US. Department of the Interior
Bureau of Land Management

Antelope and Triple B Complexes

Wild Horse Gather & Herd Management Area Plan

DOI-BLM-NV-L060-2025-0001-EA

Final Environmental Assessment
September, 2025

U.S. Department of the Interior
Bureau of Land Mangement
Bristlecone/ Wells Field Offices

1.0 Introduction

This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental effects of the Proposed Action and alternatives, which consist of establishing a Herd Management Area Plan (HMAP) (Appendix XIII) and gathering and removing excess wild horses from within and outside the Antelope Complex and Triple B Complex Wild Horse Herd Management Areas (HMA). The gather and removal of excess wild horses from the U.S. Forest Service's (USFS) Cherry Springs Wild Horse Territory (WHT) is also included in the Proposed Action and if approved, will be authorized under a separate USFS decision associated with this EA. The Cherry Springs WHT is managed in accordance with an Interagency Agreement between the BLM and the USFS and is included for informational purposes and impact analysis. Refer to Map 1, Appendix I which displays the HMAs and WHT included within the Triple B Complex.

The BLM proposes to immediately gather and remove excess wild horses in accordance with the Wild Free-Roaming Horses and Burros Act (WFRHBA) in an initial gather (and a follow-up gather or gathers if necessary) in order to achieve Appropriate Management Levels (AMLs), and to continue fertility control management. This EA will assist the Bureau of Land Management (BLM) Bristlecone and Wells Field Offices (FOs) in project planning, ensure compliance with the National Environmental Policy Act (NEPA) and make a determination as to whether any significant effects could result from the analyzed actions. This EA describes the potential impacts of the Proposed Action and a No Action Alternative for the Antelope Complex and the Triple B Complex. If the BLM determines that the Proposed Action for the Complexes is not expected to have significant impacts, a Finding of No Significant Impact (FONSI) would be issued and a Decision Record would be prepared. If significant effects are anticipated, the BLM would prepare an Environmental Impact Statement.

This document is tiered to or conforms to the following documents:

- Ely Proposed Resource Management Plan and Final Environmental Impact Statement (2007 PRMP/FEIS)
- Ely District Record of Decision and Approved Resource Management Plan, as amended (2008 Ely RMP)
- Proposed Wells Resource Management Plan and FEIS US DOI 1983 (Wells RMP), approved July 16, 1985
- Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment (BLM 2015)
- Wells RMP Wild Horse Amendment and Decision Record, approved August 1993 (US DOI 1993) (WRMPWHA)
- Humboldt National Forest Land and Resource Management Plan (LRMP) dated August 1986.

1.1 Background

The Complexes are located in northern White Pine County and southeastern Elko County and are comprised of 2,815,664 acres. Table 1, below, displays the total acreage and established AML for each of the HMAs and WHT.

The 2008 Ely RMP combined three existing HMAs (Buck and Bald, Butte, and Cherry Creek HMAs) into the Triple B HMA. The decision to combine all, or portions of the three HMAs was due to the historical interchange of wild horses between the three HMAs and was also based on an in-depth analysis of habitat suitability and monitoring data as set forth in the Ely Proposed Resource Management Plan/Final Environmental Impact Statement, Table 3.8-2 and Page 4.8-2. The 2007 EIS evaluated each herd management area for five essential habitat components and herd characteristics: forage, water, cover, space, and reproductive viability. Through this analysis and the subsequent Final RMP and Record of Decision (ROD), the boundaries of the Triple B HMA were established to ensure sufficient habitat for wild horses, and an AML of 250-518 wild horses was established to achieve a thriving natural ecological balance and rangeland health.

The 2008 Ely RMP re-affirmed long-term management of wild horses within the Antelope HMA through the Ely Proposed Resource Management Plan/Final Environmental Impact Statement, Table 3.8-2 and Page 4.8-2. The 2007 EIS evaluated the herd management area for five essential habitat components and herd characteristics: forage, water, cover, space, and reproductive viability. Through this analysis and the subsequent Final RMP and Record of Decision (ROD), the boundaries of the Antelope HMA were reaffirmed to ensure sufficient habitat for wild horses, and an AML of 150-324 wild horses was reviewed and set to achieve a thriving natural ecological balance and rangeland health.

The 1993 WRMPWHA established the four HMAs as follows: Antelope Valley, Goshute, Maverick-Medicine and Spruce-Pequop. In addition, it established baseline AMLs of 240 wild horses for the Antelope Valley HMA, 160 wild horses for the Goshute HMA, 389 wild horses for the Maverick-Medicine HMA and 82 wild horses for the Spruce-Pequop HMA. The WRMPWHA stated that adjustments would be based on monitoring and grazing allotment evaluations. The baseline AML for the Antelope Valley, Goshute and Spruce-Pequop HMAs was established at 155-259 wild horses through a combination of the 1994 Antelope Valley Final Multiple Use Decision (FMUD), the 1998 Badlands FMUD, the 1998 Spruce FMUD, the 2001 Maverick-Medicine Complex FMUD, the 2001 Sheep Allotment Complex FMUD and the 2002 Big Springs FMUD. In the Maverick-Medicine HMA the WRMPWHA established a baseline AML of 389 wild horses, which was adjusted to 166-276 wild horses through a combination of the 1998 Spruce FMUD, the 1994 West Cherry Creek Allotment FMUD, and the 2001 Maverick-Medicine Complex FMUD. The wild horses from the Maverick-Medicine HMA travel back and forth across the Elko and White Pine County line, mixing with the wild horses from the Triple B HMA. They also move back and forth mixing with wild horses from the western portion of the Antelope Valley HMA west of U.S. Highway 93. The population within this HMA can fluctuate depending on the seasonal movement of the wild horses.

Since the passage of the WFRHBA, management knowledge regarding wild horse population levels has increased. For example, it has been determined that wild horses are capable of increasing their numbers by 15% to 25% annually, resulting in the doubling of wild horse populations about every 4 years (NRC 2013). This has resulted in the BLM shifting program emphasis beyond just establishing AML and conducting wild horse gathers to include a variety of management actions that further facilitate the achievement and maintenance of viable and stable wild horse populations and a thriving natural ecological balance. Management actions resulting from shifting program emphasis include increasing fertility control, adjusting sex ratio, and collecting genetic diversity baseline data to support genetic diversity assessments.

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 in keeping with the multiple-use management concept for the area. The Antelope and Triple B Complexes currently have a cumulative AML range of 899-1,678 wild horses which has been established through land use plans, FMUDs, and a Wild Horse Territory Management Plan. This population range was established at a level that would maintain healthy wild horses and rangelands over the long-term based on monitoring data collected over time as well as an in-depth analysis of habitat suitability.

Tables 1 and 2 show the current approximate HMA acreage, AML range, wild horse populations (as of May 2025), and wild horse use within the Antelope and Triple B Complexes. The Antelope and Triple B HMAs are managed by the Ely District's Bristlecone FO and the Antelope Valley, Goshute, Spruce-Pequop and Maverick Medicine HMAs are managed by the Elko District's Wells FO. The Cherry Springs WHT is in the Humboldt-Toiyabe National Forest and is managed in accordance with an Interagency Agreement between the BLM and USFS and is included for informational purposes and impact analysis.

Table 1. Antelope Complex Characteristics

Herd Management Area	Total Acres Private/Public Land	AML Range	Current Adult Population Estimate*	Estimated Wild Horse Use (AUMs)
Antelope	331,000	150-324	1,367	16,488
Antelope Valley	463, 540	155-259	904	10,908
Goshute	250,800	73-124	808	8,196
Spruce-Pequop	138,000	57-82	1,179	14,136
Total	1,183,340	427-789	4,258	51,372

Table 2. Triple B Complex Characteristics

Herd Management Area	Total Acres Private/Public Land	AML Range	Current Adult Population Estimate*	Estimated Wild Horse Use (AUMs)
Triple B	1,225,000	250-518	1,234	14,808
Maverick-Medicine	286,460	166-276	622	7,464
Antelope Valley West of U.S. Highway 93	97,070	16-27	24	288
Cherry Springs WHT	23,794	40-68	29	348
Total	1,632,324	472-889	1,909	22,908

*As of fall 2025. Current Adult Population Estimates do not include foals born in 2025.

The BLM conducted population census flights over the Antelope Complex in March 2024 and the Triple B Complex in February 2025 to help confirm wild horse numbers within the Complexes. Double-observer data from the February 2025 inventory flight of the Triple B Complex was analyzed, leading to the estimated 1,909 adult wild horses there at that time. Maps of the recent flight surveys can be found in Appendix I. Based on past herd growth rates and monitoring, the BLM assumes that annual herd-level population growth rates are approximately 20% per year.

Based upon all information available at this time, including the 2024 and 2025 population census flights, the BLM has determined that within the Antelope Complex there are approximately 3,831 or more excess adult wild horses above the low end of AML (Table 1), and in the Triple B Complex there are approximately 1,437 or more excess adult wild horses above low AML (Table 2). As a result of 20% population growth per year, the BLM expects that the total herd sizes including both foals and adults will grow to approximately 5,109 in the Antelope Complex, and approximately 2,290 in the Triple B complex by early fall 2025. All excess wild horses need to be removed to achieve the established AML, restore a Thriving Natural Ecological Balance (TNEB), and prevent degradation of rangeland resources. This assessment is based on factors including, but not limited to the following rationale:

- Antelope Complex estimated populations exceed the established AML range for the project area (Table 1).
- Triple B Complex estimated populations exceed the established AML range for the project area (Table 2).

- Excess wild horses are establishing populations outside of identified HMA boundaries.
- Moderate, heavy, and severe utilization is evident on key forage species within the Antelope and Triple B Complexes.
- Wild horses are contributing to not meeting Rangeland Health Standards throughout most of the Antelope and Triple B Complexes and in some cases are the sole contributor (See Appendix VIII).
- Use by wild horses has caused damage to the water developments at Rock, Tunnel, Sidehill, Sheep Camp, White Rock, Pot, Pony, Willow, Johnson, and Cherry Springs, and has caused water source damage at numerous other springs.
- The BLM was required to conduct emergency water trap gathers in 2017, 2018, 2019, 2020, and 2021 in the Antelope Complex and 2019, 2020, and 2024 in the Triple B Complex due to a lack of water.
- In 2023, the BLM conducted a gather and removed 3,077 excess wild horses from the Antelope Complex. AML was not achieved for the Antelope Complex.
- In 2024, the BLM conducted two gathers and removed 2,131 excess wild horses from the Triple B Complex. AML was not achieved for the Triple B Complex.
- The BLM gathered and removed 8,146 wild horses from the Antelope Complex and 6,700 wild horses from the Triple B Complex since the 2017 Decision.
- Monitoring and historical information indicate that future emergency removals would likely be necessary due to lack of water and/or forage if gathers are not conducted to reduce the wild horse population to AML.

1.2 Purpose and Need

The BLM's purpose is to adopt and implement a Herd Management Area Plan (HMAP) consistent with the authority provided in 43 Code of Federal Regulations (CFR) 4700, restore and maintain Thriving Natural Ecological Balance (TNEB) by managing wild horse populations within the established AML ranges for the HMAs, and to reduce wild horse population growth rates to extend the time between gather events.

The BLM's need is to prevent undue or unnecessary degradation of the public lands associated with excess wild horses, and to restore a thriving natural ecological balance and multiple-use relationship on public lands, consistent with the Federal Land Policy and Management Act (FLPMA) and the WFRHBA, as well as conform with 43 CFR 4710.3-1 and BLM policies including the BLM Wild Horse and Burro Handbook H-4700.

The Antelope Complex and Triple B Complex are managed as two separate Complexes. Both complexes are included in this document due to the similarities in short- and long-term management and monitoring objectives and the similarities in wild horse habitat. The only thing dividing the Complexes is the Highway 93 and Alternate Highway 93 right-of-way fences. The Antelope Complex includes the Antelope, Antelope Valley, Goshute, and Spruce-Pequop HMAs. The Triple B Complex includes the Triple B, Maverick-Medicine, the western portion of the Antelope Valley HMA and the Cherry Springs WHT.

1.3 Land Use Plan Conformance and Consistency with Other Authorities

The Proposed Action (Alternative A), and Alternatives B and C would be in conformance with the 2008 Ely District RMP, the 1985 Wells RMP, and the 1993 WRMPWHA.

<u>2008 Ely RMP:</u>

- **Goal:** "Maintain and manage healthy, self-sustaining wild horse herds inside herd management areas within appropriate management levels to ensure a thriving natural ecological balance while preserving a multiple-use relationship with other uses and resources."

- **Objective:** "To maintain wild horse herds at appropriate management levels within herd management areas where sufficient habitat resources exist to sustain healthy populations at those levels."

1985 Wells RMP:

- **Objective**: Improve and maintain a sufficient, quality and diversity of habitat and forage for livestock, wildlife and wild horses through natural regeneration and/or artificial methods.

1993 Wells RMP Wild Horse Amendment and Decision Record, approved August 1993 (US DOI 1993) (WRMPWHA).

- **Objective:** To manage wild horses within HMAs and maintain a thriving natural ecological balance consistent with other resource.

Humboldt National Forest Land and Resource Management Plan and Record of Decision dated August 1986

- **Goal # 20:** "Manage the Cherry Springs, Monte Cristo, and Quinn Wild Horse Territories in accordance with the Wild Horse and Burro Act and the approved territory plans."
- • **Standards and Guidelines:** "Manage wild free-roaming horses and burros to population levels compatible with the resource capabilities and needs."

Nevada and Northeastern California Greater Sage-grouse Approved Resource Management Plan Amendment dated September 2015

- **Management Decision (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)."
- **MD WHB 7**: Develop or amend herd management area plans (HMAPs) to incorporate GRSG habitat objectives (Table 2-2) and management considerations for all HMAs within GRSG habitat, with emphasis placed on SFA and PHMAs outside of SFA."

1.4 Relationship to Statutes, Regulations, or other Plans

The Federal Land Policy and Management Act of 1976 (FLPMA) requires that an action under consideration be in conformance with the applicable BLM land use plan(s), and be consistent with other federal, state, and local laws and policies to the maximum extent possible.

The Proposed Action would also be consistent with the WFRHBA, which mandates the Bureau to "*prevent the range from deterioration associated with overpopulation*", and "*remove excess horses in order to preserve and maintain a thriving natural ecological balance and multiple use relationships in that area."*

The WFRHBA at section 1333 (b)(1) states: "*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 for wild free-roaming horses and burros on these areas of public land; and determine whether appropriate managements should be achieved by the removal or destruction of excess animals, or other options (such as sterilization, or natural control on population levels)*."

The Proposed Action would be consistent with all applicable regulations at 43 CFR Part 4700:

- 43 CFR 4700.0-6 (a) Wild horses shall be managed as self-sustaining populations of healthy animals in balance with other uses and the productive capacity of their habitat.

- 43 CFR 4710.3 The authorized officer shall prepare a herd management area plan, which may cover one or more herd management areas.

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

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

- 43 CFR 4720.2-1 Upon written request from a private landowner……the Authorized Officer shall remove stray wild horses and burros from private lands as soon as practicable.

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

The Proposed Action would be consistent with all applicable regulations at 36 CFR Part 222:

- 36 CFR 222.60 (a) Authority. The Chief, Forest Service, shall protect, manage, and control wild free-roaming horses and burros on lands of the National Forest System and shall maintain vigilance for the welfare of wild free-roaming horses and burros that wander or migrate from the National Forest System. If these animals also use lands administered by the Bureau of Land Management as a part of their habitat, the Chief, Forest Service, shall cooperate to the fullest extent with the Department of the Interior through the Bureau of Land Management in administering the animals.

- 36 CFR 222.61 (a) (1) Administer wild free-roaming horses and burros and their progeny on the National Forest System in the areas where they now occur (wild horse and burro territory) to maintain a thriving ecological balance considering them an integral component of the multiple use resources, and regulating their population and accompanying need for forage and habitat in correlation with uses recognized under the Multiple-Use Sustained Yield Act of 1960 (70 Stat. 215; 16 U.S.C. 528-531)

- 36 CFR 222.64 (a) Prior to using helicopters in capture operations and/or using motor vehicles for the purpose of transporting captured animals, a public meeting will be held in the proximity of the territory where the capture operation is proposed. (b) Helicopters may be used in all phases of the administration of the Act including, but not limited to, inventory, observation, surveillance, and capture operations... (c) Fixed-wing aircraft may be used for inventory, observation, and surveillance purposes necessary in administering the Act… (d) Motor vehicles may be used in the administration of the Act except that such vehicles shall not be used for driving or chasing wild horses or burros in capture operations. Motor vehicles may also be used for the purpose of transporting captured animals…

- 36 CFR 222.66 Owners of land upon which wild free-roaming horses and burros have strayed from the National Forest System may request their removal by calling the nearest office of either the Forest Service or Federal Marshall.

- 36 CFR 222.69 (a) The Chief, Forest Service, shall, when he determines over-population of wild horses and burros exists and removal is required, take immediate necessary action to remove excess animals from that particular territory. Such action shall be taken until all excess animals have been removed so as to restore a thriving natural ecological balance to the range and protect the range from deterioration associated with over-population.

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

2.0 Description of Alternatives, Including Proposed Action

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

- **No Action Alternative.** Under the No Action Alternative, existing management would continue, and a gather to remove excess wild horses would not occur. There would be no active management to control population growth rates or the size of the wild horse population, or to bring the wild horse population to AML. A Herd Management Area Plan (HMAP) would not be implemented for the Antelope and Triple B Complexes.

- **Proposed Action (Alternative A).**
    - Implement HMAP with a management strategy which would include several population growth suppression methods.
    - Immediately gather and remove excess animals to reach low AML as expeditiously as possible through an initial gather, and if necessary, a follow-up gather or gathers, to achieve the population within AML range. Any necessary follow-up gathers to remove excess animals to achieve low AML would be conducted as promptly as appropriate to allow sufficient time for the animals to settle after a helicopter gather and to provide for a safe, efficient, and effective follow-up gather operation.
    - Apply fertility control methods (vaccines) to selected released mares.
    - Maintain a sex ratio adjustment of 60% male and 40% female.

- **Alternative B.** Alternative B would be the same as Alternative A but would release a small non-reproducing component of males (up to 181 geldings in the Antelope Complex and 209 in the Triple B Complex) that would bring the population to mid-AML.

- **Alternative C.** Under Alternative C, implement a HMAP with a management strategy to gather and remove excess animals to within the AML range without fertility control, sex ratio adjustments, or geldings.

2.2 Herd Management Area Plan

The HMAP would be a plan for the management of wild horses within the Antelope and Triple B Complexes. The HMAP is described in more detail in Appendix XIII, including management, monitoring, and implementation objectives. Potential future actions listed in the objectives of the HMAP would be reviewed by BLM prior to implementation to determine if additional NEPA documentation is required. While the BLM's plan would be to immediately remove all excess animals above low AML and include enough mare fertility control treatments to slow population growth, it is possible that a single gather would not achieve this because of limitations such as gather efficiency, logistics, space capacity for holding removed animals, or contractor availability. The result would be a need to conduct a follow-up gather or gathers to achieve low AML.

Table 3. Summary Comparison of the Impacts of Alternatives

Item	No Action	Alternative A (Proposed Action)	Alternative B	Alternative C
Population Management	AML for the Antelope Complex would remain at 427-789 and 472-889 for the Triple B Complex.	This would allow the herd to grow over a four-year period at an average rate of 20% per year to reach high range of the AML without need for additional gathers to remove excess wild horses in the interim unless population growth suppression methods are utilized within the complex. The Antelope Complex would have an AML range of 427-789 and the Triple B Complex would have an AML range of 472-889 wild horses. Excess wild horses would be removed to the low range of AML upon determination that excess animals are present. Once high-end of AML is reached follow-up gathers would occur to remove excess wild horses back down to low end of AML.	Same as Alternative A. Would include a portion of the population to be managed as geldings.	No population growth suppression methods would be utilized. Complexes would be gathered once wild horses exceed High end of AML and an excess determination has been made.
Future Adjustments to AML	Range evaluations would likely trend in a negative condition as populations increase. Without being able to achieve and maintain AML to evaluate if AML needs to be adjusted.	AML would be evaluated, as needed, following an in-depth analysis of resource conditions including actual use, utilization, available forage and water, range conditions, trend, and precipitation.		
Population Control Methods	Continue existing management, a gather to remove excess wild horses would not occur. There would be no active management to control population growth rates, the size of the wild horse population or to bring the wild horse population to AML.	Future gathers to remove excess wild horses would be implemented under all alternatives as outlined below.		
		Additional population growth suppression methods would be utilized, adjusting sex ratio in favor of males, implementing fertility control methods (vaccines).	Same as Alternative A. Include managing a portion of the Complexes as a non- breeding population of geldings.	No population growth suppression would be utilized but area would be gathered once High-end of AML is reached and excess animals would be removed to achieve low-end of AML.
Size of Non-Breeding Population	No Geldings	No Geldings	Up to 181 wild horses would be managed as geldings in the Antelope Complex and 209	No Geldings

Item	No Action	Alternative A (Proposed Action)	Alternative B	Alternative C
			in the Triple B Complex that would bring the population to mid-AML.	
Desired Sex Ratio (immediately following gathers)	50/50 Male/Female	60/40 Male/Female	Same as Alternative A	No sex ratio adjustments
Total # Wild Horses Remain Following Gathers	N/A. No gathers; herds exceed AML	427 for the Antelope Complex 472 for the Triple B Complex (low range AML)	427 for the Antelope Complex 472 for the Triple B Complex (Low Range AML)	427 for the Antelope Complex 472 for the Triple B Complex (Low Range AML)
Selective Removal Criteria	No correction for potential future genetic loss would be implemented under this alternative.	Selective Removals would only be implemented once the HMA/WHT or Complex is within Appropriate Management Levels. Selection would be focused on returning animals with good conformation or size. See Appendix XIII.		Gate Cut Removal only (All horses captured would be removed to achieve low AML)
Genetic Diversity	The objective under all alternatives is to maintain genetic diversity within the herd (avoid inbreeding depression, i.e. maintain observed heterozygosity at 0.66 [+ or – 10%])			
	No correction for potential future genetic loss would be implemented under this alternative.	Under these alternatives, if future genetic diversity sampling indicates a loss of 10% heterozygosity per generation or a level of observed heterozygosity below 0.66 for the standard DNA markers currently used in analyses, 3-4 mares from similar HMAs would be introduced.		
Rangeland Health	Utilization by all herbivores is limited to 50% of current year's production for key grasses and 45% for key shrubs and forbs. HMAs managed within the Elko District (Maverick-Medicine, Spruce-Pequop, Antelope Valley, Goshute) Utilization objective for wild horses grazing on winter use areas, prior to livestock entry which occurs between Nov 1 and Dec 31 had been established at an average of 10% of current year's growth as per the WRMPWHA.			
Riparian Health	Maintain existing water developments until they outlive their useful life then remove them and readjust AML based on available water.	Existing water developments would be periodically maintained, and new water developments could be constructed as identified and needed. BLM would first need to file an application with the state to appropriate water from the affected source(s) and would follow all laws and BLM policy.		

2.3 No Action Alternative

Although the No Action Alternative does not comply with the WFRHBA and does not meet the purpose and need for the action in this EA, it is included as a basis for comparison with the Proposed Action and alternatives.

Under the No Action Alternative, a gather to remove excess wild horses would not occur. A Herd Management Area Plan would not be implemented for the Antelope Complex or Triple B Complex. There would be no active management to control the size of the wild horse population or to bring the wild horse population to AML. The current wild horse population would continue to increase at a rate of approximately 20% per year. Within five years, the wild horse population could exceed 10,600 in the Antelope Complex and 4,400 in the Triple B Complex. Wild horses residing outside the HMAs would remain in areas not designated for management of wild horses and population numbers would continue to increase. The presence of increasing numbers of excess wild horses will continue to deteriorate rangelands within the Complexes, public safety concerns will increase along heavily traveled roads as well as private property issues, and an increase in emergency actions will be necessary to address the overpopulations of wild horses and limited water/forage resources.

2.4 Alternative A: Proposed Action Alternative

2.4.1 Population Management

The Proposed Action (Alternative A) would implement a management strategy which would incorporate a number of population growth suppression methods. Wild horses within the Antelope Complex will be managed within the AML range of 427-789 and wild horses within the Triple B Complex will be managed within the AML range of 472-889 (see Tables 4 and 5 below). The BLM would immediately gather and remove excess wild horses both within and outside the Complexes, which are currently estimated at 3,469 in the Antelope Complex and 1,020 in the Triple B Complex. To administer population control measures, the BLM will gather and release horses over a period of multiple years from the initial gather. This would allow BLM to achieve management goals and objectives of attaining a herd size that is at the low range of AML, reducing population growth rates, and achieving a thriving natural ecological balance on the range as identified within the WFRHBA.

Table 4. Antelope Complex AML under Alternative A

Herd Management Area	Total Acres Private/Public land	Appropriate Management Level (AML)
Antelope	331,000	150-324
Antelope Valley	463, 540	155-259
Goshute	250,800	73-124
Spruce-Pequop	138,000	57-82
Total	1,183,340	427-789

Table 5 Triple B Complex AML under Alternative A

Herd Management Area	Total Acres Private/Public land	Appropriate Management Level (AML)
Triple B	1,225,000	250-518
Maverick-Medicine	286,460	166-276
Antelope Valley West of U.S. Highway 93	97,070	16-27

Herd Management Area	Total Acres Private/Public land	Appropriate Management Level (AML)
Cherry Springs WHT	23,794	40-68
Total	1,632,324	472-889

It is expected that gather efficiencies and holding space during the initial gather may not allow for the removal of sufficient excess animals during the initial gather to reach low AML. Based on BLM's experience over the past few decades, there are a number of logistical and operational factors that can affect BLM's ability to achieve low AML with a single gather, including (but not limited to): gather efficiency is typically less than 80%, which reduces the likelihood that all excess animals can be removed in a single operation when the population significantly exceeds AML; the likely population undercount can result in additional excess wild horses being identified in a follow-up inventory even if the targeted numbers of estimated excess wild horses have been removed; the wild horses become more challenging to catch as the helicopter gather operation progresses and they learn to evade the helicopter; weather conditions may impede achieving the targeted removal numbers; and/or limited availability of contractors with the expertise needed to gather animals safely can impact the ability to continue with a gather until all excess animal have been removed. For this reason, if low AML cannot be achieved through a single initial gather, a follow-up gather may be necessary to achieve low AML. The BLM would return to the Complexes to remove the remaining excess horses in follow-up gathers as necessary. Follow-up gathers would be scheduled as expeditiously as feasible, considering all factors including logistics, contractor availability, space capacity at holding facilities, and funding.

In both initial and follow-up gathers, BLM would aim to remove excess wild horses necessary to achieve the low range of AML, as well as to gather a sufficient number of wild horses to implement the population growth suppression component of the Proposed Action, which includes fertility control vaccines (PZP vaccines and GonaCon-Equine vaccine) and sex ratio adjustment (to a 60% male: 40% female ratio) for wild horses remaining in the Complexes. Removal of excess wild horses would be prioritized as follows: from areas where public health and safety issues have been identified; private land and non-HMA areas where resource degradation/deficiency has been identified; within HMAs from areas where resource degradation or habitat issues are most pressing; and where needed to reach low AML. Selective removal procedures would prioritize removal of younger excess wild horses within the Complexes to keep the population from exceeding the high range of AML so that degraded range resources have sufficient opportunity for recovery, and allow older, less adoptable wild horses, to be released back to the Complexes.

BLM could begin implementing the fertility control components (PZP and GonaCon vaccines) of this alternative as part of the initial gather and continue with increasing use of fertility controls in the follow-up gathers as the excess population is removed from the range. While in the temporary holding corral, horses would be identified for removal or release based on age, gender, and/or other characteristics. BLM may also apply fertility control treatments outside of removal operations, either through gather and release or other methods like darting. To help improve the efficacy and duration of fertility control vaccines, mares could be held for an additional 30 days and given a booster dose prior to release. It is expected that the number of fertile mares and stallions will always be a relatively large fraction (i.e., ~60% or more) of low AML, including those elusive animals that are never gathered, and their offspring, fertile stallions, and mares whose reversible fertility control vaccines have become ineffective over time.

Population inventories and routine resource/habitat monitoring would continue to be completed every two to three years to document current population levels, growth rates, and areas of continued resource concerns (horse concentrations, riparian impacts, over-utilization, etc.). Funding limitations and competing national priorities may impact the timing and ability to gather and conduct population control components of the Proposed Action.

The management objectives for the Complexes would be to manage the wild horse population within the AML range to achieve and maintain TNEB. BLM would achieve this through gathering and removing excess wild horses within the Complexes to the low AML and by applying population growth suppression measures to include:

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

The fertility control component of the Proposed Action would reduce the total number of wild horses that would otherwise be permanently removed from the range. Including some fertility control-treated mares in the herd at mid-AML herd size would allow for management of a total wild horse population within the Complexes that would be larger than low AML, while still reducing population growth rates compared to those of an untreated herd and achieving a thriving natural ecological balance. Primary gather methods would include helicopter drive, bait, and water trapping. It is expected that not all horses would be able to be captured, as gather efficiencies rarely exceed 80-85% especially in larger Complexes. As a result of that and associated herd growth between gathers, it is expected that a proportion of wild horses (15-20%+) in the project area would not be captured or treated.

As a part of periodic sampling to monitor wild horses' genetic diversity in the complex, hair follicle samples would be collected from a minimum of 25 horses in the released population from an HMA. Samples would be collected for analysis to assess the levels of observed heterozygosity, which is a measure of genetic diversity (BLM 2010), within the Complexes and may be analyzed to determine relatedness to established breeds and other wild horse herds. Mares identified for release would be aged, microchipped and freeze-marked for identification prior to being released to help identify the animals for future treatments/boosters and assess the efficacy of fertility control treatments.

2.4.2. Population Growth Suppression Methods

The Proposed Action would include population growth suppression methods such as fertility control vaccines and sex ratio adjustment in the herd. In cases where a booster vaccine dose is advantageous, mares could be held for approximately 30 days and given a booster shot prior to release. During gather operations to remove excess wild horses, in separate gathers where horses will not be removed, or using other methods like darting, BLM would treat/ retreat mares with fertility control to help meet herd management objectives. Since release of the 2013 National Research Council (NRC) Report, the BLM has supported field trials of potential new fertility control vaccine methods that may be used in wild horse and burro management, but inclusion of any particular method for population management is not contingent on completion of any given research project. The use of any new fertility control method would conform to current best management practices as coordinated with the BLM National Wild Horse and Burro Program.

Mares that are selected for treatment would be treated with fertility control vaccine treatments (PZP vaccines [ZonaStat-H, PZP-22], GonaCon-Equine vaccine or most current formulation) to prevent pregnancy in the following year(s). In addition to the summaries below, detailed analysis on population growth suppression methods is discussed further in Appendix II, III, and XII.

2.4.2.1. Porcine Zona Pellucida (PZP)

PZP Vaccine

Immunocontraceptive Porcine Zona Pellucida (PZP) vaccines have been used on over 75 areas managed for wild horses and burros by the National Park Service, US Forest Service, and the Bureau of Land

Management and its use is appropriate for free-ranging wild horse and burro herds. Taking into consideration available literature on the subject, the National Research Council concluded in their 2013 report that PZP vaccine was one of the preferred available methods for contraception in wild horses and burros (NRC 2013). PZP vaccine use can reduce or eliminate the need for gathers and removals (Turner et al. 1997). PZP vaccines meet most of the criteria that the National Research Council (2013) used to identify promising fertility control methods, in terms of delivery method, availability, efficacy, and side effects. It has been used extensively in wild horses (NRC 2013), and in wild and feral burros (Turner et al. 1996, French et al. 2020, Kahler and Boyles-Griffin 2022). PZP vaccine can be relatively inexpensive, meets BLM requirements for safety to mares and the environment, and is commercially produced as ZonaStat-H, an EPA-registered product (EPA 2012, SCC 2015), or as PZP-22, which is a formulation of PZP in polymer pellets that can lead to a longer immune response (Turner et al. 2002, Rutberg et al. 2017, Carey et al. 2019). Its categorization as a pesticide is consistent with regulatory framework for controlling overpopulated vertebrate animals, and in no way is meant to convey that the vaccine is lethal; the intended effect of the vaccine is as a contraceptive. It can be remotely administered (dart-delivered) in the field, but only where mares are relatively approachable.

Under the Proposed Action Alternative, mares being treated for the first time would receive a liquid primer dose of ZonaStat-H vaccine, either with or without PZP-22 pellets. BLM would return to the HMA as needed to re-apply PZP-22 and/or ZonaStat-H and initiate new treatments to maintain contraceptive effectiveness to help reduce population growth rates. Application methods could be by hand in a working chute during gathers, or through field darting if mares in some portions of the Complex prove to be approachable. Both forms of PZP can safely be reapplied as necessary to reduce the population growth rate. Even with repeated booster treatments of PZP, it is expected that most, if not all, mares would return to fertility, and not all mares would be treated or receive boosters within the Complex due to the sheer numbers of the population, the large size of the Complex, and logistics of wild horse gathers. Once the population is at AML and population growth seems to be stabilized, BLM could use population planning software (PopEquus, USGS Fort Collins Science Centre, https://rconnect.usgs.gov/popequus/) to determine the required ongoing frequency of re-treating mares with PZP or other fertility control methods.

2.4.2.2. Gonadotropin Releasing Hormone (GnRH) Vaccine (GonaCon)

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, 2025). Its use is appropriate for free-ranging wild horse herds. Taking into consideration available literature on the subject, the National Research Council concluded in their 2013 report that GonaCon-B (which is produced under the trade name GonaCon-Equine, for use in feral horses and burros) was one of the most preferable available methods for contraception in wild horses and burros (NRC 2013). GonaCon-Equine has been used on feral horses in Theodore Roosevelt National Park (Baker et al. 2023) and on a growing number of BLM-managed wild horse herd management areas. GonaCon-Equine can be remotely administered in the field in cases where mares are relatively approachable via dart (McCann et al. 2017, Baker et al. 2023). Use of remotely delivered (dart-delivered) vaccine is generally limited to populations where individual animals can be accurately identified and repeatedly approached within 50 meters or less (BLM 2010).

As with other contraceptives applied to wild horses, the long-term goal of GonaCon-Equine use is to reduce or eliminate the need for gathers and removals (NRC 2013). GonaCon-Equine vaccine is an EPA-approved pesticide (EPA 2009a, 2025) that is relatively inexpensive, meets BLM requirements for safety to mares and the environment, and is produced in a USDA-APHIS laboratory. Like with PZP vaccine, its categorization as a pesticide is consistent with regulatory framework for controlling overpopulated vertebrate animals, and in no way is meant to convey that the vaccine is lethal; the intended effect of the vaccine is as a contraceptive. GonaCon is produced as a pharmaceutical-grade vaccine, including aseptic manufacturing technique to deliver a sterile vaccine product (Miller et al. 2013). If stored at 4° C (39.2° F), 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 2025) 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. 2022).

Under the Proposed Action, the BLM would return to the Complexes as needed to re-apply GonaCon-Equine and initiate new treatments to maintain contraceptive effectiveness in controlling population growth rates. Booster dose effects may lead to increased effectiveness of contraception (EPA 2025), which is generally the intent. GonaCon-Equine can safely be reapplied as necessary to control the population growth rate. Even with one booster treatment of GonaCon-Equine, it is expected that most, if not all, mares would return to fertility at some point, as a study of boostered mares shows a gradual return to fertility over time (Baker et al. 2023), although the exact average duration of effect per booster dose has not yet been quantified. Once the herd size in the project area is at AML and population growth seems to be stabilized, BLM would make a determination for the required frequency of new mare treatments and mare re-treatments with GonaCon or other fertility control methods, such as with the PopEquus modeling software, to maintain the number of horses within AML.

2.4.2.3 Sex Ratio Adjustment

Sex ratio adjustment, leading to a reduced fraction of mares in the herd, can be considered a form of contraceptive management, insofar as it can reduce the realized per-capita growth rate in a herd. By reducing the proportion of breeding females in a population (as a fraction of the total number of animals present), the technique leads to fewer foals being born, relative to the total herd size. Sex ratio is typically adjusted in such a way that no more than 60 percent of the horses are male. In the absence of other fertility control treatments, this 60:40 sex ratio alone can temporarily reduce population growth rates from approximately 20% to approximately 15% (Bartholow 2004). While such a decrease in growth rate may not appear to be large or long-lasting, the net result can be that fewer foals are born, at least for a few years – this can extend the time between gathers, and reduce impacts on-range, and costs off-range.

2.5 Alternative B

Alternative B is similar to Alternative A except that it includes a gelding component. This alternative would include selective removal of excess wild horses to low end AML, population growth control using mare fertility control treatments (PZP vaccines, GonaCon-Equine or most current vaccine formulation), gelding and sex ratio adjustments. In addition to bringing the wild horse population to low AML, up to 181 gelded horses in the Antelope Complex and 209 in the Triple B Complex would bring the population to mid-AML – that would otherwise be excess animals permanently removed from the range and sent to off-range corrals for adoption/sales or off-range pastures (ORPs) – may be returned to the range and managed as a non-breeding population of geldings, so long as the geldings do not result in the population exceeding mid-range AML.

2.5.1. Gelding

In order to reduce the total number of excess wild horses that would otherwise be permanently removed from the Complex, a portion of the male population would be managed as geldings. The procedures to be followed for gelding of stallions are detailed in the Gelding Standard Operating Procedures (SOPs) in Appendix III.

Gelding Procedure
BLM routinely gelds all excess male horses that are captured and removed from the range prior to their adoption, sale, or shipment to ORPs. The gelding procedure for excess wild horses removed from the range would be conducted at temporary (field) or off-range corrals by licensed veterinarians and follow industry standards. Under Alternative B, in addition to returning the population of wild horses to low AML, up to 181 gelded horses in the Antelope Complex and 209 in the Triple B Complex could be returned to resume their free-roaming behaviors on the public range instead of being permanently removed from the Complexes, which could bring the population to mid-AML. Geldings have been released on BLM lands as a part of herd management in many areas, including the Barren Valley complex in Oregon (BLM 2011), the Challis HMA in Idaho (BLM 2012), and the Conger HMA in Utah (BLM 2016, King et al. 2022). By including some geldings in the population and having a slightly skewed sex ratio with more males than females overall, the anticipated result would be a reduction in per-capita population growth rates while allowing for management of a larger total wild horse population on the range. Stallions that would otherwise be permanently removed as excess wild horses would be selected for gelding and release. No animals which appear to be distressed, injured, or in poor health or condition would be selected for gelding. Stallions would not be gelded within 72 hours of capture. The surgery would be performed at a BLM-managed holding center by a veterinarian using general anesthesia and appropriate surgical techniques (see Gelding SOPs in Appendix III).

The animal is sedated then placed under general anesthesia. Ropes are placed on one or more limbs to help hold the animal in position and the anesthetized animals are placed in either lateral or dorsal recumbency. The surgical site is scrubbed and prepped aseptically. The surgeon would wear sterile gloves. The scrotum is incised over each testicle, and the testicles are removed using a surgical tool to control bleeding. The incision is left open to drain. Each animal would be given a Tetanus shot, antibiotics, and an analgesic.

Any males that have inguinal or scrotal hernias would be removed from the population, sent to a BLM prep corral facility and be treated surgically as indicated if possible or euthanized if they have a poor prognosis for recovery according to BLM policy (WO PIM 2021-007). Horses with only one descended testicle may be removed from the population and managed at a BLM prep corral facility according to BLM policy or anesthetized with the intent to locate the undescended testicle for castration. If an undescended testicle cannot be located, the animal may be recovered and removed from the population if no surgical exploration has started. Once surgical exploration has started those that cannot be completely castrated would be euthanized prior to recovering them from anesthesia according to BLM policy. All animals would be rechecked by a veterinarian the day following surgery. Those that have excessive swelling, are reluctant to move, or show signs of any other complications would be held in captivity and treated accordingly as they normally would in a BLM facility. Once released to the wild, no further veterinary interventions are possible.

Selected stallions would be shipped to an off-range corral, gelded, and returned to the range within 30 days. The extent practicable, gelded animals could be monitored periodically for complications for approximately 7-10 days following release. This monitoring may be completed either through aerial recon if available, or field observations from major roads and trails. The goal of this monitoring is to detect complications if they are occurring and determine if the horses are freely moving about the Complex. All adults would have been freeze-marked at the first gather to facilitate posttreatment and routine field monitoring. Other periodic observations of the long-term outcomes of gelding could be recorded during routine resource monitoring work. Such observations could include but not be limited to band size, social interactions with other geldings and harem bands, distribution within their habitat, forage utilization, and activities around key water sources. Periodic population inventories and future gather statistics may contribute to BLM's ongoing considerations about managing a portion of the herd as non-breeding animals, as an effective approach to slowing the annual population growth rate by replacing breeding mares with sterilized animals, when used in conjunction with other population control techniques. Management of a gelding population would allow for management at mid-AML, instead of gathering and removing excess animals to low AML.

By itself, it is unlikely that gelding would allow the BLM to achieve its horse population management objectives since a single fertile stallion is capable of impregnating multiple mares, and stallions other than the dominant harem stallion may also breed with some mares. Adequate reduction of female horse fertility rates would be expected to result only if a large proportion of male horses in the population are sterile, because of their social behavior (Garrott and Siniff 1992). Therefore, to be fully effective, use of gelding (alone) to control population growth requires that either nearly the entire male population be gathered and treated (which is not practical and is not being considered here) or that some percentage of the female wild horses in the population be gathered and treated with fertility control. If the mare treatment is not of a permanent nature (e.g., application of PZP vaccine or GonaCon-Equine vaccine) the mares may need to be gathered and retreated on a periodic basis.

2.6 Alternative C

This alternative would implement an HMAP with a management strategy to gather and remove excess animals to attain a population within the AML range without fertility control, sex ratio adjustments, or geldings.

2.7 Management Actions Common to Alternatives A, B, and C

The primary gather techniques would be the helicopter-drive and water/bait trapping. The use of roping from horseback could also be used when necessary. Multiple, temporary gather sites (traps) would be used to gather wild horses both from within and outside the Complex. In addition to public lands, private property may be utilized for gather sites and temporary holding facilities (with the landowner's permission) if necessary, to ensure accessibility and/or based on prior disturbance. Use of private land would be subject to Standard Operating Procedures (SOPs) (Appendix IV) and to the written approval/authorization of the landowner.

Any trapping activities would be scheduled in locations and during time periods that would be most effective to gather a sufficient number of animals to achieve management goals for the areas being gathered. The most efficient gather technique would be chosen as determined by the gather needs of the specific area.

Temporary trap and holding sites would be no larger than 0.5 acres. Temporary holding sites could be in place for up to 90 days depending on length of gather. Bait or water trapping sites could remain in place up to one year. The exact location of the trap sites and holding sites are determined by the contractor in coordination with the BLM, based on site-specific factors, and may not be determined until immediately prior to the gather because the location of the animals on the landscape is variable and unpredictable.

Trap and holding sites are often located in previously disturbed areas, but if a new site needs to be used, the BLM will conduct a cultural inventory prior to using such a site. 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 on Greater sage-grouse leks, known populations of sensitive species, in riparian areas, in cultural resource sites, sacred sites, paleontological sites. Trap locations will be located outside of all Wilderness and Wilderness Study Area boundaries except for the temporary trap located at the Shafter Well location within the Blue Bell WSA. All gather sites, holding facilities, and camping areas on public lands would be recorded with Global Positioning System equipment, given to the BLM Elko and Ely District Invasive, Non-native Weed Coordinators, and then assigned for monitoring and any necessary treatment during the next several years for invasive, non-native weeds. All gather and handling activities (including gather site selections) would be conducted in accordance with SOPs in Appendix VI.

Activities in listed species habitat would be subject to Section 7 consultation under the Endangered Species Act with the level of consultation to be determined based upon the project site-specific proposed action. BLM would complete consultation prior to implementation of any specific action which may have an effect on a listed species.

Wildlife Stipulations (Common to all Alternatives)

- If gather operations were to be conducted during the migratory bird breeding season (March 1 – July 31) a nest clearance survey would be conducted by BLM Biologist at trap, corral, and staging areas.
- Trap sites and corrals would not be located in active pygmy rabbit habitat or other sensitive habitat.
- Greater sage-grouse Required Design Features that are identified in Appendix X would be applied in Greater sage-grouse habitat.
- Prior to gathers, BLM would coordinate with NDOW regarding locations of staging areas to address Greater sage-grouse concerns. The following timing restrictions would be adhered to the best of BLM's abilities while not impeding gather operations:
    - Helicopter and water trapping gather would not occur during the lek timing restriction of March 1 – May 15 to protect breeding Greater sage-grouse.
    - Helicopter gathers would not occur during the nesting timing restriction of April 1 – June 30 within 4 miles of an active or pending lek.
    - Water trapping operations would not occur during nesting timing restriction April 1 – June 30 within 1 mile of an active or pending lek.
    - Water trapping operations would not occur at springs and seeps during brood-rearing timing restriction of May 1 – September 15 without a timing waiver.

2.7.1. Helicopter Drive Trapping

The BLM would utilize an in-house crew or a contractor in cooperation with the BLM to perform the gather activities. The contractor would be required to conduct all helicopter operations in a safe manner and in compliance with Federal Aviation Administration (FAA) regulations including 14 CFR § 91.119. Helicopter landings would not be allowed in wilderness except in the case of an emergency. For safety purposes, any public observers must be located a minimum of 1,000 feet from the areas where the helicopter may be herding animals or flying over.

Helicopter-drive trapping may be needed to meet management objectives to capture the highest percentage of wild horses possible. The appropriate gather method would be determined by the BLM based on the location, accessibility of the animals, local terrain, vegetative cover, and available sources of water and forage. Roping from horseback could also be used when necessary. Based on wild horse watering locations in this area, it is estimated that multiple trap sites may be used during trapping activities.

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

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

The BLM may find it necessary to issue a temporary closure and restriction order to ensure that gather operations will be effective and to protect the safety of the contractors, employees, public and the wild horses during gather operations. Any such closures will comply with the public notification process outlined in the BLM's regulations at 43 C.F.R. § 8364.1. The BLM will limit any such closures to the appropriate area needed to conduct gather operations and may move the closed/restricted area from capture site to capture site to ensure access to public lands when operations are not occurring near the capture site or temporary holding corrals. Where possible, closed areas may be open to traffic when directed by a pilot car.

2.7.2. Bait/Water Trapping

Bait and/or water trapping would be used as appropriate to gather wild horses efficiently and effectively. Bait and water trapping may be utilized when wild horses are in an area where there is a limited resource (such as food or water). The use of bait and water trapping, though effective in specific areas and circumstances, is not timely, cost-effective, or practical as the primary or sole gather method for the Complexes. However, water or bait trapping could be used as a supplementary approach to achieve the desired goals of the BLM in portions of the Complexes. Bait and/or water trapping generally require a longer window of time for success than helicopter drive trapping. Although the trap would be set in a high probability area for capturing excess wild horses residing within the area and at the most effective time periods, time is required for the horses to acclimate to the trap and/or decide to access the water/bait.

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

Gathering excess horses using bait/water trapping could occur at any time of the year and traps would remain in place until the target numbers of animals are removed. As the proposed bait and/or water trapping in this area is a lower stress approach to gathering wild horses, such trapping can continue into the foaling season without harming the mares or foals. Due to the nature of the bait and water trap method, wild horses are reluctant to approach the trap site when there is too much activity. Only essential gather operations personnel would be at the trap site during gather operations and, there is generally no public observation allowed. The BLM may issue a closure and restriction order in accordance with 43 C.F.R. § 8364.1 to ensure that the gather is effective and to protect wild horse and public safety.

2.7.3. Gather-related Temporary Holding Facilities (Corrals)

Wild horses that are gathered would be transported from the gather sites to a temporary holding corral. At the temporary holding corral wild horses would be sorted into different pens. Mares would be identified for fertility control and treated at the corrals. The horses would be provided good quality hay and water. At the temporary holding facility, a veterinarian, when present, would provide recommendations to the BLM regarding care and treatment of recently captured wild horses. Any animals affected by a chronic or incurable disease, injury, lameness, or serious physical defect (such as severe tooth loss or wear, club foot, and other severe congenital abnormalities) would be humanely euthanized using methods acceptable to the American Veterinary Medical Association (AVMA).

Herd health and characteristics data would be collected as part of continued monitoring of the wild horse herds. Genetic diversity baseline data would be collected to monitor the genetic diversity of the wild horses within the combined project area. Additional samples may be collected to analyze ancestry.

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

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

All gathered wild horses would be removed and transported to Off-Range Corrals (ORC, formerly short-term holding facility) where they would be inspected by facility staff (and if needed by a contract veterinarian) to observe health conditions and ensure that the animals are being humanely cared for. Wild horses removed from the range would be transported to the receiving ORC 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 10 hours.

Upon arrival, recently captured wild horses are off-loaded by compartment and placed in holding pens where they are provided good quality hay and water. Most wild horses begin to eat and drink immediately and adjust rapidly to their new situation. At the ORC, a veterinarian provides recommendations to the BLM regarding care, treatment, and if necessary, euthanasia of the recently captured wild horses. Any animals affected by a chronic or incurable disease, injury, lameness, or serious physical defect (such as severe tooth loss or wear, club foot, and other severe congenital abnormalities) would be humanely euthanized using methods acceptable to the AVMA. Wild horses in very thin condition, or animals with injuries, are sorted and placed in hospital pens, fed separately, and/or treated for their injuries. Recently captured animals in very thin condition may have difficulty transitioning to feed. Some of these animals may be in such poor condition that it is unlikely they would have survived if left on the range. Similarly, some females may lose their pregnancies. Certain management techniques would be taken to help females make a quiet, low stress transition to captivity and domestic feed to minimize the risk of miscarriage or death.

After recently captured wild horses have transitioned to their new environment, they are prepared for adoption, sale, or transport to off-range pastures. Preparation involves freeze marking the animals with a unique identification number, vaccination against common diseases, castration, microchipping, and de-worming. At ORC facilities, a minimum of 700 square feet of space is provided per animal. Mortality at ORCs averages approximately 5% per year (GAO, 2008), and includes animals euthanized due to pre-existing conditions; animals in extremely poor condition; animals that are injured and would not recover; animals which are unable to transition to feed; and animals which are seriously injured or accidentally die during sorting, handling, or preparation. ORCs may be BLM-owned or contracted private facilities.

2.7.5. Adoption

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

2.7.6. Sale with Limitations

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

2.7.7. Off-Range Pastures

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

2.7.8. Euthanasia or Sale without Limitations

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

Old, sick, or lame horses unable to maintain an acceptable body condition (greater than or equal to a Henneke BCS of 3), or with serious physical defects, would be humanely euthanized either before gather activities begin or during the gather operations as well as within off-range corrals. Decisions to humanely euthanize animals in field situations would be made in conformance with BLM policy (Permanent Instruction Memorandum (PIM) 2021-007 or current edition). Conditions requiring humane euthanasia occur infrequently and are described in more detail in PIM 2021-007.

2.7.9. Public Viewing Opportunities

Opportunities for public observation of the gather activities on public lands would be provided, when and where feasible, consistent with WO IM No. 2013-058 or other current policy and the Visitation Protocol and Ground Rules for Helicopter WH&B Gathers within Nevada (Appendix V). As part of public viewing of the gather operations, BLM will establish observation locations that reduce safety risks to the public during helicopter gathers (e.g., from helicopter-related debris or from the rare helicopter crash landing, or from the potential path of gathered wild horses), to the wild horses (e.g., by ensuring observers would not be in the line of vision of wild horses being moved to the gather site), and to contractors and BLM employees who must remain focused on the gather operations and the health and well-being of the wild horses. As feasible, observation locations would be located near gather or holding sites, although safety, gather efficiency, terrain, and land status factor into how close observation locations will be. All observation locations would be subject to the same cultural resource requirements as gather and holding sites.

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

2.8. Alternatives Considered but Eliminated from further Consideration

The following alternatives to the helicopter drive and bait/water trapping method for the removal of wild horses to reach the established AML were considered but eliminated from detailed analysis for the reasons stated below.

2.8.1. Exclusively Field Darting Horses with ZonaStat-H (Native PZP) or GonaCon-Equine

This alternative was eliminated from further consideration as the sole method of applying fertility control vaccine due to the difficulties inherent in darting wild horses in the project area. Field darting of wild horses works in small areas with good access where animals are acclimated to the presence of people who come to watch and photograph them. The size of the Complexes is very large (2,815,664 acres) and many areas do not have access. The presence of water sources on both private and public lands inside and outside the Complexes would make it almost impossible to restrict wild horse access to be able to dart horses consistently. Wild horse behavior limits their approachability/accessibility, so that the number of mares expected to be treatable via darting would be insufficient to control growth. BLM would have difficulties keeping records of animals that have been treated due to common and similar colors and patterns. This formulation of PZP also requires a booster given every year following treatment to maintain the highest level of efficacy. Annual darting of wild horses in large areas can be very difficult to replicate and would be unreliable. For these reasons, this alternative was determined to not be an effective or feasible method by itself for applying population controls to wild horses from the Complexes. Darting is included as a potential tool for use under the Proposed Action in areas that may be deemed suitable in the future, and to be implemented in concert with the other methods detailed in the Proposed Action.

2.8.2. Control of Wild Horse Numbers by Fertility Control Treatment Only (No Removals)

An alternative to gather a significant portion of the existing population (95%) and implement fertility control treatments only, without removal of excess wild horses was modeled using a three-year gather/treatment interval over a 10-year period, in the *PopEquus* (1.0.2) software. Based on this modeling, this alternative would not result in attainment of the AML range for the Complexes. In the Antelope Complex the wild horse population would reach a projected population size of 6,974 using GonaCon-Equine or (13,106 using PZP-22), adding to the current wild horse overpopulation, albeit at a slower rate of growth than an approach with no fertility control. In the Triple B Complex the wild horse population would reach a projected population size of 2,989 using GonaCon-Equine or (5,885 using PZP-22, adding to the current wild horse overpopulation, albeit at a slower rate of growth than an approach with no fertility control. Over the 10-year period modeled for the Antelope Complex 20,064 wild horses would need to be gathered if GonaCon-Equine is used (or 26,933 if PZP-22 is used), to allow for injection of vaccines for population control. Over the 10-year period modeled for the Triple B Complex 9,437 wild horses would need to be gathered if GonaCon-Equine is used (or 12,571 if PZP-22 is used), to allow for injection of vaccines for population control. It is important to understand that in these scenarios, the same wild horse may be gathered multiple times during the 10-year period. See Appendix VI for population modeling of alternatives that did include removals.

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

2.8.3. Chemical Immobilization

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

2.8.4. Exclusive Use of Wrangler on Horseback Drive-trapping

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

2.8.5. Designate the HMAs to be Managed Principally for Wild Horse Herds Under 43 C.F.R. 4710.3-2.

The HMAs are designated in the Land Use Planning process for the long-term management of wild horses in conjunction with other multiple uses. The (BLM) Bristlecone and Wells Field Offices do not administer any designated Wild Horse or Burro Ranges, which under 43 C.F.R. 4710.3-2 are "to be managed principally, but not necessarily exclusively, for wild horse or burro herds." There are currently only four designated Wild Horse or Burro Ranges on public lands and authority to designate such ranges resides with the Secretary of Interior or Nevada State Director. This alternative would involve no immediate removal of wild horses and would instead address excess wild horse numbers through removal or reduction of livestock within the HMAs. In essence, this alternative would exchange use by livestock for use by wild horses. Because this alternative would mean converting the HMAs to wild horse Ranges and modifying the existing multiple use relationships established through the land-use planning process, it would first require an amendment to the RMPs, which is outside the scope of this analysis This alternative was not brought forward for analysis because it is inconsistent with the 1985 Wells RMP, the 1993 WRMPWHA, the 2008 Ely RMP, and the WFRHBA which directs the Secretary to immediately remove excess wild horses where necessary to ensure a thriving natural ecological balance and multiple use relationship. This alternative is also inconsistent with the BLM's multiple use management mission under FLPMA. Changes to or the elimination of livestock grazing cannot be made through a wild horse gather decision. Furthermore, even with significantly reduced levels of livestock grazing within the gather area relative to the permitted levels authorized in the Ely and Wells RMPs, there is insufficient habitat for the current population of wild horses, as confirmed by monitoring data. As a result, this alternative was not analyzed in detail.

2.8.6. Raising the Appropriate Management Levels for Wild Horses

Increasing the AML is not consistent with current monitoring results or with the Ely and Wells RMPs. Monitoring and other historical data collected within the Complexes does not indicate that an increase in AMLs is warranted at this time. On the contrary, such monitoring data confirms the need to remove excess wild horses above the current AMLs to reverse downward trends, promote improvement of rangeland health and ensure safety and health of wild horses. This alternative was eliminated from further consideration because it is contrary to the WFRHBA which requires the BLM to manage the rangelands to prevent the range from deterioration associated with an overpopulation of wild horses. Raising the AML where there are known resource degradation issues associated with an overpopulation of wild horses does not meet the Purpose and Need to Restore a TNEB or meet Rangeland Health Standards.

2.8.7. Remove or Reduce Livestock Within the HMAs

This alternative would involve no removal of wild horses and would instead address excess wild horse numbers through removal or reduction of livestock within the HMAs. In essence, this alternative would simply exchange use by livestock for use by wild horses. This alternative was not brought forward for analysis because it is inconsistent with the Ely and Wells RMPs, and the WFRHBA which directs the Secretary to immediately remove excess wild horses.

Additionally, the proposal to reduce livestock would not meet the Purpose and Need for action identified in Section 1.2. Eliminating or reducing livestock grazing in order to shift forage use to wild horses would not be in conformance with the existing land use plans and is contrary to the BLM's multiple-use mission as outlined in FLPMA and would be inconsistent with the WFRHBA and PRIA. It was Congress' intent to manage wild horses and burros as one of the many uses of the public lands, not a single use. Therefore, the BLM is required to manage wild horses and burros in a manner designed to achieve a thriving natural ecological balance between wild horse and burro populations, wildlife, domestic livestock, vegetation, and other uses. Information about the Congress' intent is found in the Senate Conference Report (92-242) which accompanies the 1971 WFRHBA (Senate Bill 1116): "*The principal goal of this legislation is to provide for the protection of the animals from man and not the single use management of areas for the benefit of wild free-roaming horses and burros. It is the intent of the committee that the wild free-roaming horses and burros be specifically incorporated as a component of the multiple-use plans governing the use of the public lands.*"

Simply re-allocating livestock Animal Unit Months (AUMs) to increase the wild horse AMLs would not achieve a thriving natural ecological balance. Wild horses are unlike livestock which can be confined to specific pastures, limited to specific periods of use, and specific seasons-of-use to minimize impacts to vegetation during the critical growing season and to riparian zones during the summer months. Wild horses are present year-round and their impacts to rangeland resources cannot be controlled through the establishment of a grazing system, such as for livestock. 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.

Livestock grazing can only be reduced or eliminated through provisions identified within regulations at 43 CFR Part 4100 and must be consistent with multiple use allocations set forth in LUP/RMPs. Such changes to livestock grazing cannot be made through a wild horse gather decision and are only possible if BLM first revises the LUPs to allocate livestock forage to wild horses and to eliminate or reduce livestock grazing. Because this alternative is inconsistent with the Ely and Wells RMPs, it would first require an amendment to the RMP, which is outside the scope of this EA.

2.8.8. Wild Horse Numbers Controlled by Natural Means

This alternative was eliminated from further consideration because it is contrary to the WFRHBA which requires the BLM to prevent range deterioration associated with an overpopulation of wild horses. The alternative of using natural controls to achieve a desirable AML has not been shown to be feasible in the past (NRC 2013).

Survival rates for wild horses on western USA public lands are high (Ransom et al. 2016). None of the significant natural predators from native ranges of the wild equids in Europe, Asia, and Africa — wolves, brown bears, and African lions — exist on the wild horse ranges in the western United States (mountain lions are known to predate on horses, primarily foals, in a few herds, but predation contributes to biologically meaningful population limitation in only a handful of herds). In some cases, adult annual survival rates exceed 95%.

Many horse herds grow at sustained high rates of 15-25% per year and are not a self-regulating species (NRC 2013). The NAS report (NRC 2013) concluded that the primary way that equid populations self-limit is through increased competition for forage at higher densities, which results in smaller quantities of forage available per animal, poorer body condition, and decreased natality and survival. It also concluded that the effect of this would be impacts to resource and herd health that are contrary to BLM management objectives and statutory and regulatory mandates. This alternative would result in a steady increase in the wild horse populations which would continue to exceed the carrying capacity of the range resulting in a catastrophic mortality of wild horses in the Complexes, and irreparable damage to rangeland resources. While some members of the public have advocated "letting nature take its course", allowing horses to die of dehydration and starvation would be inhumane treatment and would be contrary to the WFRHBA, which mandates removal of excess wild horses. The damage to rangeland resources that results from excess numbers of wild horses is also contrary to the WFRHBA, which mandates the Bureau to "*protect the range from the deterioration associated with overpopulation*", "*remove excess animals from the range so as to achieve appropriate management levels*", and "*to preserve and maintain a thriving natural ecological balance and multiple-use relationship in that area*".

The BLM's regulations at 43 CFR § 4700.0-6 (a) state, "Wild horses shall be managed as self- sustaining populations of healthy animals in balance with other uses and the productive capacity of their habitat." As the vegetative and water resources are over utilized and degraded to the point of no recovery as a result of the wild horse overpopulation, wild horses would start showing signs of malnutrition and starvation. The weaker animals, generally the older animals, and the mares and foals, would be the first to be impacted. It is likely that a majority of these animals would die from starvation and dehydration which could lead to a catastrophic die off. The resultant population could be heavily skewed towards the stronger stallions which could contribute to social disruption in the Complexes. Competition between wildlife and wild horses for forage and water resources would be severe. Wild horses can be aggressive around water sources, and some wildlife may not be able to compete, which could lead to the death of individual animals. Wildlife habitat conditions would deteriorate as wild horse numbers above AML reduce herbaceous vegetative cover, damage springs and increase erosion, and could result in irreversible damage to the range. This degree of resource impact would likely lead to management of wild horses at a greatly reduced level if BLM is able to manage for wild horses at all on the Complexes in the future after a catastrophic die off and irreversible habitat damage. For these reasons, this alternative was eliminated from further consideration. This alternative would not meet the Purpose and Need for this EA which it is to remove excess wild horses from within and outside the Complexes and to reduce the wild horse population growth rates to manage wild horses within established AML ranges.

2.8.9. Gathering the Complexes to Upper Range of AML

Under this Alternative, a gather would be conducted to gather and remove enough wild horses to achieve the upper range of the AML (789 in the Antelope Complex and 889 in the Triple B Complex). A post-gather population size at the upper range of the AML would result in AML being exceeded following the next foaling season. This would be unacceptable for several reasons. The AML represents "that 'optimum number' of wild horses which results in a thriving natural ecological balance and avoids a deterioration of the range." *Animal Protection Institute*, 109 IBLA 112, 119 (1989). The Interior Board of Land Appeals has also held that "Proper range management dictates removal of horses before the herd size causes damage to the rangeland. Thus, the optimum number of horses is somewhere below the number that would cause resource damage" *Animal Protection Institute*, 118 IBLA 63, 75 (1991).

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

Additionally, gathering only to the upper range of AML, would result in the need to follow up with another gather by the next year and could result in continued overutilization of vegetation resources and damage to important wildlife habitats. Frequent gathers could increase the stress to wild horses, as individuals and as entire herds. Moreover, this alternative would not meet the Purpose and Need for this EA. For these reasons, this alternative was eliminated from further consideration.

3.0 Affected Environment/Environmental Effects

3.1 Identification of Issues

Internal scoping was conducted by an interdisciplinary (ID) team August l, 2024, that analyzed the potential consequences of the Proposed Action and alternatives. Potential impacts to the following resources/concerns were evaluated in accordance with criteria listed in the NEPA Handbook H-1790-1 (2008) page 41, to determine if detailed analysis was required. Consideration of some of these items is to ensure compliance with laws, statutes, or Executive Orders that impose certain requirements upon all Federal actions. Other items are relevant to the management of public lands in general, and to the Ely and Elko Districts in particular.

Table 6. summarizes which of the supplemental authorities of the human environment and other resources of concern within the project area are present, not present, or not affected by the Proposed Action.

Table 6. Resources of Concern

Resource/Concern	Issue(s) Analyzed? (Y/N)	Rationale for Dismissal from Detailed Analysis or Issue(s) Requiring Detailed Analysis
Air Quality	N	The affected area is not within an area of non-attainment or areas where total suspended particulates or other criteria pollutants exceed Nevada air quality standards. Any increased particulate matter (dust) resulting from the Proposed Action would be short term (temporary) and minimal. The proposed action or alternatives would not affect air quality in White Pine or Elko Counties, as it is a temporary action.
Areas of Critical Environmental Concern (ACEC)	N	There are no ACECs located within the proposed project area.
Cultural Resources	N	In accordance with the SOPs for Gather and Handling Activities in Appendix V (BLM/SHPO Protocol), gather facilities would likely be placed in previously disturbed areas. Should new, previously undisturbed gather sites or holding facility locations be required, appropriate Class III cultural resource inventories would be conducted to avoid placing gather facilities in areas with cultural resources and to ensure that measures are taken to avoid any cultural resource impacts.
Forest Health	N	Project has a negligible impact directly and indirectly to forest health. Detailed analysis not required.
Migratory Birds	Y	Effects to resource are analyzed in this EA.
Livestock Grazing	Y	Effects to resource are analyzed in this EA.
Native American Religious and other Concerns	N	No potential traditional religious or cultural sites of importance have been identified in the project according to the Ely District RMP Ethnographic Report. Tribal consultation has not identified any issues.
Wastes, Hazardous or Solid	N	No hazardous or solid wastes exist in the designated HMA boundaries, nor would any be introduced.
Water Quality, Drinking/Ground	N	The proposed action or alternatives would not affect drinking or groundwater quality. The project design would avoid surface water and riparian systems and no water wells would be affected.
Socioeconomics	N	Effects to resource are analyzed in this EA.
Floodplains	N	The project analysis area was not included on FEMA flood maps.

Resource/Concern	Issue(s) Analyzed? (Y/N)	Rationale for Dismissal from Detailed Analysis or Issue(s) Requiring Detailed Analysis
Farmlands, Prime and Unique	N	Resource not present.
Species Threatened, Endangered or Proposed for listing under the Endangered Species Act.	Y	Effects to resource are analyzed in this EA.
Wetlands/Riparian Zones	Y	Effects to resource are analyzed in this EA.
Non-native Invasive and Noxious Species	Y	Effects to resource are analyzed in this EA.
Wilderness/WSA	Y	Effects to resource are analyzed in this EA.
Fire / Fuels	Y	Effects to resource are analyzed in this EA.
Land Use Authorizations	N	The Proposed Action and Alternatives would not affect land use authorizations.
Lands with Wilderness Characteristics	N	Present but not affected
Recreation	N	Temporary impacts to dispersed recreation in the area would be negligible. Detailed analysis is not necessary.
Visual Resource Management	N	There will be no impacts to visual resources.
Human Health and Safety	N	Risks have been assessed to mitigate any safety hazards in the form of safety plans and risk management worksheets.
Wild and Scenic Rivers	N	Not Present.
Special Status Plant and Animal Species	Y	Effects to resource are analyzed in this EA.
Fish and Wildlife	Y	Effects to resource are analyzed in this EA.
Paleontology	N	Present but not affected
Wild Horses	Y	Effects to resource are analyzed in this EA.
Soils Resources	Y	Effects to resource are analyzed in this EA.
Water Resources (Water Rights)	N	The Proposed Action and Alternatives would not affect water resources or water rights. Project design would avoid surface water and riparian systems. Permitted or pending water uses would not be affected.
Mineral Resources	N	There would be no modifications to mineral resources through the Proposed Action.
Vegetation Resources	Y	Effects to resource are analyzed in this EA.

3.2. General Setting

The Antelope and Triple B Complexes are within the Great Basin physiographic region, one of the largest deserts in the world. The Great Basin is effectively cut off from the westerly flow of Pacific moisture. Orographic uplift of crossing air masses by the Sierra and the Cascades provides cooling and precipitates much of the moisture out. The result is a Dry Steppe cold climate classification for most of the Great Basin. The climate is typical of middle latitude, semiarid lands where evaporation potential exceeds precipitation throughout the year. Annual precipitation normally ranges from approximately five to seven inches on the valley bottoms to 16 to 18 inches on the mountain peaks. Most of this precipitation comes in the form of snow occurring primarily in the winter and spring with the summers being quite dry. Temperatures range from greater than 90 degrees Fahrenheit in the summer months to minus 15 degrees or colder in the mountains in the winter. The Complexes are characterized by long wide valleys and long narrow steep mountain peaks covered with heavy pinyon juniper woodlands. On many of the low hills and ridges that are scattered throughout the area, the soils are underlain by bedrock. Elevations within the Complexes range from approximately 5,000 feet to over 10,200 feet.

3.3. Wild Horses

Affected Environment

In July-August 2023 BLM conducted two wild horse gathers in the Antelope Complex. During the gathers 3,099 excess wild horses were removed.

In 2024, the BLM conducted two wild horse gathers in the Triple B Complex. An emergency gather in the Maverick-Medicine HMA was conducted in August-September due to lack of water, 109 horses were gathered and removed. In November-December 2024, 2,196 wild horses were captured. 2,131 excess wild horses were removed. 16 stallions were released, and 23 mares were treated with Gonacon-Equine vaccine and released back into the Triple B Complex.

BLM recognizes that when wild horse density is low relative to available resources, horses can have some positive ecological effects, but these positive effects do not outweigh degradation that can result when horse numbers and impacts are high relative to available natural resources (See Appendix XII). Rangeland resources have been and are currently being impacted within the Complexes due to the over-population of wild horses. Rangeland Health Standards have found wild horses are contributing factors for not meeting these Standards.

A key area is a relatively small portion of a unit selected as a point for monitoring change in vegetation or soil and the impacts of management (grazing). It is chosen because of its location, use, sensitivity to management and value. Where needed, an area may be selected for monitoring where a special management concern warrants additional attention. This kind of area is termed a critical management area or critical area. Critical areas often represent smaller parts of management units that are more important to managers.

<u>Antelope Complex</u>

The Antelope Complex is made up of the Antelope HMA (managed by the Ely District), Antelope Valley HMA, Goshute HMA, and Spruce-Pequop HMA (managed by the Elko District). These HMAs were designated through Land Use-Planning for long-term management of wild horses. The Appropriate Management Level (AML) for the Antelope HMA was reaffirmed through the Ely District RMP. AML for the Antelope Valley, Goshute HMA, and Spruce-Pequop were set through WRMPWHA and adjusted through Final Multiple Use Decisions (FMUDs) (see Table 1 for break out by HMAs). These areas are managed as a complex due to the wild horse interchange between HMAs. Fences do exist within the HMAs but do not restrict wild horse movement because the fences are open ended. The wild horses from these HMAs travel back and forth across the White Pine and Elko County line, mixing with the wild horses from the other HMAs within the Complex. The population within each HMA can fluctuate depending on the season due to these movements.

<u>Antelope HMA</u>

The 1983 Schell Management Framework Plan (MFP) originally designated the Antelope HMA for the long-term management of wild horses. The HMA is nearly identical in size and shape to the original Herd Areas representing where wild horses were located in 1971. Some fences exist within the HMA but do not restrict wild horse movement as they are open ended drift fences. Management of HMAs and wild horse populations within the Ely District is guided by the Ely District 2008 RMP as amended. The AML range for the Antelope HMA is 150-324 wild horses. The current estimated population is 1,374 wild horses. Water available for wild horses within the Antelope HMA is limited to a few perennial sources. Dipping Tank, Cottonwood, Cottonwood Spring Pipeline, Rock, Stockade, Flat, Becky, Water Canyon Springs, and Water Canyon Pipeline trough system.

