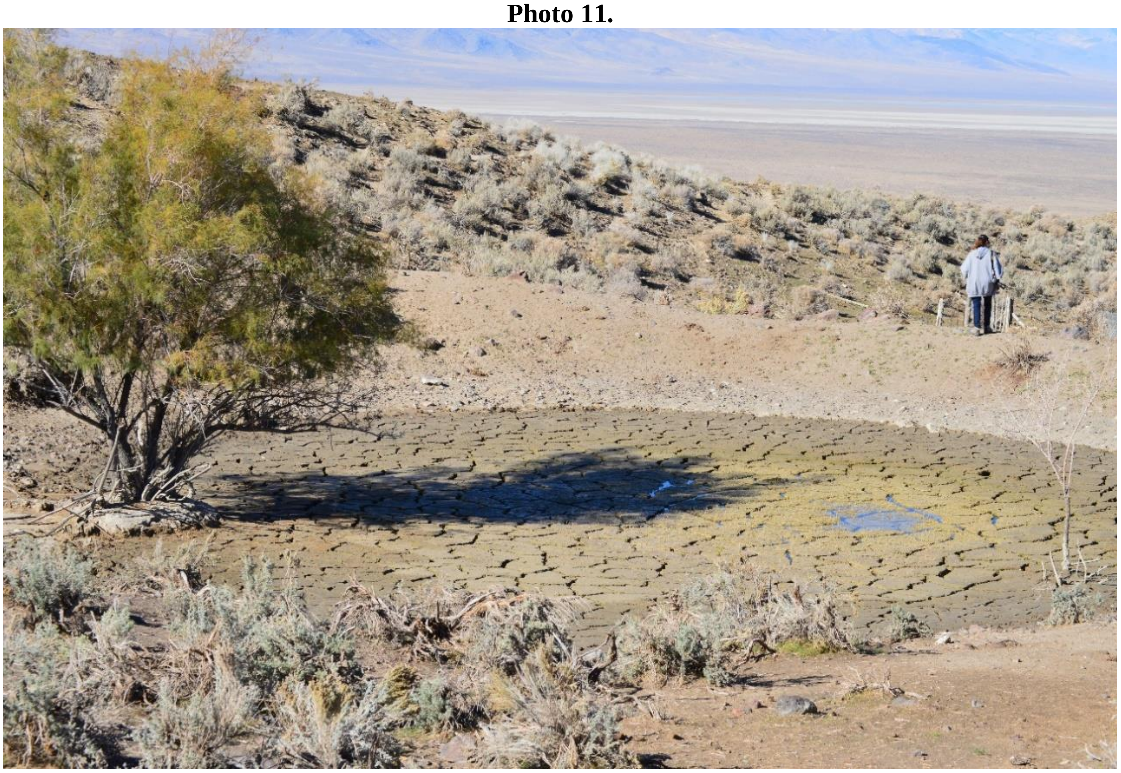
Photos 8 and 9. Spring south of Home Station Wash 6/11/2015 and 8/17/2015.

Aerial wild horse surveys in January 2015 and ground monitoring confirmed many bands watering near Logan Pond (See photo 10). Vegetation and/or body condition monitoring was conducted at Dago, Grayson, Twin, Kitten, Nancy, Harriman, Antelope, and Mustang springs.

Photos 10 and 11. Multiple bands watering at Logan Pond in May 2016 (top) and Logan Pond nearly dry in November 2016 (bottom). Logan Pond is located within the North Stillwater HMA.

Photo 10.

Photo 11.



Over the last three years, wildlife cameras were positioned at various locations to record frequency of wild horses' utilization at some of these water sources. During the summer of 2014, the BLM WH&B Specialist documented the frequency intervals from approximately 6,500 photographs taken via the wildlife cameras at Logan Pond, Cedar Canyon Creek, Sparkplug Spring, and a few unnamed springs near Copper Kettle Canyon. At one spring, the photos showed more than 25 wild horses present for up to 40 minutes awaiting their turn for a drink before moving on. The conditions of many of the springs available to the wild horses are muddy from being pawed out due to the low production of water.

The BLM is not currently supplementing any natural water sources within the East Pershing Complex for wild horses. In this Complex, water has occasionally been provided by permittees in order to meet the needs of their livestock. During the winter months, many of the water sources will freeze and no longer be viable sources for wild horses in the area. Unless adequate snow events occur, this may cause the wild horses to travel much longer distances to water.

Current Population and Aerial Surveys
The estimated population of wild horses within the Complex, as of January 2018, is approximately 1,853 wild horses based on January 2015 aerial census and includes the 2015, 2016, and 2017 foal crops.

A census flight was completed in January 2015 to determine the approximate numbers of wild horses within the East Range HA, Sonoma Range HA, Tobin Mountains HMA, Augusta HMA and HA. The Humboldt HA and North Stillwater HMA were flown the year prior. Data from census surveys is also used to determine the extent to which wild horses have moved outside of the HMA boundaries in search of forage, water and space. These flights followed the best management practices recommended in IM No. 2010-057 and utilized the Simultaneous Double Count Method as one of the scientific methods recommended by the NAS. As expected, the surveys showed wild horses have continued to migrate outside of HMA boundaries.

Population Growth Rates
The rate of population increase (accounting for foaling and mortality) for the East Pershing Complex is approximately 15-25% for wild horses per annum. This number was derived through analysis of the numbers of foals captured during previous gathers in relation to the number of adults, as well as number of foals observed during aerial population counts. Wild horse colors in the Complex consists of paint, dun, grey, bay, sorrel, chestnut, grulla, black, white, and appaloosa.

Current Herd Health

The census flights have also provided information pertaining to herd health. Aerial and ground surveys in 2014, 2015, 2016, and 2017 showed wild horses to be in the Henneke body condition score condition class (BCS) of 4 to 6. Ideally, wild horses should be at a condition class 4 to 6 when entering the winter season in order to have the ability to withstand the cold temperatures and reduced forage availability and nutrition.

Although the body condition scores of the wild horses have not shown significant decline, drought conditions in the previous four years has caused a reduction of available forage and wild horses are browsing on shrubs at a higher percent rather than consuming grasses due to their absence. Digesting shrubs consumes more energy than digesting grasses. In addition, the typically dry conditions of the desert are creating trails of powdered dust the wild horses utilize to travel from water to forage. The dust is easily inhaled and has in the past caused wild horses and livestock respiratory distress that has led to dust pneumonia.

Home Range/Habitat

Wild horses generally move widely both daily, usually between water sources, as well as seasonally, seeking higher elevations during summer months and at times when it is necessary to minimize threats to their safety by enhancing their view of the surrounding area (Ganskopp and Vavra 1986, Beever and Herrick 2006). Aerial censuses conducted in 2014 and 2015 showed the majority of the wild horses are distributed in the southeast portion of the Complex.

Population Dynamics and Demography

Wild horses usually produce one offspring per year, with an observed or projected annual herd rate of increase between 18 and 25% (Wolfe 1980, Eberhardt et al. 1982, Eberhardt 1985, Wolfe et al. 1989, Garrott and Taylor 1990, Garrott et al. 1991). A wild horse herd with a 20% rate of annual increase would more than double in four years.

Herd rate of increase is influenced by adult survival rate, foaling rate, and foal mortality. Adult wild horse survival is usually very high, estimated between and 80 and 97%, and may be the key determinant of wild horse population increases (Wolfe 1980, Eberhardt et al. 1982, Garrott and Taylor 1990). Most foals are born between April and June. Foal mortality is highest within the first year and has been recorded between 2 and 10% (McCort 1984). Causes of foal mortality include weaknesses at birth, severe winter/spring weather, rejection or inattentiveness of the mare, and separation from mares. Ransom et al. (2016) reviewed feral horse demography across a number of herds, and found that average adult and foal survival were 90% and 84%, respectively.

Foaling rates vary by year and differ between herds as well as being dependent on weather, available resources, and herd size. Peak foaling rates in mares occur between ages 8 and 20, after which reproduction is possible but much less likely. Some mares may be able to foal at age 2, but most females begin reproducing at age 3 (Eberhardt et al. 1982, Garrott and Taylor 1990).

Sex ratios of adult wild horse herds may be skewed toward females, although Ransom et al. (2016) found that, on average, the sex ratio is equal at birth. Experts cite three main reasons for cases where sex ratios are skewed at the level of the herd: differential survival of adult males and females, removal of a disproportionate number of males, and skewed foal sex ratios (Garrot and Taylor 1990). Higher mortality in male wild horses may be due to injuries acquired during fights for mates or under conditions of food shortage and being unable to obtain sufficient nutrients since male wild horses naturally need more nutrients than females (Siniff et al. 1986).

Social Interactions

Horses typically form bands composed of an adult male with 1 to 3 adult females and their immature offspring (Feist and McCullough 1976, Berger 1986, Roelle et al. 2010). In many populations subordinate ‘satellite’ stallions have been observed associating with the band, although the function of these males continues to be debated (see Feh 1999, and Linklater and Cameron 2000). It is widely agreed that wild horses have three major types of social groups: harem groups, multiple male and female groups, and bachelor male groups. A harem group consists of one adult male and several adult females and their offspring, ranging from two total individuals to more than 20 (McCort 1984). Harems are stable groups, and are the type of wild horse group most often described by authors. Harem females mate almost exclusively with the harem male, however genetic testing has shown that nearly one-third of foals are sired by stallions other than the harem stallion (Bowling and Touchberry 1990). Juvenile offspring of both sexes leave the band at sexual maturity (normally around two or three years of age (Berger 1986), but adult females may remain with the same band over a span of years. Group stability and cohesion is maintained through positive social interactions and agonistic behaviors among all members, and herding and reproductive behaviors from the stallion (Ransom and Cade 2009).

The most common male wild horse interactions include olfactory investigation and fecal marking. Fecal marking of the same location repeatedly by various males is common and can become very large. These stud piles are used throughout the year, commonly for 1-3 years, and are often located in highly visible areas such as the edges of trails or roads or beneath lone trees in a grassy area (Salter and Hudson 1982, McCort 1984). Group movements and consortship of a stallion with mares is advertised to other males through the group stallion marking stud piles as they are encountered, and over-marking mare eliminations as they occur (King and Gurnell 2006). Quantifying these key wild horse behaviors is an important tool in understanding how the presence of a large number of gelded males may influence social structure in the population and ultimately how animals congregate and distribute themselves on the range.

In horses, males play a variety of roles during their lives (Deniston 1979): after dispersal from their natal band they generally live as bachelors with other young males, before associating with mares and developing their own breeding group as a harem stallion or satellite stallion. In any population of horses not all males will achieve harem stallion status, so all males do not have an equal chance of breeding (Asa 1999). Stallion behavior is thought to be related to androgen levels, with breeding stallions having higher androgen concentrations than bachelors (Angle et al. 1979, Chaudhuri and Ginsberg 1990). A bachelor with low libido had lower levels of androgens, and two year old bachelors had higher testosterone levels than two year olds with undescended testicles who remained with their natal band (Angle et al. 1979).

Genetic Analysis and Herd History

Wild horses are primarily descendants of ranch horses and cavalry remounts. Most wild horse herds sampled have high genetic heterozygosity, genetic resources are lost slowly over periods of many generations, and wild horses are long-lived with long generation intervals (Singer and Zeigenfuss 2000). The dominant colors in the Complex are paint, gray, bay, black, brown, and sorrel. Based on past gather and field observations, there are no signs of inbreeding which suggests that the Complex wild horses are genetically diverse. The AML within the East Pershing Complex (345-555 horses) is at a level that supports genetic diversity. The population size at AML should promote adequate conditions for genetic health even after excess wild horses are removed.

Genetic samples were collected from wild horses during previous gathers to develop genetic baseline data (e.g. genetic diversity, historical origins of the herd, unique markers). The samples were analyzed by a geneticist at the Texas A&M Veterinary Medicine and Biomedical Sciences' to determine the degree of heterozygosity for the herd. In 2011, genetic sampling was conducted in the Augusta HMA and results showed genetic variability of this herd in general is good and somewhat high with respect to heterozygosity. Highest mean genetic similarity of the Augusta Mountains HMA herd was with North American Gaited Breeds, followed closely by the Light Racing and Riding. These results indicate the herd likely has origins from American saddle or ranch stock of mixed origins with no clear indication of primary breed type. This data would be incorporated into a Herd Management Area Plan(s) in the future. At this time, there is no evidence to indicate that the HMAs' wild horses would suffer from reduced genetic fitness at the established AMLs. Additional genetic sampling would occur when wild horses are gathered through any management alternative.

HMAs within the East Pershing Complex are not separated by fences. Between these HMAs there are non-HMA areas which are not designated for long-term management of wild horses. Movement does occur (and has been observed) between these HMAs, but no formal research has been completed to determine the extent of this movement. Management of the wild horses in the Complex at the established AML ranges and as an interacting population regardless of boundaries (i.e., as an HMA Complex) would ensure continued genetic diversity and health.

Diet/Dietary Overlap with Other Species

Numerous studies identify dietary overlap of preferred forage species and habitat preference between horses, cattle, and wildlife species in the Great Basin ecosystems for all seasons (Ganskopp 1983, Ganskopp and Vavra 1986, Ganskopp and Vavra 1987, McInnis 1984, McInnis and Vavra 1987, Smith et al. 1982, Vavra and Sneva 1978). A strong potential exists for exploitative competition between wild horses and cattle under conditions of limited forage, water, and space availability (McInnis et al. 1987).

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 determined that elk and bighorn sheep were the most likely to negatively interact with wild horses (1986). Hanley and Hanley compared the diets of wild horses, domestic cattle and sheep, pronghorn antelope, and mule deer and found that wild horse and cattle diets consisted mostly of grasses, pronghorn and mule deer diets consisted mostly of shrubs (>90%) and sheep diets were intermediate (1982). Due to different food preferences, diet overlap between wild horses, deer, and pronghorn rarely reaches above 20% (Hubbard and Hansen 1976, Hansen et al. 1977, Meeker 1979, Hanley and Hanley 1982).

The dietary overlap between wild horses and cattle is much higher, and averages between 60 and 80% (Hubbard and Hansen 1976, Hansen et al. 1977, Hanley 1982, Krysl et al. 1984, McInnis and Vavra 1987). Horses are cecal digesters while most other ungulates including cattle, pronghorn, and others are ruminants (Hanley and Hanley 1982, Beever 2003). Cecal digesters do not ruminate, or have to regurgitate and repeat the cycle of chewing until edible particles of plant fiber are small enough for their digestive system. Ruminants, especially cattle, must graze selectively, searching out digestible tissue (Olsen and Hansen 1977).

Although horses and cattle are often compared as grazers, wild horses have been cited as more destructive to the range than cattle due to their digestive system and grazing habits. Horses, however, are one of the least selective grazers in the West because they can consume high fiber foods and digest larger food fragments (Hanley and Hanley 1982, Beever 2003). Wild horses can exploit the high cellulose of graminoids, or grasses, which have been observed to make up over 88% of their diet (McInnis and Vavra 1987, Hanley 1982). However, this lower quality diet requires that wild horses consume 20-65% more forage than a cow of equal body mass (Hanley 1982, Menard et al. 2002). With more flexible lips and upper front incisors, both features that cattle do not have, wild horses trim vegetation more closely to the ground (Symanski 1996, Menard et al. 2002, Beever 2003). As a result, areas grazed by wild horses may retain fewer plant species than areas grazed by other ungulates. A potential benefit of a wild horse’s digestive system may come from seeds passing through system without being digested but the benefit is likely minimal when compared to the overall impact wild horse grazing has on vegetation in general. However, this potential for seed dispersal could also result in the widespread dispersal of viable non-native invasive annual grass seed such as cheatgrass seed.

Competition over Water with Other Species

Wild horses have been found to have some effect on the frequency of use of a water source by other wildlife in arid environments. One study found that in areas where bighorn sheep and wild horse water sources overlapped, the higher the frequency of wild horse use led to lower frequency of bighorn sheep use, and vice versa (Ostermann-Kelm 2009). The presence of wild horses at water sources is believed to deter the use of that water by pronghorn antelope until the wild horses leave the area.

Competition with wildlife for water at artificial pit reservoirs and water catchments, or natural catchments/ponds, could be keen. Based on data from the Merck Veterinary Manual regarding water consumption by horses and potential competition with wildlife, an average wild horse uses around 10 gallons of water a day at isolated to limited scattered sources during the heat of the summer (Kahn et al. 2012). For the East Pershing Complex, the current estimated population of 1,853 wild horses uses approximately 129,710 gallons of water in one week compared to what a low AML population of 345 wild horses would use – 24,150 gallons in one week – a difference of 105,560 gallons per week. More water would be available for a longer period of time for the AML number of wild horses and wildlife species dependent on the same source(s).

3.18 Wilderness Study Areas

The BLM’s management policy is to continue resource uses on lands designated as WSAs in a manner that maintains the area’s suitability for preservation as wilderness until Congress determines whether the areas should be designated as wilderness or released from further study. Section 603 (c) of FLPMA directs how the BLM is to manage “lands under wilderness review,” which includes WSAs. Actions occurring within WSAs must meet the non-impairment criteria, or fall under one of the few exceptions (BLM Manual 6330 - Management of Wilderness Study Areas), and are to be evaluated on the basis of their possible direct and indirect impacts on wilderness values of naturalness, solitude and primitive or unconfined recreation, and special features. Identified within the East Pershing Complex are four WSAs: Augusta Mountain, China Mountain, Tobin Range, and North Stillwater. These WSAs total approximately 207,444 acres.

Table 123. HMA/HA acreage within Wilderness Study Areas

Wilderness Study Areas	Total Acres	HMA/HA	% of WSA in HMA/HA
Augusta Mountain WSA	89,372	Augusta Mountains	100%
Tobin Range WSA	13,107	Tobin Range	100%
China Mountain WSA	10,358	China Mountain	100%
Stillwater Range WSA	94,607	North Stillwater	4.9%

For a complete description of the WSA, including detailed information of wilderness characteristics, refer to the Nevada Wilderness Study Area Notebook (April 2001).

3.19 Wildlife

Terrestrial wildlife resources in the East Pershing Complex are typical of the Northern Great Basin (see *Appendix F. Wildlife Species List – North-central Nevada*). A wide variety of wildlife species common to the Great Basin ecosystem and several types of vegetative communities can be found here (See *Chapter 3.3.7 Vegetation*). Common wildlife species include: coyote (*Canis latrans*), black-tail jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), bobcat (*Lynx rufus*), and numerous raptors, reptiles, and other small mammal species. Mule deer (*Odocoileus hemionus*) and pronghorn (*Antilocapra americana*) are common big game species in the area. Bighorn sheep are discussed in *Chapter 3*.

An important and often overlooked indirect effect of grazing on ecosystems, including those grazed by wild horses, is the effect on small mammal communities and reptiles. Mammals provide many ecologic services that are intimately linked to the plant community, including seed dispersal and predation, herbivory, and soil perturbation (Beever and Brussard 2004). Although abundance of mammals in areas grazed by wild horses may not differ from that of areas not grazed by wild horses, greater species richness has been observed in Great Basin ecosystems where wild horses have been removed (Beever and Brussard 2004).

Herpetofaunal species in the East Pershing Complex are typical of the Northern Great Basin (see *Appendix F. Wildlife Species List – North-central Nevada*). Many species of reptile and amphibians are important links between higher and lower trophic levels, but soil compaction and decreases in vegetative cover (resulting from livestock and wild horse grazing) may contribute to decreased prey, in turn affecting the abundance and diversity of herpetofauna. Beever and Brussard noted greater abundance and greater species richness of reptiles in areas without wild horse grazing than in areas with wild horse grazing (2004).

Mule Deer

The Complex contains approximately 983,000 acres of mule deer habitat. Of the total habitat identified approximately 554,000 acres act as crucial mule deer winter range which provides mule deer with critical winter foraging opportunities. Additionally, about 332,000 acres act as crucial summer range which supports the early summer fawning season for mule deer. Deer are generally classified as browsers, with shrubs and forbs making up the bulk of their annual diet. The diet of mule deer is quite varied; the importance of various classes of forage plants varies by season. In winter, especially when grasses and forbs are covered with snow, their entire diet may consist of shrubby species.

Wild horses have dietary overlap with mule deer, forage competition can occur when desirable grass forage for wild horses becomes limited due to degraded range conditions, drought, or overuse and they must subsist on a diet of forbs and shrubs. Competition between wild horses and mule deer also exists at water sources.

Pronghorn Antelope

The Complex contains approximately 224,000 acres of pronghorn antelope habitat. Of the total identified habitat about 32,000 acres act as crucial winter range by providing foraging opportunities during the winter months. The remaining 192,000 acres are classified as year round habitat. Pronghorn use open country with few trees and short shrubs. Wild horses have dietary overlap with antelope. Antelope diets consist of forbs and grasses during the spring and early summer and shrub browse the remainder of the year. Wet meadows associated with spring meadows provide succulent green forage during hot dry summer months. These are the habitats that wild horses also prefer during this period of the year. Heavy wild horse utilization of spring meadows removes the succulent forage that antelope depend on during the hot summer months as well as causing degradation of these important habitats.

Chapter 4. Environmental Effects

For the purposes of this analysis, direct impacts are those that result from the actual gather and/or removal of excess wild horses and treatments to decrease the annual growth rate. Indirect impacts are those impacts that occur once the excess animals are removed. For the purposes of this analysis, a 20-year timeframe is assumed.

Supplemental Authorities

4.1 Areas of Critical Environmental Concern (ACEC)

4.1.1 Impacts from Actions Common to Alternatives A-B

Under Alternatives A and B, the number of wild horses using the ACECs for forage and water would be reduced to within the established AML range for North Stillwater HMA. This would reduce damage to cultural resources, TCPs, and to upland and riparian vegetation within the ACEC by reducing trampling.

The following common actions would have little to no impact to TCPs or cultural resources within the Stillwater Range ACEC from November 1 to August 14: helicopter activity, roping from horseback, transportation of gathered wild horses, observers and observation sites during gathering operations. From August 15 to October 31 these common actions could interfere with the traditional practices of Native American tribes that utilize the ACEC to camp, hunt, gather pine nuts and other traditional foods and medicines, and conduct traditional ceremonies.

4.1.2 Impacts from Alternative A

Fertility Control and/or Spaying, with or without Gathers

Under Alternative A, fertility control and/or spaying would lead to slow improvement in such areas as permanent and intermittent water sources where cultural resources and traditional uses tend to occur. Areas in the vicinity of permanent and intermittent water sources (i.e., riparian areas) have the highest potential for utilization by Native Americans during traditional hunting and gathering practices. Approximately 58 known springs and seeps are present within the Stillwater Range ACEC. Visitation to these springs by excess wild horses has the potential to disturb surface and subsurface deposits containing cultural resources, increase runoff and erosion, as well as impair traditional use areas within the ACEC. Alternative A would lead to a slow reduction over time (approximately 20 years) of indirect impacts to cultural resources and traditional use areas in riparian areas in the Stillwater Range ACEC.

4.1.3 Impacts from Alternative B

Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding

Impacts would be the same as those described under Alternative A, with the exception of when the impacts would occur: There would be potential for an immediate reduction of impacts to the Stillwater Range ACEC due to initial and subsequent gathers and removals of wild horses over approximately 20 years in addition to fertility control and/or spaying/gelding. Each successive action under this alternative would adjust the population towards low AML, incrementally reducing indirect impacts to cultural resources and alleviating potential damage in riparian zones in the Stillwater Range ACEC.

4.1.4 Impacts from Alternative C

No Action Alternative

There are many National Register quality cultural resources and TCPs, as well as approximately 58 known springs and seeps within the Stillwater Range ACEC. Impacts to these resources within the ACEC from over-grazing by excess wild horses would likely occur more frequently and with greater intensity as herd sizes increase. Impacts associated with the wild horse overpopulation would consist of degradation of riparian areas, and trampling damage and displacement to some of the unique cultural resources and TCPs that played a role in the designation of the ACEC. See additional sections in this chapter on Cultural Resources, Water Quality, and Wetlands and Riparian Zones for more information.

4.2 Cultural Resources

4.2.1 Impacts from Actions Common to Alternatives A-B

The following common actions would have little to no impact to cultural resources: helicopter activity, roping from horseback, transportation of gathered wild horses, observers and observation sites during gathering operations. Gather trap sites, including bait/water trapping sites if used, and temporary holding areas are the locations that could potentially impact cultural resources. Direct impacts to cultural resources would not be anticipated because gather sites, temporary holding facilities, or bait/water traps would be placed in previously disturbed areas, previously inventoried areas with no cultural resources, or would be inventoried for cultural resources prior to construction. Any location where cultural resources are encountered would not be utilized unless the trap or holding site configuration could be repositioned to avoid impacts to cultural resources. In addition, no traps, holding facilities or staging areas would be located along or adjacent to segments of the Applegate National Historic Trail rated as Class I, II, or III.

4.2.2 Impacts from Alternative A

Fertility Control and/or Spaying, with or without Gathers

There would be no direct impact from gathering operations apart from those described above pertaining to trap sites and holding corrals. Areas in the vicinity of permanent and intermittent water sources (i.e., riparian areas) have the highest potential for cultural resources. Since wild horses concentrate in these areas, soils are likely to be compacted, increasing runoff and subsequently increasing erosion. This has the potential to disturb surface and subsurface deposits containing cultural resources. Alternative A would lead to a reduction of indirect impacts to cultural resources in riparian areas over time.

4.2.3 Impacts from Alternative B

Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding

Under Alternative B, the multiple removals of excess wild horses with fertility control would lead to incremental improvements in such areas as permanent and intermittent water sources where cultural resources tend to be found/located. Concentrations of wild horses can lead to damage and displacement of surface and subsurface cultural deposits in these areas. Each successive action under this alternative would adjust the population, incrementally reducing indirect impacts to cultural resources and slowly alleviating potential damage in riparian zones.

4.2.4 Impacts from Alternative C

No Action Alternative

Indirect impacts to cultural resources resulting from wild horses trampling as described above would increase as populations continue to grow and concentrate at riparian areas. These impacts to cultural resources would occur more frequently and with greater intensity as herd sizes increase.

4.3 Invasive, Nonnative Species

4.3.1 Impacts from Actions Common to Alternatives A-B

Areas most vulnerable to establishment of invasive vegetation are heavily disturbed areas, such as gather trap sites and temporary holding facilities. These areas would be prioritized for follow up inventory and treatment reducing the potential for establishment and spread. Setting gather trap sites and holding facilities outside of areas known to contain noxious or non-native species would limit the potential to spread invasive vegetation. In order to eliminate, minimize, and limit the spread of noxious weeds, only certified weed-free hay would be used for bait-trapping and feeding captured wild horses on BLM managed public lands (*Refer to Chapter 2 EPMs*).

Alternatives A through B would result in nearly identical direct impacts to invasive and nonnative species. The degree and timing of these impacts would vary under the alternatives. Increases in vehicle use along roads within the assessment area by observers, transportation of wild horses, and transportation of support personnel could potentially introduce weed seed into the area. These areas would be prioritized for follow up inventory and treatment to reduce the potential for establishment and spread. Promoting on-road use and limiting off-road travel would also prevent the spread of non-native species into areas that were not previously infested. Any off-road equipment exposed to weed infestations would be cleaned before moving into weed-free areas (*Refer to Chapter 2 EPMs*).

In areas where perennial vegetation is sparse, helicopter use could cause the removal of vegetation around landing zones; these areas would be susceptible to erosion and invasive species establishment.

4.3.2 Impacts from Alternative A

Fertility control and/or Spaying, with or without Gathers

Direct impacts to invasive, non-native species from gather activities under Alternative A would be the same as those described under *Impacts from Actions Common to Alternatives A-B* and would occur over the life of the plan when gathers are implemented.

Indirect impacts to invasive, non-native species from gathering wild horses and implementing population control measures would, over time, reduce areas of bare ground caused from concentrated grazing and hoof action thereby decreasing the areas available for weed infestation. In the short term some of these areas may re-establish with invasive vegetation. However, as land health improves, less soil compaction and soil erosion would occur. These conditions would promote the re-establishment of native vegetation in the long term. The actions under this alternative would make areas more resilient to infestation by invasive species.

4.3.3 Impacts from Alternative B

Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding

Direct impacts would be the same as those described under Alternative A. Indirect impacts to invasive, non-native species from actions under Alternative B would be similar to those described under Alternative A.

4.3.4 Impacts from Alternative C

No Action Alternative

There would be no direct impacts expected under this alternative.

As a result of the increasing wild horse population within the Complex, wild horses would continue to trail farther out from limited waters to foraging areas, subsequently broadening the areas receiving heavy grazing or trailing use. Abundance and long-term production potential of desired plant communities may be compromised and become irreversible, potentially creating areas for invasive, non-native species to establish. Forage utilization would exceed the capacity of the range, resulting in a loss of desired forage species from plant communities as plant health and watershed conditions deteriorate.

4.4 Migratory Birds

4.4.1 Impacts from Actions Common to Alternatives A-B

The project area contains riparian and sagebrush habitats, therefore potential impacts to migratory birds may be expected. Impacts from helicopter gathers include potential collisions which would require a take permit under USFWS (see Wildlife Stipulations in Appendix section). Small areas of migratory bird habitat would be impacted by trampling at trap sites and holding facilities. This impact would be minimal (generally less than 0.5 acre/trap site), temporary, and short-term (two weeks or less) in nature.

Alternatives A through B would result in nearly identical indirect impacts to migratory birds. The degree and timing of these impacts would vary under each alternative. Indirect impacts would be related to wild horse densities and patterns of use. The reduction in the current populations would provide opportunity for vegetative communities to progress toward achieving a thriving natural ecological balance. The action alternatives would support a more diverse vegetative composition and structure through improvement and maintenance of healthy populations of native perennial plants. The reduction of wild horse numbers would allow the habitat to restore to its natural condition. This would impact migratory bird species including loggerhead shrikes, Brewer's sparrows, sage thrashers, Western burrowing owls and migratory and resident raptor species. According to Paige and Ritter (1999), "Long–term heavy grazing may ultimately reduce prey habitat and degrade the vegetation structure for nesting and roosting. Light to moderate grazing may provide open foraging habitat."

Competition between wild horses and wildlife species for water was discussed under *Wild Horses in Chapter 3.* Competition with wildlife for water at artificial pit reservoirs and water catchments, or natural catchments, would be reduced. More water would be available for a longer period of time for wildlife species once AML is achieved.

4.4.2 Impacts from Alternative A

Fertility Control and/or Spaying, with or without Gathers

The scale of direct impacts discussed above (*Impacts from Actions Common to Alternatives A-B*) would depend on the relative frequencies of gather methods. Under this alternative, the indirect impacts to migratory birds would phase-in gradually over the 20 year lifespan, and would be permanent as long as population control is maintained.

4.4.3 Impacts from Alternative B

Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding

This alternative would have same direct impacts as Alternative A. However, each removal would lead to immediate indirect impacts to migratory birds which would likely be maintained and enhanced by the other actions within this alternative.

4.4.4 Impacts from Alternative C

No Action Alternative

There would be no direct impacts from gather operations. However, the continued over-population of wild horses within the Complex would lead to indirect impacts due to further degradation of habitat for migratory birds. The indirect impacts to vegetative communities which support migratory birds would increase each year that a gather is postponed.

4.5 Native American Religious Concerns

The East Pershing Complex lies within the traditional territory of Northern Paiute and the Western Shoshone peoples. The Battle Mountain Band of the Te-Moak Tribe of Western Shoshone Indians, the Fallon Paiute and Shoshone Tribe, the Lovelock Paiute Tribe, and the Winnemucca Indian Colony have been contacted via notification letter to elicit any concerns they may have regarding the Action Alternatives. At the publication of this preliminary EA, no comments have been received from the tribes listed above. Tribal consultation is ongoing and any comments received would be addressed. Data related to the Native American consultation process for this document is addressed in *Chapter 7.2 Native American Consultation*.

4.5.1 Impacts from Actions Common to Alternatives A-B

Based on ongoing consultation with potentially-affected tribes, the following common actions to Alternative A and B would not have an impact to Native American cultural or religious concerns: helicopter activity, roping from horseback, transportation of gathered wild horses, observers, and observation sites during gathering operations.

Direct impacts to areas of Native American cultural and religious concern would not occur from trapping and holding areas, because those areas would be placed in previously disturbed areas or in areas where there are no known Native American concerns based on consultation with potentially-affected tribes.

4.5.2 Impacts from Alternative A

Fertility Control and/or Spaying, with or without Gathers

Under Alternative A, fertility control and/or spaying would lead to a slow reduction in wild horse populations, which would lead to slow improvement in such areas as permanent and intermittent water sources where cultural resources and Native American traditional uses tend to occur. The reduction of wild horse populations from current levels would decrease surface disturbance around riparian zones, leading to increased residual vegetation and improved water quality evidenced by reduced sediment, nutrients, and bacteria in surface waters over time. Therefore, indirect impacts to plants in riparian zones used by Native Americans for medicinal and other purposes, and impacts to springs considered sacred by Native Americans, would be reduced slightly as wild horse populations decline over approximately 20 years.

4.5.3 Impacts from Alternative B

Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding

Impacts would be the same as those described under Alternative A, with the exception of when the impacts would occur: There would be potential for an immediate reduction of impacts to plants and springs due to initial and subsequent gathers and removals of wild horses over approximately 20 years in addition to fertility control and/or spaying/gelding. Each successive action under this alternative would adjust the population towards low AML, incrementally reducing indirect impacts and alleviating potential damage to springs, plants, and other resources of concern to Native Americans.

4.5.4 Impacts from Alternative C

No Action Alternative

There would be no new direct impacts under this alternative. Impacts associated with continued wild horse overpopulation would consist of degradation of riparian areas, water use, and trampling damage and displacement to areas of Native American traditional uses. Impacts to these resources from wild horse overgrazing would likely occur more frequently and with greater intensity as herd sizes increase. This would substantially reduce the regeneration of riparian vegetation; including plants used by Native Americans, and would lead to accelerated erosion and deteriorated hydrologic function over time to springs considered sacred by Native Americans. See additional sections in this chapter on Water Quality and Wetlands and Riparian Zones for more information.

4.6 Public Health and Safety

4.6.1 Impacts from Alternatives A-B

Public safety as well as the safety of the BLM and contractor staff is always a concern during gather operations and is addressed through the implementation of East Pershing Complex Gather Observation Protocol (see *Appendix B. East Pershing Complex Wild Horse Observation Protocol*) that has been used in recent gathers to ensure that the public remains at a safe distance and does not impede gather operations. Appropriate BLM staffing (public affair specialists and law enforcement officers) would be present to assure compliance with visitation protocols at the site. These measures minimize the risks to the health and safety of the public, BLM staff and contractors, and to the wild horses themselves during the gather operations.

When the helicopter is working close to the ground, the rotor wash of the helicopter is a safety concern for members of the public by potentially causing loose vegetation, dirt, and other objects to fly through the air, and can strike or land on anyone in close proximity as well as cause decreased vision. Should a helicopter crash or have a hard landing it is possible that pieces of the helicopter can travel significant distances through the air, which can strike or land on anyone in close proximity. All helicopter operations must therefore be in compliance with distance restrictions set forth in 14 CFR § 91.119.

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

Disturbances in and around the gather and holding corral have the potential to injure the government and contractor staff who are trying to sort, move and care for the wild horses by causing them to be kicked, struck, and possibly trampled by the animals trying to flee such disturbance. Such disturbances also have the potential to harm members of the public if they are in too close a proximity to the wild horses.

4.6.2 Impacts from Alternative C
No Action Alternative
There would be no gather related safety concerns for BLM employees, contractors or the general public as no gather activities would occur.

4.7 Threatened and Endangered Species

4.7.1 Impacts from Actions Common to Alternatives A-B
Direct impacts to Lahontan cutthroat trout (LCT) would be minimal, due to the short term duration of the gather. Although wild horses may cross streams during gather operations causing trampling in riparian areas and on stream banks, impacts would be short-term and minor as LCT is only found in one stream (Rock Creek). The stream banks could receive greater impacts than under normal wild horse movement crossing a stream due to the speed at which the wild horses might cross the stream when being herded by a helicopter. Indirect impacts to LCT would be beneficial and would include reduced use of riparian areas by wild horses. Increases in riparian vegetation at springs, seeps, and along perennial and intermittent waterways could lead to reduced erosion rates and improved habitat conditions for LCT in adjacent drainages. Following the gather operation(s) to achieve and maintain AML ranges would provide the best opportunity for conservation, protection and preservation of the LCT and their habitat (USFWS 1995).

4.7.2 Impacts from Alternative C
No Action Alternative
With the no action alternative, there would be no direct impacts on LCT from gather operations. Indirect impacts would be related to the wild horse population size. The larger population could impact LCT through stream bank trampling, increased sedimentation, reduced vegetation (herbaceous and woody) cover, and overall reduced riparian/stream condition.

4.8 Water Quality (Surface and Ground)

4.8.1 Impacts from Actions Common to Alternatives A-B
Direct impacts to water quality occur when wild horses cross streams or springs as they are herded to temporary gather sites. These impacts would be temporary and relatively short-term in nature. Indirect impacts would be related to wild horse population size. Reduction of wild horse populations from current levels would decrease competition for available water which should lead to a reduction in hoof action (sediment), nutrients, and bacteria in surface waters. Achievement of

the AML would likely also result in increased residual vegetation (increased stubble heights), decreased surface disturbance, and increased vegetation cover, leading to improved water quality and availability.

Due to the limited availability of water quality data, quantifiable impacts are difficult to discern. Qualitative impacts (photographs) showing changes in spring conditions such as flow and surrounding riparian vegetation are often used instead. Both action alternatives would result in identical types of direct and indirect impacts to water quality. The degree and timing of these impacts would vary under each alternative. Effects from direct impacts would likely be negligible relative to variations in the affected environment or would be of such short duration that they would not be measurable and would not last beyond the gather activities themselves. These effects include increased sediment loading to streams occurring when wild horses cross streams or springs as they are herded to temporary gather sites. Effects from indirect impacts would be related to population size. Use of water sources and riparian areas by wild horses during non-gather periods leads to increased sediment loading from hoof action and reduction of vegetation and introduction of excess nutrients and bacteria from feces and urine. Loss of vegetation can also lead to increased surface water temperatures due to decreased shade.

Alternatives A and B would aim to reduce the total number of wild horses in the Complex which would reduce utilization pressure at all surface water sources. Reduced use is anticipated to allow regeneration of riparian vegetation which would lead to a restored hydrologic function over time. It is unknown, however, whether the proposed reduction in numbers would be sufficient in and of itself to allow riparian functionality to recover (see 4.7 below). Riparian recovery would reduce sediment loading through reduced erosion and keep water temperatures low via increased shading.

4.8.2 Impacts from Alternative A

Fertility control and/or Spaying, with or without Gathers

The use of gathers in this alternative would result in the direct impacts discussed above, under Impacts from Actions Common to Alternatives A-B. The scale of these impacts would depend on the relative frequencies of gathers and remote darting. Darting without gathering would result in fewer direct impacts to water quality.

Indirect effects on water quality have been discussed in Impacts from Actions Common to Alternatives A-B. Under this alternative, indirect impacts would phase-in gradually over the 20 year lifespan, and would be permanent as long as population control was maintained.

4.8.3 Impacts from Alternative B

Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding

The use of gathers in this alternative would result in the direct impacts discussed above, under Impacts from Actions Common to Alternatives A-B. Multiple gathers could result in repeated impacts to water resources.

Each removal would lead to immediate indirect impacts to water quality, which would likely be maintained and enhanced by the other actions within this alternative.

4.8.4 Impacts from Alternative C

No Action Alternative

There would be no direct impacts. Indirect impacts would include increasing degradation to water quality as herd populations increase each year that a gather is postponed. Water quality would remain in a degraded state on heavily grazed spring sources and ephemeral streams due to removal of riparian vegetation, soil compaction, and deposition of urine and manure. The increasing population of wild horses would exacerbate over-use of existing limited waters. Individual animals would travel farther in search of available water sources leading to an increased number of surface water sources being impacted.

4.9 Wetlands and Riparian Zones

4.9.1 Impacts from Actions Common to Alternatives A-B

Alternatives A and B would result in nearly identical types of direct and indirect impacts to wetlands and riparian zones. The degree and timing of these impacts would vary under each alternative. Effects from direct impacts would likely be negligible relative to variations in the affected environment or would be of such short duration that they would not be measurable and would not last beyond the gather activities themselves. These effects include trampling of vegetation and alteration of streambanks when wild horses cross streams or springs as they are herded to temporary gather sites.

Effects from indirect impacts would be related to population size. Year-long use of riparian areas by wild horses can result in alteration of soil and hydrologic function due to punching, shearing, and compaction of soft sediments. Loss of vegetation associated with grazing and bank alteration can also lead to increased erosion, loss of riparian soils and organic material. Both action alternatives would aim to reduce the total number of wild horses in the Complex, which would reduce utilization pressure and alteration at wetland and riparian zones. Reduced wetland and riparian use could allow regeneration of riparian vegetation, decreased erosion, and improved hydrologic function over time, although it is unknown whether the proposed decrease in wild horse numbers would be sufficient in and of itself to allow riparian functionality to recover.

4.9.2 Impacts from Alternative A

Fertility Control and/or Spaying, with or without Gathers

The scale of direct impacts discussed above (Impacts from Actions Common to Alternatives A-B) would depend on the frequency of gathers. Fewer gathers and/or darting without gathering would result in fewer direct impacts to riparian condition.

