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**Bureau of Land Management
Environmental Assessment**

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**Pryor Mountain Wild Horse Range (PMWHR)
Joint Herd Management Area Plan (JHMAP), Revision
Appropriate Management Level (AML),
Wild Horse Gather Plan,
and Proposed RMP Plan Amendment (MD WH-7)**



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1 Introduction

1.1 Summary of Proposed Project

This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental consequences of implementing a new Pryor Mountain Wild Horse Range Joint Herd Management Area Plan (HMAP) that identifies management objectives for the Pryor Mountain wild horses and the Pryor Mountain Wild Horse Range (PMWHR), and of conducting gather operations to remove excess wild horses. The HMAP and gather plan would allow for continued fertility control treatment as well as gather operations to achieve Appropriate Management Levels (AMLs) and a population that allows for a “thriving natural ecological balance” (TNEB) as mandated under the Wild Free-Roaming Horses and Burros Act (WFRHBA) of 1971, as amended.

In addition, this EA analyzes and discloses the effects of a proposed amendment to the Billings Field Office Resource Management Plan Management Decision (MD) WH-7 with respect to how the Pryor Mountain wild horses are managed to maintain acceptable levels of genetic diversity.

The EA is a site-specific analysis of potential impacts that could result with the implementation of a proposed action or alternatives to the proposed action. The EA assists the BLM, in partnership with the US Forest Service (USFS) and National Park Service (NPS), in project planning, ensuring compliance with the National Environmental Policy Act (NEPA), and determining whether any “significant” impacts could result from the analyzed actions. “Significance” is defined by NEPA and is found in regulation 40 Code of Federal Regulation (CFR) 1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of “Finding of No Significant Impact” (FONSI). If the decision maker determines that this project has “significant” impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a Decision Record (DR) may be signed for the EA approving the selected alternative, whether the proposed action, another alternative, or a combination of the alternatives. A DR, including a FONSI statement, documents the reasons why implementation of the selected alternative would not result in “significant” environmental impacts (effects) beyond those already addressed in the Billings Field Office Resource Management Plan (RMP)/Final EIS (September 2015) and the Custer Gallatin National Forest Plan Final EIS and Record of Decision, dated January 2022.

1.2 Background

The 2009 Pryor Mountain Wild Horse Range/Territory HMAP functioned as an activity level plan to implement established management objectives and actions for the Pryor Mountain horses and resources on the PMWHR. The plan guided management of the horse population using a combination of population control techniques including gathers, fertility control, natural means, or a combination of prescriptions, and identified management actions that would be completed on the PMWHR including construction of perimeter fencing and development of numerous water features. The 2009 HMAP further established that the wild horses on the PMWHR would be managed for a phenotype (set of observable characteristics) animal reminiscent of a “Colonial Spanish Mustang” as described by “Sponenberg North American Colonial Spanish Horses” while balancing colors, sex ratios and age structures. The overall goal was to manage for healthy wild horses within healthy productive habitats or rangelands.

The 2009 HMAP also established an AML of 90-120 horses for the PMWHR. AML is the number of adult horses or burros to be managed within a Herd Management Area (HMA). As described in the BLM Wild Horses and Burros Management Handbook H-4700-1, AML Upper Limit refers to the maximum number of Wild Horses and Burros (WH&B) that results in a TNEB and avoids a deterioration of the range. AML Lower Limit refers to the number that allows the population to grow to the AML upper limit over 4-5 years, without the need for gathers to remove excess WH&B in the interim. As part of BLM’s decision on the 2009 HMAP, the BLM committed to collect monitoring data to re-calculate the AML within five years or after the revision of the Billings RMP, whichever came first. Under management direction contained in the 2009 HMAP, BLM gathered and removed

excess wild horses from the range in 2009, 2012, and 2015. In 2015, the BLM approved a decision for fertility control treatments, which BLM continues to implement.

In September 2015, the BLM approved a new Resource Management Plan (RMP) for the Billings Field Office (BIFO). The new RMP provided that the wild horse population would initially be managed within a population range between 90 to 120 wild horses (MD WH-1), and that implementation level planning would occur through an HMAP or other activity level plan to identify and set objectives including, but not limited to, herd composition, animal characteristics, genetics, and habitat development needs; soil, vegetation, and watershed characteristics; and establishment and adjustment to AML (MD WH-3). Further the RMP provides that AMLs will be adjusted as needed to ensure a thriving natural ecological balance (MD WH-4).

In a July 2016, the United States District Court for the District of Montana, Billings Division found that the BLM committed to recalculating the 2009 HMAP AML by 2015 in the Record of Decision approving the 2009 HMAP, but failed to do so in accordance with H-4700-1, the BLM's Wild Horses and Burros Management Handbook. See *Friends of Animals v. Sparks*, 200 F. Supp. 3d 1114, 1126 (D. Mont. 2016). Following the court's decision, in December 2016, the BLM Billings Field Office prepared the Pryor Mountain Wild Horse Range AML Recalculation Report, which concluded that the AML of 90-120 horses would achieve a thriving natural ecological balance. In August 2018, the Billings Field Office issued a Final EA, Record of Decision, and FONSI (2018 Gather Decision), authorizing a bait and water trapping gather based on the Recalculation Report. However, shortly thereafter, a separate challenge was filed to the 2018 Gather Decision, which resulted in the district court enjoining BLM from conducting the proposed gather. See *Kathrens v. Zinke*, 323 F. Supp. 3d 1142, (D. Mont. 2018). The district court held that BLM was required under the court's decision in *Sparks* to recalculate AML, but likely failed to satisfactorily do so. The district court also held that the 2018 Gather Decision likely failed to adequately consider the loss of patrilineal lines, as well as the ramifications of the loss of horses selected for removal with respect to loss of genetic lines.

This EA analyzes the impacts of re-evaluating the AML to sustain healthy WH&B populations and healthy rangelands over the long-term and discloses the environmental effects of the proposed action and three additional alternatives, including No Action, for revised HMAP objectives that include population control and selective removal criteria, and rangeland and riparian management. Preparation of an EA assists the authorized officer to determine whether to prepare an EIS if significant impacts could result, or a FONSI if no significant impacts are expected.

1.3 Purpose and Need for Action

The purpose and need of this project are to address the following:

1. Develop a new Pryor Mountain Wild Horse Range Joint HMAP that will establish short and long-term objectives for management of both the wild horse population as well as the rangelands, vegetation, and riparian areas within the boundaries of the PMWHR. The new HMAP will supersede all previous HMAPs and serves as the Territory Plan for the USFS and HMAP for the BLM. The USFS lands are designated as a "territory" and the BLM lands are designated as an HMA.
2. Re-evaluate the AML to determine the number of horses that may be maintained on the PMWHR while ensuring a TNEB, preserving multiple use relationships, and making progress towards Standards for Rangeland Health. The BLM committed in the 2009 Pryor Mountain HMAP to recalculate the AML within five years, or upon revisions of a new RMP, whichever came first. Under the district court decisions discussed above, the BLM must re-evaluate the AML in accordance with H-4700-1, Wild Horses and Burros Management Handbook.
3. Develop a Multi-Year Gather Plan that would allow for gather and removal operations to achieve low AML. The gather plan would allow the BLM to achieve and maintain AML, protect rangeland resources from further deterioration associated with the current overpopulation, and restore and maintain a thriving

natural ecological balance and multiple use relationship on public lands in the area consistent with the provisions of Section 1333 (b) of the Wild Free-Roaming Horses and Burros Act of 1971 (WFRHBA).¹

4. Amend the 2015 Billings Field Office RMP Management Decision (MD) WH-7 to be consistent with Federal laws, regulations and policy related to management of genetic diversity in wild horse populations.

1.4 Decision to be Made

The BLM, USFS, and NPS work cooperatively in the long-term management of the PMWHR. Each agency has final management and decision-making authority for their respective portions of the PMWHR, including population management, establishing appropriate management level (AML), habitat conditions, and monitoring associated with its portions of the PMWHR.

In addition, the BLM will decide whether to amend Management Decision (MD) WH-7 in the 2015 RMP to manage for genetic diversity consistent with management guidance in the BLM Wild Horse & Burro Handbook. The USFS and NPS may also make decisions consistent with their statutory authorities related to management of the PMWHR.

1.5 Land Use Plan Conformance

BLM: The 2015 Billings Field Office RMP sets land use plan decisions on approximately 434,154 acres of BLM-administered surface and 889,479 acres of BLM administered minerals in the Billings Field Office, including the BLM portion of the PMWHR. Land use decisions consist of desired outcomes (goals and objectives) and allowable uses and management actions. The RMP identifies three management goals and nine management decisions (MD) pertaining to the PMWHR. These goals specify that BLM should manage the Pryor horses within the appropriate management level (AML), make progress towards achieving Standards for Rangeland Health, maintain a diverse age structure, genetic diversity, and any characteristics unique to the Pryor horses, and to manage wild horses within a balanced program which considers all values without impairment to the productivity of the land (Goal WH 1, 2 and 3). Applicable management decisions establish that the wild horse population will initially be managed within a population range between 90 to 120 wild horses (MD WH-1), maintain a diverse age structure, genetic diversity, and any characteristics unique to the Pryor horses (MD WH-2) as well as other management decisions related to development HMAPs within the existing boundaries of the PMWHR, adjusting AMLs, and utilizing vegetation and/or water developments to increase forage availability (MD WH 3-6 and 8-9). Alternatives 1 through 3 would require an amendment to the BLM 2015 Billings RMP with respect to MD WH-7, discussed in detail below. RMP conformance is discussed under each alternative.

USFS: The 2022 Custer Gallatin National Forest Land Management Plan (LMP) provides forestwide direction, which includes desired conditions, goals, objectives, standards, guidelines, and suitability of lands for national forest uses and activities (referred to as Plan components). There is also “geographic area” direction specific to certain areas or places, which also applies. The Pryor Mountains Geographic Area (PMGA) includes the Pryor Mountain Wild Horse Territory (PMWHT) that adjoins other portions of the PMWHR. The LMP identifies components specific to the PMGA for endemic species including desired conditions to provide resilient ecosystems and conservation values that retain the value associated with future potential designation as a proposed or established botanical area and provide resilient habitat conditions for the area’s regional endemic and peripheral plant species occurrences (PR-DC-VEGNF 01 and 02). A standard for invasive species treatments in

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

locations of regional endemic and peripheral plant occurrences provides protections (PR-STD-VEGNF-01). Standards are mandatory and established to help achieve or maintain desired conditions, to avoid or mitigate undesirable effects, or to meet legal requirements.

In addition, the LMP identifies components specific to the PMWHT, including one desired condition, two goals, six standards, and suitability of the territory for other uses specific to the PMWHT. The desired condition is that the PMWHT maintains a thriving ecological balance with other resources and activities (PR-DC-WHT-1). The goals include cooperation and coordination with BLM to achieve efficient and successful management of the entire PMWHT (PR-GO-WHT-1), and coordination with BLM and other Federal and State agencies to maintain or enhance wild horse habitat and appropriate management level in a manner which is compatible with wildlife habitat and population numbers (PR-GO-WHT-2). Of the six standards for PMWHT, the standard related to this project is “new range improvements shall not attract horses into the Lost Water Canyon Research Natural Area or Lost Water Canyon Recommended Wilderness Area” (PR-STD-WHT-5). The suitability components are not applicable to this project, but as an example they do not allow timber production or permitted livestock grazing but do allow timber harvest or fuels management to achieve desired conditions such as wild horse habitat enhancement, public safety, or ecological restoration (PR-SUIT-WHT-1). Conformance with LMP components is discussed under each alternative.

1.5.1 Proposed BLM Billings Field Office Resource Management Plan Amendment

Under Alternatives 1, 2, and 3, BLM is proposing to amend MD WH-7 consistent with RMP Goal WH-2, but more closely aligned with management guidance in the BLM Wild Horses and Burros Management Handbook H-4700-1.

The 2015 RMP does not define “all representations in the herd” in management decision (MD) WH-7 which currently reads:

- MD WH-7: Herd Characteristics: Within an HMAP, herd structure will be managed for all representations in the herd, not allowing specific colors or bloodlines to dominate from management manipulation.

In the 2018 Gather Decision, the BLM interpreted this management direction to mean that each active breeding mare would have at least one progeny to carry forward into the next generation based upon an implementation objective on page 27 in the 2009 HMAP. However, as discussed above, the district court ultimately concluded that BLM established this one progeny rule without consideration of the loss of patrilineal lines, which suggested to the court that BLM may have acted arbitrarily and capriciously in its decision.

Under the RMP, the intent of MD WH-7 was to limit the loss of genetic diversity, consistent with Goal WH-2, which directs the BLM to “Maintain a wild horse herd that exhibits a diverse age structure, genetic diversity, and any characteristics unique to the Pryor horses.” However, *maximizing* genetic diversity at the expense of ecosystem sustainability was not a goal or directive for the herd. Two out of three Goals and seven out of nine WHB Management Decisions clearly identify that the herd be managed at population sizes that are bounded by finite available lands and natural resources (these include wild horse Goals 1 and 3, and MD WH-1, MD WH-3, MD WH-4, MD WH-5, MD WH-6, MD WH-8, and MD WH-9).

Unfortunately, the wording of MD WH-7 is ambiguous, and the interpretation that every crossing of any given mare and any given stallion should leave a surviving foal that is left on the range (i.e., a “representation” of the bloodline resulting from that particular crossing) that is kept in the herd is not practical to implement for several reasons. The foremost impracticality is that, if the foals from every pairing of any stallion and any mare are interpreted to be a “representation,” then that precludes removal of any animal unless it has full siblings. However, because individual stallions sire offspring with multiple mares, and individual mares may mate with multiple stallions, there would be an ever-increasing number of “representations” in the herd. In other words, if one offspring must be kept on the range from every mare/stallion pairing, then population recruitment rate would

far exceed the death rate, resulting in undesirable population growth. AML would be mathematically impossible to achieve. Moreover, the BLM cannot cause all patrilineal or matrilineal lines to be propagated. When considering patrilineal lines, not all stallions get to reproduce; breeding is often limited to the band stallion, and some horses may forever remain a bachelor stallion.

There are also practical matters related to the well-being of animals that are removed from the wild. Wild horse adoption programs tend to more readily place younger animals into homes – animals 3 years and younger are more adoptable (Bender and Stowe 2020) and transition more readily to domestic life compared to an older horse. However, when young horses are gathered and removed from the range, many of them will not have reached maturity, nor produced any offspring.

Although each individual represents a unique combination of available genetic material, maintaining a herd that largely retains the genetic material and diversity presently in the herd does not depend on each individual reproducing with each mate. Genetic information present in a specific mare and a specific stallion was also shared with their cousins, aunts, uncles, and more distant relatives. The genes (alleles) from the specific mare and stallion can still be maintained in the Pryor Mountain herd even if offspring from any particular pairing are removed, because there are numerous members of the herd that possess similar genetics.

It is for these reasons that BLM is proposing to amend MD WH-7 consistent with RMP Goal WH 2 but more closely aligned with management guidance in the BLM Wild Horses and Burros Management Handbook (H-4700-1). The 2015 Billings Field Office RMP would be amended so that MD WH-7 would state the following:

- MD WH-7: Maintain desirable levels of genetic diversity, as measured by Observed Heterozygosity (H_o). Observed heterozygosity is a measure of how much diversity is found, on average, within individual animals in the HMA. If H_o drops below thresholds identified in the BLM Wild Horses and Burros Management Handbook H-4700-1, then BLM would take any combination of the following actions to reduce the possible risks associated with inbreeding depression:
 - 1) maximize the number of fertile, breeding age wild horses (6-15 years) within the herd;
 - 2) adjust the sex ratio in favor of males (but with not more than approximately 60 percent males); and/or
 - 3) introduce mares or stallions from other wild horse HMAs. Prioritize introductions from herds with characteristics similar to the Pryor Mountain horses, such as the Sulfur herd in Utah, the Cerbat Mountain herd in Arizona, or others.

Current Handbook H-4700-1 guidance notes that heterozygosity values below the mean for feral populations are an indication that the WH&B herd may have genetic diversity issues worthy of closer attention. Herds with observed heterozygosity values that are one standard deviation below the mean, or lower, are considered at critical risk. For DNA-based (hair follicle) samples analyzed at a defined set of 12 microsatellite loci this value is 0.66.

In February 2013, a set of 45 hair follicle-based genetic diversity monitoring samples was collected from the Pryor Mountain herd. Laboratory and population genetics analysis of the 45 samples collected in early 2013 (Cothran 2013) indicated that values for observed heterozygosity ($H_o=0.720$), mean number of alleles per locus ($MNA=6.25$), and allelic diversity ($A_e=4.01$) in the Pryor Mountain herd were above the mean for feral horse herds (mean values: $H_o=0.716$, $MNA=6.06$, $A_e=3.87$). Dr. Cothran (2013) suggested that the decline in genetic variability observed in 2013, relative to previous sampling occasions, may have been due to the population size of the herd and due to management efforts to remove wild horses that were the descendants of recently introduced animals (those efforts had been undertaken to increase the prevalence of Spanish-like phenotypes in the herd). Dr. Cothran (2013) recommended that no action was needed in 2013 to maintain adequate genetic diversity levels but suggested that the herd could drop below the mean heterozygosity for feral herds by 2023 if trends continued. However, genetic diversity levels have remained relatively high, as indicated by results from analyses of fecal DNA collected noninvasively from horses on the range in 2020 and 2021. Appendix N is a report by Zimmerman et al. (2022) which found that observed heterozygosity based on 79 individuals genotyped was equal to that

estimated by Cothran in 2013 ($H_o=0.72$). Although the mean number of alleles per locus from the 2020-2021 samples was slightly higher if all 79 samples were considered ($MNA=6.40$), it was lower if only a subset of 20 samples was used ($MNA=5.87$). Regardless, both results are still within one standard deviation of the mean for feral horse herds (SD for $H_o=0.056$, SD for $MNA=1.09$) and therefore consistent with H-4700-1 guidance to maintain genetic diversity. Continued monitoring of genetic diversity will provide valuable information for management. BLM would continue to collect hair follicle samples for genetic monitoring during future gather operations.