Utilization data was collected for the Antelope HMA in February 2025, Appendix XIII. The key forage species monitored at that time include: Indian ricegrass (*Achnatherum hymenoides*), winterfat (*Krascheninnikovia lanata*), Squirreltail grass (*Elymus elymoides*) and Needleandthread grass (*Hesperostipa comata*). Use pattern mapping shows wild horse utilization as 5% slight (1-20%), 17% light (21- 40%), 42% moderate (41-60%), 18% heavy (61-80%), 11% severe (81-100%).
Current monitoring data collected using Range Utilization Key Forage Plant Method over the last three years has indicated Heavy and Severe utilization directly attributable to wild horses.

<u>Antelope Valley HMA</u>
The 1985 Wells RMP designated the Antelope Valley as a Herd Area and the 1993 WRMPWA designated the Antelope Valley as a Herd Management Area for the long-term management of wild horses.

In 2001, the Nevada Department of Transportation (NDOT) fenced the Highway 93 Right of Way (ROW) to improve public safety as numerous vehicle/horse collisions had occurred in previous years. This fence separates the western portion of the Antelope Valley HMA from the rest of the HMA. The wild horses in the western portion of the HMA move freely back and forth with wild horses from the Maverick/Medicine HMA.

In the spring of 2007, the NDOT fenced the Alternate Highway 93 right-of-way to ensure public safety. This new fence separates the eastern 1/3 of the Antelope Valley HMA from the rest of the HMA; however, wild horses have been observed moving from the northern portions (north of the highway right-of-way fence) of Antelope Valley HMA into the Goshute HMA and from the Goshute HMA areas not designated for wild horse management.

Water available for use by wild horses within the Antelope Valley HMA is very limited. In the eastern portion (south of U.S. Alternate Hwy 93) there is one spring on public lands and five ephemeral stock ponds. These ponds are filled with winter/spring runoff or water from summer monsoons late summer. As these ponds and reservoirs dry up wild horses leave the HMA in search of water on private lands.
In the central portion of the HMA (Dolly Varden Mountains) water is very limited. There are seven springs which do not provide sufficient water for wild horses. Many of the springs were historically developed prior to the establishment of the BLM. There are also numerous undeveloped springs, many of which discharge surface water which is also available for utilization. Spring development was usually accomplished by piping a portion of spring water a short distance from the source into troughs or by constructing an earthen dam for water collection.

Water is also available for use by wild horses when livestock operators pump stock-water wells (with privately held water rights) in northern and western part of the HMA, that is only for a few months each year when livestock are present. The wells in the northern part have not been pumped as the permittee has taken non-use since 2019.

Wild horse utilization data was collected for Antelope Valley in April 2024. Wild horse utilization ranged 0% slight (1-20%), 27% light (21-40%), 45% moderate (41-60%), 0% heavy (61-80%), 27% severe (81-100%).

<u>Goshute HMA</u>

The 1985 Wells RMP designated the Goshute as a Herd Area and the 1993 WRMPWA designated the Goshute as a Herd Management Area for the long-term management of wild horses.

Water availability is limited to small springs and seeps in the Goshute Range. Many springs within the range are developed to make surface water available for wild horses, and/or wildlife. Many of the springs were historically developed prior to the establishment of the BLM. There are also numerous undeveloped springs, many of which discharge surface water which is also available for utilization. Spring development was accomplished by piping a portion of spring water a short distance from the source into troughs or by constructing an earthen dam for water collection.

Water is also available for use by wild horses when livestock operators pump stock-water wells on the west side of the HMA (with privately held water rights) for a few months each year when livestock are present. The wells west and south of Morgan Canyon (in Goshute Valley) have not been pumped as the permittee has taken non-use since 2019.

Wild horse utilization data was collected for Goshute HMA in April 2024. Wild horse utilization ranged 20% slight (1-20%), 60% light (21-40%), 20% moderate (41-60%), 0% heavy (61-80%), 0% severe (81-100%).

Spruce-Pequop HMA

The 1985 Wells RMP designated the Spruce-Pequop as a Herd Area and the 1993 WRMPWA designated Spruce-Pequop as a Herd Management Area for the long-term management of wild horses.

Water availability is limited to small springs and seeps in the Spruce Mountain area and the south end of the Pequop Range. Many springs within the Spruce-Pequop HMA are developed to make surface water available for wild horses, livestock, and/or wildlife. Most of the springs were historically developed prior to the establishment of the BLM. There are numerous undeveloped springs, many of which discharge surface water which is also available for utilization. Spring development was accomplished by piping a portion of spring water a short distance from the source into troughs or by constructing an earthen dam for water collection.

Water is also available for use by wild horses when livestock the operator pumps stock-water wells (with privately held water rights) in the valley portions of the HMA, only for a few months each year when livestock are present. The wells in the HMA have not been pumped as the permittee has taken substantial non-use since 2021.

Wild horse utilization data was collected for Spruce-Pequop HMA in 2024. Wild horse utilization ranged 17% slight (1-20%), 0% light (21-40%), 33% moderate (41-60%), 17% heavy (61-80%), 33% severe (81-100%).

Within the Antelope Complex Monitoring data collected using the Range Utilization Key Forage Plant Method for the 2018-2024 years has shown severe (81%-99%) and heavy (61%-80%) use within portions of the Antelope Complex. Severity of these impacts has increased with increasing numbers of excess wild horses. Proper Functioning Condition (PFC) studies have been completed on several springs indicating that most are not at PFC and are exhibiting downward trends in functionality. Wild horses have been documented as a contributing factor for springs not meeting PFC.

In March 2024 monitoring measurements of upland utilization in winter use areas by wild horses in the Antelope Complex (Antelope Valley and Goshute HMAs) on the key shrub species winterfat ranged from 24 percent to 91 percent on previous (2023) year's growth. This represents a large portion of winter use areas where the WRMPWHA listed Resource Constraints on Utilization by all grazing animals will not exceed 55% on key forage species by March 31 on winter range. Utilization represents wild horse utilization only. Monitoring in the Antelope Valley and Goshute HMAs has shown that wild horse use alone routinely exceeds allowable utilization levels. This level of use impacts native perennial plants and allows for annuals such as halogeton (*Halogeton glomeratus*), cheatgrass (*Bromus tectorum*), prickly Russian thistle (*Salsola tragus*), and tall tumblemustard (*Sisymbrium altissimum*) to increase.

Pre-livestock utilization

The 1993 WRMPWHA found that the availability of forage in the winter use areas was a limiting factor for wild horses and it was important to provide forage to adequately carry wild horses and livestock through the winter use period without exceeding the utilization objectives of 55% on key grass species and shrub species (this has been since changed to 60% on key grass species and 50% on shrub species). The utilization objectives are in accordance with the Nevada Rangeland Monitoring Handbook.

The 1993 WRMPWHA established a utilization objective for wild horses grazing on winter use areas, prior to livestock entry which occurs between Nov 1 and Dec 31 had been established at an average of 10% of current years growth. Limiting wild horse use to 10% prior to entry of livestock should leave enough forage to carry wild horses and livestock through the winter use period and not exceed utilization objectives. This objective is for the Antelope Valley, Goshute, Spruce-Pequop, and Maverick-Medicine HMAs only.

In 2024 pre-livestock monitoring measurements of upland utilization in winter use areas by wild horses in the Antelope Complex (Antelope Valley, Goshute, and Spruce-Pequop HMAs on the key forage species ranged from 6% to 84% on current (2024) year's growth. The breakdown is as follows: 21% slight (1-10%), 15% slight (11-20%), 19% light (21-40%), 15% moderate (41-60%), 21% heavy (61-80%), 9% severe (81-100%).

Triple B Complex

As water supplies become depleted at other smaller water sources, wild horses tend to concentrate around these primary water sources causing negative effects to riparian resources. These water sources are monitored throughout the summer to make sure water is available for wild horses. Wild horses also rely on springs (Waterspout, Buck Walker, Rye Grass, Upper Cherry and Cherry springs) located on the Forest Service lands within and outside the Cherry Spring Wild Horse Territory. The remaining springs within the Triple B HMA might have water in early spring depending on precipitation but are not reliable perennial water sources.

Triple B HMA

The 1987 Egan RMP originally designated the Buck and Bald, Butte, and Cherry Creek HMAs for the long-term management of wild horses. The Buck and Bald, Butte and a portion of the Cherry Creek HMAs were later combined into the Triple B HMA in the 2008 Ely RMP. The decision to combine all, or portions of the three HMAs was due to the historical interchange of wild horses between the three HMAs and was also based on an in-depth analysis of habitat suitability and monitoring data as set forth in the Ely Proposed Resource Management Plan/Final Environmental Impact Statement. The 2007 EIS evaluated each herd management area for five essential habitat components and herd characteristics: forage, water, cover, space, and reproductive viability. Through this analysis and the subsequent Final RMP and Record of Decision (ROD), the boundaries of the Triple B HMA were established to ensure sufficient habitat for wild horses, and an AML of 250-518 wild horses was established to achieve a thriving natural ecological balance and rangeland health. Major water sources for wild horses include Pot, White Rock, Pony, and

Butte springs. Wild horse key forage utilization data was collected in April of 2024, the breakdown is as follows: 9% Slight, 22% Light, 28% Moderate, 28% Heavy, 13% Severe.

Maverick-Medicine HMA

The 1985 Wells RMP designated the Maverick-Medicine as a Herd Area and the 1993 WRMPWHA designated Maverick-Medicine as a Herd Management Area for the long-term management of wild horses. In addition, the 1993 WRMPWHA incorporated positions of the Cherry Creek HA into the Maverick-Medicine HMA.

Water availability is limited to the eastern one third of the HMA. In the eastern third of the HMA there are numerous springs and seeps and two creeks (Odgers and Taylor). West of Butte Valley (western two thirds of the HMA there are two water sources in the Maverick Range which do not provide sufficient water for wild horses. Many of the springs in the HMA were historically developed prior to the establishment of the BLM. Spring development was accomplished by piping a portion of spring water a short distance from the source into troughs or by constructing an earthen dam for water collection.

Water is also available for use by wild horses when livestock operators pump stock-water wells (with privately held water rights) in the northern part of the HMA, only for a few months each year when livestock are present.

Wild horse utilization data was collected for Maverick-Medicine HMA in April -May 2024. Wild horse utilization ranged 0% slight (1-20%), 0% light (21-40%), 0% moderate (41-60%), 50% heavy (61-80%), 50% severe (81-100%).

Pre-livestock Utilization

The 1993 WRMPWHA found that the availability of forage in the winter use areas was a limiting factor for wild horses and it was important to provide forage to adequately carry wild horses and livestock through the winter use period without exceeding the utilization objectives of 55% on key grass species and shrub species (this has been since changed to 60% on key grass species and 50% on shrub species). The utilization objectives are in accordance with the Nevada Rangeland Monitoring Handbook.

The 1993 WRMPWHA established a utilization objective for wild horses grazing on winter use areas, prior to livestock entry which occurs between Nov 1 and Dec 31 had been established at an average of 10% of current year's growth. Limiting wild horse use to 10% prior to entry of livestock should leave enough forage to carry wild horses and livestock through the winter use period and not exceed utilization objectives. This objective is for the Antelope Valley, Goshute, Spruce-Pequop, and Maverick-Medicine HMAs only. In 2024 pre-livestock monitoring measurements of upland utilization in winter use areas by wild horses in the Maverick-Medicine HMA on the key forage species ranged from 2% to 89% on current (2024) year's growth. The breakdown is as follows: 6% slight (1-10%), 0% slight (11-20%), 6% light (21-40%), 38% moderate (41-60%), 38% heavy (61-80%), 12% severe (81-100%).

Antelope and Triple B Complexes

Population inventory flights have been conducted in the Complexes every two to three years. These population inventory flights have provided information pertaining to population numbers, foaling rates, distribution, and herd health. A population inventory was conducted in the Antelope Complex in March 2024 utilizing simultaneous double-observer aerial surveys. An estimated population of 3,567wild horses were observed throughout the project area (not including the 2024 foal crop). As of March 1, 2025 the current population estimate is 4,258 which includes the 2024 foal crop. A population inventory flight was completed in the Triple B Complex in February 2025, utilizing simultaneous double-observer aerial surveys. An estimated 1,754 wild horses were observed throughout the project area. Double-observer data from the February 2025 inventory flight of the Triple B Complex was analyzed, leading to the estimated 1,909 adult wild horses there at that time. Due to wild horse movement within the Complexes and variable conditions when population inventory flights are performed, wild horse numbers can increase or decrease from year to year in each individual HMA.

Wild horse body condition scores (BCS) within the Complexes currently range from a score of 2-5 (Very thin/emaciated – Moderate) based on the Henneke Body Condition Chart and some animals at time of gather may have a lower BCS of 2-3 (Very thin – Thin).

Standards determination documents and rangeland health evaluations have identified wild horses as a contributing factor for non-achievement of some standards for rangeland health and management objectives. The achievement or non-achievement of standards for rangeland health are summarized in Appendix VIII. These standard determination documents, evaluations, and write-ups are available at the Bristlecone and Wells Field Offices.

Fertility Control

Antelope Complex

PZP-22 was administered to 132 mares in 1992, 176 in 1999, and 11 in 2011. GonaCon was administered to 15 mares in 2015, 2 in 2017, and 9 in 2019.

Triple B Complex

PZP-22 was administered to 28 mares in 2018, 50 mares in 2022 and 23 in 2024.

Population Modeling

Population modeling was completed for the proposed action and alternatives to analyze how the alternatives would affect the wild horse populations. Analysis included removal of excess wild horses with no fertility control, as compared to alternatives which consider removal of excess wild horses with fertility control and sex ratio adjustments. The No Action (no removal) Alternative was also modeled (Appendix VII). The primary objective of the modeling was to identify if any of the alternatives "crash" the population or cause extremely low population numbers or growth rates. The results of population modeling show that minimum population levels and growth rates would be within reasonable levels and adverse impacts to the population would not be likely under Alternatives A, B, and C. Graphic and tabular results are displayed in detail in Appendix VI.

Genetic Diversity

Analyses from Texas A&M University indicate that wild horses in both Complexes appear to descend from mixed ancestry of multiple breeds, to have relatively high levels of genetic diversity, and to be highly related to BLM-managed wild horses in a number of other herd management areas. Pairwise measures of genetic distance (Fst; Frankham et al. 2010) published in the 2013 report from the National Academies of Sciences also demonstrate that these herds (including samples from Antelope Valley, Goshute, and Spruce-Pequop HMAs) are highly related to a large number of other BLM-managed wild horse herds. Subsequent results by Cothran et al. (2024) confirm this. Herd size in these complexes have been at or above low AML for many years, and there is no indication that they would have gone through a genetic ‘bottleneck’ recently. The action alternatives call for periodic genetic diversity sampling in the course of wild horse gathers and, if periodic genetic diversity monitoring indicates it is warranted, introduction of a small number of wild horses from other herds.

Antelope Complex

During the 2015 Antelope Complex Gather, the BLM collected hair follicle samples for genetic analysis by E. Gus Cothran (Cothran 2016). In summarizing results from that sampling, the genetic variability of this herd was above average. Similarity levels showed no clear ancestral relationships to particular domestic breeds; similarity index values were virtually identical with Light racing and riding breeds, Oriental and Arabian breeds, old world Iberian breeds, new world Iberian breeds, and North American gaited breeds, but significantly lower with heavy draft breeds and true pony breeds. Cothran (2016) indicated that the herd is of mixed ancestry but with some evidence of Spanish heritage. The analysis found that observed heterozygosity and allelic diversity levels were higher than average for this herd and no immediate action was recommended. Cothran (2016) suggested the herd should be monitored due to the high proportion of rare alleles. Most recently, Dr. Cothran’s lab analyzed additional samples from the Antelope HMA (50 in 2021) and Antelope Valley HMA (50 in 2021 and 25 more in 2023; Cothran et al. 2025), Goshute HMA (25 in 2021 and 25 more in 2023; Cothran and Juras 2025a), and Spruce-Pequop HMA (25 in 2021; Cothran and Juras 2021, and 25 more in 2023; Cothran and Juras 2025b).

No unique variants were observed in any of the samples. Allelic diversity was above the average for feral horses for all recent sample sets (2015, 2021, and 2023). As can be expected when the number of alleles is high compared to the number of samples, many alleles occurred at frequencies below 5%.

Genetic Variation: Observed heterozygosity (Ho) was well above the feral mean of 0.710. These values for Ho were 0.707 (Antelope, 2015), 0.752 (Antelope 2021), 0.728 (Antelope Valley 2021), 0.790 (Antelope Valley 2023), 0.717 (Goshute 2021), 0.737 (Goshute 2023), 0.760 (Spruce Pequop 2021), and 0.783 (Spruce Pequop 2023). No unique variants were observed in any of the samples. Allelic diversity was above the average for feral horses for all for sample sets (2015, 2021, and 2023). As can be expected when the number of alleles is high compared to the number of samples, many alleles occurred at frequencies below 0.05.

Genetic Similarity: Reports from Dr. Cothran’s lab in 2025 showed that wild horses from any one HMA in the complex were most closely related to horses from other HMAs in the complex. This is not surprising considering that horses regularly move between these HMAs. Relative to domestic breeds, DNA from the wild horses sampled from the Antelope Complex indicated a herd with mixed origins with no clear indication of primary breed type. Genetic similarity results suggest a herd with mixed ancestry but some evidence of Spanish heritage, which is not unusual among wild horse herds.

Triple B Complex

Blood samples from wild horses from the Buck and Bald HMA and Butte HAs (currently the Triple B HMA) were analyzed in 2001 in terms of protein allozyme markers, but those results are not considered here because the microsatellite DNA marker panel used by the Cothran laboratory provides a more recent and more informative baseline measure of diversity in the Triple B Complex.

During the 2011 Maverick Medicine HMA Gather, the BLM collected hair follicle samples for genetic analysis (Cothran 2014). In summary, the genetic similarity to domestic breeds was about average.

Genetic Variation: Genetic variation levels noted in Cothran (2014) were high, with an observed heterozygosity of 0.787. Allelic diversity was higher than the average for feral herds. As can be expected when the number of alleles is high compared to the number of samples, many alleles occurred at frequencies below 0.05.

Genetic Similarity: In comparison to other feral herds, Cothran (2014) reported that the Maverick Medicine HMA herd was closest to the Saulsbury HMA on a dendrogram of Nevada herds, but a principal components analysis in Cothran et al. (2024) associated the herd near the center of a large cluster of other herds, indicating high similarity. Genetic similarity results suggested a herd with mixed ancestry and no clear indication of primary domestic breed type, but the highest mean genetic similarity was with Oriental and Arabian Breeds followed by the Old-World Iberian breeds. Overall similarity of the Maverick Medicine HMA herd to domestic breeds was about average for feral herds.

Environmental Effects

No Action Alternative – Under the No Action Alternative, no population growth suppression action or wild horse removals (gathers) would take place. A HMAP would not be implemented for the Antelope and Triple B Complexes. The population of the wild horses within the Complexes would continue to grow at the national average rate of increase seen in the majority of HMAs of 20 to 25% per year.

The wild horse population levels would not achieve AML or a thriving natural ecological balance, and excess concentrations of wild horses would continue to impact site specific areas throughout the Complexes at this time. The animals would not be subject to the individual direct or indirect impacts as a result of a trapping operation. Over the short-term, individual animals in the herd would be subject to increased stress and possible death as a result of increased competition for water and/or forage as the population continues to grow even further in excess of the land's capacity to meet the wild horses' habitat needs. The areas currently experiencing heavy to severe utilization by wild horses would increase over time and degradation could become irreversible in areas where ecological thresholds are passed.

This alternative would be expected to result in increasing damage to rangeland resources throughout the Complexes. Trampling and trailing damage by wild horses in/around riparian and impacts to rangeland resources would also be expected to increase, resulting in larger, more extensive areas of poor range condition, some of which might be unable to recover even after removal of excess horses. Competition for the available water and forage among wild horses, domestic livestock, and native wildlife would continue and further increase.

Wild horses are a long-lived species with survival rates estimated between 80 and 97% and may be the determinant of wild horse population increases (Garrott and Taylor 1990, Ransom et al. 2016). Predation and disease have not substantially regulated wild horse population levels within or outside the project area. Throughout the HMAs few predators exist to control wild horse populations. Some mountain lion predation likely occurs but does not appear to be substantial, as evidenced by the continued high growth rates in the herds. Coyotes are not prone to prey on wild horses unless the horses are young, or extremely weak. Other predators such as wolf or bear do not inhabit the area in high enough numbers to cause an effect on horse growth rates. Being a non-self-regulating species (NRC 2013), there would be a steady increase in wild horse numbers for the foreseeable future, which would continue to exceed the carrying capacity of the range. Individual wild horses would be at risk of death by starvation and lack of water as the population continues to grow annually. The wild horses would compete for the available water and forage resources, affecting mares and foals most severely. Social stress would increase. Fighting among stud horses would increase as well as injuries and death to all age classes of animals as the studs protect their position at scarce water sources. Significant loss of the wild horses in the Complexes due to starvation or lack of water would have obvious consequences to the long-term viability of the herd. Allowing wild horses to die of dehydration and starvation would be inhumane treatment and would be contrary to the WFRHBA, which mandates removal of excess wild horses.

The damage to rangeland resources that results from excess numbers of wild horses is also contrary to the WFRHBA, which mandates the Bureau to "protect the range from the deterioration associated with overpopulation", "remove excess animals from the range so as to achieve appropriate management levels", and "to preserve and maintain a thriving natural ecological balance and multiple-use relationship in that area." Once the vegetative and water resources are at critically low levels due to excessive utilization by an overpopulation 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 extremely skewed towards the stronger stallions which would lead to significant social disruption in the Complexes. By managing the public lands in this way, the vegetative and water resources would be impacted first and to the point that they have limited potential for recovery, as is already occurring in some areas hardest hit by the excess wild horses. As a result, the No Action Alternative, by delaying the removal of excess horses from specific areas that are most impacted at this time, would not ensure healthy rangelands that would allow for the management of a healthy wild horse population, and would not promote a thriving natural ecological balance.

As populations increase beyond the capacity of the habitat, more bands of horses would also leave the boundaries of the Complex in search of forage and water, thereby increasing impacts to rangeland resources outside the HMA boundaries as well. This alternative would result in increasing numbers of wild horses in areas not designated for their use and would not achieve and thriving natural ecological balance.

Proposed Action – The Proposed Action would implement a management strategy which would incorporate a number of population growth suppression methods. Wild horses across the Antelope Complex would be managed within the AML range of 427-789 and wild horses across the Triple B Complex would be managed within the AML range of 474-889, with successive helicopter drive trap and bait and water trapping operations. Stallions would be selected for release with the objective of establishing a 60% male ratio out of the low-range AML herd size on the range. Any mares that would be returned to the range would be treated with fertility control (PZP vaccines, GonaCon-Equine vaccine). The target population when the objectives of this alternative are reached is to manage a total population at approximately mid-range AML, or roughly 608 wild horses in the Antelope Complex and 682 wild horses in the Triple B Complex. The Proposed Action would not reduce all of the associated impacts to wild horses and rangeland resources as quickly as the other alternatives because the herd population would be near mid-AML as opposed to low AML. Over the short-term, individuals in the herd would still be subject to increased stress and possible death because of continued competition for water and forage until the project area's population can be reduced to the AML range. The areas experiencing heavy and severe utilization levels by wild horses would likely still be subject to some excessive use and impacts to rangeland resources, those being concentrated trailing, riparian trampling, increased bare ground, etc. These impacts would be expected to continue until the project area's population can be reduced to the AML range and concentration of horses can be reduced.

Removal of excess wild horses would improve herd health. Decreased competition for forage and water resources would reduce stress and promote healthier animals. Removal of excess animals coupled with anticipated reduced reproduction (population growth rate) because 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. Reduced population growth rates would be expected to extend the time interval between large gathers and reduce disturbance to individual animals as well as to the herd social structure over the foreseeable future. Bringing the wild horse population size back to low AML and slowing its growth rate once that level has been achieved would reduce damage to the range from the current overpopulation of wild horses and allow vegetation resources to start recovering, without the need for additional gathers in the interim. As a result, there would be fewer disturbances to individual animals and the herd, and a more stable wild horse social structure would be provided.

Impacts to individual animals may occur as a result of handling stress associated with the gathering, processing, and transportation of animals. The intensity of these impacts varies by individual animal and is indicated by behaviors ranging from nervous agitation to physical distress. Mortality to individual animals from these impacts is infrequent but does occur in 0.5% to 1% of wild horses gathered in a given gather (Scasta 2019). Other impacts to individual wild horses include separation of members of individual bands of wild horses and removal of animals from the population.

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

Stallions selected for release would be released to increase the post-gather sex ratio to approximately 60% stallions, out of the low AML overall herd size. Stallions would be selected to maintain a diverse age structure, herd characteristics and body type (conformation). It is expected that releasing additional stallions to reach the targeted sex ratio of 60% males would result in smaller band sizes, larger bachelor groups, and some increased competition for mares (see Appendix XII). With more stallions involved in breeding it should result in a slightly higher genetic effective population size (Ne) relative to total herd size.

Alternative B – Alternative B is similar to Alternative A but would include a gelding component. Under Alternative B, BLM would gather and selective removal of excess wild horses to low end AML, population growth control using mare fertility control treatments (PZP vaccines, GonaCon-Equine vaccine or most current vaccine formulation) gelding and sex ratio adjustments. In addition to bringing the wild horse population to low AML, up to 181 wild horses would be managed as geldings in the Antelope Complex and 209 in the Triple B Complex. The gelded horses would otherwise be excess animals permanently removed from the range and sent to ORC for adoption/sales or ORP,

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 rarely leads to serious complications and seldom requires postoperative veterinary care. 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 aggression toward other horses and reduced 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.

Though castration (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. fortunately, 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. The expectations for serious complications are less than 5% of horses operated under general anesthesia, but in some populations these rates can be as high as 12% (Shoemaker

2004). These complications are generally noted within 3 or 4 hours of surgery but may occur any time within the first 7 days following surgery. If they occur, they would be treated in the same manner as at BLM facilities.

By including some geldings in the population and having a slightly skewed sex ratio with more males than females overall, the result would be that there would be a relatively lower number of breeding females in the population and, hence, a lower per-capita growth rate. The surgery would be performed by a veterinarian using general anesthesia and appropriate surgical techniques. The final determination of which specific animals would be gelded for release would be based on the professional opinion of the attending veterinarian in consultation with the Authorized Officer (see Gelding SOPs in Appendix III). 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.

Gelded animals could be monitored 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 major roads and trails to the extent practicable. 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 HMA. Once released, anecdotal information suggests that some geldings would join bachelor bands while others may gain or retain harems (King et al. 2022). Periodic observations of the long-term outcomes of gelding could be recorded during routine resource monitoring work. Such observations could include but not be limited to band size, social interactions with other geldings and harem bands, distribution within their habitat, forage utilization and activities around key water sources. Periodic population inventories and future gather statistics may assist BLM to determine 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, while allowing more horses to remain on the range.

Surgical sterilization techniques, while not reversible, may provide reproductive control on horses without the need for any additional handling of the horses as required in the administration of chemical contraception techniques. See Appendix XII for a more detailed analysis on gelding effects.

Effects Common to the Proposed Action and Alternative B –
Fertility Control BLMs Use of Contraception in Wild Horse Management
Expanding the use of population growth suppression to slow population growth rates and reduce the number of animals removed from the range and sent to Off-Range Pastures (ORPs) is a BLM priority. The WFRHBA of 1971 specifically provides for contraception and sterilization (section 3.b.1) as viable management approaches. 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 horses from an HMA's population, so if a wild horse population is in excess of AML, then contraception alone would result in some continuing environmental effects of horse overpopulation (i.e. Appendix VI). Successful contraception reduces future reproduction. Limiting future population increases of horses could limit increases in environmental damage from higher densities of horses than currently exist. Horses are long-lived, potentially reaching 20 years of age or more in the wild and, if the population is above AML, treated horses returned to the HMA may continue exerting negative environmental effects, as described in the PZP Direct Effects and GnRH Direct effects

sections in Appendix XII, throughout their life span. In contrast, if horses above AML are removed when horses are gathered, that leads to an immediate decrease in the severity of ongoing detrimental environmental effects throughout their lifespan, as described above. See Appendix XII for a more detailed analysis on fertility control effects

Alternative C – Much like the Proposed Action and Alternative B this action would address the need to remove excess wild horses while bringing the population on the range to the low AML. This action would address attainment and maintenance of a thriving natural ecological balance through the gather and removal of excess animals only. Direct impacts to the wild horse population would be the decreased population to low AML resulting in reduced competition for scarce resources within the HMA such as water, forage, and space. Improved body condition should be experienced in the short term by the remaining wild horse population in the Complex. There would be increased opportunities for wild horses to utilize higher quality habitat related to a reduction in competition in these areas and to lessened pressure on the habitat itself. Reduced wild horse densities should result in less competition between bands resulting in fewer injuries and a reduced risk of disease outbreak.

This alternative would directly impact the BLM's Wild Horse Program's off range corrals and off-range pasture facilities. Due to national WHB program constraints, the available funding and space at these facilities may be needed for other higher priority removals. This action would not address population control on the range by reducing population growth and would not slow population growth over the long term or result in greater intervals between gathers or fewer excess wild horses being removed and sent to short-term holding and long-term pasture facilities.

Under Alternative C, impacts to the population growth rate should be moderately higher than with Alternatives A and B. The population would increase at a higher rate resulting in more frequent gathers and more animals removed over time.

Effects Common to Proposed Action, Alternatives B and C – Over the past 35 years, various impacts to wild horses because of gather activities have been observed. Under the Proposed Action, potential impacts to wild horses would be both direct and indirect, occurring to both individual horses and the population.

Helicopter Drive Trapping

The BLM has been conducting wild horse gathers since the mid-1970s and has been using helicopters for such gathers since the late 1970's. During this time, methods and procedures have been identified and refined to minimize stress and impacts to wild horses during gather implementation. Published reviews of agency practice during gathers and subsequent holding operations confirm that BLM follows guidelines to minimize those impacts and ensure humane animal care and high standards of welfare (GAO 2008, AAEP 2011, Greene et al. 2013, Scasta 2019). Refer to Appendix II, III, and IV for information on the methods that are utilized to reduce injury or stress to wild horses and burros during gathers. The Comprehensive Animal Welfare Policy (CAWP) would be implemented to ensure a safe and humane gather occurs and would minimize potential stress and injury to wild horses.

In any given gather, gather-related mortality averages only about one half of one percent (0.5%), which is very low when handling wild animals. Approximately, another six-tenths of one percent (0.6%) of the captured animals, on average, are humanely euthanized due to pre-existing conditions and in accordance with BLM policy (GAO 2008, Scasta 2019). These data affirm that the use of helicopters and motorized vehicles has proven to be a safe, humane, effective, and practical means for the gather and removal of excess wild horses (and burros) from the public lands. The BLM also avoids gathering wild horses by helicopter during the 6 weeks prior to and following the expected peak of the foaling season (i.e., from March 1 through June 30).

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

Other injuries may occur after a horse has been captured and is either within the trap site corral, the temporary holding corral, during transport between facilities, or during sorting and handling. Occasionally, horses may sustain a spinal injury or a fractured limb but based on prior gather statistics, serious injuries requiring humane euthanasia occur in less than 1 horse per every 100 captured. Similar injuries could be sustained if wild horses were captured through bait and/or water trapping, as the animals still need to be sorted, aged, transported, and otherwise handled following their capture. These injuries can result from kicks and bites, or from collisions with corral panels or gates.

To minimize the potential for injuries from fighting, the animals are transported from the trap site to the temporary (or short-term) holding facility where they are sorted as quickly and safely as possible, then moved into large holding pens where they are provided with hay and water. Fatalities and injuries due to gathers are few, with direct gather related mortality averaging less then 1%. Most injuries are a result of the horse's temperament, meaning they do not remain calm and lash out more frequently.

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

Indirect individual impacts are those which occur to individual wild horses after the initial event. These may include miscarriages in mares, increased social displacement, and conflict in studs. These impacts, like direct individual impacts, are known to occur intermittently during wild horse gather operations. An example of an indirect individual impact would be the brief 1-2 minute skirmish between older studs which ends when one stud retreats. Injuries typically involve a bite or kick with bruises which do not break the skin. Like direct individual impacts, the frequency of these impacts varies with the population and the individual. Observations following capture indicate the rate of miscarriage varies but can occur in about 1 to 5% of the captured mares, particularly if the mares are in very thin body condition or in poor health. A few foals may be orphaned during a gather. This can occur if the mare rejects the foal, the foal becomes separated from its mother and cannot be matched up following sorting, the mare dies or must be humanely euthanized during the gather, the foal is ill or weak and needs immediate care that requires removal from the mother, or the mother does not produce enough milk to support the foal. On occasion, foals are gathered that were previously orphaned on the range (prior to the gather) because the mother rejected it or died. These foals are usually in poor condition. Every effort is made to provide appropriate care to orphan foals. Veterinarians may administer electrolyte solutions or orphan foals may be fed milk replacer as needed to support their nutritional needs. Orphan foals may be placed in a foster home to receive additional care. Despite these efforts, some orphan foals may die or be humanely euthanized as an act of mercy if the prognosis for survival is very poor.

Through the capture and sorting process, wild horses are examined for health, injury, and other defects. Decisions to humanely euthanize animals in field situations would be made in conformance with BLM policy. BLM Euthanasia Policy IM-2021-007 is used as a guide to determine if animals meet the criteria and should be euthanized (refer to CAWP). Animals that are euthanized for non-gather related reasons include those with old injuries (broken or deformed limbs) that cause lameness or prevent the animal from being able to maintain an acceptable body condition (greater than or equal to BCS 3); old animals that have serious dental abnormalities or severely worn teeth and are not expected to maintain an acceptable body condition, and wild horses that have serious physical defects such as club feet, severe limb deformities, or sway back. Some of these conditions have a causal genetic component such that the animals should not be returned to the range; this prevents suffering and avoids amplifying the incidence of the deleterious gene in the wild population.

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

It is not expected that genetic diversity would be adversely affected by the Proposed Action. Available indications are that these populations contain high levels of genetic diversity at this time, and the action alternatives include periodic collection of genetic diversity samples at the time of gather(s). The AML range of 427-789 in the Antelope Complex and 472-889 in the Triple B Complex should provide for acceptable rates of genetic diversity maintenance (BLM 2010). If at any time in the future the genetic diversity in the Complexes is determined to be relatively low, then a large number of other HMAs could be used as sources for fertile wild horses that could be transported into the area of concern to augment local genetic diversity levels.

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

Water/Bait Trapping

Bait and/or water trapping generally requires a long window of time for success. Although the trap would be set in a high probability area for capturing excess wild horses residing within the area and at the most effective time periods, time is required for the horses to acclimate to the trap and/or decide to access the water/bait.

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

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

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

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

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

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

During transport, potential impacts to individual horses can include stress, as well as slipping, falling, kicking, biting, or being stepped on by another animal. Unless wild horses are in extremely poor condition, it is rare for an animal to die during transport.

Recently captured wild horses, generally mares, in very thin condition may have difficulty transitioning to feed. A small percentage of animals can die during this transition; however, some of these animals are in such poor condition that it is unlikely they would have survived if left on the range.

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

Mortality at off-range corrals (ORCs) facilities averages approximately 5% (GAO-09-77, Page 51), which includes animals euthanized due to a pre-existing condition, animals in extremely poor condition, animals that are injured and would not recover, animals that are unable to transition to feed; and animals that die accidentally during sorting, handling, or preparation. The mortality rates at short-term and long-term holding facilities are comparable to the natural annual mortality rate on the range of about 16% per year for foals (animals under age 1), about 5-10% per year for horses ages 1-10 years, and about 10-25% for animals aged 10-20 years (Ransom et al. 2016)

Mortality may also be caused by hyperlipidemia in horses and burros, hyperlipidemia may be caused by a negative energy balance exacerbated by stress (stress hormones such as adrenaline and cortisol), pregnancy, lactation, etc. When this occurs, animals may either deplete their glycogen stores and switch to using fatty acids from fat to energy or become less sensitive to insulin which causes the same switch to mobilizing fat into the bloodstream. Paradoxically, obesity as well as starvation can predispose animals to the disease. The inability to obtain and process energy from the new feed ration provided in corrals may also be caused by the stressful condition of the gather, changing social structures, behavioral responses and adaption to the new environment. These factors on top of the increased energy demands of pregnancy, lactation, roundup, shipping etc. are what may trigger the condition

Off-Range Pastures (ORPs), known formerly as long-term holding pastures, are designed to provide excess wild horses with humane, and in some cases life-long care in a natural setting off the public rangelands. There, wild horses are maintained in grassland pastures large enough to allow free-roaming behavior and with the forage, water, and shelter necessary to sustain them in good condition. Mares and sterilized stallions (geldings) are segregated into separate pastures except at one facility where geldings and mares coexist. About 37,000 wild horses that are in excess of the current adoption or sale demand (because of age or other factors such as economic recession) are currently located on private land pastures in western and midwestern states. The establishment of ORPs is subject to a separate NEPA and decision-making process. Located mainly in mid or tall grass prairie regions of the United States, these ORPs are highly productive grasslands compared to more arid western rangelands. These pastures comprise about 400,000 acres (an average of about 10-11 acres per animal). Of the animals currently located in ORP, less than one percent is age 0-4 years, 49 percent are age 5-10 years, and about 51 percent are age 11+ years.

Potential impacts to wild horses from transport to adoption, sale or off-range pastures (ORP) are similar to those previously described. One difference is when shipping wild horses for adoption, sale or ORPs, animals may be transported for up to a maximum of 24 hours. Immediately prior to transportation, and after every 24 hours of transportation, animals are offloaded and provided a minimum of 8 hours on-the-ground rest. During the rest period, each animal is provided access to unlimited amounts of water and two pounds of good quality hay per 100 pounds of body weight with adequate space to allow all animals to eat at one time.

A small percentage of the animals may be humanely euthanized if they are in very poor condition due to age or other factors. Horses residing on ORP facilities live longer, on the average, than wild horses residing on public rangelands, and the natural mortality of wild horses in ORP averages approximately 8% per year but can be higher or lower depending on the average age of the horses pastured there (GAO-09-77, Page 52).

Wild Horses Remaining or Released Back into the Complexes following Gather

The wild horses that are not captured may be temporarily disturbed and may move into another area during the gather operations. With the exception of changes to herd demographics and their direct population, wide impacts from a gather have proven, over the last 20 years, to be temporary in nature with most if not all impacts disappearing within hours to several days of when wild horses are released back into the HMAs.

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

Past, Present, and Reasonably Foreseeable Future

No Action Alternative – Under the No Action Alternative, the wild horse population within the Antelope and Triple B Complexes combined could exceed 8,690 in two years. Continued and expanded movement outside the HMAs would be expected as greater numbers of horses search for food and water for survival, thus impacting larger areas of public lands and threatening public safety as wild horses cross highways in search of forage. Heavy to Severe utilization of the available forage would continue to be expected and the water available for use would become increasingly limited. Ecological plant communities would continue to be damaged to the extent that they would no longer be sustainable, and the wild horse population would be expected to crash; this result would be expedited under drought conditions. As wild horse populations continue to increase within and outside the Complexes, rangeland degradation intensifies on public lands. As wild horse populations increase, concerns regarding public safety along highways increase as well as conflicts with private land. Wild horses that reside along highways would continue to come on to the highways in many areas during the evenings or early mornings looking for forage and salt along the pavement, posing a hazard to motorists.

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

Impacts of the no action alternative would result in foregoing the opportunity to improve rangeland health and to properly manage wild horses in balance with the available forage and water and other multiple uses. Attainment of site-specific vegetation management objectives and Standards for Rangeland Health would not be achieved. AML would not be achieved.

Proposed Action – In the future, application of population growth suppression techniques (i.e. PZP, PZP-22, GonaCon-Equine vaccine, and Gelding) and adjustment in sex ratios would be expected to slow total population growth rates, and result in fewer gathers with less frequent disturbance to individual wild horses and the herd's social structure. Return of wild horses back into the Complexes could lead to decreased ability to effectively gather horses in the future as released horses learn to evade gather operations. The effect may be reduced gather effectiveness and the ability to capture a smaller portion of the population with each consecutive operation.

Alternatives B and C – A gather would ultimately benefit wild horses and rangeland resources. During gather operations, wild horses would be provided adequate feed and water at temporary and short-term holding. Removal of excess wild horses would allow for reduced competition for the remaining resources left on the range. Removal of excess wild horses would ensure that individual animals do not perish due to starvation, dehydration, or other health concerns related to insufficient feed and water and extreme dust conditions. Additionally, a gather would remove excess wild horses while they remain in adequate health to transition to feed.

The effects associated with the capture and removal of excess wild horses include gather-related mortality, which averages approximately 1% of the captured animals but could be higher based on the circumstances of individual gathers (Scasta, 2019). Mortality averages about 5% per year associated with transportation, ORCs, adoption or sale with limitations and about 8% per year associated with ORPs. These rates are comparable to natural mortality on the range, ranging from about 5-8% per year for foals (animals under age 1), about 5% per year for horses ages 1-15, and 5-100% for animals age 16 and older (Jenkins 1996, Garrott and Taylor, 1990). In situations where forage and/or water are limited, mortality rates in the wild increase, with the greatest impact to young foals, nursing mares and older horses. Animals can experience lameness associated with trailing to/from water and forage, foals may be orphaned (left behind) if they cannot keep up with their mare, or animals may become too weak to travel. After suffering, often for an extended period, the animals may die. Before these conditions arise, the BLM generally removes the excess animals to prevent their suffering from dehydration or starvation.

While humane euthanasia and sale without limitation of healthy horses for which there is no adoption demand is authorized under the WFRHBA, Congress prohibited the use of appropriated funds between 1987 and 2004 and again in 2010 to present for this purpose. If Congress were to lift the current appropriations restrictions, then it is possible that excess horses removed from the Complexes could potentially be euthanized or sold without limitation consistent with the provisions of the WFRHBA.

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

3.4. Riparian/Wetland Areas and Surface Water Quality

Affected Environment

Riparian areas occupy a small but unique position on the landscape in the Complexes. Riparian areas are important to water quality, water quantity, and forage. Riparian sites provide habitat needs for many species and support greater numbers and diversity of wildlife than any other habitat type in the western United States. Riparian areas at high elevations support cottonwood and aspen woodlands. Small riparian areas and their associated plant species occur throughout the HMAs near seeps, springs, and along sections of perennial drainages. Many of these areas support limited riparian habitat (forage) and water flows. At the present time, wild horse use of the majority of these areas is averaging heavy to severe use. Trampling and trailing damage by wild horses is evident at most locations; soil compaction and surface and rill erosion are evident. Some of the spring sources within the HMAs are minimally functioning because of factors such as over utilization and trampling effects. The current over population of wild horses is contributing to resource damage and decline in functionality of spring sources.

Environmental Effects

No Action Alternative – With the No Action Alternative, wild horse populations would continue to increase within the HMAs and to expand beyond the HMA boundaries. Increased horse use within and outside the HMAs would present additional adverse impacts to riparian resources and their associated surface waters. Over the longer-term, as native plant health continues to deteriorate and plants are lost, soil erosion would increase. An opportunity to make progress toward achieving and maintaining riparian areas in properly functioning condition would be foregone as ever-increasing numbers of wild horses continue to trample and degrade other riparian areas, springs and associated water sources. Riparian areas that are currently in a Functional at Risk with a Downward Trend state would be expected to decline to a Non-Functional state over time.

Proposed Action – To avoid the direct impacts potentially associated with the gather operation, temporary gather sites and holding/processing facilities would not be located within riparian areas. The amount of trampling/trailing would be reduced. Utilization of the available forage within the riparian areas would also be expected to be reduced to within allowable levels. Over the longer-term, continued management of wild horses within the established AML would be expected to result in healthier, more vigorous vegetative communities. Hoof action on the soil around unimproved springs and stream banks would be lessened which should lead to increased stream bank stability and decreased compaction and erosion. Improved vegetation around riparian areas would dissipate stream energy associated with high flows and filter sediment that would result in some associated improvements in water quality. The alternative would make progress towards achieving and maintaining proper functioning condition in riparian areas. There would also be reduced competition among wildlife, wild horses, and domestic livestock for the available water. An opportunity to make progress toward achieving and maintain riparian areas in properly functioning condition would be foregone until reaching the mid-range of AML.

Alternative B – Initial impacts would be similar to the Proposed Action.

Alternative C – Initial impacts would be similar to the Proposed Action.

Past, Present, and Reasonably Foreseeable Future
Proposed Action and Alternatives B and C – Impacts to riparian/wetland areas and surface water quality within the Antelope and Triple B Complexes have resulted from past and present actions such as grazing, road construction and maintenance, agriculture, off-highway vehicle (OHV) use and recreation, mining and processing activities, aggregate operations, public land management activities, and wildland fire.

Impacts to riparian/wetland areas and surface water quality from Reasonably Foreseeable Future Actions (RFFAs) would be similar to those described above for past and present actions, as these activities are expected to continue into the future. Direct impacts to riparian/wetland areas and surface water quality would be marginal because part of the Proposed Action is to avoid riparian/wetland areas during the present and future horse gathers. However, the long-term incremental impact to these resources from the proposed action would be positive as the number of horses are decreased with this gather and over time with subsequent gathers. This would result in improved surface water quality and reestablishment of riparian areas exhibiting increased stability and vigor.

No Action Alternative – Under the No Action Alternative, no incremental gather-associated impacts would occur to riparian/wetland areas and surface water quality, thus declining conditions would continue as horse populations increase.

3.5. Wildlife, Including Migratory Birds

Affected Environment
The Antelope and Triple B Complexes provide habitat for many species of wildlife, including large mammals like mule deer, Rocky Mountain elk, and pronghorn antelope. Various big game seasonal habitats overlap with the herd management areas, see Table 7.

Table 7. Big Game Habitat within Herd Management Areas.

HMA	Mule Deer	Rocky Mountain Elk	Pronghorn Antelope
Antelope	Crucial Summer, Crucial Winter, Summer Range, Winter Range, Year-round	Agricultural, Crucial Summer, Winter Range, Year-round	Crucial Winter, Winter Range, Year-round

HMA	Mule Deer	Rocky Mountain Elk	Pronghorn Antelope
Antelope Valley	Crucial Summer, Crucial Winter, Limited Use, Summer Range, Transition Range, Winter Range, Year-round	Crucial Summer, Summer Range, Winter Range, Year-round	Crucial Winter, Winter Range, Year-round
Goshute	Crucial Winter, Year-round	N/A	Year-round
Maverick-Medicine	Crucial Summer, Crucial Winter, Limited Use, Winter Range, Year-round	Crucial Summer, Summer Range, Winter Range, Year-round	Crucial Summer, Crucial Winter, Winter Range, Year-round
Spruce-Pequop	Crucial Summer, Crucial Winter, Winter Range	Crucial Summer, Winter Range, Year-round	Winter Range, Year-round
Triple B	Crucial Summer, Crucial Winter, Limited Use, Summer Range, Transition Range, Winter Range, Year-round	Crucial Summer, Summer Range, Winter Range, Year-round	Crucial Summer, Crucial Winter, Winter Range, Year-round

Predominant habitat types within the Complexes which are likely to support migratory birds include: aspen, mountain riparian, mountain shrub, sagebrush, pinyon/juniper, salt desert scrub, playa and cliffs/talus habitat types. The migratory bird nesting season is from March 1 through July 31 (including raptors). No surface disturbing activity (staging, trapping, or corrals) can be conducted during this time period without a nesting bird survey of the proposed project area.

Environmental Effects
No Action Alternative – Wildlife would not be disturbed or displaced by gather operations under the no action alternative. However, competition between wildlife and wild horses for forage and water resources would continue and may get worse as wild horse numbers continue to increase above AML. As competition increases, some wildlife species may not be able to compete successfully, potentially leading to increased stress and possible dislocation or death of native wildlife species over the long-term.

Proposed Action – Individual animals of all species may be disturbed or displaced during gather operations. Large mammals and some birds may run or fly (flush from the nest) during helicopter operations, but animals should return to normal activities post disturbance. Small mammals, birds, and reptiles would be displaced at staging areas and slower moving animals may be adherently killed. Overall, there would be no impact to animal populations as a result of gather operations.

The use of previously disturbed areas would reduce impacts to migratory birds. Any new staging, corral, and trap sites with vegetation would be surveyed for nesting birds, if gather operations were to occur during the migratory bird breeding season.

Removing wild horses would result in decreased competition between wild horses and wildlife for available forage and water resources as soon as the gather is completed. Over the long-term, both riparian and upland habitat conditions (forage quantity and quality) for wildlife would improve. This Alternative would be the most effective at improving habitat conditions for wildlife.

Alternative B – Impacts from this alternative would be similar to the Proposed Action, however it does include management of non-reproducing portion of the population. This Alternative would be more effective at improving wildlife habitat than Alternative C, and slightly less effective than Alternative A.

Alternative C – Impacts from this alternative would be the similar to the Proposed Action. Overall, this alternative would be the least effective of action alternatives at improving habitat conditions for wildlife because there would be no fertility control, sex ratio adjustments, or gelding management.

Past, Present, and Reasonably Foreseeable Future
Proposed Action and Alternatives B and C
Impacts to wildlife habitat within the Complexes have resulted from past and present actions such as livestock grazing, road construction and maintenance, agriculture, OHV use and recreation, Powerlines and other right-of-way actions, and wild horses. The impacts from the Proposed Action, in addition to past, present and reasonably foreseeable future actions would be beneficial for all wildlife and their habitat. With a reduction of horse numbers, habitat within the HMAs and surrounding area would have the opportunity to improve. Impacts to vegetation at riparian areas would be reduced, allowing them to slowly recover with time. Breeding, forage, nesting, and security habitat for all species would improve over time.

No Action Alternative
The impacts from the No Action Alternative, in addition to past, present and reasonably foreseeable future actions would result in continual degradation of habitat for all wildlife. Horses would continue to be above AML and compete for resources with other wildlife and livestock. Breeding, foraging, nesting and security habitat for all species would continue to degrade.

3.6. Special Status Plant and Animal Species, Including Endangered Species Act

Affected Environment
Appendix X identifies numerous BLM special status species that may potentially occur within the Complexes, including several bat, reptile, raptor and other bird species.

According to the 2015 Greater sage-grouse Land Use Plan Amendments (LUPA; 2022 maintenance action), portions of the Complexes contain Other Habitat (OHMA), General Habitat (GHMA), and Priority Habitat Management Areas (PHMA; Appendix XI). Greater sage-grouse use the majority of the Antelope and Triple B Complexes throughout the year for all of their seasonal habitat needs. These needs include breeding (i.e., strutting grounds or leks), nesting and early brood-rearing, late brood-rearing or summer, and winter habitat. Greater sage-grouse require an herbaceous understory of forbs and grass to provide nest concealment, as well as to provide a diet of forbs and insects for the adults and their chicks. Riparian areas are frequently used by greater sage-grouse for late brood-rearing habitat.

The Complexes contain large portions of the Butte/Buck/White Pine, Schell/Antelope, and East Valley greater sage-grouse Population Management Units (PMU), with minor portions of the Diamond, and Ruby Valley PMUs. There are approximately 52 known active and pending greater sage-grouse leks within the Complexes with several more just outside the boundaries, many have hit a soft or hard trigger as of 2023 according to USGS Targeted Annual Warning System (TAWS; Prochazka et al. 2023) Additionally, the gather area overlaps nineteen lek clusters in which eleven have reached a hard trigger as of 2023 (Prochazka et al. 2023). In 2020, an Adaptive Management Response Team determined that wild horses were one of the casual factors for the Butte/Buck/White Pine PMU for hitting a soft trigger at that time (State of Nevada Sagebrush Ecosystem Program, 2020). The presence of wild horses is associated with a reduced degree of greater sage-grouse lekking behavior (Muñoz et al. 2020). Moreover, increasing densities of wild horses, measured as a percentage above AML, are associated with decreasing greater sage-grouse population sizes, measured by lek counts (Coates 2021). In northwest Nevada, Behnke et al. (2023) found that Greater sage-grouse nesting rates were marginally higher in areas with wild horses, but Behnke et al. (2022) found that Greater sage-grouse in areas with feral horses had elevated corticosterone levels, especially under drought conditions. Behnke et al. (2022) also found that high corticosterone levels were associated with low Greater sage-grouse nesting success rates. In Wyoming, Hennig et al (2023) found a high degree of spatial overlap between wild horses and Greater sage-grouse in summer. Most recently, Beck et al. (2024) demonstrated significant declines in Greater sage-grouse survival rates associated with wild horse densities, with greater wild horse densities above AML causing greater declines in sage-grouse survival at several life stages.

Areas within and around the Complexes provide aquatic and riparian habitat for BLM Sensitive Species including Bonneville Cutthroat Trout (*Oncorhynchus clarkii utah),* Newark Valley Tui Chub (*Siphateles bicolor newarkensis),* Lahontan Cutthroat Trout (*Oncorhynchus clarkii henshawi)* which is also a Federally Threatened species, Northern Leopard Frog *(Lithobates onca),* and several gastropods.

There is potential pygmy rabbit habitat within the Complexes as well as documented sightings within the Antelope, Antelope Valley, Triple B, and Maverick-Medicine HMAs. Pygmy rabbits predominately inhabit tall sagebrush with deep friable soils for burrowing.

There are several BLM sensitive plant species that have been found within or adjacent to the Antelope and Triple B Complexes. These are the Basalt Springparsley (*Cymopterus basalticus*), Broad-pod Freckled Milkvetch (*Astragalus lentiginosus var. latus*), Dad's Penstemon (*Penstemon patricus*), Low Feverfew (*Parthenium ligulatum*), Mount Moriah Beardtongue (*Penstemon moriahensis*), Nachlinger's Catchfly (*Silene nachlingerae*), One-leaflet Torrey's Milkvetch (*Astragalus calycosus var. monophyllidius*), and Mound Catseye (*Cryptantha compacta*).

Environmental Effects

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

Proposed Action – Individual raptors and birds may be disturbed during helicopter gather operations; however, birds should return to normal activities. Staging, corral and trapping locations would be surveyed for nests if operations take place during the breeding season, minimizing impacts to species. BLM would not locate any trap sites, holding corrals, or staging areas where sensitive animal and plant species are known to occur, so there would be no impact from the placement of facilities.

BLM would not locate trap sites, holding corrals, or staging areas in areas used for Greater sage-grouse strutting grounds or potential pygmy rabbit habitat. Additionally, the BLM would apply the Greater sage-grouse timing restrictions identified in the Proposed Action to the greatest extent possible to minimize impacts to breeding, nesting and brood-rearing birds. In order to minimize impacts to Greater sage grouse during the late brood-rearing season, the BLM would review any water bait trapping sites on natural water sources for use. Nevada Department of Wildlife would be consulted with prior to gathers to ensure that the most current data available is utilized to assist in minimization and avoidance of impacts to Greater sage grouse. Greater sage-grouse may be temporarily disturbed during winter gather operations.

Under the Proposed Action, the removal of excess wild horses would cause habitat conditions to improve for all special status species; however, this alternative does not remove all horses.

Alternative B – Impacts from this alternative would be similar to the Proposed Action, however it does include management of nonreproducing portion of the population. This Alterative would be more effective at improving special status species' habitat than Alternative C, and slightly less effective than

Alternative A.

Alternative C – Impacts from this alternative would be the similar to the Proposed Action. Overall, this alternative would be the least effective of action alternatives at improving habitat conditions for special status species because there would be no fertility control, sex ratio adjustments, or gelding management.

Past, Present, and Reasonably Foreseeable Future

Proposed Action and Alternatives B and C – Impacts to special status species' habitat within the Complexes have resulted from past and present actions such as livestock grazing, road construction and maintenance, agriculture, OHV use and recreation, powerlines and other right-of-way actions, and wild horses. The impacts from the Proposed Action, in addition to past, present and reasonably foreseeable future actions would be beneficial for all wildlife and their habitat. With a reduction of horse numbers, habitat within the Complexes and surrounding area would have the opportunity to improve. Impacts to vegetation at riparian areas would be reduced, allowing them to slowly recover with time. Breeding, forage, nesting, and security habitat for all species would improve over time.

No Action Alternative – The impacts from the No Action Alternative, in addition to past, present and reasonably foreseeable future actions would result in continual degradation of habitat for all special status species. Horses would continue to be above AML and compete for resources with other wildlife and livestock. Breeding, foraging, nesting, and security habitat for all species would continue to degrade.

3.7. Livestock Grazing

Affected Environment

The Antelope and Triple B Complexes include portions of several livestock grazing allotments. Permitted livestock grazing use in the HMAs, HA, and WHT include cattle, sheep, and goats. Some livestock grazing occurs during all seasons. Livestock grazing also occurs in areas immediately adjacent to the Complexes.

Appendix VIII, Tables 1 and 2 summarize grazing use by grazing allotments across associated horse management units of the Triple B and Antelope Complexes. The kind of livestock, season of use and permitted use in Animal Unit Months (AUM) is described alongside the percentage of the allotment within the HMA or WHT and the percent of the permitted use that has been used across a seven-year average from 2018 to 2024. An AUM is the amount of forage necessary for the sustenance of one cow or its equivalent for a period of 1 month (43 C.F.R. 4100.0-5).

Over the past seven years, actual livestock use has generally been less than what is permitted for each of the grazing allotments within the Complexes. This has been in part due to droughts, competition with wild horses for forage, and the needs of the livestock operations, among others. Permitted livestock grazing use has also generally been reduced from historical grazing levels over the past decades in a majority of the allotments. Allotments continue to be evaluated for achievement of the rangeland health standards, and adjustments to livestock grazing are implemented as appropriate, as grazing term permits are renewed or through annual coordination between BLM and grazing permit holders. Adjustments can include livestock stocking levels, seasons of use, grazing rotations, utilization standards, and other management practices to better control livestock distribution.

Land Health Assessments, Evaluation Reports and Determination Documents are used to assess livestock grazing management practices to determine whether those practices are conforming to the standards and guidelines for rangeland health, as required by 43 C.F.R. Subpart 4180. In addition to livestock grazing, these Determination Documents provide insights into whether wild horses and other factors are contributing to non-attainment of land health standards. A summary of Determination Documents which have been completed within the Triple B and Antelope Complexes can be found in Appendix VIII, Tables 3 and 4.

Livestock impact vegetation resources through consumption of forage species and trampling. Under improper livestock management there is potential for degradation. Livestock grazing is limited to certain use levels on forage species, AUMs, and seasons of use as described in the terms and conditions of grazing permits, which are designed to be sustainable and prevent resource degradation.

Environmental Effects

No Action Alternative – Under the No Action Alternative, there would be continued competition with excess numbers of wild horses for limited water and forage resources. Uncontrolled wild horse population growth would lead to degradation of rangelands, riparian areas, and forage resources which would reduce the respective grazing allotment potential to support livestock grazing. As wild horse numbers continue to increase, livestock grazing within the HMAs may necessitate reductions to slow the deterioration of the range to the greatest extent possible.

Excess wild horse numbers can also lead to damage and degradation of range improvement projects causing the need for additional maintenance, including time and monetary costs. Nonfunctional range improvements decrease the capabilities and effectiveness of livestock grazing management.

Proposed Action – Past experience has shown that wild horse gather operations have few direct impacts to cattle and sheep grazing. Livestock located near gather activities would be temporarily disturbed or displaced by the helicopter and the increased vehicle traffic during the gather operation. Typically, livestock would move back into the area once gather operations cease. Coordination often occurs with the permittees to reduce any impacts gather operations may have on the livestock operators. Under the Proposed Action, competition between livestock and wild horses for water and forage resources would be reduced over time. Forage availability and quality would improve over time as the wild horse population is incrementally brought to low or mid AML. These effects would be extended by population growth control measures.

Alternative B – Impacts would be similar to those of the Proposed Action, but to a lesser extent.

Alternative C – Impacts would be similar to those of the Proposed Action, but to a lesser extent.

Past, Present, and Reasonably Foreseeable Future

The incremental effects of different population levels and different reproductive rates of wild horse populations over time would have varying effects on livestock grazing and their shared use of resources.

No Action Alternative – Under the no action alternative, wild horse populations would continue to increase. This continually increasing competition for available forage and water resources would lead to increased resource utilization and increased likelihood of rangeland degradation. Where site-specific vegetation management objectives and Standards for Rangeland Health are not being achieved, they would likely continue to not achieve the standard. Where standards are being achieved, it is possible they would change to not achieving the standard. Opportunities to improve rangeland health, by bringing the wild horse population to AML and reducing resource competition and utilization, would be lost.

Proposed Action and Alternatives B and C – Under the Proposed Action, wild horse populations would be at or near AML for the longest amount of time, compared to the alternatives. This would reduce excess pressure from wild horses on the shared forage and water resources. Over time this would likely aid in the increased potential for achievement of the Standards of Rangeland Health and allow for the perpetuity of livestock grazing. Potential effects of Alternatives B and C would be similar to the Proposed Action, but they would not be as long lasting because the reproductive rates of the wild horse would not be reduced or controlled indefinitely.

3.8. Wilderness

Affected Environment
The Antelope and Triple B Complexes encompass an area that include two designated Wilderness areas in White Pine County and four Wilderness Study Areas (WSA) in Elko County. The Goshute Canyon and Becky Peak Wilderness areas were designated in 2006 under the White Pine County Recreation and Development Act. The Goshute Canyon, South Pequop, Bluebell and Goshute Peak WSAs were established as Wilderness Study Areas for further review during the original inventories in 1979-80. The findings from the study and suitability recommendations were included in the Elko Final Wilderness Environmental Impact Statement, July 1987. In October 1991 the Nevada Statewide Wilderness Report formally reported the recommendations on suitability for wilderness designation and or release. Currently these four original WSA boundaries are being managed as WSAs until designated as wilderness or released from WSA status through an act of Congress.

See Appendix I for Wilderness and Wilderness Study Areas Map.

The Wilderness Act of 1964 and BLM Manual 6340- Management of Designated Wilderness sets forth the agencies responsibilities in administering wilderness areas and states that the preservation of wilderness character is the primary management mandate. The Five qualities of wilderness character are described as:

- Untrammeled – area is unhindered and free from modern human control or manipulation.
- Natural – area appears to have been primarily affected by the forces of nature.
- Undeveloped – area is essentially without permanent improvements or human occupation and retains its primeval character.
- Outstanding opportunities for solitude or a primitive and unconfined type of recreation – area provides outstanding opportunities for people to experience solitude or primeval and unrestricted recreation, including the values associated with physical and mental inspiration and challenge.
- Supplemental values – complementary features of scientific, educational, scenic, or historic values.

Management of Wilderness Study Areas (BLM Manual 6330) establishes policy and guidance with the objective to manage and protect WSAs to preserve wilderness characteristics so as not to impair the suitability of such areas for designation by Congress as wilderness. Manual 6330 provides policies for specific activities one of which is wild horse management.

Goshute Canyon Wilderness totals 42,618 acres and sits at an elevation of 6,000 to 10410 feet, located in the Cherry Creek Range. The 11-mile-long wilderness is a rugged, uplifted range, with massive white limestone cliffs jutting from its slopes. The lower elevations are thickly forested by pinyon pine and juniper, while scattered bristlecone and limber pine occur at the higher elevations. Aspens and cottonwoods in the moist drainages provide a cool retreat. Large high elevation basins rimmed by peaks contain pockets of aspen and white fir and are filled with wildflowers in the spring and summer. Snowmelt and numerous springs provide riparian settings and water sources for a great number of wildlife species including Bonneville cutthroat trout in Goshute Creek, mule deer, mountain lions, bobcats, and various birds of prey. Recreational activities include camping, hiking, backpacking, horseback riding, and hunting, and caving. Solitude is easily found throughout this wilderness due to its remoteness, steep terrain and infrequent visitation. Wild horse use of the Wilderness area is primarily located along the benches at the base of the mountain along the boundary on the east and west slopes, and into the Goshute Basin.

The Becky Peak Wilderness totals 18,189 acres and sits at an elevation of 6,500 to 9,859 feet, located on the northern end of the Schell Creek Range. Vegetation primarily includes desert brush and grass at the lower elevations and a dense scattering of pinyon pine and juniper stands on the upland slopes of Becky Peak and surrounding hillsides. Atop Becky Peak itself (9,859 feet), you will encounter bristlecone and limber pine trees. Wildflowers can be abundant in the spring and include yarrow, prickly poppy, prickly pear cactus, larkspur, lupine, paintbrush, and Sego lilies. Pronghorn antelope are frequently seen through the sagebrush lowlands. Other animals that may be spotted on a visit to Becky Peak Wilderness area include mule deer, wild horses, lizards and a variety of birds. Recreational opportunities include camping, hiking, backpacking, horseback riding, and hunting. Becky Peak Wilderness provides opportunities for solitude in the numerous washes extending from the mountain, particularly on the eastern side of the range. Wild horse use of the Wilderness area is occurring primarily along the entire boundary outside of the pinyon juniper woodlands and at all water sources.

Goshute Canyon WSA totals 343 acres and is situated on the northern end of Goshute Canyon Wilderness sharing a boundary on the White Pine and Elko County line. This small area is characterized by extremely steep pinyon pine and juniper forested limestone foothills bisected by a narrow canyon with a legal way that leads through the WSA to a cherry stemmed road into the Goshute Canyon Wilderness. There is little opportunity for solitude on this small steep area and the only notable recreational opportunity is venturing through it on the legal way to the cherry stemmed road into the designated wilderness. Wild horse use is limited to the benchland on the northern slope along the boundary and into the wilderness area and Goshute Basin via the legal way. Within the Nevada Statewide Wilderness Report there is no reference for recommending wilderness designation or release.

South Pequop WSA totals 41,090 acres and sits at an elevation of 5,700 to 8,951 feet in the south end of the Pequop Mountains. Portions of the WSA contain rugged, dissected limestone topography densely forested with pinyon pine, juniper, white fir, limber pine and mountain mahogany. Small scatterings of bristlecone pine can be found in a few high elevation areas. Collectable fossils are found weathering out of limestone. Opportunity for solitude is easily found in the numerous drainages that extend from the ridgeline offering a sense of remoteness and total isolation from other portions of the area. Outstanding opportunities for backpacking and hiking is available in the numerous drainages and on the ridgeline. Wild horse use of the area is occurring around the lower elevations outside of the densely forested areas, into the drainages and at all water sources. The Nevada Statewide Wilderness Report identifies that 35,544 acres are recommended for wilderness and 6,546 acres are recommended for nonwilderness.

Goshute Peak WSA totals 69,770 acres and sits at an elevation of 5,800 to 9,615 feet on the south end of the Goshute Mountain Range. The WSA measures 18 miles long by 8 miles wide. The Goshute Peak WSA is extremely rugged with high mountain peaks, rocky limestone cliffs and numerous canyons radiating from the central ridgeline. The majority of the WSA is densely wooded. At lower elevations is a pinyon pine, Utah juniper and mountain mahogany woodland, and at higher north facing elevations are found white fir, limber pine, and bristlecone pine, the Rocky Mountain maple can be found in some riparian areas. From late August to October the area provides a stopover for numerous species of raptors migrating south from the Great Salt Lake. Opportunities for solitude can be found along the east slope, along with opportunities for hiking, backpacking, hunting and bird watching. Wild horse use of the area is primarily located along the benches at the base of the mountain along the boundary on the east and west slopes, and into the numerous drainages and water sources. The Nevada Statewide Wilderness Report identifies that 61,004 acres are recommended for wilderness, and 8,766 acres are recommended for non-wilderness.

Blue Bell WSA totals 55,665 acres and sits at an elevation of 5,300 to 8,695 feet in the central portion of the Goshute Mountain Range. The area is characterized by steep rugged limestone ridgeline with the dissected lowlands of east slope consisting of hundreds of meandering canyons wandering through low mountains, gathering together to form the densely forested drainages of Thirty-mile Canyon and Morris, West Morris and Morgan Basins. Lower elevations consist of pinion juniper woodlands with higher elevations support mixed conifer forests. Opportunities for solitude and recreation although not considered outstanding in all areas are available in the numerous drainages of the east slope. Wild horse use of the area is occurring around the lower elevations outside of the densely forested areas, into the drainages and at all water sources. The Nevada Statewide Wilderness Report identifies that 0 acres are recommended for wilderness, and 55,665 acres are recommended for nonwilderness due to mineral potential and possible limestone quarry expansion and less than outstanding wilderness values.

During gather operations, all facilities for holding, gather and trap sites will be located outside of all Wilderness and WSAs except for one location which is inside the Blue Bell WSA. The Shafter Well, located two hundred feet inside the boundary of the Blue Bell WSA is proposed for use as a temporary gather/trap site location. The Shafter Well is a livestock water development that was in existence prior to WSA designation. The area totals approximately two acres of barren heavily used ground around the water development with an approximately additional three acres of disturbed ground surrounding it. There are two sections of two track roads that lead two hundred feet to the Shafter Well and back out of the WSA to the WSA boundary road. This location has been historically used during previous gathers as a temporary gather/trap site because no other practical effective alternative's outside of the WSA within this area exists due to the large flat valley bottom without any vegetative or topographical features that are needed in order drive and funnel horses into a hidden trap.

BLM Manual 6330 has specific guidance for this activity, which is outlined in 1.6 Policy, Policies for Specific Activities, 10. Wild horse and burro management, iii. Traps.

> Traps for the removal of excess wild horses or burros must be located outside of WSAs whenever possible. When practical alternatives do not exist, temporary traps may be located within WSAs for the effective removal of animals in excess of the appropriate management level established for the herd area. Traps must be situated to minimize impacts to vegetation and soils. Vehicles necessary for set-up and take-down of traps and for transporting excess wild horses and burros away from the area may be driven off of existing primitive routes or boundary roads on a route specified through the NEPA analysis. At the completion of the gather, all facilities must be removed, the route used for trap access closed to motor vehicles until it is restored to the original condition, and any new access route and trap area rehabilitated so that the route is no longer visible to subsequent motor vehicle operators.

See Appendix V for the Shafter Well location aerial photo and operating plan.

Environmental Effects
No Action Alternative – No direct impacts to wilderness character would occur. However, impacts to wilderness character of naturalness could be further degraded through the continued population growth of wild horses. The Wilderness/WSAs currently receives slight-moderate use by wild horses during certain times of the year. Increasing wild horse populations would be expected to further degrade the condition of vegetation, soil and water resources. The sight of heavy horse trails, trampled vegetation and areas of high erosion would continue to detract from the wilderness experience within the Wilderness and WSA.

Proposed Action – There would be no negative effects to the untrammeled quality of wilderness character within designated Wilderness or WSAs. Both BLM policy MS-6330, Management of WSAs Section 10. Wild horse and burro management and BLM MS-6340 Management of designated wilderness, Section 20. Wild horses and burros require management of herd populations at levels that will preserve the natural quality of wilderness character.

There would be long term positive effects to the natural quality of wilderness character. With effectively managed wild horse populations on the landscape either through removal or reduced growth rates from fertility control, there will be less negative impacts to soil, vegetation and water source locations.

There will be no permanent impacts to undeveloped in any Wilderness or WSA. Only the Shafter Well location in the Blue Bell WSA would have temporary gather/trap facilities for the short duration of gather operations.