Under this alternative, indirect impacts would phase-in gradually over the 20 year lifespan, and would be permanent as long as population control was maintained.

4.9.3 Impacts from Alternative B

Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding

The use of gathers in this alternative would result in the direct impacts discussed above, under Impacts from Actions Common to Alternatives A-B. Multiple gathers could result in repeated impacts to riparian zones.

Each removal would lead to immediate indirect impacts to riparian condition, which would likely be maintained and enhanced by the other actions within this alternative.

4.9.4 Impacts from Alternative C

No Action Alternative

Under this alternative, the wild horse population within the Complex would not be reduced. Increased competition at currently utilized wetland and riparian zones would lead to continued loss of vegetative, soil, and hydrologic functionality. Individual animals would travel further in search of available water sources, leading to an increased number of wetland and riparian zones being impacted by wild horse use.

Without management actions, excess wild horses would lead to more damage to livestock fences, making control and management of livestock more difficult. This would result in a greater likelihood that existing or proposed riparian grazing management would not be successful.

Additional Affected Resources

4.10 Fisheries

4.10.1 Impacts from Actions Common to Alternatives A-B

Direct impact to fisheries would be minimal, due to the short term duration of the gather and the minimal fisheries habitat that could be crossed by the wild horses during the gather operations. If streams are crossed during gather operations, the stream banks could receive greater impacts than under normal wild horse movement crossing a stream due to the speed at which the wild horses might cross the stream being herded by the helicopter. Indirect impacts with the reduction of the wild horse herd size and from bringing the population to AML would be a reduction in the long-term impacts of stream bank trampling to the fisheries habitat.

4.10.2 Impacts from Alternative C

No Action Alternative

Under this alternative, there would be no direct impacts on fisheries from gather operations. Indirect impacts resulting from continued over-population of wild horses would persist. This larger population could impact fisheries through stream bank trampling, increased sedimentation, reduced vegetation (herbaceous and woody) cover, and overall reduced riparian/stream condition.

4.11 Rangeland Management

4.11.1 Impacts from Actions Common to Alternatives A-B

Both action alternatives would result in identical types of direct and indirect impacts to livestock, however the degree and timing of indirect impacts would vary under each alternative. The direct impacts from a gather would be temporary displacement of livestock due to helicopter activity and livestock may be unable to gain access to water sources being used for water/bait traps for up to 30 days at a time. Reduction of excess wild horse populations from current levels would decrease competition for available water and forage, lead to increased forage availability and quality, and improved vegetative resources, thereby leading to a thriving ecological condition. These indirect impacts would occur until low AML is reached within the HMA and wild horses are removed from areas that are not designated for wild horse management.

4.11.2 Impacts from Alternative A

Fertility Control and/or Spaying, with or without Gathers

Utilization by authorized livestock would continue to be impacted by the overpopulation of wild horses. The indirect impacts of this Alternative would phase in gradually over the 20 year timeframe.

4.11.3 Impacts from Alternative B

Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding

Initially, there is potential to remove excess wild horses, thereby reducing the competition for forage and water between wild horses and livestock. In the long term, removing excess wild horses and implementation of proposed fertility control measures would provide an opportunity for rangeland resources to recover. Immediate responses would be expected to occur in locations where wild horses are removed. This would assist in maintaining the BLM's multiple use mandates.

4.11.4 Impacts from Alternative C

No Action Alternative

There would be no direct impacts to livestock from gather operations under the No Action Alternative. Utilization by authorized livestock would continue to be indirectly impacted by the overpopulation of wild horses, both inside and outside the HMAs. The indirect impacts of the No Action Alternative would consist of continued resource deterioration resulting from competition between wild horse and livestock for water and forage, reduced quantity and quality of forage, and undue hardship on the livestock operators, due to their inability to graze livestock on public lands within the grazing allotments as a result of competition for limited waters or the consumption by excess wild horses of forage allocated to livestock under the operative land-use plans and prior multiple use decisions.

4.12 Recreation

4.12.1 Impacts from Alternatives A-B

Activities associated with the wild horse gather would impact recreational opportunities directly and indirectly. Dates of the gather and future gathers would determine the amount of impact to visitors as use levels peak in the fall during hunting seasons with season opening weekends having the highest visitation of the year and range from extremely low in winter, low to moderate in the summer. Tourism revenues to the local community from recreationists would follow this trend as well. Hunters would be directly impacted by wildlife movements if the gather occurs during their hunts. Big and small game hunting seasons range from August-December, refer to the Recreation section in Chapter 3 for details. Recreationists in the WSAs wanting the opportunities of solitude and naturalness would be affected by helicopter noise during herding activities (see *Chapter on Wilderness Study Areas*).

Individuals wanting to view/photograph wild horses would also be impacted indirectly by the gather since wild horses would have a heightened response to human presence following the gather and might be more difficult to observe for a period following the gather. Even though the density of wild horses in the area would be reduced, it would still be possible to view/photograph wild horses. Alternatives A through B would aim to reduce wild horse numbers to AML which would reduce competition with wildlife for forage allowing for increased wildlife populations.

4.12.2 Impacts from Alternative C
No Action Alternative
No direct impacts would occur under this alternative. However, without any management actions, competition with wildlife for forage would continue to intensify, indirectly affecting recreational values.

4.13 Soils

4.13.1 Impacts from Alternatives A-B
Direct impacts associated with these alternatives would consist of disturbance to soil surfaces immediately in and around the gather trap sites and temporary holding facilities. Impacts would be created by vehicle traffic and hoof action as a result of concentrating wild horses, and could be high in the immediate vicinity of the gather trap sites and temporary holding facilities. Generally, these sites would be small (less than one half acre) in size. Any impacts would remain site specific and isolated in nature. Impacts would be minimal as herding would have a short-term duration.

In addition, most gather trap sites and temporary holding facilities would be selected to enable easy access for transportation vehicles and logistical support equipment. Normally, these gather sites are located near or on roads, pullouts, water haul sites, gravel pits, or other flat areas, which have been previously disturbed. These common practices would minimize the potential impacts to soils.

Indirect impacts of implementing the action alternatives would be reduced concentrations of wild horses, leading to reduced soil erosion on soils most frequented in this Complex by wild horses. This reduction in soil erosion would be most notable and important in the vicinity of small spring meadows and water developments experiencing high levels of disturbance and bare ground from the current excess numbers of wild horses.

4.13.2 Impacts from Alternative C
No Action Alternative
No direct impacts are expected under this alternative. In the absence of a wild horse gather, however, soil loss from wind and water erosion, particularly in the vicinity of small spring meadows and water developments, would be expected to accelerate. The increasing utilization of vegetation, trailing and soil compaction from hoof action due to an over-population of wild horses would continue. These factors increase the loss of perennial native bunchgrasses, forbs and shrubs which exposes larger areas to potential soil loss.

4.14 Special Status Species

4.14.1 Impacts from Actions Common to Alternatives A-B
See the Migratory Birds section in Chapter 4 in regards to effects on wildlife species that would occur with the reduction of water use as a result of wild horse numbers at AML.

<u>Sensitive Migratory Birds and Raptors</u>
Impacts to sensitive migratory birds (including raptors) would be the same as those discussed under the Migratory Birds section in Chapter 4.

Chiroptera (Bat Species)
These alternatives would also have indirect impacts to bats that depend upon flying insects primarily associated with riparian zones. Flying insect populations would be expected to increase as riparian meadows become more productive and stubble heights increase, creating favorable micro sites for insects. Increased insect production would be expected to provide increased foraging opportunities for resident and migratory bats. No direct impacts are expected for bats under these alternatives.

Pygmy Rabbit
A slight chance of damage to pygmy rabbits and their burrows could occur due to trampling by wild horses. Rabbit behavior may be disrupted due to noise from the low-flying helicopter and running wild horses. Potential indirect impacts to pygmy rabbits would include increased herbaceous cover under existing stands of big sagebrush used as pygmy rabbit habitats. Decreased wild horse numbers would decrease physical damage to tall sage-brush plants that screen rabbit burrows and decrease hoof damage to burrows.

Special Status Plants
Potential direct impacts to windloving buckwheat, and obscure scorpionflower could be from trampling by wild horse during gather activities. Indirect impacts to windloving buckwheat, obscure scorpionflower, and other potential special status plants could be: the degradation of habitat suitable to specific species (such as soil alteration, increased competition for water and nutrients with invasive species, and the reduction in seed production or plant vigor from increased browsing pressure). Additional indirect impacts to special status plants from the proposed alternatives could include the reduced risk of habitat degradation and better plant growth.

Bighorn Sheep
Impacts to bighorn sheep may include disturbance during feeding and watering. Removal of excess wild horses would decrease competition for available cover, space, forage, and water between wild horses and bighorn sheep. Decreased wild horse levels would reduce conflicts between wild horses and wildlife at limited water sources. Reduced use of vegetation would result in increased plant vigor, production, seedling establishment, and ecological health of important wildlife habitat. Bighorn sheep would benefit from an increase in forage availability, vegetation density, and structure.

4.14.2 Impacts from Alternative A

Fertility Control and/or Spaying, with or without Gathers

The scale of direct impacts discussed above (*Impacts from Actions Common to Alternatives A-B*) would depend on the relative frequencies of gather methods. Under this alternative, the indirect impacts to special status species would phase-in gradually over the 20 year lifespan, and would be permanent as long as population control is maintained.

4.14.3 Impacts from Alternative B

Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding

This alternative would have same direct impacts as Alternative A. However, each removal would lead to immediate indirect impacts to special status species, which would likely be maintained and enhanced by the other actions within this alternative.

4.14.4 Impacts from Alternative C

No Action Alternative

No direct impacts to special status species are expected under this alternative. Maintaining the existing excess wild horse numbers within the Complex, which would continue to increase as a result of population growth, would result in continued indirect impacts to sensitive species populations and habitats. Wild horse populations would increase approximately 15-25% each year that the gather is postponed. Upland habitats would continue to see locally heavy levels of utilization associated with wild horse use which would expand as wild horses populations continue to grow.

If excess wild horses are not managed, continued heavy grazing would occur on spring meadow systems that serve important habitat functions for sensitive species. Sage-grouse brooding habitats would continue to be degraded. Insect populations, important to bats, sage-grouse, and migratory birds would continue to decline.

4.15 Vegetation

4.15.1 Impacts from Alternatives A-B

Direct impacts associated with these alternatives would consist of human disturbance to vegetation immediately in and around the temporary public viewing areas, gather sites and holding facilities. Normally these gather sites are located near or on roads, pullouts, water haul sites, gravel pits, or other flat areas, which have been previously disturbed. Human impacts would be created by vehicle traffic associated with the temporary gather sites and public viewing areas. Wild horse impacts could be substantial in the immediate vicinity of the gather sites and holding facilities. Generally, these sites would be small (less than one half acre) in size. Any impacts would remain site specific and isolated in nature. These impacts would include trampling of vegetation. In addition, most gather sites and holding facilities would be selected to enable easy access by transportation vehicles and logistical support equipment. These common practices would minimize the short and long-term effects of these impacts.

Indirect impacts would be realized through the implementation of these alternatives which would reduce the current wild horse populations, creating an opportunity for impacted vegetation communities to recover, providing for improved ecological function. Competition for forage among wild horses, wildlife, and livestock would be reduced as utilization levels decrease, allowing for recovery of vegetation communities.

4.15.2 Impacts from Alternative C

No Action Alternative

There would be no direct impacts expected under this alternative. As a result of the increasing wild horse populations over AML within the Complex, wild horses would continue to trail farther out from limited waters to foraging areas, subsequently broadening the areas receiving heavy to severe grazing or trailing use. Indirect impacts include increased competition for forage among multiple-users of the range as wild horse populations continue to increase. Forage utilization would continue to exceed the capacity of the range, resulting in a loss of desired forage species from plant communities as plant health and watershed conditions deteriorate.

4.16 Wild Horses

4.16.1 Impacts from Actions Common to Alternatives A-B

Impacts to wild horses under Alternatives A-B would be both direct and indirect, occurring on both individual animals and populations as a whole.

Capturing Wild Horses and Burros

The BLM has been gathering excess wild horses from public lands since 1975 and has been using helicopters for such gathers since the late 1970s. Refer to *Appendix A. CAWP for Wild Horse Gathers* for information about methods that are utilized to reduce injury or stress to wild horses during gathers. Since 2004, BLM Nevada has gathered over 40,000 excess animals. Of these, gather related mortality has averaged 0.5%, which is very low when handling wild animals. Another 0.6% of the animals captured were humanely euthanized due to pre-existing conditions and in accordance with BLM policy. This data affirms that the use of helicopters and motorized vehicles are a safe, humane, effective and practical means for gathering and removing excess wild horses from the range.

Injuries sustained by wild horses during gathers include nicks and scrapes to legs, face, or body from brush or tree limbs while being herded to the trap corrals by the helicopter. Rarely, wild horses may encounter barbed wire fences and receive wire cuts. These injuries are generally not fatal and are treated with medical spray at the holding corrals until a veterinarian can examine the animal. During the actual herding of wild horses with a helicopter, injuries are rare, and consist of scrapes and scratches from brush, or occasionally broken legs from wild horses stepping into a rodent hole. Serious injuries requiring euthanasia may be anticipated to occur in 5 animals per every 1,000 captured based on prior gather statistics.

Though some members of the public have expressed the view that helicopter gathers are not humane, most injuries occur once the wild horses are captured, and similar injuries would also be sustained if wild horses were captured through a more passive gather method such as bait trapping, as the animals would still need to be sorted, aged, transported and otherwise handled.

Water/Bait Trapping

Due to allowing wild horses to acclimatize over a longer period of time, water/bait trapping creates a low stress trap. During this acclimation period the wild horses would experience some stress due to the panels being setup and perceived access restriction to the water/bait source. Such trapping can continue into the foaling season without harming the mares or foals. Conversely, it has been documented that at times water trapping could be stressful to wild horses due to their reluctance related to approaching new, human structures or intrusions. In these situations, wild horses may avoid watering or may travel greater distances in search of other watering sources.

Environmental Stressors

Gathering wild horses during the winter months can minimize the risk of heat stress, although this can occur during any gather, especially in older or weaker animals. Adherence to the CAWP and techniques used by the gather contractor help minimize the risks of heat stress. Heat stress does not occur often, but if it does, death can result. Most temperature related issues during a gather can be mitigated by adjusting daily gather times to avoid the extreme hot or cold periods of the day. The BLM and the contractor would be pro-active in controlling dust in and around the holding facility and the gather corrals to limit the wild horses' exposure. Electrolytes can be administered to the drinking water during gathers that involve animals in weakened conditions or during summer gathers. Additionally, BLM staff maintains supplies of electrolyte paste if needed to directly administer to an affected animal.

Water resources would be monitored if there are drought conditions to address any potential concerns before and after the proposed gather operations. As stated in BLM policy, BLM would provide water for wild horses as a temporary measure until wild horse populations are within the AML as well as during periods of critical need. Any watering of wild horses would be separately evaluated under NEPA.

Wild horses have been observed outside the HMA boundaries within the East Pershing Complex in large numbers and trailing into water sources in abnormally large groups. Moderate to severe forage utilization within 2 miles of the current water sources has been observed throughout the summer months. In order to ensure the health and well-being of the wild horses in the Complex, it is imperative to achieve and maintain AML as soon as possible. Since they are concentrating around limited water sources, implementing population control measures would reduce the distance traveled during gather activities reducing stress. The minimal spring vegetation growth, diminishing residual vegetation from the previous year's forage crop and reduced spring, seep, and stream flows as well as dry reservoirs may cause a reduction of wild horse overall health.

Sorting and Transporting Wild Horses and Burros

Most injuries are sustained once the wild horse has been captured and is either within the trap corrals or holding corrals, or during transport between the facilities and during sorting. These injuries result from kicks and bites, and from animals making contact with corral panels or gates. Transport and sorting is completed as quickly and safely as possible to reduce the occurrence of fighting and to move the wild horses into the large holding pens where they can settle in with hay and water. Injuries that may be experienced by wild horses during transport and sorting consist of superficial wounds of the rump, face, or legs. Despite precautions, occasionally a wild horse may rear up or make contact with panels hard enough to sustain a fatal neck break, though such incidents are rare. There is no way to reasonably predict any of these types of injuries. On many gathers, no wild horses are injured or die. On some gathers, due to the genetic background of some herds, they are not as calm and injuries are more frequent. Overall, injuries and death are not frequent and usually average less than 0.5%.

Through the capture and sorting process, wild horses are examined for health status, injury and other defect. Decisions to humanely euthanize animals in field situations would be made in conformance with BLM policy. BLM 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 (refer to *Appendix A. Comprehensive Animal Welfare Program for Wild Horse Gathers*). Animals that are euthanized for non-gather related reasons include those with old injuries (broken hip, leg) that have caused the animal to suffer from pain or prevents them from being able to travel or maintain body condition; old animals that have lived a successful life on the range, but now have few teeth remaining (dental regression or breakage), are in poor body condition, or are weak from old age; and wild horses that have congenital (genetic) or serious physical defects such as club foot, or sway back and would not be successfully adopted, or should not be returned to the range.

Temporary Holding Facilities during Gathers

Wild horses that are gathered would be transported from the gather sites to a temporary holding corral within the East Pershing Complex in goose-neck trailers or straight deck tractor-trailers. At the temporary holding corral wild horses would be sorted into different pens based on sex. The wild horses would be aged and provided good quality hay and water. Mares and their un-weaned foals would be kept in pens together. Wild horses are initially nervous in new surroundings which necessitates need to keep visitors and extra personnel at a safe distance from pens to allow the animals to settle down and to water and feed. At the temporary holding facility, a veterinarian, when present, would provide recommendations to the BLM regarding care, treatment, and if necessary, euthanasia of the recently captured wild horses. Any animals affected by a chronic or incurable disease, injury, lameness or serious physical defect (such as severe tooth loss or wear, club foot, and other severe congenital or developmental abnormalities) would be humanely euthanized using methods acceptable to the American Veterinary Medical Association (AVMA).

Wild Horses and Burros Response to Handling

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

Wild horses are very adaptable animals and assimilate into the environment with new members quite easily. Observations made following completion of gathers shows that captured wild horses acclimate quickly to the holding corral situation, becoming accustomed to water tanks and hay, as well as human presence.

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

Spontaneous abortion events among pregnant mares following capture is also rare, though poor body condition can increase the incidence of such events. Foals are often gathered that were orphaned on the range (prior to the gather) because the mother rejected it or died. These foals are usually in poor, unthrifty condition. Orphans encountered during gathers are cared for promptly and rarely die or have to be euthanized

Herd Health

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

4.16.2 Impacts from Alternative A

Fertility Control and/or Spaying, with or without Gathers

Alternative A would decrease and then maintain the existing population of wild horses within the range of AML. Individuals in the herd would still be subject to increased stress and possible death as a result of continued competition for water and forage until the project area's population can be reduced to the low AML range. Areas experiencing heavy utilization levels by wild horses would likely still be subject to excessive use to rangeland resources (trailing, riparian trampling, increased bare ground, etc.).

<u>BLMs Use of Contraception in Wild Horse and Burro Management</u>

Expanding the use of population growth suppression (PGS) to slow population growth rates and reduce the number of animals removed from the range and sent to off-range pastures (ORPs) is a BLM priority. The WFRHBA of 1971 specifically provides for contraception and sterilization (section 3.b.1). No finding of excess animals is required for BLM to pursue contraception in wild horses or wild 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). 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 animals from a population, so if a wild horse or burro 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 on the environment, as well as WH&B management costs to taxpayers. Bartholow (2007) concluded that the application of 2 or 3-year contraceptives to wild mares could reduce operational costs in a project area by 12-20%, or up to 30% in carefully planned population management programs. He also concluded that contraceptive treatment would likely reduce the number of horses that must be removed in total, with attendant cost reductions in the number of adoptions and total holding costs. If application of contraception to horses requires capturing and handling the animals, the risks and costs associated with capture and handling of horses may be roughly equivalent (not counting the cost of adoption). Application of contraception to older animals and returning them to the Complex may reduce risks associated with horses that are difficult to adopt and also negates the compensatory reproduction that follows removals (Kirkpatrick and Turner 1991).

PZP

Limiting future population increases of wild horses could limit increases in damage to water, soils, and other wildlife potentially caused by higher densities of horses. It may also reduce the effect of gather activities on the environment if it limits the numbers of gathers required.

All breeding age mares/jennies selected for release, including those previously treated with fertility control, would be treated/re-treated with the most effective fertility control formulation or similar vaccine and released back to the range. Immuno-contraceptive treatments would be conducted in accordance with the approved standard operating and post-treatment monitoring procedures (*Appendix A. CAWP*). Mares/jennies would be selected to maintain a diverse age structure, herd characteristics and conformation (body type). Every mare prevented from being removed, by virtue of contraception, is a mare that will, generally, only be delaying her reproduction rather than being eliminated permanently from the range. This should help to preserve herd genetic diversity, while removals and adoption do not. (Kirkpatrick and Turner 2002, 2008; Turner and Kirkpatrick 2002, 2003)

Direct Effects

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

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

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

The highest efficacy for fertility control has been achieved when applied during the time frame of December through February. Refer to *Appendix C. Standard Operating Procedures for Population-level Porcine Zona Pellucida Fertility Control Treatments* for more information about fertility control research procedures.

Reversibility and Effects of PZP on Ovaries

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

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

Effects of PZP on Existing Pregnancies, Foals, and Birth Phenology

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

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

Effects of Marking and PZP Injection

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

Most mares recover from the stress of capture and handling quickly once released back to the

HMA, and none are expected to suffer serious long term effects from the fertility control injections, other than the direct consequence of becoming temporarily infertile. Injection site reactions associated with fertility control treatments are possible in treated mares (Roelle and Ransom 2009, Bechert et al. 2013, French et al. 2017), but swelling or local reactions at the injection site are expected to be minor in nature. Roelle and Ransom (2009) found that the most time-efficient method for applying PZP is by hand-delivered injection of 2-year pellets when horses are gathered. They observed only two instances of swelling from that technique. The dart-delivered formulation produced injection-site reactions of varying intensity, though none of the observed reactions appeared debilitating to the animals (Roelle and Ransom 2009). Joonè et al. (2016) found that injection site reactions had healed in most mares within 3 months after the booster dose, and that they did not affect movement or cause fever. The longer term nodules observed did not appear to change any animal's range of movement or locomotor patterns and in most cases did not appear to differ in magnitude from naturally occurring injuries or scars.

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

Following resumption of fertility, the proportion of mares that conceive and foal could be increased due to their increased fitness; this has been called a 'rebound effect.' Elevated fertility rates have been observed after horse gathers and removals (Kirkpatrick and Turner 1991). More research is needed to document and quantify these hypothesized effects in PZP-treated herds. If repeated contraceptive treatment leads to a prolonged contraceptive effect, then that may minimize or delay the hypothesized rebound effect. Selectively applying contraception to older animals and returning them to the HMA could reduce long-term holding costs for such horses, which are difficult to adopt, and may reduce the compensatory reproduction that often follows removals (Kirkpatrick and Turner 1991).

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

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

Behavioral Effects

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

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

In two studies involving a total of four wild horse populations, both Nuñez et al. (2009) and Ransom et al. (2010) found that PZP-treated mares were involved in reproductive interactions with stallions more often than control mares, which is not surprising given the evidence that PZP-treated females of other mammal species can regularly demonstrate estrus behavior while contracepted (Shumake and Wilhelm 1995, Heilmann et al. 1998, Curtis et al. 2002). There was no evidence, though, that mare welfare was affected by the increased level of herding by stallions noted in Ransom et al. (2010). Nuñez's later analysis (2017) noted no difference in mare reproductive behavior as a function of contraception history.

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

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

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

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

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

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

Genetic Effects of PZP Vaccination

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

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

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

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

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

Spaying

Dependent upon the technique used, direct impacts to the animal are considered here to be those related to the physical aspect of surgery and indirect impacts are those related to social behaviors and herd dynamics. No long-term effects to the overall health of the mares are expected, other than sterility. While spaying is widely practiced for domesticated pets, spaying female domestic horses is generally only performed to remove tumors, or for behavioral or breeding stock reasons (Scott and Kunze 1977, Hooper et al. 1993, Röcken et al. 2011). Spaying and neutering dogs and cats is generally encouraged to prevent production of unwanted offspring, but it is not without risk. Complications of any surgery can include morbidity or mortality, the distinction being that morbidity reflects survival with some degree of ill health, while mortality implies death. In cats and dogs surgical and post-operative complications were reported to be 3% to 20%, depending on the study (Pollari and Bennett 1996, Kustritz 2007). Long-term complications in spaying dogs and cats can include increased risk for certain cancers, hypothyroidism, urinary incontinence and urinary tract infections and tumors in spayed pets (Hart 1991, Spain et al. 2004), although there is a greatly reduced risk of ovarian or mammary tumors and cysts (Reichler 2009). Any surgery can entail some risk of death, or morbidity such as intraoperative hypotension, myopathies, and neuropathies, postoperative pain, anorexia, depression, problems around the incision (Loesch et al. 2003), but the choice of surgical method can have a large influence on the risk of post-operative complications.

This literature review of spay impacts focuses on 2 methods: flank laparoscopy, and colpotomy. At the time of the NRC report (2013), no field studies had observed the results of spaying in wild mares, but Collins and Kasbohm (2016) documented that it was used with low rates of mortality and morbidity in a free-roaming horse population. Regardless of the method used for ovariectomy, this procedure can be painful and the use of peri-operative analgesics is important. As with any abdominal surgery, insufficient anti-microbial medication could result in peritonitis, but both of the procedures below take measures to reduce the risk of infection.

Flank laparoscopy has become a favored approach among veterinarians for removal of ovarian tumors; it overcomes drawbacks of several other surgical ovariectomy techniques (Lee and Hendrickson 2008), and is commonly used in domestic horses for application in mares due to its minimal invasiveness and full observation of the operative field. Ovariectomy via flank laparoscopy was seen as the lowest risk method considered by a panel of expert reviewers convened by USGS (Bowen 2015). In a review of unilateral and bilateral laparoscopic ovariectomy on 157 mares, Röcken et al. (2011) found that 10.8% of mares had minor post-surgical complications, and recorded no mortality.

Mortality due to surgery or post-surgical complications is not expected, but it is a possibility. In two studies, ovariectomy by laparoscopy or endoscope-assisted colpotomy did not cause mares to lose weight, and there was no need for rescue analgesia following surgery (Pader et al. 2011, Bertin et al. 2013). This surgical approach entails three small incisions on the animal’s flank, through which three cannulae (tubes) allow entry of narrow devices to enter the body cavity: these are the insufflator, endoscope, and surgical instrument. The surgical procedure involves the use of narrow instruments introduced into the abdomen via cannulas for the purpose of transecting the ovarian pedicle, but the insufflation should allow the veterinarian to navigate inside the abdomen without damaging other internal organs. The insufflator blows air into the cavity to increase the operating space between organs, and the endoscope provides a video feed to visualize the operation of the surgical instrument. This procedure can require a relatively long duration of surgery, but tends to lead to the lowest post-operative rates of complications. Because the incisions are small, and on the flank, there is low risk of herniation of the bowel.

Flank laparoscopy may leave three small (<5 cm) visible scars on one side of the horse's flank, but even in performance horses these scars are considered minimal. It is expected that the tissues and musculature under the skin at the site of the incisions in the flank will heal quickly, leaving no long-lasting effects on horse health. Monitoring for up to two weeks at the facility where surgeries take place will allow for veterinary inspection of wound healing. The ovaries may be dropped into the abdomen, but this is not expected to cause any health problem; it is usually done in ovariectomies in cattle (e.g., the Willis Dropped Ovary Technique) and Shoemaker et al. (2014) found no problems with revascularization or necrosis in a study of young horses using this method.

A different surgical approach, ovariectomy via colpotomy (the vaginal approach), has been used in free-roaming feral horses (Collins and Kasbohm 2017). Advantages of the method include the relatively short time required for the surgery. The mortality rate for this procedure can be relatively low if the surgeon is experienced; major complications that lead to the death or necessary euthanasia of a mare after ovariectomy via colpotomy are anticipated to be higher than ovariectomy via flank laparoscopy, but still less than 2 percent (Bowen, 2015). This method is associated with greater postoperative morbidity and mortality than other non-emergency surgeries in domestic horses (Loesch and Rodgerson 2003). A morbidity of 4% of 23 mares was found in a study of ovariectomies by colpotomy (Hooper et al. 1993), and 11% of 157 mares in a study of laparoscopic ovariectomies (through the flank) (Röcken et al. 2011). Neither study reported mortality resulting from the procedure, or followed mares over the long-term. Loesch and Rodgerson (2003) list the following potential risks with ovariectomy via colpotomy: pain and discomfort; injuries to the cervix, bladder, or a segment of bowel; delayed vaginal healing; eventration of the bowel; incisional site hematoma; intra-abdominal adhesions to the vagina; and chronic lumbar or bilateral hind limb pain. Most horses, however, tolerate ovariectomy via colpotomy with very few complications, including feral horses (Collins and Kasbohm 2017). The vaginal tissue contracts after the incision, leading to a relatively low risk of herniation of the bowel (Bowen 2015). Two studies examined the short-term (42 days) effect of spaying heifers in field conditions in Australia by colpotomy or by flank incision with a surgeon's hand entering the body (McCosker et al. 2010, Petherick et al. 2011). BLM is not at all considering the use of this type of flank incision surgery for wild horses or burros – the studies here are mentioned here to contrast the outcomes of flank incision with manual entry of the body cavity, versus colpotomy. In those studies, no anesthetic or analgesics were used. Overall conclusions were that spay surgery resulted in compromised health and welfare of some animals for 3-4 days post-surgery, but there were few differences between the surgical methods. Plasma cortisol levels were lower in controls than spayed heifers from both methods, but heifers spayed using the flank method sustained an inflammatory response for longer than colpotomy, suggesting longer-lasting adverse effects (Petherick et al. 2011). In the 6 hours after the surgery there was no difference in morbidity between surgical groups, with both showing signs of acute discomfort (McCosker et al. 2010). During this 6 hour post-surgical period, heifers that had been spayed spent less time feeding than controls, although there was no difference in lying down or drinking. Over the following 42 days, spayed heifers gained less weight than controls (although all groups gained weight), and 5% of flank wounds were still not healed at the end of this period (McCosker et al. 2010, Petherick et al.

2011). Of 400 spayed heifers, 2 died 24-48 hours after surgery from hemorrhage, one died about 5 days after surgery, and 7 died 11-22 days after spaying (McCosker et al. 2010).

Effects of Spaying on Hormones, Pregnancy, and Behavior

There are few peer reviewed studies documenting the effects of ovariectomy on the outcome of pregnancy in a mare. Not all information on the risk associated with conducting ovariectomy on pregnant mares has been documented, but may be surmised from previous work. When wild horses are gathered or trapped for fertility control treatment there would likely be mares in various stages of gestation. The gestation period in horses usually ranges from 335 to 340 days (Evans et al., 1977, p.373). Progesterone is necessary to maintain pregnancy in female mammals; less progesterone is produced when ovaries are removed but production does not cease (Webley and Johnson 1982), allowing late pregnancies to go to term. Evans wrote that by 200 days, the secretion of progesterone by the corpora lutea is insignificant, given that removal of the ovaries does not result in abortion (p. 376)The NRC committee that reviewed research proposals submitted to the BLM explained, "The mare's ovaries and their production of progesterone are required during the first 70 days of pregnancy to maintain the pregnancy," and, "…if this procedure were performed in the first 90 days of pregnancy, the fetus would be resorbed or aborted by the mother. If performed after 120 days, the pregnancy should be maintained. The effect of ovary removal on a pregnancy at 90–120 days of gestation is unpredictable because it is during this stage of gestation that the transition from corpus luteum to placental support typically occurs" (NRC 2015). Holtan et al. (1979) evaluated the effects of bilateral ovariectomy at selected times between 25 and 210 days of gestation on 50 mature pony mares. Holtan et al. (1979) found that resorption of the conceptus occurred in all 14 mares ovariectomized before day 50 of gestation, that pregnancy was maintained in 11 of 20 mares after ovariectomy between days 50 and 70, and that pregnancy was not interrupted in any of 12 mares ovariectomized on days 140 or 210.

For those pregnancies that are maintained following an ovariectomy procedure, likely those past 120 days, the development of the foal is not expected to be affected. However, because this procedure is not commonly conducted on pregnant mares the rate of complications to the fetus has not yet been quantified. There is the possibility that entry to the abdominal cavity could cause premature births related to inflammation. However, after five months the placenta should hormonally support the pregnancy after removal of ovaries. In a variety of species, ovariectomies in early stages of pregnancy (25-45 days in horses) led to abortion of the fetus, whereas pregnant animals ovariectomized from mid to late gestation generally went to term (Hartman 1939, Alexander et al. 1955, Estergreen et al. 1967, Holtan et al. 1979, Webley and Johnson 1982) (with the exception of ferrets, which aborted when ovariectomized at any stage of pregnancy (Galil 1975)). Ovariectomized cows tended to have calving difficulties and a shorter gestation length than controls (Estergreen et al. 1967), although gestation length was similar between ovariectomized and control mares (Holtan et al. 1979). Progesterone shots led to retention of fetuses in ovariectomized mares, even when embryos were implanted (Bertin et al. 2013). Importantly, ovariectomized mares with implanted embryos produced milk for the growth of healthy foals, and had little postpartum genital discharge (Sertich et al. 1988).

Although the wild mare is expected to remain in a herd, no study has yet documented the behavior of spayed wild mares, so additional consequential behavioral effects of spaying remain speculative. Other studies, below, though, may be informative. Wild horses and burros are instinctually herd-bound and this behavior is expected to continue. However, no study has documented the rate at which spayed mares would continue to remain with the stallion and band from which the mare was most recently attached. Overall the BLM anticipates that some spayed mares may continue to exhibit estrus behavior which could foster band cohesion. Nymphomaniac behavior in domestic mares was not always ‘cured’ following bilateral ovariectomy (Kobluk et al., 1995). It has been reported that 60 percent of ovariectomized domestic mares will cease estrous behavior following surgery (Vaughn, 1984; Loesch and Rodgerson, 2003). Yet, the full repertoire of courtship and mating behavior has been displayed by ovariectomized mares and by anestrous mares during the nonbreeding season (Asa et al., 1980; Hooper et al., 1993; NRC 2013, p. 99). Although the wild mare is expected to remain in a herd, additional consequential behavioral effects of spaying are unknown at this time.

If free-ranging ovariectomized mares also show estrous behavior and occasionally allow copulation, interest of the stallion may be maintained, which could foster band cohesion (NRC 2013, p. 99). Horses are anovulatory during the short days of late fall and early winter, beginning to ovulate as days lengthen and then cycling roughly every 21 days, with about 5 days of estrus (Asa et al. 1979, Crowell-Davis 2007). Estrus in mares is shown by increased frequency of proceptive behaviors: approaching and following the stallion, urinating, presenting the rear end, clitoral winking, and raising the tail towards the stallion (Asa et al. 1979, Crowell-Davis 2007). In most mammal species outside primates’ estrus behavior is not shown during the anovulatory period, and reproductive behavior is considered extinguished following spaying (Hart and Eckstein 1997). However, mares may continue to demonstrate estrus behavior during the anovulatory period, and even when ovariectomized (Scott and Kunze 1977, Asa et al. 1980*b*). This is due to non-endocrine support of estrus behavior in horses, specifically steroids from the adrenal cortex, and has the function of maintaining social cohesion within a group even outside the breeding season (Asa et al. 1980*a*, 1984). This may be a unique response of horses (Bertin et al. 2013) as spaying usually greatly reduces female sexual behavior in companion animals (Hart and Eckstein 1997). Application of estrogen and progesterone were necessary for exhibition of estrus behavior in spayed golden hamsters, and estradiol or testosterone for spayed sheep (Ciacco and Lisk 1968, Clarke and Scaramuzzi 1978). Ovariectomy may also affect production of luteinizing hormone: in women there was an increase in luteinizing hormone after ovariectomy, followed by a reduction (Erb and Richter 1970), with levels staying high for 50 days in sheep (Reeves et al. 1972). However in six ponies mean monthly plasma luteinizing hormone levels in ovariectomized mares were similar to intact mares during the anestrous season, and during the breeding season were similar to levels in intact mares at mid-estrus (Garcia and Ginther 1976).

The effect of ovariectomy on hormone production means there is the potential for it to affect behavioral interactions in unforeseen ways (Ransom and Powers 2014). Mares that were ovariectomized due to perceived behavioral problems had an improvement in aggression issues, disagreeable demeanor, excitability, kicking and biting, frequent urination and training problems, but in general spaying mares corrected generalized behavioral problems more successfully than specific issues, and the issue of them having problems with other horses was less affected (Kamm and Hendrickson 2007). It is not known whether or how the social standing of spayed mares may change in a given band. In other species, there has been relatively little clinical or experimental research on the behavioral effects of ovariectomy, but in general there can be wide inter-individual variability in response (Hart and Eckstein 1997, Wirant and McGuire 2004). Social relationships among dominant and subordinate female brushtail possums (*Trichosaurus vulpecula*) did not change 5-12 months after ovariectomy of dominant animals, and there was no effect on relationships between females and males (Jolly and Spurr 2010). The maintenance of the dominance hierarchy could be due to habitual relationships between each pair, or be maintained by adrenal steroids. Spayed ewes and mini pigs did not show any increased aggression or masculine behavior after surgery (Clarke and Scaramuzzi 1978, Tynes et al. 2007), and one study of dogs found no basic personality change after spaying (Hart 1991). Other studies found that some spayed dogs showed increased aggression (O'Farrell and Peachey 1990, Hart and Eckstein 1997, Kustritz 2007). Spayed dogs were more likely to ground scratch after urination or defecation, which could be connected to dominance or territoriality behaviors (Wirant and McGuire 2004). On the other hand, dogs were less interested in the urine of gonadectomised conspecifics, and tended to have fewer social contacts than intact individuals (Lisberg and Snowdon 2009, Sparkes et al. 2014).

Individual-level responses to ovariectomy may be similar to those seen in contracepted populations. At the individual level most studies of contracepted wild horse mares have found no change in activity budget, with minimal impact on home range size or movements (Gray and Cameron 2010), however group behavioral differences have been observed (Nuñez et al. 2009). Individuals receiving fertility control often have reduced mortality and increased longevity, which has been interpreted as a result of their being released from the costs of reproduction (Kirkpatrick and Turner 2008). The long-term survival rate of treated wild mares appears to be the same as that of untreated mares (Collins and Kasbohm 2016). In other wildlife species a common trend has been higher survival of sterilized females (Twigg et al. 2000, Saunders et al. 2002, Ramsey 2005, Jacob et al. 2008, Seidler and Gese 2012), and in rabbits sterilized females were also heavier and had greater longevity (Twigg et al. 2000). Sterilization affected predation rates in coyotes (Seidler et al. 2014), as their prey preferences changed when they did not need to provision pups (Bromley and Gese 2001).

Other Potential Physiological Effects of Spaying

In domestic animals, spaying is often associated with weight gain and associated increase in body fat (Fettman et al. 1997, Beckett et al. 2002, Jeusette et al. 2006, Belsito et al. 2008, Reichler 2009, Camara et al. 2014). Spayed cats had a decrease in fasting metabolic rate, and spayed dogs had a decreased daily energy requirement, but both had increased appetite (O'Farrell and Peachey 1990, Fettman et al. 1997, Hart and Eckstein 1997, Jeusette et al. 2004). Coit et al. (2009) demonstrated that spayed dogs have elevated levels of LH-receptor and GnRH-receptor mRNA in the bladder tissue, and lower contractile strength of muscles. They noted that urinary incontinence occurs at elevated levels in spayed dogs and in post-menopausal women. Thus, it is reasonable to suppose that some ovariectomized mares could also suffer from elevated levels of urinary incontinence. In horses spaying has the potential to increase risk of equine metabolic syndrome (potentially leading to obesity and laminitis), but both blood glucose and insulin levels were similar in mares before and after ovariectomy over the short-term (Bertin et al. 2013). In wild horses the quality and quantity of forage is unlikely to be sufficient to promote over-eating or obesity. Ovariectomy can lead to depression in mice and humans (Bekku et al. 2006). This was manifested in mice as moving less, but sterilization had no effect on movements and space use of feral cats or brushtail possums (Ramsey 2007, Guttilla and Stapp 2010), or greyhound racing performance (Payne 2013). Spayed possums had a similar core range area after surgery compared to before, and were no more likely to shift their range than intact females (Ramsey 2007).