Maintaining desirable levels of genetic diversity would also help to assure a variety of colors are maintained in the Pryor Mountain horse herd. Pryor Mountain horses exhibit a variety of colors with common colors including dun, grulla, bay, black, and roan. Less common colors that appear in the herd include red or apricot dun, chestnut, sorrel, palomino, and buckskin. A 1970s report on the Pryor Mountain Horse Range by BLM biologist Ron Hall noted that palominos, pintos, and appaloosa were not present on the PMWHR at that time. However, palominos are present on the range today, as result of the introduction of mustangs from other HMAs. Color is a phenotypic representation of dominant or recessive genes passed through generations. A horse that is a rare color may or may not produce offspring that are also a rare color (Sponenberg 1996). MD WH-2 provides that BLM shall *Maintain a wild horse herd that exhibits a diverse age structure, genetic diversity, and any characteristics unique to the Pryor horses*, and color will generally be addressed through the Selective Removal Criteria.

1.6 Relationship to Laws, Regulations, and Other Plans

The **Federal Land Policy and Management Act of 1976 (FLPMA)** requires that an action under consideration by the BLM be in conformance with applicable BLM land use plans, and be consistent with other Federal, State, local, and tribal policies to the maximum extent possible.

Wild Free-Roaming Horses and Burros Act of 1971; PL 92-195 as amended by PL-579 (FLPMA) and PL 95-514 (PRIA): Wild horses and burros are considered an integral part of the national system of public lands. The WFRHBA provides the BLM and the USFS the authority and responsibility to manage healthy wild horse and burro populations on healthy rangelands in a “thriving natural ecological balance and multiple use relationship” (16 USC 1333(a)). Under the WFRHBA, WH&B are to be managed in a manner designed to achieve and maintain a thriving natural ecological balance and protect the range from the deterioration associated with WH&B overpopulation. WH&B shall be managed as self-sustaining populations of healthy animals in balance with other uses and the productive capacity of their habitat.

36 CFR Part 222 Subpart D (USFS). Provides direction to 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 natural 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). Requires establishment of territories in accordance with the WFRHBA and analysis of the territory, and based on that analysis, development and implementation of a management plan.

43 CFR 4700.0 et. seq. Provides for management of wild horses and burros as an integral part of the natural ecosystem under the principle of multiple use, and at self-sustaining populations that maintain free-roaming behavior. These regulations also establish requirements for management within an appropriate management level, management at the minimal feasible level necessary, removal of excess animals and making them available for adoption and other regulatory requirements.

Wild Horses and Burros Management Handbook (H-4700-1). H-4700-1 provides further guidance for the protection, management and control of wild horse and burros in accordance with the 1971 Wild Free Roaming Horse and Burro Act, as amended, and the implementing regulations in 43 CFR 4700.

Forest Service Manual 2260 Wild Free-Roaming Horses and Burros: Provides further guidance when wild free-roaming horses and burros roam part of the year on National Forest lands and part of the year on lands

administered by BLM, the authorized officers of the two agencies should develop and approve a single territory plan. The plan should include agreement on inventory, desired population level, determination of excess animals, planning, management, protection, control, capture methods, and responsibility for initiating action.

PMWHR Wild Horse Range Fertility Control EA, March 2015; DOI-BLM-MT-0010-2015-0006-EA. This EA and associated decision authorized use of the Porcine Zoonosis Vaccine (PZV) vaccine for population control efforts on the Pryor Mountain horses.

In addition, the Proposed Action is in conformance with the following Acts, regulations, and policy:

- 36 CFR Part 219 (2012 Planning Rule)
- Taylor Grazing Act (TGA) of 1934
- FLPMA of 1976 (43 U.S.C. 1701 et seq.) as amended
- Public Rangelands Improvement Act of 1978
- ESA of 1973, as amended
- Bald and Golden Eagle Protection Act of 1962
- BLM Manual 6840 – Special Status Species Management
- USFS Manual 2670 Threatened, Endangered, and Sensitive Plants and Animals
- 36 CFR 219.9 – Species of Conservation Concern
- National Forest Management Act (NFMA) 1976
- Migratory Bird Treaty Act
- Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds
- IM 2008-50, Migratory Bird Treaty Act – Interim Management Guidance
- NEPA of 1969, as amended
- American Indian Religious Freedom Act of 1979
- Archaeological Resource Protection Act of 1979
- NHPA of 1966, as amended
- Appropriations Act, 2001 (114 Stat. 1009) (66 Fed. Reg. 753, January 4, 2001)
- Invasive Species, Executive Order 13112, Amended 2016 E.O. 13751

1.7 Issues Identified for Analysis

The BLM scoped draft HMAP objectives for 30-day public comment in May 2020 and received over 1,300 comments. See Section 4.2 for more information on the public scoping process. Based upon review of public comments and internal scoping, the BLM identified the following analysis issues:

Wild Horses

- How would proposed removal criteria affect genetic diversity?
- How would proposed gather and fertility control criteria affect population growth trends (including age class, sex ratios and growth rates) and body condition/health?

Rangeland Condition

- How will proposed management actions affect rangeland health?
- How will proposed management actions affect riparian condition at Cottonwood Spring, Sykes Spring, and Layout Creek?

BLM Sensitive Species-Plants

- How would proposed management actions affect the known habitat and plant population of the BLM Sensitive Species, Pryor Mountains Bladderpod (*Lesquerella lesicii*)?

Wildlife Habitats

- How would grazing pressure by wild horses affect health and integrity of habitats for wildlife?

Cultural Resources

- How would proposed management activities affect cultural resources?

1.8 Issues Identified but Eliminated from Further Analysis

Several potential issues including but not limited to cultural and visual resources, recreation, tribal affiliation, fire/fuels management, invasive and noxious species and wilderness study areas were considered by the interdisciplinary team but were dismissed from further analysis. The rationale for these conclusions can be found in the Interdisciplinary Team Checklist Contained in **Appendix A**.

Effects of Bait/Water Trapping and Helicopter Capture Techniques on wild horses

BLM would use bait/water trapping as the capture methods for planned gathers. However, BLM may utilize helicopter gathers under emergency situations if horses must be quickly removed and/or bait/water trapping would be ineffective. The BLM has completed an in-depth review of the effects of gathering wild horses utilizing both bait trapping and helicopter gathers, and those effects are described in detail in **Appendix H**.

Effects of Removal on Herd Dynamics: Like all other wild horse herds, the Pryor Mountain horses live in family groups represented by a band stallion with a harem of mares and their immature offspring, varying in size from two to about eight individuals. Under all four Alternatives considered, the essential patterns of relations between horses present on the range would be expected to continue to be consistent with that seen in other wild horse herds (Boyd et al. 2016). There is every expectation that those animals who remain on the range would continue to exhibit free-roaming behaviors. The band stallion typically travels at the rear of his band, sires all the offspring, and ensures the safety of his band. The lead mare is usually the one to lead the band to water and new areas for grazing. Young stallions will leave their natal herds and may form bachelor herds, comprised of juvenile males who are still sexually immature or stallions who are not part of a family group. There are also satellite stallions that may be allowed to hang onto the outskirts of a band that already has a band stallion. Satellite stallions may interact with a band, acting as an extra set of eyes for the band, and potentially stopping to face a threat while the band and lead stallion run for safety. In some cases, a satellite stallion may challenge the band stallion for control of the herd. When horses are removed from the range, it is expected that the remaining horses would establish new dominance hierarchies. Stallions remaining on the range could be expected to challenge each other for access to bands with mature females.

BLM Sensitive Species (SS)-Plants and USFS Species of Conservation Concern (SCC)-Plants

The BLM Manual 6840-Special Status Species Management establishes procedures for implementing measures to conserve sensitive species and their habitats to promote their conservation and reduce the likelihood and need for them to be listed pursuant to the Endangered Species Act (ESA). There are currently five BLM sensitive status plants within the project area, four of the species are discussed below as eliminated from further analysis. One of these four is also a USFS Species of Conservation Concern (*Shoshonea*). The fifth species, Pryor Mountains Bladderpod (*Lesquerella lesicii*), will be carried forward for further analysis in chapter 3.

USFS Species of Conservation Concern (SCC) are those species, other than federally listed threatened, endangered, proposed, or candidate species, that are known to occur in the Land Management Plan area, and for which the regional forester has determined that the best available scientific information indicates substantial concern about the species capability to persist over the long-term in the plan area (36 CFR 219.9; FSH 1909.12.52).

Forest Service Manual direction (FSM 2670) requires that proposed activities be reviewed for their potential effects on threatened, endangered and sensitive (TES) species, and outlines policies, objectives, and procedures for conducting the reviews. For national forests and grasslands operating under the 2012 Planning Rule, sensitive species are no longer designated, and species of conservation concern are tracked instead. Currently there is no Manual guidance for SCC species. However, requirements that pertain to species listed under the Endangered

Species Act and generally govern the biological evaluation of project activities and the coordination with other agencies still apply. There is one known SCC species within the project area, *Shoshonea pulvinata* which is discussed below.

Cary's Beardtongue (*Penstemon caryi*) (BLM SS) is regionally endemic to the Bighorn and Pryor mountains of north-central Wyoming and south-central Montana. It is a glabrous perennial herb. The habitat for Cary's Beardtongue is stony, calcareous soils in Douglas-fir forests, juniper woodlands and sagebrush steep from the montane to lower subalpine zone. It is found in disturbed, semi-open habitats, often occurring on sparsely vegetated outcrops, slopes of limestone or dolomite, and in road-cuts (Fertig, 2002; Heidel and Handley, 2004). The potential threat is habitat loss due to encroaching anthropogenic activities, such as limestone quarrying and road construction (Stone, Ward, Farenwald, Lutz, Wolfe, 2019). A study was conducted and published in 2019 which stated, "Although we found moderate to high levels of genetic diversity, this species is still of conservation concern due to the anticipated effects of global climate change on species with narrow distributions, fragmented populations, and small populations sizes." (Stone, Ward, Farenwald, Lutz, Wolfe, 2019). The alternatives do not include encroaching anthropogenic activity's; therefore, this species was considered but eliminated from further analysis.

Shoshonea (*Shoshonea pulvinata*) Shoshonea is a species that is considered as both a BLM Sensitive Species and USFS Species of Conservation Concern. It is regionally endemic to the region of northwestern Wyoming and adjoining south-central Montana. It is a mat-forming, herbaceous, long-lived perennial with woody taproot and branching underground stems. In Montana, Shoshonea grows on thin, rocky soils of open, exposed limestone outcrops, ridgetops, and canyon rims at elevations from 6,400 to 7,950 feet. Monitoring data has been collected every 7 years for a span of 25 years for the Shoshonea plant. That data was used to complete a trend report in 2016. The monitoring conducted in the Pryor Mountain Wild Horse Range was partially initiated by concerns that wild horse and native ungulate populations could have a negative impact on the Shoshonea population within the range. A trail used by wild horses and by game animals, crosses through and parallels the Mystery Cave Road transect. This provides a good setting to observe the effects of animal use on Shoshonea plants as the trail has been present since at least 1991. Herbivory, soil compaction, and soil surface disturbance was not observed on the transect during the seven years of monitoring. This indicates that in the span of 25 years, Shoshonea plants at this site are not negatively impacted by wild horses or native ungulates (Pipp, 2016) and that habitat and the plant populations would be maintained. Therefore, there would be "no impact" under any of the alternatives and this species was considered but eliminated from further analysis.

Thick-leaf Bladderpod (*Physaria pachyphylla*) (BLM-SS) is a regionally endemic species, occurring only in the Pryor Mountain Desert of south-central Montana and in the Big Horn Basin of north-central Wyoming. It is a loosely mounded perennial herb with a rosette-like growth form. As of 2020, Montana has 10 species occurrences located in two geographical areas. Nine of the 10 species of occurrence occur within 10-miles of one another between Gypsum Creek and Bighorn River. In Montana, the habitat for Thick-leaf Bladder pod is dry, barren, and stony, yet edaphically diverse soils in the Pryor Mountain Desert which occur on exposed slopes, ridges, and valleys. The species is limited to pinkish or reddish soils derived from limestone or a combination of limestone and diatomaceous earth at elevations ranging from 300 to 1,600 meters above sea level. In Wyoming, the habitat is associated with outcrops in the Chugwater Formation which consists mainly of siltstones and shales with interspersed sandstones. The formation is brick-red in color, caused by the oxidation of iron minerals in the rock. Current and potential long-term threats to thick-leaf bladderpod are gypsum mining, invasive species, and recreation (Montana Heritage Program Field Guide); because the alternatives do not include the current or potential long-term threats this species was considered but eliminated from further analysis.

Big Horn Fleabane (*Erigeron allocotus*) (BLM-SS) is regionally endemic of Montana and Wyoming. It is a taprooted perennial with a usually branched caudex. In Montana it is known only from the Pryor Mountain Desert-Bighorn Basin area of Carbon and Big Horn Counties. This species can be common in areas where it is found. The habitat is stony, sparsely vegetated, limestone or calcareous sandstone-derived soil of exposed ridges and cliffs in the valleys and montane zone. There has been no documentation and/or observation of a decline in

trend data of this species or a negative impact correlated between this species and wild horse use; therefore, this species was considered but eliminated from further analysis.

Montana Species of Concern (SOC)-Plants

There are currently 14 Montana SOC plants documented within the project area. There has been no documentation and/or observation of a decline in trend data for these species or a negative impact correlated between these species and wild horse use; therefore, they were considered but eliminated from further analysis. Refer to the PMWHR land health assessment in **Appendix B** for additional information regarding Montana Species of Concern in the project area.

BLM Special Status Species (western bumble bee; *Bombus occidentalis* and Suckley's cuckoo bumble bee; *B. suckleyi*)

Western bumble bee and its nest parasite, Suckley's cuckoo bumble bee, are generalist foragers with ranges overlapping the PMWHR. Western bumble bee was observed during a Rangeland Health Assessment site visit in 2021 at the north end of the horse range. Poor grazing management can limit forage and nesting resources for pollinators in general (The Xerces Society 2018). However, floral resources on the horse range, particularly at higher elevations, were abundant and do not appear to be limiting. Horses preferentially forage on grasses, leaving most flowering plants untouched. Western bumble bees typically nest underground, and presence of wild horses likely is not affecting existing or potential nest sites. Suckley's cuckoo bumble bee does not make its own colony but takes over and lays its eggs in the colonies of western bumble bees, the workers of which rear the cuckoo's offspring as their own siblings. Climate and water availability are greater factors influencing bumble bee habitat in the PMWHR. Therefore, western bumble bee and Suckley's cuckoo bumble bee have been eliminated from further analysis.

Cultural Resources

A total of 129 cultural resource sites are found in the horse range. Twenty-five sites are on BLM managed land, ten are on USFS lands, two are on private land and 100 sites are located on NPS managed land. Twenty-four of these have been determined eligible for the National Register of Historic Places (NRHP). Fifteen of the eligible sites are precontact. These include five Lithic Material Scatters (LMS), six tipi rings, two cairns, and one buffalo jump. One site, a petroglyph site, is already listed on the NRHP. Two of the eligible sites are historic, a cribbed log structure and an historic land marker. Two sites contain both historic and prehistoric components: both lithic and historic material scatters and the Bad Pass/Sioux Trail. Five of the eligible sites could not be attributed to a time period. A total of 27 sites have been determined ineligible for listing on the Register. Sixteen of these sites are precontact, including two rock shelters, ten LMS sites, a quarry site, and two Culturally Modified Trees (CMT). The remaining eleven ineligible sites are historic, including four historic land markers, one stock raising site, a mining site, two cribbed log structures, two historic material scatters and one historic road/trail, the Transpark Road (Hwy 37).

Seventy-six of the known sites remain unevaluated for the Register. Of these sites, 58 are precontact, including 25 tipi-ring sites and 23 sites containing lithic material concentrations. One site is a game drive line, three are stone cairns, two are rock shelters, two contain petroglyphs, and one is a vision quest structure. Seven of the unevaluated sites are historic, including two buildings, one dump, two cairns/land markers, a crib logged structure and a fire hearth/roasting pit. Twelve of the unevaluated sites cannot be attributed to a time period. These are ten rock cairns, one rock shelter and one grave site. Thirty cultural resource inventories or investigations have occurred within the horse range, dating back to 1952. Eighteen of the inventories have occurred within the last two decades.

None of the alternatives would impact cultural resources in the horse range differently than the status quo. Trap sites and temporary holding facilities would be located in previously used sites or other disturbed areas whenever possible. Undisturbed areas identified as potential trap sites or holding facilities would be inventoried for cultural resources prior to use. If cultural resources are encountered, these locations would not be utilized unless they could be modified to avoid impacts to cultural resources.

Paleontological Resources

The area in the southern part of the PMWHR known as the south administrative pasture has been closed to horse use since 1984. It contains paleontological resources dating back to the early Cretaceous time period. The 2015 RMP MD WH-6 provides that BLM shall *designate the closed portions of the Herd Area known as the administrative pastures to be included in the HMA. Due to private property conflicts, the “buffer” area will remain closed.* While the effects of wild horse movements on fossils have not been well studied, potential damage could occur from trampling including breakage and scattering of important artifacts. The BLM is not proposing to open the south administrative pasture with the HMAP revision, which would require additional NEPA and contain monitoring requirements for assessing damage to known paleontological resources.

Forest Vegetation Objectives or Treatments

No forest vegetation objectives or treatments are addressed in this HMAP. The Pryor Mountain horses rely heavily on rangeland and riparian vegetation and grazing patterns and use affect these resources disproportionately compared to forest vegetation. Any forest or fuels treatments proposed in the future within the boundaries of the PMWHR would be analyzed consistent with the National Environmental Policy Act and consistent with management direction in the 2015 Billings RMP and the 2022 Custer Gallatin National Forest LMP.