There would be temporary impacts to opportunities for solitude for all Wilderness and WSA within the Antelope and Triple B Complexes area due to the possible noise of the helicopter and increased vehicle traffic around all Wilderness and WSA boundaries. This impact would be even more apparent with the temporary gather/trap site and activities at the shafter Well location within the Blue Bell WSA. The current use levels of visitors in the areas occupied by wild horses tends to be low. In addition, the wilderness areas and WSAs tend to have very few trails, and so visitation is generally low. These areas generally appear highly undeveloped as few human effects are encountered. Visitors may commonly experience sights of human activity outside of wilderness and WSAs, but these sights are less extensive because wilderness areas and WSAs are mostly remote. Consequently, the degree of solitude is high, visitors have a high expectation of solitude, and visitors are more sensitive to disruptions of solitude. There would be no impacts to opportunity for unconfined recreation.

There are no supplemental values identified that would be impacted by gather operations.

Alternative B – Impacts would be similar to the Proposed Action.

Alternative C – Impacts would be similar as described for the Proposed Action for all qualities of Wilderness character except for the natural quality. There would be less long-term positive effects to the natural quality of wilderness character. Without effectively managing wild horse populations through reduced growth rates from fertility control or sex ratio adjustments, wild horse populations will grow at a faster rate and there will be more negative impacts to soil, vegetation and water source locations.

Past, Present, and Reasonably Foreseeable Future
Impacts to Wilderness/WSAs from past actions such as road development/improvement, grazing, range improvements, wildfire, recreation and OHV use have been accounted for within the designation of the Wilderness, its boundary, BLM Wilderness management plans and established WSA boundaries and interim management policy. Impacts from planned present and future actions should be limited to outside of the Wilderness/WSA boundary and within WSAs all planned actions will need to meet the non-impairment standard. It is, however, expected that the occasional illegal vehicle incursions, possible trespass, and wildfire either natural or human caused will continue to occur in these areas at much the same rate they have. Wild horse gather operations have occurred in the past and are likely to continue into the reasonably foreseeable future with the long term positive and temporary negative impacts occurring at the same rate that have been previously described. For the WSAs, it is reasonable to foresee that at some point in the future Congress will either designate some portion or all of these four WSAs as wilderness or release them for other uses.

No Action Alternative- The impacts from the No Action Alternative, in addition to past, present, and reasonably foreseeable future actions would have no negative temporary impacts to solitude and undeveloped but would have long term negative impacts to naturalness.

Proposed Action - The impacts from the Proposed Action, in addition to past, present and reasonably foreseeable future actions would continue to have temporary negative impacts to solitude and undeveloped during operations but would have beneficial impacts to naturalness.

Alternative B – Impacts are similar to those described in the Proposed Action.

Alternative C - Impacts are similar to those described in the Proposed Action with less beneficial impacts to natural.

3.9. Noxious Weeds and Invasive Non-Native Species

Affected Environment

Noxious and invasive species introduction and proliferation are a growing concern among local and regional interests. Noxious and invasive weeds are known to exist on public lands within the administrative boundaries of the Elko and Ely District offices (Appendix IX). Noxious and invasive weed species are aggressive, typically nonnative, ecologically damaging, undesirable plants, which severely threaten native rangeland, biodiversity, decrease forage quality, wildlife habitat, and ecosystems. Because of their aggressive nature, noxious and invasive weeds can readily spread into established plant communities primarily through ground disturbing activities. In addition, new populations can become established when the seeds hitchhike on equipment, vehicles, and people. The following noxious and invasive weed species are known to exist within the Antelope and Triple B Complexes or along drainages and roadways leading into them.

Table 8. Noxious and Invasive Weeds

Scientific Name	Common Name
Acroptilon repens	Russian knapweed
Carduus nutans	Musk thistle
Centaurea stoebe	Spotted knapweed
Centaurea squarrosa	Squarrose knapweed
Cirsium vulgare	Bull thistle
Conium maculatum	Poison hemlock
Hyoscyamus niger	Black henbane
Lepidium draba	Hoary cress
Lepidium latifolium	Perennial Pepperweed
Onopordum acanthium	Scotch thistle
Tamarix spp.	Salt cedar
Bromus tectorum	Cheatgrass
Salsola iberica	Russian thistle
Halogeton glomeratus	Halogeton

These species occur in a variety of habitats including roadside areas, rights-of-way, wetland meadows, and as well as undisturbed upland rangelands.

Environmental Effects

No Action Alternative – As a result of not having a gather component, noxious and/or invasive species would not be spread by vehicles associated with gather operations. Wild horse populations would remain over AMLs and the impacts to native vegetation from wild horse over-grazing and/or trampling would increase especially around water sources. The impacts to the present plant communities could lead to an expansion of noxious and invasive species.

Proposed Action and Alternatives B and C – Under the Proposed Action, B, and C, proposed gather activities may spread existing noxious and/or invasive species. This could occur if vehicles drive through infestations and spread seed into previously weed-free areas or arrives already carrying seeds attached to the vehicle or equipment. This is especially a concern as the gather crew moves from valley to valley. The contractor, together with the contracting officer's representative or project inspector (COR/PI), would examine proposed gather sites and holding corrals for noxious and invasive weed populations prior to construction. If noxious weeds are found, the location of the facilities would be moved. Any equipment or vehicles exposed to weed infestations or arriving on site carrying dirt, mud, or plant debris would be cleaned before moving into or within the project area. All gather sites, holding facilities, and camping areas on public lands would be monitored for weeds during the next several years. Despite short-term risks, over the long term the reduction in wild horse numbers and the subsequent recovery of the native vegetation would result in fewer disturbed sites that would be susceptible for non-native plant species to invade.

Past, Present, and Reasonably Foreseeable Future

No Action Alternative – Under the No Action Alternative, the impacts are reduced but still exist. By not gathering to AML the overall rangeland health would decrease thus allowing the opportunity for established noxious and invasive weed populations to expand and establish. Seeds can be carried on the horse's lower legs among their hair and fall off in other locations and establish as seedlings. There is a direct correlation between declining rangeland health and increasing noxious and invasive weed populations.

Proposed Action and Alternatives B and C – The impacts of the proposed gather could increase the existing noxious and invasive weed populations through vehicle traffic, foot traffic, gather sites, camp sites, and temporary holding and processing sites, however through awareness and location scouting the risks of spreading the populations can be reduced. New weed species could be introduced without proper inspection and washing, if necessary, of equipment and vehicles. Best Management Practices should be followed to reduce the risks.

3.10. Vegetation

Affected Environment

The vegetative plant communities within the Complexes have developed on many different soil types with several kinds of parent materials under varying climatic conditions through time. The vegetation is diverse with greasewood flats, desert shrub and sagebrush grasslands plant communities dominating the lower elevations while sagebrush, mountain shrub grasslands, pinyon-juniper woodlands, mountain mahogany, and mixed conifer plant communities dominating the benches and higher elevation sites.

The valleys and lower foothills are dominated by big sagebrush shrublands and salt desert scrublands. Greasewood flats and playas play a minor role in these areas. Big sagebrush shrublands are typically dominated by Wyoming big sagebrush (*Artemisia tridentata* spp. *wyomingensis*) or black sagebrush (*Artemisia nova*) in the overstory. In the understory, graminoid species typically include Indian ricegrass (*Achnatherum hymenoides*), Sandberg's bluegrass (*Poa secunda*), needlegrass (*Hesperostipa comata*), and bottlebrush squirreltail *(Elymus elymoides*). Common forb species include globemallow (*Sphaeralcea* sp.) and milkvetch (*Astragalus* sp.). Shadscale (*Atriplex confertifolia*), greasewood (*Sarcobatus vermiculatus*), sickle saltbush (*Atriplex falcata*), bud sagebrush (*Picrothamnus desertorum*), black sagebrush, winterfat (*Krascheninnikovia lanata*), and rabbitbrush (*Chrysothamnus* and *Ericameria* sp.) are common overstory species in salt desert scrub communities. Common graminoids include those listed above (except needlegrass), in addition to alkali sacaton (*Sporobolus airoides*), inland saltgrass (*Distichlis spicata*), western wheatgrass (*Pascopyrum smithii*), and basin wildrye (*Leymus cinereus*). Forbs are generally limited.

The upper foothills and lower mountain slopes are dominated by pinyon-juniper woodlands and mixed sagebrush shrublands. The pinyon-juniper community is primarily composed of Utah juniper (*Juniperus osteosperma*), Rocky Mountain juniper (*Juniperus scopulorum*) and singleleaf pinyon (*Pinus monophylla*). Understory shrub species, where present, typically include Wyoming big sagebrush, mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*), snowberry (S*ymphoricarpos* sp.), cliffrose (*Purshia stansburiana*) and serviceberry (*Amalanchier* sp.). Graminoid species include bluebunch wheatgrass (*Pseudoroegneria spicata*), Indian ricegrass, Thurber's needlegrass (*Achnatherum therberianum*), Sandberg's bluegrass, and bottlebrush squirreltail. Forbs are numerous and varied. Mixed sagebrush shrublands have similar understory species as compared to piñon-juniper woodlands, with the addition of little sagebrush (*Artemisia arbuscula*) as an important shrub component.

The higher mountainous areas are dominated by the montane sagebrush steppe, but also support some small mountain mahogany woodland and mixed conifer forest inclusions. The montane sagebrush steppe is dominated by mountain big sagebrush and little sagebrush, but also supports mountain browse species including serviceberry (*Amelanchier alnifolia*), mountain snowberry (*Symphoricarpos oreophilus*), chokecherry (*Prunus virginiana*) and antelope bitterbrush. Understory graminoids include bluebunch wheatgrass, slender wheatgrass (*Elymus trachycaulus*), Letterman's needlegrass (*Achnatherum lettermanii*), mountain brome (*Bromus marginatus*), muttongrass (*Poa fendleriana*), Sandberg's bluegrass, and Indian ricegrass. Forbs are many and varied, balsamroot (*Balsamorhiza* sp.), buckwheat (*Eriogonum* sp.), and milkvetch species are common. The high elevation forests and woodlands support many of these understory species in addition to tree species such as curl-leaf mountain mahogany (*Cercocarpus ledifolius*) limber pine (*Pinus flexilis*), white fir (*Abies concolor*), Rocky Mountain Douglas-fir (*Pseudotsuga menziesii* var. *glauca*) Engelmann spruce (*Picea engelmannii*), and Great Basin bristlecone pine (*Pinus longaeva*).

Annual non-native species such as halogeton (*Halogeton glomeratus*), cheatgrass (*Bromus tectorum*), prickly Russian thistle (*Salsola tragus*), and tall tumblemustard (*Sisymbrium altissimum*) are pervasive across the project area, if not always common. In many areas, past disturbance events (e.g. fire, long-term drought, inappropriate livestock grazing management, unsuccessful vegetation treatments, wild horse overgrazing etc.) have enabled annual species to dominate the landscape.

As the majority of the dominant vegetation communities in the project area (i.e. big sagebrush shrublands, lower elevation pinyon-juniper woodlands, mixed sagebrush shrublands, salt desert scrublands, and greasewood flats) are adapted to arid climates with narrow windows for plant establishment and recovery, the resilience of these communities to disturbance is relatively low (Davies et al. 2015; Holechek 2010; Pyke 2011; Romo et al. 1995; Stringham et al. 2015). As such, care needs to be taken in these communities to ensure that ecological thresholds are not crossed. When transitions to alternative stable states are made in these vegetation communities, the recovery of crucial ecosystem processes and functions may not be possible without substantial energy input (Anderson and Holte 1981, Anderson and Inouye 2001, Briske et al. 2008; Clements 2010, Pyke 2011, Rice and Westoby 1978, Stringham et al. 2015; Wambolt and Payne 1986, West et al. 1984).

Rangeland Health Standards have been assessed on several livestock grazing allotments overlapping with Antelope and Triple B Complexes. See Appendix VIII for a summary of these determinations. The majority of the assessed grazing allotments within the Complexes are not meeting one or more of the Rangeland Health Standards directly and/or indirectly related to impacts to hydrologic cycle, soil health, wildlife habitat quality, and site stability caused by altered structure and composition of the present plant communities. Current and historical livestock grazing management, wild horses, drought, lack of wildfire, insects, invasive species, and road construction have been attributable factors to not meeting Standards. The causal factors listed above have caused shifts in the vegetation communities such as increased shrub dominance, reduced native perennial grass and forb cover, and increased invasive species spread.

Environmental Effects
No Action Alternative – Under the no action alternative, no direct impacts to vegetation resources from gather related activities would occur. Wild horse populations would remain over appropriate management levels and populations levels would continue to grow. The impacts to vegetation through consumption or trampling would increase proportionally to wild horse population levels and deteriorations in plant health, reproduction, diversity, and site appropriate composition would be expected. As plants become over utilized, their vigor reduces, and they have reduced abilities to reproduce or recover. By reducing opportunities for photosynthetic processes through grazing, the plants would be more susceptible to other stressors such as drought. Although repeated excessive defoliations can singularly lead to plant mortality, it is a more likely outcome when compounded by multiple negating factors. Loss of desirable forage species will lead to increases in less desirable species and will continue to shift vegetative communities into increasingly degraded states from which recovery becomes increasingly difficult to impossible. Over time forage resources would become less available, impacting wild horse herd health, and wild horses would be more susceptible to disease and drought.

Proposed Action – Expected effects of the proposed action on vegetative resources include trampling of vegetation by wild horses at gather sites and holding locations and crushing vegetation by vehicles, temporary corrals, and holding facilities. These impacts would be short term and highly localized in nature, as gather corrals and holding facility locations are usually placed in previously disturbed sites (e.g. gravel pits) which are easily accessible to livestock trailers and standard equipment using existing roads. These disturbed areas would be less than one acre in size. No new roads would be created. These impacts are temporary, and vegetation is expected to recover within the next growing season. Noxious and invasive species are analyzed in Section 3.9.

Wild horse population within the established AML would benefit vegetation by reducing the grazing pressure on the forage resources. Forage utilization would be reduced. The impacts to vegetation by grazing or trampling based on the reduction in wild horse numbers to AML would result in maintaining or improving vegetation health and vigor, diversity, and composition by allowing the plants to maintain and continue photosynthetic processes to initiate regrowth and reproduction.

Alternative B – Impacts would be similar to those of the Proposed Action but to a lesser extent.

Alternative C – Impacts would be similar to those of the Proposed Action but to a lesser extent.

Past, Present, and Reasonably Foreseeable Future
No Action Alternative – Under the no action alternative, wild horse populations would continue to increase leading to greater resource use and consumption. As vegetative forage resources become degraded and more scarce, wild horses are likely to emigrate outside of the herd management areas and have impacts to vegetation resources in new areas. Alongside vegetative resources, soil resources would also be expected to be degraded which would have negative effects and feedback on the vegetative communities. Where site-specific vegetation management objectives and Standards for Rangeland Health are not being achieved, they would likely continue not being achieved. Where standards are being achieved, it is possible they would transition to not being achieved. Opportunities to improve rangeland health and that of the vegetation, by bringing the wild horse population to AML and reducing vegetation utilization and trampling, would be lost.

Degraded vegetative resources and reduced amounts of available forage over time will have negative effects on livestock grazing and wildlife, and it may affect permitted livestock use in grazing allotments that overlap with the Complexes and wildlife populations and movement.

Pressure and degradation on vegetative resources under the no action alternative would be impacted by disturbances and losses of vegetation associated with present and future solid and fluid mineral exploration and activities, and future renewable energy development.
Past, present, and future fuel treatment projects are expected to increase plant communities' resilience, and they may have positive impacts on vegetative resources.

Proposed Action and Alternatives B and C – Under the Proposed Action, wild horse populations would be at or near AML for the longest amount of time, compared to the alternatives. This would reduce excess pressure on the vegetative resources. Over time this would likely improve plant health, reproduction, diversity, and composition. The effects of Alternatives B and C would be similar to the Proposed Action, but they would not be as long lasting because the reproductive rates of the wild horse would not be reduced or controlled to the same extent.

The positive effects of fuel treatment projects would have a greater impact on vegetation than compared to the no action alternative. Negative impacts from disturbances and losses of vegetation associated with present and future solid and fluid mineral exploration and activities, and future renewable energy development would be to a lesser extent than the no action alternative because wild horse populations would be at or near AML. Negative effects to vegetative and forage resources that would directly impact livestock grazing and wildlife would be reduced under the proposed action and other alternatives.

3.11. Soils/Watershed

Affected Environment
Soils within the Complex are typical of the Great Basin and vary with elevation. Soils range in depth from very shallow (below 20 inches to bedrock) to deep (greater than 60 inches to bedrock) and are typically gravelly, sandy and/or silt loams. Soils that are located on low hill slopes, upland terraces, and fan piedmont remnants are typically shallow to deep over bedrock or indurated lime hardpan. They are highly calcareous and medium textured with gravel. Soils on mountain slopes are also calcareous and range from shallow to deep over limestone. Some of the mountain soils have high rock fragment content, and support pinyon and juniper trees. Mountain soils typically have gravelly to very gravelly loam textures. Soils on floodplains and fan skirts are deep, have silt textures, and are highly calcareous.

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

Proposed Action- Project implementation would stay on existing roads, washes and horse trail areas, and would disturb relatively small areas used for gathering and holding operations. Horses may be concentrated for a limited period of time in traps. Potential for soil compaction would occur but would be minimal and temporary and is not expected to adversely impact soil or hydrologic function. Soils and watersheds would remain at or near the current condition. However, soils and watersheds would likely see improvement over time since wild horse population would be gathered in increments and growth rates would be less under this alternative.

Alternative B- Impacts would be similar to the Proposed Action; however, long term impacts may improve the area due to less soil compaction from trailing.

Alternative C- Impacts would be similar to those described for the Proposed Action.

Past, Present, and Reasonably Foreseeable Future
Proposed Action and Alternatives B and C – Impacts to soils/watersheds within the Complexes have resulted from past and present actions such as grazing, road construction and maintenance, OHV use and recreation, mining and processing activities, aggregate operations, public land management activities, and wildland fire.

Impacts to soils/watersheds from RFFAs would be similar to those described above for past and present actions, as these activities are expected to continue into the future. Direct impacts from the Proposed Action would include the short-term incremental impact of disturbance and compaction from hoof action around horse corrals. However, the long-term incremental impact to soil resources/watersheds would be positive as the number of horses are decreased with this gather and over time with subsequent gathers. This would result in restored soil structure, increased stability, and improved biological function of soils resulting in increased water-holding capacity, reduced erosion and enhanced vegetation community support.

No Action Alternative – Under the No Action Alternative, no incremental gather-associated impacts would occur to soils/watersheds, thus the declining conditions from compaction, erosion, and consequent poor vegetation support would continue to increase as horse populations increase.

3.12. Fire / Fuels

Affected Environment
The Complexes are located in areas that are dominated by vegetation typical of the great basin consisting of Pinyon and Juniper Woodlands, Sagebrush ecological sites, Salt Desert Scrub and Greasewood communities (see Vegetation 3.10 for a detailed description). Maintaining a balance of grazing animals and controlling the timing and amount of forage that is consumed each year by wildlife, livestock, and wild horses is crucial to maintaining healthy upland plant communities within the HMAs. Appropriate grazing levels by large ungulates has been associated with the known effect of reducing the cover, density, and volume of fuels, particularly fine fuels, on the landscape (Schmelzer et al., 2014). In turn, this reduces the probability and severity of catastrophic wildfires. Within the shrub and grasslands of the HMAs and surrounding areas, the fuel reducing benefits are known. Recent research has identified that grazing by many global herbivore species, including but not limited to horses, aids in the reduction of fuel loading and the impact of grazing by herbivores, including livestock, have long been recognized (Rouet-Leduc, 2021; Davies et al., 2010).

Year-round heavy grazing on upland vegetation from all ungulates reduces the overall amount of fuels available for wildfires but heavy grazing does not allow upland sites to recover from past disturbances and those areas are in danger of trending downward in ecological health and increasing in annual invasive grasses. Additionally, plant communities and sagebrush ecosystems that have been impacted in the past by wildfires and historic livestock grazing are vulnerable to losing more of their native perennial grass component when grazed at higher than moderate utilization levels (less than 60%) (USFS, 2017).

Past and present fire history data within the Triple B HMA Complex shows that there have been 354 reported ignitions for a total of 68,615 acres over the last 30 years. The mean fire size is 233 acres with the largest being 17,054 acres burned within the HMA. Over the last 20 years there has been a total of 81,895 acres hazardous fuels reduction and habitat improvement treatments completed within he Triple B HMA.

Past and present fire history data within the Antelope HMA Complex shows that there have been 225 reported ignitions for a total of 49,924 acres within the HMA over the last 20 years. The mean fire size is 222 acres with the largest being 10,900 acres. In the last 25 years there have been a total of 105,735 acres of hazardous fuels reduction and habitat improvement treatments completed within the Antelope HMA Complex.

Past and present fire history data within the Cherry Springs Wild Horse Territory shows that there have been 24 reported ignitions for a total of 3,513 acres within the HMA over the last 20 years. The mean fire size is 146 acres with the largest being 3,496 acres burned within the HMA. Over the last 20 years only one fire reported in the area burned more than 10 acres. In the last 9 years there have been a total of 16,742 acres of hazardous fuels reduction and habitat improvement treatments completed within the Cherry Springs Wild Horse Territory.

Environmental Effects

No Action Alternative – The No Action Alternative could be expected to result in a continued decrease of the overall availability of fuels, particularly fine fuels, within the HMAs and surrounding areas in the short term. However, it would result in a continued increase in the number of wild horses above AML, which would have compounding negative impacts upon upland vegetation composition and the potential for future fires. The continued overgrazing of the landscape could be expected to decrease the native grass component and increase the invasive non-native species across the landscape which would reduce the resistance and resiliency of the landscape to disturbance such as wildfires. The increase in invasive non-native species would promote a more frequent and intense fire cycle that would further reduce native species across the landscape. Vegetation treatments for the purpose of habitat improvement and watershed restoration would be reduced due to the low probability of success.

Proposed Action – The growing scientific literature has continued to affirm that even though grazing reduces fuel loading, proper grazing management is critical for the advancement of land health characteristics (Copeland et al., 2023). Soil health, hydrologic function, and biotic integrity are all impacted differently depending on the location, timing, duration, and intensity of grazing management (Hennig et al., 2021). Properly managed grazing is critical to achieve reductions in fuel loads while curbing the expansion of invasive annual grasses, promoting native perennial species, and protecting sensitive riparian habitats. Research continues to indicate that a variable season of use contributes to site resiliency while repeated early-season, high intensity use, contributes to the degradation of rangelands and the expansion of annual grasses (Copeland et al., 2023; Davies et al., 2015; Davies et al., 2024). Moderate fall grazing of uplands has also been identified with the reduction of invasive annual grasses and the promotion of native perennial species (Copeland et al., 2023; Davies et al., 2010).

While the BLM is granted the duty of managing wild horses, the day-to-day movement of wild horses on the range is inherently unmanaged from a livestock management perspective (Davies & Boyd, 2019). With the exception of fencing, wild horses graze whatever location they want to, for whatever timing and duration they want to, and whatever intensity (amount) they want to. In more natural systems, predation may augment the location, timing, and duration. However, wild horses face very limited predation and subsequently impressive reproduction rates as a result (Garrott, 2018).

Under Alternative A the numbers of wild horses would be reduced to the AML range, which would result in a short-term increase in the volume of fine fuels throughout the HMAs. This would be due to a reduction in total amount of forage consumed year-round by the wild horses on the HMAs and surrounding areas. The increase of fuels available, especially during the late summer months, could result in a theoretical increase in wildfires in the short term. Conversely, the removal of excess wild horses may reduce the long-term increase in areas dominated by annual invasive grasses (cheatgrass). Reducing the amount of future area potentially dominated by annual invasive grasses and would theoretically reduce the size and frequency of future fires. Wild horses being managed at AML would increase the likelihood of successful hazardous fuels reduction and habitat improvement treatments within the Complexes. This would increase the likelihood that approved treatments would be implemented across the landscape and active restoration of the landscapes.

Alternative B – Impacts of Alternative B would be similar to those of the Proposed Action as the population would be managed within AML.

Alternative C – Impacts of Alternative C would be similar to those of the Proposed Action as the population would be managed within AML.

Past, Present, and Reasonably Foreseeable Future
It would be expected that the current rates and trends in ignition of wildfires would remain as see in the past and present fire history data presented in the affected environment. The current land management actions that impact wildfires and wildfire management would be expected to continue as is. Hazardous fuels reduction and habitat improvement projects would trend in different directions based upon the alternative selected.

No Action Alternative – Under the no action alternative wild horse populations would be expected to increase at the national average of 20-25%. The increased herbivory and impacts of this increasing population could be expected to reduce fine fuels in the short term. In the long term it could be anticipated that it would lead to a reduction of native understory species and an increase in non-native invasive species. The fire regime could be expected to shift to a more frequent and intense fire regime as favored by non-native invasive species such as cheatgrass. Hazardous fuels reduction and habitat improvement projects would continue to avoid areas that are over AML resulting in less active improvement of the landscape.

Proposed Action – The proposed action would manage wild horse populations at AML and would promote appropriate grazing across the landscape. This would be expected to increase fine fuels in the short term but would also lead to an increase in native understory species. This would increase the landscapes resistance to disturbance and resilience to change following disturbance maintaining a healthier landscape long term.

Alternative B – Impacts of Alternative B would be similar to those of the Proposed Action as the population would be managed within AML.

Alternative C – Impacts of Alternative C would be similar to those of the Proposed Action as the population would be managed within AML.

3.13. Socioeconomics

Socioeconomics considerations include the value placed on wild horses that may contribute to the economy. At this time there are no registered guided tours or known sales of commercial pictures being sold to increase the value to the communities from the wild horses that reside within or outside the Complexes. It is acknowledged that some people that drive through the general area may stop and view or photograph wild horses contributing to the Complexes' intrinsic value.

Potential negative impacts are those that may affect wildlife enthusiasts that hunt, photograph, and guide big game that have abandoned use of the area due to the poor condition of wildlife habitats or wildlife populations resulting in part from the overpopulation of wild horses. Although grazing permits have not been recently reduced as a direct result of the overpopulation of wild horses, the strain of excess horses on the land, as well as impacts from recent drought and fires, have cumulatively put a strain on many agricultural related businesses in the area.

It is not possible to quantify the revenue or losses attributable to the Antelope and Triple B Complexes wild horses. It is recognized that for local industries the excess wild horses cause a negative impact to resources and to many businesses that rely on healthy range conditions, and healthy wildlife in the area. It is also recognized that any revenue brought by tourism, and photography of wild horses in the Complexes has not been quantified.

4.0 Impact Analysis Area

The impact analysis area is the Antelope and Triple B Complexes. (Appendix I).The issues of major importance that are analyzed are maintaining rangeland health and achieving and managing within AML ranges.

Past, Present, and Reasonably Foreseeable Future Actions

The past, present, and reasonably foreseeable future actions applicable to the assessment area are identified (Table 9) across the impact analysis area.

Impact Analysis Area Summary

Area Boundary	Critical Element, Resource	Selection Rationale
1. Grazing Allotments overlapping the project area	Livestock and Vegetation	Livestock are managed at the allotment level.
2. Project Area	Wild Horse HMAs, Wetlands /Riparian Zones, Soils, Cultural Resources, Public Health and Safety, Fisheries and Aquatic Species, and Invasive, Non-native Species	Resources are contained within the Project Area (e.g. wild horses) or interact weakly with elements outside the Allotment boundaries (e.g. soils, vegetation, etc.).
3.Project Area + four-mile buffer	Terrestrial Wildlife, Special Status Species, and Migratory Birds	The four-mile buffer around project area that is used for GRSG seasonal habitat delineations.
4.Wilderness and WSA	Wilderness and WSA	Wilderness and WSA Boundaries

Table 9. Past, Present, and Reasonably Foreseeable Future Actions

Project -- Name or Description	Status (x)		
	Past	Present	Future
Issuance of multiple use decisions and grazing permits for ranching operations through the allotment evaluation process and the reassessment of the associated allotments.	X	X	X
Livestock grazing	X	X	X
Range Improvements (including fencing, wells, and water developments). BLM would first need to file an application with the state to appropriate water from the affected source(s) and would follow all laws and BLM policy.	X	X	X
Wild horse and burro gathers	X	X	X
Wild horse and burro management: issuance of multiple use decisions, AML adjustments and planning	X	X	X
Mineral exploration, Mining, geothermal exploration and abandoned mine land reclamation	X	X	X
Recreation	X	X	X
Wildlife guzzler construction	X	X	X
Invasive weed inventory/treatments	X	X	X
Fuels reduction treatment projects (Chaining, tree shrub removal)	X	X	X
Renewable energy projects			X
Transmission line and other right of way projects	X	X	X

Any future proposed projects within the Complexes would be analyzed in an appropriate environmental document following site specific planning. Future project planning would also include public involvement.

Past Actions

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

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

Antelope HMA

The Ely District's 1983 Schell Management Framework Plan designated the Antelope HMA for long-term management of wild horses. The Ely District Record of Decision (ROD) and Approved Resource Management Plan (RMP) re-affirmed the boundaries and long-term management of wild horses in August of 2008. The Antelope HMA is nearly identical in size and shape to the original herd area representing where wild horses were located in 1971. Currently, management of the Antelope HMA and wild horse population is guided by the 2008 Ely District ROD and RMP. The AML range for the Antelope HMA is 150-324 wild horses. The Land Use Plan analyzed impacts of management's direction for grazing and wild horses, as updated through Bureau policies, Rangeland Program direction, and Wild Horse Program direction. Forage was allocated within the allotments for livestock use and range monitoring studies were initiated to determine if allotment objectives were being achieved, or that progress toward the allotment objectives was being made.

Antelope Valley HMA

The 1993 WRMPWHA established the Antelope Valley HMA. Through this analysis and the subsequent Record of Decision (ROD), 44 percent of the Cherry Creek HA was incorporated into the Antelope Valley HMA. The new boundary would ensure sufficient habitat for wild horses, and an AML of baseline of 240 wild horses was reviewed and set to achieve a thriving natural ecological balance and rangeland health for the HMA. The WRMPWHA stated that adjustments would be based on monitoring and grazing allotment evaluations. The baseline AML for the HMA was established at 155-259 wild horses through a combination of the 1994 Antelope Valley Final Multiple Use Decision (FMUD), the 1998 Badlands FMUD, the 1998 Spruce FMUD, the 2001 Maverick-Medicine Complex FMUD, the 2001 Sheep Allotment Complex FMUD and the 2002 Big Springs FMUD.

Goshute HMA

The 1993 WRMPWHA established the Goshute HMA. Through this analysis and the subsequent Record of Decision (ROD), the boundaries of the Goshute HMA were adjusted to remove lands within the checkboard land areas that would be managed as wild horse free. The new boundary would ensure sufficient habitat for wild horses, and an AML of baseline of 160 wild horses was reviewed and set to achieve a thriving natural ecological balance and rangeland health for the HMA. The WRMPWHA stated that adjustments would be based on monitoring and grazing allotment evaluations. The baseline AML for the HMA was established at 73-124 wild horses through a combination of the 1998 Spruce FMUD, the

2000 Sheep Allotment Complex FMUD and the 2002 Big Springs FMUD.

Spruce-Pequop HMA
The 1993 WRMPWHA established the Spruce-Pequop HMA. Through this analysis and the subsequent Record of Decision (ROD), the boundaries of the HMA were adjusted to remove lands within the checkboard land areas would be managed as wild horse free. The new boundary would ensure sufficient habitat for wild horses, and an AML of baseline of 82 wild horses was reviewed and set to achieve a thriving natural ecological balance and rangeland health for the HMA. The WRMPWHA stated that adjustments would be based on monitoring and grazing allotment evaluations. The baseline AML for the HMA was established at 57-82 through the 1998 Spruce FMUD.

Triple B HMA
The Ely District's 1987 Egan Management Framework Plan (MFP) designated the Buck and Bald, Butte and Cherry Creek HMAs for long-term management of wild horses. The HMAs were later combined into the Triple B HMA in the Ely District Record of Decision (ROD) and Approved Resource Management Plan (RMP) in August of 2008 due to interchange between the three HMAs. The Triple B HMA is nearly identical in size and shape to the original herd areas representing where wild horses were located in 1971. Currently, management of the Triple B HMA and wild horse population is guided by the 2008 Ely District ROD and RMP. The AML range for the Triple B HMA is 250-518 wild horses. The Land Use Plan analyzed impacts of management's direction for grazing and wild horses, as updated through Bureau policies, Rangeland Program direction, and Wild Horse Program direction. Forage was allocated within the allotments for livestock use and range monitoring studies were initiated to determine if allotment objectives were being achieved, or that progress toward the allotment objectives was being made.

Maverick-Medicine HMA
The 1993 WRMPWHA established the Maverick-Medicine HMA. Through this analysis and the subsequent Record of Decision (ROD), 56 percent of the Chery Creek HA was incorporated into the Maverick-Medicine HMA. The new boundary would ensure sufficient habitat for wild horses, and an AML of baseline of 389 wild horses was reviewed and set to achieve a thriving natural ecological balance and rangeland health for the HMA. The WRMPWHA stated that adjustments would be based on monitoring and grazing allotment evaluations. The baseline AML for the HMA was established at 166-276 through the 1994 West Cherry Creek FMUN, 1998 Spruce FMUD, and the 2001 Maverick-Medicine FMUD.

Antelope and Triple B Complexes
Integrated wild horse management has occurred in the Antelope and Triple B Complexes. Twelve gathers have been completed in the past seven years on part or all of the HMAs/WHT, and future gathers would be scheduled on a 4- or 5- year gather cycle. Approximately 14,849 wild horses have been removed from the HMAs/WHT in the last seven years; populations are thriving and have not been negatively impacted.

Adjustments in livestock season of use, livestock numbers, and grazing systems were made through the allotment evaluation/multiple use decision process. In addition, temporary closures to livestock grazing due to extreme drought conditions, were implemented to improve range condition.

The Northeastern Great Basin RAC developed standards and guidelines for rangeland health that have been the basis for assessing rangeland health in relation to management of wild horse and livestock grazing within the Ely and Elko Districts. Adjustments in livestock numbers, season of use, grazing season, and permitted use have been based on the evaluation of progress made toward achieving the standards.

Several oil and gas exploration wells have been drilled across the impact analysis area. However, none of these wells have gone into production. The Ely RMP/EIS summarized the history of oil and gas exploration on pages 3.18-7 to 3.18-9.

Historical mining activities have occurred throughout the impact analysis area.

Present Actions

Today the Antelope Complex has an estimated population of 4,258 wild horses and the Triple B Complex has an estimated population of 1,909 wild horses (May 2025 population estimate). Resource damage is occurring in portions of the Complexes due to excess wild horses. Current BLM policy is to conduct removals targeting portions of the wild horse population based upon age and allowing the correction of any sex ratio problems that may occur. Further, the BLM's policy is to conduct gathers in order to facilitate a four-year gather cycle and to reduce population growth rates where possible. Program goals have expanded beyond establishing a "*thriving natural ecological balance*" by setting AML for individual herds to now include achieving and maintaining healthy and stable populations and controlling population growth rates.

Though authorized by the WFRHBA, current appropriations and policy prohibit the destruction of healthy animals that are removed or deemed to be excess. Only sick, lame, or dangerous animals can be euthanized, and destruction is no longer used as a population control method. An amendment to the WFRHBA allows the sale of excess wild horses that are over 10 years in age or have been offered unsuccessfully for adoption three times. BLM is adding additional long-term grassland pastures in the Midwest and West to care for excess wild horses for which there is no adoption or sale demand.

The BLM is continuing to administer livestock grazing permits and authorize grazing within the impact analysis area. Within the proposed gather area sheep and cattle grazing occurs on a yearly basis. Wildlife use by large ungulates such as elk, deer, and antelope is also common in the impact analysis area.

The focus of wild horse management has also expanded to place more emphasis on achieving rangeland health as measured against the RAC Standards. The Northeastern Great Basin RAC standards and guidelines for rangeland health are the current basis for assessing rangeland health in relation to management of wild horses and livestock grazing within the Ely and Elko Districts. Adjustments to livestock numbers, season of use, and allowable use are based on evaluating achievement of or making progress toward achieving the standards.

Fuel treatments are expected to increase forage availability and increase site resilience.

Gold/mineral exploration and mining is on-going in the impact analysis area, occurring in the Complexes.

Active oil and gas leases occur throughout the impact analysis area. Many oil and gas lease sales have taken place and currently are ongoing.

Geothermal leases have occurred in the northern part of the impact analysis area.

Active mining and mineral exploration has been approved for Bald Mountain Mine located in the northwestern part of the Triple B HMA.

Reasonably Foreseeable Future Actions

In the future, the BLM would manage wild horses within HMAs that have suitable habitat for an AML range that maintains adequate levels of genetic diversity, age structure, and targeted sex ratios. Current policy is to express all future wild horse AMLs as a range, to allow for regular population growth, as well as better management of populations rather than individual HMAs. The Ely BLM District completed the *Ely Proposed Resource Management Plan/Final Environmental Impact Statement* (RMP/EIS, 2007) released in November 2007 which analyzed AMLs expressed as a range and addressed wild horse management on a programmatic basis. The 1993 WRMPWHA established baseline AML's Future wild horse management in the BLM's Ely and Elko Districts as well as the USFS's Humboldt-Toiyabe National Forest would focus on an integrated ecosystem approach with the basic unit of analysis being the watershed. In 2014 the Bristlecone Field Office completed the Newark and Huntington Watersheds Implementation and Restoration Plan. This plan identifies actions associated with habitat improvement within the complex. The BLM would continue to conduct monitoring to assess progress toward meeting rangeland health standards. Wild horses would continue to be a component of the public lands, managed within a multiple use concept.

As the BLM and USFS achieve AML on a national basis, gathers should become more predictable due to facility space. Fertility control should also become more readily available as a management tool, with treatments that last between gather cycles reducing the need to remove as many wild horses and possibly extending the time between gathers. The combination of these factors should result in an increase in stability of gather schedules and longer periods of time between gathers.

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

There are 5 approved Plan of Operations (PoO) inside the Triple B Complex. Three are associated with Kinross Gold Mining Inc's Bald Mountain Mine. The North Operations Area (NOA), South Operations Area (SOA), and Regional Exploration Area. The locations of these PoO are nestled in the Southern Ruby Mountains and is straddled by Northern Newark Valley and Long Valley. The other two PoO are for exploration projects on the Western slopes of the Cherry Creek Range. NevGold's Limo Butte and Ridgeline's Selena. There are also several active Notice level exploration projects in and around these two larger exploration projects. Cherry Creek is a historic mining district and has dozens of Abandoned Mine Lands surrounding the area.

There are no active Notices or Plan of Operations within the boundary of the Antelope Complex. There are dozens of active mining claims within the Triple B and Antelope Complexes. While likely to not cause a conflict with a gather, an operator can start exploration activity within 15 days of notifying the BLM. The General Mining Act of 1872 entitles the claimant to the mineral rights of his claim on public land that is not withdrawn.

The Ely District Office has experienced continual and increased interest in Renewable Energy project applications, particularly in the Jake's Valley area, though applications exist in many areas of the Ely District. With several large-scale transmission lines proposed to cross the district, the existing 368 Corridor, as well as a proposed expansion of the Robinson Substation in Jake's Valley, it is reasonable to expect continued submission of Renewable Energy projects in the district.

Within the Ely District, the 2024 Utility-Scale Solar Energy Development PEIS has designated approximately 179,831 acres in the Triple B Complex and approximately 48,361 acres in the Antelope

Complex as open for development. Proposed solar project applications received have generally proposed fencing of the project boundaries and if approved would limit transitory access in those areas. While the Ely District has received a number of applications for renewable energy related projects, none of the submitted applications within the Triple B HMA are being actively processed.

The Southwest Intertie Project 500k transmission line is proposed to go through portions of the Antelope Complex. No other applications with proposed activities within the Antelope Complex are actively being processed.

Impacts Conclusion
Past actions regarding the management of wild horses have resulted in the current wild horse population within the Complexes. Wild horse management has contributed to the present resource condition and wild horse herd structure within the gather area.

The combination of the past, present, and reasonably foreseeable future actions, along with the Proposed Action or action alternatives, should result in more stable and healthier wild horse populations, healthier rangelands (vegetation, riparian areas and wildlife habitat), and fewer multiple-use conflicts within the HMAs and WHT.

Most past and all present and reasonably foreseeable future actions have noxious and invasive weed prevention stipulations and required weed treatment requirements associated with each project. This in combination with the active BLM Ely and Elko Districts Weed Management Programs would minimize the spread of weeds throughout the watershed. Under Alternatives A, B and C the risk from wildfire would be reduced due to increased resilience of the landscape due to reduced disturbance. Under the no action alternative wildfire risk would increase due to increased potential for non-native species and altered fire regimes.

5.0 Mitigation Measures and Monitoring

The BLM has already incorporated design features into the Proposed Action and alternatives. These design features are listed as SOPs (Appendix II, III, and IV) and represent the "best methods" for reducing impacts associated with gathering, handling, and transporting wild horses and collecting herd data. Hair follicle samples would be collected to establish an ongoing genetic baseline measure for the wild horses from the Complexes. Additional samples would be collected during future gathers (in 10-15 years) to determine trend. If monitoring indicates that genetic diversity (as measured in terms of observed heterozygosity) is not being adequately maintained (BLM 2010), additional young mares from HMAs in similar environments may be added every generation (every 8-10 years) to avoid inbreeding depression and to maintain acceptable genetic diversity. Samples may also be analyzed for genetic ancestry. Ongoing resource monitoring, including climate (weather), and forage utilization, population inventory, and distribution data would continue to be collected. There are no separate mitigation measures necessary, as all reasonable means of reducing adverse environmental impacts have already been incorporated into the Proposed Action and alternatives as design features.

Riparian areas are the most sensitive (reactive to changes in management) part of the land and are central to wildlife, water quality, human recreation, and to the welfare of wild horses. If AML is at the right level, when populations are at AML and when livestock grazing with animal movement would otherwise enable plant growth and recovery (Wyman et al. 2006, Swanson et al. 2015, Maestas et al. 2023), the at-risk riparian areas should and need to improve. The improving trend is most important and most monitorable along the green line using multiple indicator monitoring (MIM) (Burton et al 2011, 2024/in press, Burdick et al 2021, Swanson et al 2024). The benefit of MIM is the large number of degrees of freedom along the green line that has consistent potential to grow riparian stabilizer species in the perennially moist soil.

This riparian green line method is perhaps the most important resource monitoring needed on the Complex and the locations where this improving trend with AML should happen should be called out.

Ongoing resource monitoring, including climate (weather), and forage utilization, population inventory, and distribution data would continue to be collected. However, there are no separate mitigation measures necessary, as all reasonable means of reducing adverse environmental impacts have already been incorporated into the Proposed Action and alternatives as design features.

6.0 Consultation and Coordination

The BLM hosts public hearings annually to discuss the use of motorized vehicles, including helicopters and fixed-wing aircraft, in the management of wild horses and burros. During these meetings, the public is given the opportunity to present new information and to voice any concerns regarding the use of the motorized vehicles. The BLM hosted its annual public hearing on the use of motorized vehicles in the management of wild horses and burros on May 6, 2025, via a Microsoft Teams webinar. A total of 17 individuals provided oral comments during the hearing, and 3,084 written comments were submitted by email. Most public input expressed opposition to the use of helicopters for gathering excess wild horses and burros. All oral and written comments submitted by the deadline are part of the official record. In response to the concerns raised, the BLM reviewed its Standard Operating Procedures (SOPs) governing motorized vehicle use. Based on this review, no changes to the SOPs were warranted.

The use of helicopters and motorized vehicles has proven to be a safe, effective, and practical means for the gather and removal of excess wild horses and burros from the range. Since 2006, Nevada has gathered over 40,000 animals with a total mortality of approximately 1.1% (of which 0.5% was gather related), which is very low when handling wild animals. BLM also avoids gathering wild horses prior to or during the peak of foaling and does not conduct helicopter removals of wild horses during March 1 through June 30.

The BLM has coordinated with Nevada Department of Wildlife (NDOW) during their yearly coordination meeting. As required by the GRSG Land Use Plan Amendment (2015), NDOW has reviewed the Greater sage-grouse form and RDF's for wild horse gathers in the Complexes. BLM would continue to coordinate with NDOW regarding staging, trapping, and corral locations to minimize impacts to wildlife.

The Ely and Elko Districts issued a Management Evaluation for the Complexes to interested individuals, agencies and groups for a 30-day public review and comment period that opened on October 14, 2024 and closed November 14, 2024. Approximately 6,000 scoping comments were received, primarily as form letters, from individuals, organizations and agencies. Many of these comments contained overlapping issues/concerns which were consolidated and considered in this Environmental Assessment.

Tribal Coordination Letters were sent on February 4th, 2025, and one comment was received.

7.0 List of Preparers

Table 10. List of Preparers

Ely District Office		
Name	**Title**	**Responsible for the Following Section(s) of this Document**
Sadie Leyba	Wild Horse Specialist	Project Lead/ Wild Horse Specialist
Lizzie Nohr	Wildlife Biologist	Wildlife, Migratory Birds, Special Status Species
Matt Rajala	Fire / Fuels	Fire/ Fuels
Sherly Post	Natural Resource Specialist	Noxious/Invasive Weeds
John Miller	Wilderness Planner	Wilderness/WSA
Andy Gault	Hydrologist	Soil, Water, Wetlands and Riparian/Flood Plans
Stephen Andersen	Rangeland Management Specialist	Livestock Grazing, Vegetation
Sam Haigh	Rangeland Management Specialist	Livestock Grazing, Vegetation
Robert Nash	Archaeologist	Cultural Resources
Robert Nash	Native American Coordinator	Native American Religious Concerns

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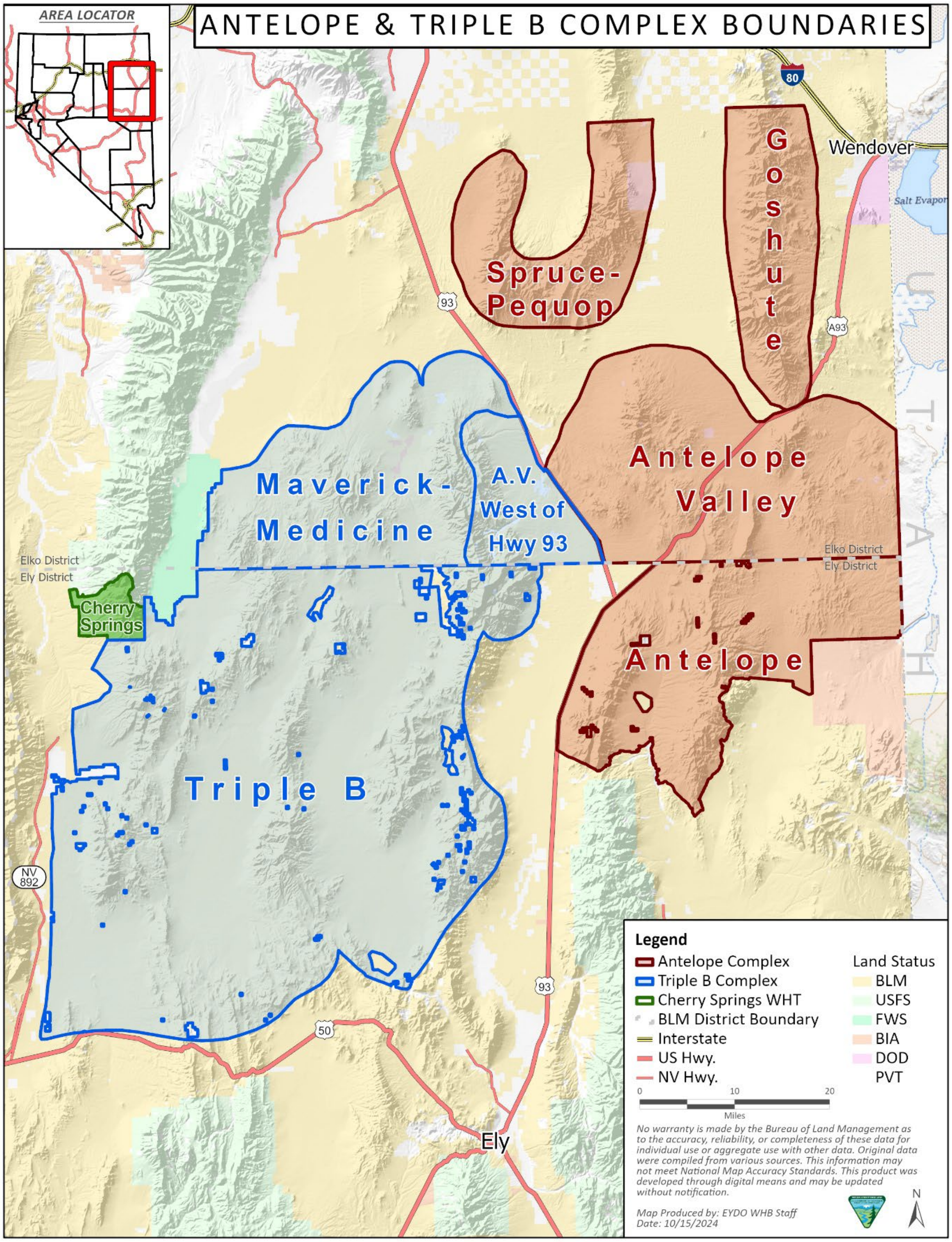
8.6 Acronyms

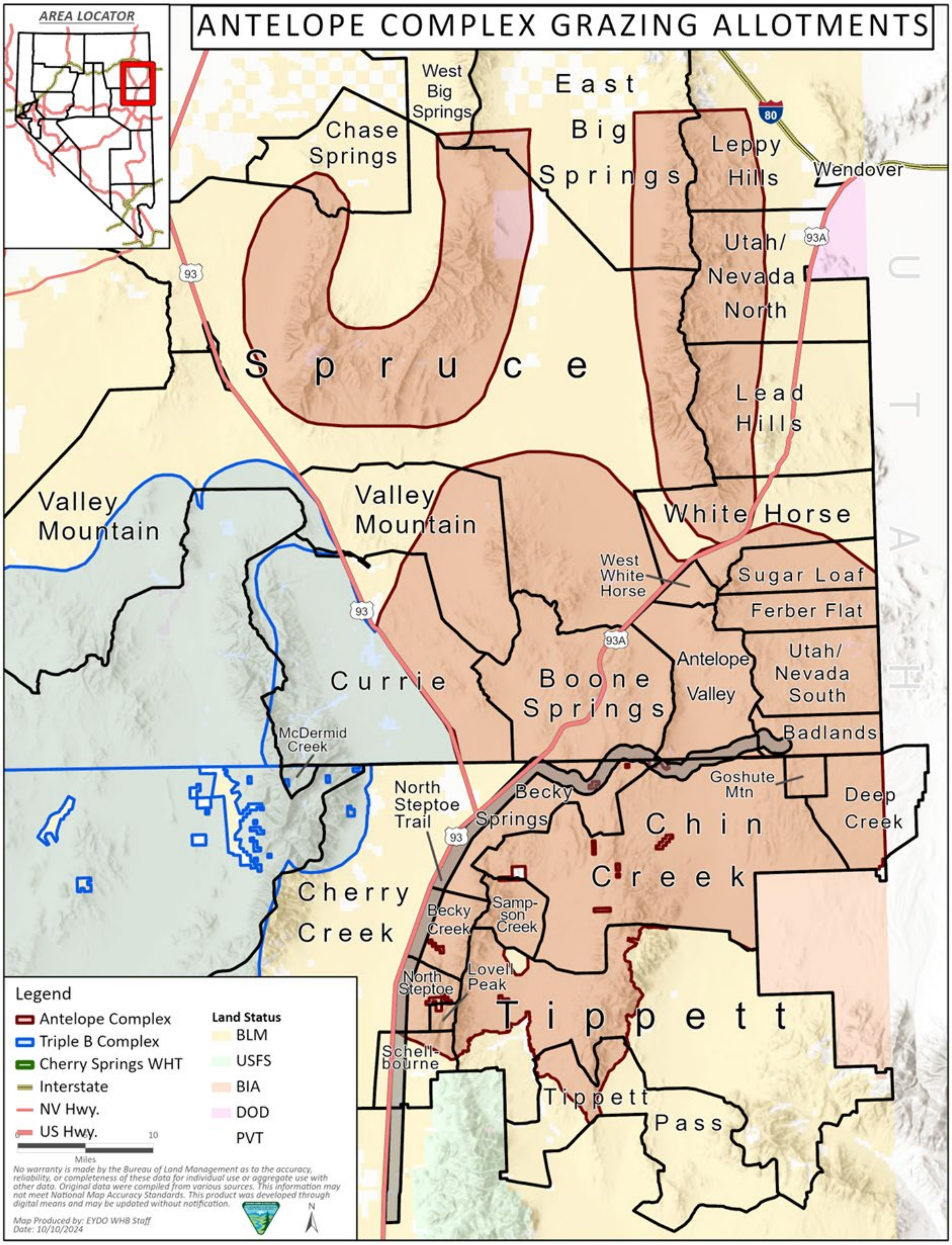
BLM-Bureau of Land Management
BIA- Bureau of Indian Affairs
CFR-Code of Federal Regulations
DR-Decision Record
EA-Environmental Assessment
EIS-Environmental Impact Statement
FLPMA-Federal Land Policy and Management Act
FONSI-Finding of No Significant Impact
HA – Herd Area
HMA – Herd Management Area
HMAP – Herd Management Area Plan
ID-Interdisciplinary
IM-Instructional Memorandum
NEPA-National Environmental Policy Act
PZP-Porcine zona pellucida
RFS-Reasonably Foreseeable Future Action
RMP-Resource Management Plan

APPENDIX I
Figures

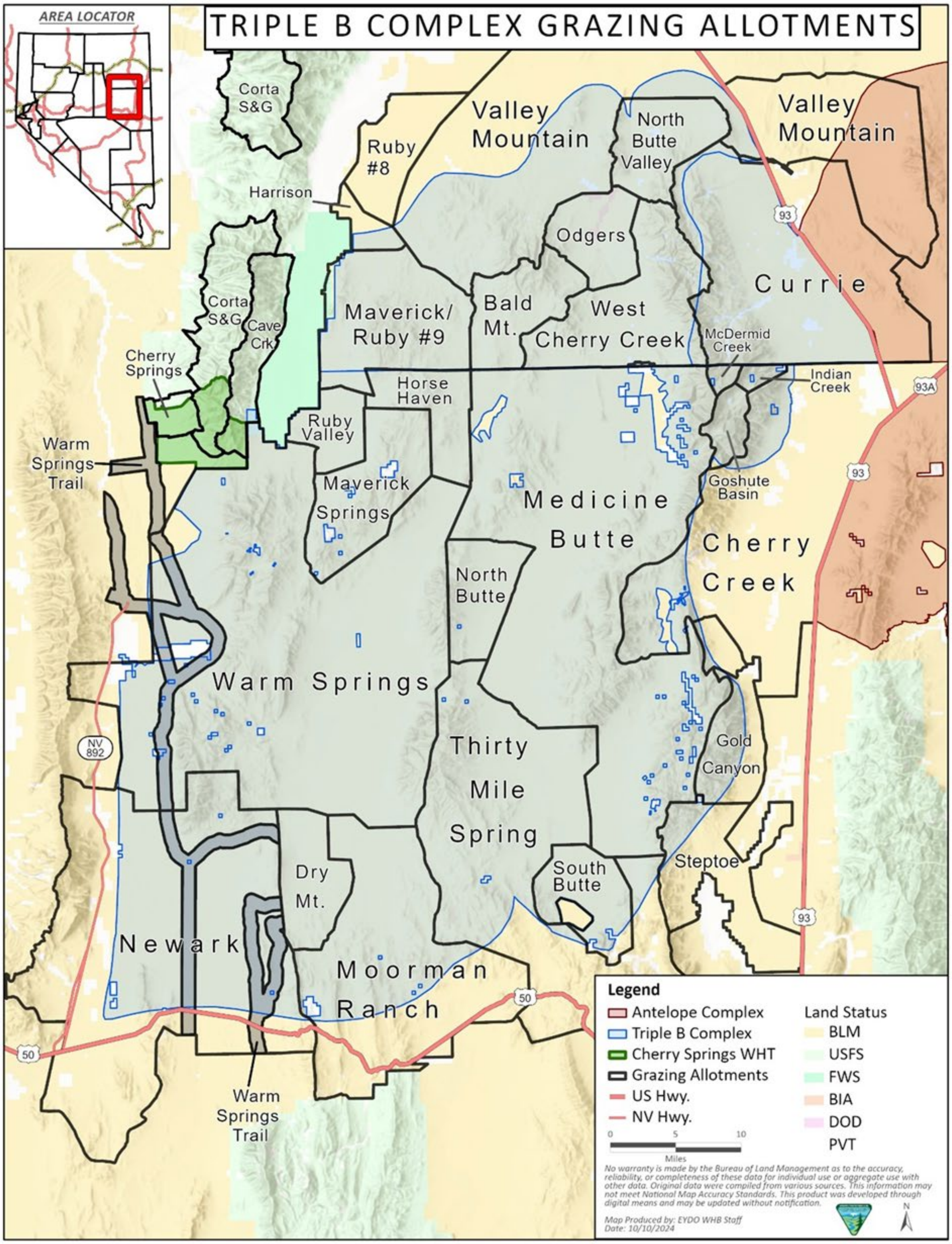
Map 1. Antelope and Triple B Complex Boundaries



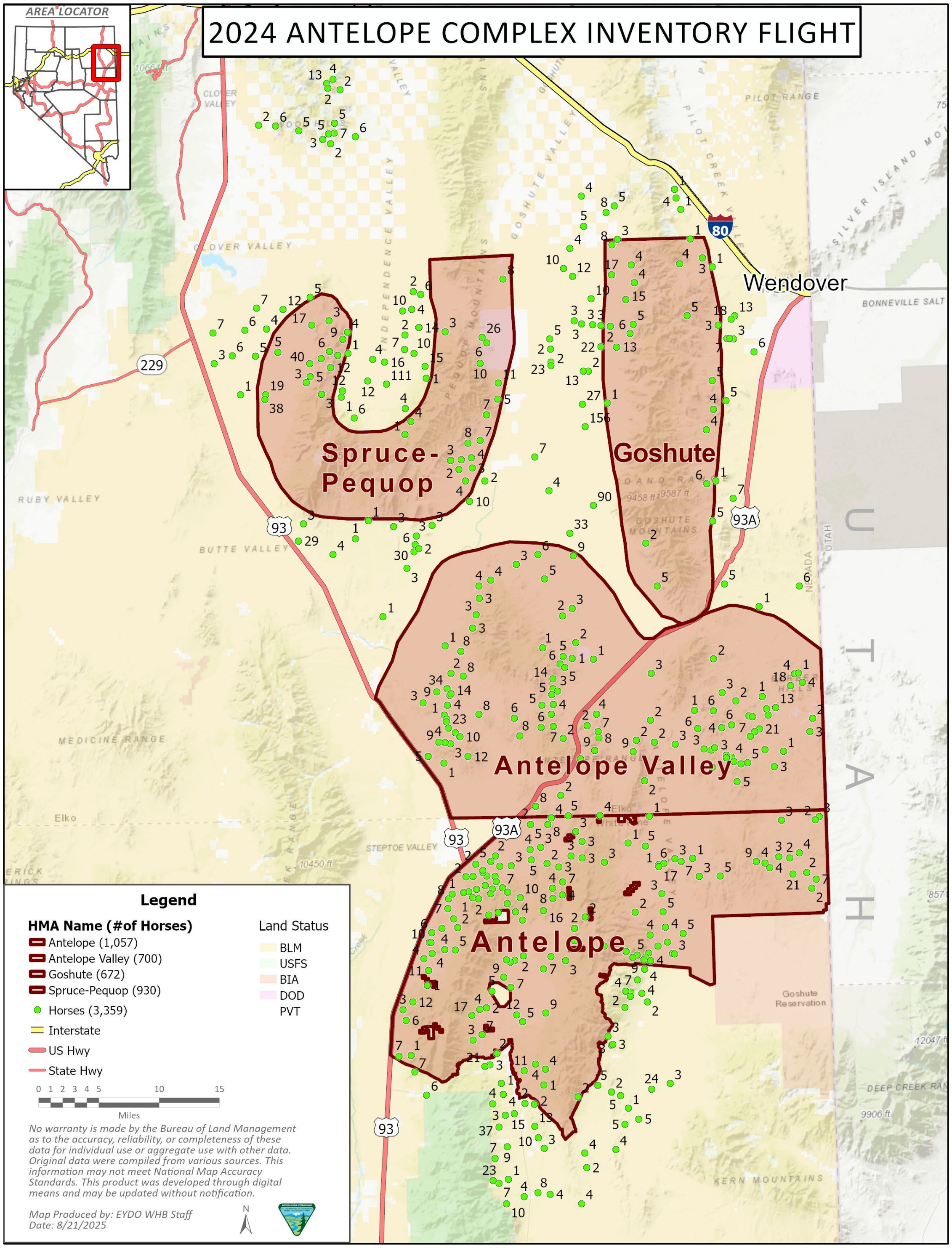
Map 2. Grazing Allotments within the Antelope Complex.



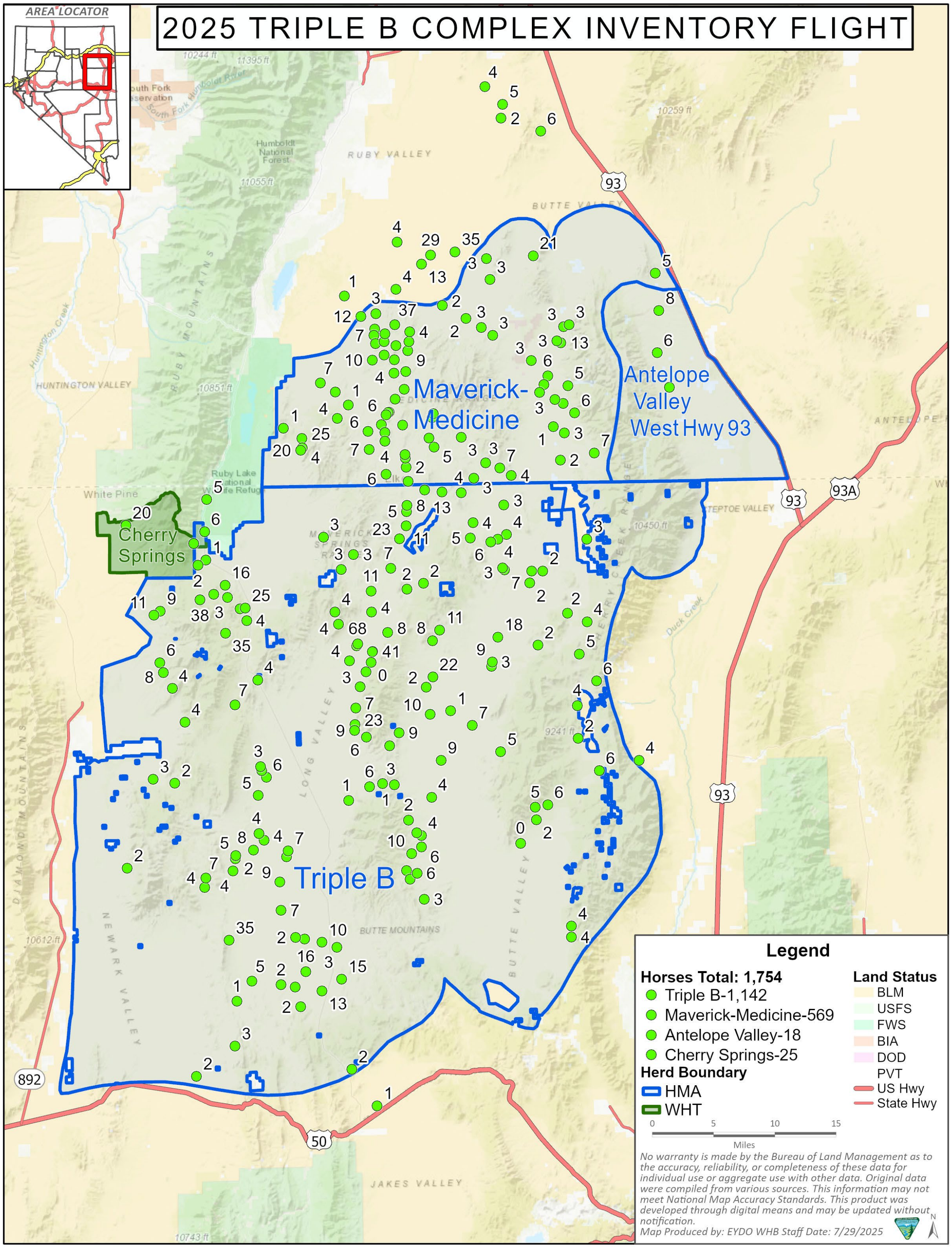
Map 3. Grazing Allotments within the Triple B Complex.