The BLM knows of no scientific, peer-reviewed literature that documents bone density loss in mares following ovariectomy. A concern has been raised in an opinion article (Nock 2013) that ovary removal in mares could lead to bone density loss. That paper was not peer reviewed, nor was it based on research in wild or domestic horses, so it does not meet the BLM's standard for "best available science" on which to base decisions (Kitchell et al., 2015). Hypotheses that are forwarded in Nock (2013) appear to be based on analogies from modern humans leading sedentary lives. Certainly, premenopausal women who have a hysterectomy with bilateral oophorectomy (both ovaries removed) undergo what could be termed surgical menopause, and those women may experience more sudden changes than women who experience naturally occurring menopause (Women's Health Queensland Wide, Inc., 2011). Menopause is associated with lower levels of estrogen, which can increase the risk of bone density loss in modern humans. Post-menopausal women have a greater chance of osteoporosis (Scholz-Ahrens et al. 1996). This has been linked to reduced circulating estrogen, which led to the concern raised by Nock (2013) that spayed horses may also be susceptible to loss of bone mass after spaying. No research has been conducted on this in horses, and there have been conflicting results when attempts have been made to explore it in animal models; all experiments have been on laboratory animals, rather than free-ranging animals. While some studies found changes in bone cell activity after ovariectomy leading to decreased bone strength (Jerome et al. 1997, Baldock et al. 1998, Huang et al. 2002, Sigrist et al. 2007), others found that changes were moderate and transient or minimal (Lundon et al. 1994, Scholz-Ahrens et al. 1996, Zhang et al. 2007), and even returned to normal after 4 months (Sigrist et al. 2007). Use of bones, for instance the chewing of hard feed by jaw bones, may limit the negative effects of estrogen deficiency on their micro-architecture (Mavropoulos et al. 2014).

The comparison between sedentary modern humans and wild horses that have been active their entire lives, though, is not at all appropriate, as there are substantial differences in lifestyle between modern humans and wild horses. The effect of exercise on bone strength in animals has been known for many years and has been shown experimentally (Rubin et al., 2001). Dr. Simon Turner, Professor Emeritus of the Small Ruminant Comparative Orthopaedic Laboratory at Colorado State University, conducted extensive bone density studies on ovariectomized sheep, as a model for human osteoporosis. During these studies, he did observe bone density loss on ovariectomized sheep, but those sheep were confined in captive conditions, fed twice a day, had shelter from inclement weather, and had very little distance to travel to get food and water (Simon Turner, Colorado State University Emeritus, written comm., 2015). Dr. Turner indicated that an estrogen deficiency (no ovaries) could potentially affect a horse's bone metabolism, just as it does in sheep and human females when they lead a sedentary lifestyle, but indicated that the constant weight bearing exercise, coupled with high exposure to sunlight ensuring high vitamin D levels, are expected to prevent bone density loss (Simon Turner, Colorado State University Emeritus, written comm., 2015). Home range sizes of wild horses in the wild has been described as 4.2 to 30.2 square miles (Green and Green, 1977) and 28.1 to 117 square miles (Miller, 1983). Green and Green (1977) reported bands travelling up to 7 miles each day to water. A study of distances travelled by feral horses in "outback" Australia shows horses travelling 5 – 17.5 miles per 24 hour period (Hampson et al., 2010a). Horses were recorded up to 34 miles from their watering points (Hampson et al., 2010a). Even when restricted to small paddocks, domestic horses moved approximately 4.5 miles per day (Hampson et al., 2010b); the expected daily movement distance would be far greater in the context of larger pastures typical of BLM long-term holding facilities in off-range pastures. A horse would have to stay on stall rest for years after removal of the ovaries in order to develop osteoporosis (Simon Turner, Colorado State University Emeritus, written comm., 2015) and that condition does not apply to any wild horses turned back to the range or any wild horses that go into off-range pastures.

Spaying Effects on Population Growth

Any decrease in the number of breeding females in a population should lead to a direct decrease in the population's growth rate, unless there is compensatory increase in reproduction by non-sterilized females. Horses and burros tend to be limited to one foal per pregnancy, so there is effectively no reproductive physiological mechanism for a compensatory response. Collins and Kasbohm (2017) showed that spaying feral horse mares led to effective population growth suppression on the range. Wild horse population growth rates would be expected to decline expected as the fraction of sterile females increases (Garrott 1995). Even if wild horse populations continue to grow from year to year, any decrease from the current population growth rates of ~20% per year would be desirable from a management perspective, so that a reduced number of wild horses would need to be removed from the range in any given time period. In long-lived ungulates, one model posited that at least 50% of fertile females would need to be sterilized to actually reduce population size (Hobbs et al. 2000).

It is possible that some demographic compensatory mechanisms could influence local wild horse or burro population growth rate decreases if there is: greater foal survival for those foals that are born; longer average lifespan in adults; or an influx of horses from neighboring areas. These mechanisms may explain why female sterilization is not always an effective strategy for population growth suppression in species that can breed frequently and have large litters. In coyotes (*Canis latrans*) and rabbits (*Oryctolagus cuniculus*), sterilization has led to variable effects on overall population size (Twigg et al. 2000, Seidler et al. 2014). Two studies investigated the effects of sterilizing different proportions of females in populations of possums and rabbits, from 0% to 80% (Twigg et al. 2000, Ramsey 2005). For brushtail possums the rate of breeding was similar among treatments, but there was no downward trend in population abundance due to births and immigration to highly sterilized groups (Ramsey 2005). Similarly, the annual rate of increase was comparable across groups of proportionally sterilized rabbits, also due to immigration and higher survival and recruitment of young in highly sterilized groups, despite lower production (Twigg et al. 2000). Owing to immigration and the high capacity for reproduction, one population of white tailed deer (*Odocoileus virginianus*), a species that can give birth to twins and triplets, was predicted to require high levels of annual sterilization (25-50% of females are sterilized annually) to reduce population sizes (Merrill et al. 2006).

Genetic Effects of Spaying

Effects of having a component of spayed mares in the complex are expected to be similar to those listed for PZP, except that spayed mares would not reproduce. Roelle and Oyler-McCance (2015) 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.

4.16.3 Impacts from Alternative B

Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding

Impacts to Alternative B resulting from PZP and/ or spaying would be the same as Alternative A. The primary differences in this alternative are removing wild horses from the range, placing them in short and long-term holding, and/or gelding a portion of the males.

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 dynamics, direct population-wide impacts from a gather have proven, over the last 30 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 area. No observable effects associated with these impacts would be expected within one month of release, except for a heightened awareness of human presence. Direct impacts to wild horses removed are associated with transport would 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.

As a result of lower density of wild horses across the Complex following the removal of excess wild horses, competition for resources would be reduced, allowing wild horses to utilize preferred, quality habitat. Forage and water resources would be allowed to improve in quality and quantity. Improved range condition and increased forage availability would promote healthy, viable populations of wild horses. A thriving natural ecological balance between wild horses and other resource values would be achieved throughout the Complex, and deterioration of the range from an over-population of wild horses would be prevented. Managing wild horse populations in balance with the habitat and other multiple uses would ensure that the populations are less affected by drought or other climate fluctuations, and that emergency gathers are either avoided or minimized, thus reducing stress to the animals, and increasing the long-term success of these herds.

Removal of excess wild horses would improve herd health. Decreased competition for forage and water resources would reduce stress and promote healthier animals. This removal of excess animals, coupled with anticipated reduced reproduction (population growth suppression) as a result of fertility control should result in improved health and condition of mares and increased foal survival rates. Additionally, reduced population growth rates would be expected to extend the time interval between gathers and reduce disturbance to individual animals as well as to herd social structure over the foreseeable future.

GonaCon

This literature review is intended to summarize what is known and what is not known about potential effects of treating mares with GonaCon. As noted below, some negative consequences of vaccination are possible. Anti-GnRH vaccines can be administered to either sex, but this analysis is limited to effects on females.

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

As with other contraceptives applied to wild horses, the long-term goal of GonaCon-Equine use is to reduce or eliminate the need for gathers and removals (NRC 2013). GonaCon-Equine vaccine is an EPA-approved pesticide (EPA, 2009a) that is relatively inexpensive, meets BLM requirements for safety to mares and the environment, and is produced in a USDA-APHIS laboratory. Its categorization as a pesticide is consistent with regulatory framework for controlling overpopulations of 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 Action Alternatives, the BLM would return to the HMA as needed to re-apply GonaCon-Equine and initiate new treatments in order to maintain contraceptive effectiveness in controlling population growth rates. GonaCon-Equine can safely be reapplied as necessary to control the population growth rate; booster dose effects may lead to increased effectiveness of contraception, which is generally the intent. Even with one booster treatment of GonaCon-Equine, it is expected that most, if not all, mares would return to fertility at some point, although the average duration of effect after booster doses has not yet been quantified. It is unknown what would be the expected rate for the return to fertility rate in mares boosted more than once with GonaCon-Equine. Once the herd size in the project area is at AML and population growth seems to be stabilized, BLM could make a determination as to the required frequency of new mare treatments and mare re-treatments with GonaCon, to maintain the number of horses within AML.

GnRH Vaccine Direct Effects

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

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

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

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

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

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

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

Changes in hormones associated with anti-GnRH vaccination lead to measurable changes in ovarian structure and function. The volume of ovaries reduced in response to treatment (Garza et al. 1986, Dalin et al. 2002, Imboden et al. 2006, Elhay et al. 2007, Botha et al. 2008, Gionfriddo

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

GnRH Vaccine Contraceptive Effects

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

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

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

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

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

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

Longer-term infertility has been observed in some mares treated with anti-GnRH vaccines, including GonaCon-Equine. In a single-dose mare captive trial with an initial year effectiveness of 94%, Killian et al. (2008) noted infertility rates of 64%, 57%, and 43% in treated mares during the following three years, while control mares in those years had infertility rates of 25%, 12%, and 0% in those years. GonaCon effectiveness in free-roaming populations was lower, with infertility rates consistently near 60% for three years after a single dose in one study (Gray et al. 2010) and annual infertility rates decreasing over time from 55% to 30% to 0% in another study with one dose (Baker et al. 2017). Similarly, gradually increasing fertility rates were observed after single dose treatment with GonaCon in elk (Powers et al. 2011) and deer (Gionfriddo et al. 2011a).

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

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

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

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

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

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

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

GnRH Vaccine Effects on Other Organ Systems

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

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

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

Several studies have monitored animal health after immunization against GnRH. GonaCon treated mares did not have any measurable difference in uterine edema (Killian 2006, 2008). Powers et al. (2011, 2013) noted no differences in blood chemistry except a mildly elevated fibrinogen level in some GonaCon treated elk. In that study, one sham-treated elk and one GonaCon treated elk each developed leukocytosis, suggesting that there may have been a causal link between the adjuvant and the effect. Curtis et al. (2008) found persistent granulomas at GonaCon-KHL injection sites three years after injection, and reduced ovary weights in treated females. Yoder and Miller (2010) found no difference in blood chemistry between GonaCon treated and control prairie dogs. One of

15 GonaCon treated cats died without explanation, and with no determination about cause of death possible based on necropsy or histology (Levy et al. 2011). Other anti-GnRH vaccine formulations have led to no detectable adverse effects (in elephants; Boedeker et al. 2011), though Imboden et al. (2006) speculated that young treated animals might conceivably have impaired hypothalamic or pituitary function.

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

GnRH Vaccine Effects on Fetus and Foal

Although fetuses are not explicitly protected under the WFRHBA of 1971, as amended, it is prudent to analyze the potential effects of GonaCon-Equine or other anti-GnRH vaccines on developing fetuses and foals. GonaCon had no apparent effect on pregnancies in progress, foaling success, or the health of offspring, in horses that were immunized in October (Baker et al. 2013), elk immunized 80-100 days into gestation (Powers et al. 2011, 2013), or deer immunized in February (Miller et al. 2000). Kirkpatrick et al. (2011) noted that anti-GnRH immunization is not expected to cause hormonal changes that would lead to abortion in the horse, but this may not be true for the first 6 weeks of pregnancy (NRC 2013). Curtis et al. (2011) noted that GonaCon-KHL treated white tailed deer had lower twinning rates than controls, but speculated that the difference could be due to poorer sperm quality late in the breeding season, when the treated does did become pregnant. Goodloe (1991) found no difference in foal production between treated and control animals.

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

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

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

Indirect Effects of GnRH Vaccination

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

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

Following resumption of fertility, the proportion of mares that conceive and foal could be increased due to their increased fitness; this has been called by some a ‘rebound effect.’ Elevated fertility rates have been observed after horse gathers and removals (Kirkpatrick and Turner 1991). More research is needed to document and quantify these hypothesized effects. If repeated contraceptive treatment leads to a prolonged contraceptive effect, then that may minimize or delay the hypothesized rebound effect. Selectively applying contraception to older animals and returning them to the HMA could reduce long-term holding costs for such horses, which are difficult to adopt, and could negate the compensatory reproduction that can follow removals (Kirkpatrick and Turner 1991).

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

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

Behavioral Effects of GnRH Vaccination

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

While successful in mares, GonaCon and other anti-GnRH vaccines are expected to induce fewer estrous cycles when compared to non-pregnant control mares. This has been observed in many studies (Garza et al. 1986, Curtis et al. 2001, Dalin et al. 2002, Killian et al. 2006, Dalmau et al. 2015). In contrast, PZP vaccine is generally expected to lead mares to have more estrous cycles per breeding season, as they continue to be receptive to mating while not pregnant. Females treated with GonaCon had fewer estrous cycles than control or PZP-treated mares (Killian et al. 2006) or deer (Curtis et al. 2001). Thus, concerns about PZP treated mares receiving more courting and breeding behaviors from stallions (Nuñez et al. 2009, Ransom et al. 2010) are not generally expected to be a concern for mares treated with anti-GnRH vaccines (Botha et al. 2008).

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

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

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

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

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

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

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

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

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

Genetic Effects of GnRH Vaccination

Genetic effects of GonaCon would be expected to be comparable to those for PZP.

<u>Gelding</u>

Direct impacts to the animal are considered here to be those related to the physical aspect of gelding and indirect impacts are those related to social behaviors and herd dynamics. No long-term effects to the overall health of the males are expected, other than sterility and associated effects such as reduced testosterone levels.

Very few studies have been conducted on techniques for reducing male fertility. Nelson (1980) and Garrott and Siniff (1992) modeled potential efficacy of male-oriented contraception as a population management tool, and both studies agreed that while slowing growth, sterilizing only dominant males (i.e., harem-holding stallions) would result in only marginal reduction in female fertility rates. Eagle et al. (1993) and Asa (1999) tested this hypothesis on herd management areas (HMAs) where dominant males were vasectomized. Their findings agreed with modeling results from previous studies, and they also concluded that sterilizing only dominant males would not provide the desired reduction in population growth rate, assuming that the numbers of fertile females is not changed. While bands with vasectomized harem stallions tended to have fewer foals, breeding by bachelors and subordinate stallions meant that population growth still occurred. Collins and Kasbohm (2016) demonstrated reduced population growth rates in a feral horse herd with both spayed and vasectomized horses. Garrott and Siniff (1992) concluded from their modeling that male sterilization would effectively suppress population growth only if a large proportion of males (>85%) could be sterilized, regardless of social order. That level of gelding is not being proposed as part of this alternative. However, sterilization of >85% of males in a population may have genetic consequences, reducing heterozygosity and increasing inbreeding coefficients, as it would potentially allow a very small group of males to dominate the breeding (as seen in equid reintroductions: Saltz et al. (2000), King unpublished data).

Although such genetic consequences could be mitigated, the question of how >85% gelded males in a population would interact with intact stallions and mares and with their habitat is unknown. Garrott and Siniff's (1992) model predicts that gelding 50-80% of mature males in the population would result in reduced, but not halted, population growth. However, it is predicted that within 2 years of this treatment an entire foal crop of fertile males would become sexually mature, so the 85% treatment would have to be repeated until foaling was suppressed. Even then after just a few years there would be an accumulation of fertile males coming to maturity. There is an ongoing BLM study in Utah focused on the individual or population-level effects of gelding males in a free-roaming horse population (BLM 2016), but results from that study may not be available for some years.

Direct Effects of Gelding

Castration (the surgical removal of the testicles, also called gelding or neutering) is a well-established surgical procedure for the sterilization of domestic and wild horses. The procedure is relatively straight forward, rarely leads to serious complications, and seldom requires postoperative veterinary care. Despite livestock being managed by castrating males for centuries, there has been remarkably little research on castrates (Hart and Jones 1975, Jewell 1997).

Gelding adult male horses results in reduced production of testosterone which directly influences reproductive behaviors. Although 20-30% of domestic horses, whether castrated pre- or post-puberty, continued to show stallion-like behavior (Line et al. 1985), it is assumed that free-roaming wild horse geldings would exhibit reduced aggressive and reproductive behaviors. Gelding of domestic horses most commonly takes place before or shortly after sexual maturity, and age-at-gelding can affect the degree to which stallion-like behavior is expressed later in life. The behavior of wild horse geldings in the presence of intact male horses has not been studied or well documented. Decreases in testosterone may decrease muscle mass over time, relative to intact stallions.

Though gelding is a common surgical procedure, minor complications are not uncommon after surgery, and it is not always possible to predict when postoperative complications would occur. The most common complications are almost always self-limiting, resolving with time and exercise. Individual impacts to the stallions during and following the gelding process should be minimal and would mostly involve localized swelling and bleeding. A small amount of bleeding is normal and generally subsides quickly, within 2-4 hours following the procedure. Some localized swelling of the prepuce and scrotal area is normal and may begin between one to 5 days after the procedure. Swelling should be minimized through the daily movements (exercise) of the horse during travel to and from foraging and watering areas. Most cases of minor swelling should be back to normal within 5-7 days, more serious cases of moderate to severe swelling are also self-limiting and resolve with exercise after one to 2 weeks.

Serious complications (eviscerations, anesthetic reaction, injuries during handling, etc.) that result in euthanasia or mortality during and following surgery are rare and vary according to the population of horses being treated. Normally one would expect serious complications in less than 5% of horses operated under general anesthesia, but in some populations these rates can be as high as 12% (Shoemaker 2004).

As was reviewed for spayed mares, it is not expected that gelding would lead to bone frailty in wild horses. Any gelding under this alternative will have developed strong bones from 10-20 years of life in the wild, and continued vigorous exercise is expected to maintain bone strength.

Behavioral Effects of Gelding

Exactly what effect gelding an adult stallion and releasing him back in to a wild horse population would have on his behavior and that of the wider population is unknown. Despite livestock being managed by castrating males for centuries, there has been remarkably little research on castrates (Hart and Jones 1975, Jewell 1997). Stallion behaviors are better understood, and it is not clear how the behaviors of geldings will change, or how quickly any change will occur after surgery. Feral horses typically form bands composed of an adult male with 1 to 3 adult females and their immature offspring (Feist and McCullough 1976, Berger 1986, Roelle et al. 2010). In many populations subordinate 'satellite' stallions have been observed associating with the band, although the function of these males continues to be debated (see Feh 1999, and Linklater and Cameron 2000). Juvenile offspring of both sexes leave the band at sexual maturity (normally around two or three years of age (Berger 1986), but adult females may remain with the same band over a span of years. Group stability and cohesion is maintained through positive social interactions and agonistic behaviors among all members, and herding and reproductive behaviors from the stallion (Ransom and Cade 2009). Group movements and consortship of a stallion with mares is advertised to other males through the group stallion marking dung piles as they are encountered, and over-marking mare eliminations as they occur (King and Gurnell 2006).

In horses, males play a variety of roles during their lives (Deniston 1979): after dispersal from their natal band they generally live as bachelors with other young males, before associating with mares and developing their own breeding group as a harem stallion or satellite stallion. In any population of horses not all males will achieve harem stallion status, so all males do not have an equal chance of breeding (Asa 1999). Stallion behavior is thought to be related to androgen levels, with breeding stallions having higher androgen concentrations than bachelors (Angle et al. 1979, Chaudhuri and Ginsberg 1990). A bachelor with low libido had lower levels of androgens, and two year old bachelors had higher testosterone levels than two year olds with undescended testicles who remained with their natal band (Angle et al. 1979).

Although libido and the ability to ejaculate tends to be gradually lost after castration (Thompson et al. 1980) some geldings continue to intromit (Rios and Houpt 1995). Stallion-like behavior in domestic horse geldings is relatively common (Smith 1974), being shown in 20-33% of cases whether the horse was castrated pre- or post-puberty (Line et al. 1985, Rios and Houpt 1995). While some of these cases may be due to cryptorchidism or incomplete surgery, it appears that horses are less dependent on hormones than other mechanisms for the maintenance of sexual behavior (Smith 1974). Domestic geldings exhibiting masculine behavior had no difference in testosterone concentrations than other geldings (Line et al. 1985), and in some instances the behavior appeared context dependent (Borsberry 1980, Pearce 1980). Domestic geldings had a significant prolactin response to sexual stimulation, but lacked the cortisol response present in stallions (Colborn et al. 1991).

Dogs and cats are commonly neutered, and it is also common for them to continue to exhibit reproductive behaviors several years after castration (Dunbar 1975). Dogs, ferrets, hamsters, and marmosets continued to show sexually motivated behaviors after castration, regardless of whether they had previous experience or not, although in beagles and ferrets there was a reduction in motivation post-operatively (Hart 1968, Dunbar 1975, Dixson 1993, Costantini et al. 2007, Vinke et al. 2008). Ungulates continued to show reproductive behaviors after castration, with goats and llamas continuing to respond to females even a year later in the case of goats, although mating time and the ejaculatory response was reduced (Hart and Jones 1975, Nickolmann et al. 2008).

No study has quantified the effect of castration on aggression in horses, with only one report noting that aggression was a problem in domestic horse geldings who also exhibited sexual behaviors (Rios and Houpt 1995). Castration is thought to increase survival as males are released from the cost of reproduction (Jewell 1997). In Soay sheep castrates survived longer than rams in the same cohort (Jewell 1997), and Misaki horse geldings lived longer than intact males (Kaseda et al. 1997, Khalil and Murakami 1999).

In a pasture study of domestic horses, Van Dierendonk et al. (1995) found that social rank among geldings was directly correlated to the age at which the horse was castrated, suggesting that social experiences prior to sterilization may influence behavior afterward. Of the two geldings present in a study of semi-feral horses in England, one was dominant over the mares whereas a younger gelding was subordinate to older mares; stallions were only present in this population during a short breeding season (Tyler 1972).

A study of domestic geldings in Iceland held in a large pasture with mares and sub-adults of both sexes, but no mature stallions, found that geldings and sub-adults formed associations amongst each other that included interactions such as allo-grooming and play, and were defined by close proximity (Sigurjónsdóttir et al. 2003). These geldings and sub-adults tended to remain in a separate group from mares with foals, similar to castrated Soay sheep rams (*Ovis aries*) behaving like bachelors and grouping together, or remaining in their mother’s group (Jewell 1997).

In Japan, Kaseda and Khalil (1996) reported that young males dispersing from their natal harem and geldings moved to a different area than stallions and mares during the non-breeding season. Although the situation in Japan may be the equivalent of a bachelor group in natural populations, in Iceland this division between mares and the rest of the horses in the herd contradicts the dynamics typically observed in a population containing mature stallions. Sigurjónsdóttir et al. (2003) also noted that in the absence of a stallion, allo-grooming between adult females increased drastically. Other findings included increased social interaction among yearlings, display of stallion-like behaviors such as mounting by the adult females, and decreased association between females and their yearling offspring (Sigurjónsdóttir et al. 2003). In the same population in Iceland Van Dierendonck et al. (2004) concluded that the presence of geldings did not appear to affect the social behavior of mares or negatively influence parturition, mare-foal bonding, or subsequent maternal activities. Additionally, the welfare of broodmares and their foals was not affected by the presence of geldings in the herd. These findings are important because treated males in this alternative will potentially interact with pregnant mares and mares with foals of the year.

These few studies may not reflect behavior of free-roaming wild horses in the western US, where ranges are much larger, intact stallions are present year-round, and population size and density may be highly variable. Additionally, no study exists on the behavior of wild stallions pre- and post-castration, and what effects this will have on their group membership, home range, and habitat use. Studies on sterilization of harem stallions to control population growth all acknowledge that success is dependent on a stable group structure, as strong bonds between a stallion and mares reduce the probability of a mare mating an extra-group stallion (Nelson 1980, Garrott and Siniff 1992, Eagle et al. 1993, Asa 1999).

Bands of horses tend to have distinct home ranges, varying in size depending on the habitat and varying by season, but always including a water source, forage, and places where horses can shelter from inclement weather or insects (King and Gurnell 2006). By comparison, bachelor groups tend to be more transient, and can potentially use areas of good forage farther from water sources, as they are not constrained by the needs of lactating mares in a group. It is unknown whether gelded stallions will behave like group stallions, bachelors, or form a group of their own concentrating in prime habitat or in the vicinity of water sources due to reduced desire for mare acquisition, maintenance, and reproductive behaviors.

The BLM does anticipate that gelded individuals may exhibit some behavioral differences, when compared to their own pre-treatment behaviors, or when compared to other intact stallions. There is no evidence to suggest that a gelded wild horse would become docile or its patterns of movement within the HMA or the Complex be hindered as a result of castration. While it may be that a gelded horse could have a different set of behavioral priorities than an intact stallion, the expectation is that geldings will choose to act upon their behavioral priorities in an unhindered way, just as is the case for an intact stallion. In this sense, a gelded male would be just as much ‘wild’ as defined by the act as any intact stallion, even if his patterns of movement differ from those of an intact stallion.

Wild horse movements may be motivated by a number of biological impulses, including the search for forage, water, and social companionship that is not of a sexual nature. As such, a gelded animal would still be expected to have a number of internal reasons for moving across a landscape and, therefore, exhibiting ‘free-roaming’ behavior. BLM fully expects that geldings would remain feisty and unruly with respect to humans.

A high fraction of stallions and jacks in the complex would not be gelded, and would remain reproductive. Gelding a small subset of stallions would not prevent other stallions and mares from continuing with the typical range of social behaviors for sexually active adults.

Demographic and Genetic Effects of Gelding

Because the fraction of males gelded is not expected to come anywhere close to the ~85% threshold suggested by Garrott and Siniff (1992) as being necessary to substantially reduce population growth rates, is not expected that gelding a relatively small subset of stallions will significantly change the social structure or herd demographics (age and sex ratios) of wild horses that remain in the Complex.

While geldings are unable to contribute to the genetic diversity of the herd, it does not lead to an expectation that the Complex would experience inbreeding. Existing levels of genetic diversity were high when last measured, and expectations are that heterozygosity levels are even higher now that the population has continued to grow exponentially. In addition, because stallions selected would be between ages 10-20, stallions that are gelded would be expected to have already had a chance to breed, or have already passed on genetic material to their offspring. Herds within the Complex are not at immediate risk of catastrophic loss of genetic diversity. Herds within the Complex would be viable due to the fact that the treated population would still have mares and intact stallions at all times.

It is not expected that genetic health would be impacted, due to the relatively low numbers of geldings in this alternative. The AML range of 345-555 wild horses would provide adequate opportunity for genetic health, even if 50 mares are spayed and 50 studs are gelded. Following analysis of samples that would be collected, the Winnemucca District would work with Dr. Gus Cothran's recommendations to develop plans to maintain and further improve genetic health.

4.16.4 Impacts from Alternative C

No Action Alternative

Under the No Action alternative, AML would not be achieved within the Complex and excess wild horses would not be removed from areas within or outside of the designated HMAs. There would be no active management to control the size of the population at this time. Wild horse populations would continue to increase at an average rate of 15-25% per year. Without population control, the wild horse population in the Complex would double within 4-5 years based on population annual reproduction rate estimates. These population levels would continue to exceed the carrying capacity of the range.

AML is the maximum population at which a thriving natural ecological balance would be maintained and that avoids deterioration of the rangeland. The increasing population of wild horses even further in excess of AML under the No Action alternative would over-extend and deplete water and forage resources. Excessive utilization, trampling, and trailing by wild horses would further degrade the vegetation, prevent improvement of range that is already in less than desirable or in degraded condition, would degrade currently healthy rangelands, and would not allow for sufficient availability of forage and water for either wild horses or other ungulates, especially during drought years, fire, or severe winter conditions.

Wild horses are a long-lived species with documented foal survival rates exceeding 95% (See WinEquus in the Appendix section). Survivability rates collected through research efforts are as follows:

> Pryor Mountain Wild Horse Range, Montana: >95%; 15 years and younger, except for foals, both sexes: 93%;
>
> Granite Range HMA, Nevada: >95%; 15 years and younger, except for male foals: 92%;
>
> Garfield Flat HMA, Nevada: > 95%; 24 years and younger, except both foals, both sexes: 92%.

Usually the habitat is severely, if not irreversibly, damaged before the wild horse population is abruptly impacted and experiences substantial death loss. Once the vegetative and water resources are at these critically low levels due to excessive utilization by an over population of wild horses, the weaker animals, generally the older animals and the mares and foals, are the first to be impacted. It is likely that a majority of these animals would die from starvation and dehydration. The resultant population would be heavily skewed towards the stronger stallions which would lead to substantial social disruption in the HMAs. Fighting among wild horse studs would increase as they protect their position at scarce water sources, and injuries and death to all age classes of animals would be anticipated. Substantial loss of the wild horses in the Complex due to starvation or lack of water would have obvious consequences to the long-term viability of the herd. By managing the public lands in this way, the vegetative and water resources would be impacted first and to the point that they have no potential for recovery.

Trampling and trailing damage by wild horses in/around riparian areas would also be expected to increase, resulting in larger, more extensive areas of bare ground. This degree of damage would have significant future impacts to the Complex and all other users of the range's resources. Competition for the available water and forage between wild horses, domestic livestock, and native wildlife would increase.

As populations increase beyond the capacity of the habitat to sustain them, more bands of wild horses would leave the boundaries of the HMAs in search of forage and water. This alternative would also result in increasing numbers of wild horses in areas not designated for their use, and would not achieve the stated objectives for herd management areas, to "prevent the range from deterioration associated with overpopulation", and "preserve and maintain a thriving natural ecological balance and multiple use relationship in that area".

4.17 Wilderness Study Areas

4.17.1 Impacts from Actions Common to Alternatives A-B

Four WSAs exist within the project area: China Mountain WSA (NV-020-406P), Tobin Range WSA (NV 020-406Q), Augusta Mountains (NV-030-108), and North Stillwater Range (NV-030-104). Section 603 (c) of FLPMA directs how the BLM is to manage "lands under wilderness review," which includes WSAs. These lands are to be managed in a manner so as not to impair the suitability of such areas for preservation as wilderness. Consequently, actions proposed within WSAs are to be evaluated on the basis of their possible direct and indirect impacts on wilderness values of naturalness, solitude and primitive or unconfined recreation, and special features. All temporary trap sites and/or holding corrals fall outside these WSA boundaries. Wild horses located within the WSAs would be driven out with helicopters and trapped outside of the WSA (BLM Manual-6330-Sec D.9A, pg 1-36).

Wild horses are managed to remain in balance with the productive capacity of the habitat; this includes managing herds so as not to impair wilderness characteristics. Wild horse populations must be managed at appropriate management levels so as to not exceed the productive capacity of the habitat (as determined by available science and monitoring activities), to ensure a thriving natural ecological balance, and to prevent impairment of wilderness characteristics, watershed function, and ecological processes. The BLM should limit population growth or remove excess animals as necessary to prevent the impairment of the WSA.

In the short-term, the sight and noise of helicopters would be noticeable throughout the wilderness study areas during gather operations and would reduce opportunities for solitude. However, conducting gathers during the winter months when visitation is least would minimize these effects. Over the long-term, removals would decrease trampling, trailing, hedging, and forage utilization of native grasses thereby maintaining vegetative cover and natural conditions.

Gather activities would not have an immediate direct impact on the area's naturalness quality. Achieving and maintaining within AML ranges would decrease trampling, trailing, hedging, and forage utilization of native grasses. Over the period of analysis, components of the naturalness quality, such as vegetative cover and riparian areas, would improve thus improving the natural conditions of the area. Reducing competition for water would improve wildlife which is also a component of the naturalness quality.

4.17.2 Impacts from Alternative A

Fertility Control and/or Spaying, with or without Gathers

Impacts are anticipated to be similar as those described under Impacts from Actions Common to Alternatives A-B. Impacts to the naturalness would occur gradually over 20 years.

4.17.3 Impacts from Alternative B

Multiple Gathers and Removals with Fertility Control

Under this alternative, impacts to opportunities for solitude would be based on the number of gathers and removals over time. Removal of wild horses under this alternative would have impacts to the naturalness characteristics similar to those described under Impacts from Actions Common to Alternatives A-B; however impacts would be intermittent in nature.

4.17.4 Impacts from Alternative C

No Action Alternative

The No Action Alternative would not result in direct impacts to solitude from gather operations. The indirect impacts from the current over-population of wild horses would include removal of natural vegetation, damage to water sources, and increased erosion. These impacts represent continued and accelerating degradation of the quality of the natural conditions, scenic qualities, and conservation aspects of wilderness characteristics. Expansion of invasive plant species due to removal of vegetation from trampling and overgrazing would result in long-term degradation of the naturalness and untrammeled conditions. These impacts represent continued and increasing degradation of natural conditions and are inconsistent with current policy for the management of wild horse populations within WSAs.

4.18 Wildlife

4.18.1 Impacts from Actions Common to Alternatives A-B

In addition to direct impacts previously analyzed for Migratory Bird and Special Status Species, direct impacts would consist primarily of disturbance and displacement to wildlife by the low-flying helicopter, running wild horses, and construction of temporary trap/holding facilities. Typically, the natural survival instinct of wildlife to this type of disturbance is to flee from the perceived danger. These impacts would be minimal, temporary, and of short duration. There is a slight possibility that less mobile animals would be trampled.

Indirect impacts would be related to wild horse densities and patterns of use. Achieving and maintaining within AML ranges would decrease competition for available cover, space, forage, and water between wild horses and other wildlife. Decreased wild horse levels would reduce conflicts between wild horses and wildlife at limited water sources. Reduced consumption of vegetation would result in increased plant vigor, production, seedling establishment, and ecological health of important wildlife habitat. Resident populations of mule deer and pronghorn would benefit from an increase in forage availability, vegetation density, and structure.

4.18.2 Impacts from Alternative A

Fertility Control and/or Spaying, with or without Gathers

The scale of direct impacts discussed above (*Impacts from Actions Common to Alternatives A-B*) would depend on the relative frequencies of gather methods. Under this alternative, the indirect impacts to wildlife species would phase-in gradually over the 20 year lifespan, and would be permanent as long as population control is maintained.

4.18.2 Impacts from Alternative B

Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding

This alternative would have same direct impacts as Alternative A. However, each removal would lead to immediate indirect impacts to wildlife species, which would likely be maintained and enhanced by the other actions within this alternative.

4.18.3 Impacts from Alternative C

No Action Alternative

No direct impacts are expected under this alternative. Maintaining the current numbers of excess wild horses on the range, augmented by yearly population growth, would result in continued impacts to wildlife populations and habitats. Wild horse populations would increase by about 15-25%. Upland habitats would continue to see locally heavy levels of consumption and use associated with wild horses, which would expand into wildlife habitat as increasing populations continue to seek forage. The associated decrease in herbaceous vegetation would reduce wildlife forage availability and quality, decreasing population levels. Wildlife habitat would also continue to be impacted by the physical action of wild horse movement. Habitats associated with wetland

and riparian areas would remain degraded due to removal of residual stubble height and compaction, leading to increased disturbance and levels of bare ground. Increasing wild horse populations would continue to trample riparian areas, thereby degrading riparian habitats and the important functions these sites represent for many wildlife species.

Chapter 5. Cumulative

NEPA regulations define cumulative impacts as impacts on the environment that result from the incremental impact of each alternative when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other 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 Assessment Area for the purpose of this analysis is the East Pershing Complex (Figure 1). This assessment area is the same as that used for analysis of direct and indirect impacts described earlier in the document. As the assessment area encompasses HMAs, HAs, as well as non-HMA areas where impacts from excess wild horses occur, it is sufficient geographically to cover potential cumulative impacts.

5.1. Past and Present Actions

Past wild horse gathers and removals conducted have influenced the condition of the environment within the cumulative assessment area. These gathers and removals have resulted in the capture of some 7,948 wild horses, the removal of 7,125 excess wild horses and release of 4,075 wild horses back into East Pershing Complex. Refer to *Table 13. East Pershing Complex Gather History in Chapter 3 Wild Horses section.*

In addition, Past and Present Actions which have impacted the assessment area to varying degrees consist of: livestock grazing, lands and realty, mining, recreation, creation of WSAs, and wildfires. Information on Past and Present actions was gathered from aerial photographic data, agency records, GIS, and BLM Legacy Rehost 2000 database (which records lands and mineral actions)

5.1.1. Livestock Grazing

Forage utilization during the 1900s was high when thousands of cattle, sheep, and horses grazed lands in northern Nevada. In the 1930s when overgrazing threatened to reduce Western rangelands to a dust bowl, Congress approved the Taylor Grazing Act (TGA) in 1934, which for the first time regulated grazing on public lands. The TGA required ranchers who grazed horses or livestock on public lands to have a permit and to pay a grazing fee, but by that time, thousands of wild horses roamed the Nevada desert unbranded and unclaimed.

Prior to the TGA, livestock grazing practices resulted in major impacts to soil resources and the vegetation communities they supported. As a result, historic livestock grazing activities prior to the TGA had significant impacts on the vegetation resources within the impact assessment area by eliminating or greatly reducing the primary understory plants. Cheatgrass was introduced into the area in the early 1900s.

Prior to the TGA, livestock grazing practices also significantly impacted wetland and riparian zones. Wetland and riparian zones declined, riparian vegetation was insufficient to dissipate energy or to filter sediments, thereby increasing erosion and destabilizing stream banks and meadows. Destabilization of streams and meadows led to incised channels and gullies resulting in lowered water tables. In an effort to prevent adverse impacts to rangeland health and to support and better distribute livestock on the public range, a variety of range improvement projects have been implemented through the years dating back to the 1930s.

A series of livestock grazing decisions since the TGA and as required by FLPMA and the Public Rangelands Improvement Act (PRIA) of 1978 have resulted in reductions in livestock numbers and changes in seasons of use and in grazing management practices to promote rangeland health within grazing allotments. Other management changes have also resulted in restrictions on when, where, and how long livestock can graze, to minimize potential impacts to rangeland health.

Current livestock grazing management has helped reduce the impacts livestock have on soil and has maintained soil resource conditions.

5.1.2. Lands and Realty

According to BLM records, LR 2000, GIS data, past and present lands actions that have impacted the cumulative assessment area to varying degrees are: transportation and access (use and maintenance of roads and trails), development of utilities (power lines, natural gas line, fiber optic lines, communication sites), water pipelines, and easements across private lands.

Transportation and access – Past and present actions within the assessment area are supported by an extensive transportation system. Most of these roads originated from mining exploration or ranching access and few are regularly maintained.

Utilities -Power lines, and other various land authorizations identified above, traverse the assessment area and have been in place for many years. Periodic maintenance to the existing facilities has resulted in some temporary vegetation removal and short term disturbance to wild horses due to human presence.

5.1.3. Minerals

There has been mining activity within the cumulative impact assessment area since the 1870s. These were open pit or underground mines initiated to produce gold, silver, lead, copper, tin, zinc, mercury, tungsten, molybdenum, arsenic, antimony, uranium, diatomite, gypsum, limestone, iron, montmorillonite, sodium chloride, borates, sulfur, titanium, or perlite. Some of these operations ended prior to current reclamation requirements and it is unlikely that any of these mining-related disturbances were reclaimed, although natural re-vegetation over time may have partially reclaimed some disturbances.

In the East Pershing Complex there are sixteen active mining and exploration operations totaling approximately 55,396 acres. There are thirteen projects being evaluated through NEPA. There are 33 Notice level exploration operations as described in the surface management regulations at 43 CFR 3809. Approximately 25 gravel pits totaling approximately 753 acres are located within the Complex. Surface disturbance is required to be reclaimed as soon as practical. There are two geothermal operations within the Complex.

5.1.4. Recreation

Recreation resources that exist in the area are mainly outdoor recreation including, wildlife watching/photography, wild horse watching/photography, rock hounding, motocross racing and hunting for both large and small game. Visitor use levels range from extremely low in winter, low to moderate in the summer and peak in the fall, with weekends throughout the various hunting seasons having the highest visitation of the year.

5.1.5. Wild Horses

Refer to *Chapter 3 Wild Horses* for more information on AML establishment, current population, aerial population counts, growth rates, genetic analysis and herd history, gather history, and wild horse use and habitat health.

The actions which have influenced the wild horse populations in existence today are primarily gathers and removals, which resulted in the capture of some 7,948 wild horses, the removal of 7,125 excess wild horses and release of 423 wild horses back into East Pershing Complex. Refer to *Table 13. East Pershing Complex Gather History in Chapter 3 Wild Horses section.*

5.1.6. Wilderness Study Areas

There are four WSAs within the Complex (See Chapter 3 WSA section). Since designation, the areas have been managed to protect and enhance their wilderness character including naturalness and outstanding opportunities for solitude and primitive recreation. As only Congress can change WSA designation, this management would be expected to continue.

5.1.7. Wildfires

Since 1984, 163 wildfires have burned approximately 559,106 acres in the cumulative impact assessment area or 22% of the total planning area. The largest fire, Spaulding, occurred in 2001 consuming 75,137 acres within the Complex. Burned areas were rehabilitated or allowed to recover naturally with varying degrees of success. Table 4 contains a summary of the fire history within the East Pershing Complex since 1984.

5.2. Reasonably Foreseeable Future Actions

All past and present actions discussed in *Chapter 5.1* are expected to continue into the foreseeable future.

5.2.1. Lands and Realty

Several road and transmission line rights-of-way (ROWs), land sales, and the Jersey Valley pipeline and ditch and reservoir are currently pending evaluation by the BLM.