Wild Horse Tourism

Wild horses are part of iconic Western Culture. The Pryor Mountain Wild Mustang Center in Lovell, WY was incorporated in 1998 and serves as a local source of information, conducting wild horse research and providing educational programs. Information about the center comes from their website www.pryormustangs.org. The center provides information to tourists with maps and directions on best locations to potentially find horses, along with offering school field trips. Full day guided tours are also offered mid-May through September. The Center reported visitation in 2017 as 4,000 people from all 50 states and 29 foreign countries. The tours had 221 people, which was considered to be around max capacity. In 2022 and 2023, the Center reported visitation around 3,000 people. Anecdotal evidence indicates tourists highly value their ability to see these charismatic horses on public lands. Although alternatives that reduce the herd population may also reduce the probability of a visitor seeing a wild horse, it is anticipated that the remaining animals will continue to visit current population viewing locations, such as where water is available, and therefore tourism will not be adversely impacted under the alternatives by any measurable means.

2 Alternatives

This section of the EA describes the Proposed Action and alternatives, including any that were considered but eliminated from detailed analysis. Based upon internal and external scoping comments, BLM will consider four alternatives in detail:

- **Alternative 1- Continue Existing Management with RMP Plan Amendment:** Alternative 1 carries forward all management objectives and decisions from the 2009 HMAP and the 2015 Fertility Control EA and related decisions. BLM would complete one or more gathers to remove excess horses from the range following selective removal criteria in the 2009 HMAP, which manages the population for a phenotype animal reminiscent of a “Colonial Spanish Mustang” as described by “Sponenberg North American Colonial Spanish Horses” while balancing colors, sex ratios and age structures. Alternative 1 includes the proposed RMP plan amendment to MD WH-7 as described in Section 1.5.1. since the selective removal criteria in the 2009 HMAP conflicts with MD WH-7 in the 2015 Billings Field Office RMP. This would allow selective removal criteria from the 2009 HMAP and fertility control while maintaining genetic diversity.
- **Alternative 2 – Proposed Action:** BLM would approve an HMAP with new objectives for managing the wild horse population, including fertility control and selective removal criteria, and new objectives for managing rangeland vegetation, riparian ecosystems, and sensitive plant *Lesquerella lesicii*. ZonaStat-H (native PZP) would remain the preferred method for reducing population growth; however other BLM approved fertility control vaccines such as GonaCon-Equine could also be used. Mares would be primed at

18 months, treated at age 2-3 and then mares 4 or older would not be treated until after they have successfully foaled once, which is defined as a foal living to 1 year of age. BLM would complete one or more gathers to remove excess horses from the range following selective removal criteria that maintain a level of genetic diversity to avoid inbreeding depression and maintain characteristics that are typical of Pryor Mountain horses of mixed ancestry including Colonial Spanish. After removing horses with genetic defects or closely inbred individuals, horses would be randomly gathered/removed to meet desired age class and sex ratios. BLM would conduct gathers until low AML is achieved. After that, a new determination of excess would be made under the WFRHBA before the BLM removed any additional excess animals from the range. Alternative 2 includes the proposed RMP plan amendment to MD WH-7 as described in Section 1.5.1 to gather/remove horses following selective removal criteria that maintains genetic diversity consistent with guidance in the BLM Wild Horses and Burros Management Handbook H-4700-1. This would allow new objectives, selective removal criteria, and fertility control including GonaCon-Equine while maintaining genetic diversity.

- **Alternative 3 – Lineage based decisions:** Alternative 3 was developed in response to public comment and provides differing objectives for fertility control and selective removal criteria. Rangeland health, riparian and sensitive species objectives would be the same as Alternative 2. PZP vaccines would be the only fertility control that would be administered. Mares would be primed at 18 months, treated at age 2-3 and then mares would resume treatments upon birth of a second foal. BLM would utilize information from publicly available Pryor Mountain Wild Mustang Center field guides and BLM data to inform decisions about which horses would be removed. Selective removal criteria would prioritize removal of excess siblings from the range, retaining two offspring per mare, but could remove additional offspring or mothers, if necessary, to meet gather objectives. As with Alternative 2, BLM would conduct gathers until low AML is achieved. After that, a new determination of excess would be made under the WFRHBA before the BLM removed any additional excess animals from the range. Alternative 3 includes the proposed RMP plan amendment to MD WH-7 as described in Section 1.5.1 to gather/remove horses following selective removal criteria that maintains genetic diversity consistent with guidance in the BLM Wild Horses and Burros Management Handbook H-4700-1.
- **Alternative 4: Continue Existing Management, No RMP Plan Amendment:** Alternative 4 is a No Action Alternative that does not include the RMP amendment or a gather. This alternative carries forward all provisions in the 2009 HMAP and 2015 Fertility Control EA. However, BLM would not implement the selective removal criteria to complete a gather because it conflicts with MD WH-7 in the 2015 Billings Field Office RMP.

2.1 Management Actions Common to Alternatives 1-3

- The initial gather is expected to occur in 2025-2026 and would be completed by bait and water/trapping until removal objectives are achieved. Several factors such as animal condition, herd health, weather conditions, or other considerations could result in adjustments in the schedule. BLM would conduct gathers until low AML is achieved. Alternatives 1-3 all are expected to yield annual growth rates of close to 4% per year (Appendix J). As a result, though the specific timing of gather(s) after AML is achieved would depend in part on national funding and other logistical considerations, one can make a reasonable guess about herd growth. For example, one could expect the herd would grow by approximately 17% over a 4-year period if growth is 4% per year. After that, a new determination would be made under the WFRHBA as to future removals to achieve or maintain AMLs.
- Gather operations would be conducted in accordance with the BLM's Comprehensive Animal Welfare Program (CAWP) policy. The primary capture methods would be bait/water trapping. However, BLM may utilize helicopter gathers under emergency situations if horses must be quickly removed or if bait/water trapping is ineffective.
- Trap sites and temporary holding facilities would be in previously used sites or other disturbed areas with established ingress/egress whenever possible. Undisturbed areas identified as potential trap sites or holding facilities, including ingress/egress to these new locations, would be inventoried for cultural resources prior to

use. If cultural resources are encountered, these locations would not be utilized unless they could be modified to avoid impacts to cultural resources.

- An Animal and Plant Health Inspection Service (APHIS) or other veterinarian will be on-site or on call during gathers to examine animals and make recommendations to BLM for care and treatment of wild horses. Decisions to humanely euthanize animals in field situations will be made in conformance with BLM policy.
- Genetic samples would be collected during gathers to determine whether the horses are maintaining acceptable levels of genetic diversity (i.e., avoiding high levels of inbreeding depression).
- Excess animals would be transported to Britton Springs or another holding facility, where they would be prepared for adoption, sale, or off-range pastures.
- BLM would consider utilizing road and/or area closures to assist in gather operations for the safety of the public, BLM personnel, and the wild horses.

2.2 Alternative 1: Continue Existing Management with RMP Amendment

Alternative 1 carries forward all objectives and decisions from both the 2009 HMAP and the 2015 Fertility Control EA, including provisions for management of the horse population and rangeland management, as well as the established AML of 90-120 horses.

It is important to note that the BLM Wild Horse and Burro Handbook describes the authorities, objectives, policies and procedures that guide the management of WH&B on the public lands administered by the BLM and provides guidance for the protection, management and control of WH&B in accordance with federal laws and regulations. The Handbook notes that the AML lower limit allows the population to grow (at the annual population growth rate) to the upper limit over a 4–5-year period, without any interim gathers to remove excess WH&B. While Alternative 1 (implement the 2009 HMAP) contains an objective to gather to the upper AML as long as fertility control is used, it does not comport with BLM guidance and policy direction to maintain horse populations within a lower and upper AML.

While Alternative 1 carries forward all provisions in the 2009 HMAP, there are conflicts between competing objectives in the 2009 HMAP resulting in inherent flaws. The 2009 HMAP contains herd characteristic objectives to manage the population for a phenotype reminiscent of a Colonial Spanish Type horse in order to prevent the loss of “Spanish” characteristics and to manage to prevent bloodlines from being eliminated while maintaining a core breeding population. The 2009 HMAP states these objectives would be accomplished by allowing each active breeding mare to have at least one progeny to carry forward into the next generation. However, the selective removal considerations would remove horses that do not exhibit the phenotype for a “Colonial Spanish Type” utilizing the Colonial Spanish Horse Type Matrix (which includes all horses that score as a 4 or 5; Tier 1, followed by removing horses that score as 3, tier 2 that are genetically well represented on the range. There is an inherent flaw with having an objective that allows each mare to have one foal, but then having selective removal criteria that removes horses that do not have a Spanish phenotype. Additionally, the selective removal criteria to remove horses without Spanish phenotypes conflicts with MD WH-7 in the 2015 Billings RMP that requires BLM to manage for all representation in the herd. The previously established selective removal criteria relies on the proposed RMP plan amendment in order to be implemented.

2.2.1 HMAP Objectives

The BLM would continue to manage the PHMHR as set forth in the 2009 HMAP and the 2015 Fertility Control EA. Overall management goals include:

- Manage wild horses and resources to preserve and maintain a thriving natural ecological balance and multiple use relationships.
- Manage for healthy wild horses within healthy productive habitats or rangelands.
- The wild horses on the PMWHR would be managed for a phenotype animal reminiscent of a “Colonial Spanish Mustang” as described by “Sponenberg North American Colonial Spanish Horses” while balancing colors, sex ratios and age structures.

- The population would be managed using a combination of population control techniques including gathers, fertility control, natural means, or a combination of prescriptions.

The AML would remain set at 90 to 120 horses, excluding foals less than one year of age. The 2009 HMAP carried forward a 1992 Amendment that helicopters may be used to move and capture wild horses except during foaling period. However, the Billings Field Office Manager implemented bait/water trapping after 2009 to alleviate concerns the public expressed regarding continued use of helicopter gathers. Management, Monitoring, and Implementation Objectives for Alternative 1 related to horse population, range and riparian management are summarized in Section A in **Appendix O**. Additional objectives from the 2009 HMAP are incorporated by reference and not summarized in Section A.

2.2.2 Gather/Removal

The wild horse population would be reduced to the high range of AML (120 horses) with continued application of PZP. BLM would reduce the population to about 150 horses in the first gather and would complete additional gathers to manage the horse population towards the high range of the AML. BLM would prioritize removal of horses identified as Tier 1 under the selective removal criteria (**Appendix E**).

The selective removal criteria in the 2009 HMAP utilizes the Colonial Spanish Horse Type Matrix developed by Dr. Sponenberg and Chuck Reed (**Appendix D**). This matrix evaluates horses for their relative consistency with Spanish type conformation and scores a variety of conformational traits related to Colonial Spanish Horse type. A score near 1 for each trait is most consistent with an Iberian origin, those with a score near 5 are much less typical. The selective removal criteria first remove horses with scores of 4 and 5 that do not exhibit phenotypes representative of the “Colonial Spanish Type.” After horses scoring 4 and 5 are removed, horses that score 3 which are genetically well represented on the range would be removed. After those criteria have been met, selective removal criteria are based on age. Herd characteristics management objectives (**Appendix O**) also state an objective to manage to maintain rare or unusual (for the Pryors) colors in order to prevent any one color becoming dominant or being eliminated.

Tier 1. Horses not exhibiting phenotypic “Colonial Spanish Type” utilizing the Colonial Spanish Horse Type Matrix which score 4 or 5.

Dr. Phillip Sponenberg visited the PMWHR in 2009 and scored 94 horses, of which 9 scored as a 4 or a 5. The BLM consulted Dr Sponenberg during the preparation of this EA and asked if the current horses would need to be scored, or if the BLM could identify and remove the descendants of the horses identified as 4s and 5s. Dr. Sponenberg indicated that removing all descendants of Category 4 and 5 would remove the non-Spanish phenotypes, and that another site visit would not be necessary to evaluate phenotypes (personal communication May 19, 2021). Of those nine horses originally scored as a 4 or a 5, four of them do not have any descendants living on the range: Bigfoot, Sierra, BJ Star, and Stiles. Quelle Colour, Conquistador, Coronado, Ireland, and Tecumseh have descendants currently living on the range (**Appendix E**). .

Under Tier 1 of the Selective Removal Criteria, the BLM would prioritize removal of all living descendants of Category 4 and 5 horses less than 20 years of age (**Appendix E, Table 12**). Neither Ireland (scored as a 4 by Sponenberg and still living on the range) nor Celt/Cascade (descendant of Ireland) would be removed because they would be 20 years old or older at the time of gather. This approach would remove all descendants of horses on the PMWHR that did not have Spanish phenotypes and retain those horses reminiscent of the Colonial Spanish horse. However, this approach could eliminate all descendants of five horses determined by Sponenberg to be non-Spanish in origin. **Table 1** below summarizes the Tier 1 horses that would be prioritized for removal sorted by sex and age class based on the spring 2024 population. Refer to **Appendix E, Table 12** for an example list of horses that would be prioritized for removal based on the spring 2024 population. Gather and removal lists would be updated based on the best-available population information immediately prior to the gather.

Table 1: Descendants of Horses Scored by Sponenberg as Non-Spanish Phenotypes that would be available for removal based on the spring 2024 population sorted by sex and age class. This table is intended to provide an

example of removals by age and sex, however gather and removal lists would be updated based on the best-available population information immediately prior to a gather.

Birth Year	2018-2021	2012-2017	2003-2011	Total
Age Class	1-4	5-10	11-19	
Mares	5	6	8	19
Stallions	10	7	6	23
Total	15	13	14	42

Tier 2. Horses that score 3 utilizing the Colonial Spanish Horse Type Matrix which are genetically well represented on the range.

Tier 2 of the selective removal criteria removes horses scored by Sponenberg as a 3 that are genetically well represented on the range. Similar to Tier 1, the horses identified for potential gather/removal under Tier 2 are the descendants of those horses scored by Sponenberg during his visit to the PMWHR in 2009. Sponenberg scored 18 horses as a 3, of which five do not have any descendants living on the range. For the purposes of identifying horses that are *genetically well represented* for potential gather/removal, the BLM identified four horses that have more than 10 descendants living on the PMWHR, each comprising more than 5 percent of the current horse population. While the 2009 HMAP does not define what *genetically well represented* means, if the objective in the 2009 HMAP is for each mare to have one surviving offspring, then horses with ten or more descendants would appear to have multiple individuals that could be removed, while still retaining representation on the PMWHR.

BLM would not remove any horse 20 years or older at the time of gather. BLM would preferentially remove Tier 1 horses during the initial gather but could remove Tier 2 horses to meet gather objectives. BLM would prioritize several Tier 2 horses for removal, as noted below:

- Ukko – result of father/daughter pairing
- Parry – result of a full-sibling pairing
- Greta, Feldspar, and Helenium – Non-responders to fertility control. As of spring 2024, Greta has 7 offspring, Feldspar has 7 offspring, and Helenium has 4 offspring on the PMWHR.

BLM could remove as many horses as needed from this Tier 2 list to meet gather objectives and/or AML but would prioritize for removal horses in the younger age classes and would retain at least 5 descendants from each of the horses originally scored by Sponenberg. There are 74 horses on this list. As of spring 2024, there are 200 adult horses on the PMWHR. If all 42 horses were gathered from Tier 1, then 38 or more horses would need to be removed under Tier 2 to meet AML. However, if not all 42 horses are gathered under Tier 1 (some may never be caught in a trap), then BLM could remove as many horses as needed from Tier 2 to meet gather objectives. Refer to **Appendix E, Table 13** for a list of specific horses that could potentially be removed under Tier 2.

Once BLM removes horses identified as Tier 1 and Tier 2 (leaving at least 5 descendants from each of the horses scored by Sponenberg), the BLM would make future selections based upon Tier 3-6 criteria.

The remaining Selective Removal Criteria include:

- **Tier 3** - Animals under five years old which are genetically well represented on the range.
- **Tier 4** - Animals between 11 and 15 years old which have contributed genetically and are not band Stallions.
- **Tier 5** - Animals between 5-10 years old.
- **Tier 6** - Animals 16 and over.

2.2.3 Land Management Plan Consistency

BLM cannot remove excess horses under Alternative 1 unless MD WH-7 in the 2015 RMP is amended as described in Section 1.5.1. The removal criteria to remove non-Spanish horses conflicts with MD WH-7 to manage herd structure for all representations in the herd. Further, an implementation objective in the 2009 HMAP is to ensure each active breeding mare would have at least one progeny to carry forward into the next generation. Tier 1 of the selective removal criteria is incompatible with the stated implementation objective, creating a conflict between the management and implementation objectives.

The 2009 HMAP selective criteria would remove all descendants of five horses scored by Sponenberg as a 4 or a 5. The selective removal criteria were designed to favor horses with a Spanish phenotype and promote the existence of the Colonial Spanish Horse. However, that is not a goal of the 2015 Billings Field Office RMP, and the selective removal criteria are not consistent with MD WH-2 to maintain genetic diversity, nor are they consistent with MD WH-7 to manage the herd structure for all representations in the herd. Furthermore, there is no law, regulation or policy that requires the BLM to manage for specific genetic representations.

Additionally, Alternative 1 assumes both gather (with RMP amendment) and fertility control are used and gather the horse population at a higher level compared to Alternatives 2 and 3 (gather to high AML as long as fertility control is used). With a horse population ranging from 120 to 150 or more horses (see section 3.3.2), it is unlikely that rangeland health would improve and it is questionable whether the existing condition, which is highly degraded, could even be maintained. Therefore, even with an RMP amendment, Alternative 1 does not meet BLM goals to make progress towards achieving Standards for Rangeland Health. This alternative also does not meet USFS plan component (PR-DC-WHT-01): PMWHT maintains a thriving natural ecological balance with other resources and activities.

Alternative 1 would be inconsistent with the Wild Free-Roaming Horses and Burros Act of 1971, as amended, 43 CFR 4700.0 et. seq., the BLM Wild Horse and Burros Management Handbook (H-4700-1), 36 CFR Part 222 Subpart D (USFS) and Forest Service Manual 2260 Wild Free-Roaming Horses and Burros which require the BLM and USFS to manage the population for a thriving natural ecological balance and consider multiple use relationships, protect the range from deterioration associated with overpopulation, and to meet standards for rangeland health.

2.3 Alternative 2: Proposed Action

The BLM scoped draft management, monitoring, and implementation objectives in May 2020. BLM refined Alternative 2 to further clarify and articulate objectives, and relate them to management goals and decisions in the 2015 Billings RMP and management guidance in the BLM Wild Horse and Burro Handbook H-4700-1. Alternative 2 most closely aligns with management guidance in BLM Handbook H-4700-1 and how BLM manages other wild horse populations across the West.