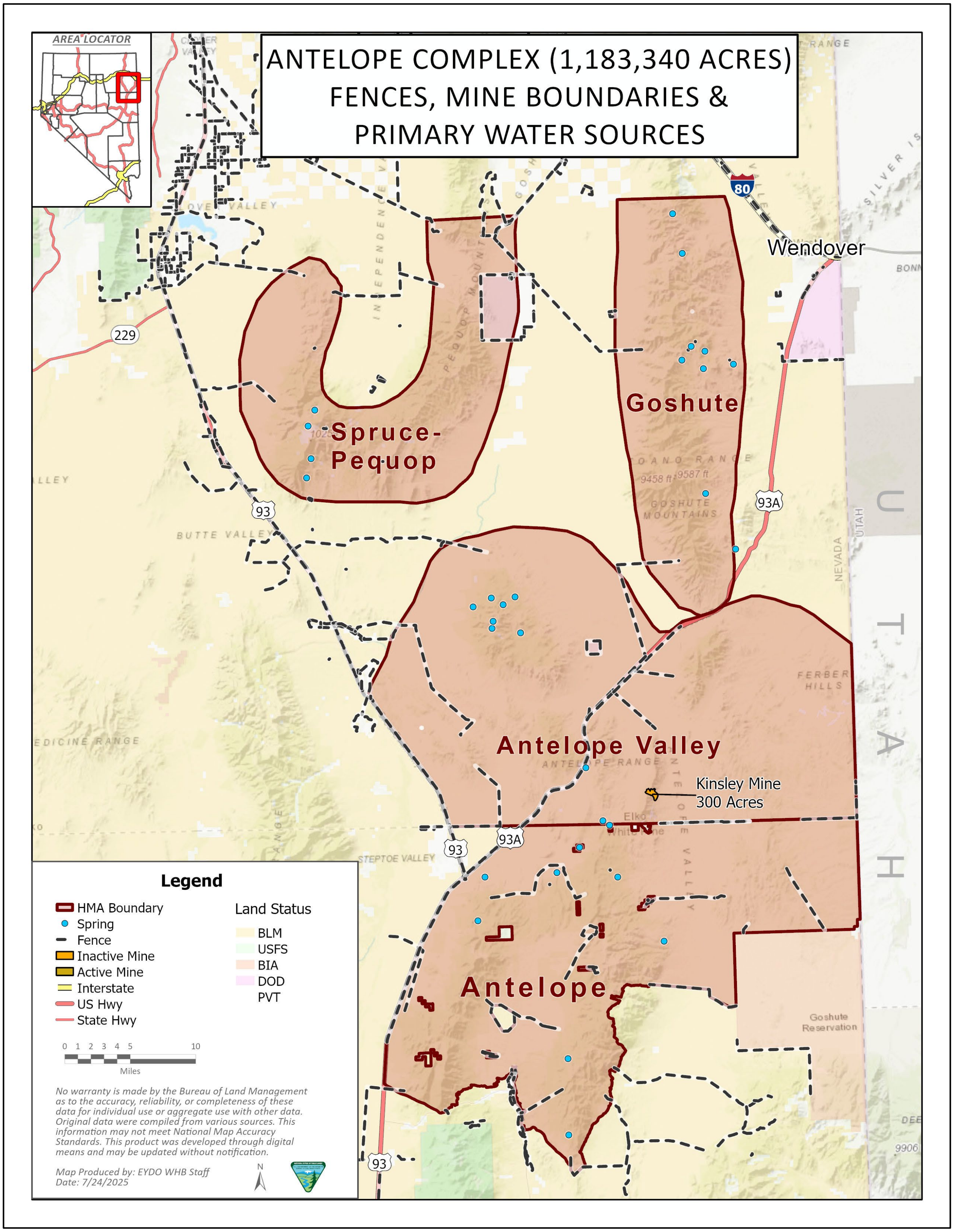
Map 4. Antelope Complex Wild Horse Inventory



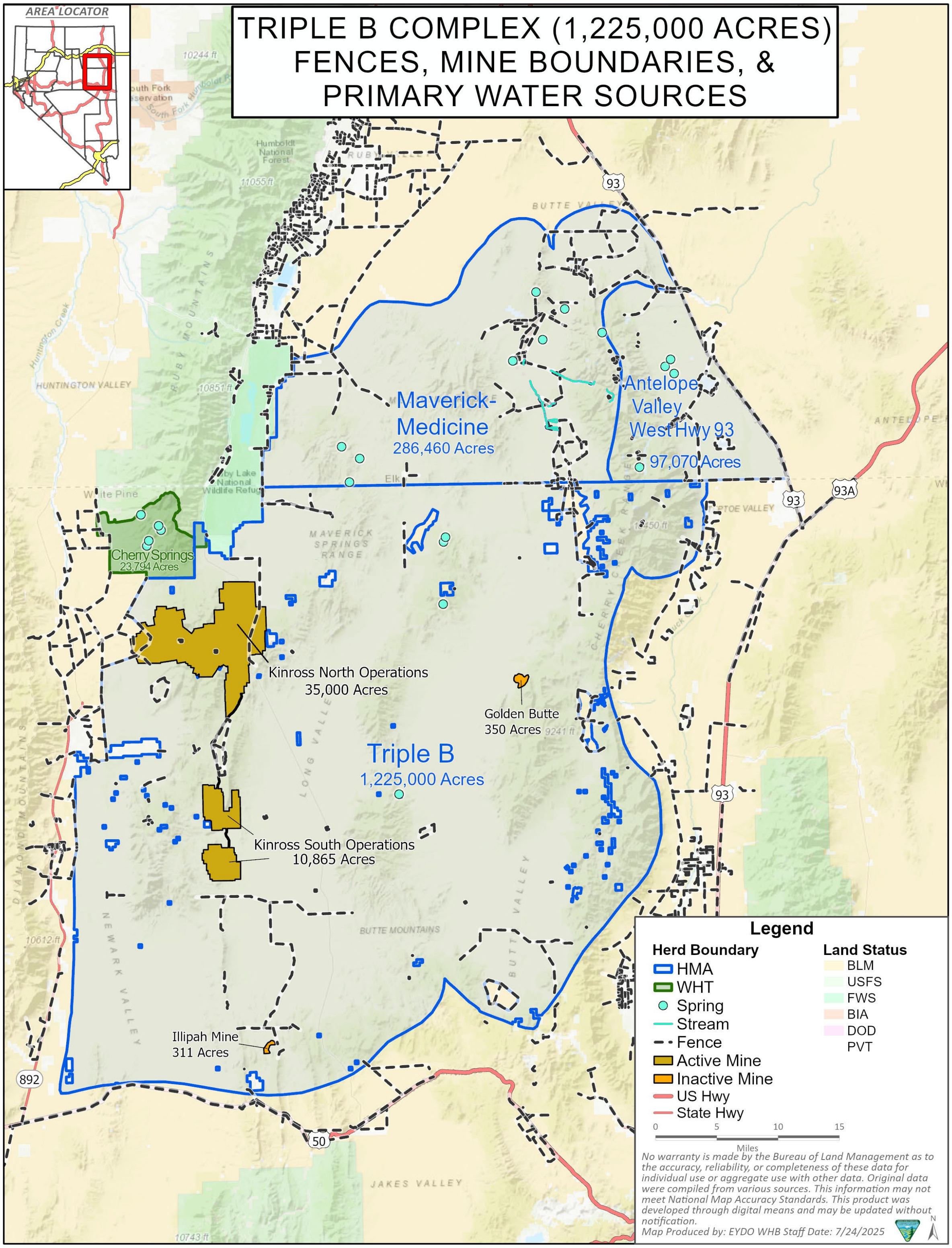
Map 5. Triple B Complex Wild Horse Inventory



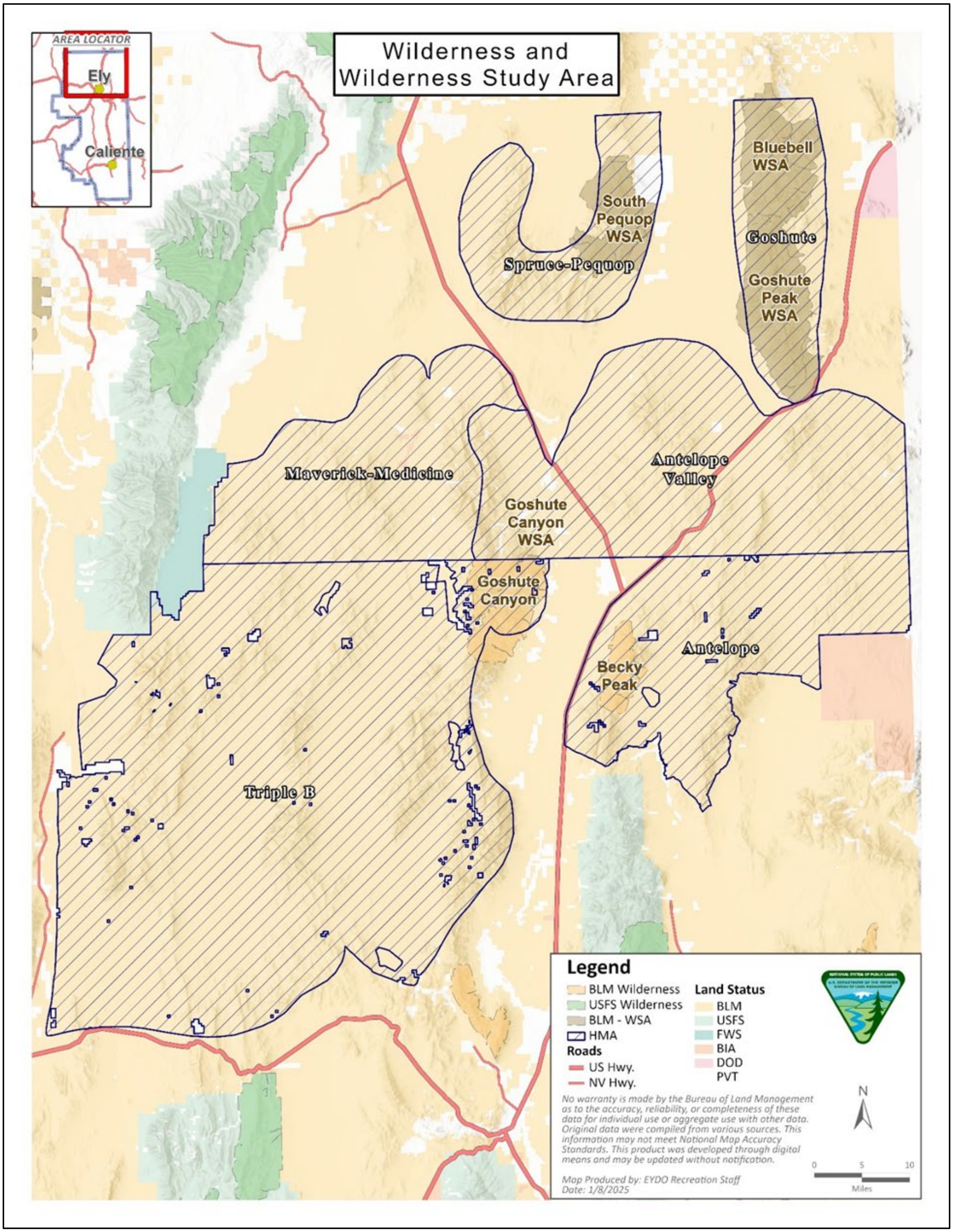
Map 6. Antelope Complex Fences, Mine Boundaries, and Primary Water Sources



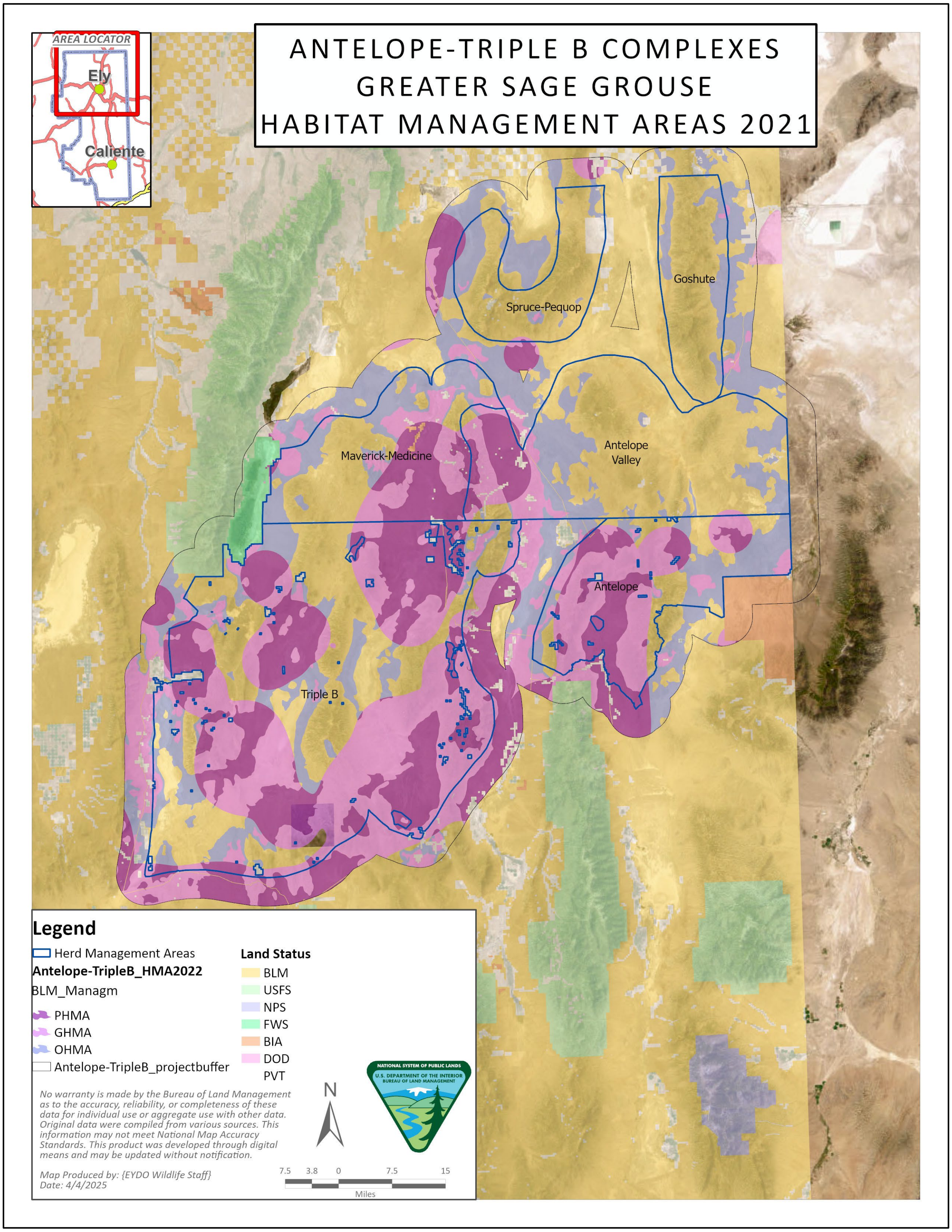
Map 7. Triple B Complex Fences, Mine Boundaries, and Primary Water Sources



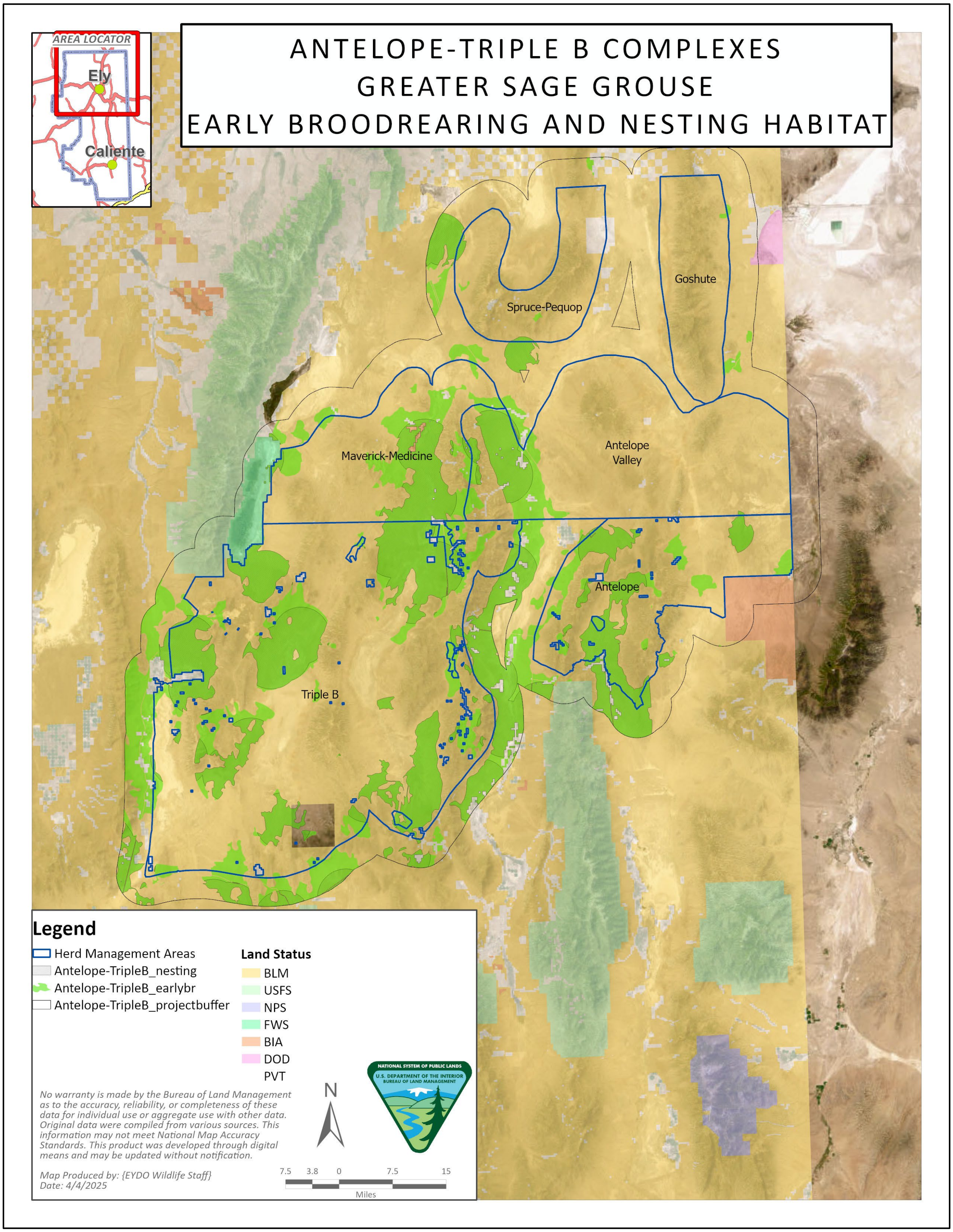
Map 8. Antelope and Triple B Complexes Wilderness and Wilderness Study Areas



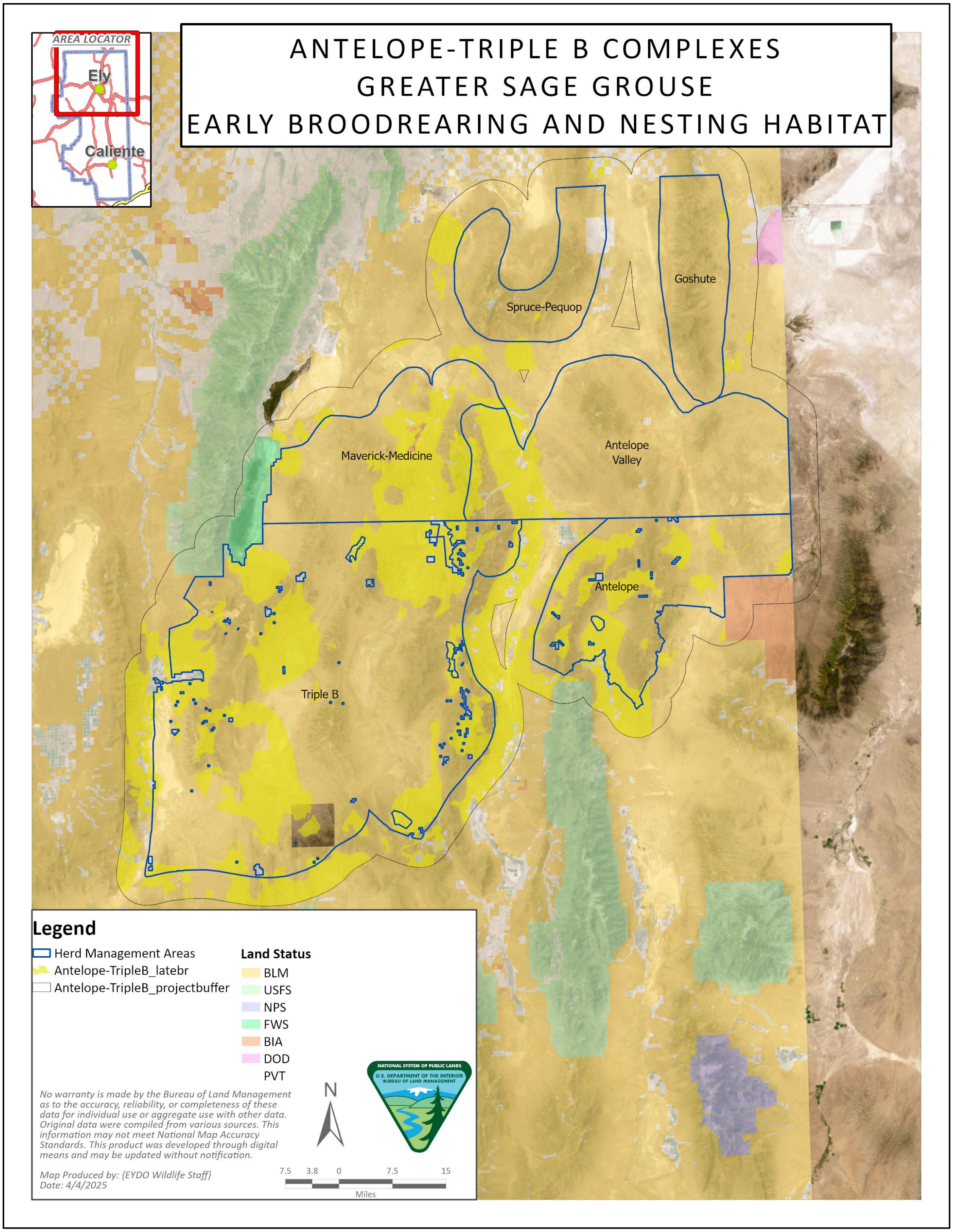
Map 9. Antelope and Triple B Complexes Greater Sage Grouse Habitat Management Areas



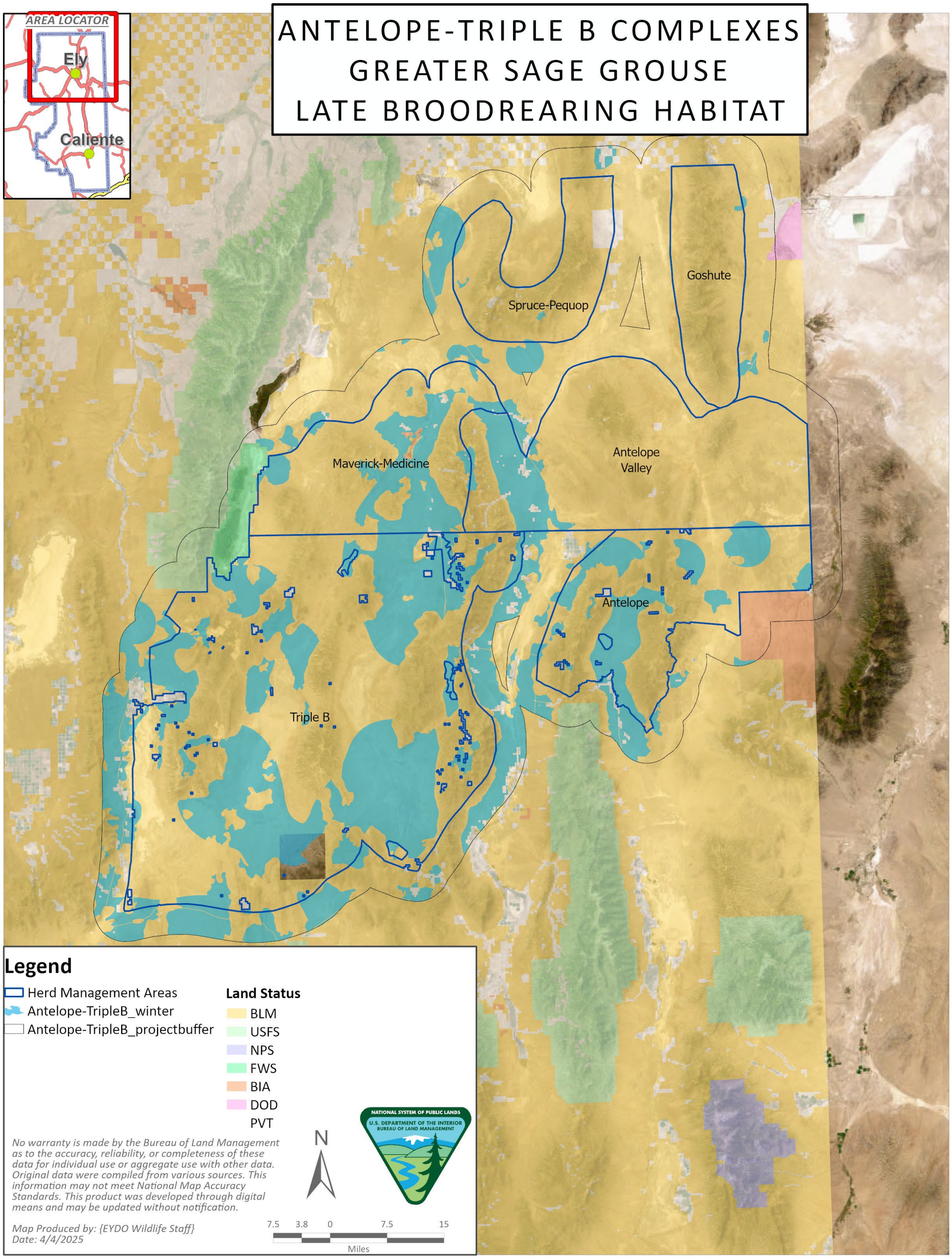
Map 10. Antelope and Triple B Complexes Greater Sage Grouse Early Broodrearing and Nesting Habitat



Map 11. Antelope and Triple B Complexes Greater Sage Grouse Habitat Management Areas



Map 12. Antelope and Triple B Complexes Greater Sage Grouse Habitat Management Areas



APPENDIX II

Standard Operating Procedures for Mare Fertility Control Treatments

Mare Fertility Control Treatment (SOPs)

The following management and monitoring requirements are part of the Proposed Action and Alternatives A and B.

PZP Vaccine SOPs

1. PZP vaccine would be administered by trained BLM personnel.

2. 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 loaded on the end of a trocar (dry syringe with a metal rod) which is loaded into the jab-stick which then pushes the pellets into the breeding mares being returned to the range. The pellets and liquid are designed to release the PZP over time similar to a time-release cold capsule.

3. Delivery of the vaccine would be as an intramuscular injection while the mares are restrained in a working chute. Half a cubic centimeter (cc) of the PZP vaccine would be emulsified with half a cc of adjuvant (a compound that stimulates antibody production) and loaded into the delivery system. The pellets would be loaded into the jab-stick for the second injection. With each injection, the liquid and pellets would be propelled into the left hindquarters of the mare, just below the imaginary line that connects the point of the hip and the point of the buttocks.

4. All treated mares would be freeze marked on the neck (or location as approved by Nevada State Department of Agriculture) and / or chipped to enable researchers to positively identify the animals during the research project as part of the data collection phase.

5. At a minimum, monitoring of reproductive rates using helicopter flyovers will be conducted in years two through four by checking for the presence or absence of foals. The flight scheduled for year four will also assist in determining the percentage of mares that have returned to fertility. In addition, field monitoring will be routinely conducted as part of other regular ground-based monitoring activities.

6. A field data sheet will be used by the field applicators to record all the pertinent data relating to identification of the mare including a photograph when possible, date of treatment, type of treatment (1- or 2-year vaccine, adjuvant used) and HMA. The original form with the data sheets will be forwarded to the Authorized Officer at the National Program Office (NPO) in Reno, Nevada. A copy of the form and data sheets and any photos taken will be maintained at the district office.

7. A tracking system will be maintained by NPO detailing the quantity of PZP issued, the quantity used, and disposition of any unused PZP, the number of treated mares by HMA, district office, and state along with the freeze-mark and / or chip applied by HMA.

8. The field office will assure that treated mares do not enter the adoption market for 3 years following treatment. In the rare instance, due to unforeseen circumstances, that treated mare(s) are removed from an HMA before 3 years have lapsed, they will be maintained in either a BLM facility or BLM-contracted Long-Term Pastures (LTPs) until expiration of the 3-year holding period. In the event it is necessary to remove treated mares, their removal and disposition will be coordinated through NPO. After

expiration of the 3-year holding period, the animal may be placed in the adoption program or sent to long-term pastures.

PZP Remote Darting SOPs

1. PZP vaccine would be administered through darting by trained BLM personnel or collaborating partners only. For any darting operation, the designated personnel must have successfully completed a nationally recognized wildlife darting course and who have documented and successful experience darting wildlife under field conditions.
2. All mares targeted for treatment will be clearly identifiable through photographs to enable darters and HMA managers to positively identify the animals during the project and at the time of removal during subsequent gathers.
3. Mares that have never been treated would receive 0.5 cc of PZP vaccine emulsified with 0.5 cc of Freund's Modified Adjuvant (FMA) and loaded into darts at the time a decision has been made to dart a specific mare. Mares identified for re-treatment receive 0.5 cc of the PZP vaccine emulsified with 0.5 cc of Freund's Incomplete Adjuvant (FIA).
4. The liquid dose of PZP vaccine is administered using 1.0 cc Pneu-Darts with 1.25" or 1.5" barbless needles fired from either Dan Inject®, Pneu-Dart® X-Caliber or Palmer® Cap-Chur rifle.
5. Only designated darters would mix the vaccine/adjuvant and prepare the emulsion. Vaccine-adjuvant emulsion would be loaded into darts at the darting site and delivered by means of an appropriate CO_2 powered or cartridge darting delivery system.
6. Delivery of the vaccine would be by intramuscular injection into the left or right hip/gluteal muscles while the mare is standing still.
7. Safety for both humans and the horse is the foremost consideration in deciding to dart a mare. Safe darting distances would depend on the skill and ability of the darter, and the particular model of dart gun being utilized. No attempt would be taken when other persons are within a 30-m radius of the target animal.
8. No attempts would be taken in high wind or when the horse is standing at an angle where the dart could miss the hip/gluteal region and hit the rib cage. The ideal is when the dart would strike the skin of the horse at a perfect 90° angle.
9. If a loaded dart is not used within two hours of the time of loading, the contents would be transferred to a new dart before attempting another horse. If the dart is not used before the end of the day, it would be stored under refrigeration and the contents transferred to another dart the next day. Refrigerated darts would not be used in the field.
10. No more than two people should be present at the time of a darting. The second person is responsible for locating fired darts. The second person should also be responsible for identifying the horse and keeping onlookers at a safe distance.
11. To the extent possible, all darting would be carried out in a discrete manner. However, if darting is to be done within view of non-participants or members of the public, an explanation of the nature of the project would be carried out either immediately before or after the darting.
12. Attempts will be made to recover all darts. To the extent possible, all darts which are discharged and drop from the horse at the darting site would be recovered before another darting occurs. In exceptional situations, the site of a lost dart may be noted and marked, and recovery efforts made at a later time. All discharged darts would be examined after recovery in order to determine if the charge fired and the

plunger fully expelled the vaccine. Personnel conducting darting operations should be equipped with a two-way radio or cell phone to provide a communications link with the Project Veterinarian for advice and/or assistance. In the event of a veterinary emergency, darting personnel would immediately contact the Project Veterinarian, providing all available information concerning the nature and location of the incident.

13. In the event that a dart strikes a bone or imbeds in soft tissue and does not dislodge, the darter would follow the affected horse until the dart falls out or the horse can no longer be found. The darter would be responsible for daily observation of the horse until the situation is resolved.

GonaCon SOPs

Orders for GonaCon–Equine are placed with the Unites States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS).

Delivering GonaCon by Hand-Injection of GonaCon

1. GonaCon-Equine vaccine is administered by hand-injection to mares that are appropriately immobilized or restrained. Important: label instructions must be followed for this product. Females identified for treatment application are hand-injected with an intramuscular injection of Gona-Equine vaccine (2 ml) in the lower gluteal musculature using a hand-held, luer-lock syringe (18-gauge, 3.8 cm needle). The syringe is made of transparent plastic with the barrel showing graduated marks indicating the volume of the vaccine in the syringe. This facilitates the visual assessment of the quantity of vaccine injected into the animal without the need to weigh the syringes. Pre-loaded syringes should be kept refrigerated overnight and then set out the morning of application at room temperature. They should not be allowed to get too warm or cold during the day.

2. The vaccine is distributed as preloaded doses (2 mL) in labeled syringes. Upon receipt, the vaccine should be kept refrigerated (4° C) until use. Do not freeze. The vaccine has a 6-month shelf-life from the time of production and the expiration date will be noted on each syringe that is provided.

3. Although infrequent, hand-injections to immobilized or restrained horses can result in partial delivery of the vaccine due to inexperienced personnel and/or unexpected movement of the horse. As a precaution, order extra doses of the vaccine. For hand-injection application, assume a 10% failure rate and increase the original quantity accordingly.

4. Examine each syringe before and after injection and visually determine approximately how much vaccine was injected. A full dose is considered 90% (1.8 ml) or greater of the original 2 ml dose. Ensure a full dose is administered.

5. It is recommended that all treated mares be photographed to facilitate identification by individual markings, RFID chip, and/or freeze-marked on the hip or neck to positively identify the animals as a GonaCon-Equine vaccinated mare during field observations or subsequent gathers.

Preparation of Darts for GonaCon Remote Delivery:

1. The vaccine is distributed as preloaded doses (2 mL) in labeled syringes. Upon receipt, the vaccine should be kept refrigerated (4° C) until use. Do not freeze. The vaccine has a 6-month shelf-life from the time of production and the expiration date will be noted on each syringe that is provided. Important: label instructions must be followed for this product.

2. Although infrequent, dart injections can result in partial injections of the vaccine, and shots are missed. As a precaution, it is recommended that extra doses of the vaccine be ordered to accommodate failed

delivery (~15 %). To determine the amount of vaccine delivered, the dart must be weighed before loading, and before and after delivery in the field.

3. For best results, darts with a gel barb should be used. (i.e. 2 cc Pneu-Dart brand darts configured with Slow-inject technology, 3.81 cm long 14 ga.tri-port needles, and gel collars positioned 1.27 cm ahead of the ferrule).

4. Wearing latex gloves, darts are numbered and filled with vaccine by attaching a loading needle (7.62 cm; provided by dart manufacturer) to the syringe containing vaccine and placing the needle into the cannula of the dart to the fullest depth possible. Slowly depress the syringe plunger and begin filling the dart. Periodically, tap the dart on a hard surface to dislodge air bubbles trapped within the vaccine. Due to the viscous nature of the fluid, air entrapment typically results in a maximum of approximately 1.8 ml of vaccine being loaded in the dart. The dart is filled to max once a small amount of the vaccine can be seen at the tri-ports.

5. Important! Do not load and refrigerate darts the night before application. When exposed to moisture and condensation, the edges of gel barbs soften, begin to dissolve, and will not hold the dart in the muscle tissue long enough for full injection of the vaccine. The dart needs to remain in the muscle tissue for a minimum of 1 minute to achieve dependable full injection. Sharp gel barbs are critical.

6. Darts (configured specifically as described above) can be loaded in the field and stored in a cooler prior to application. Darts loaded, but not used can be maintained in a cooler at about 4° C and used the next day, but do not store in a refrigerator or any other container likely to cause condensation.

Administering the GonaCon Vaccine Remotely (via Darting):

1. For initial and booster treatments, mares would ideally receive 2.0 ml of GonaCon-Equine. However, experience has demonstrated that only 1.8 ml of vaccine can typically be loaded into 2 cc darts, and this dose has proven successful. Calculations below reflect a 1.8 ml dose.

2. With each injection, the vaccine should be injected into the left or right 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).

3. Darts should be weighed to the nearest hundredth gram by electronic scale when empty, when loaded with vaccine, and after discharge, to ensure that 90% (1.62 ml) of the vaccine has been injected. Animals receiving <50% should be darted with another full dose; those receiving >50% but <90% should receive a half dose (1 ml). All darts should be weighed to verify a combination of ≥1.62 ml has been administered. Therefore, every effort should be made to recover darts after they have fallen from animals.

4. A booster vaccine may be administered 90 or more days after the first injection to improve efficacy of the product over subsequent years.

Free ranging animals may be photographed using a telephoto lens and high-quality digital receiver as a record of treated individuals, and the injection site can be recorded on data sheets to facilitate identification by animal markings and potential injection scars.

APPENDIX III

Field Castration (Gelding) SOPs

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 (IM 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 cannot 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 re-dosed 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 meglumine 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.

The animal would be sedated then placed under general anesthesia. Ropes are placed on one or more limbs to help hold the animal in position and the anesthetized animals are placed in either lateral or dorsal recumbency. The surgical site is scrubbed and prepped aseptically. The scrotum is incised over each testicle, and the testicles are removed using a surgical tool to control bleeding. The incision is left open to drain. Each animal would be given a tetanus shot, antibiotics, and an analgesic.

Any males that have inguinal or scrotal hernias would be removed from the population, sent to a regular BLM facility, and be treated surgically as indicated, if possible, or euthanized if they have a poor prognosis for recovery (IM 2009-041, IM 2009-063). Horses with only one descended testicle may be removed from the population and managed at a regular BLM facility according to BLM policy or anesthetized with the intent to locate the undescended testicle for castration. If an undescended testicle cannot be located, the animal may be recovered and removed from the population if no surgical exploration has started. Once surgical exploration has started, those that cannot be completely castrated would be euthanized prior to recovering them from anesthesia according to BLM policy (IM 2009-041, IM 2009-063). All animals would be rechecked by a veterinarian the day following surgery. Those that have excessive swelling, are reluctant to move or show signs of any other complications would be held in captivity and treated accordingly. Once released no further veterinary interventions would be possible.

Selected stallions would be shipped to the facility, gelded, and returned to the range within 30 days. Before release back to the range, they may be marked for visibility with a freeze brand or other method of marking. Gelded animals could be monitored periodically for complications for approximately 7-10 days following release. In the proposed alternatives, gelding is not part of a research study, but additional monitoring on the range could be completed either through aerial reconnaissance, if available, or field observations from major roads and trails. It is not anticipated that all the geldings would be observed but if the goal is to detect complications on the range, then this level of casual observation may help BLM determine if those are occurring. Periodic observations of the long-term outcomes of gelding could be recorded during routine resource monitoring work. Such observations could include but not be limited to band size, social interactions with other geldings and harem bands, distribution within their habitat, forage utilization, and activities around key water sources. Periodic population inventories and future gather statistics could provide additional anecdotal information about how logistically effective it is to manage a portion of the herd as non-breeding animals.

APPENDIX IV

Gather Operations Standard Operating Procedures (SOPs)

Gathers would be conducted by utilizing contractors from the one of the national Wild Horse and Burro Gather Contracts, or BLM personnel. The following procedures for gathering and handling wild horses would apply whether a contractor or BLM personnel conduct a gather. For helicopter gathers conducted by BLM personnel, gather operations will be conducted in conformance with the *Wild Horse Aviation Management Handbook* (January 2009).

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

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

The primary gather methods used in the performance of gather operations include:

1. Helicopter Drive Trapping. This gather method involves utilizing a helicopter to herd wild horses into a temporary trap.
2. Helicopter Assisted Roping. This gather method involves utilizing a helicopter to herd wild horses or burros to ropers.
3. Bait Trapping. This gather method involves utilizing bait (e.g., water or feed) to lure wild horses into a temporary trap.

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

A. Gather Methods used in the Performance of Gather Contract Operations

1. The primary concern of the contractor is the safe and humane handling of all animals gathered. All gather attempts shall incorporate the following:

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

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

distance the animals travel will account for the different factors listed above and concerns with each HMA.

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

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

    b. All loading chute sides shall be a minimum of 6 feet high and shall be fully covered, plywood, metal without holes larger than 2"x4".

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

    d. All crowding pens including the gates leading to the runways shall be covered with a material which prevents the animals from seeing out (plywood, burlap, plastic snow fence, etc.) and shall be covered a minimum of 1 foot to 5 feet above ground level for burros and 2 feet to 6 feet for horses

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

4. No modification of existing fences will be made without authorization from the COR/PI. The Contractor shall be responsible for restoration of any fence modification which he has made.

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

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

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

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

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

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

10. Animals shall be transported to their final destination from temporary holding facilities as quickly as possible after gather unless prior approval is granted by the COR for unusual circumstances. Animals to be released back into the HMA following gather operations may be held up to 30 days or as directed by the COR. Animals shall not be held in traps and/or temporary holding facilities on days when there is no work being conducted except as specified by the COR. The Contractor shall schedule shipments of animals to arrive at final destination between 7:00 a.m. and 4:00 p.m. No shipments shall be scheduled to arrive at final destination on Sunday and Federal holidays, unless prior approval has been obtained by the COR. Animals shall not be allowed to remain standing on trucks while not in transport for a combined period of greater than three (3) hours in any 24 hour period. Animals that are to be released back into the gather area may need to be transported back to the original trap site. This determination will be at the discretion of the COR/PI or Field Office horse specialist.

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

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

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

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

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

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

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

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

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

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

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

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

C. Use of Motorized Equipment

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

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

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

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

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

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

11 square feet per adult horse (1.4 linear foot in an 8 foot wide trailer);
8 square feet per adult burro (1.0 linear foot in an 8 foot wide trailer);
6 square feet per horse foal (.75 linear foot in an 8 foot wide trailer);
4 square feet per burro foal (.50 linear feet in an 8 foot wide trailer).

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

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

D. Safety and Communications

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

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

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

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

2. Should the contractor choose to utilize a helicopter the following will apply:

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

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

E. Site Clearances

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

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

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

F. Animal Characteristics and Behavior

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

G. Public Participation

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

H. Responsibility and Lines of Communication

Contracting Officer's Representative/Project Inspector

Ben Noyes, Wild Horse and Burro Specialist, Ely District
Sadie Leyba Wild Horse and Burro Specialist, Ely District
Bruce Thompson, Wild Horse and Burro Specialist, Elko District
Ruth Thompson, NV WH&B Program Lead
Amery Sifre, Homboldt Toiyabe National Forrest

The Contracting Officer's Representatives (CORs) and the project inspectors (PIs) have the direct responsibility to ensure the Contractor's compliance with the contract stipulations. The Bristlecone Supervisory Natural Resource Specialist and the Bristlecone and Wells Field Managers will take an active role to ensure the appropriate lines of communication are established between the field, Field Office, State Office, National Program Office, and BLM Holding Facility offices. All employees involved in the gathering operations will keep the best interests of the animals at the forefront at all times.

All publicity, formal public contact and inquiries will be handled through the Field Manager and/or the Supervisory Natural Resource Specialist and Field Office Public Affairs. These individuals will be the primary contact and will coordinate with the COR/PI on any inquiries.

The COR will coordinate with the contractor and the BLM Corrals to ensure animals are being transported from the gather site in a safe and humane manner and are arriving in good condition.

The contract specifications require humane treatment and care of the animals during removal operations. These specifications are designed to minimize the risk of injury and death during and after gather of the animals. The specifications will be vigorously enforced.

Should the Contractor show negligence and/or not perform according to contract stipulations, he will be issued written instructions, stop work orders, or defaulted.

APPENDIX V

Wild Horse Gather Observation Protocol

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

Daily Visitor Protocol

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Public Outreach and Education Day

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

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

APPENDIX VI

Population Modeling

Antelope Complex
PopEquus (1.0.2) Advanced Tool - Simulation Report

19 May 2025 15:47:37

Population inputs

You used the *PopEquus* Advanced Tool to simulate a horse population that started with 4281 horses, had a population sex ratio where 0.5 of the population is female, was censused at a time that foals were present (Yes), had a mean annual population growth rate of 20 percent per year, and a capture probability during management (e.g., helicopter gather) of 0.75. You assumed that the target population size range for the population (i.e., Appropriate Management Level) was 427-789 horses, that removals aimed for a target population size of 427, and that if the population decreased to beneath 30 horses that it would be at high risk of local extirpation. In summary:

- Population size: 4281
- Female proportion of population: 0.5
- Foals included in population size? Yes
- Population growth rate (% increase per year): 20
- Capture proportion during gathers: 0.75
- Appropriate management level (minimum): 427
- Appropriate management level (maximum): 789
- Target population size: 427
- Persistence threshold (i.e., minimum number of individuals): 30

Simulation inputs

You simulated populations over a 10-year projection interval, and you performed 10 replicate projections.

- Projection interval (years): 10
- Number of simulation replicates: 10

Management alternatives

You simulated 6 management alternatives using the tool: GonaCon, No management, PZP-22, Removals, Removals and GonaCon, Removals and PZP-22.

The following settings were specified for management actions:

Gather options

- Short-term holding costs ($ per day): 7.61

Removal options

- Removal years: 1, 3, 5, 7, 9
- Reactive removals: No
- Minimum gather interval (years) for a reactive removal: 2
- Selective removals: No

- Male proportion of population returned after a removal: 0.6
- Maximum number removed from the population per year: 2000
- Number of years to project holding population: 25
- Long-term holding costs ($ per day): 2.02
- Proportion of horses adopted per year: 0.69
- Net adoption cost to agency ($ per horse): 1775
- Foaling reduction (%) of removed females in captivity the first year after removal: 25

GonaCon options

- Treatment years: 1, 3, 5, 7, 9
- Treatment ages: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
- Treatment percentage (%) for age-eligible females: 100
- Treatment cost per shot ($): 50
- Hold to give booster treatment: Yes
- Days in holding until booster: 30

PZP-22 options

- Treatment years: 1, 3, 5, 7, 9
- Treatment ages: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
- Treatment percentage (%) for age-eligible females: 100
- Primer treatment cost ($): 430
- Days in holding to receive treatment: 7
- Booster treatment cost ($): 30

Results

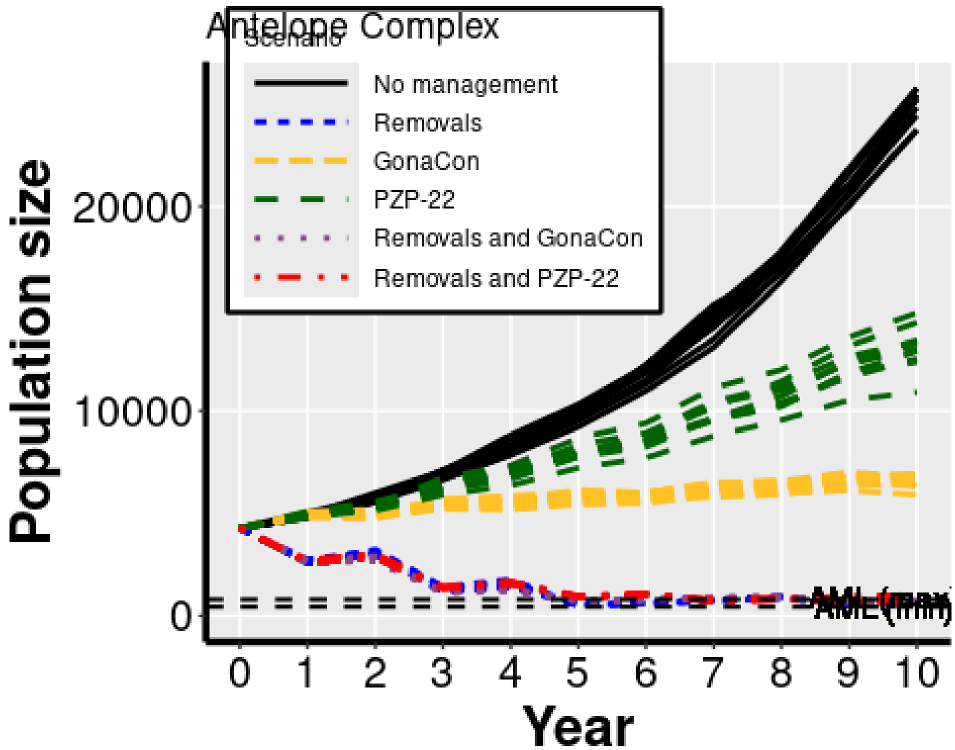
Simulation outcomes can be summarized with a table(s) describing mean values among replicates for relevant metrics. Metrics include: population size in the final year of the projection interval (‘Final population size’), average population size across all years (‘Mean population size’), proportion of replicates that ended within the AML (i.e., the likelihood that an alternative yielded AML in the final year; ‘AML probability’), proportion of replicates that ended above the persistence threshold (‘Persistence probability’), total number of horses gathered (‘Number gathered’), total number of horses removed (‘Number removed’), total number of horses treated (‘Number treated’), cost of management in the Herd Management Area (HMA) in millions of USD [‘On-range cost ($ million)’], and total cost of management, including costs incurred at the HMA and in holding facilities [‘Total cost ($ million)’]. Values in parentheses are 95% confidence intervals.

Alternative	Final population size	Overall mean population size	AML probability
No management	24962 (23720-25765)	11728 (11191-12061)	0.00
Removals	609 (579-639)	1510 (1480-1559)	1.00
GonaCon	6573 (5996-6904)	5664 (5399-5811)	0.00
PZP-22	13106 (11254-14685)	8212 (7520-8849)	0.00
Removals and GonaCon	691 (663-714)	1517 (1496-1547)	1.00
Removals and PZP-22	803 (647-1016)	1614 (1571-1654)	0.70

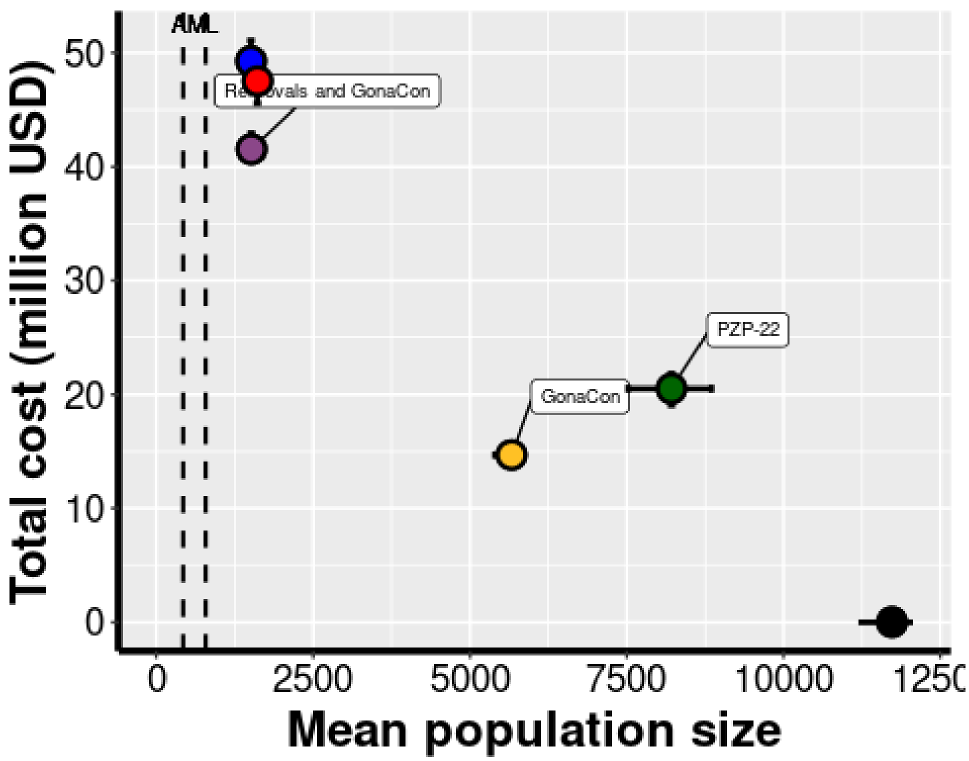
Alternative	Persistence probability	Number gathered	Number removed	Number treated
No management	1.00	0 (0-0)	0 (0-0)	0 (0-0)
Removals	1.00	7320 (7160-7585)	5567 (5434-5757)	0 (0-0)
GonaCon	1.00	20064 (19348-20494)	0 (0-0)	9860 (9498-10176)
PZP-22	1.00	26933 (25054-28595)	0 (0-0)	12180 (11455-12912)
Removals and GonaCon	1.00	7482 (7392-7635)	4622 (4545-4762)	1945 (1910-1961)
Removals and PZP-22	1.00	7978 (7805-8171)	5366 (5047-5611)	1806 (1764-1876)

Alternative	On-range cost ($ million)	Off-range cost ($ million)	Total cost ($ million)
No management	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)
Removals	4.89 (4.79-5.07)	44.39 (42.71-46.06)	49.28 (47.53-51.10)
GonaCon	14.68 (14.15-15.02)	0.00 (0.00-0.00)	14.68 (14.15-15.02)
PZP-22	20.51 (19.05-21.83)	0.00 (0.00-0.00)	20.51 (19.05-21.83)
Removals and GonaCon	5.31 (5.26-5.41)	36.23 (35.38-37.55)	41.54 (40.67-42.95)
Removals and PZP-22	5.67 (5.57-5.77)	41.87 (39.95-43.62)	47.53 (45.56-49.31)

A graph of population size through time can be used to visualize effects of management alternatives on population size. Different colored lines indicate management alternatives simulated by the user; for each alternative, individual lines are different simulation replicates, that vary due to random chance. Dashed horizontal black lines indicate the minimum and maximum target population size range (i.e., AML). That graph is provided below.



Individuals might be interested in identifying a management alternative(s) that achieves the reduction or maintenance of a population within the target population size range (i.e., AML) while also incurring lower direct costs relative to other options. We can visualize the relationship between predicted population size and direct costs of management by graphing the overall mean population size (number of horses) on the x-axis and total cost of management (millions of USD) on the y-axis predicted by each alternative. Points are mean predictions among replicates and are colored by scenario (as in in the first graph); horizontal and vertical lines from points represent 95% confidence intervals in predicted population size and cost, respectively, for each scenario. While this graph does not account for all factors that might be important during management decisions, the graph provides a useful illustration of the trade-off between predicted population size and total direct cost of management resulting from the simulated alternatives. That graph is provided below.



Summary

The alternative that yielded the smallest average population size was:

```
## [1] "Removals"
```

The alternative that incurred the lowest direct costs 'on range' (other than 'no management') over the next 10 years was:

```
## [1] "Removals"
```

The alternative that incurred the lowest total direct costs across the sum of 'on range' and 'off range' (other than 'no management') over the next 35 years was:

```
## [1] "GonaCon"
```

Among the alternatives that achieved population size within Appropriate Management Levels, the alternative that incurred the lowest total direct costs across the sum of 'on range' and 'off range':

```
## [1] "Removals and GonaCon"
```

Note: results from the simulations may not be the sole basis for a management decision. The model does not explicitly account for or consider multiple uses on public lands, local land use planning considerations, ecological costs of horses on ecosystems, or other important values. The results presented here reflect considerations related to population size, amount of management, and fiscal costs of management that were estimated, given the input parameters and alternatives specified.

Triple B Complex Population Modeling

PopEquus (1.0.2) Advanced Tool - Simulation Report

20 May 2025 07:50:47

Population inputs

You used the *PopEquus* Advanced Tool to simulate a horse population that started with 1909 horses, had a population sex ratio where 0.5 of the population is female, was censused at a time that foals were present (No), had a mean annual population growth rate of 20 percent per year, and a capture probability during management (e.g., helicopter gather) of 0.75. You assumed that the target population size range for the population (i.e., Appropriate Management Level) was 472-889 horses, that removals aimed for a target population size of 472, and that if the population decreased to beneath 30 horses that it would be at high risk of local extirpation. In summary:

- Population size: 1909
- Female proportion of population: 0.5
- Foals included in population size? No
- Population growth rate (% increase per year): 20
- Capture proportion during gathers: 0.75
- Appropriate management level (minimum): 472
- Appropriate management level (maximum): 889
- Target population size: 472
- Persistence threshold (i.e., minimum number of individuals): 30

Simulation inputs

You simulated populations over a 10-year projection interval, and you performed 10 replicate projections.

- Projection interval (years): 10
- Number of simulation replicates: 10

Management alternatives

You simulated 6 management alternatives using the tool: GonaCon, No management, PZP-22, Removals, Removals and GonaCon, Removals and PZP-22.

The following settings were specified for management actions:

Gather options

- Short-term holding costs ($ per day): 7.61

Removal options

- Removal years: 1, 3, 5, 7, 9
- Reactive removals: No
- Minimum gather interval (years) for a reactive removal: 2
- Selective removals: No
- Male proportion of population returned after a removal: 0.6
- Maximum number removed from the population per year: 2000

- Number of years to project holding population: 25
- Long-term holding costs ($ per day): 2.02
- Proportion of horses adopted per year: 0.69
- Net adoption cost to agency ($ per horse): 1775
- Foaling reduction (%) of removed females in captivity the first year after removal: 25

GonaCon options

- Treatment years: 1, 3, 5, 7, 9
- Treatment ages: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
- Treatment percentage (%) for age-eligible females: 100
- Treatment cost per shot ($): 50
- Hold to give booster treatment: Yes
- Days in holding until booster: 30

PZP-22 options

- Treatment years: 1, 3, 5, 7, 9
- Treatment ages: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
- Treatment percentage (%) for age-eligible females: 100
- Primer treatment cost ($): 430
- Days in holding to receive treatment: 7
- Booster treatment cost ($): 30

Results

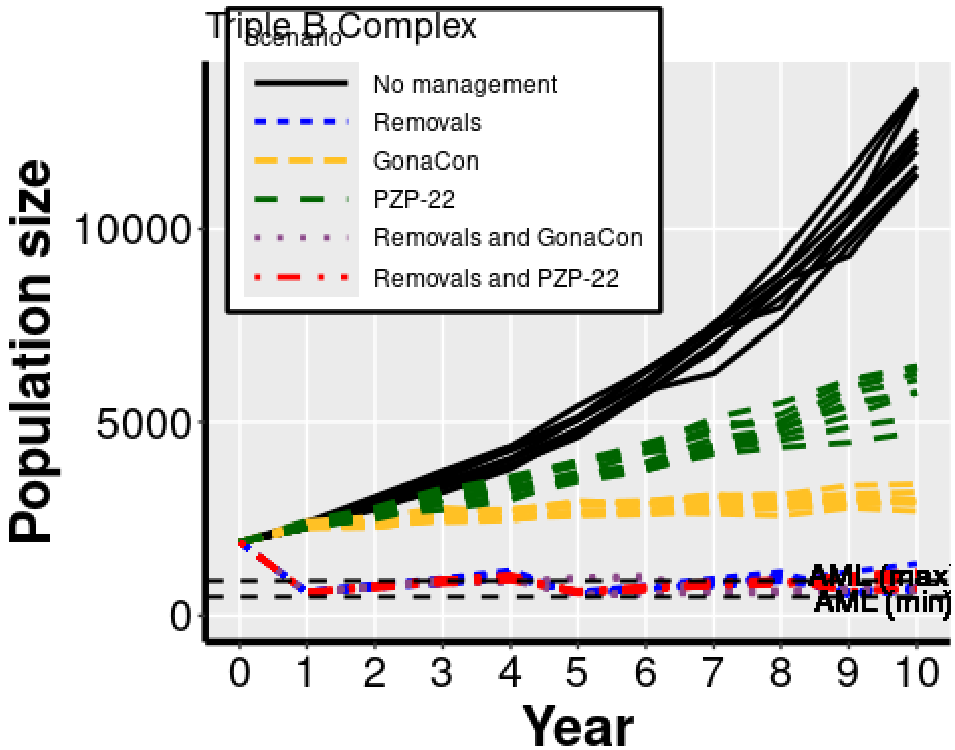
Simulation outcomes can be summarized with a table(s) describing mean values among replicates for relevant metrics. Metrics include: population size in the final year of the projection interval ('Final population size'), average population size across all years ('Mean population size'), proportion of replicates that ended within the AML (i.e., the likelihood that an alternative yielded AML in the final year; 'AML probability'), proportion of replicates that ended above the persistence threshold ('Persistence probability'), total number of horses gathered ('Number gathered'), total number of horses removed ('Number removed'), total number of horses treated ('Number treated'), cost of management in the Herd Management Area (HMA) in millions of USD ['On-range cost ($ million)'], and total cost of management, including costs incurred at the HMA and in holding facilities ['Total cost ($ million)']. Values in parentheses are 95% confidence intervals.

Alternative	Final population size	Overall mean population size	AML probability
No management	12448 (11422-13641)	5820 (5451-6257)	0.00
Removals	752 (635-1203)	874 (850-929)	0.90
GonaCon	2989 (2736-3352)	2649 (2504-2811)	0.00
PZP-22	5885 (4832-6458)	3802 (3473-4099)	0.00
Removals and GonaCon	650 (610-718)	804 (765-860)	1.00
Removals and PZP-22	935 (671-1139)	891 (857-933)	0.40

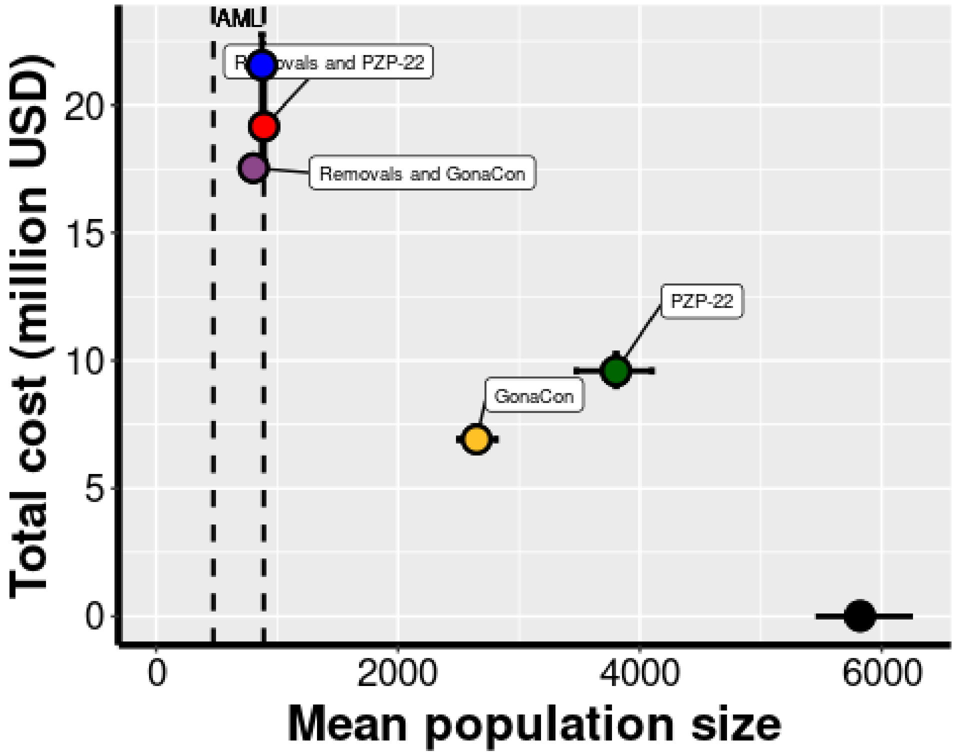
Alternative	Persistence probability	Number gathered	Number removed	Number treated
No management	1.00	0 (0-0)	0 (0-0)	0 (0-0)
Removals	1.00	2887 (2340-3031)	2475 (2067-2620)	0 (0-0)
GonaCon	1.00	9437 (8987-9854)	0 (0-0)	4778 (4628-5032)
PZP-22	1.00	12571 (11815-13475)	0 (0-0)	5923 (5613-6232)
Removals and GonaCon	1.00	3626 (3476-3854)	1884 (1850-1918)	1001 (911-1177)
Removals and PZP-22	1.00	3878 (3766-3986)	2055 (1861-2420)	1002 (961-1050)

Alternative	On-range cost ($ million)	Off-range cost ($ million)	Total cost ($ million)
No management	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)
Removals	1.99 (1.60-2.08)	19.57 (16.29-20.70)	21.56 (17.90-22.77)
GonaCon	6.92 (6.60-7.24)	0.00 (0.00-0.00)	6.92 (6.60-7.24)
PZP-22	9.59 (9.00-10.28)	0.00 (0.00-0.00)	9.59 (9.00-10.28)
Removals and GonaCon	2.77 (2.67-2.93)	14.77 (14.35-15.24)	17.54 (17.04-17.94)
Removals and PZP-22	3.00 (2.94-3.05)	16.17 (14.87-18.76)	19.16 (17.82-21.79)

A graph of population size through time can be used to visualize effects of management alternatives on population size. Different colored lines indicate management alternatives simulated by the user; for each alternative, individual lines are different simulation replicates, that vary due to random chance. Dashed horizontal black lines indicate the minimum and maximum target population size range (i.e., AML). That graph is provided below.



Individuals might be interested in identifying a management alternative(s) that achieves the reduction or maintenance of a population within the target population size range (i.e., AML) while also incurring lower direct costs relative to other options. We can visualize the relationship between predicted population size and direct costs of management by graphing the overall mean population size (number of horses) on the x-axis and total cost of management (millions of USD) on the y-axis predicted by each alternative. Points are mean predictions among replicates and are colored by scenario (as in in the first graph); horizontal and vertical lines from points represent 95% confidence intervals in predicted population size and cost, respectively, for each scenario. While this graph does not account for all factors that might be important during management decisions, the graph provides a useful illustration of the trade-off between predicted population size and total direct cost of management resulting from the simulated alternatives. That graph is provided below.



Summary

The alternative that yielded the smallest average population size was:

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## [1] "Removals and GonaCon"
```

The alternative that incurred the lowest direct costs ‘on range’ (other than ‘no management’) over the next 10 years was:

```
## [1] "Removals"
```

The alternative that incurred the lowest total direct costs across the sum of ‘on range’ and ‘off range’ (other than ‘no management’) over the next 35 years was:

```
## [1] "GonaCon"
```

Among the alternatives that achieved population size within Appropriate Management Levels, the alternative that incurred the lowest total direct costs across the sum of ‘on range’ and ‘off range’:

```
## [1] "Removals and GonaCon"
```

Note: results from the simulations may not be the sole basis for a management decision. The model does not explicitly account for or consider multiple uses on public lands, local land use planning considerations, ecological costs of horses on ecosystems, or other important values. The results presented here reflect considerations related to population size, amount of management, and fiscal costs of management that were estimated, given the input parameters and alternatives specified.

APPENDIX VII
Bluebell WSA Operating Requirements for the Shafter Well Gather Site

BLUEBELL WSA OPERATING REQUIREMENTS FOR THE SHAFTER WELL GATHER SITE

1. A wilderness specialist or a COR who is knowledgeable on the non-impairment standard will be present during set-up and removal of the gather site. The COR will inform the contractor and all personnel on-site of the location and rules for uses in Wilderness Study Areas.

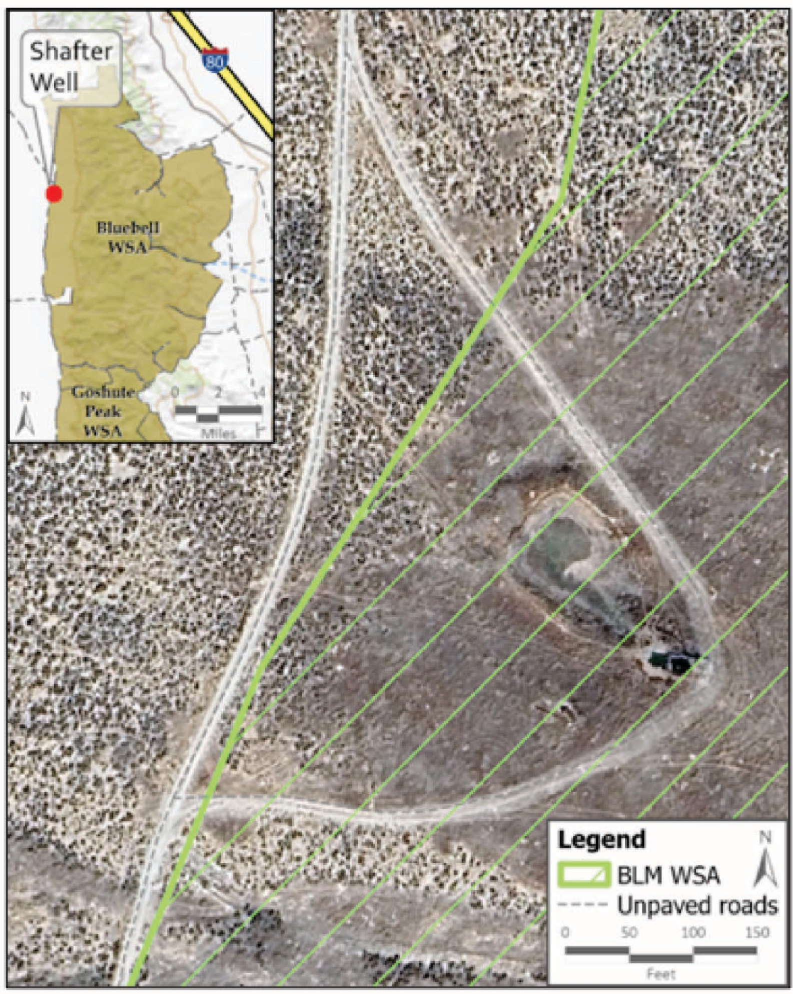
2. All motorized vehicles must stay on existing roads. Vehicles that are parked in the area must be parked in already disturbed areas.

3. All gather sites and blinds will be erected without causing surface disturbance.

4. Any helicopter landings will be in previously disturbed areas at the site. For example, there is a gravelly area that is devoid of vegetation near the well pump that could be used for landing a helicopter.

5. All trash and waste will be disposed of properly and not buried or burned on-site.

6. Any new or additional disturbance within the WSA will be repaired by BLM as soon as possible. This includes reseeding if necessary.



APPENDIX VIII

Permitted Grazing Use and Rangeland Health Standards Summary

Grazing use is permitted across several livestock grazing allotments which overlap with the Antelope and Triple B Complexes. Tables 1 and 2 summarize the percentage of the allotment land area that is within an HMA, the number of AUMs permitted, the seven-year average actual use, and the average percent of the permitted use that was used.

The Determination Documents evaluate and assess livestock grazing management practices, to determine whether those practices are conforming to the standards and guidelines for rangeland health, as required by 43 C.F.R. Subpart 4180. These documents provide insights into whether wild horses are contributing to non-attainment of overall standards during the livestock permit renewal process. Tables 3 and 4 summarize the determinations of the most recent rangeland health standards evaluations completed for each allotment within the Antelope and Triple B Complexes.

Table 1. Permitted Grazing Use in the Antelope Complex.

HMA	Allotment	Season of Use/ Livestock Kind	Percent of Allotment in HMA	Permitted Use (AUMs)	2018-2024 Average Actual Use (AUMs)	Percent Actual Use of Permitted Use
Antelope Valley	Antelope Valley[1]	11/1-5/31 Cattle	100%	5,376	1,960	37%
Antelope Valley	Badlands[1]	11/1-3/31 Sheep	100%	1,018	1,040	102%
Antelope	Becky Creek	11/1-3/15 Goats and Sheep	99%	671	538	80%
Antelope	Becky Springs	11/01-4/30 Sheep 11/15-2/28 Cattle	100%	3,842	2,053	54%
Antelope Valley	Boone Springs	11/1-3/31 Sheep	100%	2,947	995	34%
Spruce-Pequop	Chase Springs	4/1-11/30 Cattle	31%	2,586	1567	61%
Antelope	Chin Creek	11/1-5/31 Cattle 3/1-2/28 Sheep	99%	13,245	4,491	34%
Antelope Valley	Currie	3/1-2/28 Cattle and Domestic Horses	91%	5,504	3,852	70%
Antelope	Deep Creek	11/1-5/15 Cattle	98%	2,934	1,447	49%
Goshute	East Big Springs[2]	3/1-2/28 Cattle	20%	3,396	2233	66%

HMA	Allotment	Season of Use/ Livestock Kind	Percent of Allotment in HMA	Permitted Use (AUMs)	2018-2024 Average Actual Use (AUMs)	Percent Actual Use of Permitted Use
Antelope Valley	Ferber Flat	11/1-4/20 Sheep	100%	2,013	604	30%
Antelope	Goshute Mountain[1]	11/1-3/31 Sheep	100%	465	572	123%
Goshute	Lead Hills	11/1-4/15 Sheep	51%	5,609	1,757	31%
Goshute	Leppy Hills	11/1-4/30 Sheep	53%	3,351	1,361	41%
Antelope	Lovell Peak	7/1-9/30 Goats and Sheep	94%	162	0	0
Antelope Valley	McDermid Creek[3]	5/1-7/15 Cattle	100%	--	--	--
Antelope	North Steptoe	10/1-3/15 Sheep	75%	1,289	386	30%
Antelope	North Steptoe Trail	9/15-10/15 and 3/1-3/30 Sheep	74%	253	74	29%
Antelope	Sampson Creek	5/1-9/30 Sheep	99%	1,592	500	32%
Antelope	Schellbourne	10/15-5/15 Cattle	16%	685	490	72%
Antelope Valley/ Goshute/ Spruce-Pequop	Spruce	3/1-2/28 Cattle	67%	13,423	2,931	22%
Antelope Valley	Sugarloaf	11/1-4/20 Sheep	97%	2,001	1214	61%
Antelope	Tippett	3/1-2/28 Cattle 4/16-12/15 Sheep	27%	13,615	4,799	35%
Antelope	Tippett Pass	11/1-5/31 Cattle 10/1-6/15 Sheep	14%	8,177	1,240	15%
Goshute	UT/NV North	11/1-4/30 Sheep	65%	3,704	798	22%
Antelope Valley	UT/NV South	11/1-4/30 Sheep	100%	2,646	601	23%
Antelope Valley	Valley Mountain	11/1-5/15 Cattle	57%	5,572	1993	36%

HMA	Allotment	Season of Use/ Livestock Kind	Percent of Allotment in HMA	Permitted Use (AUMs)	2018-2024 Average Actual Use (AUMs)	Percent Actual Use of Permitted Use
Spruce-Pequop	West Big Springs[4]	3/1-2/28 Cattle	<1%	5,385	--	--
Antelope Valley	West White Horse	12/1-2/28 Sheep	100%	465	355	76%
Antelope Valley/ Goshute	White Horse	11/1-4/15 Sheep	53%	3,916	2057	53%

[1] Administered by the Bristlecone Field Office as per an interdistrict agreement.
[2] Actual use is for the Shafter Pasture only. The Shafter Pasture is the only pasture of the East Big Springs Allotment is within an HMA.
[3] The McDermid Creek Allotment is administered as part of the Currie Allotment by the Elko District. McDermid Creek actual use AUMs are reported as part of the Currie Allotment actual use AUMs summarized above.
[4] That portion of the West Big Springs Allotment within the Spruce-Pequop HMA is not grazed by livestock.

Table 2. Permitted Grazing Use in the Triple B Complex.

HMA/WHT	Allotment	Season of Use/ Live-stock Kind	% of Allotment in HMA/WHT	Permitted Use (AUMs)	2018-2024 Average Actual Use (AUMs)	% Actual Use of Permitted Use
Maverick-Medicine	Bald Mountain	6/15-9/15 Cattle	100%	312	131	42%
Triple B	Cherry Creek	5/01-2/28 Cattle	22%	9,089	3,284	36%
Antelope Valley	Currie	3/1-2/28 Cattle	3%	5,504	3,852	70%
Triple B	Dry Mountain	10/01-4/01 Cattle and Sheep	100%	1,149	0	0%
Triple B	Goshute Basin	7/01-10/15 Sheep	97%	449	82	18%
Triple B	Gold Canyon	6/20-11/30 Sheep	59%	1,068	0	0%
Maverick-Medicine	Harrison[1]	4/16-12/3 Cattle	55%	620	434	70%
Triple B	Horse Haven	5/01-7/31 Cattle	100%	1,056	18	2%
Triple B	Indian Creek	7/01-8/31 Cattle	100%	177	44	25%
Maverick-Medicine	Maverick/Ruby #9[2]	7/1-11/1 Cattle	92%	2,757	0	0%
Triple B	Maverick Springs	3/01-2/28 Cattle	100%	1,500	1,504	100%

HMA/WHT	Allotment	Season of Use/ Live-stock Kind	% of Allotment in HMA/WHT	Permitted Use (AUMs)	2018-2024 Average Actual Use (AUMs)	% Actual Use of Permitted Use
Triple B	McDermid Creek[3]	3/1-2/28 Cattle	100%	--	--	--
Triple B	Medicine Butte	3/01-2/28 Cattle 4/15 to 11/15 Sheep	98%	7,226	2,423	34%
Triple B	Moorman Ranch	3/01-2/28 Cattle	58%	10,092	2,254	22%
Triple B	Newark	11/01-4/02 Cattle	51%	9,709	2,776	29%
Triple B	North Butte	8/01-4/15 Cattle	100%	180	0	0%
Maverick-Medicine	North Butte Valley	4/15-12/22 Cattle	92%	2,420	1676	69%
Maverick-Medicine	Odgers[4]	10/1-12/31 Cattle	100%	1,596	0	0%
Maverick-Medicine	Ruby #8[1]	4/20-9/30 Cattle	< 1%	1,963	--	--
Triple B	Ruby Valley	11/01-4/03 Cattle	100%	467	408	87%
Triple B	South Butte	4/15-2/28 Cattle	91%	396	298	75%
Triple B	Steptoe	11/1-6/15 Cattle	11%	2,836	1,796	63%
Triple B	Thirty Mile Spring	4/15-2/28 Cattle and Sheep	32%	8,405	4,501	54%
Maverick-Medicine	Valley Moun-tain	11/1-5/1 Cattle	40%	5,572	1993	36%
Triple B	Warm Spring	3/01-2/28 Cattle 11/01 to 11/30 Sheep	95%	7,709	3,340	43%
Triple B	Warm Springs Trail	03/01-5/15 and 11/01-12/15 Sheep	38%	2,480	481	19%
Maverick-Medicine	West Cherry Creek	5/1-10/31 Cattle and Sheep	100%	2,674	1081	40%

HMA/WHT	Allotment	Season of Use/ Live-stock Kind	% of Allotment in HMA/WHT	Permitted Use (AUMs)	2018-2024 Average Actual Use (AUMs)	% Actual Use of Permitted Use
Cherry Springs	Cherry Springs	5/16-10/31 Cattle	79%	2,006[5]	536	27%
Cherry Springs	Corta S&G	6/16-10/15 Sheep	12%	22,115[5]	4,889	22%
Cherry Springs	Cave Creek	5/25-8/31 Cattle	13%	602[5]	286	48%

[1] Although technically within the Maverick-Medicine HMA, the Harrison and Ruby #8 Allotments are completely fenced from the remainder of the Maverick-Medicine HMA.

[2] No use has occurred in the summer range of the Maverick-Ruby #9 Allotment since 2001, and no use has occurred on the winter range since 2009.

[3] The McDermid Creek Allotment is administered as part of the Currie Allotment by the Elko District. McDermid Creek actual use AUMs are reported as part of the Currie Allotment actual use AUMs summarized above.

[4] The Odgers Allotment has not had an annually active grazing permit for over 20 years. Grazing use was approved once as Temporary Not Renewable (TNR) for the 2003-04 grazing season.

[5] The USFS uses Head Months (HM) in place of Animal Unit Months (AUM) as a unit of measurement. The conversion rate is 1.25 AUMs = 1 HM.

Table 3. Summary of the most recent rangeland health determinations for grazing allotments located in the Antelope Complex.

HMA (s)	Allotment	Rangeland Health Standards	Completion Year
Antelope Valley	Antelope Valley	**Standard 1: Upland Site;** Not assessed. Most recent evaluation (FMUD, 1994) was completed before standards were developed.	NA
		Standard 2: Riparian and Wetland Sites; Not assessed. Most recent evaluation (FMUD, 1994) was completed before standards were developed.	
		Standard 3: Habitat; Not assessed. Most recent evaluation (FMUD, 1994) was completed before standards were developed.	
		Standard 4: Cultural; Not assessed. Most recent evaluation (FMUD, 1994) was completed before standards were developed.	
Antelope Valley	Badlands	**Standard 1: Upland Standards;** Achieving the standard.	2013
		Standard 2: Riparian and Wetland Sites; Not applicable.	
		Standard 3: Habitat; Not achieving the Standard, and not making significant progress towards the standard. Current livestock grazing management practices are not considered to be a casual factor. Vegetation composition does not provide suitable feed, cover, and living space for some species of wildlife.	
		Standard 4: Cultural; Achieving the standard.	
Antelope	Becky Creek	**Standard 1: Upland Standards;** Achieving the standard.	2009
		Standard 2: Riparian and Wetland Sites; Not achieving the Standard but making significant progress towards achievement. Livestock are not a causal factor. Lack of riparian vegetation, pinyon and juniper encroachment and spring development are causal factors.	
		Standard 3: Habitat; Not achieving the Standard but making significant progress towards achievement. Livestock are not a causal	

HMA (s)	Allotment	Rangeland Health Standards	Completion Year
		factor. Shrub dominance, lack of perennial grass cover, and pinyon-juniper encroachment are causal factors.	
		Standard 4: Cultural; Was not assessed.	
Antelope	Becky Springs	**Standard 1: Upland Standards;** Not Assessed.	NA
		Standard 2: Riparian and Wetland Sites; Not Assessed.	
		Standard 3: Habitat; Not Assessed.	
		Standard 4: Cultural; Not Assessed.	
Antelope Valley	Boone Springs	**Standard 1: Upland Sites;** Met	2001
		Standard 2: Riparian and Wetland Sites; Not Met; wild horses have been determined to be a casual factor in the non-attainment of this standard.	
		Standard 3: Habitat; Some progress is being made toward attainment of this standard; utilization data indicates that livestock and wild horses are a causal factor in the non-attainment of this standard.	
		Standard 4; Cultural; Met	
Spruce-Pequop	Chase Springs	**Standard 1: Upland Sites;** Not Assessed	NA
		Standard 2: Riparian and Wetland Sites; Not Assessed	
		Standard 3: Habitat; Not Assessed	
		Standard 4; Cultural; Not Assessed	
Antelope	Chin Creek	**Standard 1: Upland Sites;** Not assessed. Most recent evaluation (FMUD, 1990) was completed before standards were developed.	NA
		Standard 2: Riparian and Wetland Sites; Not assessed. Most recent evaluation (FMUD, 1990) was completed before standards were developed.	
		Standard 3: Habitat; Not assessed. Most recent evaluation (FMUD, 1990) was completed before standards were developed.	
		Standard 4; Cultural; Not assessed. Most recent evaluation (FMUD, 1990) was completed before standards were developed.	
Antelope	Deep Creek	**Standard 1: Upland Sites;** Not Assessed	NA
		Standard 2: Riparian and Wetland Sites; Not Assessed	
		Standard 3: Habitat; Not Assessed	
		Standard 4; Cultural; Not Assessed	
Goshute	East Big Springs (Shafter Pasture is the only pasture within an HMA))	**Standard 1: Uplands Sites;** Met	2001
		Standard 2: Riparian and Wetland Sites; Not Applicable	
		Standard 3: Habitat; Partially met with progress made toward attainment.	
		Standard 4; Cultural; Met	
Antelope Valley	Ferber Flat	**Standard 1: Upland Sites;** Met	2001
		Standard 2: Riparian and Wetland Sites; Not Applicable.	
		Standard 3: Habitat; Some progress is being made toward attainment of this standard; utilization data indicates that livestock and wild horses are a causal factor in the non-attainment of this standard.	

HMA (s)	Allotment	Rangeland Health Standards	Completion Year
		Standard 4; Cultural; Met	
Antelope	Goshute Mountain	**Standard 1: Upland Standards;** Achieving the standard.	2013
		Standard 2: Riparian and Wetland Sites; Not applicable.	
		Standard 3: Habitat; Not achieving the Standard, and not making significant progress towards the standard. Current livestock grazing management practices are not considered to be a casual factor. Vegetation composition does not provide suitable feed, cover, and living space for some species of wildlife.	
		Standard 4: Cultural; Achieving the standard.	
Goshute	Lead Hills	**Standard 1: Upland Sites;** Met	2001
		Standard 2: Riparian and Wetland Sites; Some progress is being made toward attainment of this standard. It has been determined that Standard #2 assessment that the one spring in this allotment is rated at functional at risk with upward trend, Riparian data indicates that site characteristics at this spring are not adequate to provide the minimum requirements for this standard. Utilization data indicates that livestock grazing, and wild horse use are a casual factor of non-attainment of this standard.	
		Standard 3: Habitat; Some progress is being made toward attainment of this standard; utilization data indicates that livestock and wild horses are a causal factor in the non-attainment of this standard.	
		Standard 4: Cultural; Met	
Goshute	Leppy Hills	**Standard 1: Upland Sites;** Met	2000
		Standard 2: Riparian and Wetland Sites; Not Met; wild horses have been determined to be a casual factor in the non-attainment of this standard.	
		Standard 3: Habitat; Some progress is being made toward attainment of this standard; utilization data indicates that livestock and wild horses are a causal factor in the non-attainment of this standard.	
		Standard 4; Cultural; Met	
Antelope	Lovell Peak	**Standard 1: Upland Standards;** Achieving the standard.	2009
		Standard 2: Riparian and Wetland Sites; Not achieving the Standard but making significant progress towards achievement. Livestock are not a causal factor. Spring development, heavy trampling are some of the causal factors.	
		Standard 3: Habitat; Not achieving the Standard but making significant progress towards achievement. Livestock are not a causal factor. Pinyon-juniper encroachment is a causal factor.	
		Standard 4; Cultural; Was not assessed.	
Antelope	N. Steptoe	**Standard 1: Upland Sites;** Not achieving the Standard but making significant progress towards achievement. Livestock are not a causal factor. Causal factors include drought and fire suppression.	2008
		Standard 2: Riparian and Wetland Sites; Not achieving the Standard but making significant progress towards achievement. Livestock are not a causal factor. Casual factors include pinyon-juniper encroachment influencing spring flow, vegetation composition and vegetation structure.	

HMA (s)	Allotment	Rangeland Health Standards	Completion Year
		Standard 3: Habitat; Not achieving the Standard but making significant progress towards achievement. Livestock are not a causal factor. Casual factors include species composition, structure, and production which appear to not be appropriate to the range site potential due to historical livestock use, drought, lack of wildfire, pinyon-juniper competition, and invasive species.	
		Standard 4; Cultural; Was not assessed.	
Antelope	N. Steptoe Trail	**Standard 1: Upland Sites;** Not achieving the Standard but making significant progress towards achievement. Livestock are not a causal factor. Causal factors include drought and fire suppression.	2008
		Standard 2: Riparian and Wetland Sites; Not achieving the Standard but making significant progress towards achievement. Livestock are not a causal factor. Casual factor include pinyon-juniper encroachment influencing spring flow, vegetation composition and vegetation structure.	
		Standard 3: Habitat; Not achieving the Standard but making significant progress towards achievement. Livestock are not a causal factor. Casual factors include species composition, structure, and production which appear to not be appropriate to the range site potential due to historical livestock use, drought, lack of wildfire, pinyon-juniper competition, and invasive species.	
		Standard 4; Cultural; Was not assessed.	
Antelope	Sampson Creek	**Standard 1: Upland Sites;** Not assessed. Most recent evaluation (FMUD, 1990) was completed before standards were developed.	NA
		Standard 2: Riparian and Wetland Sites; Not assessed. Most recent evaluation (FMUD, 1990) was completed before standards were developed.	
		Standard 3: Habitat; Not assessed. Most recent evaluation (FMUD, 1990) was completed before standards were developed.	
		Standard 4; Cultural; Not assessed. Most recent evaluation (FMUD, 1990) was completed before standards were developed.	
Antelope	Schellbourne	**Standard 1: Upland Sites;** Achieving the standard	2008
		Standard 2: Riparian and Wetland Sites; Achieving the standard	
		Standard 3: Habitat; Not achieving the standard but making significant progress towards the standard. Livestock are not a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 4; Cultural; Not assessed	
Antelope Valley, Goshute, Spruce-Pequop	Spruce	**Standard 1: Upland Sites;** Some progress is being made toward attainment of this standard; livestock are a causal factor in the non-attainment of this standard.	1997
		Standard 2: Riparian and Wetland Sites; Some progress is being made toward attainment of this standard; livestock are a causal factor in the non-attainment of this standard	
		Standard 3: Habitat; Some progress is being made toward attainment of this standard; livestock are a causal factor in the non-attainment of this standard.	
		Standard 4; Cultural; Met	
Antelope Valley	Sugarloaf	**Standard 1: Upland Sites;** Met	2001
		Standard 2: Riparian and Wetland Sites; Not Applicable	

HMA (s)	Allotment	Rangeland Health Standards	Completion Year
		Standard 3: Habitat; Some progress is being made toward attainment of this standard; utilization data indicates that livestock is a causal factor in the non-attainment of this standard.	
		Standard 4; Cultural; Met	
Antelope	Tippett	**Standard 1: Upland Sites;** Not assessed. Most recent evaluation (FMUD, 1992) was completed before standards were developed.	NA
		Standard 2: Riparian and Wetland Sites; Not assessed. Most recent evaluation (FMUD, 1992) was completed before standards were developed.	
		Standard 3: Habitat; Not assessed. Most recent evaluation (FMUD, 1992) was completed before standards were developed.	
		Standard 4; Cultural; Not assessed. Most recent evaluation (FMUD, 1992) was completed before standards were developed.	
Antelope	Tippett Pass	**Standard 1: Upland Sites;** Not Assessed	NA
		Standard 2: Riparian and Wetland Sites; Not Assessed	
		Standard 3: Habitat; Not Assessed	
		Standard 4; Cultural; Not Assessed	
Goshute	UT/NV North	**Standard 1: Upland Sites;**	2001
		Standard 2: Riparian and Wetland Sites; Not Met; wild horses have been determined to be a casual factor in the non-attainment of this standard.	
		Standard 3: Habitat; Some progress is being made toward attainment of this standard; utilization data indicates that livestock and wild horses are a causal factor in the non-attainment of this standard.	
		Standard 4: Cultural; Met	
Antelope Valley	UT/NV South	**Standard 1: Upland Sites;** Met	2001
		Standard 2: Riparian and Wetland Sites; Not Applicable	
		Standard 3: Habitat; Some progress. Utilization data indicates that livestock grazing is not a casual factor in the non-attainment of this standard.	
		Standard 4; Cultural; Met	
Antelope Valley	Valley Mountain	**Standard 1: Upland Sites;** Some progress is being made toward attainment of this standard; livestock are a causal factor in the non-attainment of this standard.	1997
		Standard 2: Riparian and Wetland Sites; Some progress is being made toward attainment of this standard; livestock are a causal factor in the non-attainment of this standard.	
		Standard 3: Habitat; Some progress is being made toward attainment of this standard; livestock are a causal factor in the non-attainment of this standard.	
		Standard 4; Cultural; Met	
Spruce-Pequop	West Big Springs	**Not Applicable.** That portion of the West Big Springs Allotment is not grazed by livestock.	2001
Antelope Valley	West White Horse	**Standard 1: Upland Sites;** Some progress is being made toward attainment of this standard; livestock are a causal factor in the non-attainment of this standard.	2001
		Standard 2: Riparian and Wetland Sites; Not Applicable.	

HMA (s)	Allotment	Rangeland Health Standards	Completion Year
		Standard 3: Habitat; Some progress is being made toward attainment of this standard; utilization data indicates that livestock is a causal factor in the non-attainment of this standard.	
		Standard 4; Cultural; Met	
Antelope Valley, Goshute	White Horse	**Standard 1: Upland Sites;** Some progress is being made toward attainment of this standard; Utilization data indicates that livestock grazing is not a causal factor in the non-attainment of this standard.	2001
		Standard 2: Riparian and Wetland Sites; Not Applicable.	
		Standard 3: Habitat; Some progress is being made toward attainment of this standard; utilization data indicates that livestock is not a causal factor in the non-attainment of this standard.	
		Standard 4; Cultural; Met	

Table 4. Summary of the most recent rangeland health determinations for grazing allotments located in the Triple B Complex.

HMA/ WHT	Allotment	Rangeland Health Standards	Completion Year
Maverick-Medicine	Bald Mountain	**Standard 1: Upland Sites;** Met	2000
		Standard 2: Riparian and Wetland Sites; Not Applicable	
		Standard 3: Habitat; Met	
		Standard 4: Cultural; Met	
Triple B	Cherry Creek	**Standard 1: Upland Sites;** Not achieving the standard but make significant progress towards achieving. Livestock are not a contributing factor. Failure to meet the standard is related to other issues or conditions.	2008
		Standard 2: Riparian and Wetland Sites; Not achieving the standard but making significant progress towards. Livestock are a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 3: Habitat; Not achieving the standard but make significant progress towards achieving. Livestock are not a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 4; Cultural; Not Assessed.	
Antelope Valley	Currie	**Standard 1: Uplands Sites;** Met	2000
		Standard 2: Riparian and Wetland Sites; Not Applicable.	
		Standard 3: Habitat; Some progress is being made toward attainment of this standard; livestock are a causal factor in the non-attainment of this standard.	
		Standard 4; Cultural; Met	
Triple B	Dry Mountain	**Standard 1: Upland Sites;** Achieving the Standard.	2009
		Standard 2: Riparian and Wetland Sites; N/A.	
		Standard 3: Habitat; Not achieving the standard but making significant progress towards achievement. Livestock are not a contributing factor. Failure to meet the Standard is related to other issues or conditions.	
		Standard 4; Cultural; Was not assessed.	

HMA/ WHT	Allotment	Rangeland Health Standards	Completion Year
Triple B	Goshute Basin	**Standard 1: Upland Sites;** Achieving the standard.	2008
		Standard 2: Riparian and Wetland Sites; Not achieving the standard but making significant progress towards. Livestock are a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 3: Habitat; Achieving the standard.	
		Standard 4; Cultural; Not assessed.	
Triple B	Gold Canyon	**Standard 1: Upland Sites;** Achieving the standard.	2009
		Standard 2: Riparian and Wetland Sites; Not achieving the standard but making significant progress towards. Livestock are not a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 3: Habitat; Not achieving the standard but make significant progress towards achieving. Livestock are not a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 4; Cultural; Not assessed.	
Maverick-Medicine	Harrison	**Not Applicable** [1]	
Triple B	Horse Haven	**Standard 1: Upland Sites;** Achieving the Standard.	2008
		Standard 2: Riparian and Wetland Sites; N/A.	
		Standard 3: Habitat; Not achieving the standard but making significant progress towards achievement. Livestock are not a contributing factor. Failure to meet the Standard is related to other issues or conditions.	
		Standard 4; Cultural; Was not assessed.	
Triple B	Indian Creek	**Standard 1: Upland Sites;** Achieving the standard.	2008
		Standard 2: Riparian and Wetland Sites; Not achieving the standard but making significant progress towards. Livestock are a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 3: Habitat; Achieving the standard.	
		Standard 4; Cultural; Not assessed.	
Maverick-Medicine	Maverick-Ruby #9	**Standard 1: Upland Sites;** Met	2000
		Standard 2: Riparian and Wetland Sites; Not met. Utilization and grazing impacts by livestock and wild horses on Tick and Gardner indicate that livestock and wild horses are a causal factor in the non-attainment of this standard.	
		Standard 3: Habitat; Some progress has been made toward attainment of this standard. Utilization and grazing impacts by livestock and wild horses on Tick and Gardner indicate that livestock and wild horses are a causal factor in the non-attainment of this standard. The remainder of the allotment is either achieving significant progress towards the attainment of the standard or is meeting the standard.	
		Standard 4: Cultural; Met	
Triple B	Maverick Springs	**Standard 1: Upland Sites;** Achieving the Standard.	2008
		Standard 2: Riparian and Wetland Sites; N/A.	

HMA/ WHT	Allotment	Rangeland Health Standards	Completion Year
		Standard 3: Habitat; Not achieving the standard but making significant progress towards achievement. Livestock are not a contributing factor. Failure to meet the Standard is related to other issues or conditions.	
		Standard 4; Cultural; Was not assessed.	
Triple B	McDermid Creek (Currie)	**Standard 1: Upland Sites;** - see Currie	2000
		Standard 2: Riparian and Wetland Sites; - see Currie	
		Standard 3: Habitat; - see Currie	
		Standard 4; Cultural; - see Currie	
Triple B	Medicine Butte	**Standard 1: Upland Sites;** Achieving the standard.	2010
		Standard 2: Riparian and Wetland Sites; Not achieving the standard but making significant progress towards achievement. Livestock are not a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 3: Habitat; Not achieving the standard but making significant progress towards. Livestock are a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 4; Cultural; Not assessed.	
Triple B	Moorman Ranch	**Standard 1: Upland Sites;** Achieving the standard.	2012
		Standard 2: Riparian and Wetland Sites; Achieving the standard.	
		Standard 3: Habitat; Not achieving the standard but making significant progress towards achievement. Livestock are not a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 4; Cultural; Not assessed.	
Triple B	Newark	**Standard 1: Upland Sites;** Standard achieved.	2009
		Standard 2: Riparian and Wetland Sites; Not achieving the Standard, not making significant progress towards achievement. Livestock area a contributing factor to not achieving the Standard. Failure to mee the Standard is also related to other issues or conditions. Wild horse and wildlife use, variable precipitation, and altered natural disturbance regimes were listed as other contributing factors.	
		Standard 3: Habitat; Not achieving the standard but making significant progress towards achievement. Livestock are not a contributing factor. Failure to meet the Standard is related to other issues or conditions. Wild horse and wildlife use, variable precipitation, and altered natural disturbance regimes were listed as other contributing factors.	
		Standard 4; Cultural; Was not assessed.	
Triple B	North Butte	**Standard 1: Upland Sites;** Achieving the standard.	2010
		Standard 2: Riparian and Wetland Sites; Not assessed/not applicable.	
		Standard 3: Habitat; Not achieving the standard but making significant progress towards achievement. Livestock are not a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 4; Cultural; Not assessed.	
Maverick-Medicine		**Standard 1: Upland Sites;** Some progress is being made toward attainment of this standard.	2000

HMA/ WHT	Allotment	Rangeland Health Standards	Completion Year
	North Butte Valley	**Standard 2: Riparian and Wetland Sites;** Met	
		Standard 3: Habitat; Some progress is being made toward attainment of this standard. Livestock and wild horses are not a causal factor in the non-attainment of this standard.	
		Standard 4; Cultural; Met	
Maverick-Medicine	Odgers	**Standard 1: Upland Sites;** Some progress is being made toward attainment of this standard.	2000
		Standard 2: Riparian and Wetland Sites; Not met. Livestock have been determined to be a causal factor in the non-attainment of this standard.	
		Standard 3: Habitat; Not met. Livestock grazing management practices as well as wild horse use are a causal factor in the non-attainment of this standard.	
		Standard 4: Cultural; Met	
Maverick-Medicine	Ruby #8	**Not Applicable** [1]	
Triple B	Ruby Valley	**Standard 1: Upland Sites;** Achieving the Standard.	2008
		Standard 2: Riparian and Wetland Sites; N/A.	
		Standard 3: Habitat; Not achieving the standard but making significant progress towards achievement. Livestock are not a contributing factor. Failure to meet the Standard is related to other issues or conditions.	
		Standard 4 Cultural; Was not assessed.	
Triple B	South Butte	**Standard 1: Upland Sites;** Achieving the standard.	2010
		Standard 2: Riparian and Wetland Sites; Achieving the standard.	
		Standard 3: Habitat; Not achieving the standard but making significant progress towards achievement. Livestock are not a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 4; Cultural; Not assessed.	
Triple B	Steptoe	**Standard 1: Upland Sites;** Achieving the standard.	2009
		Standard 2: Riparian and Wetland Sites; Achieving the standard.	
		Standard 3: Habitat; Not achieving the standard but making significant progress towards. Livestock are a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 4; Cultural; Not assessed.	
Triple B	Thirty Mile Spring	**Standard 1: Upland Sites;** Achieving the standard.	2008
		Standard 2: Riparian and Wetland Sites; Not achieving the standard but making significant progress towards. Livestock are a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 3: Habitat; Not achieving the Standard but making significant progress towards achievement. Livestock are not a contributing factor. Failure to meet the standard is related to other issues or conditions.	
		Standard 4; Cultural; Not assessed.	

HMA/ WHT	Allotment	Rangeland Health Standards	Completion Year
Maverick-Medicine	Valley Mountain	**Standard 1: Upland Sites;** Some progress is being made toward attainment of this standard; livestock are a causal factor in the non-attainment of this standard.	1997
		Standard 2: Riparian and Wetland Sites; Some progress is being made toward attainment of this standard; livestock are a causal factor in the non-attainment of this standard.	
		Standard 3: Habitat; Some progress is being made toward attainment of this standard; livestock are a causal factor in the non-attainment of this standard.	
		Standard 4: Cultural; Met	
Triple B	Warm Springs	**Standard 1: Upland Sites;** Achieving the Standard.	2009
		Standard 2: Riparian and Wetland Sites; Not achieving the standard but making significant progress towards achievement. Livestock are not a contributing factor. Failure to meet the Standard is related to other issues or conditions.	
		Standard 3: Habitat; Not achieving the standard but making significant progress towards achievement. Livestock are not a contributing factor. Failure to meet the Standard is related to other issues or conditions.	
		Standard 4; Cultural; Was not assessed.	
Triple B	Warm Springs Trail	**Standard 1: Upland Sites;** Achieving the Standard.	2009
		Standard 2: Riparian and Wetland Sites; N/A.	
		Standard 3: Habitat; Not achieving the standard but making significant progress towards achievement. Livestock are not a contributing factor. Failure to meet the Standard is related to other issues or conditions.	
		Standard 4; Cultural; Was not assessed.	
Maverick-Medicine	West Cherry Creek	**Standard 1: Upland Sites;** Not assessed. Most recent evaluation (FMUD, 1994) was completed before standards were developed.	NA
		Standard 2: Riparian and Wetland Sites; Not assessed. Most recent evaluation (FMUD, 1994) was completed before standards were developed.	
		Standard 3: Habitat; Not assessed. Most recent evaluation (FMUD, 1994) was completed before standards were developed.	
		Standard 4 Cultural; Not assessed. Most recent evaluation (FMUD, 1994) was completed before standards were developed.	
Cherry Springs WHT	Cherry Springs	**Standard 1: Upland Sites;**	NA
		Standard 2: Riparian and Wetland Sites;	
		Standard 3: Habitat;	
		Standard 4 Cultural;	
Cherry Springs WHT	Corta S&G	**Standard 1: Upland Sites;**	NA
		Standard 2: Riparian and Wetland Sites;	
		Standard 3: Habitat;	
		Standard 4 Cultural;	
Cherry Springs WHT	Cave Creek	**Standard 1: Upland Sites;**	NA
		Standard 2: Riparian and Wetland Sites;	
		Standard 3: Habitat;	

HMA/ WHT	Allotment	Rangeland Health Standards	Completion Year
		Standard 4 Cultural;	

[1] Although technically within the Maverick-Medicine HMA, the Harrison and Ruby #8 Allotments are completely fenced from the remainder of the Maverick-Medicine HMA.

APPENDIX IX

Risk Assessment for Noxious & Invasive Weeds

ANTELOPE AND TRIPLE B COMPLEXES
WILD HORSE GATHER

Elko and White Pine Counties, Nevada

On February 14, 2025, a Noxious & Invasive Weed Risk Assessment was completed for the Complexes wild horse gather. This weeds risk assessment includes the Ely District Antelope and Triple B HMAs and the Elko District Antelope Valley, Goshute, Maverick-Medicine and Spruce-Pequop HMAs.

Alternatives analyzed include the following:

Proposed Action (Alternative A).

- Implement HMAP with a management strategy which would include several population growth suppression methods.
- Immediately gather and remove excess animals to reach low AML as expeditiously as possible through an initial gather, and if necessary, a follow-up gather or gathers, to achieve and maintain the population within AML range. Follow-up gathers to remove excess animals to achieve low AML would be conducted as promptly as appropriate to allow sufficient time for the animals to settle after a helicopter gather and to provide for a safe, efficient, and effective follow-up gather operation. 3
- Apply fertility control methods (vaccines) to released mares.
- Maintain a sex ratio adjustment of 60% male and 40% female.

Alternative B.

- Alternative B would be the same as Alternative A but would release a small non-reproducing component of males (181 in Antelope Complex and 209 in Triple B Complex) that would bring the population to mid-AML.

Alternative C.

- Implement an HMAP with management strategy to gather and remove excess animals to within the AML range without fertility control, sex ratio adjustments, or geldings.

No Action Alternative.

- Under the No Action Alternative, existing management would continue, and a gather to remove excess wild horses would not occur. There would be no active management to control population growth rates or the size of the wild horse population, or to bring the wild horse population to AML. A Herd Management Area Plan would not be implemented for the Antelope and Triple B Complexes.

No field weed surveys were completed for this project. Instead, the Ely District and Elko District weed inventory data was consulted. Currently, the following weed species are found within the Ely District Antelope and Triple B HMAs and the Elko District Antelope Valley, Goshute, Maverick-Medicine and Spruce-Pequop HMAs or along roads and drainages leading to the project area:

Scientific Name	Common Name
Acroptilon repens	Russian knapweed
Carduus nutans	Musk thistle
Centaurea stoebe	Spotted knapweed
Centaurea squarrosa	Squarrose knapweed
Cirsium vulgare	Bull thistle
Conium maculatum	Poison hemlock
Hyoscyamus niger	Black henbane
Lepidium draba	Hoary cress
Lepidium latifolium	Perennial Pepperweed
Onopordum acanthium	Scotch thistle
Tamarix spp.	Salt cedar
Bromus tectorum	Cheatgrass
Halogeton glomeratus	Halogeton

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

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

For Alternative A, B, and C the factors rate as Moderate (6) at the present time. The concentrated use around capture sites could result in new infestations, specifically at the capture sites and holding pens. However, by removing excess horses, native plant communities should have increased vigor and out compete weed species. Those alternatives that reach AML faster and offer solutions to slow population growth would have the most benefit to native vegetation recovery and preventing weeds from establishing and spreading. For the no action alternative, the factor rates as High (8). No gather operation would occur to spread weeds, and excess horses would remain on the range. This would have detrimental impact on native plant populations by decreased vigor due to overgrazing and weeds would be more competitive.

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

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

For alternatives A, B and C this project rates as Moderate (5) at the present time. The project area has several noxious and invasive weed infestations, especially along the main roads and in old fires. New weed infestations could spread to the area during gather operations which would have an adverse effect on the surrounding native vegetation, as well as an increase in cheatgrass populations which could alter the fire regime in the area. The potential to spread weeds would be limited primarily to identified areas making follow up monitoring and treatment, if necessary, more manageable. Following the gather operations native plant populations should have increased vigor and reproduction, slowing weed infestations from spreading outside the gather sites. For the no action alternative this project rates as High (8). By not gathering horses down to AML native plant communities could continue to be stressed due to over grazing allowing the expansion of invasive plants such as cheat grass, Russian thistle and Halogeton. Overtime native plant communities would not be able to recover and would be lost to monocultures of invasive species. Another concern is that as wild horse population increases, wild horses would need to seek alternative forage sources and consume noxious and invasive weeds found within the HMA. Russian knapweed is prevalent throughout the HMA and if consumed causes "chewing disease" in horses by damaging the area of the brain that controls fine motor movements, particularly of the mouth resulting in starvation or dehydration.

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

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

For all alternatives, this project Risk Rating is Moderate.

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

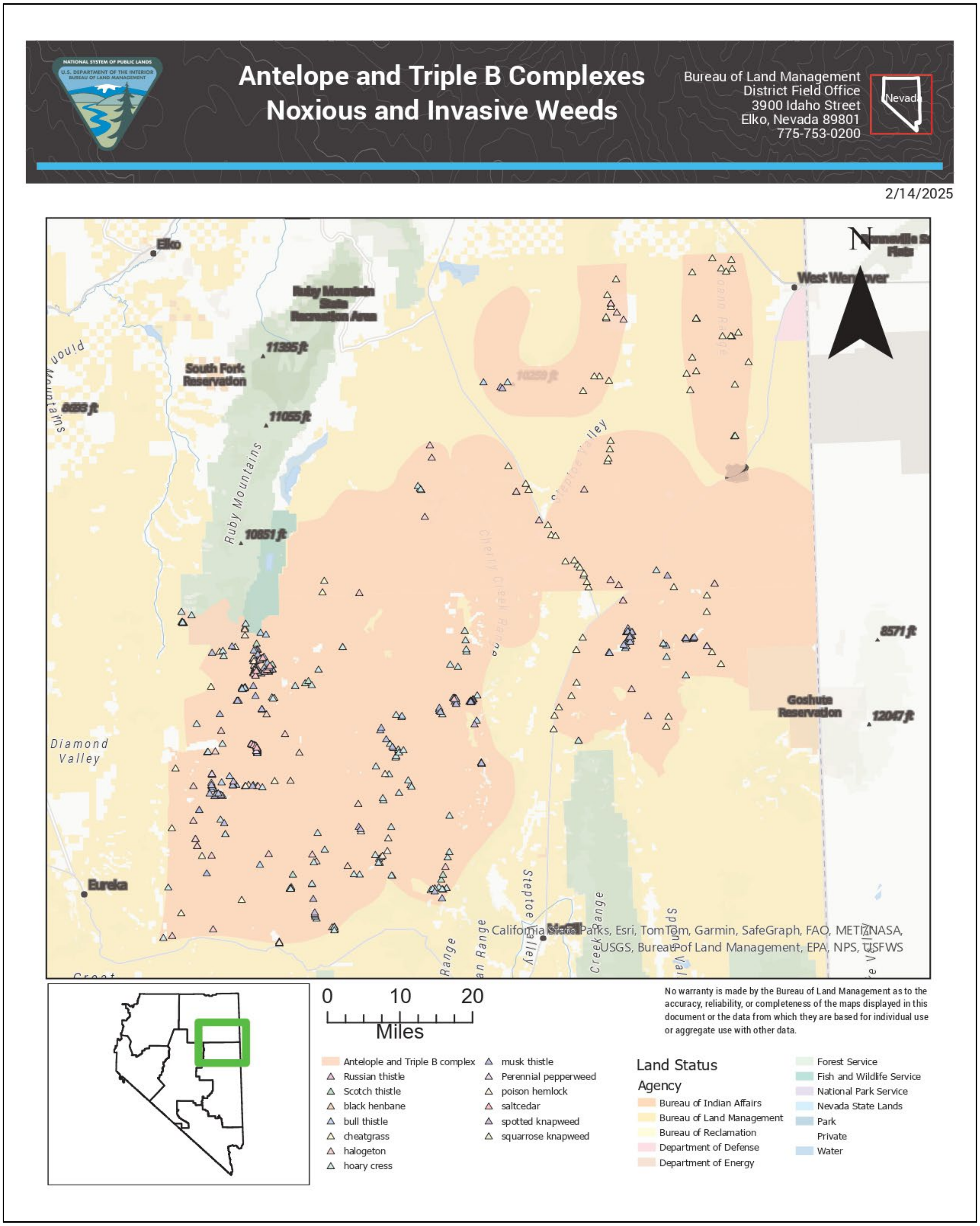
Reviewed by: Kyle Martin — February 14, 2025

Kyle Martin
Natural Resource Specialist (Elko District) — Date

Reviewed by: Sheryl L. Post — 03/12/2025

Sheryl Post
Natural Resource Specialist (Ely District) — Date

Figure 1. Map of documented noxious and invasive weeds in the Antelope and Triple B complexes



APPENDIX X

Special Status Species that may occur within or near the Complexes (2023)

<u>Common Name</u>	<u>Scientific Name</u>
<u>*Birds*</u>	
American Avocet	*Recurvirostra americana*
American White Pelican	*Pelecanus erythrorhynchos*
Bald Eagle	*Haliaeetus leucocephalus*
Black Rosy-finch	*Leucosticte atrata*
Black Tern	*Chlidonias niger surinamenisis*
Black-throated Gray Warbler	*Setophaga nigrescens*
Bobolink	*Dolichonyx oryzivorus*
Brewer's Sparrow	*Spizella breweri*
Broad-tailed Hummingbird	*Selasphorus platycercus*
California Gull	*Larus californicus*
Calliope Hummingbird	*Larus californicus*
Cassin's Finch	*Haemorhous cassinii*
Clark's Grebe	*Aechmorphorus clarkii*
Common Nighthawk	*Chordeiles minor*
Evening Grosbeak	*Coccothraustes vespertinus*
Ferruginous Hawk	*Buteo regalis*
Flammulated Owl	*Otus flammeolus*
Forster's Tern	*Sterna forsteri*
Franklin's Gull	*Leucophaeus pipixcan*
Golden Eagle	*Aquila chrysaetos*
Gray-crowned Rosy Finch	*Leucosticte tephrocotis*
Gray Vireo	*Vireo vicinior*
Great Basin Willow Flycatcher	*Empidonax traillii adastus*
Greater Sage-grouse	*Centrocercus urophasianus*
Juniper Titmouse	*Baeolophus griseus*
Lesser Yellowlegs	*Tringa flavipes*
Lewis's Woodpecker	*Melanerpes lewis*
Loggerhead Shrike	*Lanius ludovicianus*
Long-billed Curlew	*Numenius americanus*
Long-eared Owl	*Asio otus*
Olive-sided Flycatcher	*Contopus cooperi*
Northern Goshawk	*Accipiter gentilis*
Northern Harrier	*Northern Harrier*
Peregrine Falcon	*Falco peregrinus*
Pinyon Jay	*Gymnorhinus cyanocephalus*
Prairie Falcon	*Falco mexicanus*
Rufous Hummingbird	*Selasphorus rufus*
Sagebrush Sparrow	*Artemisiospiza nevadensis*
Sage Thrasher	*Oreoscoptes montanus*

Short-eared Owl	*Asio flammeus*
Swainson's Hawk	*Buteo swainsoni*
Vesper Sparrow	*Pooecetes graminueus*
Virginia's Warbler	*Leiothlypis virginiae*
Western Burrowing Owl	*Athene cunicularia hypugaea*
Western Grebe	*Aechmorphorus occidentalis*
Western Snowy Plover	*Charadrius nivosus nivosus*
Willet	*Tringa semipalmata*
Yellow-breasted Chat	*Icteria virens*
Mammals	
Big Brown Bat	*Eptesicus fuscus*
California Myotis	*Myotis californicus*
Canyon Bat	*Parastrellus hesperus*
Dark Kangaroo Mouse	*Mycrodipodops megacephalus*
Desert Kangaroo Rat	*Dipodomys deserti*
Fringed Myotis	*Myotis thysanodes*
Hoary Bat	*Lasiurus cinereus*
Little Brown Myotis	*Myotis lucifugus*
Long-eared Myotis	*Myotis evotis*
Long-legged Myotis	*Myotis volans*
Mexican Free-tailed Bat	*Tadarida brasiliensis*
Pale Kangaroo Mouse	*Mycrodipodops pallidus*
Pallid Bat	*Antrozous pallidus*
Pygmy Rabbit	*Brachylagus idahoensis*
Silver-haired Bat	*Lasionycteris noctivagans*
Spotted Bat	*Euderma maculatum*
Townsend's Big-eared Bat	*Corynorhinus townsendii*
Western Small-footed Bat	*Myotis ciliolabrum*
Yuma myotis	*Myotis yumanensis*
Reptiles/Amphibians	
Greater Short-horned Lizard	*Phrynosoma hernandesi*
Northern Leopard Frog	*Lithobates onca*
Sonoran Mountain Kingsnake	*Lampropeltis pyromelana*
Plants	
Basalt Springparsley	*Cymopterus basalticus*
Broad-pod Freckled Milkvetch	*Astragalus lentiginosus var. latus*
Dad's Penstemon	*Penstemon patricus*
Low Feverfew	*Parthenium ligulatum*
Mount Moriah Beardtongue	*Penstemon moriahensis*
Nachlinger's Catchfly	*Silene nachlingerae*
One-leaflet Torrey's Milkvetch	*Astragalus calycosus var. monophyllidius*
Mound Catseye	*Cryptantha compacta*
Whitebark Pine	*Pinus albicaulis**

Insects

Monarch Butterfly	*Danaus plexippus*
Dark Sandhill Skipper	*Polites sabuleti nigrescens*
Western Bumble Bee	*Bombus occidentalis*
White River Wood Nympth	*Cercyonis pegala pluvialis*
Suckley's Cuckoo Bumble Bee	*Bombus suckleyi*

Fish

Bonneville Cutthroat Trout	*Oncorhynchus clarkii utah*
Lahontan Cutthroat Trout	*Oncorhynchus clarkii henshawi*
Newark Valley Tui Chub	*Siphateles bicolor newarkensis*
Relict Dace	*Relictus solitarius*
Clover Valley Speckled Dace	*Rhinichthys osculus oligoporus*
Independence Valley Speckled Dace	*Rhinichthys osculus lethoporus*
Pahrump Poolfish	*Empetrichthys latos*

Gastropods

Black-footed Tightcoil	*Pristiloma chersinella*
Great Basin Mountainsnail	*Oreohelix strigosa depressa*
Goshute Mountainsnail	*Oreohelix loisae*
Hardy Springsnail	Pyrgulopsis marcida
Northern Steptoe Pyrg	*Pyrgulopsis serrata*
Schell Creek Mountainsnail	*Oreohelix nevadensis*
Steptoe Hydrobe	*Eremopyrgus eganensis*
Sub-globose Steptoe Ranch Pyrg	*Pyrgulopsis orbiculata*
Toquerville Springsnail	*Pyrgulopsis kolobensis*
Transverse Gland Pyrg	*Pyrgulopsis cruciglans*
Undescribed Pyrg Lineage C	*Pyrgulopsis cf kolobensis Lineage C*
Whitepine Mountainsnail	*Oreohelix hemphilli*

APPENDIX XI

Greater Sage-Grouse Required Design Features

Required Design Feature	Conclusion (Required /Not Applicable/Applicant Committed)	Rationale* (should be one or two statements, if in-depth analysis is needed, it should be provided separately)
RDF Gen 1: Locate new roads outside of GRSG habitat to the extent practical.	Not Applicable	No new roads are proposed.
RDF Gen 2: Avoid constructing roads within riparian areas and ephemeral drainages. Construct low-water 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).	Not Applicable	No new roads are proposed.
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.	Not Applicable	No new roads are proposed.
RDF Gen 4: Coordinate road construction and use with ROW holders to minimize disturbance to the extent possible.	Not Applicable	No new roads are proposed.
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.	Required	BLM and contractors would drive slower in GRSG habitat.
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.	Not Applicable	No new roads are proposed.
RDF Gen 7: Require dust abatement practices when authorizing use on roads.	Not Applicable	Roads would be driven at reduced speeds in GRSG habitat.
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.	Not Applicable	No reclamation required.
RDF Gen 10: Design or site permanent structures that create movement (e.g., pump jack/ windmill) to minimize impacts on GRSG habitat.	Not Applicable	No permanent moving structures are proposed.
RDF Gen 11: Equip temporary and permanent aboveground facilities with structures or devices that discourage nesting and perching of raptors, corvids, and other predators.	Not Applicable	Consistent and frequent human presence at the facilities and lack of nesting substrate provided due to the nature of the facilities.

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.	Required	A Weed Risk Assessment was completed.
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.	Required	
RDF Gen 14: Locate project related temporary housing sites outside of GRSG habitat.	Not Applicable	No temporary housing is proposed.
RDF Gen 15: When interim reclamation is required, irrigate site to establish seedlings more quickly if the site requires it.	Not Applicable	No reclamation required.
RDF Gen 16: Utilize mulching techniques to expedite reclamation and to protect soils if the site requires it.	Not Applicable	No reclamation required.
RDF Gen 17: Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.	Not Applicable	No reclamation required.
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.	Not Applicable	Gathers use previously disturbed areas.
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).	Required	
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.	Not Applicable	No facilities or fences would be constructed
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).	Required	Any troughs would be equipped with the escape ramps.
RDF GEN 22: Load and unload all equipment on existing roads to minimize disturbance to vegetation and soil.	Required	Equipment would be loaded and unloaded on existing roads and previously disturbed areas.

APPENDIX XII

Literature Reviews on Effects of Gathers, Ecological Interactions, and Population Growth Suppression Methods

This appendix includes scientific literature reviews addressing five topics: effects of gathers, effects of wild horses and burros on rangeland ecosystems, effects of fertility control vaccines and sex ratio manipulations, and effects of sterilization.

Effects of Gathers on Wild Horses and Burros

Gathering any wild animals into pens has the potential to cause impacts to individual animals. There is also the potential for impacts to individual horses and burros during transportation, short-term holding, long-term holding that take place after a gather. However, BLM follows guidelines to minimize those impacts and ensure humane animal care and high standards of welfare. The following literature review summarizes the limited number of scientific papers and government reports that have examined the effects of gathers and holding on wild horses and burros.

Two early papers, by Hansen and Mosley (2000) and Ashley and Holcomb (2001) examined limited effects of gathers, including behavioral effects and effects on foaling rates. Hansen and Mosley (2000) observed BLM gathers in Idaho and Wyoming. They monitored wild horse behaviors before and after a gather event and compared the behavioral and reproductive outcomes for animals that were gathered by helicopter against those outcomes for animals that were not. This comparison led to the conclusion that gather activities used at that time had no effect on observed wild horse foraging or social behaviors, in terms of time spent resting, feeding, vigilant, traveling, or engaged in agonistic encounters (Hansen and Mosley 2000). Similarly, the authors did not find any statistically significant difference in foaling rates in the year after the gather in comparisons between horses that were captured, those that were chased by a helicopter but evaded capture, or those that were not chased by a helicopter. The authors concluded that the gathers had no deleterious effects on behavior or reproduction. Ashley and Holcomb (2001) conducted observations of reproductive rates at Garfield Flat HMA in Nevada, where horses were gathered in 1993 and 1997, and compared those observations at Granite Range HMA in Nevada, where there was no gather. The authors found that the two gathers had a short-term effect on foaling rates; pregnant mares that were gathered had lower foaling rates than pregnant mares that were not gathered. The authors suggested that BLM make changes to the gather methods used at that time, to minimize the length of time that pregnant mares are held prior to their release back to the range. Since the publications by Hansen and Mosley (2000) and by Ashley and Holcomb (2001), BLM did make changes to reduce the stress that gathered animals, including pregnant females, may experience as a result of gather and removal activities; these measures have been formalized as policy in the comprehensive animal welfare program (BLM IM 2021-002). That policy also covers care of animals in corrals, where measures to ensure wild horse and burro health and welfare include oversight by attending veterinarians.

A thorough review of gather practices and their effects on wild horses and burros can be found in a 2008 report from the Government Accounting Office. The report found that the BLM had controls in place to help ensure the humane treatment of wild horses and burros (GAO 2008). The controls included SOPs for gather operations, inspections, and data collection to monitor animal welfare. These procedures led to humane treatment during gathers, and in short-term and long-term holding facilities. The report found that cumulative effects associated with the capture and removal of excess wild horses include gather-related mortality averaged only about 0.5% and approximately 0.7% of the captured animals, on average, are humanely euthanized due to pre-existing conditions (such as lameness or club feet) in accordance with BLM policy. Scasta (2020) found the same overall mortality rate (1.2%) for BLM WH&B gathers in 2010-2019, with a mortality rate of 0.25% caused directly by the gather, and a mortality rate of 0.94%

attributable to euthanasia of animals with pre-existing conditions such as blindness or club-footedness. Scasta (2020) summarized mortality rates from 70 BLM WH&B gathers across nine states, from 2010-2019. Records for 28,821 horses and 2,005 burros came from helicopter and bait/water trapping. For wild burro bait / water trapping, mortality rates were 0.05% due to acute injury caused by the gather process, and death for burros with pre-existing conditions was 0.2% (Scasta 2020). For wild horse bait / water trapping, mortality rates were 0.3% due to acute injury, and the mortality rate due to pre-existing conditions was 1.4% (Scasta 2020). For wild horses gathered with the help of helicopters, mortality rates were only slightly lower than for bait / water trapping, with 0.3% due to acute causes, and 0.8% due to pre-existing conditions (Scasta 2020). Scasta (2020) noted that for other wildlife species capture operations, mortality rates above 2% are considered unacceptable and that, by that measure, BLM WH&B "…welfare is being optimized to a level acceptable across other animal handling disciplines." In a separate analysis of 2010-2019 BLM wild horse gathers, Scasta et al. (2021) concluded that fewer than 20% of wild horse deaths at gathers were attributable to acute causes, with the great majority being euthanasia of animals with pre-existing, chronic conditions.

King et al. (2023) studied the fate of wild horse foals, as part of a broader 2016-2020 study on the effects of having some geldings in with breeding herds (King et al. 2022). In two HMAs in Utah that were intensively monitored for 4 years, about 5% of foals died in their first year of life, and about 2.5% of foals younger than 70 days old that became separated from their mothers (dams) survived and joined other social bands. BLM gather activities were not associated with any statistical increase in foal mortality, foal separation from their dams, or infanticide. King et al. (2023) concluded that, "…separation of offspring may be more common than previously considered, and that this is a natural event that does not necessarily result in mortality. … the separation of young foals from their dams was not a result of human disturbance or handling, resulting in the conclusion that foals even as young as 2 months old have a good chance of survival if separated from their dam or orphaned, as long as other social groups remain on the range that they can join."

The GAO report (2008) noted the precautions that BLM takes before gather operations, including screening potential gather sites for environmental and safety concerns, approving facility plans to ensure that there are no hazards to the animals there, and limiting the speeds that animals travel to trap sites. BLM used SOPs for short-term holding facilities (e.g., corrals) that included procedures to minimize excitement of the animals to prevent injury, separating horses by age, sex, and size, regular observation of the animals, and recording information about the animals in a BLM database. The GAO reported that BLM had regular inspections of short-term holding facilities and that animal I there, ensuring that the corral equipment is up to code and that animals are treated with appropriate veterinary care (including that hooves are trimmed adequately to prevent injury). Mortality was found to be about 5% per year associated with transportation, short term holding, and adoption or sale with limitations. The GAO noted that BLM also had controls in place to ensure humane care at long-term holding facilities (i.e., pastures). BLM staff monitor the number of animals, the pasture conditions, winter feeding, and animal health. Veterinarians from the USDA Animal and Plant Health Inspection Service inspect long-term facilities annually, including a full count of animals, with written reports. Contract veterinarians provide animal care at long-term facilities, when needed. Weekly counts provide an incentive for contractors that operate long-term holding facilities to maintain animal health (GAO 2008). Mortality at long-term holding was found to be about 8% per year, on average (GAO 2008). The mortality rates at short-term and long-term holding facilities are comparable to the natural annual mortality rate on the range of about 16% per year for foals (animals under age 1), about 5-10% per year for horses ages 1-10 years, and about 10-25% for animals aged 10-20 years (Ransom et al. 2016).

In 2010, the American Association of Equine Practitioners (AAEP 2011) was invited by the BLM to visit the BLM operations and facilities, spend time on WH&B gathers and evaluate the management of the wild equids. The AAEP Task Force evaluated horses in the BLM Wild Horse and Burro Program through several visits to wild horse gathers, and short- and long-term holding facilities. The task force was specifically asked to "review animal care and handling within the Wild Horse and Burro Program, and make whatever recommendations, if any, the Association feels may be indicated, and if possible, issue a public statement regarding the care and welfare of animals under BLM management." In their report (AAEP 2011), the task force concluded "that the care, handling and management practices utilized by the agency are appropriate for this population of horses and generally support the safety, health status and welfare of the animals." The comprehensive animal welfare program (BLM 2021) includes standards of care of animals in corrals, where measures include oversight by attending veterinarians.

In June 2010 BLM invited independent observers organized by American Horse Protection Association (AHPA) to observe BLM gathers and document their findings. AHPA engaged four independent credentialed professionals who are academia-based equine veterinarians or equine specialists. Each observer served on a team of two, and was tasked specifically to observe the care and handling of the animals for a 3-4-day period during the gather process, and submit their findings to AHPA. An Evaluation Checklist was provided to each of the observers that included four sections: Gather Activities; Horse Handling During Gather; Horse Description; and Temporary Holding Facility. The independent group visited 3 separate gather operations and found that "BLM and contractors are responsible and concerned about the welfare of the horses before, during and after the gather process" and that "gentle and knowledgeable, used acceptable methods for moving horses… demonstrated the ability to review, assess and adapt procedures to ensure the care and well-being of the animals" (Greene et al. 2011).

BLM commissioned the Natural Resources Council of the National Academies of Sciences (NRC) to conduct an independent, technical evaluation of the science, methodology, and technical decision-making approaches of the BLM Wild Horse and Burro Management Program. Among the conclusions of their 2013 report, NRC (2013) concluded that wild horse populations grow at 15-20 percent a year, and that predation will not typically control population growth rates of free-ranging horses. The report (NRC 2013) also noted that, because there are human-created barriers to dispersal and movement (such as fences and highways) and not enough substantial predator pressure to actually cause herds to decrease, maintaining a herd within an AML requires removing animals in roundups, also known as gathers, and may require management actions that limit population growth rates. The report (NRC 2013) examined a number of population growth suppression techniques, including the use of sterilization, fertility control vaccines, and sex ratio manipulation.

The effects of gathers as part of feral horse management have also been documented on National Park Service Lands. Since the 1980s, managers at Theodore Roosevelt National Park have used periodic gathers, removals, and auctions to maintain the feral horse herd size at a carrying capacity level of 50 to 90 horses (Amberg et al. 2014). In practical terms, this carrying capacity is equivalent to an AML. Horse herd sizes at those levels were determined to allow for maintenance of certain sensitive forage plant species. Gathers every 3-5 years did not prevent the herd from self-sustaining. The herd continues to grow, to the point that the NPS now uses gathers and removals along with temporary fertility control methods in its feral horse management (Amberg et al. 2014).

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Effects of Wild Horses and Burros on Rangeland Ecosystems

The presence of wild horses and wild burros can have substantial effects on rangeland ecosystems, and on the capacity for habitat restoration efforts to achieve landscape conservation and restoration goals. While wild horses and burros may have some beneficial ecological effects, such benefits are outweighed by ecological damage they cause when herds are at levels greater than supportable by allocated, available natural resources (i.e., when herds are greater than AML).

In the biological sense, all free-roaming horses and burros in North America are feral, meaning that they are descendants of domesticated animals brought to the Americas by European colonists. Available evidence has indicated that horses went extinct in the Americas by the end of the Pleistocene, about 10,000 years ago (Webb 1984; MacFadden 2005), though DNA samples from permafrost suggest their extinction from Alaska could possibly have been as recent as about 6,000 years ago (Murchie et al. 2021). Burros evolved in Eurasia (Geigl et al. 2016). After domesticated horses were introduced to the Americas, their geographic distribution was facilitated by Native Americans and colonizing Europeans (Taylor et al. 2023a, 2023b). The published literature refers to free-roaming horses and burros as either feral or wild. In the ecological context the terms are interchangeable, but the terms 'wild horse' and 'wild burro' are associated with a specific legal status. The legal status of federally recognized wild horses and burros stems entirely from the WFRHBA of 1971 and is not dependent on whether the animals are or are not considered 'native' to the particular lands of the western USA where they are managed by the BLM and US Forest Service. Whether or not those animals were continuously present throughout the Holocene period in the 10 states where they are currently managed does not appear to influence the magnitude or direction of their ecological effects (Lundgren et al. 2024), but those effects are by no measure benign with respect to less well known plant and animal species, many of which have far more limited geographic distributions.

The following literature review on the effects of wild horses and burros on rangeland ecosystems draws on scientific studies of feral horses and burros, some of which also have wild horse or wild burro legal status. Parts of this review draw heavily on Parts 1 and 2 of the 'Science framework for conservation and restoration of the sagebrush biome' interagency report (Chambers et al. 2017, Crist et al. 2019).

Because of the known damage that overpopulated wild horse and burro herds can cause in rangeland ecosystems, the presence of wild horses and burros is considered a threat to Greater sage-grouse habitat quality, particularly in the bird species' western range (Beever and Aldridge 2011, USFWS 2013). Wild horse population sizes on federal lands have more than doubled in the five years since the USFWS report (2013) was published (BLM 2018). On lands administered by the BLM, there were over 82,000 BLM-administered wild horses and burros as of March 1, 2022, which does not include foals born in 2020. Lands with wild horses and burros are managed for multiple uses; scientific studies designed to separate out effects of wild horses and burros, which are summarized below, point to conclusions that landscapes with greater wild horse and burro abundance will tend to have lower resilience to disturbance and lower resistance to invasive plants than similar landscapes with herds at or below target AML levels.

In contrast to managed livestock grazing, neither the seasonal timing nor the intensity of wild horse and burro grazing can be managed, except through efforts to manage their numbers and distribution. Wild horses live on the range year round, they roam freely, and wild horse populations have the potential to grow 15-20% per year (Wolfe 1980; Eberhardt et al. 1982; Garrott et al 1991; Dawson 2005; Roelle et al. 2010; Scorolli et al. 2010). Although this annual growth rate may be lower in some areas where mountain lions can take foals (Turner and Morrison 2001, Turner 2015), horses tend to favor use of more open habitats (Schoenecker 2016) that are dominated by grasses and shrubs and where ambush is less likely. Wild horses may compete for forage with elk, mule deer, other wild ungulates, and managed livestock (Smith et al. 1986a, Scasta et al. 2016, Platte and Torland 2024).

As a result of the potential for wild horse populations to grow rapidly, impacts from wild horses on water, soil, vegetation, and native wildlife resources (Davies and Boyd 2019) can increase exponentially unless there is active management to limit their population sizes. For the majority of wild horse herds, there is little overall evidence that population growth is significantly affected by predation (NRC 2013), although wild horse and burro herd growth rates may be somewhat reduced by predation in some localized areas, particularly where individual cougars specialize on horse or burro predation (Turner and Morrison 2001, Roelle et al. 2010, Mesler and Jones 2021). Andreasen et al. (2021) and Iacono (2023) found that the level of specializing on young horse varies across individual mountain lions (*Puma concolor*). This specialization seems more prevalent where horses are at very high densities and native ungulates are at very low densities (Andreasen et al. 2021). Some of the greatest recorded rates of predation on horses, by mountain lions, have been in the Virginia Range, where the state of Nevada manages a herd of feral horses that is not federally protected. Where lion predation on horses was common, Andreasen et al. (2021) found that female lions preyed on horses year-round, but 13% or fewer of horses killed by lions were adults. Andreasen et al. (2021) concluded that, "at landscape scales, cougar predation is unlikely to limit the growth of feral horse populations." Mesler and Jones (2021) also documented that some mountain lions have a far higher prevalence of wild burro in their diet than others, though their sample size was relatively lower than Andreasen et al. (2021) or Iacono (2023). Similarly, Lundgren et al. (2022) documented that mountain lions kill feral burros in Death Valley National Park. Lundgren et al. (2022) advocated for not eliminating wild equids from landscapes, but that is not a consideration on HMAs, where the BLM aims to have herd sizes of wild horses and burros that are at or above the low level of AML. BLM does not have the legal authority to regulate or manage mountain lion populations, and it does not appear that enough mountain lions (if any) specialize on horse predation to the extent needed to prevent herd growth in the Complexes. Andreasen et al. (2021) concluded that “At landscape scales, cougar predation is unlikely to limit the growth of feral horse populations.” In a study of Mexican wolf predation in an area of Arizona with free-roaming horses, horses were not part of the documented wolf diet (Smith et al. 2023). Given the recent history of consistent growth in the Complexes wild horse herd, as documented by repeated aerial surveys, the inference that predation does not limit local wild horse herd growth rates apparently applies.

The USFWS (2008), Beever and Aldridge (2011), and Chambers et al (2017) summarize much of the literature that quantifies direct ecosystem effects of wild horse presence. Beever and Aldridge (2011) present a conceptual model that illustrates the effects of wild horses on sagebrush ecosystems. In the Great Basin, areas without wild horses had greater shrub cover, plant cover, species richness, native plant cover, and overall plant biomass, and less cover percentage of grazing-tolerant, unpalatable, and invasive plant species, including cheatgrass, compared to areas with horses (Smith 1986b; Beever et al. 2008; Davies et al. 2014; Zeigenfuss et al. 2014; Boyd et al. 2017). There were also measurable increases in soil penetration resistance and erosion, decreases in ant mound and granivorous small mammal densities, and changes in reptile communities (Beever et al. 2003; Beever and Brussard 2004; Beever and Herrick 2006; Ostermann-Kelm et al. 2009). Intensive grazing by horses and other ungulates can damage biological crusts (Belnap et al. 2001). In contrast to domestic livestock grazing, where post-fire grazing rest and deferment can foster recovery, wild horse grazing occurs year round. These effects imply that horse presence can have broad effects on ecosystem function that could influence conservation and restoration actions.

Many studies corroborate the general conclusion that wild horses can lead to biologically significant changes in rangeland ecosystems, particularly when their populations are overabundant relative to water and forage resources, and other wildlife living on the landscape (Eldridge et al. 2020). The presence of wild horses is associated with a reduced degree of Greater sage-grouse lekking behavior (Muñoz et al. 2020). Moreover, increasing densities of wild horses, measured as a percentage above AML, are associated with decreasing greater sage-grouse population sizes, measured by lek counts (Coates et al. 2021). In northwest Nevada, Behnke et al. (2023) found that Greater sage-grouse nesting rates were marginally higher in areas with wild horses, but Behnke et al. (2022) found that Greater sage-grouse in areas with feral horses had elevated corticosterone levels, especially under drought conditions. Behnke et al. (2022) also found that high corticosterone levels were associated with low Greater sage-grouse nesting success rates. In Wyoming, Hennig et al (2023) found a high degree of spatial overlap between wild horses and Greater sage-grouse in summer. Horses are primarily grazers (Hanley and Hanley 1982), but shrubs – including sagebrush – can represent a large part of a horse’s diet, at least in summer in the Great Basin (Nordquist 2011). Horses may crop grazed plants closer to the ground than bovids because horses have agile lips and top and bottom teeth (Chapter 21 in McNew et al. 2023). Free-ranging equids have a high affinity for habitats that are close to water (Esmaeili et al. 2021, Karish et al 2023), which appears to be stronger than for like-sized ruminants (Esmaeili et al. 2021). Grazing by wild horses can have severe impacts on water source quality, aquatic ecosystems and riparian communities as well (Beever and Brussard 2000; Barnett 2002; Nordquist 2011; USFWS 2008; Earnst et al. 2012; USFWS 2012, Kaweck et al. 2018), sometimes excluding native ungulates from water sources (Ostermann-Kelm et al. 2008; USFWS 2008; Perry et al. 2015; Hall et al. 2016; Gooch et al. 2017; Hall et al. 2018). Impacts to riparian vegetation per individual wild horse can exceed impacts per individual domestic cow (Kaweck et al. 2018, Burdick et al. 2021). Bird nest survival may be lower in areas with wild horses (Zalba and Cozzani 2004), and bird populations have recovered substantially after livestock and / or wild horses have been removed (Earnst et al. 2005; Earnst et al. 2012; Batchelor et al. 2015). Wild horses can spread nonnative plant species, including cheatgrass, and may limit the effectiveness of habitat restoration projects (Beever et al. 2003; Couvreur et al. 2004; Jessop and Anderson 2007; Loydi and Zalba 2009). Riparian and wildlife habitat improvement projects intended to increase the availability of grasses, forbs, riparian habitats, and water will likely attract and be subject to heavy grazing and trampling by wild horses that live in the vicinity of the project. Even after domestic livestock are removed, continued wild horse grazing can cause ongoing detrimental ecosystem effects (USFWS 2008; Davies et al. 2014) which may require several decades for recovery (e.g., Anderson and Inouye 2001).

Wild horses and burros may have ecologically beneficial effects, especially when herd sizes are low relative to available natural resources, but those ecological benefits do not typically outweigh damage caused when herd sizes are high, relative to available natural resources. Under some conditions, there may not be observable competition with other ungulate species for water (e.g., Meeker 1979), but recent studies that used remote cameras have found wild horses excluding native wildlife from water sources under conditions of relative water scarcity (Perry et al. 2015, Hall et al. 2016, Hall et al. 2018). Compared to landscapes where large herbivores such as horses and burros are completely absent, the presence of some large herbivores can cause local-scale ecological disturbances that may increase local species diversity (Trepel et al. 2024); this is consistent with the intermediate disturbance hypothesis (e.g., Wilkinson 1999), which also predicts that excessive disturbance, such as may be associated with wild horse herds far above AML, leads to reduced species diversity. Wild burros (and, less frequently, wild horses) have been observed digging ‘wells;’ such digging may improve habitat conditions for some vertebrate species and, in one site, may improve tree seedling survival (Lundgren et al. 2021). This behavior has been observed in intermittent stream beds where subsurface water is within 2 meters of the surface (Lundgren et al. 2021). The BLM is not aware of published studies that document wild horses or burros in the western United States causing similar or widespread habitat amelioration on drier upland habitats such as sagebrush, grasslands, or pinyon-juniper woodlands. Lundgren et al. (2021) suggested that, due to well-digging in ephemeral streambeds, wild burros (and horses) could be considered ‘ecosystem engineers;’ a term for species that modify resource availability for other species (Jones et al. 1994). Rubin et al. (2021) and Bleich et al. (2021) responded by pointing out that ecological benefits from wild horse and burro presence must be weighted against ecological damage they can cause, especially at high densities. Rubin et al. (2024) summarized effects of burro presence on Sonoran desert vegetation, birds, small mammals, and reptiles as a function of distance to water; some species had strongly negative associations with burro presence. Burro density appears to be negatively correlated with endangered desert tortoise presence which implies that burros should be considered along with other known environmental factors that can degrade tortoise habitat and demographic rates (Berry et al. 2020).

In HMAs where wild horse and burro biomass is very large relative to the biomass of native ungulates (Boyce and McLoughlin 2021), they should probably also be considered ‘dominant species’ (Power and Mills 1995) whose ecological influences result from their prevalence on the landscape. Wild horse densities could be maintained at high levels in part because artificial selection for early or extended reproduction may mean that wild horse population dynamics are not constrained in the same way as large herbivores that were never domesticated (Boyce and McLoughlin 2021). Another potentially positive ecological effect of wild horses and burros is that they, like all large herbivores, redistribute organic matter and nutrients in dung piles (i.e., King and Gurnell 2007), which could disperse and improve germination of undigested seeds. This could be beneficial if the animals spread viable native plant seeds (i.e., Downer 2022), but could have negative consequences if the animals spread viable seeds of invasive plants such as cheatgrass (i.e,, Loydi and Zalba 2009, King et al. 2019). Increased wild horse and burro density would be expected to increase the spatial extent and frequency of seed dispersal, whether the seeds distributed are desirable or undesirable. As is true of herbivory by any grazing animals, light grazing can increase rates of nutrient cycling (Manley et al. 1995) and foster compensatory growth in grazed plants which may stimulate root growth (Osterheld and McNaughton 1991, Schuman et al. 1999) and, potentially, an increase in carbon sequestration in the soil (i.e., Derner and Schuman 2007, He et al. 2011). In Spain, Segarra et al. (2023) noted that an area lightly to moderately grazed by donkeys had lower net productivity but higher plant biodiversity than ungrazed pastures where trees were encroaching. However, when grazer density is high relative to available forage resources – as can be the case when wild horse and burro densities exceed AML – then overgrazing by any species can lead to long-term reductions in plant productivity, including decreased root biomass (Herbel 1982, Williams et al. 1968) and potential reduction of stored carbon in soil horizons. Ecological processes associated with large herbivore carcass decomposition can contribute to higher insect and microbial diversity and localized nutrient flux to soils and plants, with effects that may last for several years (Newsome and Barton 2023). Degraded ecosystems may not have the capacity to use and recycle the ecological benefits of decomposing carcasses to the same level as healthy, diverse, resilient ecosystems (Newsome and Barton 2023).

Recognizing the potential beneficial effects of low-density wild horse and burro herds, but also recognizing the totality of available published studies documented ecological effects of wild horse and burro herds, especially when above AML (as noted elsewhere), it is prudent to conclude that horse and burro herd sizes above AML may cause levels of disturbance that reduce landscapes' capacity for resilience in the face of further disturbance (Rubin et al. 2024), such as is posed by extreme weather events and other consequences of climate change.

Most analyses of wild horse effects have contrasted areas with wild horses to areas without, which is a study design that should control for effects of other grazers, but historical or ongoing effects of livestock grazing may be difficult to separate from horse effects in some cases (Davies et al. 2014). Analyses have generally not included horse density as a continuous covariate; therefore, ecosystem effects have not been quantified as a linear function of increasing wild horse density. One exception is an analysis of satellite imagery confirming that varied levels of feral horse biomass were negatively correlated with average plant biomass growth (Ziegenfuss et al. 2014).

Horses require access to large amounts of water; an individual can drink an average of 7.4 gallons of water per day (Groenendyk et al. 1988). Despite a general preference for habitats near water (e.g., Crane et al. 1997), wild horses will routinely commute long distances (e.g., 10+ miles per day) between water sources and palatable vegetation (Hampson et al. 2010).

Wild burros can also substantially affect riparian habitats (e.g., Tiller 1997), native wildlife (e.g., Seegmiller and Ohmart 1981), and have grazing and trampling impacts that are similar to wild horses (Carothers et al. 1976; Hanley and Brady 1977; Douglas and Hurst 1983). Where wild burros and Greater sage-grouse co-occur, burros' year-round use of low-elevation habitats may lead to a high degree of overlap between burros and Greater sage-grouse (Beever and Aldridge 2011).

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Effects of Fertility Control Treatments and Sex Ratio Manipulations in Wild Horse and Burro Management

Various forms of fertility control can be used in wild horses and wild burros, with the goals of maintaining herds at or near AML, reducing fertility rates, and reducing the frequency of gathers and removals. The WFRHBA of 1971 specifically provides for contraception and sterilization (16 U.S.C. 1333 section 3.b.1). Although sex ratio manipulation is not expected to directly reduce individual fertility, it is included in discussions of fertility control treatments here because it can be a form of population growth suppression. Fertility control measures have been shown to be a cost-effective and humane treatment to slow increases in wild horse populations or, when used in combination with gathers, to reduce horse population size (Bartholow 2004, de Seve and Boyles-Griffin 2013, Fonner and Bohara 2017). Although fertility control treatments may be associated with a number of potential physiological, behavioral, demographic, and genetic effects, those impacts are generally minor and transient, do not prevent overall maintenance of a self-sustaining population, and do not generally outweigh the potential benefits of using contraceptive treatments in situations where it is a management goal to reduce population growth rates (Garrott and Oli 2013).

The percentage of effectively contracepted mares in the herd could vary over time, depending on the number of mares that are treated in different years, the formulation of vaccine that is used and the expected duration of vaccine effectiveness. After the initial gather, the BLM could use a population modeling software such as PopEquus (Folt et al. 2023a, 2023b) to help inform expectations about how many animals in future gathers or actions should be removed, or mares treated, in order to achieve herd management goals. Herd management projections and specific decisions about the number of mares to be treated in the future would be informed by the best available information at the time, based on the results of records of past treatments and on herd monitoring results. However, logistical constraints associated with gather scheduling (for vaccine hand-injection) and animal approachability (for dart-based vaccine treatments) are such that it is unlikely that the fraction of mares that are effectively contracepted in any given year would ever exceed 75%. Because of high foal and adult survival rates (Ransom et al. 2016), the likely result is that the herd will always have a positive growth rate over time.

An extensive body of peer-reviewed scientific literature details the impacts of fertility control methods on wild horses and burros. No finding of excess animals is required for BLM to pursue contraception in wild horses or wild burros, but NEPA analysis has been required, as there are possible effects to individuals and groups of wild horses and burros. This review focuses on peer-reviewed scientific literature. The summary that follows first examines effects of fertility control vaccine use in mares, then of sex ratio manipulation. This review does not examine effects of spaying and neutering, and does not include an analysis of oocyte growth factor vaccine formulations, which are the subject of ongoing research (Bruemmer et al. 2023). Cited studies are generally limited to those involving horses and burros, except where including studies on other species helps in making inferences about physiological or behavioral questions not yet addressed in horses or burros specifically. Burros (donkeys) are a distinct species from horses, however they are both of the family Equidae. While there are notable differences between the species in their anatomy, diet, behaviors and metabolism (Burden and Thiemann 2015), the essential endocrine controls of the hypothalamic-pituitary-gonadal axis and the function of the zona pellucida in fertility are the same. While most studies reviewed are based on results from horses, burros are similar enough in their reproductive physiology and immunology (i.e., Turini et al. 2021) that expected effects of immunocontraception are comparable.

On the whole, the identified impacts of fertility control methods are generally transient – other than the contraceptive effects which are the purpose of treatment – and affect primarily the individuals treated. Fertility control that affects individual horses and burros does not prevent BLM from ensuring that there will be self-sustaining populations of wild horses and burros in single herd management areas (HMAs), in complexes of HMAs, and at regional scales of multiple HMAs and complexes. Under the WFRHBA of 1971, BLM is charged with maintaining self-reproducing populations of wild horses and burros. The National Academies of Sciences (NRC 2013) encouraged BLM to manage wild horses and burros at the spatial scale of "metapopulations" – that is, across multiple HMAs and complexes in a region. In fact, many HMAs have historical and ongoing genetic and demographic connections with other HMAs, and BLM routinely moves animals from one to another to improve local herd traits and maintain high genetic diversity. The NAS report (2013) includes information (pairwise genetic 'fixation index' values for sampled WH&B herds) confirming that WH&B in the vast majority of HMAs are genetically similar to animals in multiple other HMAs, and that is the case for wild horses in the Antelope Complex and Triple B complex.

All fertility control methods affect the behavior and physiology of treated animals (NRC 2013), and 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 alone does not remove excess horses from an HMA's population, so one or more gathers are usually needed in order to bring the herd down to a level close to AML. Because population growth rates depend partly on the frequency of females that give birth (i.e., the foaling rate), the use of fertility control vaccination to reduce growth rates is more effective when a herd is relatively close to AML. Population modeling (i.e. Gross 2000, deSeve and Boyles-Griffin 2013, Folt et al. 2023a, 2023b) confirms the common sense conclusion that the higher the fraction of contracepted mares, generally the lower the growth rate. Schulman et al. (2024) demonstrated that a shorter duration of effect requires larger fractions of mares need to be frequently treated to maintain a 'fertility control index' large enough to reduce herd-level growth rates. This is one reason that the BLM has historically sought to use humane, longer-lasting fertility control methods. For example, it is easier to achieve the 60-90% rate of effectively treated mares if the method used does not require treatment every year. Horses are long-lived, potentially reaching 20 years of age or more in the wild. Except in cases where extremely high fractions of mares are rendered infertile over long time periods of (i.e., 10 or more years), fertility control methods such as immunocontraceptive vaccines and sex ratio manipulation are not very effective at reducing population growth rates to the point where births equal deaths in a herd. However, even more modest fertility control activities can reduce the frequency of horse gather activities, and costs to taxpayers. Bartholow (2007) concluded that the application of 2-year 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.

Population monitoring will be useful to guide BLM in achieving and maintaining the managed population at over the duration of any action. To determine desired fertility control vaccine application rates, the BLM could use a population modeling software such as PopEquus (Folt et al. 2023a, 2023b) to help assess how many animals at that time should be removed or mares treated in order to achieve herd management goals and update its herd management projections in the future, based on the results of local, contemporaneous herd monitoring. Because applying contraception to horses often requires capturing and handling, 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. Dart-based fertility control applications would entail no capture cost, but administration costs will vary in relation to approachability. Population growth suppression becomes less expensive if fertility control is long-lasting (Hobbs et al. 2000).

In the context of BLM wild horse and burro management, fertility control vaccines and sex ratio manipulation rely on reducing the number of reproducing females. Taking into consideration available literature on the subject, the National Academies of Sciences concluded in their 2013 report that forms of fertility control vaccines were two of the three 'most promising' available methods for contraception in wild horses and burros (NRC 2013). That report also noted that sex ratio manipulations where herds have approximately 60% males and 40% females can expect lower annual growth rates, simply as a result of having a lower number of reproducing females.

It is not realistic to rely on wild horse and burro herds to limit their own population size or growth rates in the western United States. Predators such as mountain lions tend to not fully prevent free-roaming horse population growth, even in locations where relatively high numbers of foals die per year, such as in the Virginia Range of Nevada (Schulman et al. 2024). Wild horses and burros are long-lived species with documented survival rates that can exceed 95 percent (Ransom et al. 2016) and they do not self-regulate their population (NRC 2013). The National Academies of Sciences report (NRC 2013) concluded that the primary way that equid populations self-limit is through increased competition for forage at higher densities, which results in smaller quantities of forage available per animal, poorer body condition and decreased natality and survival. It also concluded that the effect of this would be impacts to resource and herd health that are contrary to BLM management objectives and statutory and regulatory mandates. In the absence of management actions to limit the herd size, wild horse and burro populations would be expected to increase to a point where forage and/ or water resources are depleted resulting in the irreversible loss of native vegetation, a loss of wildlife habitat (including riparian habitat), and eventually the potential for periodic large-scale die-offs of the wild horses and burros themselves (NRC 2013). In a detailed demographic study of a growing population of Przewalski horses in Hungary, Kerekes et al. (2021) did observe slight reductions in foaling rates at high population sizes, but not nearly enough to prevent the population from continuing to grow at high annual rates, except during a winter die-off event when a quarter of the herd died. As such, there is a continuing need for active wild horse and burro herd management, such as through removals and fertility control.