5.2.2. Livestock Grazing

Livestock grazing is expected to continue at similar stocking rates. Allotment management plans focusing on BLM’s multiple use mandate are expected to be revised or developed for the allotments in the Complex, during the timeframe of this analysis.

5.2.3 Minerals

There are currently two projects being evaluated through NEPA (Lincoln Hill and Wilco Exploration Project totaling approximately 24,000 acres).

5.2.4. Recreation

Recreational use is expected to increase, approximately five percent annually, as a result of population growth and family oriented activities. Some activities, such as hunting and off-road vehicle use would likely continue and/or increase over time (Winnemucca RMP Analysis of the Management Situation, 2005). The assessment area includes eight NDOW Hunt Units.

5.2.5. Wild Horses
Wild horse populations are expected to continue to increase. The rate of increase would be dependent on the alternative chosen. BLM would only provide water for wild horses in periods of critical need. Water hauling actions would be evaluated under NEPA at that time.

5.2.6. Wildfires
Wildfire ES&R efforts would continue as the needs are identified and actions are approved. Excess wild horses would cumulatively reduce native vegetation creating niches for invasive annual grasses which are known to increase wildland fire intensity. Wild horse numbers over AML would also impact the re-establishment of native vegetation after fires due to over grazing and trampling of newly planted vegetation. The area of impact on ES&R treatments would be expanded as wild horse populations migrate into non-managed HAs.

5.3. Cumulative Impacts
Impacts associated with past, present, and reasonably foreseeable future actions are generally created by ground or vegetation-disturbing activities that affect natural and cultural resources in various ways. Of particular concern is the accumulation of these impacts over time. This section of the EA considers the nature of the cumulative effect and analyzes the degree to which the alternatives contribute to the collective impact.

Due to the similar cumulative impacts to Migratory Birds, Special Status Species and Wildlife, these resources are combined into one section for analysis in this chapter. Water quality and riparian habitats have been similarly combined. Threatened and Endangered Species and fisheries have been combined due to similarity in cumulative impacts.

Based on conclusions reached in previous chapters, no cumulative impacts are expected on Public Health and Safety.

5.3.1 Areas of Critical Environmental Concern (ACEC)

Impacts from Past and Present Actions

A portion of the Stillwater Range was designated as an ACEC through the May 2015 WD RMP/ROD because of its “significant historic, cultural, religious, and scenic values important to Native Americans” (BLM 2015a:12). The earliest ethnographic documents indicate that Native Americans were using the Stillwater Range 100 years ago, and archaeological data confirms that they used the area for thousands of years prior to that. Since Euro-American entrance into Nevada, historical actions such as homesteading, livestock grazing, mineral extraction, and road construction have driven Native Americans from their traditional lands—including the Stillwater Range—confined them to reservations, and despoiled their culture. In the recent past and present various multiple uses—such as livestock grazing, lands and realty actions, mining, recreation, wild horses, and wildfire—have impacted various areas of the Stillwater Range.

Livestock and wild horses have both caused direct and indirect impacts to vegetation, soils, water quality, and the visual quality of a landscape; all of which has impacted the Stillwater Range ACEC. The ACEC contains portions of six grazing allotments (Cottonwood Canyon, Jersey Valley, Pleasant Valley, Rawhide, South Buffalo, and South Rochester), one HMA (North Stillwater), and one HA (East Range). Over-grazing by livestock and wild horses limits vegetation and water availability, which can negatively impact the health and sustainability of both wildlife and vegetation while also impacting traditional Native American hunting grounds and gathering areas. Over-grazing can also negatively impact water sources—considered sacred by many tribes including those known to have utilized the Stillwater Range for generations—through increased erosion and sedimentation. Additionally, Native American religious and traditional cultural practices are often performed in conjunction with the land, and can be impacted from over-grazing by livestock and wild horses primarily through the visual loss of vegetation. The physical loss of vegetation caused by livestock and wild horses is important as well because particular plants are important to Native Americans for food and medicine as well as for traditional practices and ceremonies.

Realty actions have caused impacts through the authorization of access and the permitting of structures and activities. Such actions have resulted in more human activity, noise, and disturbance to the Stillwater Range, impacting cultural sites and areas of traditional use by Native Americans that contributed to its designation as an ACEC.

Mining activities have caused both direct and indirect impacts to areas of the Stillwater Range ACEC. Potential direct impacts from mining activity include ground disturbance related to the removal of material as well as the construction of mining infrastructure. Potential indirect impacts from mining activities include visual, auditory, and atmospheric disturbances related to the removal and processing of material and the presence of mining infrastructure on the landscape.

Certain recreational activities, such as off-highway vehicle operation, cause direct and indirect impacts to cultural resources through direct ground disturbance and increased erosion. Looting and vandalism of archaeological sites—which are considered to be sacred by many tribes—also occur as a result of various recreational activities. Additional recreational activities specific to the Stillwater Range ACEC include fuelwood cutting and the cutting of Christmas trees. Concentrated use has resulted in overcutting in parts of the ACEC to the point that certain parts of the ACEC have been removed from cutting area maps.

Wildfire has caused both direct and indirect impacts to the Stillwater Range ACEC. One human-caused 40-acre fire and two 6,000+ acre fires have been documented from 1985 to 2017. Potential direct impacts from wildfire include destruction of vegetation, destruction of important cultural or archaeological sites, and ground disturbance related to wildfire suppression. Potential indirect impacts from wildfire include erosion and the introduction of non-native vegetation into burned areas.

<u>Impacts from Reasonably Foreseeable Future Actions</u>
Impacts to the Stillwater Range ACEC described in the Impacts from Past and Present Actions section (5.3.1.1) are likely to continue albeit with some variability.

Recreational activities are expected to increase in the future (*Chapter 5.2 Reasonably Foreseeable Future Actions – Recreation*), resulting in a proportionate increase of impacts related to ground disturbance, erosion, looting, and vandalism as described in *Chapter 5.3*. Wildfire in specific areas of the Stillwater Range ACEC could result in the reduction or destruction of culturally important plants and the degradation of sacred landscapes. Impacts from reasonably foreseeable future actions are likely to be proportional to the amount, size, and scope of any future actions; however, any reasonably foreseeable future actions authorized by the BLM would be subject to mitigation to minimize or avoid impacts.

Cumulative Impacts
No direct cumulative impacts from activities proposed under Alternatives A-B are expected.

Cumulative Impacts from Alternatives A through B.
Previous land management practices and other human activities as described above have contributed to the overall condition of in the East Pershing Complex, including the Stillwater Range ACEC. Indirectly, the wild horse population management goals outlined in Alternatives A through B should result in decreased impacts to resources in the ACEC including cultural resources, TCPs, vegetation, and springs. Managing wild horses to achieve and maintain AML under Alternatives A and B would reduce direct impacts to unique biological and cultural resources within the ACEC. Cumulative impacts to vegetation resources and riparian/areas within the ACEC would be greatly reduced from what is occurring at the present with wild horses over AML. Since there would be an improvement to the ecological condition over time, the condition of the Stillwater Range ACEC would improve accordingly. Impacts to the ACEC from mining, OHV use, livestock grazing, or wildfire activity as discussed in Chapter 5.2 would not be affected by Alternatives A through B.

Cumulative Impacts form Alternative C. No Action Alternative
While Alternative C would not affect impacts from mining, OHV use, livestock grazing, or wildfire activity, this alternative—along with the past, present, and reasonable foreseeable future actions—would continue to increase damage to resources within the Stillwater Range ACEC. Wild horse herd sizes would double every 4-5 years resulting in damage to vegetation and accelerated erosion, which could impact cultural resources, TCPs, springs, and riparian areas.

5.3.2. Cultural Resources

Impacts from Past and Present Actions
Past actions have been known to damage or destroy cultural resources where these actions have occurred in areas of high resource sensitivity. Previous grazing, range improvements, fire suppression activities, road construction/maintenance and accompanying gravel pits, and off-highway vehicle (OHV) use have impacted cultural resources. Since many Great Basin prehistoric sites in the region are surface or near-surface resources, any ground disturbing activities may destroy site integrity, spatial patterning, and site function. In addition, datable organic features are either destroyed or contaminated. Damage of this nature can result from concentration of grazing animals (livestock and wild horses), use and maintenance of roads and trails, development and maintenance of utilities (power lines, natural gas lines, fiber optic lines, communication sites, water pipelines), and recreational activities, such as OHV use. These impacts have generally been mitigated through avoidance, controlled excavation, and cultural resource monitoring. Cultural resources located within WSAs are indirectly protected because of WSA management protocols. However, wildfire can impact cultural resources by destroying wooden and other flammable artifacts and features. A fire of sufficient heat intensity can even shatter prehistoric lithic artifacts.

Looting of cultural resources has heavily impacted sites in the past. Artifacts have been removed and the synchronic context of some sites has been destroyed. Passage of the NHPA of 1966, the

NEPA of 1969, the FLPMA of 1976 and the ARPA of 1979 and an improved level of cooperation between federal law enforcement officers, agency fire fighters, and archaeologists has led to increased protection of cultural resource and reduced impacts to these resources as a result of the actions just described, although OHV use and looting are exacerbated by current population growth trends.

Impacts from Reasonably Foreseeable Future Actions

Impacts to cultural resources described under Impacts from Past and Present Actions would continue. Like impacts from past actions, the reasonably foreseeable future actions would be subject to mitigation and avoidance to minimize impacts. Increase in recreational use, particularly OHV traffic, is especially destructive to cultural resources through direct ground disturbance or by increasing erosion. Looting and vandalism (intentional or accidental) may also occur more often as the population grows and as access and recreational activities increase.

Implementation of laws and regulations, continuing improvement in consultation between fire officials and archaeology staff and increasing awareness of potential impacts that may result from certain wild horse management practices should minimize impacts to cultural resources from authorized activities on public lands.

Cumulative Impacts

No direct cumulative impacts from activities proposed under Alternatives A-B are expected.

Cumulative Impacts from Alternatives A through B.

Previous land management practices and other human activities as described above have contributed to the overall condition of cultural resources in the East Pershing Complex. Indirectly, the wild horse population management goals outlined in Alternatives A through B should result in decreased impacts to cultural resources (see Chapter 4.1). Achieving and maintaining AML under any of these alternatives would improve environmental conditions in riparian areas, which in turn, would decrease potential impacts to cultural resources. Since there would be a slight improvement to the ecological condition of these areas over time, the health and vigor of certain plants used by Native Americans may improve accordingly. However, Alternatives A through B would not affect impacts to cultural resources from OHV use, range improvements, fire suppression activities, or site looting as discussed above.

Cumulative Impacts form Alternative C. No Action Alternative

While Alternative C would not affect impacts to cultural resources from OHV use, range improvements, fire suppression activities, or looting, this alternative along with the past, present, and reasonable foreseeable future actions, would continue to increase damage to cultural resources. Wild horse populations would not be controlled, leading to over grazing and possibly exacerbation of natural erosional processes, which, in turn, could impact cultural sites.

5.3.3. Invasive, Nonnative Species

Impacts from Past and Present Actions

Past impacts from road maintenance, grazing, recreation, wild fires, and other ground disturbing activities have introduced and spread invasive species throughout the assessment area. Cattle, sheep, and horse grazing during the 1900s caused high forage utilization which led to the degradation of the soil medium needed to maintain the desired native perennial understory. These areas of high disturbance caused a decrease in competition of perennial herbaceous grasses and forbs which was exacerbated by the introduction of cheatgrass and other non-native species. Since these non-native species are capable of out-competing most perennial seedlings, increased distribution and abundance of invasive species resulted.

Cattle-trailing continues to be a catalyst in distributing invasive species across the landscape. The TGA of 1934, ongoing grazing management projects, and practices to promote rangeland health have eased the pressure on perennial vegetation; however, areas that were previously invaded by non-native species would likely remain in a dominated state. With correct management, continued livestock grazing within the project area should maintain current conditions. Above AML-range use of the project area by wild horses continues to impact soil and vegetative health, promoting establishment and spread of non-native species.

The establishment of roads, trails, fiber optic lines, communication sites, and water pipelines in lands and realty projects within the Complex, result in varying degrees of ground disturbance. Disturbances that are not re-vegetated with native species create opportunities for non-native establishment and spread. Recreational activities, including OHV use, have provided corridors for weed transportation and establishment. Implementation of best management practices and treatments to control non-native species on disturbed ground within the Complex have reduced the spread of invasive species.

The spread of invasive species following the severe overgrazing that occurred in the 1900s also affected the fire regime. These non-natives contributed to high levels of fine fuel loading, resulting in more frequent fires. Without rehabilitation, burned areas have and would continue to be extremely susceptible to invasive species dominance. Existing areas dominated with invasive species would continue to be susceptible to wildfire ignition.

Impacts from Reasonably Foreseeable Future Actions

With correct management, continued livestock grazing within the Complex should maintain current conditions. Above AML-range use of the Complex by wild horses would continue to impact soil and vegetative health, promoting establishment and spread of non-native species in the future. Water-hauling activities associated with increasing wild horse populations would also provide conduits for invasive species spread within the area.

Disturbances that are not re-vegetated with native species create opportunities for non-native establishment, and spread. Future implementation of best management practices including treatments on ground disturbing activities would occur on public and private land within the assessment area and reduce the spread of invasive species.

In areas with approved OHV routes and recreation sites, implementation of best management practices and invasive species treatments would occur on public and private land which would reduce the spread of invasive species within the Complex. Increased OHV use in unauthorized areas in the future would increase the spread of invasive species and introduce new infestations to these areas.

Areas dominated with invasive species would continue to be susceptible to wildfire ignition. New infestations, as well as increased OHV use could increase the probability of ignition.

Cumulative Impacts

Cumulative Impacts from Actions Common to Alternatives A-B

The cumulative impacts of Alternatives A-B would affect long term management goals to maintain rangeland health and healthy wild horse populations by reducing trailing; which would decrease the probability of invasive species being transported to new locations. The reduction in wild horse numbers would also decrease invasive species competition with native perennial species. The implementation of these alternatives would be expected to increase the success of ES&R treatment projects due to the decrease of excess wild horses. This, in addition to existing mitigation associated with federal actions (such as authorizing right-of-ways) and post-fire rehabilitation efforts, would promote re-establishment of native vegetation in the long term.

Cumulative Impacts from Alternative C. No Action Alternative

Impacts from the continuous growth and overpopulation of the wild horses would add to the impacts from past, present and future actions resulting in large areas that would be susceptible to establishment and spread of invasive species. The No Action Alternative would result in decreased success of ES&R treatment projects due to the increased potential for competition from noxious weeds, and a greater, unmanaged grazing pressure following wildfire.

5.3.4. Migratory Birds, Special Status Species, and Wildlife

Impacts from Past and Present Actions

Wildlife and their habitats have been impacted through wildfire and various multiple uses such as livestock grazing, lands and realty, minerals, recreation, wild horses, WSA designation and associated roads and trails.

Livestock and wild horses would continue to utilize vegetation and impact riparian vegetation, soils and water quality. Therefore, competition with wildlife would persist. These impacts are especially pronounced during times of below average precipitation. Forage and water availability can become limited, and affect wildlife health and fitness.

Range improvements, such as fences and water developments, have been installed over the last several decades and continue to be used and maintained for the purpose of livestock grazing management. Fencing structures limit access and can help reduce impacts to wildlife habitat from livestock, and human activities. Fences may also provide unnatural, advantageous perch sites for avian predators. Water developments have provided additional sources that can support wildlife populations. However, concentrated populations around water sources can increase transmission of disease.

Realty actions have added to impacts to wildlife through transportation and access activities (use and maintenance of roads and trails), development of utilities (power lines, natural gas line, fiber optic lines, and communication sites), water pipelines, and easements across private lands in the assessment area. Some species are reluctant to go near or cross roads, resulting in habitat fragmentation. Additionally, these realty actions have the potential for the introduction and spread of weeds which results in increased competition with native plant species important to wildlife.

The prominent impacts associated with mineral related activities include habitat fragmentation and loss.

Recreation activities affect wildlife in a similar manner as realty. OHV use can injure wildlife, disrupt their activities, disturb soil and vegetation, and spread weeds.

Management of WSAs results in reduced noise and disturbance to wildlife due to the limited activities permitted. By limiting the number of anthropogenic disturbances the habitat fragmentation and disturbances to wildlife are reduced.

<u>Impacts from Reasonably Foreseeable Future Actions</u>
Impacts on *Migratory Birds, Special Status Species, and Wildlife* from past and present actions would be expected to continue.

Recreational activities are expected to increase in the future resulting in a proportional increase of impacts as described above in past and present actions *Migratory Birds, Special Status Species, and Wildlife*.

<u>Cumulative Impacts</u>
Cumulative Impacts from Actions Common to Alternatives A-B
All action alternatives analyzed focus on reducing excess wild horses to low AML. The results of reducing wild horse numbers outweigh the impacts from actions which contribute to cumulative effects in the Complex. Cumulative impacts would essentially be the same as the indirect impacts described in the Chapter 4 *Migratory Birds, Special Status Species, and Wildlife* section.

Cumulative Impacts from Alternative C. No Action Alternative
Cumulative effects to wildlife resources would increase with wild horse population and compound effects from livestock grazing, lands and realty actions, minerals related activities, and recreation.

5.3.5. Native American Religious Concerns

<u>Impacts from Past and Present Actions</u>
Native Americans have been impacted since their first contact with Euro-Americans. Past historical actions such as homesteading, livestock grazing, mineral extraction, and road construction have driven Native Americans from their traditional lands, confined them to reservations, and despoiled their culture. In the recent past and present various multiple uses—such as livestock grazing, lands and realty actions, mining, recreation, wild horses, WSA designation, and wildfire—have impacted areas of Native American cultural and religious importance. Only in the past 50 years has an attempt been made by federal and state governments to assuage some of these actions.

Livestock and wild horses have caused direct and indirect impacts on vegetation, soils, water quality, and the visual quality of a landscape; all of which has impacted areas of Native American cultural and religious importance. Over-grazing by livestock and wild horses limits vegetation and water availability, which can negatively impact the health and sustainability of both wildlife and vegetation while also impacting traditional Native American hunting grounds and gathering areas. Additionally, many tribes consider water sources to be sacred. Water sources can be impacted by over-grazing by livestock and wild horses through the loss of riparian vegetation, increased erosion and sedimentation, decreased water quality, and degradation of visual quality. While the visual quality of a landscape is difficult to evaluate, it is important to consider: Native American religious and traditional cultural practices are often performed in conjunction with the land, and can be impacted by over-grazing primarily through the visual loss of vegetation. The physical loss of vegetation caused by livestock and wild horses is important as well because particular plants are important to Native Americans for food and medicine as well as for traditional practices and ceremonies.

Realty actions have caused impacts through the authorization of access and the permitting of structures and activities. Such actions have resulted in more human activity, noise, and disturbance to areas of Native American cultural and religious importance.

Mining activities have caused both direct and indirect impacts to areas of Native American religious concern. Potential direct impacts from mining activity include ground disturbance related to the removal of material as well as the construction of mining infrastructure. Potential indirect impacts from mining activities include visual, auditory, and atmospheric disturbances related to the removal and processing of material and the presence of mining infrastructure on the landscape.

Certain recreational activities, such as off-highway vehicle operation, cause direct and indirect impacts to cultural resources through direct ground disturbance and increased erosion. Looting and vandalism of archaeological sites—which are considered to be sacred by many tribes—also occur as a result of various recreational activities.

The designation of Wildernesses and WSAs has reduced ground disturbance as well as reduced visual, auditory, and atmospheric disturbances due to the limited activities allowed. Such actions result in less human activity, noise, and disturbance to areas of Native American cultural and religious importance.

Wildfire has caused both direct and indirect impacts to areas of Native American religious concern. Potential direct impacts from wildfire include destruction of vegetation, destruction of important cultural or archaeological sites, and ground disturbance related to wildfire suppression. Potential indirect impacts from wildfire include erosion and the introduction of non-native vegetation into burned areas. Wildfire in areas of Native American cultural and religious importance can result in the reduction or destruction of culturally important plants and the degradation of sacred landscapes.

Impacts from Reasonably Foreseeable Future Actions

The impacts to Native American religious concerns described in the Impacts from Past and Present Actions section (5.3.4.1) are likely to continue albeit with some variability.

Recreational activities are expected to increase in the future (*Chapter 5.2 Reasonably Foreseeable Future Actions – Recreation*), resulting in a proportionate increase of impacts related to ground disturbance, erosion, looting, and vandalism as described in *Chapter 5.3*.

Impacts from reasonably foreseeable future actions are likely to be proportional to the amount, size, and scope of any future actions; however, any reasonably foreseeable future actions authorized by the BLM would be subject to mitigation to minimize or avoid impacts to areas of Native American cultural and religious importance.

<u>Cumulative Impacts</u>

Cumulative Impacts from Alternatives A through B.

Previous land management practices and other human activities as described above have contributed to the overall condition of resources important to Native Americans in the East Pershing Complex. Indirectly, the wild horse population management goals outlined in Alternatives A through B should result in decreased impacts to vegetation and springs important to Native Americans. Since there would be a slight improvement to the ecological condition over time, the health and vigor of certain plants used by Native Americans would improve accordingly. Impacts to resources important to Native Americans from mining, OHV use, livestock grazing, or wildfire activity as discussed in Chapter 5.2 would not be affected by Alternatives A through B.

Cumulative Impacts from Alternative C. No Action Alternative

While Alternative C would not affect impacts from mining, OHV use, livestock grazing, or wildfire activity, this alternative—along with the past, present, and reasonable foreseeable future actions—would continue to increase damage to resources important to Native Americans. Wild horse populations would not be controlled and substantial increases in wild horse numbers would lead to over grazing, possibly exacerbating natural erosional processes which could impact resources important to Native Americans.

5.3.6 Water Quality (Surface) and Wetland Riparian Zones

<u>Impacts from Past and Present Actions</u>

Impacts to water resources from past and present management of wild horses and grazing have largely led to the conditions described in the affected environment chapters for water resources and wetland and riparian zones. Most of these resources within the Complex have been affected by grazing from wild horses and livestock. Continued use of riparian vegetation and alteration of wetland and riparian soils has resulted in hummocking, compaction, and erosion, impacting physical, chemical, and biological water quality.

Designation of portions of the East Complex as WSA and ACEC has led to the protection of perennial, intermittent, and ephemeral streams and of the riparian habitat within the Complex. These protections have decreased disturbance by recreation activities, especially OHV use.

Impacts to water resources and wetland and riparian zones related to realty action come primarily from recreational use of transportation routes. Where roads cross streams or meadows, degradation of vegetation and soil/ hydrologic function can occur. These impacts can be of short or long duration depending on the frequency of the impact. Additionally, introduction of excess sediment and pollution can occur where road cross surface water sources even when the sources only flow for a portion of the year. These effects are generally short lived and of low severity which allows the impacts to dilute or recover soon after the impact occurs.

It is likely that any fires that have occurred within the East Pershing Complex led to some temporary increases in sediment and nutrient loading to surface waters along with short term impacts to riparian vegetation. The resilient nature of riparian habitats would most likely have led to the rehabilitation of any impacts caused by fire.

Impacts from Reasonably Foreseeable Future Actions

Impacts to water resources and wetland and riparian zones from future wild horse and livestock grazing are expected to be similar in type and distribution to those observed currently. In general, the BLM strives to manage wild horses and livestock to maintain or improve habitat functionality for multiple uses. Grazing permit stipulations are designed to manage utilization of riparian and wetland zones to promote maintenance or improvement of riparian functionality. As wild horse management requires year-round use, recovery of these areas may require further management, such as riparian pastures or off-site water sources.

The reasonably foreseeable future action related to lands and realty is not expected to impact water quality or wetland and riparian zones.

Growth in recreation activities would tend to increase the severity and distribution of impacts to water and riparian resources. Because of the attractiveness of stream and meadow areas, increases in use would likely lead to measurable changes in the condition of the resources.

Fire is expected to continue to be a major cause for impacts to water quality or wetland and riparian zones. The severity of future fire impacts to this area is not predictable, being reliant on existing riparian and wetland conditions, weather, fuel loads and accessibility to suppression activities.

Cumulative Impacts

Alternative A: Fertility Control and/or Spaying, with or without Gathers

Reduction of the wild horse population would decrease the overall degradation of water resources and wetland and riparian zones and may increase their resilience to impacts from recreation, fire, and transportation. Effects would begin slowly and increase through the period of analysis as wild horse populations decrease.

Alternative B: Multiple Gathers and Removals with Fertility Control and/or Spaying/Gelding

Cumulative effects would be similar to Alternative A. They would increase after each removal and continue through the period of analysis as wild horse populations approach AML.

Alternative C: No Action Alternative

Cumulative effects to water resources and riparian zones would increase with wild horse population and compound effects from recreation, transportation, and wildfire.

5.3.7 Threatened and Endangered Species and Fisheries

Impacts from Past and Present Actions

Past and present actions have caused impacts to threatened and endangered/fishery habitats from livestock grazing, recreation and road construction/maintenance. The impacts to the threatened and endangered/fishery habitats from these past and present actions, in general, include: loss of streamside vegetation, increased sedimentation, increased stream channel width, and loss of undercut stream bank habitat. These impacts to threatened and endangered species and fisheries have been reduced through implementation of mitigation measures. Recreation use has removed streamside vegetation and increased stream sedimentation due to OHV use in and around streams.

Past actions from road construction and transportation have caused impacts to threatened and endangered/fishery habitats with increased sedimentation and loss of streamside vegetation at the road/stream crossings. Past fires that have occurred within the East Pershing Complex have caused some temporary loss in streamside vegetation and increases in stream sedimentation.

Impacts from Reasonably Foreseeable Future Actions
Reasonably foreseeable future actions for livestock grazing, road maintenance, and recreation use could impact threatened and endangered species and fisheries. The expected impacts to the threatened and endangered/fishery habitat would be similar to the past and present actions to include: loss of streamside vegetation, increased sedimentation, increased stream channel width, and loss of undercut stream bank habitat. Implementation of mitigation measures would reduce these impacts.

Cumulative Impacts
Actions Common to Alternatives A-B
There should be an incremental improvement in the riparian and aquatic habitat conditions for threatened and endangered species and fisheries over an extended period of time.

Alternative C: No Action Alternative
If the no action is chosen, impacts to threatened and endangered species and fisheries described in the past, present, and reasonably foreseeable future sections could increase from habitat lost due to the increase in size of the wild horse populations in the East Pershing Complex.

5.3.8 Rangeland Management

Impacts from Past and Present Actions
Past and present activities have affected livestock grazing through the removal of forage within disturbed areas related to realty, transportation and mineral related activities. Transportation and access improvements and activities have also provided livestock operators better access to portions of their allotments to better check and care for the livestock on the allotments. Dispersed recreational activities have caused impacts due to damage or vandalism of range improvements and difficulties in managing livestock from fences being cut or broken or gates being left open. Past wildfire events have removed large areas of forage and restricted access to forage. Fire rehabilitation projects have re-established vegetation in some areas and mitigated some of the effects associated with wildfire events. Past and present wild horse use has impacted livestock grazing by creating competition between wild horses and livestock for forage and water resources, especially when wild horses are above AML.

Impacts from Reasonably Foreseeable Future Actions
Impacts to livestock grazing from reasonably foreseeable future actions would remain similar to those analyzed under the past and present actions.

Cumulative Impacts
Cumulative Impacts from Actions Common to Alternatives A-B
All action alternatives analyzed focus on achieving and maintaining within AML ranges. Any disturbance to livestock management from past, present, or reasonably foreseeable future actions listed above are minor in comparison to reducing wild horse herd numbers. Therefore cumulative

impacts on livestock grazing are expected to be the same as the indirect impacts discussed for livestock grazing earlier in this analysis.

Cumulative Impacts from Alternative C. No Action Alternative
Outside of wild horse and livestock management activities, the past, present, and reasonably foreseeable future actions described above would have little influence on cumulative impacts to livestock grazing. With unchecked population growth and no planned management actions, rangeland resources would become degraded at an accelerated rate. Cumulative impacts would be similar to the past and present actions for livestock grazing and to indirect impacts described earlier in the document. Increasing excess wild horse numbers could result in grazing permittees being asked to reduce livestock numbers further.

5.3.9 Recreation

Impacts from Past and Present Actions
Since WSA designation, the area has been managed to provide outstanding opportunities for solitude and primitive recreation. Livestock grazing and wild horses have caused impacts near waterways and campsites, and degradation to spring sites that hikers visit. Wildfires temporarily remove vegetation supporting wildlife that has supported hunting activities. Livestock and wild horses have also competed for forage used by wildlife. Lands and realty actions identified in *Chapter 5.1 Past and Present Actions – Lands_and Realty* would have little to no impact to recreational values.

Impacts from Reasonably Foreseeable Future Actions
Past and present actions are expected to continue.

Cumulative Impacts
Cumulative Impacts from Alternative A through B
Impacts associated with any of the action Alternatives would not cumulatively impact recreational values. Impacts from wild horses would be reduced as excess wild horses are removed from the Complex; however, the impacts caused by livestock and the remaining wild horses would continue.

Cumulative Impacts from Alternative C. No Action Alternative
This alternative, along with the past, present, and reasonable foreseeable future actions, would incrementally increase impacts to recreational resources through continued grazing and population increases of wild horses.

5.3.10 Soils and Vegetation

Impacts from Past and Present Actions
Forage utilization during the 1900s was high when thousands of cattle, sheep, and horses grazed lands in northern Nevada. In the 1930s when overgrazing threatened to reduce Western rangelands to a dust bowl, Congress approved the Taylor Grazing Act (TGA) of 1934, which for the first time regulated grazing on public lands. The TGA required ranchers who grazed horses or livestock on public lands to have a permit and to pay a grazing fee, but by that time, thousands of wild horses roamed the Nevada desert unbranded and unclaimed.

Prior to the TGA, livestock grazing practices resulted in significant impacts to soil and vegetation resources. The soil tolerance was exceeded and the soil medium for plant growth was not maintained. As a result, historic livestock grazing activities prior to the TGA had significant impacts on soil and vegetation resources within the Complex. A series of livestock grazing decisions since the TGA have resulted in reductions in livestock numbers and changes in seasons of use and in grazing management practices to promote rangeland health within grazing allotments. The present livestock grazing system and efforts to manage the wild horse populations within AML has helped reduce past historic soil and vegetation impacts and has improved current conditions. The current overpopulation of wild horses has resulted in areas of heavy vegetative utilization, trailing and trampling damage, and prevents BLM from managing public lands within the Complex for rangeland health and for a thriving natural ecological balance.

Impacts from Reasonably Foreseeable Future Actions

Multiple-use activities would continue to have similar to present impacts on soils and vegetation within the Complex, with slight increases expected from recreational activities.

Cumulative Impacts

Cumulative Impacts from Alternative A through B

All action alternatives analyzed focus on reducing excess wild horses to low AML. The results of reducing wild horse numbers overshadow the impacts from other actions in the Complex that contribute to cumulative effects. Therefore, cumulative impacts would essentially be the same or less from those described earlier in this document under indirect impacts.

Cumulative Impacts from Alternative C. No Action Alternative

Cumulative effects to soils and vegetation would increase with wild horse population growth and compound effects from livestock grazing, lands and realty actions, minerals related activities, and recreation.

5.3.11 Wild Horses

Impacts from Past and Present Actions

Impacts to wild horses from past actions include establishment of HMAs and AMLs for wild horses, gathers and removals, livestock grazing, mining, lands and realty, and recreational activities throughout the areas. Impacts associated with these actions are due to habitat disturbance, construction activities, and increased human presence. These impacts may include disruption of wild horses' daily activities, such as foraging and watering, disruptions to herd movements along construction routes, and wild horse /vehicular accidents. The majority of these impacts have been short-lived and temporary in nature.

Impacts from Reasonably Foreseeable Future Actions

Impacts to wild horses described under Impacts from Past and Present Actions would continue. Increase in recreational use, particularly OHV traffic, is especially disruptive to wild horse herds by dispersing the animals away from water resources and separating mares and foals.

Cumulative Impacts

Cumulative Impacts from Actions Common to Alternatives A-B

Alternatives A-B would achieve and maintain AML. Incremental decreases would be observed in recreation impacts discussed above (Refer to *Impacts from Reasonable Foreseeable Future Actions*). Managing the population within AML would also offer improved recreational opportunities by maintaining healthy rangeland resources.

Cumulative Impacts from Alternative C. No Action Alternative
Deferring removal of excess wild horses and/or applying fertility control measures in the East Pershing Complex would further deteriorate range conditions and water resources that wild horses require. This alternative would cause a continued increase in the wild horse population; resulting in death of individual animals as numbers continue to exceed capacity of the resources needed to sustain populations within the HMAs. Impacts associated with increases in recreational uses (Refer to *Impacts from Reasonably Foreseeable Future Actions*) would be exacerbated by the increased numbers of wild horses.

5.3.12 Wilderness Study Areas

Impacts from Past and Present Actions
Since designation, the WSAs have been managed to protect and enhance their wilderness character including naturalness and outstanding opportunities for solitude and primitive recreation. Authorized grazing by cattle has largely remained stable with usage comparable to that occurring at designation. These developments have reduced the naturalness to some degree. Small wildfires have occurred and been suppressed. Management of wild horse populations through gather and removal of individual animals with the use of helicopters has occurred in the past.

Impacts from Reasonably Foreseeable Future Actions
Management for the protection and enhancement of wilderness values within each WSA would continue until Congress designates the WSA as a wilderness or releases them from further study. Grazing and maintenance of existing range developments such as water troughs and fences is expected to continue. It is anticipated these developments would continue to reduce the naturalness nature, and untrammeled nature of the WSAs. Wildfires and wildfire suppression are expected to continue, as well as aerial monitoring of wild horses.

Cumulative Impacts
Actions Common to Alternatives A-B
Increased human activity associated with gather activities would increase the percentage of time the WSAs have human use, reducing opportunities for solitude. Over the period of analysis, achieving and maintaining within AML ranges would augment restoration activities and increase the naturalness of the WSAs.

Alternative C: No Action Alternative
Over-utilization of vegetation and other habitat resources would degrade the natural vegetative community allowing invasive non-native species to dominate. Increased frequency of repairs of range developments damaged by excess wild horses would decrease opportunities for solitude.

Chapter 6. Monitoring

The BLM Contracting Officer Representative and Project Inspectors assigned to the gather would be responsible for ensuring contract personnel abide by contract specifications and the CAWP. Ongoing rangeland, riparian, and wild horse monitoring would continue, including periodic aerial population counts.

Under the Action Alternative A fertility control monitoring of treated mares would be conducted in accordance with the SOPs outlined in *Appendix C. Standard Operating Procedures for Population-level Porcine Zona Pellucida Fertility Control Treatments* and routine monitoring of the herd health would continue.

Chapter 7. Tribes, Individuals, Organizations, or Agencies Consulted

Public hearings are held annually on a state-wide basis regarding the use of motorized vehicles, including helicopters and fixed-wing aircraft, in the management of wild horses. During these meetings, the public is given the opportunity to present new information and to voice any concerns regarding the use of the motorized vehicles. The Ely District Office held a public hearing on June 27, 2017, providing the public an opportunity to comment. There were no substantive comments presented at this meeting. On-going consultation with Resource Advisory Councils, NDOW, USFWS, livestock operators and others, underscores the need for BLM to maintain wild horse populations within AML.

7.1 Endangered Species Act Consultation

Section 7 consultation is in progress with the U.S. Fish and Wildlife Service (USFWS). BLM requested a species list from the USFWS, per their online resource (Information for Planning and Conservation (IPAC)) on February 16, 2017. The Nevada USFWS responded on February 16, 2017 with an electronic version of the official species list, and based upon the results, Section 7 consultation was required. A letter of concurrence was received from the Nevada USFWS on December 27, 2017 to complete the Section 7 consultation. The letter of concurrence concluded that the Project may affect, but is not likely to adversely affect LCT. No critical LCT habitat has been designated; therefore, none will be affected.

7.2 Native American Consultation

Letters requesting comments on the Action Alternatives were sent out on February 27, 2017 to the following tribes: Battle Mountain Band of the Te-Moak Tribe of Western Shoshone Indians, Fallon Paiute and Shoshone Tribe, Lovelock Paiute Tribe, and Winnemucca Indian Colony. The preliminary EA was sent to the above-mentioned tribes. At the time of publishing this EA, no issues or comments have been received from any tribes on the Action Alternatives. The table below outlines the consultation and coordination activities which were conducted in conjunction with this project.

Table 134. Native American Consultation

Tribe	Date Initial Consultation Letter was Mailed	Date Preliminary EA was Mailed	Date of Consultation Meeting
Winnemucca Indian Colony	February 27, 2017	June 21, 2017	None requested
Battle Mountain Band	February 27, 2017	June 21, 2017	None requested
Lovelock Paiute Tribe	February 27, 2017	June 21, 2017	None requested
Fallon Paiute and Shoshone Tribe	February 27, 2017	June 21, 2017	None requested

Chapter 8. Public Involvement

A Notice of Proposed Action (NOPA) letter was sent to interested parties for activities within WSAs. Like the letter referred to in the preceding paragraph, the NOPA notified these individuals of how to access the EA and where to submit comments.

A general interested party letter was sent to notify individuals of the location of the preliminary EA and commenting methods.

Chapter 9. List of Preparers

Table 145. Names and Resources of Preparers

Name	Title	Responsible for the Following Section(s) of this Document
Samantha Gooch	Wild Horse & Burro Specialist	Project Lead; Wild Horse and Burro; Public Health and Safety
Sabrina McCue/Patrick Champa	Rangeland Management Specialist	Rangeland Management
Dwayne Coleman	Weeds Management Specialist	Invasive, Non-native species (plants)
Rob Burton	Assistant Field Manager	Soils; Vegetation
Jeanette Black	Hydrogeologist	Minerals
Robert Gibson	Hydrologist	Water Quality; Wetlands and Riparian
Evan Myers	Wildlife Biologist	Migratory Birds; Threatened and Endangered Species; Special Status Species; Wildlife
Tanner Whetstone	Native American Coordinator	Native American Religious Concerns; Areas of Critical Environmental Concern; Paleontology

Name	**Title**	**Responsible for the Following Section(s) of this Document**
Matt Yacubic	Archeologist	Cultural Resources
Greg Lynch	Fisheries Biologist	Threatened and Endangered Fish Species; Fisheries
Debbie Dunham	Realty Specialist	Lands and Realty
Robin Sears/Sandi Gracia	Wilderness Specialist	Wilderness; Wilderness Study Areas; Lands with Wilderness Characteristics
Brian Scott Older	Outdoor Recreation Planner	Recreation
Nate Pepe/Lorence Busker	Geologist	Minerals
Michael McCampbell	ES&R Specialist	Fire History and Rehab
Kurt Miers	HazMat Specialist	Hazardous Materials
Environmental Justice	GB Socioeconomic Specialist	Environmental Justice, Socio-economic Values
Lynn Ricci	Planning and Environmental Coordinator	National Environmental Policy Act Compliance
Shannon Mazzei	NEPA Technician	Assisting with National Environmental Policy Act Compliance

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Chapter 11. Figures

Appendix A. Comprehensive Animal Welfare Program for Wild Horse Gathers

ATTACHMENT 1: COMPREHENSIVE ANIMAL WELFARE PROGRAM FOR WILD HORSE AND BURRO GATHERS

STANDARDS

Developed by

The Bureau of Land Management Wild Horse and Burro Program

in collaboration with

Carolyn L. Stull, PhD
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University of California, Davis School of Veterinary Medicine

June 30, 2015

WELFARE ASSESSMENT STANDARDS for GATHERS

CONTENTS

Welfare Assessment Standards

STANDARDS

Standard Definitions

Major Standard: Impacts the health or welfare of WH&Bs. Relates to an alterable equipment or facility standard or procedure. Appropriate wording is "must," "unacceptable," "prohibited."

Minor Standard: unlikely to affect WH&Bs health or welfare or involves an uncontrollable situation. Appropriate wording is "should."