2.3.1 HMAP Objectives

The AML would be set at 107 to 120 horses, excluding foals less than one year of age, based upon the 2021 AML Re-Evaluation that is part of this analysis (Appendix C). The overall management goals of Alternative 2 are to:

- Manage wild horses and resources to preserve and maintain a thriving natural ecological balance and multiple use relationships.
- Manage for healthy wild horses, maintain a level of genetic diversity that avoids inbreeding depression, and maintain characteristics that are typical of Pryor Mountain horses of mixed ancestry including Colonial Spanish.
- Manage population growth using a combination of techniques including removals, fertility control, natural means, or a combination of prescriptions.

ZonaStat-H (native PZP vaccine) would remain the preferred method for reducing population growth. However, non-responders could be treated with other BLM approved fertility control vaccines such as, but not limited to GonaCon-Equine or be removed from the PMWHR. Mares ages 4 and older would not receive fertility control

treatments until after they have successfully foaled once, which is defined as a foal living to 1 year of age. As such, the delay in bringing the mares back onto treatment could give them an opportunity to become pregnant with a second foal.

BLM would conduct incremental gather/removal operations by bait/water trapping (no helicopter gathers except in emergency situations) to move the population towards AML. An immediate population reduction to AML would be difficult to achieve given the inherent difficulty associated with capturing wild horses using bait/water trapping, and would require the removal of many older age class animals. Younger horses adapt more easily to domestic life and tend to more readily be placed into private care. Conducting incremental gathers will allow BLM to remove more younger age class animals over a longer period and reduce the number of older age class animals that would need to be removed immediately and in total. An initial gather would reduce the population to around 150 horses. The BLM would then complete additional gathers and removals as necessary, and as expeditiously as possible to reach low AML. In accordance with the gather plan, the BLM would reduce the population to the lower AML while maintaining age class and sex ratios, and then allow the population to grow to the upper limit of AML before making a determination regarding the need for additional removals.

BLM would continue to collect fecal samples and/or hair samples to monitor Observed Heterozygosity (Ho). If Ho drops below thresholds identified in the BLM Wild Horse and Burro Handbook, then BLM could take one or more actions to maintain or increase genetic diversity under amended RMP MD WH-7 (see section 1.5.1 herein), including introducing wild horses from other herds with similar characteristics. Management, Monitoring, and Implementation Objectives for Alternative 2 are detailed in Section B of **Appendix O**.

2.3.2 Gather/Removal

Under Alternative 2, BLM would reduce the wild horse population to the lower range of AML (107 horses) to allow the population to grow to the upper limit over a 4 to 5-year period without additional removals. The BLM would conduct an initial gather and removal operation to bring the population down to about 150 horses. Additional removals would be conducted as necessary, and as expeditiously as possible, to reduce the population towards low AML. Any removals conducted after achieving low AML would occur only after making a new excess determination under 16 U.S.C. 1333(b)(2).

Horses would be selected for removal based upon the following selective removal criteria:

1. Remove any horse that has a genetic defect including but not limited to hernias, parrot mouth, dwarfism, clubfoot, and contracted tendons.
2. Remove any horse that is the result of father/daughter, mother/son, full sibling, or half sibling pairing.
3. Remove horses to meet desired sex ratios and age classes post gather. Horses would generally be gathered and removed as they enter a horse trap, but BLM would decide to remove or release specific horses to achieve desired sex ratios and age class for horses remaining on the PMWHR post gather.
 - Sex Ratio: Manage the sex ratio toward a ratio of approximately 50% males and 50% females in horses 1-19 years old. Manage the overall population such that the sex ratio is no more than 60/40 of either sex (however, if observed heterozygosity thresholds are not met, defer to RMP guidance).
 - Age Class: Manage wild horses to achieve as closely as possible the following relative age distribution:
 - 15-40% Young Age Class (Ages 1-4)
 - 20-45% Middle Age Class (Age 5-10)
 - 20-45% Old Age Class (Age 11-19 years)
 - <30% Very Old Age Class (Age 20+ years)
4. Preference would be to remove horses from the younger age classes first (1-4 followed by 5-10).
5. Remove horses from the older age class (11-19) only if necessary to meet AML and desired age class and sex ratios. If horses must be removed from the 11-19 age class, the preference would be to remove mares,

as females live longer than males. Attempt to remove horses on the younger range of this age class if possible.

6. Do not remove any horse 20 years or older.
7. Mares of any age that are non-responders to fertility control treatments could be prioritized for removal.
8. Consider color last. If possible, make removal selections to maintain a variety of colors on the PMWHR. Common colors include dun, grulla, bay, black, and roan, whereas less common colors include chestnut, sorrel, palomino, buckskin, and sabino.

BLM prepared an example list of horses on the PMWHR sorted by age class and sex and identified the number of mares and stallions that could be removed from each age class to meet desired age class and sex ratios based on the spring 2024 population. Horses meeting Criterion 1 (genetic defect) and 2 (representative of close inbreeding) would be prioritized for removal whenever possible. The selective removal criteria for Alternative 2 most closely aligns with BLM policy in the Wild Horse and Burro Handbook H-4700-1, which identifies age structure and sex ratio as two parameters for population management. Refer to **Appendix F** for an example list of horses that could be gathered/removed under Alternative 2 based on the spring 2024 population. However, gather and removal lists would be updated based on the best-available population information immediately prior to a gather.

Table 2. Example gather and removal goals under Alternative 2 based on the spring 2024 PMWHR population. No horses over the age of 20 would be removed, thus the population would comprise 13% in the 20+ age class post-gather. To minimize the number of 11-19 year olds that would need to be removed, the population could be maintained near the upper limit of the age class management goal, which is 45%, or 68 horses. To preferentially remove younger horses, the population could be adjusted toward the lower limit of the 1-4 age class management goal, which is 15% or 23 horses. The remainder of removals could target the 5-10 year old age class. Sex ratio goals are to manage the population toward a 50-50 sex ratio in horses 1-19 years old, not to exceed (NTE) 60-40 in either direction in the overall population as a result of removal decisions. The numbers and percentages in this table are goals, actual gather results are expected to vary based on logistics of trapping horses under field conditions. Wild populations regularly change due to births and deaths; gather and removal goals will be updated based on the best-available population information immediately prior to a gather.

Age Class	Spring 2024 Population					Post-Gather Goals			
	Females (F)	Males (M)	Total	%F-%M	% in Age Class	Remove	Number Remaining	% in Age Class	%F-%M
1-4	28	25	53	53-47	26.5%	30	23	15%	Manage toward 50-50
5-10	25	30	55	45-55	27.5%	16	39	27%	
11-19	43	29	72	60-40	36%	4	68	45%	
20+	20	0	20	100-0	10	0	20	13%	N/A
<i>TOTAL</i>	<i>116</i>	<i>84</i>	<i>200</i>	<i>58-42</i>	<i>100</i>	<i>50</i>	<i>150</i>	<i>100</i>	NTE 60-40

2.3.3 Land Management Plan Consistency

Under Alternative 2, the BLM would amend MD WH-7 as described in Section 1.5.1 to replace it with a management decision that aligns with management guidance in the BLM Wild Horse and Burro Handbook to monitor observed heterozygosity and take action if necessary to increase genetic diversity. Alternative 2 is consistent with all other existing WH&B management goals and decisions, as well as the 2022 Custer Gallatin National Forest LMP components. The population control methods would maintain healthy wild horses at population levels that would maintain/improve rangeland health. Proposed riparian improvements would provide more consistent water sources while improving riparian condition. BLM would continue to collect genetic samples to monitor genetic diversity over time and would take specific management actions only if established thresholds indicate loss of genetic diversity is a management concern.

2.4 Alternative 3 (Lineage-based decisions)

This alternative was developed in response to public comment while still meeting BLM mandates under applicable laws, regulations, and policy. However, not all of the public's desires for management of the Pryor Mountain horses are mutually compatible. The BLM received numerous comments to develop selective removal criteria that considers available lineage data maintained by non-profit organizations. The BLM developed lineage spreadsheets tracked by the mother, identifying offspring, using information derived from publicly available Pryor Mountain horse field guides published by the Pryor Mountain Wild Mustang Center (PMWMC) and BLM data. This is the best-available information, and BLM attempted to verify the accuracy of the data present herein, but recognizes that errors may exist based on inherent difficulties in determining probable parentage for wild animals, as well as challenges associated with managing a database which is constantly evolving based on births, deaths, and newly-obtained information from the field, all of which highlight the challenge associated with trying to implement a decision based on lineage. The PMWMC elected not to share their proprietary lineage data for the preparation of this EA. It is important to note that this sort of analysis would simply not be possible for most other HMAs across the west and is only possible due to the strong base of available documentation and historic records.

2.4.1 HMAP Objectives

Section C in **Appendix O** summarizes the Management, Monitoring, and Implementation Objectives that would guide management of the Pryor Mountain horses. Compared to Alternative 2, notable changes include 1) PZP vaccines would be the only fertility control that would be administered. Mares that are apparent non-responders could be darted twice a year or removed from the range. 2) Mares would be primed at 18 months, treated from age 2-3 and then mares would resume fertility treatments upon birth of a second foal (as opposed to waiting for the second foal to live to 1 year of age, which could give them an opportunity to become pregnant with a third foal). 3) Selective removal of wild horses would consider best available lineage data.

2.4.2 Gather/Removal

As under Alternative 2, BLM would reduce the wild horse population to the lower range of AML (107 horses) to allow the population to grow to the upper limit over a 4 to 5-year period without additional removals. The BLM would conduct an initial gather and removal operation to bring the population down to about 150 horses. Additional gathers would be conducted as necessary, and as expeditiously as possible, to reduce the population towards low AML. Any additional removals conducted after achieving low AML would occur only after making a new excess determination under 16 U.S.C. 1333(b)(2).

The first two selective removal criteria are the same as Alternative 2 (genetic defects and closely inbred). Whereas Alternative 2 next randomly removes horses to meet desired age class and sex ratios, Alternative 3 considers lineage data, to identify a targeted list of horses that could be removed. Lineage data is tracked by the matrilineal line and probable paternal lines are identified if known. However, removal decisions will be tracked by the mother due to uncertainty associated with determining probable paternity in wild populations. For example, Eggert et al. (2010) found that probability of accurate paternity assignment based on visual observations was accurate for only 65 percent of individuals on Assateague Island. In 2022, the USGS used DNA samples from identified individuals to test the degree to which the presumed parentage listed by the Pryor Mountain Wild Mustang Center was correct. Eighty-four named individuals were genotyped using microsatellite alleles, using methods as described in Appendix N, but the USGS recommended not using three of those individuals because of inadequate DNA amplification. For horses whose visually-identified, nominal parents were also genotyped, the accuracy of the visually-identified maternal or paternal parentage could be validated against DNA-based evidence. Presumed paternity was correct for 72.5 percent of applicable samples (n=21), whereas presumed maternity was correct for 95.6 percent of applicable samples (n=23; one sample was excluded that was likely a misidentified fecal sample) (S. Oyler-McCance, USGS, unpublished data, May 2022). These results one can infer that the lineage data from the Pryor Mountain Wild Mustang Center represents high-quality information regarding Pryor Mountain herd lineage, and is likely to be quite accurate with respect to maternity. However, that

information source for assigned paternity is less reliable. Moreover, the accuracy of nominal parentage in the Pryor Mountain herd has not been verified with as large of a sample size as was completed for the Assateague study. Thus, the necessary accurate paternity assignments do not exist at this time to implement a removal strategy that relies heavily on paternity as a definitive decision factor for removal strategies. Although presumed paternity is not reliable enough to utilize in a lineage-based removal strategy, it may be useful to inform removal decisions related to pairings between closely related individuals, as the magnitude of the decision is smaller (applicable to individual presumed-inbred animals versus a removal strategy applied to the whole population), and removal of presumed-inbred animals is desirable even if assigned paternity is incorrect and one-third to one-fourth of presumed-inbred animals are not, in fact, inbred.

Additionally, modern genetic methodologies such as Mean Kinship (MK) analysis provide a more robust framework to evaluate the relatedness among individuals in a population, quantify low-frequency genetic variation and identify genetically “valuable” individuals. A removal strategy that provides for a certain number of offspring to be maintained for each mother or father fails to consider that genetic material is shared not only among parents and offspring, but also among siblings, uncles, cousins, or more distant relatives. Mean kinship analyses were performed for individuals of the Pryor herd but cannot be interpreted (refer to section 2.6.1 for further information).

Under Alternative 3, horses would be selected for removal based upon the following selective removal criteria:

Step 1: Remove any horse that has a genetic defect including but not limited to hernias, parrot mouth, dwarfism, clubfoot, and contracted tendons.

- For example, Ruby has a hernia and would be prioritized for removal.

Step 2: Remove any horse that is the result of father/daughter, mother/son, full sibling, or half sibling pairings.

- For example, Ukko is the result of a father/daughter pairing between Garcia and Norma Jean and would be prioritized for removal.

Step 3: Choose horses for removal based on lineage, keeping within age class and sex ratio objectives identified below. Where Selective Removal Considerations allow for a choice between sexes, make removal decisions that would adjust the sex ratio of the population toward a 50/50 sex ratio in horses 1-19 years old. Manage the overall population such that the sex ratio does not exceed 60/40 of either sex (however, if observed heterozygosity thresholds are not met, defer to RMP guidance).

Use lineage data to make removal decisions as identified in **Section C of Appendix O**.

- Manage wild horses to achieve as closely as possible the following relative age distribution:
 - 15-40% Young Age Class (Age 1-4 years)
 - 20-45% Middle Age Class (Age 5-10 years)
 - 20-45% Old Age Class (Age 11-19 years)
 - <30% Very Old Age Class (Age 20+ years)

Step 3A: Identify mares with 3 or more offspring. Remove 1 or more offspring such that each mare retains at least two offspring. Half-siblings are acceptable.

3B: If necessary to meet population objectives, next identify mares with two or more offspring, and either remove one of the offspring or the mother.

3C: If additional removals are necessary to achieve desired population objectives, then identify and remove mares that do not have offspring but have siblings (full or half) on the range.

Within each step 3A-3C, prioritize removal of Young (1-4) horses first, Middle Age (5-10) horses second, and Old age (11-19) horses third. Horses in the 1-4 age class may be removed before they reach sexual maturity and have produced offspring. Do not remove any horse greater than 20 years old.

If there is a choice to be made between horses available for removal within an age class, prioritize removals as follows:

- Choose individuals for removal based on Sex Ratio Management Objectives (preferentially remove individuals of the more abundant sex).
- If choosing between males within an age class, preferentially retain band stallions over bachelors.
- If all the above metrics are met and deciding which horse to remove, preferentially retain a horse with a rare color (such as sorrel, buckskin or palomino).

BLM prepared an example list demonstrating how removal criteria under Alternative 3 would be applied. Refer to **Appendix G** for a sample list of horses that could be retained/removed based on the spring 2024 population data derived from Pryor Mountain Wild Mustang Center Field Guides and BLM data. **Table 3** summarizes the results of example removal decisions from Appendix G:

Table 2: Alternative 3 –Example summary showing post-gather numbers, age class and sex ratios based on the removal criteria under Alternative 3 and the spring 2024 population. Gather and removal lists and expected post-gather summaries would be updated based on the best-available population information immediately prior to a gather.

Birth Year	Age Class	# Females Removed	# Males Removed	Total Remaining	Total Females Remaining	Total Males Remaining	Age Class Post Gather (%)
2020-2023	1 - 4	14	11	28	14	14	19
2014-2019-	5 - 10	12	9	34	13	21	23
2005-2013	11 - 19	4	0	68	39	29	45
2004 or older	20+	0	0	20	20	0	13
Total		30	20	150	86	64	100
Sex Ratio Age Classes 1-19					51%	49%	
Sex Ratio All Age Classes					57%	43%	

2.4.3 Land Management Plan Consistency

Under Alternative 3, the BLM would amend MD WH-7 as described in **Section 1.5.1** to replace it with a management decision that aligns with management guidance in the BLM Wild Horse and Burro Handbook to monitor observed heterozygosity and take action if necessary to increase genetic diversity. Alternative 3 is consistent with all other existing WH&B management goals and decisions. Alternative 3 is consistent with all 2022 Custer Gallatin National Forest Plan management goals and decisions, as well as the 2022 Custer Gallatin National Forest LMP components.

2.5 Alternative 4: Continue Existing Management, No RMP Amendment

As described in Section 2.2 for Alternative 1, NEPA requires BLM to analyze a no action alternative and carries forward all management objectives and decision from the 2009 HMAP and 2015 Fertility Control EA. Under Alternative 4, BLM would not amend the 2015 Billings RMP, which requires BLM to manage for all representations in the herd. BLM cannot implement the selective removal criteria in the 2009 HMAP to remove horses that do not have a Spanish phenotype without the amendment. Therefore, no horses would be

gathered/removed from the PMWHR under this alternative and this alternative uses only fertility control to limit population growth.

BLM would continue to treat mares with fertility control as described in the 2015 Fertility Control EA (refer to Alternative 1). BLM would continue to maintain existing water sources as presently installed/designed but in order to be consistent with a true No Action Alternative, would not reconstruct the water sources at Cottonwood Creek or Sykes Spring to improve reliability of the water sources nor would any additional structures be proposed or constructed.

Alternative 4 maintains the horse population at a much higher level because there would be no removals and fertility control would be the only population management tool employed (see **Appendix J**). With increased number of horses, and no reconstruction of the water sources at Cottonwood Creek and Sykes Spring, rangeland health would continue to decline (see Section 3.4 of this EA).

Therefore, Alternative 4 does not meet BLM goals to make progress towards achieving Standards for Rangeland Health and is not consistent with Custer Gallatin National Forest LMP component (PR-DC-WHT-01) to maintain a thriving natural ecological balance with other resources and activities). Alternative 1 would be inconsistent with the Wild Free-Roaming Horses and Burros Act of 1971, as amended, 43 CFR 4700.0 et. seq., the BLM Wild Horse and Burros Management Handbook (H-4700-1), 36 CFR Part 222 Subpart D (USFS) and Forest Service Manual 2260 Wild Free-Roaming Horses and Burros which require the BLM and USFS to manage the population for a thriving natural ecological balance and consider multiple use relationships, protect the range from deterioration associated with overpopulation, and to meet standards and guidelines for rangeland health.