Fertility Control Vaccines

Fertility control vaccines (also known as (immunocontraceptives) meet BLM requirements for safety to mares and the environment (EPA 2009a, 2012). Because they work by causing an immune response in treated animals, there is no risk of hormones or toxins being taken into the food chain when a treated mare dies. The BLM and other land managers have mainly used three fertility control vaccine formulations for fertility control of wild horse mares on the range: ZonaStat-H, PZP-22, and GonaCon-Equine. As other formulations become available they may be applied in the future.

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. Adjuvants are additional substances that are included in vaccines to elevate the level of immune response. Adjuvants help to incite recruitment of lymphocytes and other immune cells which foster a long-lasting immune response that is specific to the antigen.

Liquid emulsion vaccines can be injected by hand or remotely administered in the field using a pneumatic dart (Roelle and Ransom 2009, Rutberg et al. 2017, McCann et al. 2017) 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). Booster doses can be safely administered by hand or by dart. Even with repeated booster treatments of the vaccines, it is expected that most mares would eventually return to fertility, though some individual mares treated repeatedly may remain infertile. Once the herd size in a project area is at AML and population growth seems to be stabilized, BLM can make adaptive determinations as to the required frequency of new and booster treatments.

BLM has guidelines for fertility control vaccine application, with respect to selection of herds (BLM IM 2009-090). Herds selected for fertility control vaccine use should have annual growth rates over 5%, have a herd size over 50 animals, and have a target rate of treatment of between 50% and 90% of female wild horses or burros. Treated mares should be identifiable via a visible freeze brand or individual color markings, so that their vaccination history can be known. Follow-up population surveys should be used to determine the realized annual growth rate in herds treated with fertility control vaccines.

The BLM's potential application of PZP ZonaStat-H vaccine booster doses 2 weeks or more after an initial dose, and GonaCon-Equine booster doses 30 or more days after an initial dose are consistent with use specifications on the product labels (EPA 2012, 2013). Temporarily holding animals or use of dart-based delivery to provide a booster dose does not require further study for justification. The Environmental Protection Agency regulates the use of fertility control agents such as the PZP vaccine ZonaStat-H or the GnRH vaccine GonaCon-Equine, in wild horses and burros. These vaccines are registered with the EPA, and are not experimental. The EPA-required product label associated with the registration for ZonaStat-H is cited in the EA as EPA (2012). That label states that "For maximum efficacy, ZonaStat-H is administered as an initial priming dose followed by a booster dose at least two weeks later." The EPA-required product label associated with the registration for GonaCon-Equine is cited in the EA as EPA (2013). That label states that "If longer contraceptive effect is desired, a second vaccination may be given 30 or more days after the first injection or during the following year with no known adverse health effects to the vaccinated animal."

The explicit intention of BLM's potential use of fertility control vaccines such as PZP ZonaStat-H or GonaCon-Equine, is to reduce the fertility rate of treated individual mares for one or more years and, therefore, to reduce the herd-level annual growth rates. This outcome would be consistent with the Purpose and Need identified in the EA, and consistent with authorities in the WFRHBA. The BLM acknowledges that there is a range of possible duration of contraceptive effects (noted below). It is even possible that some fertility control vaccine-treated mares may not reproduce again before they die. The 2013 EPA label for GonaCon-Equine states that, "there is a chance some vaccinated females will become permanently sterile." Precise probabilistic estimates of the return time to fertility for individual mares are not required for the BLM to ensure that these methods are humane, safe, and effective, and that herd management goals of achieving and maintaining the AML are met.

Vaccine Formulations: Porcine Zona Pellucida (PZP)
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 PZP vaccine use is approved for free-ranging wild and feral horse herds in the United States (EPA 2012). PZP use can reduce or eliminate the need for gathers and removals, if very high fractions of mares are treated over a very long time period (Turner et al. 1997). PZP vaccines have been used extensively in wild horses (NRC 2013), and in wild and feral burros (Turner et al. 1996, French et al. 2017, French et al. 2020, Kahler and Boyles-Griffin 2022). PZP vaccine formulations are produced as ZonaStat-H, an EPA-registered commercial product (EPA 2012, SCC 2015), 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, Grams et al. 2022), and as SpayVac, where the PZP protein is enveloped in liposomes (Killian et al. 2008, Roelle et al. 2017, Bechert and Fraker 2018, Bechert et al 2022). '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, Nolan et al. 2018a).

When advisories on the product label (EPA 2015) are followed, the product is safe for users and the environment (EPA 2012). In keeping with the EPA registration for ZonaStat-H (EPA 2012; reg. no. 86833-1), certification through the Science and Conservation Center in Billings Montana is required to apply that vaccine to equids.

For maximum effectiveness, PZP is administered within the December to February timeframe. When applying ZonaStat-H, first the primer with modified Freund's Complete adjuvant is given and then the booster with Freund's Incomplete adjuvant is given 2-6 weeks later. Preferably, the timing of the booster dose is at least 1-2 weeks prior to the onset of breeding activity. Following the initial 2 inoculations, only annual boosters are required. For the PZP-22 formulation, 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 muscles near the hip. PZP-22 pellets have been successfully delivered via darting (Rutberg et al 2017, Carey et al. 2019).

Vaccine Formulations: Gonadotropin Releasing Hormone (GnRH)
GonaCon (which is produced under the trade name GonaCon-Equine for use in feral horses and burros) is approved for use by authorized federal, state, tribal, public and private personnel, for application to free-ranging wild horse and burro herds in the United States (EPA 2013, 2015, 2025). GonaCon has been used on feral horses in Theodore Roosevelt National Park and on wild horses administered by BLM. 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). 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.

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 contraceptive 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. GonaCon is 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 2025) 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. 2022).

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 after booster treatment of GonaCon-Equine, it is expected that most, if not all, mares would return to fertility at some point. Although the exact timing for the return to fertility in mares boosted more than once with GonaCon-Equine has not been quantified, a prolonged return to fertility would be consistent with the desired effect of using GonaCon (e.g., effective contraception).

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.

Direct Effects: PZP Vaccines

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, Joonè et al. 2017c, Nolan et al. 2018b, 2018c, French et al. 2020). PZP vaccines do not appear to interact with other organ systems, as antibodies specific to PZP protein do not crossreact with tissues outside of the reproductive system (Barber and Fayrer-Hosken 2000).

Research has demonstrated that contraceptive efficacy of an injected liquid PZP vaccine, such as ZonaStat-H, is approximately 90% or more for mares or burros treated twice in the first year (Turner and Kirkpatrick 2002, Turner et al. 2008, French et al. 2020). In the PopEquus projection model (Folt et al. 2023a, 2023b), a primer and booster dose of PZP ZonaStat-H treatment is modeled as having 95% and 19% reductions on reproduction one and two years after the first two doses, respectively. The same effect is modeled for a third dose, but a higher effectiveness of 95%, 72%, 58% and 30% fertility reductions is modeled for one, two, three, and four years, respectively, after receiving a fourth dose. The highest success for fertility control has been reported when the vaccine has been applied November through February. High contraceptive rates of 90% or more can be maintained in horses that are given a booster dose 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, Carey et al. 2019, Grams et al. 2022). Application of PZP for fertility control would reduce fertility in a large percentage of mares for at least one year (Ransom et al. 2011). The contraceptive result for a single application of the liquid PZP vaccine primer dose along with PZP vaccine pellets (PZP-22), based on winter applications, can be expected to fall in the approximate efficacy ranges as follows (based on figure 2 in Rutberg et al. 2017). Below, the approximate efficacy used in PopEquus (Folt et al. 2023a, 2023b) modeling for PZP-22 effects is based on available studies and is measured as the relative decrease in foaling rate for treated mares, compared to control mares:

Year 1	Year 2	Year 3
0 (developing fetuses come to term)	~33-72%	~20-40%

If mares that have been treated with PZP-22 vaccine pellets subsequently receive a booster dose of either the liquid PZP vaccine or the PZP-22 vaccine pellets, the subsequent contraceptive effect is apparently more pronounced and long-lasting. The approximate efficacies following a booster dose can be expected to be in the following ranges (based on figure 3 in Rutberg et al. 2017, and used in Folt et al. (2023a, 2023b).

Year 1	Year 2	Year 3	Year 4
0 (developing fetuses come to term)	~68-85%	~70-75%	~60-72%

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 over many years to be treated to totally prevent population-level growth (e.g., Turner and Kirkpatrick 2002, Grams et al. 2022). Gather efficiency does not usually exceed 85% via helicopter, and may be less with bait and water trapping, so there will almost always be a portion of the female population uncaptured that is not treated in any given year. Additionally, a small number of mares may not respond to the fertility control vaccine, but instead will continue to foal normally (i.e., BLM 2023).

Direct Effects: GnRH Vaccines
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. When combined with an adjuvant, a GnRH vaccine stimulates a persistent immune response resulting in prolonged antibody production against GnRH, the carrier protein, and the 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.

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 commercially available 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, Nolan et al. 2018c), 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. 2012); 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, Schaut et al. 2018, Yao et al. 2018). 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. 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).

GonaCon can provide multiple years of infertility in several wild ungulate species, including horses (Killian et al., 2008; Gray et al., 2010). The lack of estrus cycling that results from successful GonaCon vaccination has been compared to typical winter period of anoestrus in open mares. As anti-GnRH antibodies decline over time, concentrations of available endogenous GnRH increase and treated animals usually regain fertility (Power et al., 2011). In the PopEquus projection model (Folt et al. 2023a, 2023b), a single dose of GonaCon-equine treatment is modeled as having 37% and 29% reductions on reproduction one and two years; as with the PZP ZonaStat-H vaccine, GonaCon is not expected to reduce the foaling rate for existing pregnancies. The PopEquus model (Folt et al. 2023a, 2023b) models fertility reductions of 100%, 85%, and 50% respectively for years 1, 2–4, and 5–7 years after two or more doses.

Baker et al. (2018) showed that mares which receive only one dose of GonaCon-Equine tend to return to fertility within 3 years. Baker et al. (2018, 2023) have also shown that mares treated twice with GonaCon-Equine return to fertility over time, with an increasing number of mares returning to fertility the longer the time since the second dose. The specific method of injection and the time between the first and second dose appear to influence the effectiveness. Two hand-injected doses 4 years apart caused 100% infertility for a year, but that had dropped to 80% by year 6. Two darted injections separated by 6 months, 1 year, or 2 years appear less effective: within 3-4 years after two darted injections, only between about 55% to 75% of mares were infertile. When two hand-injections were only separated by 30 days, approximately 85% of treated mares were infertile for 1 year (BLM 2022); this is more effective than one dose, but less effective than when the doses are separated by 4 years. This 30-day timing is becoming a relatively common treatment schedule and is consistent with the EPA label for this vaccine; EPA 2025).

As is true for PZP vaccine treatments, the fraction of mares treated in a herd can have a large effect on the realized change in growth rate. Due to high wild horse survival rates, in any given year, a very high fraction of mares (i.e. ~75%) must be effectively contracepted (i.e., to the point that the fertility control vaccine prevents fertility in that year) to cause overall herd-level growth rates to be anywhere close to zero. The fraction of contracepted mares at any given time has also been called the 'fertility control index' (Grams et al. 2022, Schulman et al. 2024). As part of its adaptive management in decisions about how many mares to treat with fertility control vaccine, the BLM could use results of monitoring to make inferences about the number of mares present and the expected fraction of those that may be effectively contracepted, based on their treatment histories. Due to logistical limitations associated with difficult access in the Complexes, there could almost always be a sizeable portion of the female population that is fertile in any given year.

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, Nolan et al. 2018c). 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. 2012, 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 et al. 2007, Botha et al. 2008, Killian et al. 2008, Miller et al. 2008, 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.

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 et al. (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. 2002, 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 with precision which individuals of a given age class will have long-lasting immune responses to the GonaCon vaccine. Gray (2009a) 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 quantitative relationship is between various factors and the resulting contraceptive efficacy, but average efficacy rates have been reported in studies such as Baker et al. (2023).

Several studies have monitored animal health after immunization against GnRH. GonaCon treated mares did not have any measurable difference in uterine edema (Killian et al. 2006, Killian et al. 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. 2012), 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 (NRC 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.

Return to Fertility and Effects on Ovaries: PZP Vaccines
In most cases, PZP contraception appears to be temporary and most treated mares return to fertility over time (Kirkpatrick and Turner 2002) unless they receive additional vaccine treatments. The return to fertility associated with a reduced immune response to the fertility control vaccine antigen has been called 'reversibility,' but the timing of the return to fertility is not under direct human control in the same sense that a narcotic drug can be reversed by application of naloxone, for example. The ZonaStat-H formulation of the vaccine tends to confer only one year of efficacy per 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 (see Appendix B in BLM 2021).

The purpose of applying PZP vaccine treatment is to prevent mares or jennies from conceiving foals, but BLM acknowledges that long-term infertility could be a result for some number of individual wild horses receiving PZP vaccinations. The effect of the PZP vaccine treatments is an immune response but if it happens that multiple PZP vaccine treatments cause a mare to not regain fertility before death, some would interpret that course of immunocontraceptive treatment to have caused sterility. 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). This form of vaccine-induced long-term infertility or sterility for mares treated consecutively in each of 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. Repeated treatment with PZP led long-term infertility in Przewalski's horses receiving as few as one PZP booster dose (Feh 2012). However, even if some number of mares become sterile as a result of PZP treatment, that potential result would be consistent with the contraceptive purpose that motivates BLM's potential use of the vaccine, and with Congressional guidance that condones such treatment in the management of wild horses and burros, in WFRHBA section 1333(b).

In some number of individual mares and jennies, PZP vaccination may cause direct effects on ovaries (Gray and Cameron 2010, Joonè et al. 2017b, Joonè et al. 2017c, Joonè et al. 2017d, Nolan et al. 2018b, French et al. 2020). Joonè et al. (2017a) noted that effects on ovaries in mares treated with one primer dose and booster dose were temporary. Joonè et al. (2017c) and Nolan et al. (2018b) documented decreased anti-Mullerian hormone (AMH) levels in mares treated with native or recombinant PZP vaccines; AMH levels are thought to be an indicator of ovarian function. French et al. (2020) documented fewer visible follicles and reduced uterine horn diameter in PZP treated jennies; 25% of treated burros returned to fertility during that study. 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 led to multiple years of infertility in some breeding trials (Killian et al. 2008, Roelle et al. 2017, Bechert and Fraker 2018), but unacceptably poor efficacy in a subsequent trial (Kane 2018). Kirkpatrick et al. (1992) noted effects on horse ovaries after three years of treatment with PZP. Observations at Assateague Island National Seashore indicated 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 PZP vaccine applications 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). 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. Bagavant et al. (2002) demonstrated T-cell clusters on ovaries, but no loss of ovarian function after ZP protein immunization in macaques.

Return to Fertility and Effects on Ovaries: GnRH Vaccines
As with PZP vaccines, mares that are treated with GonaCon-equine vaccine can be expected to return to fertility when the immune response to the antigen declines; in the colloquial usage of the term, this also makes GonaCon-equine a ‘reversible’ treatment, even though the return to fertility is not under direct human control in the same sense that a narcotic drug can be ‘reversed’ by application of naloxone, for example. The NAS (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; a relatively ow fraction of mares that receive only one dose of GonaCon-equine may be contracepted in the first year after treatment. However, preliminary results on the effects of boostered doses of GonaCon-Equine indicate that a booster dose in horses can increase the strength and duration of immune response – this can result in high contraceptive efficacy and longer-lasting effects (Baker et al. 2017, 2018, 2023) than the one-year effect that is generally expected from a single booster of Zonastat-H.

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, 2018). 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, 2018). 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, describing effects of a single dose of GonaCon), 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 short-term fertility outcome (McCann et al. 2017). After treatment with GonaCon-equine vaccine, some mares may return to fertility faster than others (Thompson et al. 2022).

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, Nolan et al. 2018c). It is worth repeating that those vaccines do not have the same formulation as GonaCon.

Results from horses (Baker et al. 2017, 2018, 2023) and other species (Curtis et al. 2002) 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, 2018). 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); these results are consistent with the expectation that contraceptive effect of GonaCon in mammals results from the immune response, and that return to fertility increases as that immune response wanes.

Baker et al. (2017, 2018) 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. 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. In 2023, Baker et al. reported that mares treated with two doses of GonaCon-Equine returned to fertility at different rates and timing, depending on the length of time between the primer and booster dose. The longer the time between primer and booster, generally the longer-lasting was the contraceptive effect. For mares re-treated 4 years after the first dose, 29% had returned to fertility within 6 years after the second dose. For mares re-treated 2 years after the first dose, 36% had returned to fertility within 4 years of the second dose. For mares retreated 1 year, or 6 months after their first dose, 57%, and 46% of mares, respectively, had returned to fertility within 3 years. Results for the timing of return to fertility among mares treated twice with GonaCon-Equine vaccine is consistent with immune response being the cause of contraception, and that those contraceptive effects wane as the immune response declines over time (Baker et al. 2023).

In a presentation to the wild horse and burro Advisory Board (BLM 2025), the BLM summarized some preliminary, unpublished results from monitoring a subset of wild mares that were gathered, given a first dose of GonaCon-Equine vaccine, held for approximately 30 days, treated with a second dose, and then released back to their herd management areas of origin. This treatment regime may be casually referred to as 'capture-treat-hold-release,' though there is actually a second vaccine treatment before release. Because results are not yet peer-reviewed, the methods are described briefly here. GPS radio collared, GonaCon-Equine treated wild mares at Swasey HMA, Sulphur HMA, and Eagle HMA were monitored every 30 days after release to determine their survival and the presence of a foal, until the GPS collars were dropped from the mares. No detrimental effects of GonaCon treatment on mare survival were observed in the wild. In some cases, additional GonaCon-treated mares were also observed frequently enough to provide reliable foaling rate data because they associated consistently with radio-collared mares. In the first foaling season after release, closely monitored mares at those three HMAs had a 54% observed foaling rate (n=70; SE=0.06). It is consistent with expectations that mares that are pregnant at the time they are treated with GonaCon would bring the fetus to term despite the vaccination (see below, Effects on Existing Pregnancies, Foals, and Birth Phenology: GnRH Vaccines). In the second foaling season after vaccine treatment at all three of those HMAs, there was an observed foaling rate of 13% among treated mares (n=64; SE=0.06). Radio collar-based observations provided foaling rates for GonaCon-Equine-treated mares in the third foaling season only at Eagle HMA, when foaling rate had increased among treated mares to 31% (n=45; SE=0.07). A gather took place at Swasey HMA in the fourth year after treatment, and foaling rate estimates are possible there based on monitoring of re-gathered, GonaCon-Equine-treated mares, among which the foaling rate in that year was up to 47% (n=17; SE=0.12). These results of monitoring are consistent with expectations, in that among these mares treated with GonaCon-Equine via the capture-treat-hold-release approach, there was an initially high effectiveness (low foaling rate) in the first breeding season after treatment, the effectiveness waned somewhat over time, and the effectiveness was higher in years 3 and 4 than would be expected for a capture-treat-hold-release regimen of ZonaStat-H vaccine. The observed foaling rates over time for capture-treat-hold-release GonaCon-Equine treated mares were roughly comparable in value to observations for mares treated twice via darting at Theodore Roosevelt NP (in Baker et al. 2023).

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. 2002, Powers et al. 2011, Thompson et al. 2022). It is not expected that the BLM would treat prepubertal mares in the Complexes. 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. 2002, 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 the BLM is not aware of any published data.

To date, short term evaluation of anti-GnRH vaccines, show contraception appears to be temporary, and a result of an immune response that can wane over time. 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 temporary infertility lasting a short time (i.e., usually less than 2 years). Baker et al (2023) noted the possibility that some mares treated twice with GonaCon-Equine vaccine could remain contracepted for over 6 years, or even until they die; the latter outcome would presumably depend on the animal's age when treated, with older animals more likely to die before regaining fertility simply because their lifespan may not be long enough for the immune reaction to wane and cause a resumption of fertility. If long-term treatment resulted in such a long duration of immune response that a mare remains infertile until death, that type of permanent infertility would be consistent with the desired effect of using GonaCon (e.g., effective contraception), and with section 1333(b) of the WFRHBA.

Other anti-GnRH vaccines also have had temporary effects in mares. Elhay et al. (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). Joonè et al. (2017) analyzed samples from the Schulman et al. (2013) study, and found no significant decrease in anti-Mullerian hormone (AMH) levels in mares treated with GnRH vaccine. AMH levels are thought to be an indicator of ovarian function, so results from Joonè et al. (2017) support the general view that the anoestrus resulting from GnRH vaccination is physiologically similar to typical winter anoestrus. 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 temporary. 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).

Long-term infertility could result from multiple doses of GonaCon-equine vaccine. As is the case for PZP vaccines (noted above), it is possible that some fraction of mares treated with multiple doses of GonaCon-equine could be prevented from having any more foals before they die – this outcome would depend on the age when the mare is treated, duration of the mare’s immune response, and the mare’s longevity. All available evidence supports the conclusion that the effect of GonaCon-equine vaccine treatments is to cause an immune response, and that when that immune response wanes a mare is expected to return to fertility. As noted above, Baker et al (2023) demonstrated increasing rates of return to fertility over time, after a second dose of GoanCon-Equine was administered. But if it happens that GonaCon-equine vaccine treatments cause a mare or jennie to not return to fertility before death, some would interpret that course of immunocontraceptive treatment to have caused sterility. If some fraction of mares or jennies treated with GonaCon-Equine were to become sterile, though, that result would be consistent with the contraceptive purpose that motivates BLM’s potential use of the vaccine, and with Congressional guidance that condones such treatment in the management of wild horses and burros, in WFRHBA section 1333(b).

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 may lead to four or more years with relatively high rates (80+%) of additional infertility expected (Baker et al. 2018. 2023), with the potential for additional infertility until the immune response to the vaccine wears off. The duration of effect after a second dose would appear to depend on the length of time between first and second dose, with longer-lasting effects if that time span is 4 years than if it is 1 year or less (Baker et al 2023). Given that GonaCon-Equine 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.

Changes in hormones associated with anti-GnRH vaccination led 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, Powers et al. 2011, Donovan et al. 2013). In studies where the vaccine required a booster, hormonal and associated results were generally observed within several weeks after delivery of the booster dose.

Effects on Existing Pregnancies, Foals, and Birth Phenology: PZP Vaccines
Although fetuses are not explicitly protected under the WFRHBA of 1971, as amended, it is prudent to analyze the potential effects of fertility control vaccines on developing fetuses and foals. Any impacts identified in the literature have been found to be transient, and do not influence the future reproductive capacity of offspring born to treated females.

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). Studies on Assateague Island (Kirkpatrick and Turner 2002) showed that once female offspring born to mares treated with PZP during pregnancy eventually breed, they produce healthy, viable foals. It is possible that there may be transitory effects on foals born to mares or jennies treated with PZP. For example, in mice, Sacco et al. (1981) found that antibodies specific to PZP can pass from mother mouse to pup via the placenta or colostrum, but that did not apparently cause any innate immune response in the offspring: the level of those antibodies were undetectable by 116 days after birth. There was no indication in that study that the fertility or ovarian function of those mouse 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. 'Foal stealing,' where a near-term pregnant mare steals a neonate foal from a weaker mare, is unlikely to be a common behavioral result of including spayed mares in a wild horse herd. McDonnell (2012) noted that "foal stealing is rarely observed in horses, except under crowded conditions and synchronization of foaling," such as in horse feed lots. Those conditions are not likely in the wild, where pregnant mares will be widely distributed across the landscape, and where the expectation is that parturition dates would be distributed across the normal foaling season. Similarly, although Nettles (1997) noted reported stillbirths after PZP treatments in cynomolgus monkeys, those results have not been observed in equids despite extensive use in horses and burros.

On-range observations from 20 years of application to wild horses indicate that PZP application in wild mares does not generally cause mares to give birth to foals out of season or late in the year (Kirkpatrick and Turner 2003). Research by Nuñez et al. (2010) showed that a small number of mares that had previously been treated with PZP foaled later than untreated mares and expressed the concern that this late foaling "may" impact foal survivorship and decrease band stability, or that higher levels of attention from stallions on PZP-treated mares might harm those mares. However, that paper provided no evidence that such impacts on foal survival or mare well-being actually occurred. Rubenstein (1981) called attention to a number of unique ecological features of horse herds on Atlantic barrier islands, such as where Nuñez et al. made observations, which calls into question whether inferences drawn from island herds can be applied to western wild horse herds. Ransom et al. (2013), though, did identify a potential shift in reproductive timing as a possible drawback to prolonged treatment with PZP, stating that treated mares foaled on average 31 days later than non-treated mares. Results from Ransom et al. (2013), however, showed that over 81% of the documented births in that study were between March 1 and June 21, i.e., within the normal, peak, spring foaling season. Ransom et al. (2013) pointedly advised that managers should consider carefully before using fertility control vaccines in small refugia or rare species. Wild horses and burros managed by BLM do not generally occur in isolated refugia, nor are they at all rare species. The US Fish and Wildlife Service denied a petition to list wild horses as endangered (USFWS 2015). Moreover, any effect of shifting birth phenology was not observed uniformly: in two of three PZP-treated wild horse populations studied by Ransom et al. (2013), foaling season of treated mares extended three weeks and 3.5 months, respectively, beyond that of untreated mares. In the other population, the treated mares foaled within the same time period as the untreated mares. Furthermore, Ransom et al. (2013) found no negative impacts on foal survival even with an extended birthing season. Nuñez (2018) suggested that if there are shifts in birth phenology it would be reasonable to assume that some negative effects on foal survival for a small number of foals might result from particularly severe weather events; such effects were not observed, though, in North Dakota (Baker et al. 2023).

Effects on Existing Pregnancies, Foals, and Birth Phenology: GnRH Vaccines
Although fetuses are not explicitly protected under the WFRHBA of 1971, as amended, it is prudent to analyze the potential effects of fertility control vaccines on developing fetuses and foals. Any impacts identified in the literature have been found to be transient, and do not influence the future reproductive capacity of offspring born to treated females.

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.

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. (2002) 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 did not assess other possible explanatory factors such as mare social status, age, body condition, or habitat (NRC 2013). Gray et al. (2010) found no difference in sex ratio, parturition phenology, or foal survival in foals born to free-roaming mares treated with GonaCon.

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), but it is also important to note that where such shifts have been documented, there have not been any associated effects on foal survival or long-term shifts in birth phenology for individual mares. The effects of GnRH vaccination on foaling phenology appear similar to those for PZP vaccine treated mares in which the effects of the vaccine wear off. In North Dakota, Baker et al. (2023) documented that 95% of foals born to untreated mares were born between March 1 – August 1. Baker et al. (2023) found that GonaCon-Equine treated mares had, on average, a peak foaling date (May 30) that was 34 days later than that of untreated mares (April 26), which is comparable to the 31-day later peak in PZP-treated mares that Ransom et al. (2013) documented. One might suppose that if there is a shift in foaling date for some treated mares, any associated effect on foal survival could depend on weather severity and local conditions. But importantly, even though Baker et al. (2023) observed foals born to GonaCon-Equine treated mares as late as December in North Dakota, their survival rate analysis showed that "…no difference in survival resulting from contraceptive effects was observed on timing of parturition." Also, similar to results in Ransom et al. (2013) for PZP-treated mares, observations by Baker et al. (2023) lead to the conclusion that late foaling phenology is 'self correcting' for any given mare, in that if a mare gave birth to a foal later than the typical foaling season, in the following year that mare either had no foal, or gave birth to a foal during the typical foaling season. Similarly, Curtis et al. (2002) observed 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 other 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). 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 (NRC 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.

Effects of Marking and Injection

Standard practices require that immunocontraceptive-treated animals be readily identifiable, either via brand marks or unique coloration (BLM 2010). Some level of transient stress is likely to result in newly captured mares that do not have markings associated with previous fertility control treatments. It is difficult to compare that level of temporary stress with the 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 and / or RFID chipping, for the purpose of identifying that mare and identifying that mare's vaccine treatment history. Under past management practices, captured mares experienced increased stress levels from handling (Ashley and Holcombe 2001), but BLM has instituted guidelines to reduce the sources of handling stress in captured animals (BLM 2021).

Most mares recover from the stress of capture and handling quickly once released back to the range, 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 and jennies (Roelle and Ransom 2009, Bechert et al. 2013, French et al. 2017, Baker et al. 2018, French et al. 2020), 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. French et al. (2020) observed localized swelling, transient lameness in PZP vaccine-treated burros, and sterile abscesses in 87% of those treated jennies. Whether injection is by hand or via darting, GonaCon-Equine is associated with some degree of inflammation, swelling, and the potential for abscesses at the injection site (Baker et al. 2013). Swelling or local reactions at the injection site are generally expected to be minor in nature, but some may develop into draining abscesses. Use of remotely delivered vaccine is generally limited to populations where individual animals can be accurately identified and repeatedly approached. The dart-delivered PZP formulation produced injection-site reactions of varying intensity, though none of the observed reactions appeared debilitating to the animals (Roelle and Ransom 2009) but that was not observed with dart-delivered GonaCon (McCann et al. 2017). Joonè et al. (2017a) found that injection site reactions had healed in most mares within 3 months after the booster dose, and that they did not affect movement or cause fever.

Long-lasting 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. 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, 2018). 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).

Indirect Effects: PZP Vaccines

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, that mare's future foals would be expected to be healthier overall, and would benefit from improved nutritional quality in the mare's milk. This is particularly to be expected if there is an improvement in rangeland forage quality at the same time, due to reduced wild horse population size. Past application of fertility control has shown that mares' overall health and body condition remains improved even after fertility resumes. PZP treatment may increase mare survival rates, leading to longer potential lifespan (Turner and Kirkpatrick 2002, Ransom et al. 2014a) that may be as much as 5-10 years (NPS 2008). 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, NPS 2008). 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 (BLM, anecdotal observations).

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). 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 range 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 in a given herd reduces foaling rates and population growth rates, another indirect effect should be to reduce the number of wild horses that have to be removed over time to achieve and maintain the established AML. Contraception may change a herd's age structure, with a relative increase in the fraction of older animals in the herd (NPS 2008). 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.

A principal motivation for use of contraceptive vaccines or sex ratio manipulation is to reduce population growth rates and maintain herd sizes at AML. Where successful, this should allow for continued and increased environmental improvements to range conditions within the project area, which would have long-term benefits to wild horse and burro habitat quality, and well-being of animals living on the range. 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. With rangeland conditions more closely approaching a thriving natural ecological balance, and with a less concentrated distribution of wild horses and burros, there should also be less trailing and concentrated use of water sources. Lower population density should 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. Among mares in the herd that remain fertile, a higher level of physical health and future reproductive success would be expected in areas where lower horse and burro population sizes lead to increases in water and forage resources. While it is conceivable that widespread and continued treatment with fertility control vaccines 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.

Indirect Effects: GnRH Vaccines

As noted above to PZP vaccines, an expected long-term, indirect effect on wild horses treated with fertility control would be an improvement in their overall health. 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. Baker et al (2023) noted higher body condition scores in GonaCon-Equine vaccine treated mares than in untreated mares. In other species, treated deer had better body condition than controls (Gionfriddo et al. 2011b), 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). 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 range 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 area. With rangeland conditions more closely approaching a thriving natural ecological balance, and with a less concentrated distribution of wild horses across the range, 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: PZP Vaccines

Behavioral difference, compared to mares that are fertile, should be considered as potential results of successful contraception. The NAS report (2013) noted that all forms of fertility suppression have effects on mare behavior, mostly because of the lack of pregnancy and foaling, and concluded that fertility control vaccines were among the most promising fertility control methods for wild horses and burros. The resulting impacts may be seen as neutral in the sense that a wide range of natural behaviors is already observable in untreated wild horses, or mildly adverse in the sense that effects are expected to be transient and to not affect all treated animals.

PZP vaccine-treated mares may continue estrus cycles throughout the breeding season. Ransom and Cade (2009) delineated wild horse behaviors. Ransom et al. (2010) found no differences in how PZP-treated and untreated mares allocated their time between feeding, resting, travel, maintenance, and most social behaviors in three populations of wild horses, which is consistent with Powell's (1999) findings in another population. Likewise, body condition of PZP-treated and control mares did not differ between treatment groups in Ransom et al.'s (2010) study. Nuñez et al. (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.

In two studies involving a total of four wild horse populations, both Nuñez et al. (2009) and Ransom et al. (2010) found that PZP vaccine 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 Killian 1997, Heilmann et al. 1998, Curtis et al. 2002, Duncan et al. 2017). There was no evidence, though, that mare welfare was affected by the increased level of herding by stallions noted in Ransom et al. (2010). Later analysis by Nuñez et al. (2017) noted no difference in mare reproductive behavior as a function of contraception history.

Ransom et al. (2010) found that control mares were herded by stallions more frequently than PZP-treated mares, and Nuñez et al. (2009, 2014, 2017, 2018) 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, 2018) studied. Nuñez et al. (2014, 2017) and Nuñez (2018) 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. Also, despite any potential changes in band infidelity due to PZP vaccination, horses continued to live in social groups with dominant stallions and one or more mares. 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. In separate work in a long-term study of semi-feral Konik ponies, Jaworska et al. (2020) showed that neither infanticide nor feticide resulted for mares and their foals after a change in dominant stallion. Nuñez et al. (2014) wrote that these effects "…may be of limited concern when population reduction is an urgent priority." Nuñez (2018) and Jones et al. (2019, 2020) noted that band stallions of mares that have received PZP treatment can exhibit changes in behavior and physiology. Nuñez (2018) cautioned that PZP use may limit the ability of mares to return to fertility, but also noted that, "such aggressive treatments may be necessary when rapid reductions in animal numbers are of paramount importance…If the primary management goal is to reduce population size, it is unlikely (and perhaps less important) that managers achieve a balance between population control and the maintenance of more typical feral horse behavior and physiology."

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 et al. (2013) also state that "…there is little consistent evidence for a negative association between elevated baseline glucocorticoids and fitness." Band fidelity is not an aspect of wild horse biology that is specifically protected by the WFRHBA of 1971. It is also notable that Ransom et al. (2014b) found higher group fidelity after a herd had been gathered and treated with a contraceptive vaccine; in that case, the researchers postulated that higher fidelity may have been facilitated by the decreased competition for forage after excess horses were removed. At the population level, available research does not provide evidence of the loss of harem structure among any herds treated with PZP. No biologically significant negative impacts on the overall animals or populations overall, long-term welfare or well-being have been established 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 et al. (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 may 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 NAS report (2013) provides a comprehensive review of the literature on the behavioral effects of contraception that puts research up to that date by Nuñez et al. (2009, 2010) into the broader context of all of the available scientific literature, and cautions, based on its extensive review of the literature that: “. . . in no case can the committee conclude from the published research that the behavior differences observed are due to a particular compound rather than to the fact that treated animals had no offspring during the study. That must be borne in mind particularly in interpreting long-term impacts of contraception (e.g., repeated years of reproductive “failure” due to contraception).”

Behavioral Effects: GnRH Vaccines

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. Where it is 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. 2002, Dalin et al. 2002, Killian et al. 2006, Dalmau et al. 2015). Females treated with GonaCon had fewer estrous cycles than control or PZP-treated mares (Killian et al. 2006) or deer (Curtis et al. 2002). Thus, any 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. (2014b) and Baker et al. (2018) 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 (2009a) and Baker et al. (2018) found no difference in sexual behaviors in mares treated with GonaCon and untreated mares. In a sense, the hormonal state of and the behaviors of GonaCon-Equine vaccine treated animals is generally comparable to when they are pregnant, but Baker et al. (2023) noted that GonaCon-Equine treated mares actually do still “…show periodic estrous behaviors throughout the normal breeding season suggesting that vaccination only partially suppresses the hormones responsible for stimulating reproductive behavior, although concentrations are likely insufficient to induce ovulation." Mares treated with GonaCon-Equine do not leave their bands any more often than untreated mares. In fact, Ransom et al. (2014b) actually found increased levels of band fidelity after treatment with GonaCon-Equine. Baker et al. (2018) reported that GonaCon-Equine treated mares received slightly more harem-social behaviors from stallions than untreated mares, but that most of those social behaviors were allo-grooming. 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. (2014b) 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.

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. 2014b). Indeed, Gray (2009a) 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. (2014b) 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.

Gray (2009a) and Ransom et al. (2014b) monitored non-reproductive behaviors in GonaCon treated populations of free-roaming horses. Gray (2009a) 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. (2014b) 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 Fertility Control Vaccines

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 NAS 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 alleviated potential inbreeding concerns (BLM 2010).

In the last 10 years, there has been a high realized growth rate of wild horses in most areas administered by the BLM, such that most alleles that are present in any given mare are likely to already be well represented in that mare's 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). In a relatively small population with empirically documented individual genotypes, Zimmerman et al. (2023) used projections to determine that adequate genetic diversity should be maintained despite immunocontraception and planned periodic gathers. 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 a fertility control vaccine may lead to prolonged infertility, or even sterility in some mares, most HMAs have only a low risk of loss of genetic diversity if logistically realistic rates of contraception are applied to mares. 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 (i.e., see the table of Fst vales *in* NRC 2013, and several analyses in Cothran et al. 2024). 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 treatment with contraceptives.

Fertility Control Vaccines and the Evolution of Immune Response

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). Based on principles of population genetics, likely application rates in wild horse and burro metapopulations, and on currently available knowledge, it appears unlikely that BLM's application of fertility control vaccines would cause biologically significant, population-level evolutionary changes in the capacity to mount healthy immune responses, for reasons noted below.

In well-monitored wild horse herds that have been treated with PZP vaccine for many years, there have been a small number of mares that are 'non-responders' – that is, they continue to be fertile despite multiple treatments with ZonaStat-H PZP vaccine (i.e., BLM 2023). To the extent that this outcome may be partly attributable to genes, then for such 'non-responder' genes to spread widely in the population, both heritability and the selection coefficient must be high. 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. 2011). The premise of the concern (Cooper and Larson 2006, Ransom et al. 2014a) is based on an assumption that lack of immune response to any given fertility control vaccine is a highly heritable trait, that the great majority of mares in a population would be treated with immunocontraceptives, that treated 'non-responder' mares would give birth to a far greater number of foals than other treated mares, and that the result would be an increasing frequency of the poor immune response associated trait over time in a population of vaccine-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 eutherian 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. 2002, Herbert and Trigg 2005). However, Magiafoglou et al. (2003) 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).

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

One recent study attempted to quantify the heritability of a decreased response to fertility control vaccine-induced duration of infertility and the pattern of single nucleotide polymorphisms (SNPs) in the genomes of feral mares in Theodore Roosevelt National Park. SNPs can be associated with DNA variants in nearby coding regions, due to linkage. 53 mares were treated with the GonaCon-Equine immunocontraception vaccine, and 25 were not. Almost all of the GonaCon treated mares became infertile for at least one year. The researchers found a correlation between a more rapid return to fertility and several SNPs. The SNPs that were correlated with a more rapid return to fertility are not known to be located in coding regions of genes that influence immune response but based on the location of those SNPs the researchers suggested that there may be an association with genes that may influence immune response. The researchers estimated that the heritability for genetic effects on the duration of GonaCon effectiveness in feral horse mares was $h^2 = 0.27$ (SE = 0.23). They characterized this level of heritability as 'moderate.' There are several reasons to expect that in any single managed herd of wild horses, there would be the potential for only a relatively low strength of selection promoting the genes identified in the paper. Almost all of those treated mares became infertile for some time, even though certain SNPs were correlated with a marginally faster return to fertility. The fact that immunocontraception with GonaCon still reduced fertility in treated mares is indicative of a weaker selection potential than if treated mares with those SNPs had remained entirely fertile. These reasons include the only 'moderate' levels of heritability identified by Thompson et al. (2022), the expectation that mares treated multiple times should experience additional duration of effect after each dose, the likelihood that an essentially random selection of mares in the herd would not be treated at all with an immunocontraceptive, the possible non-genetic causes that treated mares may return to fertility, and the large genetic effective population size of wild horse metapopulations that is characterized across multiple HMAs and complexes. The results from Thompson et al. (2022) would not be expected substantively to change expectations about the effects of potentially heritable immune responses to immuncontraceptive vaccines. Thompson et al. (2022) based their results on mares that were treated twice with GonaCon-Equine. While some treated mares may carry genes that marginally decrease vaccine effectiveness and cause them to return to fertility faster, there may also be other treated mares who do not carry those genes but experience poor vaccine due to environmental or other causes. Of course, any mares that are not treated with immunocontraceptives would be expected to contribute more foals to the herd than treated mares, and the choice of which mares happen to be treated or not be treated would be essentially random with respect to the SNPs identified. In their conclusions, Thompson et al. (2022) suggest that wild horse managers should not rely solely on immunocontraceptive methods for herd management; in the three HMAs under consideration in this EA, gathers and immunocontraception are both considered for use in the Proposed Action. Therefore, the continued presence of untreated and other reproducing mares is likely to reduce any risk of long-term evolutionary reduction in immune function in these herds.

Although a few, generally isolated, feral horse populations have been treated with high fractions of mares receiving PZP immunocontraception for long-term population control (e.g., Assateague Island National Park, and Pryor Mountains Herd Management Area), the BLM is unaware of any studies that tested for changes in immune competence in those areas.

Sex Ratio Manipulation

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

Sex ratio can vary in local populations of wild horses, with many having approximately equal numbers of males and females, some having more females, and some more males. Basic principles of wildlife demography posit that for populations where there is no major influence of any sex-biased immigration or emigration, the realized sex ratio is expected to be a result of sex ratios at birth and sex-specific survival rates at different ages.

Across many herds of federally managed wild horses and feral horses, there can be substantial variation in the sex ratio at birth. Ransom et al (2016) summarized information about sex ratio at birth across all wild equid species, in a meta-analysis of demographic studies that were available up to that time. Across all wild equid species, Ransom et al. (2016) documented a sex ratio at birth that was slightly skewed toward males on average, with 1.1 male foal born for every 1 female foal. However, the 95% confidence interval for that ratio across wild equid populations was from 0.93:1 to 1.29:1. The actual value of sex ratio at birth can vary from herd to herd and over time, and appears to be influenced by environmental conditions. Ransom et al. (2016) cited studies indicating that female equids tend to give birth to female foals at higher rates when they are living in conditions with inadequate natural resources, when they are in relatively poorer body condition (Cameron et al. 1999), or when they give birth for the first time at very young ages. When free-roaming mares were experiencing improving body condition, they tended to give birth to male foals at high rates (Cameron and Linklater 2007), consistent with predictions of the Trivers-Willard hypothesis that mares in better condition will tend to invest more effort into the sex with higher variance in reproductive success.

The following is not an exhaustive review of all available studies that document adult sex ratio in wild or free-roaming horses, but a conclusion that can be drawn from across many studies is that there is a range of observed sex ratios; there is no single typical sex ratio typical in either unmanaged or managed herds.

In a comprehensive 1973-1987 study of 74 management areas that did not have any fertility control applications, Garrott (1991) documented that over half had male to female ratios that were very close to 50:50 (not statistically different from equal numbers of males and females). Among the others, many herds did have more females than males. Over 84% of those areas had male to female parity in horses under 1 year old (Garrott 1991). Survival of foals appears to be, on average, equal between male and female foals. In herds without fertility control, Garrott (1991) concluded that young adult male horses had lower survival than young female horses, but that older adult male horses had higher survival than older adult female horses.

The realized overall sex ratio in any given wild horse or burro herd will also be influenced by age-specific and sex-specific survival rates. Mare fertility control application in wild horses increases adult mare survival (Turner and Kirkpatrick 2002, Ransom et al. 2014a). This is expected cause an increase in adult females over time in a herd that has been treated with mare fertility control. During 1993-2007, wild horses in the Pryor Mountains were studied intensively; during that time adult sex ratio varied in the range from 44% to 55% male. The contemporary Pryor Mountain herd sex ratio is an example of where long use of fertility control vaccine has likely affected the sex ratio, which is ~57% female. However, this is largely driven by high mare longevity in the 20+ year-old age class (20 mares vs. only 2 studs), that is most likely caused by those mares having relatively few foals. Discounting that age class, the sex ratio at Pryor Mountains herd is ~52% female (BLM 2023). Before helicopter gathers or fertility control treatments began at Sheldon national wildlife refuge, the sex ratio of adults (3 years old or older) was 55% male (424 stallions to 353 mares; Collins and Kasbahm 2016). On an Atlantic barrier island in Georgia, Goodloe et al (2000) documented overall adult sex ratio that was 62% male. On Sable Island (Canada) where resources are limited and there is relatively high post-natal mare mortality, sex ratios have been over 60% male (Regan et al. 2020).

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

Having a larger number of males than females is expected to lead to several demographic and behavioral changes as noted in the NAS report (2013), including the following. Having more fertile males than females should not alter the fecundity of individual fertile females. Wild mares may be distributed in a larger number of smaller harems (as documented by Regan et al 2020). Singer and Schoeneker (2000) found that increases in the number of males on Pryor Mountain Wild Horse Range herd management area lowered the breeding male age but did not alter the birth rate among females. If females are distributed among a larger number of smaller harems, it is expected that genetic effective population size (Ne) should increase relative to a herd of the same number of mares, but with 50:50 sex ratio. Competition and aggression between males may cause a decline in male body condition. Female foraging may be somewhat disrupted by elevated male-male aggression. With a greater number of males available to choose from, females may have opportunities to select more genetically fit sires. There would also be an increase the genetic effective population size because more stallions would be breeding and existing females would be distributed among many more small harems. This last beneficial impact is one reason that skewing the sex ratio to favor males is listed in the BLM wild horse and burro handbook (BLM 2010) as a method to consider in herds where there may be concern about the loss of genetic diversity; having more males fosters a greater retention of genetic diversity.

Changes in which stallions mate with mares are a natural part of the wild horse behavioral repertoire. Berger (1983) reported forced copulations after band stallion changes, but these were not related to sex ratio per se, considering that the sex ratio in the populations he studied were approximately 43% male (Grange et al 2009). Kirkpatrick and Turner (1991) looked for but did not find any forced copulation or induced abortions after stallion changes in wild horse bands. Infanticide is a natural behavior that has been observed in wild equids (Feh and Munkhtuya 2008, Gray 2009), but there are no published accounts of infanticide rates increasing as a result of having a skewed sex ratio in wild horse or wild burro herds. Any comment that implies such an impact would be speculative.

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

- In the 2015 Cold Springs HMA Population Management Plan EA (DOI-BLM-V040-2015-022), the low end of AML was 75. Under the preferred alternative, 37 mares and 38 stallions would remain on the HMA. This is well below the 150 head threshold noted above.
- In the 2017 Hog Creek HMA Population Management Plan EA (DOI-BLM-ORWA-V000-2017-0026-EA), BLM clearly identified that maintaining a 50:50 sex ratio was appropriate because the herd size at the low end of AML was only 30 animals.

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

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Effects of Female Sterilization and Male Neutering

Various forms of fertility control can be used in wild horses and wild burros, with the goals of maintaining herds at or near AML, reducing fertility rates, and reducing the frequency of gathers and removals. The WFRHBA of 1971 specifically provides for contraception and sterilization (16 U.S.C. 1333 section 3.b.1). Fertility control measures have been shown to be a cost-effective and humane treatment to slow increases in wild horse populations or, when used in combination with gathers, to reduce horse population size (Bartholow 2004, de Seve and Boyles-Griffin 2013, Fonner and Bohara 2017). Population growth suppression becomes less expensive if fertility control is long-lasting (Hobbs et al. 2000), such as with sterilization methods. Even though physical female sterilization methods are not part of any action alternative for the Antelope and Triple B Complexes, those effects are included in this review for comparative purposes. Sterilizing a female horse (mare) or burro (jenny) can be accomplished by several methods, some of which are minimally invasive, and others of which are surgical. In this review, 'spaying' is defined to be surgical sterilization, usually accomplished by removal of the ovaries, but other surgical methods such as tubal ligation that lead to sterility may also be considered by some to be a form of spaying. Minimally invasive, physical forms of sterilization, such as trans-cervical methods that occlude the oviduct, are not labeled as spaying in this review, but may have similar physiological outcomes as surgical methods that leave the ovaries intact. In this review, 'neutering' is defined to be the sterilization of a male horse (stallion) or burro (jack), either by removal of the testicles (castration, also known as gelding) or by vasectomy, where the testicles are retained but no sperm leave the body by severing or blocking the vas deferens or epididymis.

In the context of BLM wild horse and burro management, sterilization is expected to be successful to the extent that it reduces the number of reproducing females. By definition, sterilizing a given female is 100% effective as a fertility control method for that female. Neutering males may be effective in one of two ways. First, neutered males may continue to guard fertile females, preventing the females from breeding with fertile males. Second, if neutered males are included in a herd that has a high male-to-female sex ratio, then the neutered males may comprise some of the animals within the appropriate management level (AML) of that herd, which would effectively reduce the number of females in the herd. Although these and other fertility control treatments may be associated with a number of potential physiological, behavioral, demographic, and genetic effects, those impacts are generally minor and transient, do not prevent overall maintenance of a self-sustaining population, and do not generally outweigh the potential benefits of using contraceptive treatments in situations where it is a management goal to reduce population growth rates (Garrott and Oli 2013).

Peer-reviewed scientific literature details the expected impacts of sterilization methods on wild horses and burros. No finding of excess animals is required for BLM to pursue sterilization in wild horses or wild burros, but NEPA analysis has been required. This review focuses on peer-reviewed scientific literature. The summary that follows first examines effects of female sterilization, then neuter use in males. This review does not examine effects of fertility control vaccines. Cited studies are generally limited to those involving horses and burros, except where including studies on other species helps in making inferences about physiological or behavioral questions not exhaustively addressed in horses or burros specifically. While there are notable differences between the species in their anatomy, diet, behaviors and metabolism (Burden and Thiemann 2015), the essential endocrine controls of the hypothalamic-pituitary-gonadal axis and the function of the zona pellucida in fertility are the same. While most studies reviewed are based on results from horses, burros are similar enough in their reproductive physiology and immunology (i.e., Turini et al. 2021) that expected effects of immunocontraception are comparable.

On the whole, the identified impacts at the herd level are generally transient. The principle impact to individuals treated is sterility, which is the intended outcome. Sterilization that affects individual horses and burros does not prevent BLM from ensuring that there will be self-sustaining populations of wild horses and burros in single HMAs, in complexes of HMAs, and at regional scales of multiple HMAs and complexes. Under the WFRHBA of 1971, BLM is charged with maintaining self-reproducing populations of wild horses and burros. The WFRHBA makes clear that BLM is not explicitly charged with ensuring the fertility of any given individual wild horse or burro. The National Academies of Sciences (NRC 2013) encouraged BLM to manage wild horses and burros at the spatial scale of "metapopulations" – that is, across multiple HMAs and complexes in a region. In fact, many HMAs have historical and ongoing genetic and demographic connections with other HMAs, and BLM routinely moves animals from one to another to improve local herd traits and maintain high genetic diversity.

Discussions about herds that include some ‘non-reproducing’ individuals, or even those that are entirely non-reproducing, should be considered in the context of this ‘metapopulation’ structure, where the ‘self-sustaining’ nature of herds is not necessarily to be measured at the scale of single HMAs. So long as the definition of what constitutes a self-sustaining herd includes the larger set of HMAs that have past or ongoing demographic and genetic connections – as is recommended by the NRC 2013 report – it is clear that particular HMAs can be managed as non-reproducing in whole or in part while still allowing for a self-sustaining population of wild horses or burros at the broader spatial scale. Wild horses are not an endangered species (USFWS 2015), nor are they rare. Over 64,000 adult wild horses and over 17,000 adult wild burros roamed BLM lands as of March 1, 2022, and those numbers do not include at least 9,000 WHB on US Forest Service lands, nor at least 100,000 feral horses on tribal lands in the Western United States (Schoenecker et al. 2021).

All fertility control methods affect the behavior and physiology of treated animals (NRC 2013), and 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 methods alone do not remove excess horses from an HMA’s population, so one or more gathers are usually needed in order to bring the herd down to a level close to AML. Horses are long-lived, potentially reaching 20 years of age or more in the wild. Except in cases where extremely high fractions of mares are rendered infertile over long time periods of (i.e., 10 or more years), spaying and neutering are not very effective at reducing population growth rates to the point where births equal deaths in a herd. However, even modest levels of fertility control activities can reduce the frequency of horse gather activities, and costs to taxpayers. Population growth suppression becomes less expensive if fertility control is long-lasting (Hobbs et al. 2000), such as with sterilization. Because sterilizing animals requires capturing and handling, 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.

Effects of Handling and Marking

Sterilization techniques, while not reversible, may control horse reproduction without the kind of additional handling or darting that can be needed to administer contraceptive vaccines. In this sense, sterilization can be used to achieve herd management objectives with a relative minimum level of animal handling and management over the long term. The WFRHBA (as amended) indicates that management should be at the minimum level necessary to achieve management objectives (CFR 4710.4), and if sterilizing mares or neutering some stallions can lead to a reduced number of handling occasions and removals of excess horses from the range, then that is consistent with legal guidelines. Other fertility control options that may be temporarily effective on male horses, such as the injection of GonaCon-Equine immunocontraceptive vaccine, apparently require multiple handling occasions to achieve longer-term male infertility. Similarly, some formulations of PZP immunocontraception that is currently available for use in female wild horses and burros require handling or darting every year (though longer-term effects may result after 4 or more treatments; Nuñez et al. 2017). By some measures, any management activities that require multiple capture operations to treat a given individual could be seen as more intrusive for wild horses and potentially less sustainable than an activity that requires only one handling occasion.

It is prudent for sterilized animals to be readily identifiable, either via freeze brand marks or unique coloration, and uniquely numbered RFID chips inserted in the nuchal ligament, so that their treatment history is easily recognized (e.g., BLM 2010). Markings may also be useful into the future to determine the approximate fraction of geldings in a herd and could provide additional insights about gather efficiency. BLM has instituted capture and animal welfare program guidelines to reduce the sources of handling stress in captured animals (BLM 2021). Handling may include freeze-marking, for the purpose of identifying an individual. Some level of transient stress is likely to result in newly captured horses that are not previously marked. Under past management practices, captured horses experienced increased, transient stress levels from handling (Ashley and Holcombe 2001). 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), which could occur in the absence of herd management.

Most horses recover from the stress of capture and handling quickly once released back to the range, and none are expected to suffer serious long term effects from gelding, other than the direct consequence of becoming infertile.

Observations of the long term outcomes of sterilization may be recorded during routine resource monitoring work. Such observations could include but not be limited to band size, social interactions with other geldings and harem bands, distribution within their habitat, forage utilization and activities around key water sources. Periodic population inventories and future gather statistics could provide additional anecdotal information.

Neutering Males

Whether or not stallion sterilization methods are considered in any of the action alternatives in this EA, they are included here for comparison and for the sake of completeness in the review. Castration (the surgical removal of the testicles, also called gelding or neutering) is a surgical procedure for the horse sterilization that has been used for millennia. Vasectomy involves severing or blocking the vas deferens or epididymis, to prevent sperm from being ejaculated. The procedures are fairly straight forward, and has a relatively low complication rate. As noted in the review of scientific literature that follows, the expected effects of gelding and vasectomy are well understood overall, even though there is some degree of uncertainty about the exact quantitative outcomes for any given individual (as is true for any natural system).

Including a portion of neutered males in a herd can lead to a reduced population-level per-capita growth rate if they cause a marginal decrease in female fertility or if the neutered males take some of the places that would otherwise be occupied by fertile females. By having a skewed sex ratio with fewer females than males (fertile stallions plus neutered males), the result will be that there will be a lower number of breeding females in the population. Including neutered males in herd management is not new for BLM and federal land management. Geldings have been released on BLM lands as a part of herd management in the Barren Valley complex in Oregon (BLM 2011), the Challis HMA in Idaho (BLM 2012), and the Conger HMA in Utah (BLM 2016). Vasectomized males and geldings were also included in US Fish and Wildlife Service management plans for the Sheldon National Wildlife Refuge that relied on sterilization and removals (Collins and Kasbohm 2016). Taking into consideration the literature available at the time, the National Academies of Sciences concluded in their 2013 report that a form of vasectomy was one of the three most promising methods for WH&B fertility control (NRC 2013). However, BLM is not pursuing the chemical vasectomy method. The NAS panel noted that, even though chemical vasectomy had been used in dogs and cats up to that time, “There are no published reports on chemical vasectomy in horses...” and that, “Only surgical vasectomy has been studied in horses, so side effects of the chemical agent are unknown.” The only known use of chemical vasectomy in horses was published by Scully et al. (2015); this was part of a study cited in the EA (Collins and Kasbohm 2016). They injected chlorhexidine into the stallions’ epididymis. That is the same chemical agent as had been used to chemically vasectomize dogs. Scully et al. (2015) found that the chemical vasectomy method failed to prevent fertile sperm from being located in the vas deferens seminal fluid. Stallions treated with the chemical vasectomy method still had viable sperm and were still potentially as fertile as untreated ‘control’ stallions in that study. Thus, the method did was not effective.

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 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 female fertility and overall 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 – female fertility was not dramatically reduced. Collins and Kasbohm (2016) demonstrated that there was a reduced fertility rate in a feral horse herd with both spayed and vasectomized horses – some geldings were also present in that herd. Statistically significant reductions in mare fertility rates were only observed in the first year after geldings were introduced to a herd in Utah (King et al. 2022). Garrott and Siniff (1992) concluded from their modeling that male sterilization would effectively cause there to be zero population growth (the point where births roughly equal deaths) only if a large proportion of males (i.e., >85%) could be sterilized. In cases where the goal of harem stallion sterilization is to reduce population growth rates, success appears to be 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). At Conger HMA a fraction of geldings that were returned to the range with their social band did continue to live with females, apparently excluding fertile stallions, for at least 2 years (King et al. 2022).

Despite these studies, neutered males can be used to reduce overall growth rates in a management strategy that does not rely on any expectation that geldings will retain harems or lead to a reduction in per-female fertility rates. The primary goal of including neutered males in a herd need not necessarily be to reduce female fertility (although that may be one result). Rather, by including some neutered males in a herd that also has fertile mares and stallions, the neutered males would take some of the spaces toward AML that would otherwise be taken by fertile females. If the total number of horses is constant but neutered males are included in the herd, this can reduce the number of fertile mares, therefore reducing the absolute number of foals produced. Put another way, if neutered males occupy spaces toward AML that would otherwise be filled by fertile mares, that will reduce growth rates merely by the fact of causing there to be a lower starting number of fertile mares.

Direct Effects of Neutering

No animals which appear to be distressed, injured, or in poor health or condition would be selected for gelding. Stallions would not typically be neutered within 72 hours of capture. The surgery would be performed by a veterinarian using general anesthesia and appropriate surgical techniques. The final determination of which specific animals would be gelded would be based on the professional opinion of the attending veterinarian in consultation with the Authorized Officer (i.e., See the SOPs for neutering Appendix III.

Though neutering males is a common surgical procedure, especially gelding, some level of minor complications after surgery may be expected (Getman 2009), and it is not always possible to predict when postoperative complications would occur. Fortunately, 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. Complications may include, but are not limited to: minor bleeding, swelling, inflammation, edema, infection, peritonitis, hydrocele, penile damage, excessive hemorrhage, and eventration (Schumacher 1996, Searle et al. 1999, Getman 2009). A small amount of bleeding is normal and generally subsides quickly, within 2-4 hours following the procedure. Some degree of swelling is normal, including swelling of the prepuce and scrotum, usually peaking between 3-6 days after surgery (Searle et al. 1999). 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 are expected to resolve with exercise after one to 2 weeks. Older horses are reported to be at greater risk of post-operative edema, but daily exercise can prevent premature closure of the incision and prevent fluid buildup (Getman 2009). In some cases, a hydrocele (accumulation of sterile fluid) may develop over months or years (Searle et al. 1999). Serious complications (eventration, anesthetic reaction, injuries during handling, etc.) that result in euthanasia or mortality during and following surgery are rare (e.g., eventration rate of 0.2% to 2.6% noted in Getman 2009, but eventration rate of 4.8% noted in Shoemaker et al. 2004) and vary according to the population of horses being treated (Getman 2009). Normally one would expect serious complications in less than 5% of horses operated under general anesthesia, but in some populations these rates have been as high as 12% (Shoemaker 2004). Serious complications are generally noted within 3 or 4 hours of surgery but may occur any time within the first week following surgery (Searle et al. 1999). If they occur, they would be treated with surgical intervention when possible, or with euthanasia when there is a poor prognosis for recovery. There was no observed mortality in geldings at the Conger HMA study, and geldings retained good body condition (King et al. 2022). Vasectomized stallions may remain fertile for up to 6 weeks after surgery, so it is optimal if that treatment occurs well in advance of the season of mare fertility starting in the spring (NRC 2013). The NAS report (2013) suggested that chemical vasectomy, which has been developed for dogs and cats, may be appropriate for wild horses and burros.

For intact stallions, testosterone levels appear to vary as a function of age, season, and harem size (Khalil et al 1998). It is expected that testosterone levels will decline over time after castration. Testosterone levels should not change due to vasectomy. Vasectomized stallions should retain their previous levels of libido. Domestic geldings had a significant prolactin response to sexual stimulation but lacked the cortisol response present in stallions (Colborn et al. 1991). Although libido and the ability to ejaculate tends to be gradually lost after castration (Thompson et al. 1980), some geldings continue to mount mares and intromit (Rios and Houpt 1995, Schumacher 2006).

Indirect Effects of Neutering

Other than the short-term outcomes of surgery, neutering is not expected to reduce males' survival rates. Castration is actually 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). Moreover, it is unlikely that a reduced testosterone level will compromise gelding survival in the wild, considering that wild mares survive with low levels of testosterone. Consistent with geldings not expending as much energy toward in attempts to obtain or defend a harem, it is expected that wild geldings may have a better body condition that wild, fertile stallions. King et al. (2022) noted that geldings maintained good body condition in the wild. In contrast, vasectomized males may continue to defend or compete for harems in the way that fertile males do, so they are not expected to experience an increase in health or body condition due to surgery.

Depending on whether an HMA is non-reproducing in whole or in part, reproductive stallions may or may not still be a component of the population's age and sex structure. The question of whether or not a given neutered male would or would not attempt to maintain a harem in the long run is not germane to population-level management. It is worth noting, though, that the BLM is not required to manage populations of wild horses in a manner that ensures that any given individual maintains its social standing within any given harem or band. Neutering a subset of stallions would not prevent other fertile stallions and mares from continuing with the typical range of social behaviors for sexually active adults. For fertility control strategies where gelding is intended to reduce growth rates by virtue of sterile males defending harems, the NAS (2013) suggested that the effectiveness of gelding on overall reproductive rates may depend on the pre-castration social roles of those animals. Having a post-gather herd with some neutered males and a lower fraction of fertile mares necessarily reduces the absolute number of foals born per year, compared to a herd that includes more fertile mares. An additional benefit is that geldings that would otherwise be permanently removed from the range (for adoption, sale or other disposition) may be released back onto the range where they can engage in free-roaming behaviors.

Behavioral Effects of Neutering

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). Burro jacks tend to not have as stable of relations with jennies and foals, as compared to what is most often seen in horses; wild burro social structure is more typically of a fission-fusion type nature (King et al. 2016).

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, Khalil et al. 1998). 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).

Vasectomized males continue to attempt to defend or gain breeding access to females. It is generally expected that vasectomized WH&B will continue to behave like fertile males, given that the only physiological change in their condition is a lack of sperm in their ejaculate. If a vasectomized stallion retains a harem, the females in the harem will continue to cycle until they are fertilized by another stallion, or until the end of the breeding season. As a result, the vasectomized stallion may be involved in more aggressive behaviors to other males through the entire breeding season (Asa 1999), which may divert time from foraging and cause him to be in poorer body condition going into winter. Ultimately, this may lead to the stallion losing control of a given harem. A feral horse herd with high numbers of vasectomized stallions retained typical harem social structure (Collins and Kasbohm 2016). Again it is worth noting that the BLM is not required to manage populations of wild horses in a manner that ensures that any given individual maintains its social standing within any given harem or band.

Neutering males by gelding adult male horses is expected to result in reduced testosterone production, which is expected to directly influence reproductive behaviors (NRC 2013). However, testosterone levels alone are not a predictor of masculine behavior (Line et al. 1985, Schumacher 2006). In domestic geldings, 20-30% continued to show stallion-like behavior, whether castrated pre- or post-puberty (Line et al. 1985). 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. In intact stallions, testosterone levels peak increase up to an age of ~4-6 years and can be higher in harem stallions than bachelors (Khalil et al 1998). It is assumed that free roaming wild horse geldings would generally exhibit reduced aggression toward other horses and reduced reproductive behaviors (NRC 2013). In a herd that included some geldings and some fertile stallions, there were few behavioral differences between those groups, other than that geldings engaged in more affiliative and less marking and reproductive behaviors (King et al. 2022). The behavior of wild horse geldings in the presence of intact stallions has not otherwise been well documented, but the literature review below can be used to make reasonable inferences about their likely behaviors.

Despite livestock being managed by neutering males for millennia, there was relatively little published research on castrates' behaviors (Hart and Jones 1975) until recently. Stallion behaviors in wild or pasture settings are better documented than gelding behaviors, but it inferences about how the behaviors of geldings will change, how quickly any change will occur after surgery, or what effect gelding an adult stallion and releasing him back in to a wild horse population will have on his behavior and that of the wider population may be surmised from the existing literature. There was a BLM-supported study in Utah focused on the individual and population-level effects of including some geldings in a free-roaming horse population (BLM 2016, King et al. 2022). Additional inferences about likely behavioral outcomes of gelding can be made based on available literature.