Lead COR = Lead Contracting Officer's Representative

COR = Contracting Officer's Representative

PI = Project Inspector

WH&Bs = Wild horses and burros

I. FACILITY DESIGN

A. Trap Site and Temporary Holding Facility

1. The trap site and temporary holding facility must be constructed of stout materials and must be maintained in proper working condition, including gates that swing freely and latch or tie easily. (**major**)
2. The trap site should be moved close to WH&B locations whenever possible to minimize the distance the animals need to travel.(minor)
3. If jute is hung on the fence posts of an existing wire fence in the trap wing, the wire should be either be rolled up or let down for the entire length of the jute in such a way that minimizes the possibility of entanglement by WH&Bs unless otherwise approved by the Lead COR/COR/PI. (minor)
4. Fence panels in pens and alleys must be not less than 6 feet high for horses, 5 feet high for burros, and the bottom rail must not be more than 12 inches from ground level. (**major**)

5. The temporary holding facility must have a sufficient number of pens available to sort WH&Bs according to gender, age, number, temperament, or physical condition. (**major**)
   a. All pens must be assembled with capability for expansion. (**major**)
   b. Alternate pens must be made available for the following: (**major**)
      1) WH&Bs that are weak or debilitated
      2) Mares/jennies with dependent foals
   c. WH&Bs in pens at the temporary holding facility should be maintained at a proper stocking density such that when at rest all WH&Bs occupy no more than half the pen area. (minor)
6. An appropriate chute designed for restraining WH&Bs must be available for necessary procedures at the temporary holding facility. This does not apply to bait trapping operations unless directed by the Lead COR/COR/PI. (**major**)
7. There must be no holes, gaps or openings, protruding surfaces, or sharp edges present in fence panels or other structures that may cause escape or possible injury. (**major**)
8. Padding must be installed on the overhead bars of all gates and chutes used in single file alleys. (**major**)
9. Hinged, self-latching gates must be used in all pens and alleys except for entry gates into the trap, which may be secured with tie ropes. (**major**)
10. Finger gates (one-way funnel gates) used in bait trapping must be constructed of materials approved by the Lead COR/COR/PI. Finger gates must not be constructed of materials that have sharp ends that may cause injuries to WH&Bs, such as "T" posts, sharpened willows, etc. (**major**)
11. Water must be provided at a minimum rate of ten gallons per 1000 pound animal per day, adjusted accordingly for larger or smaller horses, burros and foals, and environmental conditions, with each trough placed in a separate location of the pen (i.e. troughs at opposite ends of the pen). Water must be refilled at least every morning and evening. (**major**)
12. The design of pens at the trap site and temporary holding facility should be constructed with rounded corners. (minor)

13. All gates and panels in the animal holding and handling pens and alleys of the trap site must be covered with materials such as plywood, snow fence, tarps, burlap, etc. approximately 48” in height to provide a visual barrier for the animals. All materials must be secured in place.(**major**)

These guidelines apply:

a. For exterior fences, material covering panels and gates must extend from the top of the panel or gate toward the ground.(**major**)
b. For alleys and small internal handling pens, material covering panels and gates should extend from no more than 12 inches below the top of the panel or gate toward the ground to facilitate visibility of animals and the use of flags and paddles during sorting. (minor)
c. The initial capture pen may be left uncovered as necessary to encourage animals to enter the first pen of the trap. (minor)

14. Non-essential personnel and equipment must be located to minimize disturbance of WH&Bs. (**major**)
15. Trash, debris, and reflective or noisy objects should be eliminated from the trap site and temporary holding facility. (minor)

B. Loading and Unloading Areas

1. Facilities in areas for loading and unloading WH&Bs at the trap site or temporary holding facility must be maintained in a safe and proper working condition, including gates that swing freely and latch or tie easily. (**major**)
2. The side panels of the loading chute must be a minimum of 6 feet high and fully covered with materials such as plywood or metal without holes that may cause injury. (**major**)
3. There must be no holes, gaps or openings, protruding surfaces, or sharp edges present in fence panels or other structures that may cause escape or possible injury. (**major**)
4. All gates and doors must open and close easily and latch securely. (**major**)

5. Loading and unloading ramps must have a non-slip surface and be maintained in a safe and proper working condition to prevent slips and falls. Examples of non-slip flooring would include, but not be limited to, rubber mats, sand, shavings, and steel reinforcement rods built into ramp. There must be no holes in the flooring or items that can cause an animal to trip. (**major**)
6. Trailers must be properly aligned with loading and unloading chutes and panels such that no gaps exist between the chute/panel and floor or sides of the trailer creating a situation where a WH&B could injure itself. (**major**)
7. Stock trailers should be positioned for loading or unloading such that there is no more than 12" clearance between the ground and floor of the trailer for burros and 18" for horses. (minor)

II. CAPTURE TECHNIQUE

A. Capture Techniques

1. WH&Bs gathered on a routine basis for removal or return to range must be captured by the following approved procedures under direction of the Lead COR/COR/PI. (**major**)
   a. Helicopter
   b. Bait trapping
2. WH&Bs must not be captured by snares or net gunning. (**major**)
3. Chemical immobilization must only be used for capture under exceptional circumstances and under the direct supervision of an on-site veterinarian experienced with the technique. (**major**)

B. Helicopter Drive Trapping

1. The helicopter must be operated using pressure and release methods to herd the animals in a desired direction and should not repeatedly evoke erratic behavior in the WH&Bs causing injury or exhaustion. Animals must not be pursued to a point of exhaustion; the on-site veterinarian must examine WH&Bs for signs of exhaustion. (**major**)

2. The rate of movement and distance the animals travel must not exceed limitations set by the Lead COR/COR/PI who will consider terrain, physical barriers, access limitations, weather, condition of the animals, urgency of the operation (animals facing drought, starvation, fire, etc.) and other factors. (**major**)
   a. WH&Bs that are weak or debilitated must be identified by BLM staff or the contractors. Appropriate gather and handling methods should be used according to the direction of the Lead COR/COR/PI. (**major**)
   b. The appropriate herding distance and rate of movement must be determined on a case-by-case basis considering the weakest or smallest animal in the group (e.g., foals, pregnant mares, or horses that are weakened by body condition, age, or poor health) and the range and environmental conditions present. (**major**)
   c. Rate of movement and distance travelled must not result in exhaustion at the trap site, with the exception of animals requiring capture that have an existing severely compromised condition prior to gather. Where compromised animals cannot be left on the range or where doing so would only serve to prolong their suffering, euthanasia will be performed in accordance with BLM policy. (**major**)
3. WH&Bs must not be pursued repeatedly by the helicopter such that the rate of movement and distance travelled exceeds the limitation set by the Lead COR/COR/PI. Abandoning the pursuit or alternative capture methods may be considered by the Lead COR/COR/PI in these cases. (**major**)
4. When WH&Bs are herded through a fence line en route to the trap, the Lead COR/COR/PI must be notified by the contractor. The Lead COR/COR/PI must determine the appropriate width of the opening that the fence is let down to allow for safe passage through the opening. The Lead COR/COR/PI must decide if existing fence lines require marking to increase visibility to WH&Bs. (**major**)
5. The helicopter must not come into physical contact with any WH&B. The physical contact of any WH&B by helicopter must be documented by Lead COR/COR/PI along with the circumstances. (**major**)
6. WH&Bs may escape or evade the gather site while being moved by the helicopter. If there are mare/dependent foal pairs in a group being brought to a trap and half of an identified pair is thought to have evaded capture, multiple attempts by helicopter may

be used to bring the missing half of the pair to the trap or to facilitate capture by roping. In these instances, animal condition and fatigue must be evaluated by the Lead COR/COR/PI or on-site veterinarian on a case-by-case basis to determine the number of attempts that can be made to capture an animal.(**major**)

7. Horse captures must not be conducted when ambient temperature at the trap site is below 10ºF or above 95ºF without approval of the Lead COR/COR/PI. Burro captures must not be conducted when ambient temperature is below 10ºF or above 100ºF without approval of the Lead COR/COR/PI. The Lead COR/COR/PI will not approve captures when the ambient temperature exceeds 105 ºF. (**major**)

C. Roping

1. The roping of any WH&B must be approved prior to the procedure by the Lead COR/COR/PI. (**major**).
2. The roping of any WH&B must be documented by the Lead COR/COR/PI along with the circumstances. WH&Bs may be roped under circumstances which include but are not limited to the following: reunite a mare or jenny and her dependent foal; capture nuisance, injured or sick WH&Bs or those that require euthanasia; environmental reasons such as deep snow or traps that cannot be set up due to location or environmentally sensitive designation; and public and animal safety or legal mandates for removal. (**major**)
3. Ropers should dally the rope to their saddle horn such that animals can be brought to a stop as slowly as possible and must not tie the rope hard and fast to the saddle so as to intentionally jerk animals off their feet. (**major**)
4. WH&Bs that are roped and tied down in recumbency must be continuously observed and monitored by an attendant at a maximum of 100 feet from the animal. (**major**)
5. WH&Bs that are roped and tied down in recumbency must be untied within 30 minutes. (**major**)
6. If the animal is tied down within the wings of the trap, helicopter drive trapping within the wings will cease until the tied-down animal is removed. (**major**)
7. Sleds, slide boards, or slip sheets must be placed underneath the animal's body to move and/or load recumbent WH&Bs. (**major**)

8. Halters and ropes tied to a WH&B may be used to roll, turn, position or load a recumbent animal, but a WH&B must not be dragged across the ground by a halter or rope attached to its body while in a recumbent position. (**major**)
9. Animals captured by roping must be evaluated by the on-site/on-call veterinarian within four hours after capture, marked for identification at the trap site, and be re-evaluated periodically as deemed necessary by the on-site/on-call veterinarian. (**major**)

D. Bait Trapping

1. WH&Bs may be lured into a temporary trap using bait (feed, mineral supplement, water) or sexual attractants (mares/jennies in heat) with the following requirements:
   a. The period of time water sources other than in the trap site are inaccessible must not adversely affect the wellbeing of WH&Bs, wildlife or livestock, as determined by the Lead COR/COR/PI. (**major**)
   b. Unattended traps must not be left unobserved for more than 12 hours. (**major**)
   c. Mares/jennies and their dependent foals must not be separated unless for safe transport. (**major**)
   d. WH&Bs held for more than 12 hours must be provided with accessible clean water at a minimum rate of ten gallons per 1000 pound animal per day, adjusted accordingly for larger or smaller horses, burros and foals and environmental conditions. (**major**)
   e. WH&Bs held for more than 12 hours must be provided good quality hay at a minimum rate of 20 pounds per 1000 pound adult animal per day, adjusted accordingly for larger or smaller horses, burros and foals. (**major**)
      1) Hay must not contain poisonous weeds, debris, or toxic substances. (**major**)
      2) Hay placement must allow all WH&Bs to eat simultaneously. (**major**)

III. WILD HORSE AND BURRO CARE

A. Veterinarian

1. On-site veterinary support must be provided for all helicopter gathers and on-site or on-call support must be provided for bait trapping. (**major**)

2. Veterinary support must be under the direction of the Lead COR/COR/PI. The on-site/on-call veterinarian will provide consultation on matters related to WH&B health, handling, welfare, and euthanasia at the request of the Lead COR/COR/PI. All decisions regarding medical treatment or euthanasia will be made by the on-site Lead COR/COR/PI. (**major**)

B. Care

1. Feeding and Watering
   a. Adult WH&Bs held in traps or temporary holding pens for longer than 12 hours must be fed every morning and evening with water available at all times other than when animals are being sorted or worked. (**major)**
   b. Water must be provided at a minimum rate of ten gallons per 1000 pound animal per day, adjusted accordingly for larger or smaller horses, burros and foals, and environmental conditions, with each trough placed in a separate location of the pen (i.e. troughs at opposite ends of the pen). . (**major**)
   c. Good quality hay must be fed at a minimum rate of 20 pounds per 1000 pound adult animal per day, adjusted accordingly for larger or smaller horses, burros and foals. (**major**)
      i. Hay must not contain poisonous weeds or toxic substances. (**majo**r)
      ii. Hay placement must allow all WH&Bs to eat simultaneously. (**major**)
   d. When water or feed deprivation conditions exist on the range prior to the gather, the Lead COR/COR/PI should adjust the watering and feeding arrangements in consultation with the onsite veterinarian as necessary to provide for the needs of the animals. (minor)
2. Dust abatement
   a. Dust abatement by spraying the ground with water must be employed when necessary at the trap site and temporary holding facility. (**major**)

3. Trap Site
   a. Dependent foals or weak/debilitated animals must be separated from other WH&Bs at the trap site to avoid injuries during transportation to the temporary holding facility. Separation of dependent foals from mares must not exceed four hours unless the Lead COR/COR/PI authorizes a longer time or a decision is made to wean the foals. (**major**)
4. Temporary Holding Facility
   a. All WH&Bs in confinement must be observed at least once daily to identify sick or injured WH&Bs and ensure adequate food and water. (**major**)
   b. Foals must be reunited with their mares/jennies at the temporary holding facility within four hours of capture unless the Lead COR/COR/PI authorizes a longer time or foals are old enough to be weaned during the gather. (**major**)
   c. Non-ambulatory WH&Bs must be located in a pen separate from the general population and must be examined by the BLM horse specialist and/or on-call or on-site veterinarian as soon as possible, no more than four hours after recumbency is observed. Unless otherwise directed by a veterinarian, hay and water must be accessible to an animal within six hours after recumbency.(**major**)
   d. Alternate pens must be made available for the following: (**major**)
      1) WH&Bs that are weak or debilitated
      2) Mares/jennies with dependent foals
   e. Aggressive WH&Bs causing serious injury to other animals should be identified and relocated into alternate pens when possible. (minor)
   f. WH&Bs in pens at the temporary holding facility should be maintained at a proper stocking density such that when at rest all WH&Bs occupy no more than half the pen area. (minor)

C. Biosecurity

1. Health records for all saddle and pilot horses used on WH&B gathers must be provided to the Lead COR/COR/PI prior to joining a gather, including: (**major**)
   a. Certificate of Veterinary Inspection (Health Certificate, within 30 days).
   b. Proof of:
      1) A negative test for equine infectious anemia (Coggins or EIA ELISA test) within 12 months.
      2) Vaccination for tetanus, eastern and western equine encephalomyelitis, West Nile virus, equine herpes virus, influenza, *Streptococcus equi*, and rabies within 12 months.
2. Saddle horses, pilot horses and mares used for bait trapping lures must not be removed from the gather operation (such as for an equestrian event) and allowed to return unless they have been observed to be free from signs of infectious disease for a period of at least three weeks and a new Certificate of Veterinary Examination is obtained after three weeks and prior to returning to the gather. (**major**)
3. WH&Bs, saddle horses, and pilot horses showing signs of infectious disease must be examined by the on-site/on-call veterinarian. (**major**)
   a. Any saddle or pilot horses showing signs of infectious disease (fever, nasal discharge, or illness) must be removed from service and isolated from other animals on the gather until such time as the horse is free from signs of infectious disease and approved by the on-site/on-call veterinarian to return to the gather. (**major**)
   b. Groups of WH&Bs showing signs of infectious disease should not be mixed with groups of healthy WH&Bs at the temporary holding facility, or during transport. (minor)
4. Horses not involved with gather operations should remain at least 300 yards from WH&Bs, saddle horses, and pilot horses being actively used on a gather. (minor)

IV. HANDLING

A. Willful Acts of Abuse

1. Hitting, kicking, striking, or beating any WH&B in an abusive manner is prohibited. (**major**)
2. Dragging a recumbent WH&B without a sled, slide board or slip sheet is prohibited. Ropes used for moving the recumbent animal must be attached to the sled, slide board or slip sheet unless being loaded as specified in Section II. C. 8. (**major**)
3. There should be no deliberate driving of WH&Bs into other animals, closed gates, panels, or other equipment. (minor)
4. There should be no deliberate slamming of gates and doors on WH&Bs. (minor)
5. There should be no excessive noise (e.g., constant yelling) or sudden activity causing WH&Bs to become unnecessarily flighty, disturbed or agitated. (minor)

B. General Handling

1. All sorting, loading or unloading of WH&Bs during gathers must be performed during daylight hours except when unforeseen circumstances develop and the Lead COR/CO/PI approves the use of supplemental light. (**major**)
2. WH&Bs should be handled to enter runways or chutes in a forward direction. (minor)
3. WH&Bs should not remain in single-file alleyways, runways, or chutes longer than 30 minutes. (minor)
4. Equipment except for helicopters should be operated and located in a manner to minimize flighty behavior . (minor)

C. Handling Aids

1. Handling aids such as flags and shaker paddles must be the primary tools for driving and moving WH&Bs during handling and transport procedures. Contact of the flag or paddle end of primary handling aids with a WH&B is allowed. Ropes looped around the hindquarters may be used from horseback or on foot to assist in moving an animal forward or during loading. (**major**)

2. Electric prods must not be used routinely as a driving aid or handling tool. Electric prods may be used in limited circumstances only if the following guidelines are followed:
   a. Electric prods must only be a commercially available make and model that uses DC battery power and batteries should be fully charged at all times. (**major**)
   b. The electric prod device must never be disguised or concealed. (**major**)
   c. Electric prods must only be used after three attempts using other handling aids (flag, shaker paddle, voice or body position) have been tried unsuccessfully to move the WH&Bs. (**major**)
   d. Electric prods must only be picked up when intended to deliver a stimulus; these devices must not be constantly carried by the handlers. (**major**)
   e. Space in front of an animal must be available to move the WH&B forward prior to application of the electric prod. (**major**)
   f. Electric prods must never be applied to the face, genitals, anus, or underside of the tail of a WH&B. (**major**)
   g. Electric prods must not be applied to any one WH&B more than three times during a procedure (e.g., sorting, loading) except in extreme cases with approval of the Lead COR/COR/PI. Each exception must be approved at the time by the Lead COR/COR/PI. (**majo**r)
   h. Any electric prod use that may be necessary must be documented daily by the Lead COR/COR/PI including time of day, circumstances, handler, location (trap site or temporary holding facility), and any injuries (to WH&B or human). (**major**)

V. TRANSPORTATION

A. General

1. All sorting, loading, or unloading of WH&Bs during gathers must be performed during daylight hours except when unforeseen circumstances develop and the Lead COR/CO/PI approves the use of supplemental light. (**major**)

2. WH&Bs identified for removal should be shipped from the temporary holding facility to a BLM facility within 48 hours. (minor)
   a. Shipping delays for animals that are being held for release to range or potential on-site adoption must be approved by the Lead COR/COR/PI. (**major**)
3. Shipping should occur in the following order of priority; 1) debilitated animals, 2) pairs, 3) weanlings, 4) dry mares and 5) studs. (minor)
4. Planned
5. transport time to the BLM preparation facility from the trap site or temporary holding facility must not exceed 10 hours. (**major**)
6. WH&Bs should not wait in stock trailers and/or semi-trailers at a standstill for more than a combined period of three hours during the entire journey. (minor)

B. Vehicles

1. Straight-deck trailers and stock trailers must be used for transporting WH&Bs. (**major**)
   a. Two-tiered or double deck trailers are prohibited. (**major**)
   b. Transport vehicles for WH&Bs must have a covered roof or overhead bars containing them such that WH&Bs cannot escape. (**major**)
2. WH&Bs must have adequate headroom during loading and unloading and must be able to maintain a normal posture with all four feet on the floor during transport without contacting the roof or overhead bars. (**major**)
3. The width and height of all gates and doors must allow WH&Bs to move through freely. (**major**)
4. All gates and doors must open and close easily and be able to be secured in a closed position. (**major**)
5. The rear door(s) of the trailers must be capable of opening the full width of the trailer. (**major**)
6. Loading and unloading ramps must have a non-slip surface and be maintained in proper working condition to prevent slips and falls. (**major**)

7. Transport vehicles more than 18 feet and less than 40 feet in length must have a minimum of one partition gate providing two compartments; transport vehicles 40 feet or longer must have at least two partition gates to provide a minimum of three compartments. (**major**)
8. All partitions and panels inside of trailers must be free of sharp edges or holes that could cause injury to WH&Bs. (**major**)
9. The inner lining of all trailers must be strong enough to withstand failure by kicking that would lead to injuries. (**major**)
10. Partition gates in transport vehicles should be used to distribute the load into compartments during travel. (minor)
11. Surfaces and floors of trailers must be cleaned of dirt, manure and other organic matter prior to the beginning of a gather. (**major**)

C. Care of WH&Bs during Transport Procedures

1. WH&Bs that are loaded and transported from the temporary holding facility to the BLM preparation facility must be fit to endure travel. (**major**)
   a. WH&Bs that are non-ambulatory, blind in both eyes, or severely injured must not be loaded and shipped unless it is to receive immediate veterinary care or euthanasia. (**major**)
   b. WH&Bs that are weak or debilitated must not be transported without approval of the Lead COR/COR/PI in consultation with the on-site veterinarian. Appropriate actions for their care during transport must be taken according to direction of the Lead COR/COR/PI. (**major**)
2. WH&Bs should be sorted prior to transport to ensure compatibility and minimize aggressive behavior that may cause injury. (minor)
3. Trailers must be loaded using the minimum space allowance in all compartments as follows: (**major**)
   a. 12 square feet per adult horse.
   b. 6.0 square feet per dependent horse foal.
   c. 8.0 square feet per adult burro.
   d. 4.0 square feet per dependent burro foal.

4. The Lead COR/COR/PI in consultation with the receiving Facility Manager must document any WH&B that is recumbent or dead upon arrival at the destination. (**major**)
    a. Non-ambulatory or recumbent WH&Bs must be evaluated on the trailer and either euthanized or removed from the trailers using a sled, slide board or slip sheet. (**major**)
5. Saddle horses must not be transported in the same compartment with WH&Bs. (**major**)

VI. EUTHANASIA OR DEATH

A. Euthanasia Procedure during Gather Operations

1. An authorized, properly trained, and experienced person as well as a firearm appropriate for the circumstances must be available at all times during gather operations. When the travel time between the trap site and temporary holding facility exceeds one hour or if radio or cellular communication is not reliable, provisions for euthanasia must be in place at both the trap site and temporary holding facility during the gather operation. (**major**)
2. Euthanasia must be performed according to American Veterinary Medical Association euthanasia guidelines (2013) using methods of gunshot or injection of an approved euthanasia agent. (**major**)
3. The decision to euthanize and method of euthanasia must be directed by the Authorized Officer or their Authorized Representative(s) that include but are not limited to the Lead COR/COR/PI who must be on site and may consult with the on-site/on-call veterinarian. (**major**)
4. Photos needed to document an animal's condition should be taken prior to the animal being euthanized. No photos of animals that have been euthanized should be taken. An exception is when a veterinarian or the Lead COR/COR/PI may want to document certain findings discovered during a postmortem examination or necropsy. (minor)
5. Any WH&B that dies or is euthanized must be documented by the Lead COR/COR/PI including time of day, circumstances, euthanasia method, location, a

description of the age, gender, and color of the animal and the reason the animal was euthanized. (**major**)

6. The on-site/on-call veterinarian should review the history and conduct a postmortem physical examination of any WH&B that dies or is euthanized during the gather operation. A necropsy should be performed whenever feasible if the cause of death is unknown. (minor)

B. Carcass Disposal

1. The Lead COR/COR/PI must ensure that appropriate equipment is available for the timely disposal of carcasses when necessary on the range, at the trap site, and temporary holding facility. (**major**)
2. Disposal of carcasses must be in accordance with state and local laws. (**major**)
3. WH&Bs euthanized with a barbiturate euthanasia agent must be buried or otherwise disposed of properly. (**major**)
4. Carcasses left on the range should not be placed in washes or riparian areas where future runoff may carry debris into ponds or waterways. Trenches or holes for buried animals should be dug so the bottom of the hole is at least 6 feet above the water table and 4-6 feet of level earth covers the top of the carcass with additional dirt mounded on top where possible. (minor)

CAWP

REQUIRED DOCUMENTATION AND RESPONSIBILITIES OF LEAD COR/COR/PI

Required Documentation

Section	Documentation
II.B.5	Helicopter contact with any WH&B.
II.C.2	Roping of any WH&B.
III.B.3.a and III.B.4.b	Reason for allowing longer than four hours to reunite foals with mares/jennies. Does not apply if foals are being weaned.
III.C.1	Health status of all saddle and pilot horses.
IV.C.2.h	All uses of electric prod.
V.C.4	Any WH&B that is recumbent or dead upon arrival at destination following transport.
VI.A.5	Any WH&B that dies or is euthanized during gather operation.

Responsibilities

Section	Responsibility
I.A.10	Approve materials used in construction of finger gates in bait trapping
II.A.1	Direct gather procedures using approved gather technique.
II.B. 2	Determine rate of movement and distance limitations for WH&B helicopter gather.
II.B.2.a	Direct appropriate gather/handling methods for weak or debilitated WH&B.
II.B.3	Determine whether to abandon pursuit or use other capture method in order to avoid repeated pursuit of WH&B.
II.B.4	Determine width and need for visibility marking when using opening in fence en route to trap.
II.B.6	Determine number of attempts that can be made to capture the missing half of a mare/foal pair that has become separated.
II.B.7	Determine whether to proceed with gather when ambient temperature is outside the range of 10°F to 95°F for horses or 10°F to 100°F for burros.
II.C.1	Approve roping of any WH&B.
II.D.1.a	Determine period of time that water outside a bait trap is inaccessible such that wellbeing of WH&Bs, wildlife, or livestock is not adversely affected.
III.A.2	Direct and consult with on-site/on-call veterinarian on any matters related to WH&B health, handling, welfare and euthanasia.

III.B.1.e	Adjust feed/water as necessary, in consultation with onsite/on call veterinarian, to provide for needs of animals when water or feed deprivation conditions exist on range.
III.B.4.c	Determine provision of water and hay to non-ambulatory animals.
IV.C.2.g	Approve use of electric prod more than three times, for exceptional cases only.
V.A.1	Approve sorting, loading, or unloading at night with use of supplemental light.
V.A.2.a	Approve shipping delays of greater than 48 hours from temporary holding facility to BLM facility.
V.C.1.b	Approve of transport and care during transport for weak or debilitated WH&B.
VI.A.3	Direct decision regarding euthanasia and method of euthanasia for any WH&B; may consult with on-site/on-call veterinarian.
VI.B.1	Ensure that appropriate equipment is available for carcass disposal.

Appendix B. East Pershing Complex Wild Horse Observation Protocol

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

Daily Visitor Protocol

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Public Outreach and Education Day

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

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

Appendix C. Standard Operating Procedures for Population-level Porcine Zona Pellucida Fertility Control Treatments

22-Month Time-Release Pelleted Porcine Zona Pellucida (PZP) Vaccine:
The following implementation and monitoring requirements are part of any Action Alternative which involves the use of PZP:

PZP vaccine would be administered only by trained BLM personnel or collaborating research partners.

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

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

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

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

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

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

Population growth rates of herds selected for intensive monitoring would be estimated every year post-treatment using helicopter or fixed-wing surveys. During these surveys it is not necessary to identify which foals were born to which mares, only an estimate of population growth is needed (i.e. # of foals to # of adults). If, during routine HMA field monitoring (on-the-ground), data describing mare to foal ratios can be collected, these data should also be shared with the NPO for possible analysis by the USGS.

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

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

Appendix D. Nevada Noxious Weed List

Nevada Administrative Code (effective 10-31-05)
555.010 1. The following weeds are designated noxious weeds:

DEFINITIONS

Category ”A”: Weeds not found or limited in distribution throughout the state; actively excluded from the state and actively eradicated wherever found; actively eradicated from nursery stock dealer premises; control required by the state in all infestations

Category "B": Weeds established in scattered populations in some counties of the state; actively excluded where possible, actively eradicated from nursery stock dealer premises; control required by the state in areas where populations are not well established or previously unknown to occur.

Category "C": Weeds currently established and generally widespread in many counties of the state; actively eradicated from nursery stock dealer premises; abatement at the discretion of the state quarantine officer

Common Name	**Scientific Name**
Category A Weeds:	
African Rue	*Peganum harmala*
Austrian fieldcress	*Rorippa austriaca*
Austrian peaweed	*Sphaerophysa salsula / Swainsona salsula*
Black henbane	*Hysocyamus niger*
Camelthorn	*Alhagi camelorum*
Common crupina	*Crupina vulgaris*
Dalmation Toadflax	*Linaria dalmatica*
Dyer’s woad	*Isatis tinctoria*
Eurasian water-milfoil	*Myriophyllum spicatum*
Giant Reed	*Arundo donax*
Giant Salvinia	*Salvinia molesta*
Goats rue	*Galega officinalis*
Green fountain grass	*Pennisetum setaceum*
Houndstongue	*Cynoglossum officinale*
Hydrilla	*Hydrilla verticillata*
Iberian Star thistle	*Centaurea iberica*
Klamath weed	*Hypericum perforatum*
Leafy spurge	*Euphorbia esula*
Malta Starthistle	*Centaurea melitensis*
Mayweed chamomile	*Anthemis cotula*
Mediterranean sage	*Salvia aethiopis*
Purple loosestrife	*Lythrum salicaria*, *L.virgatum* and their cultivars
Purple Star thistle	*Centaurea calcitrapa*
Rush skeletonweed	*Chondrilla juncea*

Sow Thistle	*Sonchus arvensis*
Spotted Knapweed	*Centaurea masculosa*
Squarrose star thistle	*Centaurea virgata Lam. Var. squarrose*
Sulfur cinquefoil	*Potentilla recta*
Syrian Bean Caper	*Zygophyllum fabago*
Yellow Starthistle	*Centaurea solstiltialis*
Yellow Toadflax	*Linaria vulgaris*

Category B Weeds:

Carolina Horse-nettle	*Solanum carolinense*
Diffuse Knapweed	*Centaurea diffusa*
Medusahead	*Taeniatherum caput-medusae*
Musk Thistle	*Carduus nutans*
Russian Knapweed	*Acroptilon repens*
Sahara Mustard	*Brassica tournefortii*
Scotch Thistle	*Onopordum acanthium*
White Horse-nettle	*Solanum elaeagnifolium*

Category C Weeds:

Canada Thistle	*Cirsium arvense*
Hoary cress	*Cardaria draba*
Johnson grass	*Sorghum halepense*
Perennial pepperweed	*Lepidium latifolium*
Poison Hemlock	*Conium maculatum*
Puncture vine	*Tribulus terrestris*
Salt cedar (tamarisk)	*Tamarix spp*
Water Hemlock	*Cicuta maculata*

Appendix E. WinEquus Figures

ALTERNATIVE C

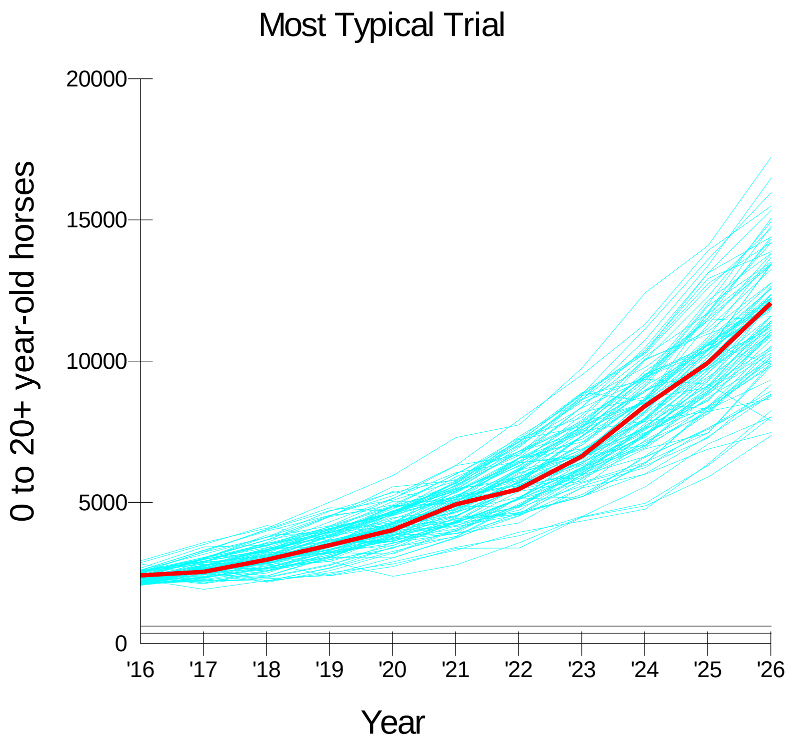
<u>Input Parameters and Overall Results</u>

Age Class	Initial Base Population		Survival Probabilities		Foaling Rates	Percentages for Removals		Percentages for Fertility Treatment
	Females	Males	Females	Males		Females	Males	
foal	132	280	0.919	0.877	0	0%	0%	0%
1	35	74	0.996	0.95	0	0%	0%	0%
2	9	6	0.994	0.949	0.52	0%	0%	100%
3	63	13	0.993	0.947	0.67	0%	0%	100%
4	195	61	0.99	0.945	0.76	0%	0%	100%
5	96	84	0.988	0.942	0.89	0%	0%	100%
6	35	65	0.985	0.939	0.76	0%	0%	100%
7	32	32	0.981	0.936	0.9	0%	0%	100%
8	56	25	0.976	0.931	0.88	0%	0%	100%
9	66	81	0.971	0.926	0.91	0%	0%	100%
10-14	159	321	0.947	0.903	0.81	0%	0%	100%
15-19	62	233	0.87	0.83	0.82	0%	0%	100%
20+	36	129	0.591	0.564	0.75	0%	0%	100%

Sex ratio at birth: 58% males
Scaling factors for annual variation: survival probabilities = 1.00, foaling rates = 1.00
Correlation between annual variation in survival probabilities and foaling rates = 0.00

No management
Starting year is 2016
Gathering occurs at minimum interval of 3 years
Initial gather year is 2016
Foals are included in AML.
Percent of population that can be gathered = 80%.

Population Size

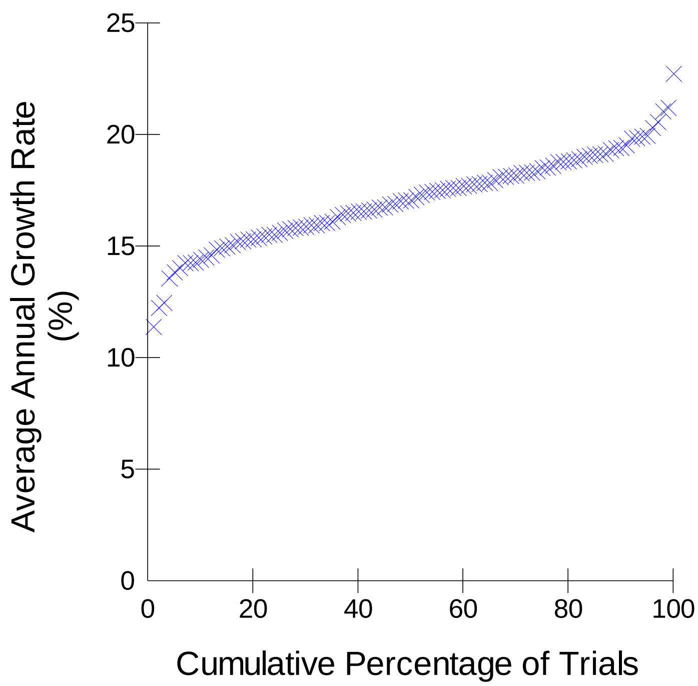


Population Sizes in 11 Years*

	Minimum	Average	Maximum
Lowest Trial	1944	3849	7392
10th Percentile	2128	4767	9092
25th Percentile	2161	5251	10498
Median Trial	2279	5712	11880
75th Percentile	2438	6311	13042
90th Percentile	2597	6952	14430
Highest Trial	2964	8216	17255

In 11 years and 100 trials, the lowest number 0 to 20+ year-old horses ever obtained was 1944 and the highest was 17255. In half the trials, the minimum population size in 11 years was less than 2279 and the maximum was less than 11880. The average population size across 11 years ranged from 3849 to 8216.

Growth Rates



Average Growth Rate in 10 Years	
10th Percentile	14.5
25th Percentile	16
Median Trial	17.1
75th Percentile	18.7
90th Percentile	19.9
Highest Trial	21.3

Gather Numbers

Alternative C requires No Management; therefore no graphs or tables for Gather Numbers are offered.

Appendix F. Wildlife Species List – North-central Nevada

This list is a combination of wildlife sight record data and NDOW's best effort to predict what wildlife species live within Pershing and Churchill County in all seasons and under optimum habitat conditions.

With the exception of the European Starling, House Sparrow, Eurasian Collared-Dove, Ringed Turtle-Dove and Rock Dove, all birds are protected in Nevada by either the International Migratory Bird Treaty Act, Endangered Species Act or as game species. Several mammal, reptile and amphibian species are also protected as either game, sensitive, threatened or priority species.

Habitats- (Sagebrush steppe, Salt desert scrub, Playa, Mountain brush, Subalpine deciduous forest and Wetland / Riparian/ Lake Habitats)

L.E. = Locally Extirpated

Updated: 6/2015 – Jane Van Gunst and Jenni Jeffers - Nevada Department of Wildlife - Winnemucca, Nevada.