Finally, this alternative does not meet the purpose and need of this document. However, examining this alternative will provide a baseline for effects as well as maintain consistency with current guidance.

2.6 Alternatives Considered but Dismissed from Detailed Analysis

Alternatives developed during the scoping period but not carried forward for detailed analysis are discussed below. Additionally, BLM received alternative suggestions during the public comment period of the preliminary EA. BLM response to these comments can be found in **Appendix P**.

2.6.1 Individual Based Genetic Management using Mean Kinship Analysis

Many of the scoping comments asked BLM to selectively remove horses using Individual-Based Genetic Management as described in a 2013 National Research Council report titled *Using Science to Improve the BLM Wild Horse and Burro Program: A Way Forward*. This report cites a study of the Assateague Island horses by Eggert et al., 2010, and notes that Individual-Based Genetic Management entails knowing all individuals in the population unit, their relationships, and their reproductive performance over time, and suggests that this approach might be possible in the Pryor Mountains. After a thorough review as described below, BLM determined that using Mean Kinship (MK) to inform removal decisions is not feasible at this time.

Individual-based genetic management, as described by Eggert and others uses specialized software to calculate Mean Kinship. Mean Kinship measures the relatedness of each individual to the population as a whole based upon assumed parentage data. Individuals with low MK are distantly related to other individuals and may represent an important component of the genetic legacy of the founders that is not present in other individuals. Although MK values are most often used to identify the genetically valuable animals in the population, they can also be used to identify those individuals whose genes are overrepresented. Individuals with high MK are closely related to a large fraction of the other horses in the population. To maximize genetic diversity while managing within the constraints of a resource-limited population size, individuals with high MK scores would be preferentially removed.

BLM reviewed the Eggert paper and spoke with the author to determine if Individual-Based Genetic Management could be attempted on the Pryor Mountain herd (A.Waring, personal communication with Dr. Eggert 2021). Lori Eggert is a Professor Emeritus in the Division of Biological Sciences at the University of Missouri, and her

professional opinion was that the MK approach should work well for the Pryor Horses, using available observations of mare-foal relations, and making assumptions that in most cases females will not nurse foals other than their own, and that “extra-band” mating by males is relatively rare.

BLM approached the Mustang Center with a request to utilize their available pedigree information to run MK analysis. The Mustang Center provided pedigree information but used a number substitution to uniquely identify each horse (numbered one through one thousand). Unfortunately, results cannot be interpreted without matching the number substitution back to the Horse ID (name/number). BLM performed MK analysis on the entire Pryor Mountain Herd. Results of the modeling identify a starting (i.e., for year 2022) MK score for each individual based upon existing herd composition. Then, BLM re-ran the model each time a horse with the highest MK score was removed to reflect modified herd composition. This was done for every horse on the range to determine the removal order for each individual as the degree of relatedness changes each time a horse is removed. The removal algorithm was such that any horse that would be 20 years or older at the time of a 2022 gather would not be removed.

The MK analysis identified 25 individuals that are highly related to each other. These horses would be prioritized for removal. The MK analysis also identified 80 horses with low MK scores, who would be preferentially retained to maximize genetic diversity, as well as 25 that were considered “old” that would also be retained (for a total of 105). The remainder had MK scores that were somewhere in the middle.

It is worth noting that in the Eggert study on the Assateague horses, they were able to collect tissue and/or fecal samples for all of the living horses, to generate individual genotypes from those samples, and then to use those genotypes to verify presumed pedigrees. With a population size similar to the Pryor Mountain herd, they found five instances where horses genetic samples were inconsistent with their presumed matrilineal ancestry and noted that either fecal samples collected in the field were mistaken for the wrong horse or the presumed pedigree was in error. To rule out the mistakes in fecal sampling, they collected a second set of samples for all horses involved in these discrepancies, and again generated individual genotypes based on those samples. Once the maternal pedigrees were established, they used the genotypes to analyze and assign paternity for each individual, with a software program that accounted for age differences between potential sires and offspring, probability of paternity, and whether sexually mature males were known to be in the vicinity of the female at the approximate time of conception, based on historical observations. Then they generated a studbook of the population containing parentage date for every living and deceased member as well as basic biological data such as age, sex, and reproductive history. This level of detailed parentage analysis has not been attempted for the Pryor Mountain herd.

While the lineage data from the Pryor Mountain Wild Mustang Center is likely to be fairly accurate, especially with respect to maternity, and may represent the best available information concerning relatedness of Pryor Mountain herd horses, the accuracy of the data has not been verified to nearly the same level that was done for the Assateague study. The BLM and partners collected fecal samples from the Pryor herd for the purposes of genotyping individuals at a set of microsatellite loci (see Appendix N), but do not have enough results that would allow for such a detailed pedigree analysis for all horses in the herd.

Citing concerns about data integrity, the board of the Pryor Mountain Wild Mustang Center decided not to provide the BLM with the names of the horses in the data set that was used for the mean kinship modeling. Lacking the names of horses which correspond to the number substitution, the results of Mean Kinship modeling cannot be used to inform gather decisions or conduct a detailed analysis of this alternative. In summary therefore, BLM does not have access to the necessary data, and results of MK analysis are not available to inform herd management at this time.

2.6.2 Remove Only Young Horses from the PMWHR

Comments noted that horses 10 years and older should be left on the PMWHR because they have less adoption demand, are more difficult to train, do not adjust as well to captivity compared to younger horses, and the public

does not want to see them placed in long-term holding at an off-range pasture. BLM would not remove any horse 20 years or older and would prioritize removal of younger horses first to meet age class and sex ratios.

Most WHB populations will have representatives from each age class, and rapidly growing populations will have a greater proportion of younger WH&B. In order to maintain the desired age structure and sex ratios, the BLM WHB Handbook H-4700-1 states that the BLM should consider retaining male and female animals from each age group (0-4, 5-9, 10-15, 15+ years of age) following a removal operation. The BLM has broken down age classes into the following ages groups: 1-4, 5-10, 11-19 and 20 plus years, with each category having a desired percentage of the population. As of spring 2024, approximately 46 percent of the population falls into the old (11-19) or very old age (20+) category.

Under both Alternative 2 and 3, BLM proposes to reduce the population to 150 horses during an initial gather. Based on the spring 2024 population, as few as 4 mares could be removed from the 11-19 age class in order to meet desired age class and sex ratios. Furthermore, due to the popularity of the Pryor Horse herd, it is highly likely that these horses would be adopted. Chances are extremely low that any Pryor Mountain horse would go to an off-range pasture (long-term holding facility). Since 1971, BLM has removed a total of 668 horses in 26 gathers, and every wild horse removed from the PMWHR has been placed.

Additionally, if the current population of 200 horses were reduced immediately to the proposed AML of 107, without removing any horses over the age of 10, then the remaining population would be heavily skewed towards older horses with very few young horses remaining. The current population consists of 108 horses under age 10 and 92 horses 10 and older. To reach low AML, 92 horses would need to be removed. If they were all taken from the under 10 age group, that would leave only 16 young horses on the range, which is not desirable. Recognizing that an immediate reduction to AML would require the removal of many older age class animals, and may be difficult to achieve given the inherent difficulty associated with capturing wild horses using bait/water trapping, Alternatives 1-3 utilize incremental gathers to reduce the population toward AML. Conducting incremental gathers will allow BLM to remove more younger age class animals over a longer period and reduce the number of older age class animals that would need to be removed immediately and in total.

2.6.3 Allow mares to produce two healthy living foal representatives living to the age of 1 to minimize potential loss of genetic diversity

The Draft HMAP proposed placing mares ages 4 and older on fertility control after they have successfully foaled once. Successful foaling is defined as a foal surviving to the age of one. Comments noted that the Pryor Mountains are a harsh environment and that two foals should be allowed before resuming fertility control treatments to promote genetic health and preservation of bloodlines. One comment noted that each mare must be allowed to retain a minimum number of two offspring on the range with the guarantee that neither be removed. Comments noted a concern that bloodlines could be lost if only one foal is allowed and that foal dies.

Under Alternative 2, mares ages 4 and older would not be treated until after they have successfully foaled once, defined as the foal living to 1 year of age. As such, the delay in bringing the mares back onto treatment could give them an opportunity to produce a second foal. Under Alternative 3, mares could resume treatments upon birth of a second foal. If fertility control treatments were delayed until after a second foal lives to 1 year of age, the delay in bringing the mares back onto fertility control treatment could give them an opportunity to produce a third foal, and would increase the population growth rate.

Under Alternative 3, selective removal criteria would first target any horse with genetic defects (Step 1) or that are closely inbred (Step 2). Step 3A would identify horses with three or more offspring and retain at least two under the age of 20 years. Based on the spring 2024 population, approximately 55 horses would be available for removal under Alternative 3 Steps 1-3A. However, when the same removal criteria were applied to the 2023 population (205 horses), only 42 horses would have been available for removal under Alternative 3 Steps 1-3A, and the resulting population would remain above the population target of around 150 horses remaining after an initial gather. It may be impossible to achieve gather objectives retaining two offspring per mare. If needed to meet gather objectives, Alternative 3 would next identify mares with two or more offspring, and either remove

the mother, or one of the offspring. Guaranteeing two foals per mare is not feasible with respect to limited natural resources, as it would create exponential population growth and prevent BLM from managing the herd to achieve and maintain AML.

2.6.4 Increase AML to 150-200, and do not introduce wild horses from other HMAs

BLM received numerous comments reflecting the view that the AML should be set to 150-200 horses to maintain genetic diversity of the Pryor Horses, which have a somewhat higher than average degree of Colonial Spanish ancestry. Comments cite a 2009 letter to the BLM from Dr. Cothran, which is referenced in the BLM's 2010 H-4700-1 wild horse and burro management handbook, noting that a population size of at least 150-200 adult individuals is required to maintain the genetic viability of wild horse herd living in isolation. Comments further reflected the view that no outside horses should be introduced to maintain the Colonial Spanish ancestry of the Pryor Mountain herd in a self-sustaining population.

Under the Wild Free Roaming Horse and Burro Act of 1971, as amended, and its implementing regulations at 43 CFR 4700, the BLM is responsible for the protection, management and control of wild free-roaming horses and burros (WH&B), to manage healthy WH&B populations on healthy rangelands, and to maintain free-roaming behavior at the minimal feasible level of management necessary. BLM is not mandated to perpetuate certain genetic lines or manage herds as isolated populations and follows guidance in the BLM Wild Horse and Burro Handbook to implement federal laws and regulations. Appendix 3 of the BLM Wild Horse and Burro Handbook describes the AML establishment and adjustment process, which is a multi-tiered analysis process that considers:

- **Tier One:** determine whether the four essential habitat components (forage, water, cover, and space) are present in sufficient amounts to sustain healthy WH&B populations and healthy rangelands over the long-term.
- **Tier Two:** determine the amount of sustainable forage available for WH&B use.
- **Tier Three:** determine whether or not the projected WH&B herd size is sufficient to maintain genetically diverse WH&B populations (i.e., avoid inbreeding depression).

Should the Tier One analysis determine that one or more of the essential habitat components is insufficient to maintain a healthy WH&B population and healthy rangelands; the authorized officer should consider amending or revising the LUP to remove the area's designation as an HMA. BLM completed an AML evaluation as part of this NEPA process, which is attached as **Appendix C**. This analysis notes that the AML would be set at 107-120 horses for Alternatives 2 and 3. Based upon BLM's assessment of essential habitat components and the amount of sustainable forage, the PMWHR cannot support a higher AML and also maintain a thriving ecological balance. Our rangeland health assessments, completed in 2021 with a population of about 178 adult horses, show that higher horse populations are negatively impacting rangeland health, with key observation areas either assessed as functioning at risk or non-functioning.

As noted under the discussion for a potential Plan Amendment, BLM would continue to monitor Observed Heterozygosity (Ho), which is a measure of genetic diversity. If Ho values drop below the threshold identified in the BLM Wild Horse & Burro Handbook, then BLM may take one or more actions to increase diversity, which may include introducing wild horses from other HMAs with characteristics similar to the Pryors. BLM cannot eliminate a management tool that may be required to minimize inbreeding depression.

2.6.5 Expansion of the PMWHR boundaries.

The WHB Act was enacted Dec 15, 1971. Wild horses can only be managed on areas of the NFS and BLM lands where they were known to exist in 1971, at the time of the passage of the Act. For the USFS these areas are known as territories and for the BLM they are known as herd management areas. Under section 1339 "Limitation of Authority" the Wild Free-Roaming Horses and Burros Act states "nothing in this act shall be construed to authorize the Secretary to relocate wild free-roaming horses or burros to areas of the public lands where they do not presently exist." Until a change in the law allows for expansion of the Pryor Mountain Wild Horse Range

onto additional national forest or BLM lands that are outside of the existing territory and herd management area, the agencies have a legal obligation to follow the law to the greatest extent possible.

Comprehensive agency inventories (Hall 1972), assessments, public involvement, and decisions (U.S. Department of the Interior and U.S. Department of Agriculture 1973, U.S. Department of Interior and U.S. Department of Agriculture 1974) provided the basis for the Bureau of Land Management herd management area and Forest Service territory boundaries per the 1971 Act. Subsequent land use planning efforts in 1987 and 2022 by the Forest Service, and 1984 and 2015 by the Bureau of Land Management validated the same areas as being a wild horse territory and herd management area, respectively. If opportunities for private land purchase or lease present themselves, the agencies would consider them, especially if they involve winter range. Winter range is recognized by both agencies as being the limiting factor for overall population size. The 2009 Herd Management Area and Territory Plan environmental assessment provides a detailed history about the wild horses in this area, and how boundaries were delineated.

3 Affected Environment and Environmental Consequences

This chapter describes the affected environment and environmental consequences to resources that could be affected by implementation of the proposed action or alternatives (refer to Analysis Issues in Section 1.6). This analysis is tiered to the 2015 Billings Field Office Approved Resource Management Plan, and the analysis of direct, indirect, and cumulative effects on the Pryor Mountain Wild Horse Range are incorporated by reference into this analysis.

3.1 General Description of the Affected Environment

The Pryor Mountain Wild Horse Range HMA comprises about 39,994 acres in the southeastern portion of Carbon County, Montana and northern Big Horn County, Wyoming. Of this, approximately 27,114 are under BLM management with roughly 7,839 acres controlled by the National Park Service, 4,401 acres by the U.S. Forest Service, and 640 acres held by private interests. The area is approximately 50 miles south of Billings, Montana and 10 miles north of Lovell Wyoming (Figure 1). The majority of the PMWHR was created by order of the Secretary of the Interior, Stewart L. Udall on September 9, 1968, with the boundaries adjusted several times since then. The current boundary was established in 1990 when the Bighorn Canyon National Recreation Area did not re-authorize the Sorenson Extension. Past history of land use decisions pertaining to the PMWHR is described in the 2009 HMAP and incorporated by reference (See Section 1.5 of the 2009 HMAP).

For the USFS these are areas known as territories and for the BLM they are known as herd management areas. There are several overlapping designations with the PMWHR, including all or portions of three BLM Wilderness Study Areas (WSAs) and one NPS WSA. The other designations are the East Pryor Area of Critical Environmental Concern (ACEC) and the Crooked Creek Natural Area. The Lost Water Canyon Research Natural Area and the Lost Water Canyon Recommended Wilderness Area lie immediately adjacent to the PMWHR.

The PMWHR varies in environment and elevation from a sagebrush/salt-shrub dominated cold desert at about 3,850 feet in the Wyoming portion, to a subalpine setting with subalpine fir and open meadows in at the northernmost portion within Montana at about 8,750 feet (Figure 2 and 3). This area is characterized by steep rocky canyons and draws, rocky outcrops, plateaus of sagebrush and grass, Utah juniper, mountain mahogany, conifer forest, and subalpine meadows. The majority of the range within Montana is a semi-arid cold desert.

There are numerous sensitive plants and animals, rare geologic formations, numerous caves, vertebrate and invertebrate fossil beds, high occurrence of archeological resources and American Indian spiritual sites. The PMWHR is a popular destination for national and international visitors that want to view the Pryor Mountain wild horses, and these visitors contributes to the local economy through eco-tourism. The PMWHR is closed to livestock grazing.

Annual precipitation varies with elevation from 6 inches of precipitation in the lower elevations to upwards of 20 inches in the alpine high elevation. Soils vary in depth from shallow (less than ten inches) to 20-40 inches deep depending on site locations and position on the landscape. Water is considered limited as there are five perennial water sources. Under the 2009 HMAP, BLM constructed several water developments, enhanced water catchments (potholes), and completed riparian enhancement to help distribute horses across the PMWHR and improve habitat conditions. Some of these water sources collect snowmelt/runoff and provide a seasonal source of water to horses, whereas others provide perennial water. Both the Layout Creek and Bad Pass Troughs provide perennial water, but the Little Sykes Spring and Cottonwood Creek are currently dry.