The effect of castration on aggression in horses has not often been quantified. One report has noted that high levels of aggression continued to be observed in domestic horse geldings who also exhibited sexual behaviors (Rios and Houpt 1995). Stallion-like behavior in domestic horse geldings is relatively common (Smith 1974, Schumacher 1996), being shown in 20-33% of cases whether the horse was castrated pre- or post-puberty (Line et al. 1985, Rios and Houpt 1995, Schumacher 2006). 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 behaviors (Smith 1974). Domestic geldings exhibiting masculine behavior had no difference in testosterone concentrations than other geldings (Line et al. 1985, Schumacher 2006), and in some instances the behavior appeared context dependent (Borsberry 1980, Pearce 1980).

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 continuing to respond to females even a year later, although mating time and the ejaculatory response was reduced (Hart and Jones 1975).

The likely effects of castration on geldings' social interactions and group membership can be inferred from available literature. 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 et al. (1997) 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 the presence of geldings did not appear to affect the social behavior of mares (Van Dierendonck et al. 2009) or negatively influence parturition, mare-foal bonding, or subsequent maternal activities (Van Dierendonck et al. 2004). Additionally, the welfare of broodmares and their foals was not affected by the presence of geldings in the herd (Van Dierendonck et al. 2004). These findings are important because treated geldings will be returned to the range in the presence of pregnant mares and mares with foals of the year.

The likely effects of castration on geldings' home range and habitat use can also be surmised from available literature. 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 2005). By comparison, bachelor groups tend to be more transient and can potentially use areas of good forage further from water sources, as they are not constrained by the needs of lactating mares in a group. The number of observations of gelded wild stallion behavior are still too few to make general predictions about whether a particular gelded stallion individual will behave like a harem stallion, a bachelor, or form a group with geldings that may forage and water differently from fertile wild horses.

Sterilizing wild horses does not change their status as wild horses under the WFRHBA (as amended). In terms of whether geldings will continue to exhibit the free-roaming behavior that defines wild horses, BLM does expect that geldings would continue to roam unhindered once they are returned to the range. 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. Despite marginal uncertainty about subtle aspects of potential changes in habitat preference, there is no expectation that gelding wild horses will cause them to lose their free-roaming nature. It is worth noting that individual choices in wild horse group membership, home range, and habitat use are not protected under the WFRHBA. BLM acknowledges that geldings may exhibit some behavioral differences after surgery, compared to intact stallions, but those differences are not be expected to remove the geldings' rebellious and feisty nature, or their defiance of man. 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 WFRHBA as any intact stallion, even if his patterns of movement differ from those of an intact stallion. Unpublished USGS results from the Conger study herd indicate that geldings' movement patterns were not qualitatively different from those of fertile stallions, when controlling for social status as bachelor or harem stallion. Congress specified that sterilization is an acceptable management action (16 USC §1333.b.1). Sterilization is not one of the clearly defined events that cause an animal to lose its status as a wild free-roaming horse (16 USC §1333.2.C.d). Several academics have offered their opinions about whether gelding a given stallion would lead to that individual effectively losing its status as a wild horse (Rutberg 2011, Kirkpatrick 2012, Nock 2017). Those opinions are based on a semantic and subjective definition of 'wild,' while BLM must adhere to the legal definition of what constitutes a wild horse, based on the WFRHBA (as amended). Those individuals have not conducted any studies that would test the speculative opinion that gelding wild stallions will cause them to become docile. BLM is not obliged to base management decisions on such opinions, which do not meet the BLM's principle and practice to "Use the best available scientific knowledge relevant to the problem or decision being addressed, relying on peer reviewed literature when it exists" (Kitchell et al. 2015).

Mare Sterilization

Sterilizing mares has already been shown to be an effective part of feral horse management that reduced herd growth rates on federal lands (Collins and Kasbohm 2016). Herd-level birth rate is expected to decline in direct proportion to the fraction of spayed mares in a herd because spayed mares cannot become pregnant. A number of methods are available, with potentially differing effects.

Current Methods of Sterilization

This literature review of mare sterilization impacts focuses on 4 methods: pharmacological or immunocontraceptive methods, minimally invasive physical sterilization, ovariectomy via colpotomy, and ovariectomy via flank laparoscopy. The range of anticipated effects may be both physical and behavioral. Whether or not surgical mare sterilization methods are considered in any of the action alternatives in this EA, they are included here for comparison and for the sake of completeness in the review.

Minimally Invasive Mare Sterilization Procedures

Population growth suppression becomes less expensive if fertility control is long-lasting (Hobbs et al. 2000), such as with spaying and neutering. For the purposes of this EA, 'minimally invasive sterilization' is defined to be the minimally invasive sterilization of a female horse (mare) by physical means. The physical means considered here include forms of oviduct blockage; for the purposes of this analysis, these are considered minimally invasive insofar as no incisions are required. Unlike in dog and cat spaying, these minimally invasive forms of mare sterilization do not entail removal of the ovaries or uterus. Only healthy mares in BCS score of 3 or greater would be considered.

The specific minimally invasive sterilization procedures could include any form of procedure that leads a mare to be unable to become pregnant, or to maintain a pregnancy, but that does not entail incision by scalpel. The two transcervical procedures analyzed below are physical, minimally invasive sterilization methods that cause long-term blockage of the oviduct, so that fertile eggs cannot go from the ovaries to the uterus. A detailed analysis of those methods and their expected effects is included in Appendix D.

One form of minimally invasive oviduct blockage procedure, "endoscopic oviduct ablation," infuses medical-grade N-butyl cyanoacrylate glue into the oviduct (Bigolin et al. 2009). In the procedure, the veterinarian passes an endoscope through the cervix, to visualize the interior of the uterus. Treated mares would stand in a padded, hydraulic chute. Banamine may be administered intravenously prior to the procedure to minimize transient colic (abdominal cramping) following the procedure. Ketamine may be added on an as needed basis for additional standing chemical restraint. Fecal material is removed from the rectum, the tail is wrapped and suspended, the perineal and vaginal areas are cleansed. A sterilized, flexible endoscope would be placed into the vaginal vault and advanced through the cervix in an atraumatic manner. A veterinary team is required to manipulate and operate the endoscope monitor, insert and hold the endoscope, manipulate and position the fine-tipped catheter into the oviduct, and infuse the fluid into the oviduct. The uterus would be partially inflated with filtered room air to visualize the oviduct papilla located at the proximal end of the uterine horn. A sterile catheter is guided to each uterotubal junction (which is the entrance to the oviduct), and medical-grade glue (N-butyl cyanoacrylate) is introduced to the oviduct, where it causes blockage. After the procedure, the uterus could be infused with an antibiotic and saline to minimize the potential for infection secondary to any unintended bacterial contamination. The mares are monitored initially for 10 minutes and observed by a veterinarian twice per day for 10-14 days, but no further pain management is expected to be needed. Any mare showing signs of postoperative complications would receive treatment as indicated by a veterinarian. The total duration of the procedure per mare is expected to be less than 30 minutes. After receiving support from the California legislature (California Legislature 2019), researchers at the UC Davis School of Veterinary Medicine used a similar method in burros, but with electrocauterization of the utero-tubular junction. A five-person team completed the procedure in 20-30 minutes total time which included a short wait for onset of light anesthesia and 5-6 minutes use of the endoscope to guide an elecotrocautery device to the uterotubal junction and apply enough heat to cause scarring.

Another form of minimally invasive oviduct blockage procedure, “endoscopic laser ablation of the oviduct papilla,” is similar to the procedure described above, except that the oviducts are blocked via heating from a laser to ablate the oviduct papilla. The diode laser is expected to immediately “seal” the oviduct opening and the resulting inflammatory reaction is expected to result in additional scar tissue formation, forming a barrier to the passage of eggs from the ovary to the uterus. Local anesthesia could be dripped directly onto each oviduct papilla to minimize any discomfort. This method has been used successfully in Georgia (Edwards et al. 2021).

Neither of these minimally invasive procedures damages the ovaries. The mare would be sterile, although the mare would continue to have estrus cycles. Because of the retention of estrus cycles, it is expected that behavioral outcomes of either method would be similar to those observed for PZP vaccine treated mares. Namely, mares would continue with hormonal cycles and associated breeding behaviors during the typical breeding season.

If the minimally invasive sterilization techniques are either of the two noted above, then mares chosen for the minimally invasive sterilization procedure could include adult females and immature females estimated to be older than 8 months. Immature females could be included because there are no concerns regarding space for instruments, as an endoscope and associated instruments used along with the endoscope are the only tools used, and only open (non-pregnant) females would receive the procedure.

Minimally invasive, physical sterilization procedure could include any physical form of sterilization that does not involve removal of the ovaries and entail only minimal or no incisions. Such procedures could include any form of physical procedure that leads a mare to be unable to become pregnant, or to maintain a pregnancy. For example, in endoscopic oviduct ablation, minimally invasive sterilization causes a long-term blockage of the oviduct by infusion of a surgical-grade glue into the oviducts, so that fertile eggs cannot go from the ovaries to the uterus (i.e., Bigolin et al. 2009). Or, in endoscopic laser ablation of the oviduct papilla, scarring caused by heat applied at the uterotubal junction prevents eggs from reaching the uterus (Edwards et al. 2021). These two procedures use trans-cervical endoscopy, so any treated mares would first need to have been screened by a veterinarian (e.g., using trans-rectal ultrasonography) to ensure they are not pregnant. Endoscopic approaches also require temporary insufflation of the uterus, to allow the veterinarian to fully visualize the internal structures. The result of such minimally invasive procedures that prevent pregnancy but do not harm the ovaries is that the mare would be sterile, although the mare would continue to have estrus cycles.

Ovariectomy via colpotomy is a surgical technique in which there is no external incision, reducing susceptibility to infection. Ovariectomy via colpotomy, has been an established veterinary technique since 1903 (Loesch and Rodgerson 2003, NRC 2013). Spaying via colpotomy has the advantage of not leaving any external wound that could become infected. For this reason, it has been identified as a good choice for sterilization of feral or wild mares (Rowland et al. 2018). The procedure has a relatively low complication rate, although post-surgical mortality and morbidity are possible, as with any surgery. For this reason, ovariectomy via colpotomy has been identified as a good choice for feral or wild horses (Rowland et al. 2018). Ovariectomy via colpotomy is a relatively short surgery, with a relatively quick expected recovery time. In 1903, Williams first described a vaginal approach, or colpotomy, using an ecraseur to ovariectomize mares (Loesch and Rodgerson 2003). The ovariectomy via colpotomy procedure has been conducted for over 100 years, normally on open (non-pregnant), domestic mares. It is expected that the surgeon should be able to access ovaries with ease in mares that are in the early- or mid-stage of pregnancy. The anticipated risks associated with the pregnancy are described below. When wild horses are gathered or trapped for fertility control treatment there would likely be mares in various stages of gestation. Removal of the ovaries is permanent and 100 percent effective, however the procedure is not without risk.

Ovariectomy via flank laparoscopy (Lee and Hendrickson 2008, Devick et al. 2018, Easley et al. 2018) 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 this type of surgery, or post-surgical complications, is not expected, but 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 or sealing (Easley 2018) 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. 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.

Effects of Sterilization on Pregnancy and Foal

The physical, behavioral, and herd-level effects of immunocontraceptives have been addressed elsewhere in this review. In the case of repeated PZP vaccine or GonaCon applications that cause infertility through the duration of a given mare's life, that effects of that form of treatment have been discussed previously; neither vaccine appears to disrupt pregnancy or foal development. OGF vaccine effects on fetal development, if any, have not been described, as no studies on the effects of vaccinating pregnant mares have yet been published; use on pregnant mares may be limited until further information is available.

Trans-cervical, minimally-invasive sterilization methods are not suitable for pregnant mares, because disruption of the cervix may lead to termination of the pregnancy. Therefore, any mares under consideration for such methods must first be screened for pregnancy, such as via transrectal ultrasound.

The average mare gestation period ranges from 335 to 340 days (Evans et al. 1977, p. 373). There are few peer reviewed studies documenting the effects of surgical ovariectomy on the success of pregnancy in a mare. A National Research Council of the National Academies of Sciences committee that reviewed research proposals in 2015 explained, "The mare's ovaries and their production of progesterone are required during the first 70 days of pregnancy to maintain the pregnancy" (NRC 2015). In female mammals, less progesterone is produced when ovaries are removed, but production does not cease (Webley and Johnson 1982). In 1977, Evans et al. stated that by 200 days, the secretion of progesterone by the corpora lutea is insignificant because removal of the ovaries does not result in abortion (p. 376). "If this procedure were performed in the first 120 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). In

1979, Holtan et al. evaluated the effects of bilateral ovariectomy at selected times between 25 and 210 days of gestation on 50 mature pony mares. Their results show that abortion (resorption) of the conceptus (fetus) 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 to 210. Those results are similar to the suggestions of the NAS committee (2015). For those pregnancies that are maintained following an ovariectomy procedure, likely those past approximately 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 regardless of the presence or absence of ovaries. Gestation length was similar between ovariectomized and control mares (Holtan et al. 1979).

Direct Effects of Sterilization

The direct effects of immunocontraceptive PZP vaccines and GonaCon-Equine have been discussed previously. In cases where PZP vaccines have been administered enough times to cause effective sterility, the mechanism of action may be related to long-term reduction in ovarian activity (i.e., Nolan et al 2018c). The direct effects of OGF vaccine treatment were discussed by BLM (2020) and may include an injection site reaction that is comparable to that of GonaCon-Equine; a brief period of heightened inflammation and mild fever that is characteristic of a successful immune response; development of an immune response against GDF9 and BMP15, with related reductions in the concentration of those proteins; and a reduction in estrus activity.

The direct effects of successful minimally invasive mare sterilization procedures are sterility, for example through occlusion of the oviduct with surgical glue and associated tissue damage, or creation of scar tissue in part of the oviduct. Hysteroscopy is a common procedure in humans (i.e., WebMD 2014). Because such minimally invasive procedures do not involve major incisions or removal of ovaries, there is no risk of hemorrhage, failure of sutures, or prolonged discomfort. There is the potential for mild, transient colic (abnormal cramping) after the procedure due to temporary inflation and expansion of the uterus. Use of analgesics prior to any procedure should minimize this incidence. Side effects of minimally invasive sterilization procedures may include mild discomfort in the short term, for example at the location where the oviduct is blocked. For example, if surgical grade glue is placed in the oviduct or if a laser is used to ablate the oviduct papilla, that may cause transient irritation. For this reason, systemic and / or topical analgesics are generally provided before or during the procedure. An NAS review of the endoscopic laser ablation of the oviduct papilla technique concluded that the method is relatively non-invasive, with a relatively low risk of complications (NRC 2015); the expected severe complication rate for the laser ablation procedure may be lower than 1 percent. Ablation of the oviduct via cyanoacrylate glue has been performed successfully in mares at UC Davis, and laser ablation of the oviduct papilla has been performed successfully in burros and horses, in California and Georgia. In addition, other transcervical endoscopic procedures (including the use of a laser diode) are not uncommon in mares (Blikslager et al. 1993, Griffin and Bennet 2002, Ley et al. 2002, Brinsko 2014).

Between 2009 and 2011, the Sheldon NWR in Nevada conducted ovariectomy via colpotomy surgeries (August through October) on 114 feral mares and released them back to the range with a mixture of sterilized stallions and untreated mares and stallions (Collins and Kasbohm 2016). Gestational stage was not recorded, but a majority of the mares were pregnant (Gail Collins, US Fish and Wildlife Service (USFWS), pers. comm.). Only a small number of mares were very close to full term. Those mares with late term pregnancies did not receive surgery as the veterinarian could not get good access to the ovaries due to the position of the foal (Gail Collins, USFWS, pers. comm.). After holding the mares for an average of 8 days after surgery for observation, they were returned to the range with other treated and untreated mares and stallions (Collins and Kasbohm 2016). During holding the only complications were observed within 2 days of surgery. The observed mortality rate for ovariectomized mares following the procedure was less than 2 percent (Collins and Kasbohm 2016, Pielstick pers. comm.). During the Sheldon NWR ovariectomy study, mares generally walked out of the chute and started to eat; some would raise their tail and act as if they were defecating; however, in most mares one could not notice signs of discomfort (Bowen 2015). In their discussion of ovariectomy via colpotomy, McKinnon and Vasey (2007) considered the procedure safe and efficacious in many instances, able to be performed expediently by personnel experienced with examination of the female reproductive tract, and associated with a complication rate that is similar to or less than male castration. Nevertheless, all surgery is associated with some risk. Loesch et al. (2003) lists that following potential risks with colpotomy: pain and discomfort; injuries to the cervix, bladder, or a segment of bowel; delayed vaginal healing; eventration of the bowel; incisional site hematoma; intraabdominal 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 2016). Evisceration is also a possibility, but these complications are considered rare (Prado and Schumacher, 2017). Mortality due to surgery or post-surgical complications is not anticipated, but it is a possibility and therefore every effort would be made to mitigate risks.

In September 2015, the BLM solicited the USGS to convene a panel of veterinary experts to assess the relative merits and drawbacks of several surgical ovariectomy techniques that are commonly used in domestic horses for potential application in wild horses. A table summarizing the various methods was sent to the BLM (Bowen 2015) and provides a concise comparison of several methods. Of these, ovariectomy via colpotomy was found to be relatively safe when practiced by an experienced surgeon and was associated with the shortest duration of potential complications after the operation. The panel discussed the potential for evisceration through the vaginal incision with this procedure. In marked contrast to a suggestion by the NAS report (2013), this panel of veterinarians identified evisceration as not being a probable risk associated with ovariectomy via colpotomy and "none of the panel participants had had this occur nor had heard of it actually occurring" (Bowen 2015).

Most ovariectomy surgeries on mares have low morbidity[1] and with the help of medications, pain and discomfort can be mitigated. Pain management is an important aspect of any ovariectomy (Rowland et al. 2018); according to surgical protocols that would be used, a long-lasting direct anesthetic would be applied to the ovarian pedicle, and systemic analgesics in the form of butorphanol and flunixin meglumine would be administered, as is compatible with accepted animal husbandry practices. In a study of the effects of bilateral ovariectomy via colpotomy on 23 mares, Hooper and others (1993) reported that postoperative problems were minimal (1 in 23, or 4%). Hooper et al. (1993) noted that four other mares were reported by owners as having some problems after surgery, but that evidence as to the role the surgery played in those subsequent problems was inconclusive. In contrast Röcken et al. (2011) noted a morbidity of 10.8% for mares that were ovariectomized via a flank laparoscopy. "Although 5 mares in our study had problems (repeated colic in 2 mares, signs of lumbar pain in 1 mare, signs of bilateral hind limb pain in 1 mare, and clinical signs of peritonitis in 1 mare) after surgery, evidence is inconclusive in each as to the role played by surgery" (Hooper et al. 1993). A recent study showed a 2.5% complication rate where one mare of 39 showed signs of moderate colic after laparoscopic ovariectomy (Devick et al. 2018).

Behavioral Effects of Mare Sterilization

All fertility control methods affect physiology or behavior of a mare (NRC 2013). Any action taken to alter the reproductive capacity of an individual has the potential to affect hormone production and therefore behavioral interactions and ultimately population dynamics in unforeseen ways (Ransom et al.

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[1] Morbidity is defined as the frequency of the appearance of complications following a surgical procedure or other treatment. In contrast, mortality is defined as an outcome of death due to the procedure.

2014). The health and behavioral effects of sterilizing wild horse mares that live with other fertile and infertile wild horses has not been well documented, but the literature review below can be used to make reasonable inferences about their likely behaviors.

The behavioral effects of PZP vaccines and GonaCon-Equine have been discussed previously. For the OGF vaccine, a paired immune reaction to two proteins (GDF9 and BMP15) can prevent the completion of oocyte development, with the result being that successfully treated mares do not exhibit estrus cycles (Bruemmer et al. 2023). As a result, the behavioral and herd-level effects of OGF vaccine treatment are expected to be similar to those documented for GonaCon-Equine; namely, a reduced incidence of breeding behaviors, but a continuation of affiliative behaviors within the social band (see previous discussion of effects of GonaCon-Equine).

Horses are anovulatory (do not ovulate/express estrous behavior) during the short days of late fall and early winter, beginning to ovulate as days lengthen and then cycling roughly every 21 days during the warmer months, 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 other than 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 (Asa et al. 1980).

The behavioral effects of minimally invasive mare sterilization methods that cause no change in ovarian functionality would be expected to be similar to those observed in mares treated with a small number of doses of PZP vaccine (i.e., those in which ovarian functionality is not impaired). Those behavioral outcomes are discussed previously, but include a continuation of estrus cycling, and associated proceptive and breeding behaviors, including copulation. As a result of the expectation that the minimally invasive procedures would have similar behavioral effects as treatment with PZP, BLM does not anticipate any need to study the behavioral effects of minimally invasive mare sterilization, in which functional ovaries are retained. Sterile mares with functional ovaries would be expected to continue to engage in breeding activities, although they would not become pregnant. There is the possibility that such mares may change social bands at a greater rate than fertile mares (e.g., Nuñez et al. 2017).

Ovariectomized mares may continue to exhibit estrous behavior (Scott and Kunze 1977, Kamm and Hendrickson 2007, Crabtree 2016), with one study finding that 30% of mares showed estrus signs at least once after surgery (Roessner et al 2015) and only 60 percent of ovariectomized mares cease estrous behavior following surgery (Loesch and Rodgerson 2003). Mares continue to show reproductive behavior following ovariectomy due to non-endocrine support of estrus behavior, specifically steroids from the adrenal cortex. Continuation of this behavior during the non-breeding season has the function of maintaining social cohesion within a horse group (Asa et al. 1980, Asa et al. 1984, NRC 2013). This may be a unique response of the horse (Bertin et al. 2013), as spaying usually greatly reduces female sexual behavior in companion animals (Hart and Eckstein 1997). In six ponies, mean monthly plasma luteinizing hormone[2] 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 likely effects of spaying on mares' social interactions and group membership can be inferred from available literature, even though wild horses have rarely been spayed and released back into the wild,

[2] Luteinizing hormone (LH) is a glycoprotein hormone produced in the pituitary gland. In females, a sharp rise of LH triggers ovulation and development of the corpus luteum. LH concentrations can be measured in blood plasma.

resulting in few studies that have investigated their behavior in free-roaming populations. Wild horses and burros are instinctually herd-bound and this behavior is expected to continue. Overall, the BLM anticipates that some spayed mares may continue to exhibit estrus behavior which could foster band cohesion. If free ranging ovariectomized mares show estrous behavior and occasionally allow copulation, interest of the stallion may be maintained, which could foster band cohesion (NRC 2013). This last statement could be validated by the observations of group associations on the Sheldon NWR where feral mares were ovariectomized via colpotomy and released back on to the range with untreated horses of both sexes (Collins and Kasbohm 2016). No data were collected on inter- or intra-band behavior (e.g. estrous display, increased tending by stallions, etc.), during multiple aerial surveys in years following treatment, all treated individuals appeared to maintain group associations, and there were no groups consisting only of treated males or only of treated females (Collins and Kasbohm 2016). In addition, of solitary animals documented during surveys, there were no observations of solitary treated females (Collins and Kasbohm 2016). These data help support the expectation that ovariectomized mares would not lose interest in or be cast out of the social dynamics of a wild horse herd. As noted by the NAS (2013), the ideal fertility control method would not eliminate sexual behavior or change social structure substantially.

A study conducted for 15 days in January 1978 (Asa et al. 1980), compared the sexual behavior in ovariectomized and seasonally anovulatory (intact) pony mares and found that there were no statistical differences between the two conditions for any measure of proceptivity or copulatory behavior, or days in estrous. This may explain why treated mares at Sheldon NWR continued to be accepted into harem bands; they may have been acting the same as a non-pregnant mare. Five to ten percent of pregnant mares exhibit estrous behavior (Crowell-Davis 2007). Although the physiological cause of this phenomenon is not fully understood (Crowell-Davis 2007), it is thought to be a bonding mechanism that assists in the maintenance of stable social groups of horses year-round (Ransom et al. 2014b). The complexity of social behaviors among free-roaming horses is not entirely centered on reproductive receptivity, and fertility control treatments that suppress the reproductive system and reproductive behaviors should contribute to minimal changes to social behavior (Ransom et al. 2014b, Collins and Kasbohm 2016).

BLM expects that wild horse harem structures would continue to exist under the proposed action because fertile mares, stallions, and their foals would continue to be a component of the herd. It is not expected that spaying a subset of mares would significantly change the social structure or herd demographics (age and sex ratios) of fertile wild horses.

'Foal stealing,' where a near-term pregnant mare steals a neonate foal from a weaker mare, is unlikely to be a common behavioral result of including sterilized mares in a wild horse herd, no matter the method of sterilization. McDonnell (2012) noted that "foal stealing is rarely observed in horses, except under crowded conditions and synchronization of foaling," such as in horse feed lots. Those conditions are not likely in the wild, where pregnant mares will be widely distributed across the landscape, and where the expectation is that parturition dates would be distributed across the normal foaling season.

Indirect Effects of Mare Sterilization

The free-roaming behavior of wild horses is not anticipated to be affected by mare sterilization, as the definition of free-roaming is the ability to move without restriction by fences or other barriers within a HMA (BLM H-4700-1, 2010) and there are no permanent physical barriers being proposed.

In domestic animals, sterilization is often associated with weight gain and associated increase in body fat (Fettman et al 1997, Becket et al 2002, Jeusette et al. 2006, Belsito et al 2009, 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 & Peachey 1990, Hart and Eckstein 1997, Fettman et al. 1997, Jeusette et al. 2004). In wild horses, contracepted mares tend to be in better body condition that mares that are pregnant or that are nursing foals (Nuñez et al. 2010); the same improvement in body condition is likely to take place in spayed mares. In horses, surgical sterilization through ovariectomy has the potential to increase risk of equine metabolic syndrome (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, and frequent exercise, is unlikely to be sufficient to promote overeating and obesity.

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.

Sterilization had no effect on movements and space use of feral cats or brushtail possums (Ramsey 2007, Guttilla & Stapp 2010), or greyhound racing performance (Payne 2013). Rice field rats (*Rattus argentiventer*) tend to have a smaller home range in the breeding season, as they remain close to their litters to protect and nurse them. When surgically sterilized, rice field rats had larger home ranges and moved further from their burrows than hormonally sterilized or fertile rats (Jacob et al. 2004). Spayed possums and foxes (*Vulpes vulpes*) had a similar core range area after spay surgery compared to before and were no more likely to shift their range than intact females (Saunders et al. 2002, Ramsey 2007).

The likely effects of sterilization on mares' home range and habitat use can also be surmised from available literature. 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 2005). It is unlikely that sterilized mares will change their spatial ecology, but not having constraints of gestation and lactation may mean they can spend more time away from water sources and increase their home range size. Lactating mares need to drink every day, but during the winter when snow can fulfill water needs or when not lactating, horses can traverse a wider area (Feist & McCullough 1976, Salter 1979). During multiple aerial surveys in years following the mare ovariectomy study at the Sheldon NWR, it was documented that all treated individuals appeared to maintain group associations, no groups consisted only of treated females, and none of the solitary animals observed were treated females (Collins and Kasbohm 2016). Given that treated females-maintained group associations, this indicates that their movement patterns and distances may be unchanged.

Sterilizing wild horses does not change their status as wild horses under the WFRHBA (as amended). In terms of whether sterile mares would continue to exhibit the free-roaming behavior that defines wild horses, BLM does expect that sterile mares would continue to roam unhindered. 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 sterilized animal would still be expected to have a number of internal reasons for moving across a landscape and, therefore, exhibiting 'free-roaming' behavior. Despite marginal uncertainty about subtle aspects of potential changes in habitat preference, there is no expectation that spaying wild horses will cause them to lose their free-roaming nature.

In this sense, a sterilized wild mare would be just as much 'wild' as defined by the WFRHBA as any fertile wild mare, even if that mare's patterns of movement did differ slightly. Congress specified that sterilization is an acceptable management action (16 USC §1333.b.1). Sterilization is not one of the clearly defined events that cause an animal to lose its status as a wild free-roaming horse (16 USC §1333.2.C.d). As noted in the discussion of neutering, any opinions based on a semantic and subjective definition of what constitutes a 'wild' horse are not legally binding for BLM, which must adhere to the legal definition of what constitutes a wild free-roaming horse[3], based on the WFRHBA (as amended). BLM is not obliged to base management decisions on personal opinions, which do not meet the BLM's principle and practice to "Use the best available scientific knowledge relevant to the problem or decision being addressed, relying on peer reviewed literature when it exists" (Kitchell et al. 2015).

Sterilization is not expected to reduce mare survival rates on public rangelands. Individuals receiving fertility control often have reduced mortality and *increased* longevity due to being released from the costs of reproduction (Kirkpatrick and Turner 2008). Similar to contraception studies, 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). Observations from the Sheldon NWR provide some insight into long-term effects of ovariectomy on feral horse survival rates. The sterilized mares in Sheldon NWR were returned to the range along with untreated mares. Between 2007 and 2014, mares were captured, a portion treated, and then recaptured. There was a minimum of 1 year between treatment and recapture; some mares were recaptured a year later and some were recaptured several years later. The long-term survival rate of treated wild mares appears to be the same as that of untreated mares (Collins and Kasbohm 2016). Recapture rates for released mares were similar for treated mares and untreated mares.

Effects on Bone Histology

There is no known mechanism by which bone development would change in mares treated with pharmacological or immunological sterilization methods, or with minimally invasive sterilization methods. 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 opinion article 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. Post-menopausal women appear to have a greater chance of developing osteoporosis (Scholz-Ahrens et al. 1996), but BLM is not aware of any research examining bone loss in horses following ovariectomy. Bone loss in humans has been linked to reduced circulating estrogen. There have been conflicting results when researchers have attempted to test for an effect of reduced estrogen on animal bone loss rates in animal models; all experiments have been on laboratory animals, rather than free-ranging wild 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 (Scholz-Ahrens et al. 1996, Lundon et al. 1994, Zhang et al. 2007), and even returned to normal after 4 months (Sigrist et al. 2007).

Consistent and strenuous use of bones, for instance using jaw bones by eating hard feed, or using leg bones by travelling large distances, may limit the negative effects of estrogen deficiency on micro-architecture (Mavropoulos et al. 2014). 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

[3] "wild free-roaming horses and burros" means all unbranded and unclaimed horses and burros on public lands of the United States.

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 size of 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). A study of distances travelled by feral horses in "outback" Australia shows horses travelling between 5 and 17.5 miles per 24-hour period (Hampson et al. 2010a), travelling about 11 miles a day even in a very large paddock (Hampson et al. 2010b). Thus, extensive movement patterns of wild horses are expected to help prevent bone loss. 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.

Genetic Effects of Mare Sterilization and Neutering

It is true that spayed females and neutered males are unable to contribute to the genetic diversity of the herd. BLM is not obliged to ensure that any given individual in a herd has the chance to sire a foal and pass on genetic material. Management practices in the BLM Wild Horse and Burro Handbook (2010) include measures to increase population genetic diversity in reproducing herds where monitoring reveals a cause for concern about low levels of observed heterozygosity. These measures include increasing the sex ratio to a greater percentage of fertile males than fertile females (and thereby increasing the number of males siring foals) and bringing new animals into a herd from elsewhere.

In a hypothetical herd that is managed to be entirely non-reproducing, it would not be a concern to maintain genetic diversity because the management goal would be that animals in such a herd would not breed.

In reproducing herds where large numbers of wild horses have recent and / or an ongoing influx of breeding animals from other areas with wild or feral horses, spaying and neutering 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 NAS 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. 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 treatment with contraceptives. Introducing 1-2 mares every generation (about every 10 years) is a standard management technique that can alleviated potential inbreeding concerns (BLM 2010). The NAS report (2013) recommended that managed herds of wild horses would be viewed as components of interacting metapopulations, with the potential for interchange of individuals and genes taking place as a result of both natural and human-facilitated movements.

In the last 10 years, there has been a high realized growth rate of wild horses in most areas administered by the BLM. As a result, most alleles that are present in any given mare are likely to already be well represented in that mare's siblings, cousins, and more distant relatives on the HMA. 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. The NAS report (2013) includes information (pairwise genetic 'fixation index' values for sampled WH&B herds) confirming that WH&B in the vast majority of HMAs are genetically similar to animals in multiple other HMAs. 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.

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. Although those results are specific to mares, some inferences about potential effects of stallion sterilization may also be made from their results. 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 population are permanently sterilized. Given that 94 of 102 wild horse herds sampled for genetic diversity did not meet a threshold for concern (NRC 2013), the starting level of genetic diversity in most wild-horse herds is relatively high.

In a breeding herd where more than 85% of males in a population are sterile, there could be genetic consequences of reduced heterozygosity and increased inbreeding coefficients, as it would potentially allow a very small group of males to dominate the breeding (e.g., Saltz et al. 2000). Such genetic consequences could be mitigated by natural movements or human-facilitated translocations (BLM 2010). Garrott and Siniff's (1992) model predicts that gelding 50-80% of mature males in the population would result in reduced, but not halted, mare fertility rates. However, neutering males tends to have short-lived effects, because within a few years after any male sterilization treatment, a number of fertile male colts would become sexually mature stallions who could contribute genetically to the herd.

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APPENDIX XIII
Antelope Complex and Triple B Complex Herd Management Area Plan

INTRODUCTION

The Bureau of Land Management (BLM), Bristlecone and Wells Field Office proposes in this Herd Management Area Plan (HMAP) to establish management goals and objectives for the Antelope Complex and Triple B Complex. The overriding objective is to maintain a thriving natural ecological balance and multiple-use relationship.

The Antelope Complex and Triple B Complex HMAP would establish short- and long-term management and monitoring objectives for wild horse herds and their habitat. These objectives would guide management within the complex. The primary purpose of the plan is to outline and implement management actions necessary to achieve and maintain a thriving natural ecological balance and multiple-use relationships. These actions would include conducting gathers and removals of excess wild horses and/or implement population growth suppression measures, outline habitat goals, monitoring methods, and insure genetic diversity of the horses for the Complexes.

The Antelope Complex and Triple B Complexes are managed separately but are both included in this document due to short and long-term management and monitoring objectives for wild horse herds and their habitats being similar. The only thing that divides the Complexes is Hwy 93, and Alt Hwy 93 highway right-of-way fence. The Antelope Wild Horse Complex includes the Antelope, Antelope Valley, Goshute, and Spruce-Pequop HMAs. The Triple B Complex includes the Triple B, Maverick-Medicine, western portion of the Antelope Valley HMA and the Cherry Springs WHT.

The management goal for the Antelope Complex and the Triple B Complex is to "Manage and maintain healthy wild horses and herds inside HMAs in a thriving natural ecological balance within the productive capacity of their habitat while preserving multiple use relationships."

RELATIONSHIP TO STATUTES, REGULATIONS, POLICIES, OR PLANS
See Section 1.3 and 1.4 of the Antelope and Triple B Complexes Wild Horse Gather and Herd Management Area Plan Environmental Assessment.

Implementation of the HMAP update is consistent with the authority provided in 43 CFR 4700 and the 1971 Wild Free-Roaming Horses and Burros Act (WFRHBA). The HMAP is needed to establish short-term and long-term management and monitoring objectives for the management of wild horses within the Antelope Complex and the Triple B Complex and to maintain the wild horse herd as a self-sustaining population of healthy animals in balance with other uses and the productive capacity of their habitat.

CURRENT CONDITIONS

The Antelope and Triple B Complexes Herd Management Area Plan Evaluation Report was made available to interested individuals, agencies and groups for a 30-day public review and scoping period that opened on October 14, 2024 and closed on November 15, 2024.

APPROPRIATE MANAGEMENT LEVEL (AML)

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 in keeping with the multiple-use management concept for the area. AML for the Antelope Complex would remain at 427-789 and 472-889 for the Triple B Complex. AMLs have been established through land use plans, Final Multiple Use Decisions, and a Wild Horse Territory Management Plan. This population range was established at a level that would maintain healthy wild horses and rangelands over the long-term based on monitoring data collected over time as well as an in-depth analysis of habitat suitability.

Antelope Complex
The Ely District's 1983 Schell Management Framework Plan designated the Antelope HMA for long-term management of wild horses. The Ely District Record of Decision (ROD) and Approved Resource Management Plan (RMP) re-affirmed the boundaries and long-term management of wild horses in August of 2008. The Antelope HMA is nearly identical in size and shape to the original Herd Areas representing where wild horses were located in 1971. Currently, management of the Antelope HMA and wild horse population is guided by the 2008 Ely District ROD and RMP. The AML range for the Antelope HMA is 150-324 wild horses. The Land Use Plan analyzed impacts of management's direction for grazing and wild horses, as updated through Bureau policies, Rangeland Program direction, and Wild Horse Program direction. Forage was allocated within the allotments for livestock use and range monitoring studies were initiated to determine if allotment objectives were being achieved, or that progress toward the allotment objectives was being made.

The 1993 WRMPWHA established the other three HMAs as follows: Antelope Valley, Goshute, and Spruce-Pequop. In addition, it established baseline AMLs of 240 wild horses for the Antelope Valley HMA, 160 wild horses for the Goshute HMA, and 82 wild horses for the Spruce-Pequop HMA. The WRMPWHA stated that adjustments would be based on monitoring and grazing allotment evaluations. The baseline AML for the Antelope Valley, Goshute and Spruce-Pequop HMAs was established at 155-259 wild horses through a combination of the 1994 Antelope Valley Final Multiple Use Decision (FMUD), the 1998 Badlands FMUD, the 1998 Spruce FMUD, the 2001 Maverick-Medicine Complex FMUD, the 2001 Sheep Allotment Complex FMUD and the 2002 Big Springs FMUD. The population within these HMAs can fluctuate depending on the seasonal movement of the wild horses.

Herd	Total Acres Private/Public land	Appropriate Management Level	March 1, 2025 Population Estimate
Antelope	331,000	150-324	1,367
Antelope Valley	463, 540	155-259	904
Goshute	250,800	73-124	808
Spruce-Pequop	138,000	57-82	1,179
Total	1,183,340	427-789	4,258

The BLM conducted a population census flight in March 2024 to obtain reliable estimates of wild horse numbers within the Antelope Complex. A map of the recent flight survey can be found in Appendix I.

The table reflects the total number of adult wild horses as of March 1, 2025. Population inventories are usually conducted in late winter and early spring when very few new foals are born.

See Tables 1 and 2 of the Antelope and Triple B Complexes Management Evaluation for historic horse inventories and removal data.

Fertility Control was implemented in 1993, 1999, 2004, and 2011 and the fertility control vaccine PZP-22 was administered to some Antelope Complex wild horses.

Triple B Complex

The 2008 Ely RMP combined three existing HMAs (Buck and Bald, Butte, and Cherry Creek HMAs) into the Triple B HMA. The decision to combine all, or portions of the three HMAs was due to the historical interchange of wild horses between the three HMAs and was also based on an in-depth analysis of habitat suitability and monitoring data as set forth in the Ely Proposed Resource Management Plan/Final Environmental Impact Statement. The 2007 EIS evaluated each herd management area for five essential habitat components and herd characteristics: forage, water, cover, space, and reproductive viability. Through this analysis and the subsequent Final RMP and Record of Decision (ROD), the boundaries of the Triple B HMA were established to ensure sufficient habitat for wild horses, and an AML of 250-518 wild horses was established to achieve a thriving natural ecological balance and rangeland health.

The 1993 WRMPWHA established the Antelope Valley and Maverick-Medicine HMAs. In addition, it established baseline AMLs of 240 wild horses for the Antelope Valley HMA and 389 wild horses for the Maverick-Medicine HMA. The WRMPWHA stated that adjustments would be based on monitoring and grazing allotment evaluations. The baseline AML for the Antelope Valley HMA was established at 155-259 wild horses through a combination of the 1994 Antelope Valley Final Multiple Use Decision (FMUD), the 1998 Badlands FMUD, the 1998 Spruce FMUD, the 2001 Maverick-Medicine Complex FMUD, the 2001 Sheep Allotment Complex FMUD and the 2002 Big Springs FMUD. In the Maverick-Medicine HMA the WRMPWHA established a baseline AML of 389 wild horses, which was adjusted to 166-276 wild horses through a combination of the 1998 Spruce FMUD, the 1994 West Cherry Creek Allotment FMUD, and the 2001 Maverick-Medicine Complex FMUD. The wild horses from The Maverick-Medicine HMA travel back and forth across the Elko and White Pine County line, mixing with the wild horses from the Triple B HMA. They also move back and forth mixing with wild horses from the western portion of the Antelope Valley HMA west of U.S. Highway 93. The population within this HMA can fluctuate depending on the seasonal movement of the wild horses.

Herd	Total Acres Private/Public land	Appropriate Management Level	March 1, 2025 Population Estimate
Triple B	1,225,000	250-518	1,234
Maverick-Medicine	286,460	166-276	622
Antelope Valley West of U.S. Highway 93	97,070	16-27	24
Cherry Springs WHT	23,794	40-68	29
Total	1,632,324	472-889	1,909

The BLM conducted a population census flight in March 2023 and March 2025 to help confirm wild horse numbers within the Triple B Complex. A map of the recent flight survey can be found in Appendix I.

The table reflects the total number of adult wild horses as of March 2025. Population inventories are usually conducted in late winter and early spring (March) when very few new foals are born.

See Tables 1 and 2 of the Antelope and Triple B Wild Horse Complexes HMAP Evaluation for historic horse inventories and removal data.

Fertility Control was implemented in 2022 and 2024 when the fertility control GonaCon-Equine was administered to some Triple B Complex wild horses.

Genetic Diversity-Antelope Complex

<u>Antelope Complex</u>
Recent genetic samples collected in 2015 from the Antelope HMA were analyzed[4] in 2016 (Cothran 2016) and 2021 (Cothran et al. 2025). Samples from Antelope Valley HMA were collected in 2021 and 2023 (Cothran et al. 2025. Samples from Goshute were collected in 2021 and 2023 (Cothran and Juras 2025a). Samples from Spruce-Pequop were collected in 2021 (Cothran and Juras 2021) and 2023 (Cothran and Juras 2025b). No unique alleles were identified from any of the sampled horses, and genetic diversity measures were higher than average. Conclusions from Dr. Cothran's laboratory regarding genetic diversity in the Antelope Complex may be summarized as follows:

<u>Antelope HMA</u>
The analyses found that current genetic diversity levels were above average for this herd and no immediate action was recommended other than continued monitoring. Not surprisingly, sampled horses from the Antelope HMA were most genetically similar to sampled horses from the Antelope Valley, Goshute, and Spruce-Pequop HMAs (Cothran et al. 2025). Similarity levels to domestic breeds showed no clear ancestral relationships, and the herd ancestry likely includes some Spanish component based upon the data, which is typical among wild horses and a number of domestic breeds.

[4] For the full citations to these reports, see Section 8.0 of the BLM's Antelope and Triple B Complexes Wild Horse Gather & Herd Area Management Plan.

Antelope Valley HMA
Genetic diversity of this herd was high. Cothran et al. (2025) suggested that high levels of movement between neighboring herds may be maintaining high genetic diversity in this and the Antelope HMA herds. Genetic similarity to domestic breeds results suggest a herds with mixed ancestry, which is in agreement with the variability results (Cothran et al. 2025). Genetic similarity results suggest a herd with mixed ancestry but some evidence of Spanish heritage (Cothran 2016, Cothran et al. 2025).

Goshute HMA
Genetic diversity in this herd was slightly above the average for feral horses (Cothran and Juras 2025a). Cothran and Juras (2025a) noted the high genetic similarity to nearby herds and suggested that HMAs in this area show evidence of gene flow. They also noted that variability patterns for the Goshute herd have not changed significantly since 2002 (Cothran and Juras (2025a). Genetic similarity results suggest a herd with mixed ancestry but probably some Spanish background (Cothran and Juras (2025a), which is typical for many wild horse herds and domestic breeds.
In comparison to other Nevada herds, Goshute is most like the Spruce/Pequop and Antelope Valley herds which are geographically the closest neighboring herds (Cothran and Juras 2025a).

Spruce-Pequop HMA
Genetic Similarity: Sample from both 2021 (Cothran and Juras 2021) and 2023 (Cothran and Juras 2025b) indicated genetic diversity levels that are higher than average for feral horse herds. Overall similarity of the Spruce/Pequop herd to domestic breeds was below average for feral herds. Highest mean genetic similarity of the Spruce/Pequop herd was with the New World Iberian breeds with the Light Racing and Riding breeds second. The similarity coefficient values are low which reduces the confidence in the measures. In comparison to other Nevada herds, Spruce/Pequop was most like the Antelope herds and Goshute herd (Cothran and Juras 2025b). Like the other herds in this area, horses in Spruce-Pequop HMA also showed some evidence of Spanish background (Cothran et al. 2025), but at an undetermined level.

HMA Recommendation-Antelope Complex

Antelope HMA
Current variability levels are high enough that no action is needed at this point. No unique alleles were identified, but allelic diversity was high. Because this herd has a very high number of alleles per locus, some of those alleles occur at relatively low frequency. As such the herd should continue to be monitored due to the high proportion of rare alleles. This is especially true if it is known that the herd size has seen a recent decline or if population size is below 150 head.

Antelope Valley HMA
Current variability levels are high enough that no action is needed at this point. No unique alleles were identified, but allelic diversity was high. Because this herd has a very high number of alleles per locus, some of those alleles occur at relatively low frequency. As such the herd should continue to be monitored due to the high proportion of rare alleles. This is especially true if it is known that the herd size has seen a recent decline.

Goshute HMA
No action is needed at this time. The herd should be monitored because the AML is low enough that some genetic variation loss could occur if it were isolated. However, gene flow in the area is expected to mitigate possible loss of genetic diversity, because across the Complex even at low AML the collective herd size would be relatively high.

Spruce-Pequop HMA
This herd should continue to be monitored because the AML is below the population size required to maintain genetic diversity, if it were isolated. Over the past 10 years no loss of genetic variation is evident but with this AML the possibility is high if it were isolated. However, gene flow in the area is expected to mitigate possible loss of genetic diversity, because across the Complex even at low AML the collective herd size would be relatively high. Re-sampling of the herd should be done by 2028 to check for changes in variation.

Antelope Complex Recommendations
Current variability diversity levels are good for the Antelope Complex and no immediate action is required. Long-term monitoring should be continued.

Genetic Diversity-Triple B Complex
Blood samples from wild horses from the Buck and Bald HMA and Butte HAs (currently the Triple B HMA) were analyzed in 2001 in terms of protein allozyme markers, but those results are not considered here because the microsatellite DNA marker panel used by the Cothran laboratory provides a more recent and more informative baseline measure of diversity in the Triple B Complex. Genetic testing was completed on the wild horses in the Maverick-Medicine HMA in 2014 (Cothran 2014). Genetic samples were analyzed by Dr. E. Gus Cothran in 2014, Department of Veterinary Science, Texas A&M University. His conclusions and recommendations regarding genetic diversity in the Triple B Complex is summarized as follows:

Maverick-Medicine HMA
Genetic variability of this herd in general is on the high side but the percentage of variation that is at risk is about normal. If there is a loss of population size that could increase the risk to genetic diversity, but movement between it and nearby herds should reduce that rate of genetic diversity loss. Genetic similarity results suggest a herd with mixed ancestry. Current variability levels are high enough that no action is needed at this point, but the herd should be monitored if it is known that the herd size has seen a recent decline.

HMA Recommendations-Triple B Complex
Triple B HMA
The analysis found that variability levels are high enough that no action is needed at this time, but it should be monitored if it is known that the herd size has seen a recent decline.
Maverick-Medicine HMA
Current variability levels are high enough that no action is needed at this point, but the herd should be monitored if it is known that the herd size has seen a recent decline.

Triple B Complex Recommendations
Current variability diversity levels are good for the Triple B Complex, but long-term monitoring

should be continued.

HERD MANAGEMENT AREA PLAN
The Antelope Complex and Triple B Complex HMAP adopts and implements a management strategy which would incorporate a number of habitat and monitoring objectives. Under this strategy, wild horses would be managed under the LUP and HMAP objectives and goals and for the life of the plan under this strategy, wild horses and their habitat will be managed over the life of the plan.

No Action Alternative: Under the No Action Alternative, continue existing management, a gather to remove excess wild horses would not occur. There would be no active management to control population growth rates, the size of the wild horse population or to bring the wild horse population to AML. See Management Objectives with Proposed Alternatives

Proposed Action (Alternative A). See Management Objectives with Proposed Alternatives

- Implement HMAP with a management strategy which would include several population growth suppression methods.
- The Antelope Complex will be managed for 427-789 wild horses and the Triple B Complex will be managed for 472-889 wild horses.
- Excess animals will be removed to the low-range of the AML upon a determination that excess wild horses exist.
- Immediately gather and remove excess animals in order to reach low AML as expeditiously as possible through an initial gather, and if necessary, a follow-up gather or gathers, in order to achieve and maintain the population within AML range. Follow-up gathers to remove excess animals to achieve low AML shall be conducted as promptly as appropriate to allow sufficient time for the animals to settle after a helicopter gather and to provide for a safe, efficient, and effective follow-up gather operation. [5]
- Apply fertility control methods (vaccines) to selected released mares
- Maintain a sex ratio adjustment of 60% male and 40% female.
- Population inventories and routine resource/habitat monitoring would continue to be completed every two to three years to document current population levels, growth rates, and areas of continued resource concerns (horse concentrations, riparian impacts, over-utilization, etc.)
- Once AML is achieved selective removal would occur and horses that are 10+ years old; that display good conformation, and a variety of colors will be selected first to be placed back in the complex.
- Wild horses from the Complexes will be sampled periodically for genetic diversity. If genetic diversity declines, a few mares and/or studs from another HMA will be introduced to the Complexes.
- Fertility control methods may be used as directed through the most recent

[5] While the BLM's plan would be to immediately remove all excess animals above low AML and include enough mare fertility control treatments to slow population growth, it is possible that a single gather would not achieve this because of limitations such as on gather efficiency, logistics, space capacity for holding removed animals, or contractor availability. The result would be a need to conduct a follow-up gather or gathers to achieve low AML.

direction of the National Wild Horse and Burro Program. The use of any fertility control methods will use the most current best management practices and humane procedures available for the implementation of the controls.

- The existing water development projects within the Complexes will be maintained as needed to ensure that water availability is adequate to disperse wild horse use. On the development of new water projects BLM would first need to file an application with the state to appropriate water from the affected source(s) and would follow all laws and BLM policy. Additional NEPA compliance would be completed for any new projects.
- When AML is achieved and maintained it will be re-evaluated, if needed, based upon the collection of monitoring data such as actual use, forage utilization, use pattern mapping, range condition and trend.
- The Antelope Complex and Triple B Complex HMAP will remain in effect until superseded by another document.

Alternative B: Alternative B is the same as Alternative A but would manage a non-reproducing population of geldings (up to181 in the Antelope Complex and 209 in the Triple B Complex). See Management Objectives with Proposed Alternatives.

Alternative C: Under Alternative C, Implement HMAP with management strategy, gather and remove excess animals to within the AML range without fertility control, sex ratio adjustments or geldings. See Management Objectives with Proposed Alternatives.

MANAGEMENT ACTIONS

- Future gather operations will be conducted in accordance with the SOPs described in and outlined in appendices of the Antelope and Triple B Complexes E.A. and/or the National Wild Horse Gather Contract.
- Future gather operations will be conducted in accordance with the most current direction and policies from the Washington Office and Nevada State Office.
- Wild horse gathers will be conducted during the gather season from July 1- March 1 except in unforeseen emergency, to reduce stress on the younger animals. The helicopter drive method and helicopter assisted roping from horseback will be the primary gather methods used although water and or bait trapping may be used in some circumstances for isolated issues that may arise.
- To the extent possible gather sites (traps) will be located in previously disturbed areas.
- During gathers, when space and funding allow an attempt will be made to gather all of the excess wild horses within the Complexes to achieve a population within the range of AML. All horses residing outside of the HMA boundaries will also be gathered and removed.
- An Animal and Plant Inspection Service (APHIS) or other licensed veterinarian will be on-site/on call as needed during gathers, to examine animals and make recommendations to BLM for the care and treatment of the wild horses. Decisions to humanely euthanize animals in field situations will be made in conformance with BLM policy.
- Once AML is achieved or for fertility control purposes, animals will be removed using a selective removal strategy. Selective removal criteria for the Complexes include:
  (1) First Priority: Age Class Four Years and Younger

(2) Second Priority: Age Class Eleven to Nineteen Years Old
(3) Third Priority: Age Class Five to Ten Years Old
(4) Fourth Priority: Curly, and medicine paint horses as well as horses 10+ years and older.

- Data including sex and age distribution, condition class information (using the Henneke rating system), color, and other information may be recorded (for animals being released).
- Genetic samples may be acquired during regularly scheduled gathers, to determine whether current management is maintaining acceptable levels of genetic diversity (avoiding negative effects of inbreeding depression). Genetic sampling may be repeated opportunistically, at times associated with future gathers, or more frequently if the analysis of samples from the initial gather indicate that is warranted.
- Any horses gathered and determined, with consultation between BLM and Nevada Livestock Board brand inspectors, to be domestic animals will be turned over to the local brand inspector in accordance with state law.

Management Objectives with Proposed Alternatives
Specific management, monitoring and implementation objectives are summarized below:

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
Proposed Action Alternative A o Implement HMAP with a management strategy which would include several population growth suppression methods. o The Antelope Complex will be managed for an AML range of 427-789 wild horses. o The Triple B Complex will be managed for an AML range of 472-889 wild horses. o Excess animals will be removed to the low-range of the AML upon a determination that excess wild horses exist. o Manage a portion of the population as non-reproducing geldings, 181 in the Antelope Complex and 209 in the Triple B Complex that would bring the population to mid-AML o Immediately gather and remove excess animals in order to reach low AML as expeditiously as possible through an initial gather, and if necessary, a follow-up gather or gathers, in order to achieve and maintain the population within AML range. Follow-up gathers to remove excess animals to achieve low AML shall be conducted as promptly as appropriate to allow sufficient time for the animals to settle after a helicopter gather and to provide for a safe, efficient, and effective follow-up gather operation. [6] o Apply fertility control methods (vaccines) to selected released mares o Maintain a sex ratio adjustment of 60% male and 40% female; and o Population inventories and routine resource/habitat monitoring would continue to be completed every two to three years to document current population levels, growth rates, and areas of continued resource concerns (horse concentrations, riparian impacts, over-		

[6] While the BLM's plan would be to immediately remove all excess animals above low AML and include enough mare fertility control treatments to slow population growth, it is possible that a single gather would not achieve this because of limitations such as on gather efficiency, logistics, space capacity for holding removed animals, or contractor availability. The result would be a need to conduct a follow-up gather or gathers to achieve low AML.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
utilization, etc.) ○ Once AML is achieved selective removal would occur and horses that are 10+ years old; that display good conformation, and a variety of colors will be selected first to be placed back in the complex. ○ Wild horses from the Complexes will be sampled for genetic diversity. If genetic diversity declines by more than 10% per generation or below the 0.66 observed heterozygosity threshold defined in BLM handbook H-4700-1, a few mares and/ or studs from another HMA will be introduced to the Complexes. ○ Fertility control methods may be used as directed through the most recent direction of the National Wild Horse and Burro Program. The use of any fertility control methods will use the most current best management practices and humane procedures available for the implementation of the controls. ○ The existing water development projects within the Complexes will be maintained as needed to ensure that water availability is adequate to disperse wild horse use. The development of new water projects will be considered as needed. BLM would first need to file an application with the state to appropriate water from the affected source(s) and would follow all laws and BLM policy. Additional NEPA compliance would be completed for any new projects. When AML is achieved and maintained it will be re-evaluated, if needed, based upon the collection of monitoring data such as actual use, forage utilization, use pattern mapping, range condition and trend.		
A. Control Population Numbers Manage wild horse populations within the established AML range to protect the range from deterioration associated with overpopulation.	Conduct population inventories a minimum of once every 3 years. Conduct gathers and additional inventories as funding and time allow. Determine wild horse herd size.	Schedule gathers to remove excess wild horses when the total wild horse population exceeds the Upper AML for the HMA (about every 5-6 years), when animals routinely reside on lands outside the Antelope and Triple B Complexes boundary (i.e. use is more than seasonal drift), or whenever animal health/condition is at risk.
B. Additional Population Control Measures **Objective 1:** When AML is achieved consider population control methods as	Monitor annual population growth rate.	Manage a population of Antelope Complex within the AML range of 427-789 of wild horses. Manage a population of Triple B Complex within the AML range of 472-889 of wild

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
needed. **Objective 2:** Adjust the sex ratio of the breeding population slightly in favor of males.	Document the number of stallions/mares released following each gather.	horses. New population control vaccines and/or population growth suppression methods may be used within the HMA as directed through the most recent direction of the National Wild Horse and Burro Program. The use of any new fertility controls and/or population growth suppression methods would use the most current best management practices and humane procedures available for the implementation of the new controls. Within each Complex's population, achieve a sex ratio of 60 males to 40 females immediately following gathers.
C. Age Distribution Assure all age classes are represented post-gather.	Monitor post-gather results.	Manage wild horses to achieve the following approximate relative age distribution following gathers: • 20% Young Age Class (Ages 0-4) • 50% Middle Age Class (Age 5-10) • 30% Old Age Class (Age 11+)
D. Additional Selective Removal Criteria After achieving AML maintain or improve animal conformation and color.	Monitor herd health and genetic diversity during gather. Monitor wild horses released back into the Complex.	Selective removal criteria after achieving AML. (1) First Priority: Age Class Four Years and Younger (2) Second Priority: Age Class Eleven to Nineteen Years Old (3) Third Priority: Age Class Five to Ten Years Old (4) Fourth Priority: Curly, and medicine paint horses as well as horses 10+ years and older.
Alternative B: Same as Alternative A with gelding component: Alternative B is the same as Alternative A but would release a small non-reproducing component of males (up to 138 geldings) that brings the population to mid-AML.		
Objective 3: Manage a Portion of the population as a non-reproductive herd.	Monitor and document the population with a portion being a nonreproductive herd.	Release a portion of geldings into the Complexes to slow per-capita population growth rates.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
Alternative C: Under Alternative C, gather and remove excess animals to within the AML range without fertility control, sex ratio adjustments, or geldings.		
Gate Cut removal	Monitor and document the population of wild horses for range capacity of TNEB.	Capture and remove all horses to AML. Implementation of fertility control, sex ratio adjustments or non-reproductive component would not take place.
Alternative A, B, and C		
E. Assure Genetic Diversity Maintain adequate levels of genetic diversity within the herd, so as to avoid excessive levels of inbreeding.	Collect hair samples every other gather to detect any changes in observed heterozygosity (H_o was above the average for feral horse herds in the most recent samples).	If genetic diversity (as measured by observed heterozygosity) declines more than 10% per generation or below 0.66 then wild horses may be introduced from other HMAs.
F. Sustain Healthy Populations of Wild Horses Manage wild horses to achieve an average body condition class score of 3+.	Visually observe wild horse body condition (Henneke Condition Class Method) throughout the year. Record average body condition and document during periodic gather and population inventory operations.	Maintain existing water developments to assist in limiting the distance horses trail to and from water sources. Conduct emergency removals when needed if animal body condition is less than Henneke Condition Class Score 3 due to lack of forage, water, drought, wildfire, or unplanned/unforeseen event.
G. Rangeland Health **Objective 1.** Achieve and maintain current AML for Antelope Complex 427-789 wild horses. Achieve and maintain current AML for Triple	Locate additional key monitoring areas within the Complexes as needed. Measure forage utilization at key areas for Wild horses, with use pattern	Achieve and maintain AML. Continue to assess and work on Rangeland Health Assessments. Analyze rangeland health through the collection of vegetative trend, cover, precipitation, forage utilization and use pattern mapping periodically. Establish additional site-specific resource management objectives for key areas, as

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
B Complex 472-889 wild horses. **Objective 2.** Assess rangeland health on BLM administered lands. **Objective 3.** Limit utilization by all herbivores to 50% of the current year's above ground primary production for key species. HMAs managed within the Elko District (Maverick-Medicine, Spruce-Pequop, Antelope Valley, Goshute) Utilization objective for wild horses grazing on winter use areas, prior to livestock entry which occurs between Nov 1 and Dec 31 had been established at an average of 10% of current year's growth.	mapping Bi-annually.	needed. Based on above, re-adjust AML or identify management actions to address/resolve rangeland health issues, as needed/appropriate. Re-adjustments in AML will be based on vegetation monitoring, herd monitoring and water availability as the limiting factors.
H. Riparian Area Health Achieve and maintain AML, Maintain / Improve riparian condition throughout the Complexes.	Re-evaluate riparian functionality. Use the Proper Functioning Condition (PFC) method on heavily impacted areas within the complex.	Gather horses to within the AML range to reduce users and maintain existing water sources or develop new water sources as needed to lessen wild horse use of the riparian areas.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
No Action Alternative Under the No Action Alternative, a gather to remove excess wild horses would not occur. There would be no active management to control population growth rates, the size of the wild horse population or to bring the wild horse population to AML.		
I. Under the No Action alternative BLM would not comply with the WFRHBA and would not meet the purpose and need for the HMAP or E.A,. No gather would occur horse populations would continue to grow at an estimated 20% per year.	Conduct wild horse inventories. Rangeland Health Assessment.	Wild horse population and health inventories would continue every 3 years. Rangeland Health would continue to be monitored and assessed.

MONITORING PLAN

Population Management Monitoring				
Monitoring Item	**How**	**Who**	**When**	**Actions to Take (Adaptive Management)**
Manage wild horse populations within the established AML range to protect the range from further deterioration associated with overpopulation.	Population Inventories through aerial flights following established protocols. Determine population number and annual growth rate.	BLM WH&B Specialist, with assistance from State and National WH&B Staff and other Field Office Staff	Conduct Population Inventories in the HMA a minimum of every three years. Schedule flights in February-April when possible, to utilize snow cover to obtain better tracking conditions and complete counts before large numbers of newborn foals are present.	Schedule gathers to remove excess wild horses when the total population exceeds the Upper AML, when animals permanently reside outside the Complexes, or when animal health/condition is at risk.

Population Management Monitoring				
Monitoring Item	**How**	**Who**	**When**	**Actions to Take (Adaptive Management)**
Assure all age classes are represented post gather.	Record ages of animals released post-gather.	BLM WH&B Specialist	Every gather.	Adjust age class distribution during future gathers if a relatively even age distribution cannot be achieved during the current gather.
Maintain genetic diversity (avoid inbreeding depression).	Hair follicle samples would be collected during regularly scheduled gather(s) to detect any changes from the baseline genetic diversity, and to determine whether BLM's management is maintaining acceptable genetic variability (avoiding inbreeding depression).	BLM WH&B Specialist	Every regularly scheduled gather.	If needed, introduce mares from another HMA displaying similar or desired characteristics of the horses within the complex to improve the genetic diversity.
Manage wild horses to achieve an average Henneke body condition class score of 3+.	Visually observe wild horse body condition (Henneke condition class method). Record average body condition and document other health conditions (i.e. lameness, clubfoot etc.) during periodic gather operations.	BLM WH&B Specialist	Annually, at key water locations particularly during periods of hot weather/drought. Every gather and population inventory.	Conduct emergency removals when needed if animal body condition is less than Henneke body condition score 3 due to drought, wildfire, or other unplanned/unforeseen event.
Following achievement of AML, apply population growth suppression, adjust the sex ratio of the breeding population slightly in favor of males following future gathers.	Document population growth suppression and the number of stallions/mares released following each gather. Monitor individual and herd behavior following the gather.	BLM WH&B Specialist	Following achievement of AML every gather.	Apply population growth suppression to animals being released. Adjust the sex ratio to 60% males / 40% females following future gathers pending monitoring results.

Population Management Monitoring				
Monitoring Item	**How**	**Who**	**When**	**Actions to Take (Adaptive Management)**
Habitat Management Monitoring				
Monitoring Item	**How**	**Who**	**When**	**Actions to Take (Adaptive Management)**
Assess Rangeland Health approximately every 10 years on BLM administered lands with the objective to meet the Rangeland Health Standards.	Assess rangeland health using procedures outlined in the rangeland health technical reference adopted by the local district office. Re-evaluate riparian functionality using the Proper Functioning Condition (PFC) method.	BLM WH&B Specialist Range Specialist and or and BFO ID team.	Approximately every 10 years	Monitor existing key areas, establish new key areas as needed. Based on the above, re-adjust AML or identify additional management actions to address/resolve identified rangeland health issues, as needed/appropriate.
Limit utilization by all herbivores to 50% of the current year's above ground production for key species. (Elko only) Utilization objective for wild horses grazing on winter use areas, prior to livestock entry which occurs between Nov 1 and Dec 31 had been established at an average of 10% of current year's growth.	Measure utilization at key areas.	BLM WH&B Specialist	Annually, in the spring prior to the growing season. Annually prior to livestock turnout.	Maintain the wild horse population within the AML range.
Maintain or improve vegetative trend within the HMA.	Evaluate vegetative trend.	BLM WH&B Specialist	Evaluate overall health every approximately 5-10 years with data collected.	Adjust AML, as needed, pending evaluation of monitoring results.
Monitor/assess annual project maintenance needs.	Site visits at water sources.	BLM WH&B Specialist	As needed, throughout the year.	Schedule and complete any necessary maintenance work.

Population Management Monitoring				
Monitoring Item	**How**	**Who**	**When**	**Actions to Take (Adaptive Management)**
				Document maintenance activities.

TRACKING LOG/PROJECT IMPLEMENTATION SCHEDULE

Population Management Actions					
Description	**Who**	**Where**	**When**	**Completed**	**Remarks**
Conduct wild horse population inventories.	BLM	Antelope and Triple B Complexes	Every 2-3 years. Winter or early spring, as funding allows.		
Schedule gathers to remove excess wild horses when the total wild horse population exceeds the Upper AML for the Complexes.	BLM	Antelope and Triple B Complexes	Gathers to remove excess wild horses would be dependent on funding, space availability and national gather schedule. Once Low end of AML is achieved it is anticipated Every 4-5 or as soon as possible once population exceeds High AML		
Gather within the AML range and apply population growth suppression to any animals being released back into the complex. Adjust the sex ratio of the breeding population slightly in favor of males.	BLM	Antelope and Triple B Complexes	When post gather population is within the AML range.		

Population Management Actions					
Description	**Who**	**Where**	**When**	**Completed**	**Remarks**
Manage a Portion of the population as a non-reproductive herd.					
Assure all age classes are represented post-gather.	BLM	Antelope and Triple B Complexes	Every gather.		
Prioritize euthanasia/ removal of any injured, sick, and/or lame horses from the herd.	BLM	Antelope and Triple B Complexes	Every gather.		
Collect hair follicle samples to determine whether BLMs management is maintaining acceptable genetic diversity (avoiding inbreeding depression).	BLM	Temporary holding facility and/or short-term holding facility.	Collected as needed during gather from a minimum of 25 animals, preferably from those animals that are being released back into the Complex.		
Gather within the AML range and apply population growth suppression to any animals being released back into the complex. Selectively release animals post-gather in a ratio of 60 males / 40 females.	BLM	Temporary holding facility.	Every gather.		

Habitat Management Actions					
Description	**Who**	**Where**	**When**	**Completed**	**Remarks**
Collect forage utilization data / conduct use pattern mapping.	BLM	Antelope and Triple	Every other year.		

Habitat Management Actions					
Description	**Who**	**Where**	**When**	**Completed**	**Remarks**
		B Complexes			
Assess the Complex for Conformance with the Rangeland Health Standards.	BLM	Antelope and Triple B Complexes	Approximately every 10 years.		
Maintain existing water sources and develop new water sources.	BLM	Throughout Antelope and Triple B Complexes	Annually.		BLM would first need to file an application with the state to appropriate water from the affected source(s) and would follow all laws and BLM policy.

HERD MANAGEMENT AREA PLANNING MONITORING AND EVALUATION
Proven mitigation and monitoring are incorporated through standard operating procedures (SOPs) that have been developed over time. These SOPs represent the "best methods" for reducing impacts associated with gathering, handling, transportation, and herd data collection. The Complexes will be monitored bi-annually as outlined in the Monitoring Plan. Management may be adjusted when monitoring data and/or other information indicates a need. In addition to monitoring, long-term evaluations will continue at roughly ten-year intervals, or as needed, based on the results of bi-annual evaluations. Monitoring objectives are outlined in the Monitoring Plan. Monitoring is designed to answer two primary questions:

"Did we do what we said we were going to do?"
"Was what we did effective in meeting/moving toward our objectives?"

The objective for the long-term evaluation is to determine:

"Are our objective(s) still current…or do they need to be modified?"
"Is our management on track…or do we need to make some changes?"

Significant changes needed as a result of annual or long-term evaluations may require appropriate NEPA analysis and documentation prior to implementation.

CONSULTATION AND COORDINATION
The consultation and coordination conducted in preparing this herd management area plan is summarized in the Antelope and Triple B Complexes Wild Horse Herd Management Area Plan

and Gather Plan Environmental Assessment. Please refer to that environmental assessment for additional information and appendices.

List of Preparers

Sadie Leyba	Wild Horse Specialist, BFO
Bruce Thompson	Wild Horse Specialist, EFO

APPENDIX XIV
Preliminary EA Comments and Responses

A Preliminary Pancake Complex Gather & Herd Management Area Plan was made available to interested individuals, agencies and groups for a 30-day public review and scoping period that opened on October 30, 2024, and closed on November 29, 2024. Comments were received from approximately 450 individuals (primarily as form letters) or organizations. Many of these comments contained overlapping issues/concerns which were consolidated into topics.

Comment Number	Commenter	Comment	BLM Response
Support			
1	Tim Gavin	Please manage the wild horses to the designated AML or lower. The horses are devastating to Nevada's Wildlife.	Comment noted.
2	Terry Jones	My personal preference is to have zero feral horses on public land. I understand that is probably not possible, but getting the numbers reduced to the allow native wildlife to flourish should be the priority. A small population of horses with a 50/50 sex ratio would be a good goal.	Comment noted.
3	Marcial Evertsen	These herds are clearly over population objectives and causing extreme detrimental to the native landscape and wildlife species. Please reduce the populations to the appreciate management levels and keep the populations at those levels.	Comment noted.

4	Alan Klebenow	The extreme undue and unnecessary degradation that has been caused due to the lack of management on these wild horse populations is some of the worst that I have seen in the state. The extreme degradation to the riparian areas that exist as well as the overutilization of forage has undoubtedly caused a negative impact on the ecosystem as a whole but most importantly the wildlife populations which includes some of the most crucial greater sage-grouse habitat in the area. I once again want to express my support as well as the urgency to achieve a Finding of No Significant Impact (FONSI) on this EA and implementation of the Herd Management Area Plan (HMAP) as soon as possible	Comment noted.

5	Mike and Eveline Hoggatt	We like to spend a lot of time on the Antelopes. What we've noticed is the Elk population is good, but the deer population is non-existent. And the horse population is overwhelming. There is not a single drop of water from rock Springs to Stockdale Springs that does not have a horse on it 24/7. I've seen elk competing with the horses for water and what few deer there are, they have no chance to get to the water. We would like to see the horses controlled better so the wildlife can have access to the water.	Comment noted.