Birds

Order: *Gaviiformes* (Diver/Swimmers)

Family: *Gaviidae* (Loons)

Common Loon	*Gavia immer*

Order: *Podicipediformes* (Flat-toed Divers)

Family: *Podicipedidae* (Grebes)

Pied-billed Grebe	*Podilymbus podiceps*
Horned Grebe	*Podiceps auritus*
Eared Grebe	*Podiceps nigricollis*
Western Grebe	*Aechmophorus occidentalis*
Clark's Grebe	*Aechmophorus clarkii*

Order: *Pelecaniformes* (Four-toed Fisheaters)

Family: *Pelecanidae* (Pelicans)

American White Pelican	*Pelecanus erythrorhynchos*

Family: *Phalacrocoracidae* (Cormorants)

Double-crested Cormorant	*Phalacrocorax auritus*

Order: *Ciconiiformes* (Long-legged Waders)

Family: *Ardeidae* (Bitterns, Herons, Egrets)

American Bittern	*Botaurus lentiginosus*
Great Blue Heron	*Ardea herodias*
Great Egret	*Ardea alba*
Snowy Egret	*Egretta thula*
Black-crowned Night Heron	*Nycticorax nycticorax*

Family: *Threskiornithidae* (Ibises)

White-faced Ibis	*Plegadis chihi*

Family: *Cathartidae* (New World Vultures)

Turkey Vulture	*Cathartes aura*

Order: *Anseriformes* (Waterfowl)

Family: *Anatidae* (Ducks, Geese, Swans)

Greater White-fronted Goose	*Anser albifrons*
Snow Goose	*Chen caerulescens*
Canada Goose	*Branta canadensis*
Tundra Swan	*Cygnus columbianus*
Wood Duck	*Aix sponsa*
Gadwall	*Anas strepera*
American Wigeon	*Anas americana*
Eurasian Wigeon	*Anas penelope*
Mallard	*Anas platyrhynchos*
Blue-winged Teal	*Anas discors*
Cinnamon Teal	*Anas cyanoptera*
Northern Shoveler	*Anas clypeata*
Northern Pintail	*Anas acuta*
Green-winged Teal	*Anas crecca*
Canvasback	*Aythya valisinaria*
Redhead	*Aythya americana*
Ring-necked Duck	*Aythya collaris*
Greater Scaup	*Aythya marila*
Lesser Scaup	*Aythya affinis*
Long-tailed Duck	*Clangula hyemalis*
Bufflehead	*Bucephala albeola*
Common Goldeneye	*Bucephala clangula*
Barrow's Goldeneye	*Bucephala islandica*
Hooded Merganser	*Lophodytes cucullatus*
Common Merganser	*Mergus merganser*
Red-breasted Merganser	*Mergus serrator*
Ruddy Duck	*Oxyura jamaicensis*

Order: *Falconiformes* (Diurnal Flesh Eaters)

Family: *Accipitridae* (Hawks, Eagles, Osprey)

Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaetus leucocephalus*
Northern Harrier	*Circus cyaneus*
Sharp-shinned Hawk	*Accipiter striatus*
Cooper's Hawk	*Accipiter cooperii*
Northern Goshawk	*Accipiter gentilis*
Red-shouldered Hawk	*Buteo lineatus*
Broad-winged Hawk	*Buteo platypterus*
Swainson's Hawk	*Buteo swainsoni*
Red-tailed Hawk	*Buteo jamaicensis*
Ferruginous Hawk	*Buteo regalis*
Rough-legged Hawk	*Buteo lagopus*
Golden Eagle	*Aquila chrysaetos*

Family: *Falconidae* (Falcons)

American Kestrel	*Falco sparverius*
Merlin	*Falco columbarius*
Peregrine Falcon	*Falco perigrinus*
Prairie Falcon	*Falco mexicanus*

Order: *Galliformes* (Chicken Relatives)

Family: *Phasianidae* (Grouse, Partridge)

Chukar	*Alectoris chukar*
Ring-necked Pheasant	*Phasianus colchicus*
Ruffed Grouse	*Bonasa umbellus*
Greater Sage-Grouse	*Centrocercus urophasianus*

Family: *Odontophoridae* (New World Quail)

California Quail	*Callipepla californica*
Mountain Quail	*Oreortyx pictus*

Order: *Gruiformes* (Cranes and Allies)

Family: *Rallidae* (Rails, Coots)

Virginia Rail	*Rallus limicola*
Sora	*Porzana carolina*
American Coot	*Fulica americana*

Family: *Gruidae* (Cranes)

Greater Sandhill Crane	*Grus canadansis tabida*

Order: *Charadriiformes* (Wading Birds)

Family: *Charadriidae* (Plovers)

Black-bellied Plover	*Pluvialis squatarola*
Snowy Plover	*Charadrius alexandrinus*
Semi-palmated Plover	*Charadrius semipalmatus*
Killdeer	*Charadrius vociferus*

Family: *Recurvirostridae* (Avocets)

Black-necked Stilt	*Himantopus mexicanus*
American Avocet	*Recurvirostra americana*

Family: *Scolopacidae* (Sandpipers, Phalaropes)

Greater Yellowlegs	*Tringa melanoleuca*
Lesser Yellowlegs	*Tringa flavipes*
Solitary Sandpiper	*Tringa solitaria*
Willet	*Catoptrophorus semipalmatus*
Spotted Sandpiper	*Actitus macularia*
Long-billed Curlew	*Numenius americanus*
Western Sandpiper	*Calidris mauri*
Least Sandpiper	*Calidris minutilla*
Long-billed Dowitcher	*Limnodromnus scolopaceus*
Wilson's Snipe	*Gallinago gallinago*
Wilson's Phalarope	*Phalaropus tricolor*
Red-necked Phalarope	*Phalaropus lobatus*

Family: *Laridae* (Gulls, Terns)

Franklin's Gull	*Larus pipixcan*
Bonaparte's Gull	*Larus philadelphia*
Ring-billed Gull	*Larus delawarensis*
California Gull	*Larus californicus*
Herring Gull	*Larus argentatus*
Caspian Tern	*Sterna caspia*
Forster's Tern	*Sterna forsteri*

Order: *Columbiformes* (Pigeons and Allies)

Family: *Columbidae* (Doves)

Rock Dove	*Columba livia*
White-winged Dove	*Zenaida asiatica*
Mourning Dove	*Zenaida macroura*
Eurasian Collared-Dove	*Streptopelia decaocto*

Order: *Cuculiformes* (Cuckoos and Allies)

Family: *Cuculidae* (Cuckoos and Roadrunners)

Order: *Strigiformes* (Nocturnal Flesh Eaters)

Family: *Tytonidae* (Barn Owls)

Barn Owl	*Tyto alba*

Family: *Strigidae* (Owls)

Flammulated Owl	*Otus flammeolus*
Western Screech-Owl	*Otus kennicottii*
Great Horned Owl	*Bubo virginianus*
Northern Pygmy-Owl	*Glaucidium gnoma*
Burrowing Owl	*Athene cunicularia*
Long-eared Owl	*Asio otus*
Short-eared Owl	*Asio flammeus*
Northern Saw-whet Owl	*Aegolius acadicus*

Order: *Caprimulgiformes* (Night Jars)

Family: *Caprimulgidae* (Goatsuckers)

Common Nighthawk	*Chordeiles minor*
Common Poorwill	*Phalaenoptilus nuttallii*

Order: *Apodiformes* (Small Fast Fliers)

Family: *Apodidae* (Swifts)

White-throated Swift	*Aeronautes saxatalis*

Family: *Trochilidae* (Hummingbirds)

Black-chinned Hummingbird	*Archilochus alexandri*
Calliope Hummingbird	*Stellula calliope*
Broad-tailed Hummingbird	*Selasphorus platycercus*
Rufous Hummingbird	*Selasphorus rufus*

Order: *Coraciiformes* (Cavity Nesters)

Family: *Alcedinidae* (Kingfishers)

Belted Kingfisher	*Ceryle alcyon*

Order: *Piciformes* (Cavity Builders)

Family: *Picidae* (Woodpeckers)

Lewis' Woodpecker	*Melanerpes lewis*
Red-naped Sapsucker	*Sphyrapicus nuchalis*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Northern Flicker	*Colaptes auratus*

Order: *Passeriformes* (Perching Birds)

Family: *Tyrannidae* (Flycatchers)

Western Wood-Pewee	*Contopus sordidulus*
Willow Flycatcher	*Epidonax traillii*
Hammond's Flycatcher	*Epidonax hammondii*
Gray Flycatcher	*Epidonax wrightii*
Dusky Flycatcher	*Epidonax oberholseri*
Cordilleran Flycatcher	*Epidonax occidentalis*
Say's Phoebe	*Sayornis saya*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Western Kingbird	*Tyrannus verticalis*
Eastern Kingbird	*Tyrannus tyrannus*

Family: *Laniidae* (Shrikes)

Loggerhead Shrike	*Lanius ludovicianus*
Northern Shrike	*Lanius excubitor*

Family: *Vireonidae* (Vireos)

Plumbeous Vireo	*Vireo plumbeus*

Warbling Vireo *Vireo gilvus*

Family: *Corvidae* (Jays)

Western Scrub-Jay *Aphelocoma californica*
Clark's Nutcracker *Nucifraga columbiana*
Black-billed Magpie *Pica pica*
American Crow *Corvus brachyrhynchos*
Common Raven *Corvus corax*

Family: *Alaudidae* (Larks)

Horned Lark *Eremophila alpestris*

Family: *Hirundinidae* (Swallows)

Tree Swallow *Tachycineta bicolor*
Violet-green Swallow *Tachycineta thalassina*
Bank Swallow *Riparia riparia*
N. Rough-winged Swallow *Stelgidopteryx serripennis*
Cliff Swallow *Petrochelidon pyrrhonota*
Barn Swallow *Hirundo rustica*

Family: *Paridae* (Chickadees, Titmice)

Mountain Chickadee *Poecile gambeli*

Family: *Aegithalidae* (Bushtits)

Bushtit *Psaltriparus minimus*

Family: *Troglodytidae* (Wrens)

Rock Wren *Salpinctes obsoletus*
Canyon Wren *Catherpes mexicanus*
Bewick's Wren *Thyromanes bewickii*
House Wren *Troglodytes aedon*
Winter Wren *Troglodytes troglodytes*
Marsh Wren *Cistothorus palustris*

Family: *Cinclidae* (Dippers)

American Dipper *Cinclus mexicanus*

Family: *Turdidae* (Thrushes)

Mountain Bluebird *Sialia currucoides*
Townsend's Solitaire *Myadestes townsendi*
Swainson's Thrush *Catharus ustulatus*
Hermit Thrush *Catharus guttatus*
American Robin *Turdus migratorius*

Family: *Mimidae* (Thrashers, Mockingbirds)

Northern Mockingbird *Mimus polyglottos*
Sage Thrasher *Oreoscoptes montanus*

Family: *Sturnidae* (Starlings)

European Starling *Sturnus vulgaris*

Family: *Motacillidae* (Pipits)

American Pipit *Anthus rubescens*

Family: *Bombycillidae* (Waxwings)

Cedar Waxwing *Bombycilla cedrorum*

Family: *Parulidae* (Wood Warblers)

Orange-crowned Warbler	*Vermivora celata*
Nashville Warbler	*Vermivora ruficapilla*
Virginia's Warbler	*Vermivora virginae*
Yellow Warbler	*Dendroica petechia*
Yellow-rumped Warbler	*Dendroica coronata*
MacGillivray's Warbler	*Oporornis tolmiei*
Common Yellowthroat	*Geothlypis trichas*
Wilson's Warbler	*Wilsonia pusilla*
Yellow-breasted Chat	*Icteria virens*

Family: *Thraupidae* (Tanagers)

Western Tanager	*Piranga ludoviciana*

Family: *Emberizidae* (Sparrows, Towhees, Juncos)

Green-tailed Towhee	*Pipilo chlorurus*
Spotted Towhee	*Pipilo maculatus*
American Tree Sparrow	*Spizella arborea*
Chipping Sparrow	*Spizella passerina*
Brewer's Sparrow	*Spizella breweri*
Vesper Sparrow	*Pooecetes gramineus*
Lark Sparrow	*Chondestes grammacus*
Sage Sparrow	*Amphispiza belli*
Savannah Sparrow	*Passerculus sandwichensis*
Grasshopper Sparrow	*Ammodramus bairdii*
Fox Sparrow	*Passerella iliaca schistacea*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
White-throated Sparrow	*Zonotrichia albicollis*
Harris' Sparrow	*Zonotrichia querula*
Gambel'sWhite-crownedSparrow	*Zonotrichia leucophrys gambelii*
Mountain W-crowned Sparrow	*Zonotrichia leucophrys oriantha*
Golden-crowned Sparrow	*Zonotrichia atricapilla*
Dark-eyed Junco*(Oregon)*	*Junco hyemalis therburi*
Dark-eyed Junco(*Gray-headed*)	*Junco hyemalis caniceps*
Lapland Longspur	*Calcarius lapponicus*

Family: *Cardinalidae* (Grosbeaks, Buntings)

Black-headed Grosbeak	*Pheucticus melanocephalus*
Lazuli Bunting	*Passerina amoena*
Indigo Bunting	*Passerina cyanea*

Family: *Icteridae* (Blackbirds, Orioles)

Bobolink	*Dolichonyx oryzivorus*
Red-winged Blackbird	*Agelaius phoeniceus*
Western Meadowlark	*Sturnella neglecta*
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
Brewer's Blackbird	*Euphagus cyanocephalus*
Great-tailed Grackle	*Quiscalus mexicanus*
Brown-headed Cowbird	*Molothrus ater*
Bullock's Oriole	*Icterus bullockii*

Family: *Fringillidae* (Finches, Grosbeaks)

Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*
Black Rosy-Finch	*Leucosticte atrata*
Cassin's Finch	*Carpodacus cassinii*
House Finch	*Carpodacus mexicanus*
Pine Siskin	*Carduelis pinus*
Lesser Goldfinch	*Carduelis psaltria*
American Goldfinch	*Carduelis tristis*
Evening Grosbeak	*Coccothraustes vespertinus*

Family: *Passeridae* (Old World Sparrows)

House Sparrow	*Passer domesticus*

Mammals

Order: *Insectivora* (Insect Eaters)

Family: *Soricidae* (Shrews)

Merriam's Shrew	*Sorex meriammi*
Dusky Shrew	*Sorex monticolus*
Vagrant Shrew	*Sorex vagrans*
Northern Water Shrew	*Sorex palustris*
Preble's Shrew	*Sorex preblei*

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Plainnose Bats)

California Myotis	*Myotis californicus*
Western Small-footed Myotis	*Myotis ciliolabrum*
Long-eared Myotis	*Myotis evotis*
Little Brown Bat	*Myotis lucifugus*
Fringed Myotis	*Myotis thysanodes*
Long-legged Myotis	*Myotis volans*
Yuma Myotis	*Myotis yumanensis*
Western Red Bat	*Lasiurus blossvellii*
Hoary Bat	*Lasiurus cinereus*
Silver-haired Bat	*Lasionycteris noctivagans*
Western Pipistrelle	*Parastrellus hesperus*
Big Brown Bat	*Eptesicus fuscus*
Townsend's Big-eared Bat	*Corynorhinus townsendii*
Spotted Bat	*Euderma maculatum*
Pallid Bat	*Antrozous pallidus*

Family: *Molossidae* (Freetail Bats)

Brazilian Free-tailed Bat	*Tadarida brasiliensis*

Order: *Lagomorpha* (Pikas, Hares, Rabbits)

Family: *Leporidae* (Hares, Rabbits)

Black-tailed Jackrabbit	*Lepus californicus*
Mountain Cottontail	*Sylvilagus nuttalli*
Desert Cottontail	*Sylvilagus audubonii*
Pygmy Rabbit	*Brachylagus idahoensis*

Order: *Rodentia* (Rodents)

Family: *Sciuridae* (Squirrels)

Least Chipmunk	*Tamias minimus*
Uinta Chipmunk	*Tamias umbrinus*
Yellow-bellied Marmot	*Marmota flaviventris*
White-tailed Antelope Squirrel	*Ammospermophilus leucurus*
Great Basin Ground Squirrel	*Spermophilus mollis*
Belding's Ground Squirrel	*Spermophilus beldingi*
Wyoming Ground Squirrel	*Spermophilus elegans*
Golden-mantled Ground Squirrel	*Spermophilus lateralis*

Family: *Geomyidae* (Gophers)

Botta's Pocket Gopher	*Thomomys bottae*
Northern Pocket Gopher	*Thomomys talpoides*
Townsend's Pocket Gopher	*Thomomys townsendii*

Family: *Heteromyidae* (Kangaroo Rodents)

Little Pocket Mouse	*Perognathus longimembris*
Great Basin Pocket Mouse	*Perognathus parvus*
Dark Kangaroo Mouse	*Microdipodops megacephalus*

Family: *Heteromyidae* (Kangaroos cont.)

Ord Kangaroo Rat	*Dipodomys ordii*
Chisel-toothed Kangaroo Rat	*Dipodomys microps*

Family: *Castoridae* (Beavers)

American Beaver	*Castor canadensis*

Family: *Cricetidae* (Mice, Rats, Voles)

Western Harvest Mouse	*Reithrodontomys megalotis*
Canyon Mouse	*Peromyscus crinitus*
Deer Mouse	*Peromyscus maniculatus*
Northern Grasshopper Mouse	*Onychomys leucogaster*
Desert Woodrat	*Neotoma lepida*
Bushy-tailed Woodrat	*Neotoma cinerea*
Mountain Vole	*Microtus montanus*
Long-tailed Vole	*Microtus longicaudus*
Sagebrush Vole	*Lemmiscus curtatus*

Family: *Zapodidae* (Jumping Mice)

Western Jumping Mouse	*Zapus princeps*

Family: *Erethizontidae* (New World Porcupines)

North American Porcupine	*Erethizon dorsatum*

Order: *Carnivora* (Flesh-Eaters)

Family: *Canidae* (Dogs)

Coyote	*Canis latrans*
Gray Fox	*Urocyon cinereoargenteus*
Kit Fox	*Vulpes velox*
Red Fox	*Vulpes vulva*

Family: *Procyonidae* (Racoons and Allies)

Common Raccoon	*Procyon lotor*

Family: *Mustelidae* (Weasels and Allies)

Short-tailed Weasel	*Mustela erminae*
Long-tailed Weasel	*Mustela frenata*
Mink	*Mustela vison*
Northern River Otter	*Lontra canadensis*
American Badger	*Taxidea taxus*
Striped Skunk	*Mephitis mephitis*
Western Spotted Skunk	*Spilogale gracilis*

Family: *Felidae* (Cats)

Mountain Lion	*Felix concolor*
Bobcat	*Lynx rufus*

Order: *Artiodactyla* (Hoofed Mammals)

Family: *Cervidae* (Deer)

Mule Deer	*Odocoileus hemionus*

Family: *Antilocapridae* (Pronghorn)

Pronghorn	*Antilocapra americana*

Family: *Bovidae* (Bison, Sheep, Goats)

California Bighorn Sheep	*O. c. californiana*

Reptiles

Order: *Squamata* (Lizards, Snakes)

Family: *Iguanidae* (Iguanas and Allies)

Common Zebra-tailed Lizard	*Callisaurus draconoides*
Long-nosed Leopard Lizard	*Gambelia wislizenii*
Desert Spiny Lizard	*Sceloporus magister*
Western Fence Lizard	*Sceloporus occidentalis*
Sagebrush Lizard	*Sceloporus graciosus*
Side-blotched Lizard	*Uta stansburiana*
Pigmy Short-horned Lizard	*Phrynosoma douglassii*
Greater Short-horned Lizard	*Phrynosoma hernadesi*
Desert Horned Lizard	*Phrynosoma platyrhinos*

Family: *Scincidae* (Skinks)

Great Basin Skink	*Eumeces skiltonianus utahensis*

Family: *Teiidae* (Whiptails)

Western Whiptail	*Cnemidophorus tigrus*

Family: *Boidae* (Boas, Pythons)

Rubber Boa	*Charina bottae*

Family: *Colubridae* (Solid-toothed Snakes)

Ringneck Snake	*Diadophis punctatus*
Striped Whipsnake	*Masticophis taeniatus*
Western Yellow-bellied Racer	*Coluber constrictor mormon*
Great Basin Gopher Snake	*Pituophis cantenifer deserticola*
Common Kingsnake	*Lampropeltis getulus*
Long-nosed Snake	*Rhinocheilus lecontei*
Western Terrestrial Garter	*Thamnophis elegans*
Variable Ground Snake	*Sonora semiannulata*
Night Snake	*Hypsiglena torquata*

Family: *Viperidae* (Vipers)

Great Basin Rattlesnake	*Crotalus viridis lutosus*

Amphibians

Order: *Anura* (Frogs and Toads)

Family: *Pelobatidae* (Spadefoots)

Great Basin Spadefoot Toad	*Spea intermontana*

Family: *Ranidae* (True Frogs)

Northern Leopard Frog	*Rana pipiens*
Bullfrog	*Rana catesbeiana*

Family: *Bufonidae* (Toads)

Western Toad	*Bufo boreas*

Family: *Hylidae* (Treefrogs)

Pacific Chorus Frog	*Pseudacris regilla*

Fish

Order: *Salmoniformes*

Family: *Salmonidae* (Salmon and Trout)

Chinook Salmon	*Oncorhynchus tshawytscha(L.E.)*
Rainbow Trout	*Oncorhynchus mykiss*

Redband Trout	*Oncorhynchus mykiss gairdneri*
Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*
Brook Trout	*Salvelinus fontinalis*
Mountain Whitefish	*Prosopium williamsoni*
Brown Trout	*Salmo trutta*

Order: *Scorpaeniformes*

Family: *Cottidae* (Sculpins)

Paiute Sculpin	*Cottus beldingii*

Order: *Cypriniformes*

Family: *Cyprinidae* (Carps and Minnows)

Chiselmouth	*Acrocheilus alutaceus*
Northern Pikeminnow	*Ptychochelus oregonensis*
Longnose Dace	*Rhinicthys cataractae*
Speckled Dace	*Rhinicthys osculus*
Redside Shiner	*Richrdsonius balteatus*
Tui Chub	*Gila bicolor*
Asiatic Carp	*Cyprinus carpio*

Family: *Catastomidae* (Suckers)

Mountain Sucker	*Catostomus platyrhynchus*
Tahoe Sucker	*Catastomus tahoensis*

Order: *Siluriformes*

Family: *Ictaluridae* (Catfish)

Channel catfish	*Ictalurus punctatus*

Order: *Perciformes*

Family: *Percidae* (Walleye)

Family: *Centrarchidae* (Bass and allies)

Largemouth Bass	*Micropterus salmoides*
Bluegill	*Lepomis macrochirus*
Crappie	*Pomoxis nigromaculatus*

Required Design Features (RDF) identified in the
Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment
Appendix C

General RDFs		Applied	If RDF not applied, select reason:
RDF Gen 1:	Locate new roads outside of GRSG habitat to the extent practical.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ______ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale: No new roads will be created for this project	
RDF Gen 2:	Avoid constructing roads within riparian areas and ephemeral drainages. Construct lowwater crossings at right angles to ephemeral drainages and stream crossings (note that such construction may require permitting under Sections 401 and 404 of the Clean Water Act).	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ______ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:	
RDF Gen 3:	Limit construction of new roads where roads are already in existence and could be used or upgraded to meet the needs of the project or operation. Design roads to an appropriate standard, no higher than necessary, to accommodate intended purpose and level of use.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ______ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:	
RDF Gen 4:	Coordinate road construction and use with ROW holders to minimize disturbance to the extent possible.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ______ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:	
RDF Gen 5:	During project construction and operation, establish and post speed limits in GRSG habitat to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ______ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:	

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RDF Gen 6: Newly constructed project roads that access valid existing rights would not be managed as public access roads. Proponents will restrict access by employing traffic control devices such as signage, gates, and fencing.	☐ Yes ☑ No	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
		☐	A specific RDF will provide no additional protection to GRSG or its habitat.
	Rationale:		
RDF Gen 7: Require dust abatement practices when authorizing use on roads.	☐ Yes ☑ No	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
		☐	A specific RDF will provide no additional protection to GRSG or its habitat.
	Rationale:		
NO RDF 8 Identified			
RDF Gen 9: Upon project completion, reclaim roads developed for project access on public lands unless, based on site-specific analysis, the route provides specific benefits for public access and does not contribute to resource conflicts.	☐ Yes ☑ No	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
		☐	A specific RDF will provide no additional protection to GRSG or its habitat.
	Rationale:		
RDF Gen 10: Design or site permanent structures that create movement (e.g., pump jack/ windmill) to minimize impacts on GRSG habitat.	☐ Yes ☑ No	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
		☐	A specific RDF will provide no additional protection to GRSG or its habitat.
	Rationale:		
RDF Gen 11: Equip temporary and permanent aboveground facilities with structures or devices that discourage nesting and perching of raptors, corvids, and other predators.	☐ Yes ☑ No	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
		☐	A specific RDF will provide no additional protection to GRSG or its habitat.
	Rationale:		

RDF Gen 12:	Control the spread and effects of nonnative, invasive plant species (e.g., by washing vehicles and equipment, minimize unnecessary surface disturbance; Evangelista et al. 2011). All projects would be required to have a noxious weed management plan in place prior to construction and operations.	☑ Yes ☐ No	☐ ☐ ☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale: This will reduce the chances that 'new' invasive plant species be brought to the area of the gather.		
RDF Gen 13:	Implement project site-cleaning practices to preclude the accumulation of debris, solid waste, putrescible wastes, and other potential anthropogenic subsidies for predators of GRSG.	☑ Yes ☐ No	☑ ☐ ☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale: Implementing project site-cleaning practices will reduce the likelihood of subsidized predation by raptors and corvids		
RDF Gen 14:	Locate project related temporary housing sites outside of GRSG habitat.	☐ Yes ☑ No	☑ ☐ ☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		
RDF Gen 15:	When interim reclamation is required, irrigate site to establish seedlings more quickly if the site requires it.	☐ Yes ☑ No	☑ ☐ ☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		
RDF Gen 16:	Utilize mulching techniques to expedite reclamation and to protect soils if the site requires it.	☐ Yes ☑ No	☑ ☐ ☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		

RDF Gen 17:	Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.	☑ Yes	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale: Gather sites should restored back to pre-disturbance landforms.		
RDF Gen 18:	When authorizing ground-disturbing activities, require the use of vegetation and soil reclamation standards suitable for the site type prior to construction.	☐ Yes	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☑ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		
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 (BLM 2005b).	☑ Yes	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		
RDF Gen 20:	To reduce predator perching in GRSG habitat, limit the construction of vertical facilities and fences to the minimum number and amount needed and install anti-perch devices where applicable.	☐ Yes	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☑ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		
RDF Gen 21:	Outfit all reservoirs, pits, tanks, troughs or similar features with appropriate type and number of wildlife escape ramps (BLM 1990; Taylor and Tuttle 2007).	☑ Yes	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale: This RDF should apply to any water/bait trap stations used during the gather.		

		Applied		If RDF not applied, select reason:
RDF Gen 22:	Load and unload all equipment on existing roads to minimize disturbance to vegetation and soil.	☑ Yes	☐	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☐ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		

In addition to the General RDFs, the following resource programs will include the following program specific RDFs applicable to PHMA, GHMA and OHMA consistent with applicable law:

Lands and Realty RDFs *		Applied		If RDF not applied, select reason:
RDF LR-LUA 1:	Where new ROWs associated with valid existing rights are required, co-locate new ROWs within existing ROWs or where it best minimizes impacts in GRSG habitat. Use existing roads or realignments of existing roads to access valid existing rights that are not yet developed.	☐ Yes	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☑ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		
RDF LR-LUA 2:	Do not issue ROWs to counties on newly constructed energy/mining development roads, unless for a temporary use consistent with all other terms and conditions included in this document.	☐ Yes	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☑ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		
RDF GEN (LR-LUA) 3:	Where necessary, fit transmission towers with anti-perch devices (Lammers and Collopy 2007) in GRSG habitat.	☐ Yes	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☑ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		
*These RDFs also apply to other land use authorizations such as leases and permits				

Fuels and Fire Management RDFs		Applied	If RDF not applied, select reason:	
RDF WFM 1:	Power-wash all firefighting vehicles, including engines, water tenders, personnel vehicles, and all-terrain vehicles (ATVs), prior to deploying in or near GRSG habitat to minimize the introduction and spread of undesirable and invasive plant species.	☐ Yes	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☑ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		
RDF WFM 2:	Protect wildland areas from wildfire originating on private lands, infrastructure corridors, and recreational areas.	☐ Yes	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☑ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		
RDF WFM 3:	Reduce the risk of vehicle or human-caused wildfires and the spread of invasive species by planting perennial vegetation (e.g., green-strips) paralleling road rights-of-way.	☐ Yes	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☑ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		

Fluid Minerals RDFs		Applied	If RDF not applied, select reason:	
RDF Lease FM 1:	Co-locate power lines, flow lines, and small pipelines under or immediately adjacent to existing roads (Bui et al. 2010) in order to minimize or avoid disturbance.	☐ Yes	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☑ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		
RDF Lease FM 2:	Cover, create barriers, or implement other effective deterrents (e.g., netting, fencing, birdballs, and sound cannons) for all ponds and tanks containing potentially toxic materials to reduce GRSG mortality.	☐ Yes	☑	A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
		☑ No	☐	An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________
			☐	A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:		

RDF Lease FM 3:	Require installation of noise shields to comply with noise restrictions (see Action SSS 7) when drilling during the breeding, nesting, brood-rearing, and/or wintering season. Require applicable GRSG seasonal timing restrictions when noise restrictions cannot be met (see Action SSS 6).	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ______ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:
RDF Lease FM 4:	Ensure habitat restoration meets GRSG habitat objectives (Table 2-2) for reclamation and restoration practices/sites (Pyke 2011).	☐ Yes ☑ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☑ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # Gen 17 ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:
RDF Lease FM 5:	Maximize the area of interim reclamation on long-term access roads and well pads, including reshaping, topsoil management, and revegetating cut-and-fill slopes.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ______ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:
RDF Lease FM 6:	Restore disturbed areas at final reclamation to the pre-disturbance landforms and meets the GRSG habitat objectives (Table 2-2).	☐ Yes ☑ No	☐ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☑ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # Gen 17 ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:
RDF Lease FM 7:	Use only closed-loop systems for drilling operations and no reserve pits within GRSG habitat.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ______ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:

RDF Lease FM 8:	Place liquid gathering facilities outside of GRSG habitat. Have no tanks at well locations within GRSG habitat to minimize vehicle traffic and perching and nesting sites for aerial predators of GRSG.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:
RDF Lease FM 9:	In GRSG habitat, use remote monitoring techniques for production facilities and develop a plan to reduce vehicular traffic frequency of vehicle use (Lyon and Anderson 2003).	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:
RDF Lease FM 10:	Use dust abatement practices on well pads.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:
RDF Lease FM 11:	Cluster disturbances associated with operations and facilities as close as possible, unless site-specific conditions indicate that disturbances to GRSG habitat would be reduced if operations and facilities locations would best fit a unique special arrangement.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:
RDF Lease FM 12:	Apply a phased development approach with concurrent reclamation.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:

RDF Lease FM 13:	Restrict pit and impoundment construction to reduce or eliminate augmenting threats from West Nile virus (Dougherty 2007).	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:
RDF Lease FM 14:	In GRSG habitat, remove or re-inject produced water to reduce habitat for mosquitoes that vector West Nile virus. If surface disposal of produced water continues, use the following steps for reservoir design to limit favorable mosquito habitat (Doherty 2007): • Overbuild size of ponds for muddy and non-vegetated shorelines • Build steep shorelines to decrease vegetation and increase wave actions • Avoid flooding terrestrial vegetation in flat terrain or low lying areas • Construct dams or impoundments that restrict down slope seepage or overflow • Line the channel where discharge water flows into the pond with crushed rock • Construct spillway with steep sides and line it with crushed rock. • Treat waters with larvicides to reduce mosquito production where water occurs on the surface	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:
RDF Lease FM 15:	Consider using oak (or other material) mats for drilling activities to reduce vegetation disturbance and for roads between closely spaced wells to reduce soil compaction and maintain soil structure to increase likelihood of vegetation reestablishment following drilling.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:

Locatable Minerals RDFs		Applied	If RDF not applied, select reason:
RDF LOC 1:	Install noise shields to comply with noise restrictions (see Action SSS 7) when drilling during the breeding, nesting, brood-rearing, and/or wintering season. Apply GRSG seasonal timing restrictions when noise restrictions cannot be met (see Action SSS 6).	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:

RDF LOC 2:	Cluster disturbances associated with operations and facilities as close as possible, unless site-specific conditions indicate that disturbances to GRSG habitat would be reduced if operations and facilities locations would best fit a unique special arrangement.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:	
RDF LOC 3:	Restrict pit and impoundment construction to reduce or eliminate augmenting threats from West Nile virus (Dougherty 2007).	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:	
RDF LOC 4:	Remove or re-inject produced water to reduce habitat for mosquitoes that vector West Nile virus. If surface disposal of produced water continues, use the following steps for reservoir design to limit favorable mosquito habitat (Doherty 2007): • Overbuild size of ponds for muddy and non-vegetated shorelines • Build steep shorelines to decrease vegetation and increase wave actions • Avoid flooding terrestrial vegetation in flat terrain or low lying areas • Construct dams or impoundments that restrict down slope seepage or overflow • Line the channel where discharge water flows into the pond with crushed rock • Construct spillway with steep sides and line it with crushed rock. • Treat waters with larvicides to reduce mosquito production where water occurs on the surface	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:	
RDF LOC 5:	Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve sage-grouse habitat needs.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # ________ ☐ A specific RDF will provide no additional protection to GRSG or its habitat.
		Rationale:	

RDF LOC 6:	Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling and revegetating cut and fill slopes.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:
RDF LOC 7:	Cover (e.g., fine mesh netting or use other effective techniques) all pits and tanks regardless of size to reduce sage-grouse mortality.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:

Comprehensive Travel and Transportation Management RDFs		Applied	If RDF not applied, select reason:
RDF CTTM 1:	Rehabilitate roads, primitive roads, and trails not designated in approved travel management plans.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:
RDF CTTM 2:	Reclaim closed duplicate roads by restoring original landform and establishing desired vegetation in GRSG habitat in accordance with GRSG habitat objectives (Table 2-2) as identified in travel management planning.	☐ Yes ☑ No	☑ A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. ☐ An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. Alternative RDF # _____ ☐ A specific RDF will provide no additional protection to GRSG or its habitat. Rationale:

Appendix H: Wildlife Stipulations

General Stipulations

Stip. No.	X (Yes)	Stipulation
1. NEPA	☒	For all water developments, install escape ramps and a mechanism such as a float or shut-off valve to control the flow of water in tanks and troughs. (BLM Manual Handbook H-1741-1 and WO-IM-2012-044 P)
2. NEPA	☐	The proposed drilling operations lie, in whole or in part, within the Preliminary General Habitat (PGH) or the Preliminary Priority Habitat (PPH) for greater sage-grouse. Once a drill site is no longer occupied, any associated drill sumps must be fenced such that the fence material is highly visible and eliminates the hazard of entanglement. Corner posts will be secured in the undisturbed ground rather than loose spoil material. Fencing material must remain upright and tight until reclamation of the sump is completed. Materials such as durable flag material or construction fence may be used to increase visibility. Excess fence material will be removed at the completion of drilling operations. Sumps will be allowed to dry to facilitate placement of backfill material but will be reclaimed at the earliest opportunity. (WO-IM-2012-044 P)
3. NEPA	☐	For water developments, design structures in a manner that minimizes potential for production of mosquitos which may carry West Nile virus. (WO-IM-2012-044 P)
4. NEPA	☐	Design fences to minimize impacts to wildlife including spacing, materials, and visibility: ☐Sage-grouse ☐Pronghorn antelope ☐Mule deer ☐Bighorn sheep (BLM Manual Handbook H-1741-1)
5. NEPA	☐	To prevent collisions from birds and bats, the applicant shall install collision deterrent or suitable “bird diverter” devices as appropriate. (WO-IM-2010-22 P and Nevada Energy and Infrastructure Standards to Conserve Greater Sage-Grouse, April 2010)

Stip. No.	X (Yes)	Stipulation
6. NEPA	☐	All guy wires shall have permanent markers attached for their entire length to increase visibility. These devices and markers will be checked periodically and replaced as needed. (WO-IM-2010-22 P and Nevada Energy and Infrastructure Standards to Conserve Greater Sage-Grouse, April 2010)
7. NEPA	☐	The proposed project falls within crucial winter range for wildlife. Activities that may disturb and displace wildlife will not be authorized during the following time periods. ☐Pronghorn antelope (November 15 through April 30) ☐Mule deer (November 15 through April 30) ☐Bighorn sheep (November 15 through April 30) ☐Elk (November 15 through April 30)
8. NEPA	☐	The proposed project falls within known kidding, fawning, lambing and calving range for wildlife. Activities that may disturb and displace wildlife will not be authorized within a quarter-mile of the known habitat during the following time periods. ☐Pronghorn antelope (April 1 through June 30) ☐Mule deer (May 15 through June 15) ☐Desert Bighorn sheep (February 1 through April 30) ☐California Bighorn sheep (April 1 through June 30) ☐Elk (May 1 through June 30)
9. Mining Notice	☐	The proposed project falls within crucial winter range for wildlife. Please try to avoid activities that may disturb and displace wildlife during the following time periods. ☐Pronghorn antelope (November 15 through April 30) ☐Mule deer (November 15 through April 30) ☐Bighorn sheep (November 15 through April 30) ☐Elk (November 15 through April 30)
10.	☐	The proposed project falls within known kidding, fawning, lambing and calving range for wildlife. Please try to avoid activities that may disturb and displace wildlife during the following time periods. ☐Pronghorn antelope (April 1 through June 30)

Stip. No.	X (Yes)	Stipulation
Mining Notice		☐Mule deer (May 15 through June 15) ☐Desert Bighorn sheep (February 1 through April 30) ☐California Bighorn sheep (April 1 through June 30) ☐Elk (May 1 through June 30)
11. NEPA	☐	Prior to any surface disturbing activities, a special status plant survey is required for the entire disturbance area. Timing of the survey will be dependent on the habitat type and the detectability of the target species. If a special status plant is located, a protective buffer will be delineated in consultation with the authorized officer. (BLM Manual 6840-1)
12. NEPA	☐	A plant survey of the disturbance area is required to determine the presence of "host" plants for special status insects within the project area. Timing of the survey will be dependent on the habitat type and the detectability of the target species. (BLM Manual 6840-1)
13. NEPA	☒	**Wildlife Mortality – General** The operator will notify the Bureau of Land Management (BLM) authorized officer and nearest Fish and Wildlife Service (FWS) Law Enforcement office within 24 hours, if the operator discovers a dead or injured federally protected species (i.e., migratory bird species, bald or golden eagle, or species listed by the FWS as threatened or endangered) in or adjacent to a pit, trench tank, exhaust stack or fence. (If the operator is unable to contact the FWS Law Enforcement office, the operator must contact the nearest FWS Ecological Services office.) (WO-IM-2013-033 P Fluid Minerals Operations)
14. NEPA	☐	**Surface Accumulation of Oil** – The operator will minimize or preclude releases of oil into open pits. Unless the authorized officer approves the release, no oil should go into a pit except in an emergency. The operator must remove any accumulation of oil or condensate in a pit within 48 hours of discovery. (WO-IM-2013-033 P Fluid Minerals Operations)
15. NEPA	☐	**Exclosure Fencing (Fluid Pits and Open Cellars)** – The operator will design, construct and maintain exclosure fencing for all open cellars and pits containing freestanding fluids to prevent access to livestock and large forms of wildlife such as deer, elk, and pronghorn. At a minimum, the operator will adequately fence all fluids pits and open cellars during and after drilling operations until the pit is free of fluids and the operator initiates backfilling. The operator will maintain the fence in order to protect public health and safety, wildlife, and livestock. (For examples of exclosure fencing design, refer to the Oil and Gas Gold Book – Exclosure Fence Illustrations, Figure 1, Page 18.) Adequate fencing [in lieu of more stringent requirements by the surface owner] includes all of the following:

Stip. No.	X (Yes)	Stipulation
		a. Construction materials will consist of steel and/or wood posts. Use a fence with five separate wires (smooth or barbed) or hog panel (16-foot length by 50-inch height) with connectors such as fence staples, quick-connect clips, hog rings, hose clamps, twisted wire, etc. Do not use electric fences. b. Set posts firmly in the ground. Stretch the wire, if used, tightly and space it evenly, from the ground level to the top wire, effectively keeping out animals. Tie hog panels securely into posts and to one another using fence staples, clamps, etc. Construct the fence at least 2 feet from the edge of the pit. c. For reserve pits, fence all four sides as soon as the pit is constructed. Reconstruct any damage to the rig side of the fence immediately following release of the drilling rig. d. Maintain the erect fences in adequate condition until the pit has been closed. (WO-IM-2013-033 P Fluid Minerals Operations)
16. NEPA	☐	**Exclosure Netting (Fluids Pits)** – The operator will prevent wildlife and livestock access (including avian wildlife) to fluids pits that contain or have the potential of containing salinity sufficient to cause harm to wildlife or livestock, hydrocarbons, surfactants, or Resource Conservation and Recovery Act-exempt hazardous substances. At a minimum, the operator will install approved netting in these circumstances, in accordance with the requirements below, immediately following release of the drilling rig. Note: The BLM does not approve of the use of flagging, strobe lights, metal reflectors, or noisemakers as techniques for deterring wildlife. Minimum Netting Requirements: The operator will: a. Construct a rigid structure made of steel tubing or wooden posts with cable strung across the pit at no more than 7-foot intervals along the X- and Y-axes to form a grid of 7-foot squares. b. Suspend netting a minimum of 4 to 5 feet above the pit surface. c. Use a maximum netting mesh size of 1½ inches to allow for snow loading while excluding most birds in accordance with Fish and Wildlife Service recommendations. Refer to: http://www.fws.gov/mountain-prairie/contaminants/contaminants1c.html d. Cover the top and sides of the netting support frame with netting and secure the netting at the ground surface around the entire pit to prevent wildlife entry at the netting edges. **Note:** Hog wire panels or other wire mesh panels or fencing used on the sides of the netting support frame is ineffective in

Stip. No.	X (Yes)	Stipulation
		excluding small wildlife and songbirds unless covered by smaller meshed netting. e. Monitor and maintain the netting sufficiently to ensure the netting is functioning as intended, has not entrapped wildlife, and is free of holes and gaps greater than 1½ inches. (WO-IM-2013-033 P Fluid Minerals Operations)
17. NEPA	☐	**<u>Escape Ramps (Open Pits and Cellars, Tanks, and Trenches)</u>** – The operator will construct and maintain pits, cellars, open-top tanks, and trenches, that are not otherwise fenced, screened, or netted, to exclude livestock, wildlife, and humans (for example, lined, clean water pits; well cellars; or utility trenches) to prevent livestock, wildlife, and humans from becoming entrapped. At a minimum, the operator will construct and maintain escape ramps, ladders, or other methods of avian and terrestrial wildlife escape in pits, cellars, open-top tanks, or at frequent intervals along trenches where entrapment hazards may exist. (WO-IM-2013-033 P Fluid Minerals Operations)
18.	☐	**<u>Exclosure Netting (Open-top Tanks)</u>** – Immediately following active drilling or completion operations, the operator will take actions necessary to prevent wildlife and livestock access, including avian wildlife, to all open-topped tanks that contain or have the potential to contain salinity sufficient to cause harm to wildlife or livestock, hydrocarbons, or Resource Conservation and Recovery Act of 1976-exempt hazardous substances. At a minimum, the operator will net, screen, or cover open-topped tanks to exclude wildlife and livestock and prevent mortality. If the operator uses netting, the operator will cover and secure the open portion of the tank to prevent wildlife entry. The operator will net, screen, or cover the tanks until the operator removes the tanks from the location or the tanks no longer contain substances that could be harmful to wildlife or livestock. (WO-IM-2013-033 P Fluid Minerals Operations)
19.	☐	**<u>Chemical and Fuel Secondary Containment and Exclosure Screening</u>** – The operator will prevent all hazardous, poisonous, flammable, and toxic substances from coming into contact with soil and water. At a minimum, the operator will install and maintain an impervious secondary containment system for any tank or barrel containing hazardous, poisonous, flammable, or toxic substances sufficient to contain the contents of the tank or barrel and any drips, leaks, and anticipated precipitation.