Figure 1: Pryor Mountain Wild Horse Range

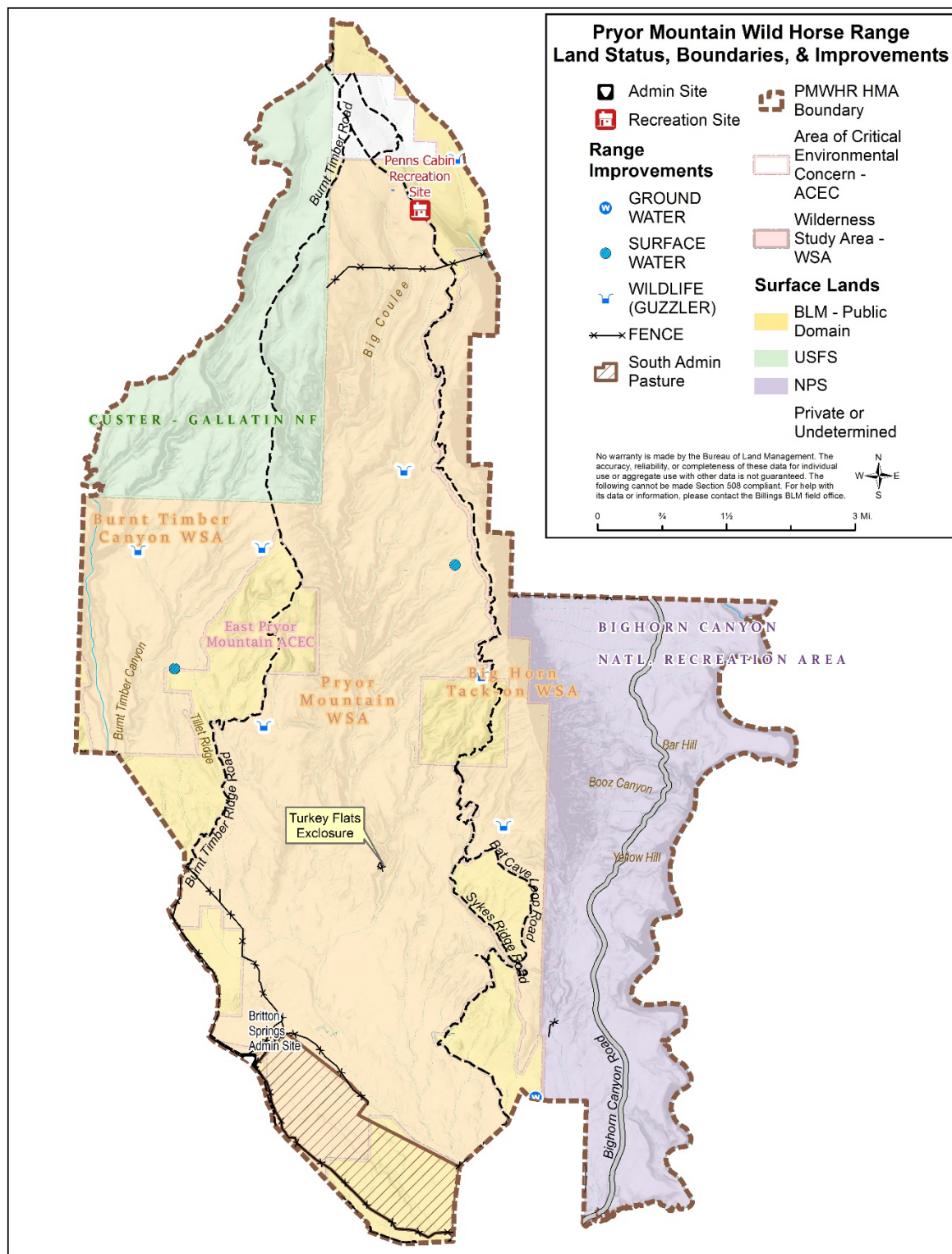




Figure 2: High elevation alpine meadow on the PMWHR (summer range)



Figure 3: Low elevation desert on the PMWHR (winter range)

Climate

The PMWHR experienced extreme drought in 2021 (US Drought Monitor, November 23, 2021) but current conditions have somewhat improved (**Appendix M**). The PMWHR experiences recurrent and prolonged drought periods which can impact annual forage production as well as plant community composition and site stability over time. Conditions during 2021 serve as an example of a severe drought period.

Long term climate projections indicate that both seasonal (over several months) and persistent drought (over multiple years) are predicted to be more severe in the future as climate change continues to increase temperatures and alter patterns of precipitation. Since 1950, average temperatures in Montana have increased by 0.5°F/decade (0.3°C/decade), with greatest warming in spring; projected to increase by 3-7°F (1.7-3.9°C) by midcentury, with the greatest warming in summer and winter. These changes are affecting how water enters the region (e.g., as rain or snow), how it is distributed among the major storage pools (groundwater, surface water, soil moisture, water vapor, etc.), and how it moves or changes from one component of the water cycle to another. Long-term snow course data in Montana for April 1 (period of near maximum snow accumulation) show that the amount of water held in the snowpack has already declined roughly 20% over the last 80 years. Researchers have also documented shifts toward earlier snowmelt and spring runoff, which are greater among low to mid elevation snowpacks and the waterbodies that they supply, than high elevation snowpacks and associated streams (Regonda et al., 2005). Shifts from snow to rain, earlier snowmelt, and increased precipitation from higher intensity storms will likely reduce the supply of water in the warm season. These trends suggest that water will continue to be a limiting factor on the PMWHR, especially during the summer months.

3.2 How would proposed removal criteria affect genetic diversity?

3.2.1 Introduction

The Wild Free Roaming Horse and Burro Act of 1971, as amended, and its implementing regulations at 43 CFR 4700 guide management of wild horses on public lands within established Herd Management Areas (HMAs). The most recent nationwide estimate of the wild horse and burro population under BLM management is 73,520 animals as of March 1, 2024, spread across 177 herd management areas on 26.9

million acres of public lands in 10 Western states (<https://www.blm.gov/programs/wild-horse-and-burro/about-the-program/program-data>).

BLM is not required by law to manage the herds found in any given HMA as if they were genetically isolated populations. Rather, management actions are carried out with the objective of maintaining free-roaming behavior at the minimal feasible level of management necessary to meet objectives in federal land use plans, including both Resource Management Plans that guide overall management of BLMs public lands as well as more specific herd and habitat objectives in Herd Management Area Plans. The BLM Wild Horse and Burro Handbook H 4700-1 provides additional guidance for managing WHB populations on public lands administered by the BLM (BLM, 2010).

The BLM Wild Horse and Burro Handbook (2010) currently recommends a minimum population size of 50 effective breeding animals (i.e., a total population size of about 150-200 animals) to maintain an acceptable level of genetic diversity within reproducing WH&B populations. The BLM Handbook notes that this the number that would be required to keep the expected rate of loss of genetic variation at 1 percent per generation and that animal interchange between adjacent HMAs with smaller population sizes may reduce the need for maintaining populations of this size within each individual HMA. However, the 2013 National Research Council report, *Using Science to Improve the BLM Wild Horse and Burro Program* (2013 NRC), suggests that a minimum population size of 150-200 animals is inadequate, and that it should be closer to 5,000 for long-term viability and maintenance of genetic diversity. Importantly though, the 2013 NRC report further indicates that that large population size is applicable at the scale of a metapopulation comprised of herds across multiple HMAs, with natural and assisted movement of animals between HMAs acting to maintain long-term persistence of horse genetic diversity at the HMA or HMA-complex level, and that there is no single HMA or complex large enough to have a minimum viable population (MVP) for the long term (NRC Report, 2013, p. 149).

There are several relevant measures of genetic diversity referred to in this analysis:

- The Fixation Index (F_{st}) is a measure of pairwise genetic distance, or population differentiation for the various HMAs compared against each other (2013 NRC Report).
- Genetic similarity analysis compares the resemblance of a sampled wild horse herd to other wild horse herds and to domestic breeds (NRC Report 2013, Cothran et al. 2024).
- Allelic diversity, as indices by mean number of alleles (MNA), measures the average number of genetic variants per locus and can provide information about changes in a herd's diversity at a population level (2013 NRC Report, p. 143 and WHB Handbook H 4700-1, p. 21).
- Observed Heterozygosity (H_o) is a measure of how much diversity is found, on average, within individual animals in a WH&B herd (BLM WHB Handbook H-4700-1, p. 21). Low levels of H_o indicate risk of inbreeding depression is a concern.

3.2.2 Affected Environment

Pryor Mountain wild horses are generally small, around 14 hands on average. Many of them display what are thought to be Spanish phenotypic characteristics, i.e., narrow but deep chests, short backs, with a sloping croup and low-set tail. Many sources report horses present in the Pryor Mountains in the late 1800s and early 1900s, speculating that their origin may have been from the adjacent Crow Indian Reservation. Following passage of the Taylor Grazing Act, use of the range by privately-owned horses was permitted between 1936 and 1964. BLM reports indicate that the population increased from 20 head, covered by license issued to the Tillett family, to an estimated 200 head by the mid-1960s. These horses were thought to be privately-owned or unbranded descendants of privately-owned and/or existing feral horses in the area. In 1965, BLM records indicate the Tillett Family claimed ownership of horses running east of Crooked Creek (they attributed ownership of other horses in the area to another individual). In October 1967, members of the Tillett family waived claims of ownership to any unmarked or unbranded

horses running at large on public land that is now included in the PMWHR, which was established less than one year later in September 1968.

The Pryor horses come in a variety of colors; dun, grulla, bay, black, and roan are common. Less common colors include chestnut, sorrel, palomino, buckskin, and sabino; none of the Pryor horses are pintos. A 1970s report on the Pryor Mountain Horse Range by BLM biologist Ron Hall notes that palominos, pintos, and appaloosa were not present on the PMWHR at that time. However, palominos are present on the range today, possibly as result of the introduction of mustangs from other HMAs. Notably a wild stallion named “The Rock” was introduced from the vicinity of Rock Springs, Wyoming. Historical records indicate the mare Phoenix, who descended from The Rock produced a palomino stallion named Cloud. Cloud was a very prolific stallion and has numerous descendants on the range today.

Fixation Index (Fst): Dr. E. Gus Cothran provided data to the National Academies of Sciences about genetic similarity between 183 pairs of samples from wild horse herds across the west, and those results are summarized in Appendix F of the 2013 National Academy of Sciences report. The Fixation Index (Fst) values presented there are a measure of genetic distance between pairs of sample sets, or population differentiation, that is based on genetic polymorphisms (Wright, 1931 in the 2013 NRC Report, p. 167). Low values of Fst indicate that a given pair of sampled herds has a high degree of shared genetic background. The lower the pairwise Fst value, the more genetically similar are the two sampled herds. Values of Fst under approximately 0.05 indicate virtually no differentiation. Values of 0.10 indicate very little differentiation. Only if values are above about 0.15 are any two sampled subpopulations (i.e., from two sampled herds) considered to have evidence of elevated differentiation (Frankham et al. 2010). The Pryor Mountain HMA herd had pairwise Fst values that averaged 0.076 in 2001 and 0.051 in 2009, in comparison to over 145 other sets of wild horse samples. Those data show that the Pryor Mountain HMA herd is not genetically unusual, with respect to over 145 other wild horse herds, and provides genetic evidence that the Pryor Mountain horses are extremely similar to horses in a large number of other BLM-managed wild horse herds. Therefore, the Pryor Mountain horses may be considered part of a highly connected metapopulation that includes horse herds in many other HMAs in multiple states.

Genetic Similarity: Dr. Cothran completed genetic similarity analysis on the Pryor Mountain herd several times in the 1990s and 2000s. In his 1992 report, Cothran describes genetic markers in the Pryor horses that are indicative of Spanish ancestry, and notes that the Pryor horses show greater similarity to the New World Breeds such as the Paso Fino than to Old World breeds such as the Andalusian. Table 4 in Cothran (1992) reported genetic similarity between the Pryor Mountain herd and 37 unique horse breeds. The PMWHR herd was most similar to quarter horses (genetic similarity 0.861), followed by the American Paso Fino (genetic similarity 0.848). This measure of genetic similarity was also high with respect to many other breeds (range 0.704-0.861), which supports an interpretation of mixed ancestry in the PMWHR herd, but confidence intervals associated with each estimate of genetic similarity were not reported, limiting the inferences that can be drawn from this report regarding ancestry. In Cothran’s 2009 and 2013 reports, he notes that the highest mean genetic similarity of the Pryor Mountains herd is to Light Racing and Riding breeds followed by the Old-World Iberian horses (in contrast to the 1992 report which stated “Among ‘Spanish’ breeds the PMWHR herd has greater similarity to the New World Breeds”) and concludes that the Pryor herd clearly has ancestry from a mix of breeds but shows strong evidence of old Spanish ancestry. Sponenberg (2011) also describes the Pryor Mountain mustangs as including some horses with Spanish conformation with blood types expected of horses with Spanish ancestry. Sponenberg notes that a non-Spanish horse was introduced from one of the Herd Management Areas near Rock Springs, in southern Wyoming, that left numerous descendants in the herd and mated his own daughters. These descendants originally had a thicker and plainer conformational type than the Iberian type, although that distinction appears to be blurring as this influence spreads through the herd.

The 2013 NRC report identifies three HMAs that had higher than average levels of Spanish ancestry, including the Cerbat Mountains, AZ herd (later analyzed in Cothran 2020) which is largely isolated, the

Pryor Mountains, MT herd and the Sulphur, UT herd (later analyzed in Cothran 2017). All three herds are thought to have somewhat higher levels of Spanish ancestry, mixed with a large influence of non-Spanish breeds (NRC 2013). The NRC report (2013) also notes that the Kiger, OR and the Lost Creek, WY herd were also thought to have some moderately elevated evidence of Spanish ancestry, though that ancestry may come indirectly, such as from associations with domestic Quarter Horses.

Results from a more recent analysis of available wild horse genetic data collected from 2001-2020 (Cothran et al. 2024) also support the conclusion that the Pryor Mountain herd is, genetically, relatively similar to a large number of other BLM-managed wild horse herds. While the BLM recognizes that the Pryor Mountain herd retains some higher than typical similarities to new world Iberian breeds, this herd is not substantially unique with respect to other wild horses in the west, based on the genetic markers used in Cothran et al. (2024). Specifically, dendrograms there indicate high similarity between the Pryor Mountain herd and wild horses from Wyoming's Antelope Hills HMA and Adobe Town HMA, Oregon's Kiger HMA, Riddle Mountain HMA and Jackies Butte HMA, Utah's Muddy Creek HMA, and New Mexico's Bordo Atravesado HMA (Cothran et al. 2024, figures 2 and 3). Also, in a principal components analysis by which herds are clustered in terms of patterns of genetic differentiation on 2 ordinal axes, 8 herds are identified as relatively unusual outliers but Pryor Mountains is not one of those 8 outlier herds. Rather, the Pryor Mountain horses are located (in that 2-dimensional ordination) well within the main cluster of herds and are nearest to various herds from Nevada and Oregon (Cothran et al. 2024, figure 5).

Allelic Diversity: At the population or HMA level, genetic diversity can be measured as the mean number of alleles (MNA) based on microsatellite loci that are used to characterize diversity. One can record the average allelic diversity, measured across multiple genes (loci). Allelic diversity has not typically been used as a criterion for wild horse management decisions, but trends in this measure can be informative. When populations undergo bottlenecks, which are large reductions in population size that persist for one or more generations, this can cause allelic diversity to decline relatively quickly through random genetic drift (2013 NRC report, p. 143). The targeted removal of introduced horses or their descendants is another way that allelic diversity could be reduced.

Laboratory analysis show that mean number of alleles per locus of the Pryor herd has been above the mean for feral horses. Dr Cothran (2013) reported allelic diversity (MNA) was 6.25 for the Pryor horses, compared to 6.06 for the feral horse mean. A more recent analysis (table 3 in Cothran et al. 2024) summarized that mean allelic diversity (MNA) was 7.500 in 2001, 6.583 in 2009, and 6.250 in 2012 in the Pryor herd, all of which were above or similar to the mean for feral horses (6.246). The mean for domestic breeds was 6.632 (table 2 in Cothran et al. 2024). Considering that the standard deviation for MNA in feral horses is 1.09, the MNA value for Pryor Mountain horses is not statistically distinguishable from the mean for this measure of genetic diversity in feral horse herds. In 2013 Cothran also documented a decline in allelic diversity up to the time of that report and noted that specific alleles and variants have been eliminated from the Pryor herd, suggesting that this may have been a result of intentionally removing introduced horses (2001 and 2009 reports). Results in the 2022 report from Zimmerman et al. (2022, as presented in Appendix N) confirm that MNA remained within 1 standard deviation of the mean (6.40 if all 79 samples are considered, or 5.87 if a subset of 20 is used).

Heterozygosity: Observed heterozygosity (H_o) is a measure of how much diversity is found, on average, within individual animals in a WH&B herd. An individual is considered heterozygous at a given locus if it has two different alleles, and it is considered homozygous if it has two identical alleles. Low levels of H_o may be an indication of excessive inbreeding. Inbreeding depression can lead to health problems and loss of fitness.

The BLM Wild Horse and Burro Handbook H-4700-1 defines Genetic Diversity as *the absence of inbreeding depression as monitored through an established baseline and periodic reassessment* and uses

Ho as the threshold metric for use to identify when risks associated with inbreeding are a concern. In that handbook, observed heterozygosity values that are one standard deviation below the mean are considered to indicate critical risk for a herd. For DNA-based (hair follicle) samples that are genotyped at a specific set of microsatellite loci, this critical value for Ho is 0.66 (BLM 2010, p. 21).

Laboratory analysis completed by Dr. Cothran (2013) shows that observed heterozygosity of the Pryor herd was above the mean for feral horses. Dr. Cothran (2013) reported Ho of 0.720 for the Pryor horses, compared to 0.710 for the feral horse mean and 0.720 for the domestic horse mean. A more recent analysis (table 3 in Cothran et al. 2024) summarized that Ho was 0.715 in 2001, 0.757 in 2009, and 0.720 in 2012 in the Pryor herd, all of which are similar to the mean (table 2 in Cothran et al. 2024) for feral herds (0.722), and domestic breeds (0.725). Additionally, the BLM collected and sent fecal DNA samples to the USGS for additional genetic analysis (King et al. 2018). Measures of Ho from noninvasively sampled fecal samples, based on the same set of microsatellite loci as are used by Cothran (NRC 2013), were also, coincidentally, 0.71 (Zimmerman et al. 2022 as presented in Appendix N). Those more recent data indicate that Ho is still above the 0.66 threshold and that, therefore, deleterious effects due to inbreeding are not currently a high concern.

3.2.3 Effects of Alternative 1

Alternative 1 follows gather criteria from the 2009 HMAP, which stipulates that gathers would reduce the herd to high AML (120 under the 2009 HMAP) as long as fertility control is used, and preferentially removes all horses that do not have Spanish phenotypes (i.e., those that were scored by Sponenberg as a 4 or 5 during his 2009 field visit) and removes some descendants of horses scored as a 3 that are well represented on the range (**Appendix E**). Descendants of horses scored as a 1 or a 2 would be preferentially retained, as they provide the best representation of a Spanish phenotype. Utilizing this approach, BLM would prioritize removal of all descendants of five apparently non-Spanish phenotype horses (**Appendix E**), resulting in a loss of diversity from those five ancestral lines. In general, efforts to make the Pryor herd more phenotypically 'Spanish' would result in the expected loss of genetic diversity by removing the influence of five genetic lines. The expected effects to the four measures of genetic diversity used in this analysis are described below.