6	Ashley O'Flaherty	I am writing to express serious concern about the current state of our rangelands due to over-population of wild (feral) horses. Our rangeland is in decline. Water sources are being drained, forage is depleted, and both wildlife and permitted livestock are suffering. We're seeing devastating impacts to native species—including the protected sage grouse—and the long-term sustainability of this ecosystem is in jeopardy.	Comment noted.
7	Robert Winn	As a strong supporter of native flora and fauna, I strongly encourage the BLM to remove as many feral horses as possible from the range. They simply cause way too much harm to our soils, plants, water and other wildlife.	Comment noted.

8	Little Paris Sheep Company	Both the Antelope and Triple B Complexes are in dire need of maintenance regarding the feral horse populations. The Little Paris Sheep Company fully supports the Proposed Action. As the EA outlines, both complexes are burdened by supporting massively overpopulated herds of horses.	Comment noted.
9	Nevada Department of Agriculture (NDA)	The Nevada Department of Agriculture (NDA) supports actively managing wild horses to maintain populations within the designated Appropriate Management Levels (AMLs) of Herd Management Areas (HMAs). This approach supports healthy Nevada rangelands and sustains multiple land uses, including livestock grazing, as overseen by the Bureau of Land Management (BLM). Achieving a thriving natural ecological balance (TNEB) and maintaining multiple-use relationships on BLM-administered public lands cannot be achieved without active management in HMAs.	Comment noted.

10	Nevada Department of Wildlife (NDOW)	The Department supports efforts to gather and remove excess WHB to low AML. Continuing to manage under the status quo will continue negatively impacting wildlife and their habitat. In achieving low AML, rangelands will make progress toward attainment of BLM Rangeland Health Standards, benefitting wildlife and other land uses such as livestock grazing and recreation. To most effectively and efficiently do this, the Department supports the BLM's Proposed Action Alternative A and/or B of gathering and removing excess WHB along with the population growth suppression methods so that low AML can be achieved as soon as possible and within reason.	Comment noted.
11	Nevada Department of Wildlife (NDOW)	In combination with the gathers and removals, the Department supports the inclusion of other population control methods as well, including vaccinations, sex ratio adjustments, and sterilization of mares using intra-uterine devices, as well as other viable tools that are available now or may become available to maintain WHB at low AML. The Department recommends that these fertility control strategies be aggressively implemented with a robust monitoring plan to evaluate effectiveness only after gathering and removing to low AML.	Comment noted.

12	Nevada Department of Wildlife (NDOW)	As an added measure to these efforts, the Department also recommends the BLM re-evaluate rangeland conditions and adjust AML accordingly as excessive WHB numbers have resulted in degraded rangelands and potentially reduced the WHB carrying capacity. Prior to releasing sterile horses or burros back on the range, the Department recommends the BLM evaluate whether rangeland conditions can support the release of additional WHB or whether the removal of these animals altogether will increase the probability of achieving rangeland health standards.	Comment noted.
13	White Pine Board of County Commissioners	The County supports gathers of this magnitude to achieve low AML as soon as possible. Delaying or partial gathers is only exacerbating the problems with being this far over high AML.	Comment noted.
14	White Pine Board of County Commissioners	The County Supports Alternative A as it is the only alternative that fulfills the expectations of the County's 2018 Public Land Policy Plan of reducing detrimental impacts to other multiple uses, avoiding, or mitigating potential adverse effects on private lands, rangelands, wildlife habitat, and water sources.	Comment noted.

15	Dale Miller	Science-based management, including the reduction of wild horse populations to appropriate management levels (AML), is essential to restoring and maintaining healthy, functioning ecosystems. I urge the BLM to proceed with the proposed gather and removal efforts and to implement the HMAP as a long-term tool for sustainable range and wildlife management.	Comment noted.
16	Multiple Responses	I am sending this email in SUPPORT of the feral horse REMOVAL in Nevada's Antelope and Triple B Complexes. The feral horses have far exceeded their carrying capacity and are in fact NOT NATIVE to the area. They degrade habitat and push out other native species such and pronghorn antelope, mule deer, and bighorn/desert sheep.	Comment noted.
BLM Regulations			
17	Katie Fite WildLands Defense	This is a major federal action and requires an EIS that thoroughly probes the current ecological conditions, and determines if a Thriving Natural Ecological Balance currently exists and/or is being maintained. A current land health assessment is needed.	An EA is a concise public document, for which a federal agency is responsible, for an action that is not likely to have a significant effect or for which the significance of the effects is unknown, that is used to support an agency's determination of whether to prepare an EIS or a FONSI. The BLM is complying with NEPA and its regulations by preparing an EA, but if the BLM determines that the action

			is likely to have a significant environmental effect, it will move forward with preparation of an EIS.
18	Katie Fite WildLands Defense	Please post all current FRH assessments and Determinations.	See Appendix VIII Permitted Grazing Use and Rangeland Health Standards Summary of the EA.
19	Form Letter 2	BLM must complete a distinct HMAP for the Triple B Complex and a distinct HMAP for the Antelope Complex. BLM cannot rely on AWHC et al v Bernhardt, 3:18-cv-00059-LRH-CBC, where the court ruled against Plaintiff and allowed a ten-year gather plan to proceed. An HMAP and a gather-EA are not the same thing as stated in Leigh et al v Raby, 3:2022cv00034, and BLM's own guidance documents that clearly state that an HMAP can be crafted for a single HMA or group of HMAs where there is population exchange ("complex"). Triple B Complex and Antelope Complex are distinct population complexes that may share proximity making some type of joint gather plan more convenient (although BLM has never done any gather in both complexes at the same time), HMAP guidance is clear that these must be created as unique plans.	Refer to Appendix XIII. The Antelope Complex and Triple B Complexes are managed separately but are both included in this document due to the short and long-term management and monitoring objectives for wild horse herds and their habitats being similar. The only thing that divides the Complexes is Highway 93, and Alternate Highway 93 right-of-way fences. There is nothing in statute, regulation, or policy that prohibits the BLM from preparing and analyzing HMAPs for nearby/adjacent HMAs or Complexes at the same time.

20	Form Letter 3	Beyond the cruelty, BLM has failed to follow proper protocol for environmental impact analysis: Ignored Public Concerns: Significant issues raised in scoping were ignored, and no meaningful public engagement has occurred. If BLM remains unclear on the concerns, proper scoping meetings must be held—just as they would be for any other project of similar scope and intensity.	The BLM has solicited and considered public comment in accordance with all applicable law, regulation, and policy. Also refer to response to comment 17.
21	Form Letter 3	The Antelope and Triple B Complexes have no population interchange, meaning they do not meet the legal definition of a "complex." Yet, BLM has improperly merged them into a single plan. This violates the agency's own guidance and contradicts court rulings on proper HMAP procedures.	Refer to response to comment 19.
22	Form Letter 3	No Alternatives Outside of Roundups: A true HMAP must explore alternative solutions—not just gather operations. There is no metric defining forage availability or justifying livestock vs. wild horse allocations. No rangeland health reports, no essential habitat protection, no mitigation strategies—just recycled language from the 2017 Gather-EA.	See section 2.0 Description of Alternatives of the EA. See Appendix VIII Permitted Grazing Use and Rangeland Health Standards Summary of the EA. The BLM has complied with all relevant law, regulation, and policy.
23	Multiple Responses	An HMAP is not the same thing as a gather-EA. There must be a distinct HMAP for the Triple B Complex and a distinct HMAP for the Antelope Complex.	Refer to response to comment 19. Refer to section 1.2 Purpose and Need of the EA.
24	Carolyn Borkowski	It fails to meet the legal requirements of the National Environmental Policy Act (NEPA), misrepresents its scope and intent, violates BLM's own guidance on HMAP criteria, and threatens the integrity of wild horse populations through inhumane and	Refer to Section 2.0 Description of Alternatives Including Proposed Action of the EA.

		scientifically questionable practices.	
25	Carolyn Borkowski	The project spans over 2.8 million acres and authorizes the removal of thousands of wild horses over a period of 10+ years—a scale and duration that unequivocally meet the NEPA thresholds of “scope and intensity.” Yet the BLM has opted for a superficial Environmental Assessment (EA) rather than preparing a full Environmental Impact Statement (EIS) as required by law.	Refer to response to comment 17.
26	Carolyn Borkowski	The failure to address scope-based procedural objections at this stage is a direct violation of NEPA, especially when far less impactful projects have warranted full EIS reviews.	Refer to response to comment 17.
27	Carolyn Borkowski	The BLM has arbitrarily merged the Antelope Complex and the Triple B Complex—two genetically and geographically distinct wild horse populations—into a single HMAP, despite acknowledging in court and guidance documents that HMAPs must only combine HMAs where population interchange occurs. Here, there is zero documented interchange. The only barrier between the two is Highway 93, which prevents genetic flow and herd movement.	Refer to response to comment 19.
28	Multiple Responses	BLM failed to hold public scoping meetings and ignored numerous procedural objections.	See Section 6.0 Consultation and Coordination of the EA.

29	Front Range Equine Rescue (FRER)	FRER underscores that it is in BLM's mandate to engage in a current AML recalculation in order to justify any such substantial gather.	Refer to section 3.3 Wild Horses. The authorized officer is not setting or adjusting AML since it was evaluated in the Ely Proposed Resource Management Plan and Final Environmental Impact Statement (2007 PRMP/FEIS) and reaffirmed through the Ely District Record of Decision and Approved Resource Management Plan, as amended (2008 Ely RMP). The authorized officer will not set or adjust AML since it was evaluated in the Proposed Wells Resource Management Plan and FEIS US DOI 1983 (Wells RMP), approved July 16, 1985 and reaffirmed in the Wells RMP Wild Horse Amendment and Decision Record, approved August 1993 (US DOI 1993) (WRMPWHA). The authorized officer will not set or adjust AML since it was evaluated in the Humboldt National Forest Land and Resource Management Plan (LRMP) dated August 1986
30	Front Range Equine Rescue (FRER)	The GonaCon applications are not justified and would violate BLM's protective mandate under the WHA and the mandate that "[a]ll management activities shall be at the minimal feasible level." 16 U.S.C. §§ 1331, 1333(a). Managing at the "minimal feasible level" means with as little disruption to the wild horses' lives as possible. 16 U.S.C. § 1333(a); see also Am. Wild Horse Campaign v. Bernhardt, 442 F. Supp. 3d 127, 139 (D.D.C. 2020), aff'd sub nom. W. Watersheds Project v. Haaland, 850 F. App'x 14 (D.C. Cir. 2021).	Refer to Appendix XII Literature Reviews on Effects of Gathers, Ecological Interactions, and Population Growth Suppression Methods.

31	Multiple Responses	Nowhere are capture methods addressed beyond using the exact copy/paste used in the 2017 gather EA that was proven inadequate.	See Appendix IV Gather Operations Standard Operating Procedures of the EA.
32	Multiple Responses	The annual Motorized Vehicle Hearings fail to meet the analysis requirement each year through a failure to address public comments and address operating procedures.	Refer to response to comment 28.
33	Friends of Animals (FOA)	BLM has not made the requisite findings under the WHBA to remove wild horses, nor can it continually round up and remove wild horses for multiple years based on a single decision.	BLM is directed by the WFRHBA to "immediately remove excess animals from the range so as to achieve appropriate management levels." 16 U.S.C. § 1333(b)(2)(iv). Here, based on monitoring and population estimates, the BLM has determined that there are excess wild horses within and outside the Complexes and further has determined that it is necessary to remove those excess wild horses from the Complexes following its review of the available monitoring data.
34	American Wild Horse Conservation (AWHC)	The agency must avoid arbitrary or capricious removal of wild horses and burros from the Complexes. BLM policy explicitly states that when "making the determination that excess WH&B are present and require immediate removal, the authorized officer will analyze current information including grazing utilization and distribution, trend in range ecological condition, actual use, climate (weather) data, current population inventory, WH&B located outside the HMA in areas not designated for their long-term maintenance and other factors which demonstrate removal is needed to restore or maintain the range. Justifying a removal based on nothing more than the 4 established AML is not acceptable."	Refer to response to comment 33.

35	American Wild Horse Conservation (AWHC)	The agency must take care to comply with binding authorities and congressional direction.	The EA is in conformance with all land use plans, regulations, laws and statutes that are applicable to the protection of wild horses during all management actions on public lands.
36	Wild Horse Education (WHE) Laura Leigh Tammi Adams	Before proceeding, BLM must consider that they are exceeding their authority by combining two distinct complexes into a single HMAP.	Refer to response to comment 19.
37	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM is required to determine LUP/RMP conformance by determining if the proposed action is clearly provided for in the LUP/RMP. The LUP/RMP is NOT a landscape level analysis, neither is a gather EA. The HMAP is the only landscape level analysis considered best available practice and science, and BLM must complete the process with the required scientific assiduousness and integrity	Refer to sections 1.3 and 1.4 and 2.0 of the EA.
38	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM must determine the severity of effect and look at direct, indirect, and cumulative effects (40 CFR 1508.25(c)) TO the Complex WHBs, range, habitat, and resources from past, present, and reasonably foreseeable future multiple uses in this NEPA Complex HMAP.	Refer to section 3.0 Affected Environment/Environmental Effects and section 4.0 Impact Analysis Area of the EA. The regulation cited by the commenter is no longer in effect. The BLM has complied with NEPA and the relevant DOI regulations and policy.
39	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM's intent is clear based on the title of this NEPA document that the ONLY proposed BLM actions and alternatives regard the permanent removal of the Complex WHBs.	Refer to response to comment 24.
40	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM must create two distinct HMAPs for the Antelope Complex and the Triple B Complex, including a landscape level analysis, under the NEPA EIS process, amend RMPs, and provide for mitigation strategies planning.	Refer to response to comment 19.

41	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM failed to provide analysis of WHB socioeconomic impacts on Tourism and Recreation as required under MS-8320. Nor did BLM provide an HMAP alternative that would plan, promote, and manage tourism and recreational interests in the historic Nevada wild horses and burros.	Refer to section 3.13 Socioeconomics in the EA. While BLM acknowledges that there is a tourism draw to wild horse and burro viewing on public lands, the removal of excess wild horses and reducing the population of wild horses to AML, is unlikely to affect visitation numbers.
42	Joy Burk	The BLM must adhere to P. L. 100-409, Sec. 2(a)(1), by including action items in the HMAP for objectives entering into agreements with private landowners to consolidate public and private lands, respectfully, upon the checkerboard areas returning historic rangeland acres back to wild horses in a fair and humane manner.	BLM does not manage for wild horses on private land.
43	Colette Kaluza	BLM must not use Motorized Vehicles until the annual Motorized Vehicles Hearing releases an analysis of findings. Under Federal Land Management and Policy Act, these hearings, classified as administrative, are required. No deliberative documents, analysis of public comments, or a final agency decision or ruling arising from any hearing has ever been produced.	Refer to response to comment 28.

44	Cloud Foundation	Under 43 CFR § 4710, BLM is authorized to close livestock grazing at any time "to provide habitat for wild horses or burros … or to protect wild horses or burros." There are no qualifications requiring an "emergency" or LUP amendment. Yet, the EA fails to acknowledge this legal fact that enables BLM to close livestock grazing to provide habitat for wild horses, and therefore fails to consider a reasonable alternative action that would protect TNEB.	Livestock grazing can only be reduced or eliminated if the BLM follows regulations at 43 CFR § 4100 and must be consistent with multiple use allocations set forth in the land-use plan. Forage allocations are addressed at the planning level. Such changes to livestock grazing cannot be made through a wild horse gather decision or through 4710.5(a), and are only possible if BLM first revises the land-use plans to allocate livestock forage to wild horses and to eliminate or reduce livestock grazing. Livestock permits, their associated administrative management, and land-use plan amendments are outside the scope of this document. Any increase in authorized grazing use must follow the requirements set forth in the 43 CFR Part 4100 regulations. Any reallocation of forage between wild horses and livestock would require a land-use plan amendment.
45	Cloud Foundation	The EA and Ely RMP fail to adhere to federal statute that requires that, "Wild horses and burros shall be considered comparably [similar] with other resource values in the formulation of land use plans." (43 CFR § 4700.0-6) The EA relies on land use plans that are between 17 and 39 years old; relying on these LUPs, which fail to authorize resources "principally" or "comparably" for wild horses is clearly not in conformance with existing laws and statutes. The final EA cannot implement an action that is not in compliance with existing laws and statutes.	Changes in forage allocations (AUMs) and amendments to the Ely and Elko District's RMPs are outside the scope of this document.

46	The Cloud Foundation	The interests of The Cloud Foundation, its members, and supporters in the transparency of BLM's management of wild horse and burro populations are an aspect of the "human environment" which the agency must consider under NEPA. See 42 U.S.C. § 4332 (requiring consideration if impacts on "the quality of the human environment."); see also id. § 4331 (describing national policy of requiring agencies to "use all practicable means and measures . . . to create and maintain conditions under which man and nature can exist in productive harmony" and "to use all practicable means . . . [to] fulfill the responsibility of each generation as trustee for the environment for succeeding generations")	The BLM has complied with all relevant laws, regulations, and policies, including the NEPA.
47	Friends of Animals (FOA)	BLM has not made the requisite findings under the WHBA to remove wild horses, nor can it continually round up and remove wild horses for multiple years based on a single decision.	BLM is directed by the WFRHBA to "immediately remove excess animals from the range so as to achieve appropriate management levels." 16 U.S.C. § 1333(b)(2)(iv). Here, based on monitoring and population estimates, the BLM has determined that there are excess wild horses within and outside the Complexes and further has determined that it is necessary to remove those excess wild horses from the Complexes following its review of the available monitoring data.

48	Wild Horse Education (WHE) Laura Leigh Tammi Adams	Nevada BLM must take the EIS track for this overwhelming HMAP establishment. NEPA shall most likely be violated by the NV BLM's failure to consider the EIS track and range level analyses required for such an enormous and important NEPA process where new circumstances and new information exists and have not been provided for in this HMAP development	Refer to response to comment 17.
		Population Growth Suppression	
49	Ashley O'Flaherty	I strongly urge BLM to implement aggressive and immediate herd reduction strategies. Ideas worth exploring include: Expanding birth control measures (PZP or similar) and gelding all stud colts in key herds.	Refer to response to comment 24.
50	Carolyn Borkowski	Sex ratio skewing (60:40 M/F), Fertility control via PZP and GonaCon, Gelding and release. None of these methods meet the "minimal feasible level of management".	Sex ratio skewing, fertility control (PZP and GonaCon), and gelding have been long-employed by the BLM as population ontrol methods and they comply with the WFRHBA. This EA analyzes the impacts of use of those methods.
51	Friends of Animals (FOA)	BLM should take a hard look at the negative effects of its growth suppression methods	See Appendix VI and Appendix XII of the EA.
52	Return to Freedom Wild Horse Conservation	We strongly recommend that management actions include immediate implementation of fertility control alongside the gathers occurring within the HMAs, even if AML is not achieved.	Comment Noted.

53	Wild Horse Education (WHE) Laura Leigh Tammi Adams	NV BLM must and failed to transparently provide past gather/capture records reporting the number of WHBs treated with population growth suppressions/fertility control, what kind of PGS was used (GonaCon, PZP, gelding, IUDs, etc.), the ages of the treated WHBs, and number of times PGS has been implemented on each WH&B. BLM has not provided any data on the use of fertility control within either complex and has already begun retreating with GonaCon causing permanent infertility even before determining any necessity.	This EA does provide information about the number of animals gathered in the past. The EA also analyzes the impacts of the use of various fertility control methods.
54	Linda Wagner	How have previous fertility control methods impacted current populations and foaling dates for each HMAP? No birth control regimens should be placed on the herd until the current data and results are scrutinized. BLM needs to let the public know exactly what they mean by non-invasive population control. Sex ratio skewing, injecting substances that could sterilize or change natural wild equine behaviors or use of any invasive methods should not be used until the BLM can give data on total numbers of mares and stallions, foaling rates, band locations, ages, and migratory patterns.	Refer to response to comment 24. See Appendix VII Literature Reviews on Effects of Gathers, Ecological Interactions, and Population Growth Suppression Methods.
55	The Cloud Foundation	The EA fails to provide scientific information or quantitative data to support the claim that altering the natural sex ratio would not jeopardize the well-being of the horses or create a genetic health problem for the herd.	Refer to response to comment 51.

56	The Cloud Foundation	The EA fails to specify which fertility control measures will be used, aside from listing broad categories such as sex ratio skewing, PZP, Gonacon or vague references to "newly developed vaccine formulations" to released mares.	Refer to response to comment 51.
57	Congresswoman Dina Titus	In addition, BLM should prioritize use of proven fertility control methods, like the Porcine Zona Pellucida (PZP) vaccine, to manage equine population levels.	Refer to response to comment 24.
58	White Pine County Board of County Commissioners	The HMAP should include an all-tools approach to gather and remove excess wild horses in the Antelope and Triple B Complexes as soon as possible, and application of fertility control to keep populations within established AML	Refer to response to comment 24.
59	Sherm Swanson	2.8.1 and 2.8.2 – These sections are well stated and essential for the BLM and the public to understand. Fertility control only becomes effective after reaching AML first. Then, if the whole national population were at AML, it may not be needed because adoption demand could meet the need to gather excess animals to maintain AML. However, it could be a tool in a toolbox recognized by this and other Plans.	Comment Noted.
Livestock Grazing			
60	Katie Fite WildLands Defense	Please provide detailed mapping ion all livestock facilities present at the time the HMA was designated. Please provide detailed mapping showing all livestock facilities (including water haul sites) at the time the AML was set. Please provide this information for the present.	Livestock permits and their associated administrative management is outside the scope of this document.

61	Katie Fite WildLands Defense	How much encroachment by fencing and other developments has there been? Are ranchers required to provide water in livestock troughs when livestock aren't present? We are requesting this info on wells, pipelines spring-gutting projects stock ponds, water haul site troughs, fences, etc.	Refer to response to comment 60.
62	Katie Fite WildLands Defense	WHERE are all livestock trend and utilization monitoring sites? WHERE are all such sites for horses? How were these selected?	Refer to response to comment 60. Wild horse utilization data can be found in the Antelope and Triple B Complexes Management Evaluation Map 4 and Map 5.
63	Katie Fite WildLands Defense	What is the average actual use over the past decade vs, the permitted use in all pastures/units in the allotments impacted by the Gather and HMAP plan.	Refer to response to comment 60.
64	Katie Fite WildLands Defense	What levels of livestock upland veg utilization has BLM measured in the HMAs? When was it measured in relation to the period when livestock were grazed? Please provide detailed mapping and analysis How does BLM get accurate info on how much grass or woody veg that cows/sheep consume if grazing periods take place spring when native grasses and forbs are actively growing and are quite sensitive to defoliation?	Refer to response to comment 60.

65	Katie Fite WildLands Defense	How does BLM separate out wild horse use? Or big game use? We recall Ely BLM documents that show horse use monitored right by horse trails - something BLM doesn't do with cows/sheep. How were all wild horse sites selected? What are closest water sites to both the livestock and wild horse monitoring sites?	A key area is a relatively small portion of a unit selected as a point for monitoring change in vegetation or soil and the impacts of management (grazing). It is chosen because of its location, use, sensitivity to management and value. Key areas are at least one mile away from water sources. Some key areas capture both wild horse and livestock, use, and big game use is captured at these sites when it is present.
66	Little Paris Sheep Company	Domestic sheep and cattle are held to rules and allotted certain areas at different times of the year for the sake of ecological health. The way that horses are currently managed, it would seem that they are exculpated from any damage or problems that they cause.	Comment noted.
67	Friends of Animals (FOA)	In the Complexes, for the low AML which BLM seeks to reduce the population to, the total AUMs for wild horses amounts to 10,788. Meanwhile, it is not clear that even BLM knows how many AUMs it currently authorizes within the Complexes. The Preliminary EA lists no such numbers.	See tables 11 and 12 in the Antelope and Triple B Complexes Management Evaluation Report.

68	Friends of Animals (FOA)	This cannot represent the thriving, natural ecological balance required by the Wild Free Roaming Horses and Burros Act (WHBA). Livestock are anything but natural in this area and disrupt the natural ecological balance. It is irrational for BLM to claim that wild horses are the cause of alleged rangeland deterioration, when BLM authorizes more than eleven times as many AUMs to livestock. BLM's clear favoritism of livestock grazing over the wild horses it is tasked to protect does not abide by the WHBA. BLM should consider an alternative that reduce the number of AUMs allotted to livestock within the Complexes.	BLM is directed by the WFRHBA to "immediately remove excess animals from the range so as to achieve appropriate management levels." 16 U.S.C. § 1333(b)(2)(iv). Here, based on monitoring and population estimates, the BLM has determined that there are excess wild horses within and outside the Complexes and further has determined that it is necessary to remove those excess wild horses from the Complexes following its review of the available monitoring data. The appropriate management action is to remove the excess horses for the health of the range and for their own wellbeing. To the extent this comment suggests that livestock grazing should be eliminated, even though resource damage is directly attributable to the wild horses, livestock grazing can only be reduced or eliminated if the BLM follows regulations at 43 CFR § 4100 and must be consistent with multiple use allocations set forth in the land-use plan. Forage allocations are addressed at the planning level. Such changes to livestock grazing cannot be made through a wild horse gather decision or through 4710.5(a), and are only possible if BLM first revises the land-use plans to allocate livestock forage to wild horses and to eliminate or reduce livestock grazing. Administration of livestock grazing on public lands fall under 43 CFR Subpart D, Group 4100. Additionally, livestock grazing is also managed under each District's respective RMP. Livestock grazing on public lands is also provided for in the Taylor Grazing act of 1934. 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 when such removal is necessary. Additionally

			this would only be effective for the very short term as the horse population would continue to increase even further beyond the current overpopulation and would cause range damage even with fewer or no livestock. Eventually the Complexes and adjacent lands would become even more degraded and would not only not be capable of supporting the wild horse populations but would also not be able to support wildlife or other multiple uses of the public lands. By law, BLM is required to manage wild horses in a thriving natural ecological balance and multiple use relationship on the public lands and to remove excess immediately upon a determination that excess wild horses exist. BLM cannot use regulations at 43 CFR 4710.5 to manage wild horses and livestock in a manner that is inconsistent with the RMPs. A land-use plan amendment or revision would be necessary to reallocate use in this manner between livestock and wild horses. Livestock adjustments have been made through other actions and documents, after following the required regulatory process for grazing decisions. The purpose of the EA is not to adjust livestock use. There is no requirement of the WFRHBA or the regulations to reduce or eliminate livestock as a means to restore TNEB. Administration of Livestock grazing on public lands fall under 43 CFR Part 4100 regulations. Livestock grazing on public lands is also provided for in the Taylor Grazing act of 1934.
69	American Wild Horse Conservation (AWHC)	The agency should thoughtfully evaluate the costs and alleged benefits of livestock grazing under the multiple-use mandate and other governing authorities.	Refer to response to comment 60.

70	American Wild Horse Conservation (AWHC)	The agency should scientifically and accurately identify the root cause of rangeland health issues. To proceed responsibly, the agency must develop new and more effective methods for identifying and addressing the predominant causes of land health issues. This includes implementing advanced monitoring technologies, increasing transparency in its data collection processes, and conducting fair evaluations of the impacts of all land users, including livestock grazing, recreation, and energy development.	Refer to response to comment 18.
71	Wild Horse Education (WHE) Laura Leigh Tammi Adams	Livestock grazing allotment rangeland health reports are not provided (AMPs, USFS rangeland reports, etc.); new and renewed grazing leases are required to have rangeland health reports and are necessary for transparent public review	Refer to response to comment 60.

72	Wild Horse Education (WHE) Laura Leigh Tammi Adams	The "utilization" data eventually provided by BLM, only after requested, is from low-lying areas in the middle of livestock grazing allotments. BLM must, yet failed to, differentiate between livestock/other multiple uses and wild horse and burro impacts to TNEB and rangeland health. BLM must provide data and analysis for multiple use impacts to TNEB on the WHB Complexes before any decision and finalization of this Draft Gather and HMAP (and transparently provide the information for public review).	See Wild Horse section and Maps 4 & 5 of the Antelope and Triple B Complexes Management Evaluation.

73	Linda Wagner	Detail commercial livestock use and percentage of HMAP intruded upon. Are areas occupied full or part-time by sheep, goats or cattle? Detail any livestock grazing expansions planned in any complex areas. What will their impact on HMAPS or WHT be? Provide details of how CFR 4710.5, if followed consistently, would impact HMAPs and allow for improved wild horse access to forage and water and their overall ability to thrive as principle and protected wildlife on the HMAP.	Outside the scope of this analysis. This action is not setting or adjusting livestock grazing levels. Livestock grazing can only be reduced or eliminated if the BLM follows regulations at 43 CFR § 4100 and must be consistent with multiple use allocations set forth in the land-use plan. Forage allocations are addressed at the planning level. Such changes to livestock grazing cannot be made through a wild horse gather decision or through 4710.5(a), and are only possible if BLM first revises the land-use plans to allocate livestock forage to wild horses and to eliminate or reduce livestock grazing. There is no requirement of the WFRHBA or the regulations to reduce or eliminate livestock as a means to restore thriving natural ecological balance. Administration of livestock grazing on public lands fall under 43 CFR Subpart D, Group 4100. Additionally, livestock grazing is also managed under each Districts respective RMP. Livestock grazing on public lands is also provided for in the Taylor Grazing Act of 1934. Removal or reduction of livestock would not be in conformance with the existing RMPs, 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. Additionally this would only be effective for the very short term as the horse population would continue to increase. Eventually the HMA and adjacent lands would no longer be capable of supporting the wild horse populations. By law, BLM is required to manage wild horses in a thriving natural ecological balance and multiple use relationship on the public lands and to remove excess immediately

			upon a determination that excess wild horses exist. BLM cannot use regulations at 43 CFR 4710.5 to manage wild horses and livestock in a manner that is inconsistent with the RMPs. A land-use plan amendment or revision would be necessary to reallocate use in this manner between livestock and wild horses. Removal or reduction of livestock would not be in conformance with the existing RMPs, 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. Additionally this would only be effective for the very short term as the horse population would continue to increase. Eventually the HMA 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 an increase in wild horse AMLs and decrease in livestock grazing. The purpose of the EA is not to adjust livestock use, or increase the level of AML for these HMAs, which was discussed in Section 2.6.6 and 2.6.7 of the EA. 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.
74	Cloud Foundation	Include the Animal Unit Months (AUM's) permitted for livestock (and wildlife, if any) and the actual use of AUMs by livestock for each HMA for each of the past 10 years.	Refer to response to comment 67.

75	Cloud Foundation	Include a list and map of all allotments within the HMA, disclosing pastures within allotments, fencing and a census map showing areas where livestock graze within each pasture/allotment to differentiate horse v livestock grazing.	Refer to response to comment 67. See Appendix I Figures of the EA.
76	Cloud Foundation	Disclosure of illegal livestock grazing in and around the Complexes over the past 15 years.	Refer to response to comment 60.
77	Cloud Foundation	Include scientific data and the criteria utilized to differentiate livestock usage impacts from wild horse impacts.	Refer to response to comment 72.
78	Cloud Foundation	Maps that show all water sources in the HMAs, including ownership and seasonal availability. The maps must also detail water sources accessible to livestock but fenced off from wild horses, as well as seasonal water sources, specifying their regulation and months of operation.	See Appendix I of the EA has been updated to include water sources utilized by wild horses.
Appropriate Management Level			

79	Form Letter 1	The Triple B Horse Complex in Nevada, with an estimated 3,500 wild horses—far exceeding its Appropriate Management Level (AML)—is in urgent need of herd reduction. The Bureau of Land Management (BLM) has a duty to manage public lands for multiple uses and sustained health, which includes protecting habitat for native species and ensuring the ecological balance of rangeland ecosystems. To uphold this mission, it is imperative that wild horse populations in the Triple B Complex be reduced to within AML.	Refer to response to comment 24.
80	Form Letter 1	Overpopulation of wild horses significantly strains already fragile landscapes. Excessive grazing depletes native vegetation, leads to soil erosion, and reduces water availability—conditions that threaten the long-term sustainability of the range. The current herd size is more than four times what the landscape can support without degradation. This overuse not only damages the land but also undermines the BLM's responsibility to maintain healthy habitat conditions for all wildlife species.	Refer to response to comment 24.

81	Form Letter 1	Native species such as elk, mule deer, and pronghorn antelope depend on intact, functioning ecosystems. As wild horses outcompete them for forage and water, these iconic animals suffer. Diminished food sources and habitat fragmentation lead to population declines and disrupt migratory patterns essential for their survival. Restoring the wild horse population to AML will relieve this pressure, allowing native wildlife to rebound and ecosystems to begin recovery.	Comment noted. Refer to response to comment 24.
82	Form Letter 1	Maintaining herds within AML is not an attack on wild horses—it is a necessary measure to ensure they remain a sustainable part of the landscape. Without intervention, the ecological cost of overpopulation will only increase, undermining both conservation goals and the BLM's own land-use mandates.	Comment noted. Refer to response to comment 24.
83	Form Letter 2	No alternative includes a single action outside of alternatives used in a gather plan. BLM must voluntarily remand this EA and begin again.	See Section 2.8 Alternatives Considered but Eliminated from Further Consideration.

84	Carolyn Borkowski	The BLM continues to treat the Appropriate Management Level (AML) as sacrosanct while providing no transparent methodology for how these numbers were derived. There is no inclusion of: - Forage availability by HMA - Terrain usability - Water access - Livestock AUM data or allocation formulas.	Refer to section 1.1 Background Portions of the Complexes located in the Ely District were established through Final Multiple Use Decisions and reaffirmed through the 2008 Ely District Resource Management Plan (RMP) and Record of Decision (ROD). Portions of the complexes located in the Elko District were established through Final Multiple Use Decisions and the Wells Resource Management Plan Wild Horse Amendment (WRMPWHA). The Cherry Springs WHT was established on the Humboldt-Toiyabe National Forest through the Cherry Spring Wild Horse Territory Management Plan. These decisions established AMLs designed to maintain healthy wild horse populations and rangelands over the long-term based on monitoring data and in-depth analysis of habitat suitability.
85	Carolyn Borkowski	In short, the HMAP fails to justify AML in any scientifically credible way. BLM cites "utilization" data but makes no attempt to differentiate impacts from wild horses versus domestic livestock, whose presence is effectively erased from the discussion—despite the fact that livestock AUMs in these complexes vastly exceed those allocated to wild horses.	Refer to response to comment 72.

86	Little Paris Sheep Company	What is the point of establishing an AML if it is to be disregarded too frequently and so blatantly? It is appreciated that the Proposed Action intends to get the horse population down to the low end of the AML, but how soon again will the populations expand beyond the AML limit?	See Section 1.1 Background and Appendix VI Population Modeling.
87	Front Range Equine Rescue (FRER)	In the 2008 Record of Decision affirming the Ely Resource Management Plan ("2008 ROD"), the AMLs for HMAs within the Complexes are denoted as "Initial [AMLs]," reflecting that they were not intended to be permanent fixtures but would be amended. See 2008 ROD at p. 47, Table 12 (emphasis added), available at Proposed Resource Management Plan/Final Environmental Impact Statement for the Ely District. That plan also expressly sets the objective that BLM is to "[b]ase adjustments to [AMLs] on monitoring data and perform adjustments." Id. at p. 48. BLM has not engaged in a process to "perform adjustments" to the AMLs as the ROD requires. The agency continues to rely on the old AMLs as if they were perpetually fixed values, even though BLM has monitoring data that would be relevant to the ROD's required AML adjustments.	Refer to section 2.8.6 Raising Appropriate Management Level of the EA. Monitoring data confirms the need to remove excess wild horses above the current AML to improve rangeland health and ensure the safety and health of wild horses. Based off this information reevaluation of AML is not warranted at this time.

88	Front Range Equine Rescue (FRER)	While the PEA frames reconsideration of the AMLs in narrow terms—that raising the AMLs in the HMAP is purportedly not warranted or even worthy of detailed consideration because current "monitoring data confirms the need to remove excess wild horses"—there is a broad gulf between the agency determining that there are some excess wild horses that need to be removed now to maintain a TNEB, and the agency determining, as it appears to have done here, that the AMLs do not warrant reconsideration simply because there are some excess wild horses currently in the Complexes.	Refer to response to comment 87.
89	Multiple Responses	We need a detailed disclosure of how AML is set and criteria for reevaluation. No rangeland health reports are linked, no water improvement plans.	AMLs were established in prior decisions. See section 1.1 Background of the EA. See Appendix VIII Permitted Livestock Grazing Use and Rangeland Health Standards Summary.
90	Nevada Department of Agriculture (NDA)	The NDA requests that this EA include language allowing the BLM to reduce the AML of the complexes when solar projects are approved. The calculation of the reduction should be based on the AML of the particular HMA along with the reduction in forage and water resources displaced by solar projects.	Outside the scope of the EA.

91	Nevada Department of Wildlife (NDOW)	The Department encourages AML adjustments considering water source and forage availability, the condition of riparian areas (e.g., PFC, bank trampling, etc.) and uplands in association with other uses (e.g., livestock grazing, wildlife), and to account for the present and future drought conditions. If rangeland and riparian conditions do not improve or are not able to meet desired conditions after adjusting AML, we encourage implementing rangeland/habitat improvement projects in those areas to alleviate further degradation (e.g., riparian/spring exclusionary fences). Riparian and spring degradation will continue to decline at current wild horse population levels, the Department recommends to remove excess horses to low AML and maintain populations at low AML.	AMLs were set in previous decisions, as outlined in the EA. The BLM is not currently considering revising the AMLs at this time.
92	Friends of Animals (FOA)	BLM fails to provide any scientific evidence to support the existing AML in the Complexes.	See Section 1.1 Background. AMLs were established through prior separate decision-making processes. Available data confirms that wild horse numbers are currently in excess of the level at which a thriving natural ecological balance can be maintained, and the data does not support an increase in the wild horse AMLs.

93	Friends of Animals (FOA)	BLM should analyze additional alternatives in detail, including adjusting the AMLs to allow more wild horses, and allowing a wild and free population, which were both eliminated from further consideration. BLM should also take a hard look at the positive impact of wild horses, something that has largely been left out of the Preliminary EA, and how their removal would negatively impact the environment and other wildlife.	Changes to forage allocations is not within the scope of this document and would require a land-use plan amendment. Increasing AML was considered but eliminated from further consideration in the EA because it is contrary to the WFRHBA which requires the BLM to manage the rangelands to prevent the range from deterioration associated with an overpopulation of wild horses. Raising the AML where there are known resource degradation issues associated with an overpopulation of wild horses does not meet the Purpose and Need to Restore a TNEB. Additionally, delay of a gather until the AMLs can be reevaluated is not consistent with the WFRHBA, Public Rangelands Improvement Act (PRIA), FLPMA, or the Ely RMP, Wells RMP and Wells RMP Wild Horse Amendment. See Section 2.8.6 of EA, which considers but eliminates this alternative from further consideration.
94	Wild Horse Education (WHE) Laura Leigh Tammi Adams	Forage carrying capacities for the Antelope and Triple B Complexes' rangelands are not provided in any NEPA document. BLM failed to provide the EIS range level analyses of carrying capacities of the range that NV BLM claims were utilized for total AUM evaluations, AUM allocations for WHBs, and for AML establishment.	Refer to response to comment 17, 84 and 92.
95	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM failed to provide data and equations utilized to set forage allocation and AML.	Refer to response to comment 92.
96	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM must provide predation impacts to mortality and AML on the Complex WHBs.	See section 2.8.8 Wild Horse Numbers Controlled by Natural Means and Appendix XII Standard Operating Procedures for Mare Fertility Control Treatments.

97	Multiple Responses	What specific formula was used to determine AML (Allowable Management Level) for each HMA? The projected population increase of wild horse herds is given as 15-20%. The BLM relies on the study done by National Academies of Science in 2013. The estimate of population growth given in this report needs to be updated with data from 2025 and a new updated report reviewing (BLM & USFS) the Wild Horse and Burro Programs. In fact, specific data needs to be given for each HMAP herd. Each herd differs in its reproduction rate and foaling dates.	Refer to response to comment 92.
98	The Cloud Foundation	Include complete description of how and when AML was created, List of groups consulted in setting AML, Full disclosure of the scientific basis upon which the AML created, Disclosure of science or historic documents that supports the AUMs allocated for livestock in the HMA.	Refer to response to comment 92. The EA notes livestock AUMS in Appendix VIII.

99	Laurie Ford	APPENDIX VI Population Modeling (pg. 119) does not analyze or debate population growth rates yet the HMAP calls for future monitoring of annual growth rates. Population growth rates that take into account the age distribution, sex distribution, age-specific reproductive and survival rates, and how they (growth rates) respond to such factors as annual variation in climate, the relative density of horses and burros, and other stochastic (random) factors must be implemented to " reflect the most realistic expectations of population change from year to year." Without accurate population counts, in combination with the lack of supporting data, BLM has no concrete concept of the true numbers on the range or the numbers the range can support (AML): therefore; the numbers to be removed.	Herd level growth rates can be determined from time series of overall herd size, which is a reflection of net growth, without knowledge of interannual variation in foal and yearling survival. It is not necessary to have detailed time series of age-sex structure, weather, survival rates, genetic variation, etc., to make reasonable projections of expected future wild horse population size. The standard operating procedures (SOP 7) in the 2020 USGS-published methods for estimating growth rates confirms that use of past population size estimates to inform expected values of annual herd growth rates provides a valid approach to estimating annual growth rates. The main emphasis in that USGS-published standard operating procedures guide for projecting herd size is that the type of highly parameterized population model that the commenter advocates is not necessary. This emphasis in that SOP is contrary to the commenter's assertion that the USGS recommended against using past observed growth rates. Indeed, 'births minus deaths' is generally a reflection of net growth in a population, unless there is substantial movement in or out of that population. The BLM is considering management of this complex of HMAs together because it is known that short-term movements between HMAs may occur, but that type of short-term movements would not be expected to substantially change the overall population size in the complex. Stochasticity (i.e., what the comment refers to as random factors) in population modeling is accounted for in the USGS PopEquus modeling software, results from which are included in Appendix VI Population Modeling.

100	Laurie Ford	Foals captured in utero and born in holding must be included in the total number of horses gathered (Number gathered'), total number of horses removed (Number removed'), (pg. 118) as live foals are. Foals gathered "inutero" must be subtracted from the pre-gather population as they were included as a foal "yet to be born" in the pre- gather annual March 1 estimate.	The legal definition of wild horses and burros comes from 16 USC section 1332 (f). Wild Free-Roaming Horses and Burros are legally defined as all unbranded and unclaimed horses and burros that use public lands within 10 contiguous Western States as all or part of their habitat, or that have been removed from these lands by the authorized officer, or have been born of wild horses or burros in authorized BLM facilities, but have not lost their status under the WFRHBA (see BLM 2010 WHB Herd Management handbook H-4700-1). This definition does not include fetuses in utero, as those animals have not been born.
101	Laurie Ford	BLM has no scientific data regarding survival rates for wild horses. Why does BLM not monitor the ages of horses removed from the range and supply that data to prove their point?	Refer to response to comment 96.
102	Laurie Ford	In 2013 AMLs established as a single number were changed to reflect a population range (upper and lower limit). BLM must provide the analysis required under NEPA that established a population range (upper and lower limit) for HMAs within the Antelope and Triple B Complexes which were initially established as a single number.	See response to comment 92. An AML range was established for the HMAs, where the upper number represents the maximum population for which thriving natural ecological balance would be maintained. The lower level represents the number of animals that should remain in the Complexes immediately following a wild horse gather that brings the population back to AML in order to allow for a periodic gather cycle and to prevent the population from exceeding the established AML between gathers. "We interpret the term AML…to mean that "optimum number" of wild horses which results in a thriving natural ecological balance and avoids a deterioration of the range" (109 IBLA 119 API 1989). Monitoring since establishment of AMLs indicates that these AMLs continue to be valid and no data exists to indicate that increases to

			the AMLs are warranted at this time.
103	Jannett Heckert	AML alone is not cause for roundups. Every roundup used low AML as a target. Reaching AML has not proven to reach stated rangeland improvement goals.	BLM is directed by the WFRHBA to "immediately remove excess animals from the range so as to achieve appropriate management levels." 16 U.S.C. § 1333(b)(2)(iv). BLM has determined that there are excess wild horses based on review of many factors, as outlined in the EA, not just AML.
104	Sherm Swanson	The BLM HMA population estimates indicate that the most severe reductions in numbers during the 2020-2023 droughts and then heavy winter resulted in many thousands of deaths that would have been from starvation or thirst, a very inhumane way to die, that could have been largely avoided by achieving and maintaining AML. Most of the die offs occurred in HMAs with more than 350% AML.	Comment Noted.

105	Sherm Swanson	2.8.9 – This section is well stated and necessary. Furthermore, AML was set prior to the time when thriving natural ecological balance was defined as meeting land health standards and prior to the time (2010) that the word riparian was included in the BLM Wild Horse and Burro Handbook for the first time. Because horses concentrate in riparian areas even more than do livestock (Burdick et al. 2021). AML may well be too high. It is essential that after achieving AML riparian areas, especially lentic meadow riparian areas essential to greater sage grouse and other wildlife, be monitored to enable adjustment of AML downward where needed. This monitoring needs to focus on the greenline riparian stabilizers essential to riparian functions!	Comment Noted.

106	Sherm Swanson	3.4. Riparian/Wetland Areas and Surface Water Quality – This section is very important and hopefully accurate. However, it depends on AML being set at an appropriate level for achieving and maintaining riparian functions. Because this is unlikely given when AML was set, monitoring of trend in riparian areas is essential for eventually getting AML right. Given the limited effect of (in comparison to the effect of movement of livestock) but essential role of managing stocking rate in riparian management without movement, AML is the BLM's remaining critically important tool for achieving riparian functions in HMAs. In allotments movement of animals is more effective and often more important in ensuring that there is more recovery than impact through time.	Comment Noted.
107	Sherm Swanson	Since AML was set before an official riparian focus, it is likely too large. Studies in Nevada (Burdick et al. 2021) indicate that free-roaming wild horses used lentic meadows in priority sage-grouse habitat at 18 times the rate of all native ungulates combined (mule deer, pronghorn, and elk) and twice the rate of all livestock (sheep and cattle). This combined use was causing deterioration of riparian functions (USDOI 2020). Yet with the recent history of chronic over-AML population numbers the question going forward is whether the achievement of AML will allow riparian areas to recover riparian functions.	Comment Noted.
Fuels/Fire			

108	Katie Fite WildLands Defense	WHERE are all sites where native PJ forest has been treated or burned in wildfires since the AML was set in these HMAs? Where are all sites where PJ and sage manipulation projects have occurred in that time period? Where are all sites where BLM veg manipulation projects have been authorized but not yet carried out? This information is vital to understand the HMA conditions and setting - as well as the potential for even further protective forest cover loss.	See section 3.12 Fire/Fuels of the Environmental Assessment.
109	American Wild Horse Conservation (AWHC)	Consideration should be given to ecosystem services provided by wild horses to the range. To fulfill its mandate to manage wild horse populations in a manner that supports a thriving natural ecological balance, the BLM must give consideration to the ecosystem services provided by wild horses on the range. These services include contributions to plant and soil health, seed dispersal, habitat creation for other species, fire mitigation, and carbon sequestration. Rather than focusing solely on perceived negative impacts, a more balanced approach would evaluate both the positive and negative ecological roles of wild horses.	Refer to Sections 1.1 and 1.3 of the EA. Available data confirms that wild horse numbers are currently in excess of the level at which a thriving natural ecological balance can be maintained. See sections
110	Multiple Responses	They also create natural water catchments by wallowing, serve as a prey or scavenged species for mountain lions, coyotes, bears, wolves, foxes, birds, etc. Last but not least, these mustangs reduce dry flammable grasses, forbs, and some bushes or those that later in the drier season become such.	Outside the scope of this analysis.

111	Mary Mabry	Our wild horses help to reduce wildfire fuels when grazing on our public lands which is critical in these times of climate change whereby wildfires are more prevalent. Our wild horse's natural grazing habits also help restore native grasses which supports healthier ecosystems on our public lands.	Comment Noted. Monitoring data specific to the Complexes currently available to BLM shows that excess numbers of wild horses are present in the HMAs and that this overpopulation of wild horses is adversely impacting forage and water resources. In many areas with heavy or severe utilization, utilization is attributable solely to wild horses because there has been no livestock grazing.
112	Wild Horse Education (WHE) Laura Leigh Tammi Adams	Impacts to fire fuels from removal of wild horses and burros is required by NV BLM and ordered by federal court. BLM failed to provide up-to-date studies, methods, and analyses specifically regarding WHB impacts to fire fuels including analysis of climate impacts and impacts to AMLs.	Appendix XII Literature Reviews on Effects of Gathers, Ecological Interactions, and Population Growth Suppression Methods includes references to the potential positive ecological benefits that wild horses can affect when present at low densities relative to available natural resources. However, potentially positive effects are generally outweighed by degradation that can result when wild horses are present at levels beyond what fosters a thriving natural ecological balance (i.e., above AML).
113	Monica Ross	Wild horses contribute positively to ecosystems through soil enrichment, seed dispersal, and wildfire prevention. These benefits should be acknowledged and incorporated into management plans.	Refer to response to comment 111 and 112. Monitoring data specific to the Complexes currently available to BLM shows that excess numbers of wild horses are present in the HMAs and that this overpopulation of wild horses is adversely impacting forage and water resources. In many areas with heavy or severe utilization, utilization is attributable solely to wild horses because there has been no livestock grazing.
114	Linda Wagner	What specific impact would wild horses in each HMAP have on fire fuel loads if kept at current population numbers? Give the scientific source used to figure this data and for each HMAP. State the BLM and USFS current formula for figuring impact of livestock grazing and land susceptibility to wildland fire in each HMAP/WHT.	See section 3.12 Fire/Fuels of the Environmental Assessment.

115	Wild Horse Education (WHE) Laura Leigh Tammi Adams	How much forage is estimated in the area and how is it divided up?	The BLM analyzed forage utilization and potential impacts of the proposed action and alternatives on forage availability in the EA.
116	Form Letter 3	Neglecting Water Scarcity & Environmental Impact: Areas like Maverick Medicine face seasonal water crises, which are worsened by expanding mining projects—yet BLM fails to address this issue. Wild horse removals also impact fire fuels, but there is zero analysis of these consequences.	See section 1.1 Background and section 3.12 Fire/Fuels of the EA. The WFRHBA requires BLM to manage horses in a manner that is designed to achieve and maintain a thriving natural ecological balance on public lands (16 USC 1333(a)). Wild horse & Burro (WH&B) Manual Sec: 4.1.1 Self-Sustaining states: "WH&B shall be managed as self-sustaining populations of healthy animals in balance with other uses and the productive capacity of their habitat." Sec: 4.1.4 Minimum Feasible Level of Management (2)" It is not consistent with management at the minimal level to provide supplemental feed or rely on water developments that require frequent maintenance…" There is no active mining in the Maverick-Medicine HMA.
Mining			
117	Form Letter 2	The HMAP is the place to address the water emergencies faced seasonally in areas like Maverick Medicine as mining expands without addressing the issue and making it worse every single year. Nowhere in the alternatives does BLM address this, or any other, water improvement.	Refer to Appendix XIII HMAP Management Objectives Table. There is no active mining in the Maverick-Medicine HMA. The WFRHBA requires BLM to manage horses in a manner that is designed to achieve and maintain a thriving natural ecological balance on public lands (16 USC 1333(a)). Wild horse & Burro (WH&B) Manual Sec: 4.1.1 Self-Sustaining states: "WH&B shall be managed as self-sustaining populations of healthy animals in balance with other uses and the productive capacity of their habitat." Sec: 4.1.4 Minimum Feasible Level of Management (2)" It is not consistent with management at the minimal level to provide supplemental feed or rely on water developments that require frequent maintenance…"

118	Rebecca Falk	There needs to be information on mining in the area. How much land has been damaged and impacted by the mine.	The EA notes mining in Section 4.0 and Appendix I of the EA.
119	Multiple Responses	Neither does it seem that mining or other resource affecting activities have been considered.	Refer to response to comment 118.
120	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM fails to adequately identify mining and energy projects through description and mapping.	Refer to response to comment 118.
121	Linda Wagner	Describe any toxic or open mine sites left anywhere in project areas by past mining activity and how they will be mitigated.	Refer to response to comment 118.
122	Linda Wagner	Define how TNEB includes wild horses and how the impacts of mining and industrial encroachment have hurt the ability of the wild horse to thrive. How will this be addressed: to keep a genetically viable herd healthy on the range?	Refer to response to comment 118. Mining is outside the scope of the EA.
Other			
123	Ashley O'Flaherty	I strongly urge BLM to implement aggressive and immediate herd reduction strategies. Ideas worth exploring include: Allowing public gathers with a tag system for adoption or training programs and Partnering with local residents who are willing to assist in humane and proactive management efforts.	These alternatives are outside the scope of the EA. Refer to response to comment 24.
124	Thomas Healing	Please allow Nevada residents to extirpate all feral horses and burros from all public lands at any time with any legal weapon, without requiring a permit. Unregulated killing of feral horses and burros, exactly the same as coyotes.	These actions are not in compliance with the Wild and Free-Roaming Horses and Burros Act of 1971.
125	Multiple Responses	They are not "wild horses" they are feral. Please remove all of them as they are harmful to native species.	Refer to response to comment 24 and 124.

126	Neal Dach	No action alternative	Comment Noted.
127	Katie Fite WildLands Defense	Why is BLM Using March 2024 census data now? How do the horses change areas of use can move across this HMA lands over the course of the year. How were livestock grazed on these lands for the months prior to , and during the census? Doesn't BLM usually census horses in late spring? Where are the horses then?	The most recent inventory flight data is included in section 1.1 Background and Appendix I Maps 4 & 5 of the EA. Refer to response to comment 60.
128	Multiple Responses	BLM does not address water emergencies seasonally.	See Appendix XIII HMAP Management Objectives Table.
129	Carolyn Borkowski	BLM has not disclosed rangeland health reports, water inventory data, critical habitat maps, or mitigation strategies for ongoing industrial expansion (e.g., mining). These are precisely the types of disclosures an HMAP is supposed to deliver.	See Appendix I Figures Maps 6 and 7 of EA.

130	Nevada Department of Wildlife (NDOW)	Due to degraded habitat conditions resulting from excess WHB in the Antelope Complex and Triple B Complex HMA's, wildlife experience greater stress, resulting in displacement into lower quality habitat and increased competition for resources, potentially leading to local population declines. Several studies conducted in the Great Basin have demonstrated that feral horses can negatively impact mule deer, pronghorn, bighorn sheep, and greater sage-grouse. Several of these studies have found a direct competitive interaction between wild ungulates and WHB through a behaviorally mediated avoidance by wildlife, especially surrounding water sources. Some studies have indicated indirect effects to wildlife from WHB including reduced water and forage availability, compaction of soils, and degraded range and riparian conditions.	Comment Noted.
131	Friends of Animals (FOA)	BLM should consider the physical, social, and behavioral impacts of the proposed roundup, and subsequent captivity, on wild horses.	Refer to Appendix XII Literature Reviews on Effects of Gathers, Ecological Interactions, and Population Growth Suppression Methods.
132	American Wild Horse Conservation (AWHC)	Consideration should be given to ecosystem services provided by wild horses to the range.	Refer to response to comment 112.
133	American Wild Horse Conservation (AWHC)	To proceed responsibly, the agency must deepen its understanding of the genetic information of the subject horses.	The EA notes genetic information in Section 3.3 Wild Horses and Appendix XII Literature Reviews on Effects of Gathers, Ecological Interactions, and Population Growth Suppression Methods.

134	American Wild Horse Conservation (AWHC)	The agency should uphold transparency and accountability by ensuring that future removal operations are open to public observation.	Refer to Appendix IV Gather Operations Standard Operating Procedures and Appendix V Wild Horse Gather Observation Protocol.
135	American Wild Horse Conservation (AWHC)	The agency should enforce animal welfare standards and hold contractors accountable	The EA notes the Comprehensive Animal Welfare Policy (CAWP) in Section 3.3 Wild Horses.
136	American Wild Horse Conservation (AWHC)	The agencies should consider the implementation of new methods to more accurately address land health issues.	Available data indicates there are excess wild horses that need to be removed from the range to ensure a thriving natural ecological balance
137	Multiple Responses	Capture methods and foaling season protections are missing.	The EA notes capture methods in Section 3.3 Wild Horses and in Appendix IV Gather Operations Standard Operating Procedures (SOPs). The EA notes foaling season in Section 6.0 Consultation and Coordination.
138	Multiple Responses	Throughout the document, I also noticed a major tendency to assign cause to wild horses for deteriorating environmental conditions, such as soil erosion or excessive consumption of forage damaging to plants, animals, etc., when a more honest and inclusive consideration of all the factors involved, including especially livestock grazing and trampling, OHVs, Mining, excessive pumping by wells and drawdown of water tables, etc., are most likely to blame.	Refer to response to comment 136.
139	Wild Horse Education (WHE) Laura Leigh Tammi Adams	We request that BLM extend the comment period for the Antelope Complex and Triple B Complex HMAP (DOI-BLM-NV-L060-2025-0001-EA) to 60 days.	The BLM considered this request but respectfully declines to extend the comment period.

140	Wild Horse Education (WHE) Laura Leigh Tammi Adams	Information, data, and evaluations provided by Nevada BLM are not adequate nor sufficient for this NEPA process, such as failure to provide mining maps, fencing maps, seasonal and perennial water resources, etc. Referencing data and making assertions but providing no link to data nor analyses to determine accuracy of assertions violates NEPA and lacks scientific integrity.	Refer to response to comment 129.
141	Wild Horse Education (WHE) Laura Leigh Tammi Adams	Considering BLM has cited over 11 separate management documents in the MER as basis for this NEPA process, and failed to provide even ONE of the management documents (2008 Ely RMP, Cherry Creek WHT Mgmt. Plan, NV Rangeland Monitoring Handbook, Strategic Plan For Management of Wild horses and Burros on Public Lands, etc.), all 11 documents should be transparently provided to the public for review.	Through the EA BLM has provided a list of all references it is not required to provide copies of the documents.
142	Wild Horse Education (WHE) Laura Leigh Tammi Adams	NV BLM claims to have historic and present-day rangeland health assessments according to the NV Rangeland Monitoring Handbook and BLM policy for Rangeland Health Monitoring and Analyses yet failed to provide that data for transparent public review,	Through the EA BLM has provided a list of all references it is not required to provide copies of the documents.
143	Wild Horse Education (WHE) Laura Leigh Tammi Adams	NV BLM reports "average" wild horse removal numbers but not totals. BLM failed to provide WHB capture reports for 1971-2024, the years established in this BLM EA Management report	See tables 3,4,5, and 6 of the Antelope and Triple B Complexes Herd Management Evaluation Report.

144	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM failed to transparently provide mapping to include all multiple uses (past, present and proposed) within the Complexes, including impacts to range acreage and resources from mining, fencing, recreation, public encroachment, solar farms, etc.	Refer to response to comment 129.
145	Wild Horse Education (WHE) Laura Leigh Tammi Adams	Climate impacts to rangeland health (as directed by Presidential Executive Order) and indicator/key species are not concise nor provided by NV BLM in response to climate impacts on the Complexes.	Executive Order 14154, Unleashing American Energy (Jan. 20, 2025), and a Presidential Memorandum, Ending Illegal Discrimination and Restoring Merit-Based Opportunity (Jan. 21, 2025), require the Department to strictly adhere to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 et seq. Further, such Order and Memorandum repeal Executive Orders 12898 (Feb. 11, 1994) and 14096 (Apr. 21, 2023). Because Executive Orders 12898 and 14096 have been repealed, complying with such Orders is a legal impossibility. The BLM verifies that it has complied with the requirements of NEPA, including the Department's regulations and procedures implementing NEPA at 43 C.F.R. Part 46 and Part 516 of the Departmental Manual, consistent with the President's January 2025 Order and Memorandum. The BLM has also voluntarily considered the Council on Environmental Quality's rescinded regulations implementing NEPA, previously found at 40 C.F.R. Parts 1500–1508, as guidance to the extent appropriate and consistent with the requirements of NEPA and Executive Order 14154.

146	Wild Horse Education (WHE) Laura Leigh Tammi Adams	Water repairs and improvements must be created to repair existing waters available to wild horses and burros and to better distribute populations. BLM failed to plan any management actions for resource development and monitoring in this PEA. There are a number of waters that have needed repair for decades. This is BLMs opportunity to address repairs of water, fence removal to allow access to water and new range improvements. BLM has approved numerous modifications for livestock outside the LUP/RMP by including them in “mitigation.” For wild horses, BLM has failed to identify one single area of critical concern (seasonal migration, foaling grounds, etc.) for wild horses to allow fair and reasonable action.	See Appendix XIII HMAP, Management Objectives Table. Comment 148.
147	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM failed to provide an alternative nor analysis regarding removal of impeding fences to allow freeroaming behavior and protect genetic health. Nor did BLM analyze the management of WHB safe cattleguards in the Complexes.	Comment Noted. Fences do exist within the HMAs but they are open ended and do not restrict wild horse movement throughout the HMAs. Cattleguards consideration will be given to the comment moving forward with the Environmental Assessment and HMAP.
148	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM failed to provide management for and analyze site-specific HMA foaling seasons - after years of manipulation utilizing fertility control drugs- including analyses of current and future impacts to foaling seasons and duration.	Refer to response to comment 54.
149	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM failed to provide management determinations for conditions that would trigger full closure to livestock, mining, utilities, “green energy,” and recreation to protect habitat and resources for wild horses and burros.	RMP amendments are outside the scope of the EA.

150	Wild Horse Education (WHE) Laura Leigh Tammi Adams	If BLM is incapable of providing the public digitized rangeland health data for the Final HMAP is released, then they must at least provide the rangeland health monitoring book and original data in the BFO and WFO for public review.	Refer to section 3.0 Affected Environment/Environmental Effects and Appendix VIII Permitted Grazing Use and Rangeland Health Standards Summary Table 3 and Table 4 of the EA.
151	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM failed to provide the mandated annual rangeland health reporting (RIME/AIM) data and information, including significant factor determination evaluation. Nor has Nevada BLM provided DOI with strategies to achieve progress towards healthy rangelands. BLM failed to provide management and range-monitoring plans to include frequency and medium (water, air, soil, & forage) goals, and objectives (including CWA, CAA, EPA and TSCA listed hazardous materials - such as arsenic, mercury, cadmium, lead, etc., utilized in hardrock mining/exploration) in the HMAPs, including significant factor determination evaluations and strategies to achieve progress towards healthy rangelands capable of supporting the wild horses and burros in the Complexes.	Refer to response to comment 150.
152	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM failed to provide the BLM/NPS/CSU report(s) on impacts of GonaCon fertility control vaccine on the Theodore Roosevelt National Park wild horses for transparent public review and demonstration of science and scholarly integrity.	See section 8.5 Citations Related to PZP, GonaCon and Sex Ratio of the EA.

153	Wild Horse Education (WHE) Laura Leigh Tammi Adams	In accordance with previous BLM policy for WHB management, BLM failed to provide management planning, actions, and guidelines (an SOP) in the HMAP so that any wild horse or burros (mares, studs, geldings, & foals) released back to the range shall be branded with a wildlife tracking number for monitoring and tracking information.	See Appendix II Standard Operating Procedures for Mare Fertility Control Treatments SOPs, Appendix III Field Castration (Gelding) SOPs, and section 8.5 Citations Related to PZP, GonaCon and Sex Ratio of the EA.
154	Wild Horse Education (WHE) Laura Leigh Tammi Adams	Because so many WHBs being illegally shot on the range, BLM must provide strategies in the Draft HMAP EA for keeping WHBs' safe and address the violence on the range.	Refer to response to comment 35.
155	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM has not released a single data point demonstrating that any roundup that has ever occurred in these complexes has moved toward achieving TNEB in any fashion. Therefore, BLM has not demonstrated that historic practices with the stated purpose of achieving AML have ever worked. Hence, BLM must suspend these practices and analyze alternatives such as limiting profit driven uses such as mining and livestock	Refer to the Antelope and Triple B Complexes Management Evaluation. The High end of AML has been achieved on two occasions in the past twenty years. Without achieving and maintaining AML it is unlikely to see a TNEB. Mining, livestock permits, and their associated administrative management is outside the scope of this document.
156	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM failed to provide the public with a simple "participate now" link on its eplanning.gov website to assist public participation during this NEPA process. This confused much of the public as emails to WHE brought the fear that the comment period had been closed. Please provide the simple "participate now" link to the public during this ongoing NEPA process and for all future BLM NEPA processes.	Comment Noted.

157	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM failed to provide mitigation of impacts from multiple uses ON the WHBs, range, habitat, and resources. The HMAP is the place to address issues like water emergencies faced seasonally in areas like Maverick Medicine as mining expands without addressing these issues (over 20 years) and makes it worse every single year. BLM fails to provide any alternatives to address this, or any other, water improvement.	Refer to response to comment 117.
158	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM failed to provide nor consider managing the WHB Complexes of public lands "under principles of multiple use and sustained yield."	The Bureau of Land Management's mission is to sustain the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations. A Multiple-Use and Sustained Yield Mission Congress tasked the BLM with a mandate of managing public lands for a variety of uses such as energy development, livestock grazing, recreation, and timber harvesting while ensuring natural, cultural, and historic resources are maintained for present and future use. To do this, we manage public lands to maximize opportunities for commercial, recreational, and conservation activities. This promotes healthy and productive public lands that create jobs in local communities while supporting traditional land uses such as responsible energy development, timber harvesting, grazing, and recreation, including hunting and fishing.
159	Wild Horse Education (WHE) Laura Leigh Tammi Adams	BLM failed to transparently provide the public with the number and content of public comments provided during scoping. Public interest in this project should be transparently provided to the public.	The EA notes public scoping in section 6 Consultation and Coordination.

160	Joy Burk	A line item must be included in the HMAP for BLM to continue long-term monitoring for genetic diversity of wild horses within both the Antelope and Triple B Complexes, as recommended by Dr. Gus Cothran. [Pg. 236, Preliminary EA].	See section 2.4.1 Population Management of the EA.
161	Linda Wagner	Give detailed Water Resource Inventory Lists and plot on maps for each complex project area. Inventories are needed for each eventual HMAP. Include geographic locations, flow rate, use by industry, wildlife, wild horses, livestock grazing and all other commercial operation users. Rank and compare user intake volume. Include times of greatest usage Plot commercial water access points in relation to access points for wild horses. Use overlay maps to give a big picture status of where each user is in relation to each HMAP total land area (HMAP).	Refer to response to comment 129.
162	Michelle Benes	Critical elements are missing: rangeland health assessments, water resource inventories and improvement plans, essential habitat designations, and mitigation strategies for expanding mining and other industrial activities.	Refer to response to comments 19, 118 and 129.
163	Colette Kaluza Laurie Ford	Fences and cattle guards and water sources should be mapped in the EA to assess horses access to water and cattle guards should be retrofitted for horses and wildlife safety.	Comment Noted. Cattleguard consideration will be given to the comment moving forward with the Environmental Assessment and HMAP. Map showing fences and primary water sources can be found in Appendix I.
164	The Cloud Foundation	The EA fails to include requirements to adequately address the protection of wild horses/burros during all management actions.	The EA is in conformance with all land use plans, regulations, laws and statutes that are applicable to the protection of wild horses during all management actions on public lands.

165	The Cloud Foundation	EA Fails to Analyze the Installation of Cameras on Helicopters, at Trap Sites and Temporary Holding Pens to Provide Meaningful Public Observation in Compliance with First Amendment Rights	In accordance with WO IM 2013-058: "The public/media are prohibited from riding or placing equipment in the helicopters contracted for a gather. The National Gather Contract §C.9.d specifies that "under no circumstances will the public or any media or media equipment be allowed in or on the gather helicopter while the helicopter is on a gather operation. The placement of public/media cameras or recording equipment on panels, gates and loading equipment including trucks and trailers are also prohibited."
166	Laurie Ford	As with livestock use, energy development sectors must be identified as issues demanding further analysis due to the corresponding impacts on rangeland health and the wild horse population and their habitat as they continue to grow and expand.	Energy development on public lands is outside the scope of the EA.
167	Laurie Ford	BLM fails to provide links to key documents so the public can submit informed, complete comments.	Through the EA BLM has provided a list of all references. The BLM is not required to provide copies of the documents.
168	Laurie Ford	Wild horses are contributing to not meeting Rangeland Health Standards throughout most of the Antelope and Triple B Complexes and in some cases are the sole contributor (See Appendix VII). (pg. 7)	Comment Noted.
169	Laurie Ford	The HMAP portion of this document – Appendix X111 – does not provide any specific monitoring data or use pattern mapping on utilization as discussed below.	See tables 7,8,9 and 10 along with maps 4 and 5 in the Antelope and Triple B Complexes Management Evaluation Report.
170	Laurie Ford	If gathers are to be considered as a potential management tool within the HMAP, BLM must provide an opportunity to address handling practices during gathers that this draft continues to fail to address.	The EA notes Gather Standard Operating Procedures in Appendix IV.

171	Congresswoman Dina Titus	I urge BLM to take a science-based, humane, and cost-effective approach to managing wild horse and burro populations. The continued reliance on helicopter roundups undermines animal welfare by routinely creating frightening and often deadly situations for equines. This practice is neither sustainable nor aligned with BLM's directive to "humanely capture" wild free-roaming horse and burro populations. I am deeply concerned that helicopter-drives are identified as the "primary gather techniques" under Alternatives A, B, and C for the Antelope and Triple B Complexes proposed HMA plan.	See Appendix IV Gather Operations Standard Operating Procedures (SOPs) and Appendix XII Literature Reviews on Effects of Gathers, Ecological Interactions, and Population Growth Suppression Methods of the EA
172	Jannett Heckert	CAWP - Enforceable welfare rules SHOULD be a priority. Year-after-year BLM refuses to complete the actual process to formalize rules and Congress fails to hold them accountable. Here is evidence of the lack of care in the gather of wild horses and burros. You need to follow regulations created by your own organization.	Refer to section 3.3 Wild Horses. The BLM will be in compliance with the agency's Comprehensive Animal Welfare Program standards.
173	Jannett Heckert	Current Climate Change policies clearly mandate climate related changes and impacts be included in analysis of proposed action (like a gather). BLM has failed to include current veterinary standards, adopted a decade ago, for Heat Index and Air Quality Index. Any use of motorized vehicles for capture of wild horses and burros must include clear guidelines such as those used by the National Weather Service.	Refer to response to comment 172.

174	Jannett Heckert	BLM is currently prohibited from using helicopter drive trapping during foaling season. BLM failed to define site-specific baseline foaling seasons and has now manipulated natural foaling season using multiple fertility control methods. BLM must clearly define current and site-specific foaling seasons to comply with this regulation prior to any roundup.	See section 3.3 Wild Horses of the EA.
175	Joy Burk	A line item must be included in the HMAP for BLM to petition the Nevada Division of Water Resources - ADJUDICATION OF VESTED WATER RIGHTS; APPROPRIATION OF PUBLIC WATERS, for short and long-term management of wild horses within both Complexes. This objective must be implemented as soon as possible.	The WFRHBA requires BLM to manage horses in a manner that is designed to achieve and maintain a thriving natural ecological balance on public lands (16 USC 1333(a)). Wild horse & Burro (WH&B) Manual Sec: 4.1.1 Self-Sustaining states: "WH&B shall be managed as self-sustaining populations of healthy animals in balance with other uses and the productive capacity of their habitat." Sec: 4.1.4 Minimum Feasible Level of Management (2)" It is not consistent with management at the minimal level to provide supplemental feed or rely on water developments that require frequent maintenance…"
176	Wild Horse Education (WHE) Laura Leigh Tammi Adams	Nowhere are capture methods addressed beyond using the exact copy/past used in the 2017 gather EA that was proven inadequate.	See Appendix IV Gather Standard Operating Procedures.
177	White Pine County Board of County Commissioners	The current situation in the Antelope and Triple B Complexes is inconsistent with the County's Policy Plan in that the overpopulation of horses is in fact resulting in adverse impacts on important values and multiple uses.	Comment Noted.

178	Mason Winship	Wild horses are not a native species to Nevada and should be treated as an invasive species. Mule deer, elk, bighorn sheep, and antelope should not have to compete for food and water. Let’s protect our native species.	Comment Noted.
179	Colonel John D Reeed	Wildlife in general loses out big time as these horses breed uncontrollably. Pictures from horse enthusiasts always show healthy animals, wind in their manes, etc. In fact, many are sick and starving. Big game, specifically mule deer and pronghorn, are pushed off of springs, while the horses stomp all over the springs, rendering them useless to wild, native species. I have seen it personally while hunting.	Comment Noted.
180	Sherm Swanson	It should be noted that the ecosystem engineer concept (paragraph 9) for the intermittent Amargosa River streambed where horses dug to a shallow water table and made it available to other wildlife would not apply to perennial or intermittent riparian areas where stabilizing riparian vegetation is needed to maintain riparian functions that keep water available into dry seasons (USDOI 2015, 2020). In these riparian systems digging and trampling often initiate or exacerbate erosion that dehydrates impacted riparian areas and makes water less available to other wildlife (Burdick et al. 2021). This is similar to the impacts often noted for poorly managed livestock grazing such as protracted periods of grazing (Wyman et al 2006, Swanson et al. 2015, Swanson 2024).	Comment Noted.