Stip. No.	X (Yes)	Stipulation
		The operator will dispose of fluids within the containment system that do not meet applicable state or U. S. Environmental Protection Agency livestock water standards in accordance with state law; the operator must not drain the fluids to the soil or ground. The operator will design, construct, and maintain all secondary containment systems to prevent wildlife and livestock exposure to harmful substances. At a minimum, the operator will install effective wildlife and livestock exclosure systems such as fencing, netting, expanded metal mesh, lids, and grate covers. (WO-IM-2013-033 P Fluid Minerals Operations)
20.	☐	**Open-Vent Exhaust Stack Exclosures** – The operator will construct, modify, equip, and maintain all open-vent exhaust stacks on production equipment to prevent birds and bats from entering, and to discourage perching, roosting, and nesting. Production equipment includes, but may not be limited to, tanks, heater-treaters, separators, dehydrators, flare stacks, in-line units, and compressor mufflers. (WO-IM-2013-033 P Fluid Minerals Operations)

Raptors

Stip. No.	X (Yes)	Stipulation
1. NEPA	☒	Power and/or communication lines shall be constructed in accordance to standards outlined in "Suggested Practices for Avian Protection on Power Lines, The State of the Art in 2006," (Avian Power Line Interaction Committee (APLIC), 2006, Edison Electric Institute and the raptor Research Foundation, Inc., Washington, DC) and Avian Protection Plan (APP) Guidelines (USFWS, 2005). (This stipulation is applicable to renewals of ROWs as well as new ROWs.)
2. NEPA	☐	Power and/or communication lines are located in a fall and/or spring migration corridors. The applicant shall install collision deterrent (e.g. line markers) or suitable "bird diverter" devices as appropriate.
3. NEPA	☐	If the proposed project has the potential to impact Golden eagles or their habitat, an Eagle Conservation Plan (ECP) is required by the BLM as a condition of the ROW grant. The ECP will be developed by the applicant in coordination with FWS to evaluate options to avoid and minimize project impacts to Golden eagles. (NV-IM-2010-63 P, NV-IM-2010-34 P)

Stip. No.	X (Yes)	Stipulation
4. NEPA	☐	Bald and/or golden eagles may now or hereafter be found to utilize the project area. The BLM will not issue a notice to proceed for any project that is likely to result in take of bald eagles and/or golden eagles until the applicant completes its obligation under applicable requirements of the Eagle Act, including completion of any required procedure for coordination with the FWS or any required permit. The BLM hereby notifies the applicant that compliance with the Eagle Act is a dynamic and adaptable process which may require the applicant to conduct further analysis and mitigation following assessment of operational impacts. Any additional analysis or mitigation required to comply with the Eagle Act will be developed with the FWS and coordinated with the BLM. (WO-IM-2010-156 P)
5. NEPA	☐	Raptor nest(s) and/or burrows are located in or near the project area. Between March 1st and August 31st no disturbance is authorized within ¼-mile non-line of sight and 1/2 –mile line of sight from the nest(s). Blasting is restricted within 1-mile of nests during this time period.(MBTA, Executive Order 13186)
6. NEPA	☐	Bald eagle nest(s) are located in or near the project area. Between January 1st and August 31st no disturbance is authorized within ¼-mile non-line of sight and ½-mile line of sight. Blasting is restricted within 1-mile of nests during this time period. (MBTA, Executive Order 13186, Bald and Golden Eagle Protection Action –BGEPA)
7. NEPA	☐	Bald eagle winter roosts are located in or near the project area. Between December 1st and April 1st no disturbance is authorized within ½-mile of winter roosting sites. (MBTA, Executive Order 13186, Bald and Golden Eagle Protection Action –BGEPA)
8. NEPA	☐	Golden eagle nest(s) are located in or near the project area. Between February 1st and August 31st no disturbance is authorized within ¼-mile non-line of sight and ½-mile line of sight of nests. (MBTA, Executive Order 13186, Bald and Golden Eagle Protection Action –BGEPA)
9. NEPA	☐	Coordination with the FWS should occur early and throughout the project planning process regarding golden eagles and their habitat. All projects must document and include as part of the administrative record any and all written correspondence from the FWS indicating whether or not the project, as proposed, is or is not likely to take golden eagles. Correspondence must also address whether or not the FWS considers the development of an APP an option for the project as proposed, or if an alternative project proposal should be considered. If FWS considers an APP to be an option for the project, a letter of concurrence must be sought and received from the FWS that addresses the adequacy of the APP. (MBTA, WO-IM-2010-156 P and NV-IM-2010-063 P)

Stip. No.	X (Yes)	Stipulation
10.	☐	Raptors are known to occur in the area and/or potential nesting habitat is present. The applicant shall contact FWS to determine project specific survey requirements for raptors. All projects must document and include as part of the administrative record any and all written correspondence from the FWS. Surveys must follow established BLM standards and protocols, and should be approved by the BLM biologist prior to being implemented. If active nests are located, the BLM biologist must be notified immediately and appropriate protection measures which may include avoidance or restriction of activities will be established. (MBTA, Executive Order 13186, Bald and Golden Eagle Protection Action –BGEPA)

Migratory Birds

Stip. No.	X (Yes)	Stipulation
1. NEPA	☐	No surface disturbance is authorized during the avian breeding season (March 1st through August 31st). (MBTA, Executive Order 13186)
2. NEPA	☒	In order to avoid potential impacts to breeding migratory birds, a nest survey shall be conducted by a qualified biologist within potential breeding habitat prior to any surface disturbance proposed during the avian breeding season (March 1st through August 31st). Surveys must be conducted no more than 10 days and no less than 3 days prior to initiation of disturbance. Surveys must follow established BLM standards and protocols, and should be approved by the BLM biologist prior to being implemented. If active nests are located, the BLM biologist must be notified immediately and appropriate protection measures which may include avoidance or restriction of activities will be established. If no active nests are present in the area surveyed, implementation of the project should commence within 10 days of survey completion. (MBTA, Executive Order 13186)
3. Mining Notices	☐	In order to avoid potential impacts to breeding migratory birds, a careful visual inspection of habitat in the project area should be made prior to any surface disturbance (including cross-country routes) during the avian breeding season (March 1st through August 31st). Nesting activities may include eggs or young present in nest, adult behavioral displays (e.g. dive-bombing, faking injury, won't leave the area, agitated calling, etc.). If active nests are located, the BLM biologist must be notified immediately and appropriate protection measures which may include avoidance or restriction of activities will be established. (MBTA, Executive Order 13186)
4. Mining Notices	☐	Project proponents must strive to conduct their mining activities outside of the migratory bird nesting season which runs from March 1st through August 31st. In the event the proponent finds it can't avoid activity during this time, the proponent should at least plan ahead and clear the native vegetation in those areas outside of the nesting season to deter birds from nesting there. Vegetation should be cleared only in the footprint of the projected disturbance for that year. For example, a pit would be cleared of only several acres of previously disturbed habitat at any one time (the projected years need) instead of clearing the entire permitted area at once. Once cleared of vegetation, any material taken from the area should be within the area devoid of vegetation. The Proponent should take measures to deter weeds and native vegetation from returning to the disturbed area such as applying a BLM approved herbicide or blading the area again as needed. (MBTA, Executive Order 13186)

Stip. No.	X (Yes)	Stipulation
5. NEPA	☐	Should a need for mineral materials arise during the nesting season in an area that has not been cleared of vegetation, any authorized permit / contract holder may request approval from the BLM to initiate a pre-disturbance migratory bird nesting survey. A pre-disturbance migratory bird nesting survey shall be conducted by a qualified biologist within potential breeding habitat prior to any surface disturbance proposed during the avian breeding season (March 1st through August 31st). Surveys must be conducted no more than 10 days and no less than 3 days prior to initiation of disturbance. Surveys must follow established BLM standards and protocols, and should be approved by the BLM biologist prior to being implemented. If active nests are located, the BLM biologist must be notified immediately and appropriate protection measures which may include avoidance or restriction of activities will be established. If no active nests are present in the area surveyed, vegetation should be cleared within 10 days of survey completion. (Migratory Bird Treaty Act)
6. Mining Notices and NEPA	☒	US FWS Avian Mortality Form for Special Use Permits must be used in case there is Avian Mortality. (IM-NV-2014-036)

Bats

Stip. No.	X (Yes)	Stipulation
1. Mining Notices	☐	A concern exists regarding the potential for bats to occur on the site, since they have been known to inhabit abandoned mines in the area. During the fall bats will enter abandoned mines to hibernate until about April. The BLM prefers potential bat-disturbing activities remain a quarter-mile or more from their habitat whenever possible. However, if activities are proposed closer to potential bat areas the BLM requests the following recommendations be taken into consideration: (1) drilling and construction/reclamation activities proximal to potential areas where bats hibernate should be avoided from mid-October to April and from dusk to dawn (when bats may be entering/exiting mines) without prior consultation with BLM, (2) the mines should not be entered, and (3) drilling through existing underground workings that may contain bats should be avoided. (IM WO 2006-114, IM NV 2011-059, Manual 6840)
2. NEPA	☐	Potential bat hibernacula are present in or near the project area. No disturbance activities will be permitted from mid-October to April within a quarter-mile of hibernacula, unless pre-disturbance clearance surveys have been conducted in accordance with BLM protocols and approved by the BLM biologist. (IM WO 2006-114, IM NV 2011-059, Manual 6840)

Stip. No.	X (Yes)	Stipulation
3. NEPA	☐	Potential bat habitat is present in or near the project area. No entry into caves, adits or shafts is permitted unless prior authorization from the BLM Authorized Officer is obtained. (This includes entry for bat surveys.) (IM WO 2006-114, IM NV 2011-059, Manual 6840)
4. NEPA	☐	Potential bat habitat is present in or near the project area. No drilling through existing underground workings containing potential bat habitat is permitted. (IM WO 2006-114, IM NV 2011-059, Manual 6840)
5. NEPA	☐	Prior to closure of caves, adits or shafts containing potential bat habitat, surveys will be conducted to determine presence or absence of bats. If bat presence is confirmed, appropriate bat access devices, approved by the BLM, must be installed. (IM WO 2006-114, IM NV 2011-059, Manual 6840)
6. NEPA	☐	The applicant is encouraged to install bat detection devices on met towers to collect data regarding these species (minimum two years) during the wind data collection phase, in order to expedite the planning and permitting of a wind generation facility. (IM WO 2006-114, IM NV 2011-059, Manual 6840)

Pygmy Rabbits

Stip. No.	X (Yes)	Stipulation
1. Mining Notices	☐	Our review of your proposed project determined that the area may have suitable habitat for pygmy rabbits. Please avoid disturbing sagebrush to the greatest possible extent. This may be accomplished by using existing roads and other areas devoid of sagebrush. (IM-NV-2003-064 P, IM WO 2006-114, IM NV 2011-059, Manual 6840)
2. NEPA	☐	Review of your proposed project determined that the project area has suitable habitat for pygmy rabbits. Prior to any ground disturbing activities, a survey to determine the presence/absence of pygmy rabbits must be conducted. If burrows or burrow complexes are found, a minimum 400 foot buffer within suitable sage-brush habitat will be applied to ensure that the burrows are not impacted by the proposed project. (IM-NV-2003-064 P and NDOW telemetry data 2010 and 2011)

Burrowing Owl

Stip. No.	X (Yes)	Stipulation
1. NEPA	☐	In order to avoid potential impacts to burrowing owls, a burrowing owl survey shall be conducted by a qualified biologist prior to ground disturbance, any time of the year due to some burrowing owls being year-round residents that do not migrate. Surveys must be conducted no more than 10 days and no less than 3 days prior to initiation of disturbance. Surveys must follow established BLM standards and protocols, and should be approved by the BLM biologist prior to being implemented. If active burrows are located, the BLM biologist must be notified immediately and a buffer of 500 meters, or line of sight (lesser of the two), shall be placed around the burrowing owl's burrow until it vacates its burrow. If active burrows are located during the breeding season (March 1 – August 31), the active burrow shall not be disturbed until after the breeding season or the burrow is no longer active. If active burrows are located during the non-breeding season, a one-way door shall be installed in burrow openings to permanently exclude burrowing owls and close burrows after verifying burrows are empty based on site monitoring by a qualified biologist. (MBTA, Executive Order 13186)
2. NEPA	☐	Do not harass or evict the burrowing owl out of the burrow, but wait until it vacates the burrow on its own and then implement the closing of the burrow openings. If a burrow needs to be permanently closed, create one passive relocation site/artificial burrow for every active burrow closed, in coordination with the BLM. Artificial burrows shall be located in the nearest suitable habitat within the Project Area, but outside of the disturbance area, to encourage the burrowing owls to use the artificial burrows. This would reduce the risk of burrowing owl mortality from the surface disturbing activities from the Proposed Action. If no active burrows are present in the area surveyed, implementation of the project should commence within 10 days of survey completion in order to avoid the need for a subsequent burrowing owl survey. (MBTA, Executive Order 13186)

Greater Sage Grouse

Stip. No.	X (Yes)	Stipulation
1. NEPA	☐	The area of the project contains designated Preliminary Priority Habitat (PPH)
1. NEPA	☐	The area of the proposed project is designated Preliminary Priority Habitat (PPH) and/or Preliminary General Habitat (PGH) for the Greater sage-grouse. Disturbance of sagebrush shall be avoided to the greatest possible extent. This may be accomplished by using existing roads and other areas devoid of sagebrush. Disturbance to meadow and riparian areas also should be avoided as these areas provide important summer habitat for sage-grouse and sage-grouse chicks. **Roads** ☐Locate roads to avoid high quality sagebrush habitats and areas. ☐Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose. ☐Coordinate road construction and use among ROW holders. ☐Do not issue ROWs to counties on mining development roads, unless for temporary use consistent with all other terms and conditions included in this stipulation. ☐Construct road crossings at right angles to ephemeral drainages and stream crossings. ☐Design roads to be driven at slower speeds and reduce driving speeds on existing roads to reduce vehicle/wildlife collisions. ☐Restrict vehicle traffic to only authorized users on newly constructed routes (e.g. signing, gates, etc.). ☐Use dust abatement practices on roads and pads (water). ☐Close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation.

Stip. No.	X (Yes)	Stipulation
1. NEPA (cont)	☐	**Operations** ☐Cluster disturbances associated with operations and facilities as close as possible. ☐Apply a phased development approach with concurrent reclamation. ☐Place infrastructure in already disturbed locations where habitat has not been restored. ☐Restrict the construction of tall facilities and fences to the minimum number and amount needed. Build sage-grouse friendly fences that increase visibility (e.g. pipe-rail, chain-link, wire fences marked with reflectors) to reduce chance of collision and entanglement. ☐Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats. ☐Place new utility developments and transportation routes in existing utility or transportation corridors. ☐Bury power lines. ☐Cover (e.g. fine mesh netting or other effective techniques) all pits and tanks regardless of size to reduce sage-grouse mortality. ☐Equip tanks and other above ground facilities with structures or devices that discourage nesting and perching of raptors and corvids. ☐Control the spread and effects of non-native plant species. ☐Restrict pit and impoundment construction to reduce or eliminate threats from West Nile Virus. Remove or re-inject produced water to reduce habitat for mosquitos. If surface disposal of produced water is used, design reservoirs to limit favorable mosquito habitat. ☐Install sage-grouse safe exclusion fences around sumps. ☐Use noise shields when drilling in PPH and PGH habitat. ☐Fit transmission towers with anti-perch devices. ☐Clean up refuse. ☐Locate man camps outside of PPH and PGH designated areas.

Stip. No.	X (Yes)	Stipulation
1. NEPA (cont)	☐	**Fluid Mineral Development Only** ☐Use directional and horizontal drilling to reduce surface disturbance. ☐Consider using oak (or other material) mats for drilling activities to reduce vegetation disturbance and for roads between closely spaced wells to reduce soil compaction and maintain soil structure to increase likelihood of vegetation reestablishment following drilling. ☐Place liquid gathering facilities outside of priority areas. Have no tanks at well locations within priority areas (minimizes perching and nesting opportunities for ravens and raptors and truck traffic). Pipelines must be under or immediately adjacent to roads. ☐Locate corridor power, flow, and small pipelines under or immediately adjacent to roads. ☐Design or site permanent structures which create movement (e.g. a pump jack) to minimize impacts to sage-grouse. ☐Cover (e.g. fine mesh netting or use other effective techniques) all drilling and production pits and tanks regardless of size to reduce sage-grouse mortality. ☐Use only closed-loop systems for drilling operation and no reserve pits. ☐Locate new compressor stations outside PPH/PGH areas and design them to reduce noise that may be directed toward PPH/PGH areas.
1. NEPA (cont)	☐	**Reclamation (Use BLM-approved seed mixes for PPH/PGH areas)** ☐Include restoration objectives to meet sage-grouse habitat needs in reclamation practices/sites. Address post-reclamation management in reclamation plans such that goals and objectives are to protect and improve sage-grouse habitat needs. ☐Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, top-soiling, and re-vegetating cut and fill slopes. ☐Restore disturbed areas at final reclamation to pre-disturbance landform and desired plant community. ☐Irrigate interim reclamation as necessary during dry periods and utilize mulching techniques to expedite reclamation and to protect soils. (WO-IM-2012-044 P)
2. Mining Notices	☐	The area of the proposed project is habitat for Greater sage-grouse. Disturbance of sagebrush should be avoided to the greatest possible extent. This may be accomplished by using existing roads and other areas devoid of sagebrush. Disturbance to meadow and riparian areas also should be avoided as these areas provide important summer habitat for sage-grouse and sage-grouse chicks. (WO-IM-2012-043 P)

Stip. No.	X (Yes)	Stipulation
3.	☐	Sage-grouse lek(s) are present within 3.2 miles of the project area. Avoid activities in the project area between March 1st and June 30th.
4.	☐	Roads used to access the project area are within close proximity to sage-grouse leks. Between March 1st and June 30th avoid driving on these roads in early morning (before 10 am) and late evening (after 4 pm) and limit total amount of traffic.
5. NEPA	☐	Sage-grouse leks are present within 4 miles of the project area. In order to avoid potential impacts to breeding sage-grouse, a careful visual inspection of habitat in the project area shall be made prior to any surface disturbance (including cross-country routes) from April 1st through June 30th. Nesting and early brood-rearing activities may include eggs or young present in nest, adult behavioral displays (e.g. faking injury, won't leave the area, agitated calling, etc.), and young sage-grouse present. If active nests or broods are located, the BLM biologist must be notified immediately and appropriate protection measures which may include avoidance or restriction of activities will be established. (WO-IM-2012-044 P)
6. NEPA	☐	Limit noise to less than 10 decibels above ambient measures (20-24 dBA) at sunrise and sunset near leks from March 1st through June 30th. Use noise shields during drilling activities. (WO-IM-2012-044 P) and (Nevada Energy and Infrastructure Standards to Conserve Greater Sage-Grouse, April 2010)
7. NEPA	☐	Sage-grouse lek(s) are present within 3.2 miles of the project area, activities must be limited at sunrise and sunset from March 1st through June 30th for sage grouse lekking season. (NV-IM-2015-017, Coates et al. 2013)
8. NEPA	☐	If drilling within 3 miles of an active sage-grouse lek is unavoidable, conduct drilling activities from July 15 to 30 November to avoid disturbing sage-grouse during the breeding, nesting, early brood rearing and winter periods. (Nevada Energy and Infrastructure Standards to Conserve Greater Sage-Grouse, April 2010)
9. NEPA	☐	Avoid placement of met towers within 0.6 miles of springs, meadows, or riparian corridors in identified brood rearing habitat. (Nevada Energy and Infrastructure Standards to Conserve Greater Sage-Grouse, April 2010)

Stip. No.	X (Yes)	Stipulation
10. NEPA	☐	The siting of new temporary MET towers must be avoided within 2 miles of active sage-grouse leks, unless they are out of the direct line of sight of the active lek. (WO-IM-2010-22 P) and (Nevada Energy and Infrastructure Standards to Conserve Greater Sage-grouse, April 2010)
11. NEPA	☐	To reduce the risk of collisions, avoid the use of guy wires for turbine or MET tower supports. All existing guy wires should be marked with recommended bird deterrent devices. (WO-IM-2010-22 P) and (Nevada Energy and Infrastructure Standards to Conserve Greater Sage-grouse, April 2010)
12. NEPA	☐	If bird mortality due to collision with fences is documented, or if collisions are likely to occur due to new fence placement, implement appropriate actions to mitigate impact. Such actions might include marking key sections of the fence with permanent marking or other suitable means. All Field Offices shall consider marking new fences in sage-grouse, sharp-tailed grouse, or prairie-chicken habitat and should identify marking fences as part of the cost of new fencing projects (see for example, State of Montana guidelines at http://fwp.mt.gov/content/getItem.aspx?id=34461). (WO-IM-2010-22 P)
13. NEPA	☐	**Perimeter or Reclamation Fence Marking – This condition of approval applies where:** The proposed perimeter or reclamation fence is constructed of fencing wire and is located within 1.25 miles of an occupied Greater Sage Grouse lek or is in a high-risk area. The operator will mark wire perimeter and reclamation fences constructed within 1.25 miles of Greater Sage-Grouse, Gunnison Sage-Grouse, Lesser Prairie-Chicken, or Sharp-Tailed Grouse leks, and other high-risk areas to reduce the chances of collisions between birds and fences. At a minimum, the operator will install fence markers on all wire fences meeting the criteria above according to the following protocol. (The BLM authorized officer may consider and approve alternate fence marking methods): a. The operator will install 2- to 3-inch wide white markers on the top and middle wires between barbs at approximately 3-foot intervals. **Note:** Alternating white and black markers will increase visibility in winter habitat where snow is likely to be present. b. Offset the markers on the middle wire from those on the top wire. (WO-IM-2013-033 P Fluid Minerals Operations)

Additional Project Specific Stipulations? Yes ☐ (see attached) No ☐

Wildlife Biologist Signature____________________________Date____________________________

Appendix I: Standard Operating Procedures for Field Castration (Gelding) of Wild Horse Stallions

June 2011

Gelding will be performed with general anesthesia and by a veterinarian. The combination of pharmaceutical compounds used for anesthesia, method of physical restraint, and the specific surgical technique used will be at the discretion of the attending veterinarian with the approval of the authorized officer (I.M. 2009-063).

Pre-surgery Animal Selection, Handling and Care

1. Stallions selected for gelding will be greater than 6 months of age and less than 20 years of age.
2. All stallions selected for gelding will have a Henneke body condition score of 3 or greater. No animals which appear distressed, injured or in failing health or condition will be selected for gelding.
3. Stallions will not be gelded within 36 hours of capture and no animals that were roped during capture will be gelded at the temporary holding corrals for rerelease.
4. Whenever possible, a separate holding corral system will be constructed on site to accommodate the stallions that will be gelded. These gelding pens will include a minimum of 3 pens to serve as a working pen, recovery pen(s), and holding pen(s). An alley and squeeze chute built to the same specifications as the alley and squeeze chutes used in temporary holding corrals (solid sides in alley, minimum 30 feet in length, squeeze chute with non-slip floor) will be connected to the gelding pens.
5. When possible, stallions selected for gelding will be separated from the general population in the temporary holding corral into the gelding pens, prior to castration.
6. When it is not possible or practical to build a separate set of pens for gelding, the gelding operation will only proceed when adequate space is available to allow segregation of gelded animals from the general population of stallions following surgery. At no time will recently anesthetized animals be returned to the general population in a holding corral before they are fully recovered from anesthesia.
7. All animals in holding pens will have free access to water at all times. Water troughs will be removed from working and recovery pens prior to use.
8. Prior to surgery, animals in holding pens may be held off feed for a period of time (typically 12-24 hours) at the recommendation and direction of the attending veterinarian.
9. The final determination of which specific animals will be gelded will be based on the professional opinion of the attending veterinarian in consultation with the Authorized Officer.
10. Whether the procedure will proceed on a given day will be based on the discretion of the attending veterinarian in consultation with the Authorized Officer taking into consideration the prevailing weather, temperature, ground conditions and pen set up. If these field situations can't

be remedied, the procedure will be delayed until they can be, the stallions will be transferred to a prep facility, gelded, and later returned, or they will be released to back to the range as intact stallions.

Gelding Procedure

1. All gelding operations will be performed under a general anesthetic administered by a qualified and experienced veterinarian. Stallions will be restrained in a portable squeeze chute to allow the veterinarian to administer the anesthesia.
2. The anesthetics used will be based on a xylazine/ketamine combination protocol. Drug dosages and combinations of additional drugs will be at the discretion of the attending veterinarian.
3. Animals may be held in the squeeze chute until the anesthetic takes effect or may be released into the working pen to allow the anesthesia to take effect. If recumbency and adequate anesthesia is not achieved following the initial dose of anesthetics, the animal will either be redosed or the surgery will not be performed on that animal at the discretion of the attending veterinarian.
4. Once recumbent, rope restraints or hobbles will be applied for the safety of the animal, the handlers and the veterinarian.
5. The specific surgical technique used will be at the discretion of the attending veterinarian.
6. Flunixin meglamine or an alternative analgesic medication will be administered prior to recovery from anesthesia at the professional discretion of the attending veterinarian.
7. Tetanus prophylaxis will be administered at the time of surgery.
8. Other medications may also be administered at the time of surgery at the professional discretion of the attending veterinarian.
9. All geldings will be allowed to recover from anesthesia within the working pen or the adjacent recovery pen. Once, fully recovered each gelding will be transferred to the gelding holding pen(s). Animals will remain segregated from intact stallions for at least 24 hours following surgery or until their release.
10. Any stallions determined or believed to be a cryptorchid will be allowed to recover from the anesthesia, marked for later recognition, and shipped to a BLM prep facility for appropriate surgery or euthanasia if it is determined that they cannot be fully castrated. At no time will a partial castration be performed. Because cryptorchidism is an inherited condition, cryptorchid stallions should never be released back into an HMA.
11. Gelded animals will be freeze marked on their left hip with an identifying mark to minimize the potential for future recapture and to facilitate post-treatment monitoring. Each State will establish its own marking system in compliance with their State Brand Board. For example, Nevada BLM will utilize the identifying freeze mark on the hip (to be determined) as well as a 2 inch "F" freeze mark on the left side of the neck per agreement with the NV Brand Board.

Post-operative handling, care and monitoring

1. All animals that have fully recovered from anesthesia will have free access to water and hay prior to subsequent release.
2. All geldings will be held at least overnight for observation. Animals will not be left unattended for at least 3 hours following the procedure.
3. The attending veterinarian will observe all animals 12-24 hours after the procedure or

again prior to release. Geldings will be released no later than 48 hours following surgery near a water source in their home range when possible.

4. Any gelding observed have complications will be held at the gather site until his condition improves or be shipped to a holding facility until he is able to be returned to the range.

5. Gelded animals would be monitored periodically for complications for approximately 7-10 days post-surgery. This monitoring will be completed either through aerial recon if available or field observations from major roads and trails. It is not anticipated that all the geldings will be observed but the goal is to detect complications if they are occurring and determine if the horses are freely moving about the HMA.

6. Animals found on the range with serious gelding complications will either be recaptured for treatment, if possible or euthanized as an act of mercy if necessary.

7. Observations of the long term outcomes of gelding will be recorded during routine resource monitoring work. Such observations will include but may not limited to band size, social interactions with other geldings and harem bands, distribution within their habitat, forage utilization and activities around key water sources.

Appendix J. Summary of Public Comments and BLM Responses

The Preliminary East Pershing Complex Gather Plan EA, DOI-NV-W010-2017-0009-EA, was made available to interested individuals, agencies and groups for a public review and comment period that opened January 11, 2017 and closed February 10, 2017. The BLM received comment submissions during the East Pershing Complex PEA public comment period. All comments received prior to the end of the public comment period were reviewed and considered. Substantive comments were utilized to finalize the EA as appropriate. BLM responses are identified in the table below. Substantive comments received were organized into the following general categories. Similar comments were summarized.

COMMENT	COMMENTER	RESPONSE
1. PROVISIONS of the WFRHBA and other LAW		
Congress did not intend to permit the animals' custodian to subvert the primary policy of the statute by capturing and removing from the wild the very animals that Congress sought to protect from being captured and removed from the wild.	Val Hogsett	The WFRHBA directs the DOI's Secretary to "maintain a current inventory of wild free-roaming horses and burros on given areas of the public lands. The purpose of such inventory shall be to: make determinations as to whether and where an overpopulation exists and **whether action should be taken to remove excess animals**; determine appropriate management levels of wild free-roaming horses and burros on these areas of the public lands; and determine whether appropriate management levels should be achieved **by the removal** or destruction **of excess animals**, or other options (such as sterilization, or natural controls on population levels)" (WFRHBA, 16 U.S.C. 1333(b)(1)). "For the purpose of furthering knowledge of wild horse and burro population dynamics," the WFRHBA provides direction to conduct research, 16 U.S.C. 1333(b)(2)(C)(3)).
Taking a preserve (HA) created by federal mandate and micro-managing HMAs within the HA	Val Hogsett	HAs are not designated as being managed for wild horses, only HMAs. HMAs and HAs are not preserves. Nor are they to be managed exclusively for wild horses per the WFRHBA of 1971.

COMMENT	COMMENTER	RESPONSE
was never authorized under any Congressional Act.		The law's language stating that public lands where WH&BS were found roaming in 1971 are to be managed "principally but not necessarily exclusively" for the welfare of these animals relates to the Interior Secretary's power to "designate and maintain **specific ranges** on public lands as sanctuaries for their protection and preservation" -- which are, thus far, the Pryor Mountain Wild Horse Range (in Montana and Wyoming), the Nevada Wild Horse Range (located within the north central portion of Nellis Air Force Range), the Little Book Cliffs Wild Horse Range (in Colorado), and the Marietta Wild Burro Range (in Nevada). The "principally but not necessarily exclusively" language applies to **specific Wild Horse Ranges**, not to Herd Management Areas in general. The Code of Federal Regulations (43 CFR, Subpart 4710.3-2) states: "Herd management areas **may also be designated as wild horse or burro ranges** to be managed principally, but not necessarily exclusively, for wild horse or burro herds." A **Herd Management Area** may be established in those Herd Areas within which wild horses and burros can be managed for the long term. HMAs are designated through the LUP process for the maintenance of wild horse and burro herds. In delineating each HMA, the authorized officer shall consider the AML for the herd, the habitat requirements of the animals, the relationships with other uses of the public and adjacent private lands, and the constraints contained in 43 CFR 4710.4. (WHB Handbook 4700-1) By definition, wild horses are not intended to be managed outside of HMA boundaries established within Herd Areas in conformance with the WFRHBA. Therefore, wild horses existing **outside of HMA boundaries** do not have an AML, are not allocated forage, and are excess.

COMMENT	COMMENTER	RESPONSE
		WFRHBA §1332. Definitions (f) "excess animals" means wild free-roaming horses or burros (1) which have been removed from an area by the Secretary pursuant to application law or, (2) which must be removed from an area in order to preserve and maintain a thriving natural ecological balance and multiple-use relationship in that area. The Antelope, Selenite, Truckee, and Trinity HAs and are not designated as HMAs. Therefore, they do not have an associated wild horse AML, and wild horses residing in those areas are excess animal for which no forage has been allocated and are to be removed from the range in accordance with the WFRHBA.
Per the WFRHBA of 1971, wild horses are to be managed as the principal users of their habitat. Under the FLPMA of 1976, BLM is required to establish a planning process to manage public lands for multiple uses of the land and its resources and achieve sustained yields of natural resources. Wild	Eileen Hennessy	The law's language stating that public lands where wild horses were found roaming in 1971 are to be managed "principally but not necessarily exclusively" for the welfare of these animals relates to the Interior Secretary's power to "designate and maintain **specific ranges** on public lands as sanctuaries for their protection and preservation" -- which are, thus far, the Pryor Mountain Wild Horse Range (in Montana and Wyoming), the Nevada Wild Horse Range (located within the north central portion of Nellis Air Force Range), the Little Book Cliffs Wild Horse Range (in Colorado), and the Marietta Wild Burro Range (in Nevada). The "principally but not necessarily exclusively" language applies to **specific Wild Horse Ranges**, not to Herd Management Areas in general. The Code of Federal Regulations (43 CFR, Subpart 4710.3-2) states: "Herd management areas **may also be designated as wild horse or burro ranges** to be managed principally, but not necessarily exclusively, for wild horse or burro herds." BLM is managing wild horses according to its mandate under FLPMA which states: ***"DECLARATION OF POLICY***

COMMENT	COMMENTER	RESPONSE
equines, like other wildlife, are a resource of our public lands. Commercial livestock grazing (or mining for that matter) is a use. Commercial grazing negatively impacts wild horses (a resource). BLM must never elevate use over resource, especially a resource that is protected by law. Many tribes consider wild horses as wild, as well as cultural historic properties under both federal and state Historic Preservation Acts.	 Val Hogsett	*Sec. 102. [43 U.S.C. 1701] (a) The Congress declares that it is the policy of the United States that– (7) goals and objectives be established by law as guidelines for public land use planning, and that management be on the basis of multiple use and sustained yield unless otherwise specified by law;"* The Winnemucca RMP was completed in 2015 and enables the BLM to manage the lands and resources administered by the WD to achieve the desired future conditions and management objectives. BLM is required to manage the wild horses and burros within the HMAs in conformance with the applicable land-use plans. 43 C.F.R. § 4710.1. The US Congress charged the BLM with the "protection, management, and control of wild free-roaming horses and burros on public lands" (P.L. 92-195). BLM is managing wild horses according to its mandate under FLPMA. Tribal horses are not managed by BLM. Tribal consultation has been conducted and is on-going; thus far no concerns have been raised as stated in Section 7.2 of the EA.
Alts A and B involve gross interference with the biological and social well-functioning of wild horses and are in conflict with the WFRHBA, which mandates giving the wild horses fair and humane treatment within their legal areas on BLM and USFS lands! Spaying and PZP interference is a gross tampering with wild horses' inherent well-being and constitute a form of domestication, and are	Craig Downer	**Wild Horses and Burros Management Handbook H-4700-1** - 4.5.3 Reduce Population Growth Rates; "Additional management alternatives (tools) may be considered in the future, pending further research (see Chapter 8)". 8.1 Strategic Research Plan - "Research results will be used to improve management practices within the WH&B Program." 8.3.2 Other Possible Fertility Control Tools - "Other possible fertility control tools that could potentially be considered in the future include: spaying mares …" 8.3.2.1 Spaying (Mares) - "Spaying mares involves major abdominal surgery, is risky, and requires good post-operative care. Spaying mares could be considered in the future if safe,

COMMENT	COMMENTER	RESPONSE
entirely in conflict and contrary to the true and core intent of the Act.		effective and humane surgical methods and post-operative care procedures can be perfected for use on wild horses". As this EA states in Chapter 1, BLM's WH&B Program protects, manages, and controls wild horses and burros under the authority of the Wild Free-Roaming Horses and Burros Act of 1971 (WFRHBA) (Public Law (PL) 92-195), as amended by the Federal Land Policy and Management Act (FLPMA) of 1976 (PL 94-579) and the Public Rangelands Improvement Act of 1978 (PL 95-514). The WFRHBA directs the DOI's Secretary to "maintain a current inventory of wild free-roaming horses and burros on given areas of the public lands. The purpose of such inventory shall be to: make determinations as to whether and where an overpopulation exists and whether action should be taken to remove excess animals; determine appropriate management levels of wild free-roaming horses and burros on these areas of the public lands; and determine whether appropriate management levels should be achieved by the removal or destruction of excess animals, or other options (such as **sterilization**, or natural controls on population levels)" (WFRHBA, 16 U.S.C. 1333(b)(1)). "For the purpose of furthering knowledge of wild horse and burro population dynamics," the WFRHBA provides direction to conduct research, 16 U.S.C. 1333(b)(2)(C)(3)).
Given the total acreage of the four HAs is 1,234,323 acres (827,158 public and 407,165 **private**), it would be reasonable to re-designate these HAs as HMAs so wild horses have an expanded range and the current population could be better accommodated.	Mary Koncel	Wild horses are managed on public lands. HAs were identified in Land Use Plans and were limited to areas of the public land used as habitat by wild horses and burros at the time the Wild Free Roaming Horses and Burros Act was enacted December 15, 1971. The HAs where wild horses and burros could be managed for the long term were designated as HMAs through the land-use planning process. The HAs within the East Pershing Complex were not designated for the long term management of the wild horses in the Winnemucca Resource Management Plan and therefore, are not

COMMENT	COMMENTER	RESPONSE
Action Alternatives include removal of horses from the HAs. EA fails to consider mitigating the need to remove horses from the HAs and provides no explanation why horses are being removed from HAs. There is no applicable statutory or regulatory requirement that wild horses be removed from a HA, and no BLM statutory or regulatory prohibition on the BLM managing wild horses in a HA. BLM has full legal discretion to restore these HAs to HMA status.		managed for wild horses and burros. The rationale states, "The herd use area (HUAs) designated for complete horse/burro removal are in a checkerboard land pattern. Landowners from each HUA have requested removal of wild horses/burros from their private lands. Section 4 of P.L. 92-195 and part 43 CFR subpart 4750.3 directs the authorized officer to remove wild horses/burros from private lands at the owner's request." These HAs were not ever designated as HMAs and not managed for wild horses.
43 CFR § 4710.5 "Closure to livestock grazing" authorizes BLM to "close appropriate areas of the public lands to grazing use by all or a particular kind of livestock" "[i]f necessary to provide habitat for wild horses or burros, to implement herd management actions, or to protect wild horses or burros from disease, harassment or injury." BLM typically states that the agency utilizes this regulation only in cases of emergency, but nothing in it limits use to emergency situations.	Mary Koncel	This is outside the scope of this EA. Although BLM may be required to consider closure of an area to livestock in certain situations, IBLA upheld a decision to remove horses from an area rather than close it to livestock, because such action was consistent with the multiple-use objectives stated in BLM's land use plans. Animal Protection Institute of America, 117 IBLA 4, 6 (1990). Removal or reduction of livestock would not be in conformance with the existing RMP, is contrary to the BLM's multiple-use mission as outlined in the FLPMA and PRIA, and would be inconsistent with the WFRHBA, which directs the Secretary to immediately remove excess wild horses outside of HMAs. Additionally this would only be effective for the very short term as the wild horse population would continue to increase. Eventually the HMAs and adjacent lands would no longer be capable of supporting the wild horse populations. The BLM understands the opinion of members of the public who would like to see a decrease in livestock grazing. The purpose of the EA is not

COMMENT	COMMENTER	RESPONSE
		to adjust livestock use. Adjustments to livestock grazing cannot be made through a wild horse gather EA, and reallocations of multiple use between livestock and wild horses are more properly raised during the land-use planning process.
2. ADAPTIVE MANAGEMENT AND OTHER CONSIDERATIONS		
Removing only younger horses (less than 5 and over 2 years old) and having a halter training program in place. Younger, trained horses are those that find a good home.	Charlotte Roe	A similar comment was received for another EA. BLM has been working with 4H youth in a halter-training program.
Utilize volunteers and college interns to monitor and document the bands.	Charlotte Roe	Comment noted. BLM has been developing volunteer agreements in an effort to establish partnerships with groups.
3. AML		
We recommend BLM evaluate rangeland conditions and adjust AML accordingly as excessive horse numbers has resulted in degraded rangelands and potentially reduced the wild horse carrying capacity. The AML's need to be adjusted to be in compliance with the 1971 law of protecting these herds.	NDOW Val Hogsett	This is outside the scope of this EA. This EA is **not** proposing a change in AML since there is no data on which to conclude that there is not sufficient forage and water available for wild horses once the population returns to AML. .
Range management experts fail to realistically adjust the acreage used by permittees (cattle and sheep grazing) for nonviable	Janet Schultz	There is no factual evidence to suggest that the resources exist to support an increased AML in this or any other HMA managed by the WD. Monitoring data for the Complex confirms that excess wild horses are

COMMENT	COMMENTER	RESPONSE
forage. This PEA is deficient in calculating the real forage available. Stocking tables reveal the numbers of actual use has risen on just about every allotment (Table 10.) This PEA is deficient in not addressing the failure to adjust the AML up.		present and that the population needs to be reduced to achieve a thriving natural ecological balance. This is outside the scope of this analysis. Please refer to "*Raising the Appropriate Management Levels for Wild Horses and Burros*" in Chapter 2. The HRFO understands that members of the public would like to see the wild horses receive a larger "share" of the AUMs within the HMAs. Neither the WFRHBA nor FLPMA require the equal allocation of forage to wild horses/burros and livestock on public lands, or greater allocation to wild horses. It is not a matter of choosing to manage wild horses rather than domestic livestock or native wildlife. By law, BLM is required to manage wild horses in a thriving natural ecological balance and multiple use relationship on the public lands and to remove excess wild horses immediately upon a determination that excess wild horses exist. Excess wild horses are being removed as required by the WFRHBA in order to maintain healthy herds of wild horses on public lands, not for the benefit of livestock. The "***Rangeland Management***" section in Chapter 3 in the EA discusses relevant information regarding livestock grazing in the HMAs. Changes to the overall multiple use relationship and allocations of forage between wild horses; livestock and wildlife would need to be addressed through the land-use planning process and any future land-use plan amendments. Until such time as the RMP is amended, BLM is required to manage the wild horses within the HMAs in conformance with the applicable land-use plans. 43 C.F.R. § 4710.1. Table 10 lists the allotment name and acres, how many of the allotment acres are within the Complex, and finally the percent of the allotment that overlaps the Complex. There are no stocking rate increases in Table

COMMENT	COMMENTER	RESPONSE
		10. Table 11, however, shows actual use in 2014, 2015, and 2016 was considerably below permitted numbers.
AMLs set do not reflect actual carrying capacity for wild horses but rather the number of animals the BLM chooses to allow in these legally designated wild horse areas.	Eileen Hennessy	Comment noted. This is outside the scope of this EA. This EA is **not** proposing a change in AML.
NAS concluded it found no "science based rationale" behind the agency's allocation of resources and establishment of AMLs. How was an AML of this size chosen? What has the BLM done to determine the carrying capacity and forage requirements of the horses and livestock within the complex — and to determine what practices and grazing habits are doing the damage, or have created the degraded conditions that exist today?	Charlotte Roe	This is outside the scope of this EA. This EA is **not** proposing a change in AML. Establishing AML is not a calculation of how many acres per animal, but is based on many factors such as forage and water availability, animal movement patterns, productivity and limitations of the range, trend, climate and actual use.
AUMs for cattle include both the cow and calf as one unit? By what measure and justification are mare and foal counted as two units?	Charlotte Roe	AUMs are calculated differently than population census numbers. During aerial and ground surveys foals are counted to calculate percent reproduction rates. For local and national population numbers, foals are included at age 1 year and older.
The EA speaks to degradation by cattle and horses. There are many more livestock in this complex. And with the entirety of the HA or preserve managed principally for the wild horses, as stated in the	Val Hogsett Charlotte Roe	As stated in ***Rangeland Management Chapter 3***, the livestock permitted to graze within this Complex are cattle and sheep. HAs are not designated as being managed for wild horses, only HMAs. HMAs and HAs are not preserves. Nor are they to be managed exclusively for wild horses per the WFRHBA of 1971.

COMMENT	COMMENTER	RESPONSE
1971 law, there would be one horse per 3,962 acres using the low AML. This is clearly not managing the preserve principally for wild horses. The number of acres to one horse, according to the total number of horses on the complex according to the EA, is 1 horse per 856 acres. Given the reported herd complex size of 2,191, 650 acres, that would leave one horse per 6,352 acres. BLM proposes multiple removals/gathers and rendering the wild equid population as "non-reproducing" through contraception and surgical sterilization procedures.	Mary Koncel	There are approximately 539,700 acres of **public lands designated to be managed for wild horses** within this Complex. At low AML, 345 animals per 539,700 acres = 1 wild horse per 1,564 acres. This EA is not adjusting AML. The Tobin HMA would be the only non-reproducing herd. Both the North Stillwater and Augusta Mountains HMAs would continue to be reproducing herds.
BLM authorizes 126,341 AUMs yearly for livestock in this Complex. Permittees self-reported using 35,817 AUMs. This means 2-4 times as many livestock as wild horses grazed.	Mary Koncel	Some of the allotments overlap the HMAs in this Complex. Allotments overlapping HAs do not have AUMs for wild horses because HAs are not designated for management of wild horses.
4. ECONOMIC ANALYSIS DATA		
Nowhere does the EA analyze the economic impact to American taxpayers including warehousing	Mary Koncel	Alternative A was designed to reduce costs to tax payers by eliminating the need for placing wild horses in short and long-term holding.