Fixation Index (Fst) (similarity of the Pryor Mountain herd to other wild horse herds). Genotype data from Cothran's analyses, summarized in the 2013 NRC report, provides genetic evidence that the Pryor Mountain herd is not genetically unusual, with respect to over 145 other wild horse herds to which it was compared. Data shows the overall mean pairwise Fst value dropped from .076 in 2001 to .051 in 2009, with the lower score indicating the Pryor Mountain HMA is becoming more similar to other HMAs (values of <0.05 indicate virtually no differentiation, <0.10 little differentiation, and > 0.15 elevated differentiation; Frankham et al 2010).

The NRC report (2013) suggests that Fst is a powerful tool for predicting which populations are so similar, that translocating animals from populations with low Fst values probably may not be successful in supplementing genetic diversity, and which populations are so different (high Fst values) that genetic compatibility between individuals may not be optimal and may reduce the probability of successful translocation (2013 NRC report, p. 167). For example, based on Fst values reported in the 2013 NRC report, the Pryor horses are genetically more similar to herds such as Calico, NV, Warm Springs Canyon, NV and Warm Springs, OR herds (pairwise Fst values <0.033) than they are to the Big Summit, OR herd (pairwise Fst 0.123 in 2009). A more recently updated matrix of pairwise Fst values based on 235 genetic sample sets (figure 6 in Cothran et al. 2024) leads to similar conclusions: pairwise Fst values are low between the Pryor Mountains herd and other BLM-managed wild horse herds.

By managing the Pryor horses for a Spanish phenotype, and reducing the influences of introduced horses, it is possible that the pairwise Fst values could increase relative to some other HMAs over generations if

the Pryor horses were managed as an isolated population. However, with a small population size, it is possible that heterozygosity levels would eventually drop below critical thresholds, and that it may be necessary to introduce wild horses from other HMAs. In the proposed plan amendment, BLM notes that horses with similar characteristics could be introduced. The NRC report (2013) also suggests that mares from off-range pastures or private sanctuaries could be used to infuse new genetic variation into an HMA, though there is less precedent for that in typical BLM WHB management.

Genetic similarity (resemblance of Pryor Mountain horses to domestic breeds). The objective of Alternative 1 is to manage the Pryor Mountain horses as a herd that retains higher prevalence of Spanish phenotypic traits. In theory, Alternative 1 aims to preferentially remove those horses whose phenotypes are nominally non-Spanish (Sponenberg 2011). This may minimize the influence of more recently introduced horses and may strengthen the genetic association with Spanish breeds. However, removal selections are based on phenotype, which is the physical appearance of a horse, not genotype, which is measured through genetic analysis.

One complication to this approach which may limit its success in increasing the herd's genetic affinity with Spanish breeds is that genetic material from more recently introduced horses is by now well admixed throughout the Pryor Mountain horse population. Although the contribution of Spanish genetic background is relatively greater than what is observed in many other BLM-managed herds, horses in this herd are by no measure highly Spanish. Cothran's 2009 and 2013 reports, which examined genetic samples, both note that the Pryor horses have highest mean genetic similarity to Light Racing and Riding breeds, followed by the Old-World Iberian horses. Sponenberg also notes that the herd has been impacted by introduced horses. Cloud is probably the most notable horse from the herd that is the descendant of a horse introduced from the vicinity of Rock Springs, Wyoming, who did not have a high level of nominally Spanish phenotypic traits; his descendants are prevalent and widespread throughout the herd.

An analogy can be made to Montana's efforts to maintain the genetic integrity and diversity of non-introgressed (hybridized) populations of westslope cutthroat trout to ensure long-term conservation of the species. Montana defines core "*genetically pure*" populations as genetically unaltered (>99%) as determined by genetic testing and distinguishes between those genetically pure populations and conservation populations, which also include populations that have unique ecological and behavioral traits of the subspecies that will typically be <10% introgressed (Cutthroat Trout MOU and Conservation Agreement, July 2007). Such a goal or objective is unrealistic to ever achieve with the Pryor Mountain horses. The Fixation Index scores, discussed above, also indicate that the Pryor horses are not genetically unusual with respect to over 145 other wild horse herds to which they were compared. While the Spanish influence in the Pryor herd is detectable and somewhat unusual, it is well established that they are a herd of mixed ancestry.

Allelic diversity. Allelic diversity would be expected to decline more quickly under Alternative 1 compared to the other alternatives, as it targets for removal those descendants of five horses that were deemed to be the least Spanish in phenotype when scored (**Appendix D**). Such a decline has been documented in the past (Cothran 2009). This alternative would, theoretically, reduce the number of genetic founders in the population's ancestry, and diminish the influence of horses that were more recently introduced to the Pryor horse range.

Observed Heterozygosity (Ho). Alternative 1 prioritizes removal of the descendants of five individuals who scored as the least phenotypically Spanish by Sponenberg. Heterozygosity would likely decline at a faster rate as a result of this preferential pattern of removal, compared to other alternatives. If Ho drops below critical thresholds identified in the BLM Wild Horse and Burro Handbook (currently 0.66 for genetic samples), then BLM would take measures to improve diversity, including increasing the breeding age population, skewing the population towards males, introducing horses from other HMAs, or some combination of those approaches. Recent sampling of fecal DNA samples indicate Ho is at 0.726 ± 0.051

which would not require immediate action by the BLM (Zimmerman et al. 2022, presented in Appendix N). However, after preferential removal of a set of individuals related to the non-Spanish phenotype individuals, Ho would be expected to decline, and measures to increase Ho may need to be taken sooner in the future, than would be expected under the other alternatives.

3.2.4 Effects of Alternatives 2 and 3

Alternative 2 would randomly remove horses to meet population objectives, and decisions would be made to remove or retain a certain number of males and females for each age class to maintain desired age and sex ratios (**Appendix F**). Alternative 3 also makes decisions to remove a certain number of males and females by age class but considers lineage data to identify specific individuals for removal. Based on the reevaluation of the AML, the BLM would initially reduce the population to about 150 horses and would complete incremental gathers over time to meet population objectives (**Appendix G**). Gathering incrementally should help reduce the amount of change to band dominance and hierarchy at one time, thus reducing the amount of stress on remaining horses. Under the proposed plan amendment, the BLM could increase the number of breeding animals, skew the sex ratios towards males, or introduce other wild horses if diversity levels drop below critical thresholds under both Alternatives.

Fixation Index (Fst). Pairwise Fst values would not be expected to significantly change under either alternative; the Pryor horses would likely remain genetically very similar to the vast majority of other wild horse herds in the west. BLM would not be prioritizing removal of non-Spanish phenotypes, nor would the BLM be managing the herd as an isolated population. Rather, the herd would continue to be managed as part of a larger metapopulation, with wild horses from other herds being introduced occasionally over time to maintain acceptable levels of genetic diversity, if necessary to limit effects of inbreeding. Fst values could be used to select wild horses for translocation, from HMAs that are not genetically too similar or too divergent from the Pryor herd.

Genetic Similarity. As discussed under Alternative 1, the Pryor Mountain horses are of mixed ancestry with a measurable but not predominant Spanish component. They are genetically similar to over 145 HMAs they were compared to and do not comprise a genetically distinct population of horses. BLM would not manage them as an isolated population but would try to introduce horses with similar characteristics if it becomes necessary to reduce effects of inbreeding depression. The Pryor horses would remain a population of horses with mixed ancestry, which includes Spanish ancestral influence.

Allelic Diversity. Compared to Alternative 1, Alternatives 2 and 3 do not prioritize removal of non-Spanish horses, or certain genetic lines, and allele diversity would likely remain more stable in comparison. Genetic drift—random change in allele frequencies between generations—can result in rapid loss of genetic diversity in small populations (Frankham et al. 2010, 2013 NRC report, p. 144). The USGS developed an individual-based population simulation model to quantify the expected changes in genetic diversity, measured in terms of allelic diversity and heterozygosity, under four different removal strategies for the Pryor Mountain herd (**Appendix N**). Simulations made use of microsatellite genotypes from fecal samples collected from 79 uniquely identifiable horses. The temporal scale of this analysis covers the 10-year life of this proposed HMAP and Gather Plan, which is the timeframe BLM will be undertaking proposed management actions. The USGS projections also modeled potential changes to diversity metrics out 100-years to explore hypothetical results of long-term isolation under different removal strategies.

The USGS report notes that allelic diversity is expected to be more sensitive to population changes than estimates of heterozygosity. The model, which reflects scenarios in which no new horses are introduced from another herd, projects that there will be a small, expected reduction in allelic richness over 100 years, but little to no change over the anticipated life of this HMAP and Gather Plan. Inclusion of such a long time span in the projection was for heuristic purposes, and not meant to reflect the time horizon for

management decisions. Regardless of time span, the reduction in allelic diversity is greater under scenarios that randomly remove horses compared to scenarios that remove horses based on relatedness. However, it is worth noting that the BLM does not have a threshold for allelic richness that would trigger a change in management actions, and the modeled reduction under all four scenarios is still within the 1.09 standard deviation from the mean reported for wild horse herds and not a cause for concern (2013 NRC Report, p. 151-159).

The introduction of horses from other HMAs can increase allelic diversity or prevent its loss. Cothran's analyses (1992) identified a notable pattern of genetic associations with Spanish ancestry in the Pryor herd, as well as in the Cerbat Mountains, AZ, and Sulphur UT herds (NRC 2013). Introducing horses from other herds that are also thought to have higher than average level of Spanish ancestry could either minimize loss of Spanish alleles or, potentially, boost the relative contribution of such genetic characteristics in the Pryor herd. However, BLM's overarching goal with respect to herd genetic diversity is to maintain healthy horses and reduce risk of inbreeding; there is no law, regulation or policy that requires BLM to manage for rare alleles.

Heterozygosity. The 2013 NRC report notes that heterozygosity can be increased by moving individual animals between populations, which will also tend to lessen the frequency of homozygous deleterious recessive genes (Frankham et al. 2010). The NRC report cites the successful translocation of Texas panthers to minimize effects of inbreeding depression in the Florida panther populations (2013 NRC report, p. 165). The 2013 NRC report suggests that the translocation of 10 animals between populations every 10 years would be appropriate in wild horse populations (p. 166), and that it would be advisable to select animals that are unrelated to the target herd with moderate levels of differentiation (refer to Fst discussion above).

With a small population size, and a reduction in population size towards AML, H_o values would be expected to decline over time as a result of genetic drift, which could increase the risk of negative results of inbreeding depression. Alternative 2 would randomly remove horses from the PMHWR, but stratified by age and sex, whereas Alternative 3 uses familial relationships to inform decisions and attempts to retain one or more descendants on the range. Under Alternative 2, it is possible that entire bands would be caught in a bait/water trap and removed as they usually travel together. In comparison, Alternative 3 may remove one or more named individuals from a band but leave the rest. Based upon these differing approaches, H_o could potentially decline at a faster rate under Alternative 2 with random removal, compared to Alternative 3, in which removals are based partly upon relatedness.

The USGS population genetic model quantifies changes to heterozygosity over 100 years, simulating removals every five years down to low AML of 107 individuals (**Appendix N**). The four scenarios consider random removal and random removal within targeted sex and age-classes, and removal of individuals based on redundant genetic diversity (e.g., removing one individual in highly related pairs) and removal of individuals based on redundant genetic diversity within sex and age-classes. Each scenario was replicated 1000 times. The results indicate all removal strategies show a high probability of maintaining genetic diversity above the management threshold of concern ($H_o = 0.66$) in the management time frame considered in this decision. Even for the hypothetical 100 years without any horses added to the herd, the average level of observed heterozygosity across 1,000 simulations in each of the four scenarios remained above 0.66.

Under relatedness-based removal scenarios, the modeling results indicate that prioritizing highly related individuals for removal increased the population genetic diversity relative to the current population and maintained a high genetic diversity for all 100 years across all replicates. Under random removal scenarios, a maximum of 18.9% of the replicates fell below BLM's 0.66 management threshold beginning around year 28, which is well beyond the management time frame for this decision. However, the most

pessimistic scenario still had an 81.1% chance of maintaining the desired amount of genetic diversity after 100 years of repeated random removals.

The results from the USGS model suggest that the long lifespan, and high survival rate of Pryor Mountain wild horses make this population less susceptible to loss of genetic diversity resulting from population control strategies (e.g., contraception, removals) than might be expected in species with shorter generation time and/or lower annual survival rates.

The BLM would continue to monitor heterozygosity of the Pryor herd through ongoing fecal DNA sampling and/or through collection of hair follicle genetic samples during gathers. If laboratory analysis shows H_o is less than the threshold identified in the WHB Handbook (currently 0.66 for the specified set of microsatellite loci), the BLM may take one or more actions to improve genetic diversity which may include: increasing the number of breeding individuals in the HMA, skewing the population with a higher percentage of males, or introducing wild horses from other HMAs with similar ancestry. Considering that the value of H_o was estimated to be 0.731 in 2021, it is expected that the BLM would not need to take immediate action to reduce the risk of inbreeding depression. Additionally, the results of the simulations completed by USGS suggest that heterozygosity levels would almost assuredly remain above the critical threshold in the next 10 years, in which case the BLM would not implement any of these actions. BLM would complete one or more of these actions only if laboratory analysis of samples from the herd at a future date indicates H_o has dropped below the threshold indicating that inbreeding depression is a concern.

Introduced horses would experience some levels of stress resulting from transportation and release into an unfamiliar environment. If, in addition to selecting horses that are genetically somewhat similar to Pryor Mountain horses, the translocated horses are from a similar environment to the Pryor mountains, that could minimize the stress of adjusting to the new setting. Based on observations from past releases in other HMAs, introduced mares, especially, have been readily accepted into existing bands, and have gone on to successfully reproduce.

Continuing to introduce new animals into the Pryor herd would be a continuation of past management practices, which have effectively meant this herd is not managed as an isolated population, but rather as part of a larger metapopulation of wild horses. BLM would strive to select horses for introduction that are similar to the Pryor Mountain herd to the extent possible. These periodic introductions would reduce the potential for inbreeding, and associated loss of fitness.

3.2.5 Effects of Alternative 4

The objective in the 2009 HMAP to remove non-Spanish phenotypes conflicts with the 2015 Billings Field Office RMP MD WH-7 to manage for all representation in the herd, not allowing certain colors or bloodlines to dominate. Therefore, under Alternative 4, the BLM would not complete the plan amendment, would not gather/remove excess horses, and would not introduce horses from other HMAs.

Fixation Index (F_{st}). If the Pryor Mountain herd were truly managed as an isolated population, pairwise F_{st} values with respect to other wild horse herds would increase over time, with F_{st} scores indicative of elevated differentiation over multiple generations of horses. However, BLM is not required to manage herds found in any given HMA as if they were genetically isolated populations and existing laws, regulations and policy direct the BLM to manage populations with the objective of maintaining free-roaming behavior at the minimal feasible level of management necessary to meet objectives in federal land use plans.

Genetic Similarity. As documented by Cothran (2009, 2013), the Pryor Mountain horses have highest mean genetic similarity to Light Racing and Riding breeds, followed by the Old-World Iberian horses. Wild horses from other HMAs would not be introduced; therefore, genetic similarity to other herds would

largely change only as a function of the loss of genetic diversity over time, due to genetic drift (Wright 1931). As previously noted, BLM is not directed to maintain or promote specific genetic ancestries, and such efforts could be conceived as management well beyond the minimal feasible level to maintain healthy populations of wild horses that exhibit free roaming behavior, which would be contrary to the WFRHBA.

Allelic Diversity and Heterozygosity. Allelic diversity and heterozygosity would decline over time due to random genetic drift. While the BLM would continue to implement fertility control measures, without gathers, population growth would likely outpace the capability of the PMWHR to sustain healthy animals. In that case, the BLM could be faced with either the need to conduct an emergency gather to avert starvation, or the population could crash if resource scarcity causes widespread mortality. Under either scenario, both allelic diversity and heterozygosity could drop quickly.

3.2.6 Cumulative Effects

BLM has not identified any projects or conditions that would contribute towards loss of genetic diversity in the Pryor Mountain horses. There are no known instances of domestic horses or tribal horses interbreeding with Pryor Mountain horses on the PMWHR.

3.3 How would proposed gather and fertility control criteria affect population growth trends (including age class, sex ratios and growth rates) and body condition/health?

3.3.1 Introduction

The BLM manages wild horse populations within the framework of an Appropriate Management Level (AML) in order to ensure a thriving natural ecological balance (TNEB). AML is expressed at a population range, with the lower limit established at a number that allows the population to grow to the upper limit over a 4-to-5-year period without interim gathers. The upper limit is the maximum number of animals which results in a TNEB and avoids a deterioration of the range (BLM, 2010). In other words, the BLM must balance the capability of the land to support healthy wild horses within specified population levels, while at the same time providing healthy rangelands and riparian areas for wildlife, including special status plant and animal species, and support other multiple uses on the land such as recreation. The Pryor Mountain herd has historically been maintained above the upper AML, and current range conditions do not meet standards and guidelines for rangeland health (refer to Section 3.4). Several studies have correlated forage availability to mare's body condition and foaling rates (Roelle et al. 2010 and Garrett and Taylor, 1990). Climatic conditions and spatial accessibility determine the availability of forage for herbivores. Population size affects the amount of forage available per animal: as population size increases, forage per animal declines; this results in reduced forage intake and reduced body condition, which affect survival rates and natality (NAS, 2013, p. 66).

BLM modeled population growth under each of the alternatives using Version 3.2 of the Win Equus population model (Jenkins 1996). The purpose of the modeling was to analyze and compare the effects of the alternatives on population size, average population growth rate, and average removal number and to identify whether any of the alternatives cause the population to reach extremely low population numbers or growth rates. The results of the modeling are detailed in **Appendix I**.