COMMENT	COMMENTER	RESPONSE
more horses in BLM short- and long-term holding facilities.		This type of cost data was not developed for this EA, is not part of the mandates under the WFRHBA, and therefore has no bearing on the action alternatives and purpose and need. The WFRHBA does not authorize a cost-based decision-making process if excess horses are present. "*Proper range management dictates removal of horses before the herd size causes damage to the range land. If the record establishes current resource damage or a significant threat of resource damage, removal is warranted*". (118 IBLA 75).
5. FERTILITY CONTROL– PZP, GONACON, SPAYING, GELDING, PREDATORS		
Gelding stallions is ineffective and dangerous. As the PEA points out, a single stallion is capable of impregnating multiple mares. Stallions can bleed out and die from castration even in closely watched situations.	Charlotte Roe	Comment noted.
Some or total loss of sex drive would be likely in castrated stallions, and this is counter to the public interest in maintaining natural behaviors in free- ranging horses. With respect to effects at the population level, it is not clear how castration of males would be better than vasectomy, which does not affect testosterone or male-type behaviors. Ultimately, the growth rate of any population that includes reproductive horses of both sexes will be commensurate	Mary Koncel	BLM understands some of the male behaviors would be reduced. All natural and social behaviors would not be lost. Even domestic horses and burros express many natural and social behaviors. As there is a level of uncertainty surrounding the effects of gelding on free-roaming wild horses, any new information collected collected in the East Pershing Complex or elsewhere, during the life of this plan would be applied to the implementation of this tool in the East Pershing ComplexAs

COMMENT	COMMENTER	RESPONSE
with the number of fertile females in the population. A potential disadvantage of both surgical and chemical castration is loss of testosterone and consequent reduction in or complete loss of male-type behaviors necessary for maintenance of social organization, band integrity, and expression of a natural behavior repertoire (NAS 2013).		
Although the EA provides a lengthy protocol, it does not acknowledge or analyze the serious risks that gelding represents to stallions.	Mary Koncel	Gelding side effects have been added and cited by Kirkpatrick, Nock, and the NAS in chapters 2 and 4.
Mix 40 darts of PZP at one time, dart one family at a time for a short period, and use dartable PZP.	Val Hogsett	Established protocols for using PZP would be followed.
We support using PZP. You must treat enough mares to achieve the desired population growth reduction. PZP Native is about $27 per mare and horses can be bait trapped one family at a time to reduce compensatory breeding, fighting of stallions, and trauma of breaking up family bands.	Val Hogsett	Comment noted. PZP Native is identified in Alternatives A and B.
BLM should focus on PZP which preserves the natural behaviors	Mary Koncel	Comment noted.

COMMENT	COMMENTER	RESPONSE
that distinguish wild-free roaming horses from domestic horses.		
PEA does not specify what form the surgery would take.	Charlotte Roe	This EA is designed to be flexible in the management actions due national priorities, available holding space and budget constraints. Section 2.3 states, "*The choice of safest method to use for a given mare would be at the discretion of the attending veterinarian, with consideration given to the health and safety of both horse and veterinarian.*
Ovariectomy should only be performed if there is a pressing medical need, under sterile conditions and with after-surgery recovery, veterinary followup and monitoring prior to release. Without such protocols, the mare is at great risk of dying, and the veterinary surgeon who performs the operation is at risk of losing his/her ability to practice the profession. Performing an ovariectomy with no clearcut medical need, with only an experimental purpose, is not only unethical. It is illegal. Ovariectomies are violating the Nevada Animal Cruelty statutes. Ovariectomies in wild mares has been highly unsuccessful and resulted in mortality rates that were above the acceptable range of the AVMA. We researched this	Charlotte Roe Val Hogsett	**Wild Horses and Burros Management Handbook H-4700-1** - 4.5.3 Reduce Population Growth Rates; "Additional management alternatives (tools) may be considered in the future, pending further research (see Chapter 8)". 8.1 Strategic Research Plan - "Research results will be used to improve management practices within the WH&B program." 8.3.2 Other Possible Fertility Control Tools - "Other possible fertility control tools that could potentially be considered in the future include: spaying mares …" 8.3.2.1 Spaying (Mares) - "Spaying mares involves major abdominal surgery, is risky, and requires good post-operative care. Spaying mares could be considered in the future if safe, effective and humane surgical methods and post-operative care procedures can be perfected for use on wild horses". As this EA states in Chapter 1, BLM's WH&B Program protects, manages, and controls wild horses and burros under the authority of the Wild Free-Roaming Horses and Burros Act of 1971 (WFRHBA) (Public Law (PL) 92-195), as amended by the Federal Land Policy and Management Act (FLPMA) of 1976 (PL 94-579) and the Public Rangelands Improvement Act of 1978 (PL 95-514). The WFRHBA directs the DOI's Secretary to "maintain a current inventory of wild free-roaming horses and burros on given areas of the public lands. The purpose of such inventory shall be to: make determinations as to whether

COMMENT	COMMENTER	RESPONSE
last year during the IBLA appeal on the BLM's decision to do these types of experiments and found doing them in non-sterile environments is not pursuant to the laws.		and where an overpopulation exists and whether action should be taken to remove excess animals; determine appropriate management levels of wild free-roaming horses and burros on these areas of the public lands; and determine whether appropriate management levels should be achieved by the removal or destruction of excess animals, or other options (such as **sterilization**, or natural controls on population levels)" (WFRHBA, 16 U.S.C. 1333(b)(1)). "For the purpose of furthering knowledge of wild horse and burro population dynamics," the WFRHBA provides direction to conduct research, 16 U.S.C. 1333(b)(2)(C)(3)).
It is a violation of the Nevada Animal Cruelty laws to even consider spaying of mares, and that option will never be acceptable to the American people. When the mortality rate of stallions gelded is higher than average when done by the BLM there is no way spaying a mare, a much more complicated surgery, should not even be considered.	Val Hogsett	**Wild Horses and Burros Management Handbook H-4700-1** - 4.5.3 Reduce Population Growth Rates; "Additional management alternatives (tools) may be considered in the future, pending further research (see Chapter 8)". 8.1 Strategic Research Plan - "Research results will be used to improve management practices within the WH&B program." 8.3.2 Other Possible Fertility Control Tools - "Other possible fertility control tools that could potentially be considered in the future include: spaying mares …" 8.3.2.1 Spaying (Mares) - "Spaying mares involves major abdominal surgery, is risky, and requires good post-operative care. Spaying mares could be considered in the future if safe, effective and humane surgical methods and post-operative care procedures can be perfected for use on wild horses". As this EA states in Chapter 1, BLM's WH&B Program protects, manages, and controls wild horses and burros under the authority of the Wild Free-Roaming Horses and Burros Act of 1971 (WFRHBA) (Public Law (PL) 92-195), as amended by the Federal Land Policy and Management Act (FLPMA) of 1976 (PL 94-579) and the Public Rangelands Improvement Act of 1978 (PL 95-514). The WFRHBA directs the DOI's Secretary to "maintain a current inventory of wild free-

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		roaming horses and burros on given areas of the public lands. The purpose of such inventory shall be to: make determinations as to whether and where an overpopulation exists and whether action should be taken to remove excess animals; determine appropriate management levels of wild free-roaming horses and burros on these areas of the public lands; and determine whether appropriate management levels should be achieved by the removal or destruction of excess animals, or other options (such as **sterilization**, or natural controls on population levels)" (WFRHBA, 16 U.S.C. 1333(b)(1)). "For the purpose of furthering knowledge of wild horse and burro population dynamics," the WFRHBA provides direction to conduct research, 16 U.S.C. 1333(b)(2)(C)(3)).
EA does not address the serious health risks ovariectomies represent to wild mares (as stated in the NAS report) or post-operative monitoring and care, including pain relief and restricted movement, necessitated by the ovariectomy procedure when performed with wild horses.	Mary Koncel	Health risks and side effects were added from Rutberg, Kelly, Ball, and NAS in chapters 2 and 4.
BLM cannot gather scientific information on these untested methods in the absence of an affiliation with an academic research institution, a scientifically sound and approved research protocol, and approval from an Institutional Animal Care and Use Committee (IACUC).	Mary Koncel	BLM is managing wild horses according to its mandate under FLPMA. Information gathered as a result of this management would be used to adapt management strategies. This does not constitute experimentation as described in the comment. IACUC is responsible for overseeing lab animal science.

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In 2013, NAS concludes spaying was "inadvisable" and recommended against gelding. It states, "The possibility that ovariectomy may be followed by prolonged bleeding or peritoneal infection makes it inadvisable for field application."		
EA does not include serious risks, behavioral changes, and social disruption posed by sterilization.	Mary Koncel	Health risks and side effects were added from Rutberg, Kelly, Ball, and NAS. Refer to *Spaying Side Effects* and *Gelding Side Effects* in Chapters 2 and *Impacts* in Chapter 4.
It will destroy the natural, wild, and free-roaming behavior, social organization, and long-term viability of the herd. AWHC is currently in litigation with BLM over the plan to make the Saylor Creek HMA in Idaho a non-breeding herd. This is unprecedented, untested, and highly controversial both scientifically and with regard to public opinion.	Mary Koncel	BLM understands some of the behaviors would be reduced. All natural and social behaviors would not be lost. Even domestic horses and burros express many natural and social behaviors.
Addition of predators in the most remote areas where the BLM refuses to utilize PZP.	Val Hogsett	This is outside the scope of this EA. As stated in *"**Control of Wild Horse and Burro Numbers by Natural Means**"*, using predators to manage wild horses would be contrary to the WFRHBA which requires BLM to protect the range from deterioration associated with an overpopulation of wild horses. Wild horse populations in the East Pershing Complex are not currently substantially regulated by predators, as evidenced by the 15-25% annual increase in the wild horse populations within this Complex. In addition, wild horses are a long-

COMMENT	COMMENTER	RESPONSE
		lived species with documented foal survival rates exceeding 95% and, like other large mammals (Wolff, 1996), are not a true self-regulating species.
6. GENERAL		
The PEA proposes removing 1,251 horses from the three HMAs and two (unmapped) Herd Areas	Charlotte Roe	There are 4 Herd Areas and 3 Herd Management Areas. The map named "East Pershing Complex" shows the 4 HAs as well as the 3 HMAs. The HAs are in red and the HMAs are in blue.
BLM did not have congressional authority to combine Herd Areas or preserves to create complexes.	Val Hogsett	Because the migration of wild horses and burros between HMAs has been documented via aerial surveys and ground monitoring, these HMAs are managed as a Complex. Managing these HMAs as a Complex increases genetic diversity and prevents a decrease in genetic viability within the herd. Preserves - The law's language stating that public lands where wild horses were found roaming in 1971 are to be managed "principally but not necessarily exclusively" for the welfare of these animals relates to the Interior Secretary's power to "designate and maintain specific ranges on public lands as sanctuaries for their protection and preservation" -- which are, thus far, the Pryor Mountain Wild Horse Range (in Montana and Wyoming), the Nevada Wild Horse Range (located within the north central portion of Nellis Air Force Range), the Little Book Cliffs Wild Horse Range (in Colorado), and the Marietta Wild Burro Range (in Nevada). The "**principally but not necessarily exclusively**" language applies to specific Wild Horse Ranges, **not** to Herd Management Areas in general. The Code of Federal Regulations (43 CFR, Subpart 4710.3-2) states: "Herd management areas may also be designated as wild horse or burro ranges to be managed principally, **but not necessarily exclusively, for wild horse or burro herds**."
7. GENETICS		
Thriving herds must be genetically viable. None of the 3 HMAs meet	Val Hogsett	Low AML for the HMAs within the East Pershing Complex are: North Stillwater HMA 138-205, Tobin Range HMA 22-42, and Augusta Mountain HMA 185-308. Except for the Tobin, which will be managed

COMMENT	COMMENTER	RESPONSE
genetic viability at the low end of the AML range.		as a non-reproducing herd per the Winnemucca RMP 2015, t**otal breeding population size** of this Complex would be between 323 and 513 animals. A minimum-viable population specific to the East Pershing Complex has not been ascertained. Per WHB Handbook 4700-1: *"A minimum population size of 50 effective breeding animals (i.e., a* ***total population size*** *of about 150-200 animals) is currently recommended to maintain an acceptable level of genetic diversity within reproducing wild horse populations (Cothran, 2009). This number is required to keep the rate of loss of genetic variation at 1 percent per generation. Animal interchange between adjacent HMAs with smaller population sizes may reduce the need for maintaining populations of this size within each individual HMA. Research has not yet established a recommended minimum breeding herd size for burros."*
A population of 345-555 horses is insufficient to prevent inbreeding; reducing the breeding males will certainly force inbreeding. Effects of decreasing the population size on the genetic viability of the remaining herds must be analyzed.	Mary Koncel	A minimum-viable population specific to the East Pershing Complex has not been ascertained. Per WHB Handbook 4700-1: *"A minimum population size of 50 effective breeding animals (i.e., a* ***total population size*** *of about 150-200 animals) is currently recommended to maintain an acceptable level of genetic diversity within reproducing wild horse populations (Cothran, 2009). This number is required to keep the rate of loss of genetic variation at 1 percent per generation. Animal interchange between adjacent HMAs with smaller population sizes may reduce the need for maintaining populations of this size within each individual HMA.*
The populations of the HMAs are not known to have interchange with other populations which would contribute to genetically healthier populations.	Mary Koncel	Many portions of the HMAs within the East Pershing Complex are not fenced off from one another. Aerial surveys and field monitoring demonstrate wild horses migrate back and forth to adjacent HMAs, especially between the Tobin and North Stillwater HMAs. This information has been observed and documented for decades. Maps showing allotment fences are available for this EA at the WD office, Monday through Friday, 7:30 a.m. to 4:30 p.m., except holidays.
8. HUMANE TREATMENT		

COMMENT	COMMENTER	RESPONSE
Using bait or water traps to conduct the "gather." Chasing horses and foals many miles by helicopter across desert terrain replete with sharp volcanic shards is a recipe for death. It is neither humane nor necessary. Helicopters should only be used to identify the most favorable gathering sites, not for chasing wild horses like prey. Helicopter stampedes are not the original intent of the law. The authority given by the Burns Amendment went against the original law and that amendment needs to be repealed. Helicopters should not be considered as an option to roundup wild horses. It is not the minimum feasible option nor is it humane. And it violates the animal cruelty laws of the state of Nevada.	Charlotte Roe Val Hogsett Mary Koncel	In Chapter 4, the EA states, "*Though some members of the public have expressed the view that helicopter gathers are not humane, most injuries occur once the wild horses are captured, and similar injuries would also be sustained if wild horses were captured through a more passive gather method such as bait trapping, as the animals would still need to be sorted, aged, transported and otherwise handled*." Utilizing bait/water trapping as a means to gather is also described in Chapter 4, "*<u>Water/Bait Trapping</u>* *Due to allowing wild horses to acclimatize over a longer period of time, water/bait trapping creates a low stress trap. During this acclimation period the wild horses would experience some stress due to the panels being setup and perceived access restriction to the water/bait source. Such trapping can continue into the foaling season without harming the mares or foals. Conversely, it has been documented that at times water trapping could be stressful to wild horses due to their reluctance related to approaching new, human structures or intrusions. In these situations, wild horses may avoid watering or may travel greater distances in search of other watering sources."* Appendix A of this EA is the Comprehensive Animal Welfare Program (CAWP) for wild horse and burro gathers which states how BLM is to use humane care. The CAWP For Wild Horse And Burro Gathers – Standards; was developed in collaboration with Carolyn L. Stull, PhD Kathryn E. Holcomb, PhD University of California, **Davis School of Veterinary Medicine** June 30, 2015. Various professionals of the veterinary and equine community have observed gathers and holding facilities, and followed up with reports of their findings and recommendations to BLM. For the most part, the team members found that wild horse gathers are necessary, and conducted humanely. Many of the recommendations have already been

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		implemented by BLM and the gather contractors. These reports can be viewed at these locations: • Office of Inspector General (OIG) report on the WHB program: http://www.doioig.gov/images/stories/reports/pdf/BLM%20Wild%20Horse%20and%20Burro%20Program%20Public.pdf • American Horse Protection Association Independent Report: http://www.blm.gov/wo/st/en/info/newsroom/2010/december/NR_12_03_2010A.html • American Association of Equine Practitioners Report: http://www.aaep.org/images/files/AAEP%20Report%20on%20the%20BLM%20Wild%
Citizens Against Equine Slaughter suggests wild horse management via predators or PZP only. Helicopter usage only for application of PZP, one band at a time, in areas where native predators are unacceptable to the BLM.	Val Hogsett	Comment noted. As stated in *"**Control of Wild Horse and Burro Numbers by Natural Means**",* using predators to manage wild horses would be contrary to the WFRHBA which requires BLM to protect the range from deterioration associated with an overpopulation of wild horses. Wild horse populations in the East Pershing Complex are **not currently substantially** regulated by predators, as evidenced by the 15-25% annual increase in the wild horse populations within this Complex. In addition, Wild horses are a long-lived species with documented foal survival rates exceeding 95% and, like other large mammals (Wolff, 1996), are not a true self-regulating species.
Limit distance horses may be chased by a helicopter to no more than 5 miles. Require helicopter *not* chase/move horses at a pace that exceeds the natural rate of movement of *slowest* animal in the band. Keep older, sick and young animals	Mary Koncel	Appendix A of this EA is the SOPs (CAWP) for wild horse and burro gathers which states how BLM is to use humane care. Since the preliminary EA was issued, BLM has adopted the Comprehensive Animal Welfare Program For Wild Horse And Burro Gathers – Standards; developed in collaboration with Carolyn L. Stull, PhD Kathryn E. Holcomb, PhD University of California, Davis School of Veterinary Medicine June 30, 2015. These SOPs (CAWP) replace the

COMMENT	COMMENTER	RESPONSE
together with their bands as they are moved into the trap. If there are compromised, old, weak or young animals in a small band – the helicopter should not move or capture those animals. Establish strict parameters for suspending helicopter roundup operations in temperatures below freezing or over 95 degrees F.		prior SOPs and define the parameters for herding with helicopters including acceptable temperature ranges.
9. NEPA		
I believe these alternatives are not compliant with NEPA since they are not real alternatives, as both are grossly unfair to the wild horses.	Craig Downer	BLM Handbook H-1790-1 states, "The NEPA directs the BLM to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources;…" (NEPA Sec102 (2)(E)). The range of alternatives explores alternative means of meeting the purpose and need for the action… In determining the alternatives to be considered, the emphasis is on what is "reasonable" rather than on whether the proponent or applicant likes or is itself capable of implementing an alternative…You can only define whether an alternative is "reasonable" in reference to the purpose and need for the action." (pg 50). The alternatives analyzed in this EA were developed to meet the purpose and need described in Chapter 1 of the EA.
BLM must prepare an EIS due to the breadth and scope of the project. BLM's decision to prepare an EA in lieu of an EIS, is contrary to NEPA's regulations.	Mary Koncel	This EA is a site-specific analysis of the potential impacts that could result from implementation of any one of the Action Alternatives. An EA provides sufficient information and analysis for determining whether to prepare an EIS or a Finding of No Significant Impact (FONSI). This EA ensures compliance with the NEPA by providing site-specific analysis of potential direct, indirect, and cumulative effects to the human environment associated with gathering and removing excess wild horses and implementing a PGS program within the East Pershing Complex. The 20-year timeframe was developed due to constraints such as holding

COMMENT	COMMENTER	RESPONSE
		space, funding, national priorities, and approval for gathers and removals. EAs are only valid as long as the environment has not significantly changed and does not need further analysis. ***Chapters 3 and 4*** of this EA address avoiding cultural resource areas.
Action Alternatives will bring heavy equipment and aircraft into environmentally sensitive areas and stampede large numbers of wild horses across those areas – will impact the cultural resources. Significant *scientific* controversy exists: • Enforcing AMLs not "transparent to stakeholders, scientifically supported or amenable to adaption with new information and environmental and social change. • Continuing management practices that "facilitate high rates of population growth" by removing large numbers of wild horses from these HMAs. • Proposing to sterilize without assessing impacts on natural behaviors, or providing scientific basis for the determination of percentage of herd to be non-reproducing.		As stated in the *Cultural, Paleontological & Native American Consultation Resources* Environmental Protection Measures (EPMs) in ***Chapter 2***, "The BLM would make every effort to place temporary gather and holding sites in previously disturbed areas and in areas that have been inventoried and have no cultural resources, TCPs, sacred sites or paleontological sites. If a new gather or holding site is needed, a cultural inventory would be completed prior to using the new sites. If cultural resources are encountered, the location of the gather/holding site would be adjusted **to avoid** all cultural resources. No trap or holding sites would be set up along or adjacent to segments of the Applegate Trail rated as Class I, II, or III. Additionally, between August 15 and October 31, any temporary gather or holding sites would be placed outside the view shed of any TCPs within the Stillwater Range ACEC so as to not be visible from those TCPs. Once the specific locations of proposed gather and holding sites are identified, BLM staff would check the paleontological database for paleontological localities in the vicinity, survey gather or holding areas for paleontological localities if necessary, and ensure that all known paleontological localities are **avoided**.

COMMENT	COMMENTER	RESPONSE
The crucial question under NEPA is whether BLM is adopting a new approach that could set a precedent for how future actions proceed (whether or not they are subject to separate NEPA review). BLM has never before rendered a percentage of a wild horse population non-reproducing by sterilizing both stallions and mares, nor conducted any sterilization procedures on mares, either in captivity or on mares who have been returned to the wild, and has never released geldings to the range as part of a management policy/plan.		The 2015 Winnemucca RMP analyzed the impacts of a non-reproducing herd in the Tobin HMA. The Winnemucca EIS states "Under Alternative D, the Tobin HMA would be managed as a non-breeding herd. The AML for this area is currently 22-42 wild horses. This population range is below the recommended range of 50 effective breeding animals (i.e., a total population size of about 150-200 animals). Another limiting factor for the Tobin HMA is the lack of reliable water. There is currently one source that has been available year long, however this source is on private land. Managing the herd as non-breeding would benefit both the horses and the resources. Non-breeding animals are less stressed and normally found to be in better body condition than breeding animals. The stress from gathers would be less as the gather schedule would be further apart than every four years. Keeping the herd within AML would allow for the improvement of the habitat condition and would allow for a sustained resource for wild horses, wildlife and livestock."
Water resources developed for livestock seem to be enough for their use but falls short of providing for an estimated 1,596 wild horses and burros. The developments seem to be reserved for privately permitted animals and hence violate the multiple use doctrine of the land on which they are installed. PEA is deficient in explaining why water is proportionately out of	Janet Schultz	Within the East Pershing Complex, there are water sources on public and private lands, and there are also private water rights holders across the Complex. BLM does not own all of the water rights within the Complex. The Jersey Valley grazing permit EA states "Water quantity and distribution on public lands is currently extremely limited in the Augusta Mountains HMA. No permanent natural waters exist in the Hole in the Wall allotment, horses water at the springs south of the ranch in the Jersey Valley allotment. Three accessible permanent waters exist in the Jersey Valley allotment – the springs south of the ranch, Stremler spring and the mouth of Cedar Canyon. Accessible permanent water is only available on the upper reach of Home Station Wash in the Home Station

COMMENT	COMMENTER	RESPONSE
balance and steps taken to ensure that WHB and wildlife are provided for under the multiple use doctrine. The shortage of forage and water does not explain the plentiful large game animals in these same areas.		Gap allotment. Water inventory data indicates spring flows are estimated between 0 to 4 gpm." The amount of water is sufficient for all the current uses. However, as the wild horse population escalates, water for the wild horses, wildlife, and livestock will be the limiting factor. The EA states, "*There is not adequate water on the public lands within the Complex to continue supporting the increasing number of wild horses*." State water law requires surface water right holders on public land to provide access to water for wildlife including wild horses.
10. OPPOSE AND SUPPORT THE GATHER		
As a stakeholder in our public lands, I urge c) no action on this roundup of America's wild horses. Federal facilities are already over-crowded, and with slaughter sales lurking in the federal budget, this is a bad idea.	Terry Farley	Comment noted.
I oppose the unnecessary removal of 1,251 wild horses. I oppose the plans to sterilize and geld.	Eileen Hennessy	**Wild Horses and Burros Management Handbook H-4700-1** - 4.5.3 Reduce Population Growth Rates; "Additional management alternatives (tools) may be considered in the future, pending further research (see Chapter 8)". 8.1 Strategic Research Plan - "Research results will be used to improve management practices within the WH&B program." 8.3.2 Other Possible Fertility Control Tools - "Other possible fertility control tools that could potentially be considered in the future include: spaying mares …" 8.3.2.1 Spaying (Mares) - "Spaying mares involves major abdominal surgery, is risky, and requires good post-operative care. Spaying mares could be considered in the future if safe,

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		effective and humane surgical methods and post-operative care procedures can be perfected for use on wild horses". As this EA states in Chapter 1, BLM's WH&B Program protects, manages, and controls wild horses and burros under the authority of the Wild Free-Roaming Horses and Burros Act of 1971 (WFRHBA) (Public Law (PL) 92-195), as amended by the Federal Land Policy and Management Act (FLPMA) of 1976 (PL 94-579) and the Public Rangelands Improvement Act of 1978 (PL 95-514). The WFRHBA directs the DOI's Secretary to "maintain a current inventory of wild free-roaming horses and burros on given areas of the public lands. The purpose of such inventory shall be to: make determinations as to whether and where an overpopulation exists and whether action should be taken to remove excess animals; determine appropriate management levels of wild free-roaming horses and burros on these areas of the public lands; and determine whether appropriate management levels should be achieved by the removal or destruction of excess animals, or other options (such as **sterilization**, or natural controls on population levels)" (WFRHBA, 16 U.S.C. 1333(b)(1)). "For the purpose of furthering knowledge of wild horse and burro population dynamics," the WFRHBA provides direction to conduct research, 16 U.S.C. 1333(b)(2)(C)(3)).
I support Alt. B, as it will take multiple gathers to ensure all animals are treated, which will be necessary to bring the herds to a manageable state.	Jerry Annis	Comment noted.
NDOW recommends any fertility control strategy should be aggressively implemented with a robust monitoring plan to evaluate effectiveness only after gathering	NDOW	Comment noted.

COMMENT	COMMENTER	RESPONSE
and removing to low AML. Furthermore, it is our opinion that gathering and removing to low AML as the primary component while combining other secondary measures (e.g. fertility control), is the only viable method for achieving the Purpose and Need.		
I urge BLM to select Alternative C. PEA does not adequately assess the impact of other grazers, particularly domestic grazing stock, in the East Pershing Complex.	Arlene Gawne	The "***Rangeland Management***" section in Chapter 3 in the EA discusses relevant information regarding livestock grazing in the HMAs. Members of the public may view the relevant documents for this EA at the WD office, Monday through Friday, 7:30 a.m. to 4:30 p.m., except holidays.
I favor the No Action alternative, and urge you to prepare another EA that truly does justice to these magnificent wild horses.	Craig Downer	Comment noted.
I fully support the Gather. I have been a grazing permittee in the Cottonwood allotment since 1990. My allotment is included in the Augusta Mountain HMA. Historically the Cottonwood allotment has had an excess number of wild horses well over AML.	Bert Paris	Comment noted. The northern 1/3 of the Cottonwood allotment is within the East Pershing Complex boundary due to wild horses from the Augusta HMA migrating into the Augusta HA.
American Wild Horse Campaign opposes Alternatives A and B.	Mary Koncel	Comment noted.
11. POPULATION - INVENTORY DATA & ANALYSIS NEEDED		

COMMENT	COMMENTER	RESPONSE
EA does not consider the looming threat the 2017 Omnibus Spending Bill and President Trump's 2018 budget presents to horses removed in Alternative B.	Mary Koncel	Comment noted. Under the **current** Appropriations bill, BLM does not send wild horses to slaughter.
Impacts inadequately analyzed include effects of roundup, helicopter drive, removal, transport and maintenance in short-term and long-term holding facilities, adoption, and sale. Analyze BLM's lack of holding space and stockpiling 50,000 wild horses in holding facilities on the long-term welfare and safety of horses captured and removed from these HMAs.	Mary Koncel	Chapters 2 and 4 describe effects and impacts of gather activities. The Winnemucca BLM office does not track the animals at BLM short and long-term facilities. Members of the public may contact the BLM corral facilities directly for more information. Members of the public may contact BLM Washington Office for information regarding holding space and current and upcoming bids.
• Trap sites should be located on public lands to allow public observation. No trap site shall be located on private lands where owners will not give permission for public observation activities. • Real-time cameras with GPS should be installed on all helicopters used in roundup operations and video should be live streamed on the Internet. This will improve transparency of roundup operations and enable BLM and public to monitor direct	Mary Koncel	Refer to standard operating procedures and public observation protocol in Appendices A and B.

COMMENT	COMMENTER	RESPONSE
impacts motorized vehicles have on wild horses and the environment. • Real-time cameras should be installed on the trap, the corral and temporary holding pens to monitor the entire roundup operation and treatment of the horses.		
EA does not provide details about proposed removals/gathers, fertility control, or sterilization procedures to fully analyze impacts.	Mary Koncel	This EA is designed to be flexible in the management actions due to national priorities, available holding space and budget constraints. Section 2.3 states, "*The choice of safest method to use for a given mare would be at the discretion of the attending veterinarian, with consideration given to the health and safety of both horse and veterinarian.*
EA does not disclose and analyze genetic data for the Complex.	Mary Koncel	Comment noted. Members of the public may view the relevant documents for this EA at the WD office, Monday through Friday, 7:30 a.m. to 4:30 p.m., except holidays.
EA states the WFRHBA Act "mandates management of wild horses in a manner that is designed to achieve and maintain a thriving ecological balance…" We assert that a thriving 'natural ecological' balance cannot be achieved where there is land degradation from excess livestock grazing. Yet the EA does not provide the number of livestock on the preserve. So with the number of allotments, and the average number of cows permitted on these allotments, we	Val Hogsett	The ***Rangeland Management*** section in ***Chapter 3*** describes the numbers of livestock permitted to graze on the allotments within this Complex. Principally managed/Preserves - The law's language stating that public lands where wild horses were found roaming in 1971 are to be managed "principally but not necessarily exclusively" for the welfare of these animals relates to the Interior Secretary's power to "designate and maintain specific ranges on public lands as sanctuaries for their protection and preservation" -- which are, thus far, the Pryor Mountain Wild Horse Range (in Montana and Wyoming), the Nevada Wild Horse Range (located within the north central portion of Nellis Air Force Range), the Little Book Cliffs Wild Horse Range (in Colorado), and the Marietta Wild Burro Range (in Nevada). The "**principally but not necessarily exclusively**" language applies to specific Wild Horse

COMMENT	COMMENTER	RESPONSE
assert that there is no principle management for wild horses.		Ranges, **not** to Herd Management Areas in general. The Code of Federal Regulations (43 CFR, Subpart 4710.3-2) states: "Herd management areas may also be designated as wild horse or burro ranges to be managed principally, **but not necessarily exclusively, for wild horse or burro herds**."
Crucial information on ungulate numbers; invasive and nonnative grazers on the wildlife, forage, and recreation uses; growth rates against artificial stocking rates; rainfall; grazing permits; and details of sterilizations is not provided in the EA.	Val Hogsett Janet Schultz	Comment noted. Members of the public may view the relevant documents for this EA at the WD office, Monday through Friday, 7:30 a.m. to 4:30 p.m., except holidays. In ***Chapter 4***, the EA states "*Removal of excess wild horses would improve herd health. Decreased competition for forage and water resources would reduce stress and promote healthier animals. This removal of excess animals, coupled with anticipated reduced reproduction (population growth suppression) as a result of fertility control should result in improved health and condition of mares and increased foal survival rates. Additionally, reduced population growth rates would be expected to extend the time interval between gathers and reduce disturbance to individual animals as well as to herd social structure over the foreseeable future*."
Grazing Allotments map reveals most of the HMAs are solidly blanketed by allotments. Most of the allotments have active grazing by permittees during the growing seasons, some are all year permits. Table 10 is inaccurate and skews data for analysis.	Janet Schultz	Grazing Allotments map and Table 10 displays accurate information of allotment and HMA boundaries.
The National Academy of Sciences found no overpopulation of wild horses.	Eileen Hennessy	The NAS was asked to review the BLM WH&B Program and to provide BLM with a scientific evaluation of the program's pressing challenges. "*In the committee's judgement, the reported annual population statistics are probably underestimates of the actual number of equids on the range...*" *(NAS 2013).*

COMMENT	COMMENTER	RESPONSE
		Currently BLM conducts aerial surveys using the simultaneous double-count method and raw data is statistically analyzed by USGS and as recommended by NAS.
To determine if the BLM's population count is valid, the public must have access to the population census' raw data. Provide methods, dates, and time period for the aerial census. What steps were taken to ensure that the same horses and bands were not counted two or three times as they moved from one quadrant of the count to another?	Charlotte Roe	Members of the public may view the relevant documents for this EA at the WD office, Monday through Friday, 7:30 a.m. to 4:30 p.m., except holidays. Population census data are described in *Chapters 1-3*. Aerial surveys were conducted using the simultaneous double-count method and raw data is statistically analyzed by USGS as recommended by the National Academy of Science (NAS). Wild horse population demographic data is collected via aerial surveys and on-the-ground monitoring. Flight lines are drawn to minimize counting bands more than once. Videos and photographs of bands are examined for accuracy.
The public needs to know how many livestock are grazing on this sensitive habitat. Livestock numbers must be included in the EA.	Charlotte Roe	The ***Rangeland Management*** section in ***Chapter 3*** describes the numbers of livestock permitted to graze and actual use for the last three years on the allotments within the Complex.
Include critical contribution wild horses make to fire prevention by eating cheat grass often before it can reseed. They eat fire-prone vegetation in remote areas where cattle will not go and fire prevention equipment cannot access.	Charlotte Roe	Comment noted. This EA analyzes impacts of gather-related activities. The alternatives proposed are designed to reduce wild horse numbers to low AML due to severe utilization of riparian vegetation, extreme spring degradation, and inadequate water to continue supporting the increasing number of wild horses. Due to these findings, BLM has determined excess wild horses are present on the range and implementing management actions is necessary.
PEA shows damaged water holes and states public lands in question do not have adequate water. What	Charlotte Roe	The EA states, "*There is not adequate water on the public lands within the Complex to continue supporting the increasing number of wild horses.*"

COMMENT	COMMENTER	RESPONSE
amount of water is used by the geothermal plant near Logan Pond? Please list all public and private enterprises within the Complex with access to the water and what is done to ensure they do not pollute water sources for the animals.		The closest geothermal plant to Logan Pond is Dixie Valley. Information on water rights users can be obtained from the NDWR website.
Alternatives A and B are not clear whether horses would be treated with fertility control vaccines, or gelded or spayed, and needs to outline the number of each of those actions in each HMA. The language pertaining to the specific actions to be taken is vague.	Val Hogsett	As stated in ***Chapter 2:*** Alternative A includes gathers, PZP, and spaying. Alternative B includes all of the above plus removals, GonaCon and gelding.
EA should include monitoring data which AMLs in Complex are based and how BLM delineates wild horse impacts from livestock impacts.	Mary Koncel	Monitoring is being conducted throughout each year as staffing, funding, and priorities allow. Members of the public may view the relevant documents for this EA at the WD office, Monday through Friday, 7:30 a.m. to 4:30 p.m., except holidays.
12. REDUCE OR REMOVE LIVESTOCK		
BLM rejected viable alternatives including reducing livestock grazing to avert the need to reduce AMLs to ridiculously low levels.	Mary Koncel	Comment noted. This is outside the scope of this EA. This EA is not adjusting AML.
PEA is deficient in analyzing the purpose for overstocking. The number of livestock permitted deviate from the mandate to have a natural ecological balance.	Val Hogsett Janet Schultz	Several management decisions have guided the multiple use management of allotments in the Complex. The allotment specific FMUDs established the AML for wild horses in the allotments in the Complex. Livestock numbers are adjusted as appropriate.

<table>
<tr><th>COMMENT</th><th>COMMENTER</th><th>RESPONSE</th></tr>
<tr><td>Photos on page 64 show a herd of more than 10 cattle at the spring at Home Station Wash (2015, the height of some of the worst drought) yet stocking rates were high or higher than they had been in 2013 or 2014. How can BLM state it is the fault of the WHBs that springs appear beat up?</td><td></td><td>There have not been any AUM reductions in livestock grazing use due to wild horses in this Complex.

Home Station Wash is located within Jersey Valley allotment. Table 11 in Chapter 3 shows actual use in 2014, 2015, and 2016 was considerably below permitted numbers:

<table>
<tr><th>Allotment</th><th>Permitted AUMs</th><th>Actual Use 2014</th><th>Actual Use 2015</th><th>Actual Use 2016</th></tr>
<tr><td>Jersey Valley</td><td>2256</td><td>409</td><td>809</td><td>1213</td></tr>
</table></td></tr>
<tr><td>Public Employees for Environmental Responsibility (PEER) found BLM’s method of assessing range conditions is skewed to minimize impacts from domestic livestock and magnify those from wild horses and burros. BLM thus favors “use” and blames “resource.”

I urge the mass removal of excess, invasive, destructive welfare livestock.

If there is not enough water or forage, livestock must be removed first not only for the wild horses but for all wildlife in the area as well.</td><td>Eileen Hennessy
Val Hogsett</td><td>In the East Pershing Complex, wild horses and burros are removed from the range due to numbers exceeding set AMLs; lack of forage or water; and animals exhibiting poor body condition. Also, in this Complex, livestock numbers have not been reduced due to wild horse impacts.

Comment noted. This is outside the scope of this EA.

Removal or reduction of livestock would not be in conformance with the existing RMP, is contrary to the BLM’s multiple-use mission as outlined in the FLPMA and PRIA, and would be inconsistent with the WFRHBA, which directs the Secretary to immediately remove excess wild horses outside of HMAs. Additionally this would only be effective for the very short term as the wild horse population would continue to increase. Eventually the HMAs and adjacent lands would no longer be capable of supporting the wild horse populations.</td></tr>
</table>

COMMENT	COMMENTER	RESPONSE
		The BLM understands the opinion of members of the public who would like to see a decrease in livestock grazing. The purpose of the EA is not to adjust livestock use. Adjustments to livestock grazing cannot be made through a wild horse gather EA. A land-use plan amendment or revision would be necessary to reallocate use between livestock and wild horses and burros.
13. SOCIAL VALUES		
Sterilization of wild horses is a significant controversy, which BLM itself has acknowledged. In the Oregon "mare sterilization research" EA, BLM posited such experiments were necessary to determine whether procedures (including ovariectomies – surgically removing the ovaries of mares) were "socially acceptable."	Mary Koncel	Comment noted.
NAS affirms importance of social preference in WH&B management: WH&B management and control strategies cannot be based on biological or cost considerations alone; management should engage interested and affected parties and also be responsive to public attitudes and preferences. Removal of wild horses from public lands negatively impacts the human environment for those who enjoy observing,	Mary Koncel	Comment noted.

COMMENT	COMMENTER	RESPONSE
photographing and researching these wild horses. Most of the American public treasures and has a deep and passionate connection to wild horses. As the 1971 Act recognizes — wild free-roaming horses are living symbols of the historic and pioneer spirit of the west. BLM should consider the social impacts of the Action Alternatives. NAS/NRC report on BLM's wild horse and burro program: Attitudes and values that influence and direct public priorities regarding the size, distribution, and condition of horse herds, as well as their accessibility to public viewing and study, must be an important factor in the determination of what constitutes excess numbers of animals in any area. An otherwise satisfactory population level may be controversial or unacceptable if the strategy for achieving it is not appropriately responsive to public attitudes and values. Biologically, the area may be able to support		

COMMENT	COMMENTER	RESPONSE
500 cattle and 500 horses, and may be carrying them. But if the weight of public opinion calls for 1,000 horses, the area can be said in this context to have an excess of 500 cattle. For these reasons, the term excess has both biological and social components.		
14. SLAUGHTER		
The 80% of the American public that oppose horse slaughter are aware Interior Secretary Zinke, in anticipation of approval of the 2018 federal budget which includes a provision for the "sales without limitations" of our wild equines to slaughter, has secretly ordered the BLM to inventory nearly 50,000 of our captive WH&Bs, by age and weight in preparation to rush these innocent victims of greed into trucks and haul them off for grisly slaughter if this deadly budget bill is approved. This arrogant and callous move speaks volumes of the true intent of this agency that claims to be fulfilling its legal mandate to ensure the welfare of our WH&Bs when, in reality, is planning a Final Solution to the illusory WH&B “problem“.	Eileen Hennessy	Comment noted. Under the **current** Appropriations bill, BLM does not send wild horses to slaughter.