3.3.2 Affected Environment

Historical Population Trends: The current estimated population of Pryor Mountain wild horses as of spring 2024, is 200 horses aged 1-20+ (Table 4) This number is based on annual ground survey

population inventories completed by the BLM and volunteer partners. There are currently 116 females and 84 males on the range, with an overall sex ratio of 58 percent female to 42 percent male. Discounting the 20+ age class, which is skewed heavily towards females, the age ratio of females to males for ages 1 to 19 is 53 percent female to 47 percent male.

Table 3: Population demographic characteristics, in terms of age and sex in 2024

Age	1-4		5-10		11-19		20+		All Horses
Sex	F	M	F	M	F	M	F	M	
Number Horses	28	25	25	30	43	29	20	0	200

Population records of the Pryor Mountain herd show that the population has averaged 149 horses from 1971 to 2024, with a low of 87 horses in 1978 to a high of 205 in 2023. In 1978 an ice storm and limited forage resources resulted in a large die-off resulting in the lowest documented population of wild horses. The median number of horses is 147. Since 1971, BLM has removed a total of 668 horses in 26 gathers. Removed animals have been offered for adoption. Every wild horse removed from the PMWHR has been placed. The last gather occurred in 2015 when 18 horses were removed. BLM was enjoined from completing a gather in 2018.

The BLM began administering fertility control in 2001, which has helped reduce the population growth rate. The horse population grew 21.29 percent overall between 1971 and 2000. As a result of births, deaths, and the numerous removals that took place, this reflects a net growth rate of 0.73 percent annually for those years when there was no fertility control, and 473 horses were removed (an average of 16 horses removed per year). Between 2001 and 2015, under a combination of fertility control and gathers, the population was reduced by 5%, for a net growth rate of -0.33 percent annually. During that time, 195 horses were removed (an average of 13 horses removed per year), and an average of 31 mares were treated with fertility control annually. Between 2016 and 2024 under fertility control but no removals, the population grew by 25% overall, for a net growth of 4.44% annually. During that time, an average of 57 mares were treated with fertility control annually. In the last five years from 2019 (population 160) to 2024 (population 200), the horse population grew 25 percent overall at an average annual rate of 5 percent, in this time period with fertility control but when no horses were removed from the range. The current population is about 65% above the current AML upper limit.

Existing Body Condition/Herd Health: Overall the Pryor Mountain horses maintain body conditions indicative of good health. A small number of them exhibit genetic defects, such as Ruby, a 2017 mare born with a hernia. Occasionally, highly inbred foals may be born that are the offspring of a father daughter pairing (such as Ukko, who is the offspring of Norma Jean and her sire Garcia) or foals are born with a genetic defect. BLM assessed body conditions using the Henneke scoring matrix (Appendix S) on 30 of the Pryor horses in August and September 2021 to track and document overall herd health on a representative number of horses. Of the 30 horses, 60 percent rated as body condition 5 (moderate), 37 percent as body condition 4 (moderately thin) and 3 percent had a body condition of 2/3 (very thin/thin). See Figure 4 and 5 below. BLM continued to monitor body condition over the winter of 2021-2022, and while the horses lost weight (which is typical over the winter), the majority of the horses maintained adequate body condition. See Figure 6 and 7 below.



Figure 4: Graciana on 7/26/21, Henneke Body Condition 5



Figure 6: Seneca on 3/2/22; Henneke Body Condition 3



Figure 5: Hataalii on 8/30/21. Henneke Body Condition 2/3



Figure 7: Horizon on 3/1/22, Henneke Body Condition 4

Population Management: This analysis focuses on how differences in gather objectives and fertility control treatments proposed under each alternative would affect population trends and body condition/health. Currently, ZonaStat-H (PZP) is administered to the Pryor Mountain mares through remote field darting following decisions made in the 2015 Fertility Control EA. In 2009, the BLM also treated 40 gathered mares with PZP-22. The BLM has not administered GonaCon-Equine (GnRH vaccine) or other forms of fertility control to the Pryor Mountain horses.

The ZonaStat-H (PZP) vaccine tends to confer only one year of efficacy per dose whereas some studies have found that PZP-22 can confer multiple years of contraception, particularly when boosted with subsequent PZP-22 or liquid PZP vaccine treatments (see Appendix I). Research on ZonaStat-H has demonstrated that it is approximately 90% or more effective for mares treated twice in the first year (primer & booster), while efficacy for PZP-22 given simultaneously with a liquid primer is approximately 60% to 85% for a one-year period. However, some mares may not respond to either of these vaccine formulations and will instead continue to conceive and foal normally. GonaCon-Equine can provide multiple years of infertility in horses. As is true for ZonaStat-H, some mares may not respond to the GonaCon-Equine vaccine and will continue to become pregnant and give birth to foals. See **Appendix I** for further analysis on the effects of fertility control vaccines. The BLM has not removed any horses from the PMWHR since 2015.

3.3.3 Effects of Alternatives 1

Age Class and Sex Ratios: The wild horses on the PMWHR would be managed for a phenotype animal reminiscent of a “Colonial Spanish Mustang” as described by “Sponenberg North American Colonial Spanish Horses” while balancing colors, sex ratios and age structures. The selective removal criteria first remove all descendants of horses with scores of 4 and 5 that do not exhibit phenotypes representative of the “Colonial Spanish Type” referred to as Tier 1. In order to implement this criterion, the BLM would prioritize removal of descendants of horses scored by Sponenberg as a 4 or a 5 during his field visit in 2009. If horses scoring 4 and 5 cannot be captured, or if additional horses are needed to meet gather objectives, the BLM would remove descendants of horses scored by Sponenberg as a 3 which are genetically well represented on the range (Tier 2). The BLM would retain at least five descendants for each of the horses originally scored by Sponenberg as a 3 to maintain representation. Refer to **Appendix E** for a list of Tier 1 and Tier 2 horses that would be available for removal based on the spring 2024 population. The BLM would complete an initial gather to 150 horses and subsequent gathers to reduce the population towards AML and would first target any Tier 1 horses remaining on the range, and then Tier 2 horses that are well represented, followed by Tier 3-6.

Table 5 below provides an example of the resulting age class and sex ratio distribution if all identified Tier 1 horses were removed based on the spring 2024 population. The resulting sex ratio would be skewed towards females.

Table 4: Example population demographic characteristics that would result from removal of all descendants of horses with non-Spanish phenotypes (rated as 4 or 5 by Sponenberg in a 2009 field visit), under Alternative 1 based on spring 2024 population data. Additional horses would be selected from Tier 2 for removal to meet the post-gather population goal of 150. Wild populations regularly change due to births and deaths; gather and removal goals will be updated based on the best-available population information immediately prior to a gather. In this spring 2024 example, a minimum 8 additional horses from Tier 2 would need to be removed to meet the gather objective of approximately 150 horses post-gather.

Birth Year	2020-2023		2014-2019		2005-2013		2004 or older		
Age	1-4	1-4	5-10	5-10	11-19	11-19	20+	20+	All Horses
Sex	F	M	F	M	F	M	F	M	
Existing	28	25	25	30	43	29	20	0	200
No. Removed	5	10	6	7	8	6	0	0	42
No. Remaining	23	15	19	23	35	23	20	0	158
Percent in age class	24		27		37		13		

If all Tier 1 horses were removed based on the spring 2024 population, the resulting population would comprise:

- Number Females (all age classes): 97
- Number Males (all age classes): 61
- Sex ratio: 61% Female to 39% Male
- Number Females (ages 1-19): 77
- Number Males (ages 1-19): 61
- Sex ratio: 56 percent Female to 44% Male

Of the 42 horses that would be prioritized for removal based on the Spring 2024 population, 14 of them are older horses that range between 11 and 19 years, including six stallions and eight older mares.

Growth Rates: Alternative 1 maintains the horse population above AML (120). For purposes of modeling, BLM let the herd grow to 150 and then reduced the herd to 120 (**Appendix J**). Mares would continue to be treated with PZP as approved in the 2015 fertility control EA:

- Mares between the ages of 18 months and 4 and 10-20 would be treated with PZP via remote darting.
- Mares between the ages of 5-9 are not treated, unless they have two offspring one year and older, regardless of whether the one offspring is removed or dies.

Since there would be no change to the fertility control prescriptions, population growth rates would be expected to remain similar to past growth rates. From 2016 to 2024, the horse population grew 25 percent overall, at a rate of 4.44 percent annually without any gathers. If the population size was reduced to upper AML of 120 horses, and the population continues to grow at a rate of 4.44 percent annually, then there would be about 149 horses at Year 5, which is 29 more than the upper AML. The BLM/NPS darted between 44 and 69 mares annually with PZP between 2016 and 2023. It is possible that some of the treated mares were already pregnant when darted or many of the mares are non-responders to PZP. According to these growth rates, the herd would grow by approximately 29 horses every 5 years and the population would be consistently maintained above AML. The WinEquus model calculated an average population size of 159 horses in 10 years with a median growth rate of 4 percent (**Table 8**), which is very similar to the actual growth rates observed over the last six years. The model shows the horse population would remain above low AML and would not crash to zero.

Body Condition: Under the 2009 HMAP, the management objective is to manage wild horses for a Henneke Body Class Condition of 4 (moderately thin; see Appendix S) or greater under “normal” range conditions. Under Alternative 1, BLM would maintain the herd above AML. A reduction in stocking in horses from the current population of 200 horses would result in a greater amount of forage on the range per horse, resulting in less competition for resources. Mares would be expected to live longer and display greater fitness since they are not having as many offspring. However, Alternative 1 maintains the horse population above AML and the horse range currently does not meet standards and guidelines for rangeland health. The 2009 HMAP stipulates that BLM would gather to upper AML, which is 120. However, BLM has not removed enough horses over time and has consistently maintained a population of 150 or more horses. Overgrazing, combined with the effects of long-term extreme drought would result in more competition for forage compared to Alternatives 2 and 3, which maintain the population between lower and upper AML. Therefore, Alternative 1 would not maintain acceptable Henneke body condition scores as efficiently as Alternatives 2 or 3 and there could be a higher number of horses with reduced fitness due to lack of forage.

3.3.4 Effects of Alternative 2

Age Class and Sex Ratios: Table 6 below summarizes example population demographics before and after an initial gather based on spring 2024 population data.

Table 5: Example population demographic characteristics that would result from a gather under Alternative 2 based on the spring 2024 population. Sex ratio goals are to manage the population toward a 50-50 sex ratio in horses 1-19 years old, not to exceed (NTE) 60-40 in either direction in the overall population as a result of removal decisions. The numbers and percentages in this table are goals, actual gather results are expected to vary based on logistics of trapping horses under field conditions. Wild populations regularly change due to births and deaths; gather and removal goals will be updated based on the best-available population information immediately prior to a gather. .

Birth Year	2020-2023		2014-2019		2005-2013		2004 or older		
Age	1-4		5-10		11-19		20+		All Horses
Sex	F	M	F	M	F	M	F	M	
Existing	28	25	25	30	43	29	20	0	200
No. Removed	30		16		4		0		50
No. Remaining	23		39		68		20		150
Percent in age class	15		27		45		13		

- Sex ratio goal (all age classes): not to exceed 60-40 in either direction as a result of removal decisions
- Sex ratio goal (1-19 year olds): manage toward 50% Female to 50% Male

Under Alternative 2, specific numbers of horses to be removed would be drawn from age and sex categories chosen to meet desired age class and sex ratios, though the particular choice of which horses from within those categories would be removed would be effectively randomized through the process of the gather. Discounting the 20+ year old horses, the resulting sex ratio of the 1-19-year-old horses would be managed toward a ratio of approximately 50% males and 50% females, and the resulting sex ratio of the overall population would not to exceed 60/40 of either sex as a result of removal decisions. The percentage of horses in each age class would fall within the desirable age ranges identified in the HMAP objectives (see **Chapter 2**). Of the approximately 50 horses that would be removed, a minimum of 5 of would be older mares between 11 and 19 years based on the spring 2024 population, which is provided as an example to demonstrate how removal criteria would be applied. While the removal would be random selection based on who is caught in a trap, BLM would attempt to remove younger horses from this age class if possible. Horses would likely enter trap sites with their band, and it is possible that all, or large portions of, trapped bands could be removed to meet targeted age class and sex ratios. If more horses are caught than are needed for removal, BLM would release horses with uncommon colors to maintain a variety of colors on the PMHWR to the extent feasible.

Over time, the BLM would complete additional gathers to bring population size closer to AML. Upon reaching lower AML, the BLM would allow the population to grow to upper AML, and then consider additional gathers to reduce the population to lower AML consistent with the provisions of Section 1333(b).

Growth Rates: Alternative 2 would reduce the population to about 150 horses in an initial gather. BLM would complete subsequent gathers to achieve low AML. Mares could be treated with PZP, GonaCon, or other approved fertility control to reduce population growth rates. Under Alternative 2, fertility control treatments would include:

- Mares between the ages of 18 months and 3 would be treated with PZP via remote darting.

- Mares come off fertility control at age 4 and are allowed one surviving foal living to the age of 1. After their foal reaches one year of age, the mares are brought back into fertility control and receive six consecutive treatments.
- Once a mare has received six consecutive treatments, she would be removed from the fertility control treatment unless she foals again, in which case she would then receive a minimum of three more fertility control treatments or treated with another approved immunocontraceptive.

For purposes of WinEquus modeling (**Appendix J**), BLM resumed fertility control in the model at year 7 as the WinEquus model (Jenkins 1996) is not flexible enough to account for nuances of individual treatment prescription in the fertility control program. The WinEquus model calculated an average population size of 143 horses in 10 years with a median growth rate of 3.7 percent, which is slightly less than Alternative 1 (**Table 8**). The model shows the horse population would grow above AML in the absence of additional gathers and would not crash to zero.

Body Condition: The HMAP objective is to manage wild horses for a Henneke Body Class Condition of 3 (thin; see Appendix S) or greater under “normal” range conditions, with the expectation that the horses naturally rely on fat reserves and lose weight over the winter. If the BLM can successfully manage the population between lower and upper AML, then there would be greater amount of forage on the range per horse, resulting in less competition for resources compared to both the current population size and Alternative 1. Mares would be expected to live longer and display greater fitness since they would have fewer offspring per mare, and there would be more forage available per horse on the range.

3.3.5 Effects of Alternative 3

Age Class and Sex Ratios: Alternative 3 would use lineage data to inform removal decisions. After selecting for horses that have genetic defects or are highly inbred, the selective removal criteria consider age, sex, and lineage data (which is tracked by the matrilineal line). Refer to Section 2.4.2 for the removal criterion under Alternative 3. The BLM applied these criteria to provide an example identifying horses that could be removed based on spring 2024 population data to reduce the population to around 150 horses. Refer to **Table 7** and **Appendix G**.

Table 6: Population Demographics before and after removal, under Alternative 3.

Birth Year	2020-2023		2014-2019		2005-2013		2004 or older		
Age	1-4		5-10		11-19		20+		All Horses
Sex	F	M	F	M	F	M	F	M	
Existing	28	25	25	30	43	29	20	0	200
No. Removed	14	11	12	9	4	0	0	0	50
No. Remaining	14	14	13	21	39	29	20	0	150
Percent in age class	19		23		45		13		

- Number Females (all age classes): 86
- Number Males (all age classes): 64
Sex ratio: 57% Female to 43% Male
-
- Number Females (1-19 years old): 66
- Number Males (1-19 years old): 64

- Sex ratio: 51% Female to 49% Male

Under Alternative 3, BLM would consider lineage data and would attempt to remove specific named horses to meet desired age class and sex ratios, while leaving two or more offspring per mare if possible (**Appendix G**). Discounting the 20+ year old horses, the sex ratio of the younger reproductive age horses would be approximately 51% female to 49% male. The percentage of horses in each age class would fall within the desirable age ranges identified in the HMAP objectives (see **Chapter 2**). Of the example 50 horses that would be removed, 4 of them would be mares between 11 and 19 years old. The older mares identified for removal were selected because they have three or more offspring on the PMWHR or are non-responders to fertility control. Their removal would be consistent with criteria to remove non-responders when PZP is the only fertility control treatment used. Removing these specific horses could reduce the overall population growth rate.

Growth Rates: Alternative 3 would have the same gather objectives as Alternative 2. However, under Alternative 3, fertility control treatments would include:

- Mares between the ages of 18 months and 3 years old would be treated with PZP via remote darting.
- Mares come off fertility control at age 4 and are allowed two foals. Mares would resume fertility treatments upon birth of the second foal and would receive six consecutive treatments.
- Once a mare has received six consecutive treatments, she would be removed from the fertility control treatment unless she foals again, in which case she would then receive a minimum of three more fertility control treatments.
- PZP would be the only fertility control treatment used. Non-responders may be darted twice a year or be removed from the PMWHR.

For purposes of WinEquus modeling (**Appendix J**), BLM resumed fertility control in the model at year 8 to account for this Alternative allowing the birth of a second foal, because the model cannot account for nuances of individual treatment prescriptions in the fertility control program. The WinEquus model calculated an average population size of 144 horses in 10 years with a median growth rate of 3.8 percent, which is slightly higher than Alternative 2 (see Table 8). The model shows the horse population would grow above AML and would not crash to zero.

Body Condition: Fertility control treatments under Alternative 3 would not be as effective in controlling population growth rates, as this alternative allows two foals instead of one and limits treatment options to PZP only. The result is expected to be that more horses would have to be removed from the PMWHR over time. The effects to body condition would likely be the same as Alternative 2 because the BLM would manage the population to maintain the populations size between lower and upper AML (107-120).

3.3.6 Effects of Alternative 4

Age Class and Sex Ratios: Under the No Action Alternative, BLM would not gather/remove any horses, but would continue to administer PZP via remote darting in accordance with the criterion in the 2015 fertility control EA. GonaCon-Equine or other approved fertility immunocontraceptives would not be available as a potential tool for controlling population growth. The current population of 200 horses would continue to grow. The distribution of horses across age class and sex ratios would not be expected to change substantially relative to the existing condition.

Growth Rates: The WinEquus model calculated an average population size of 291 horses in 10 years with a median growth rate of 5.3 percent, which is the highest of any alternative (see Table 8). The model shows the horse population would remain well above AML and would not crash to zero. However, the model does not take into account forage availability or body condition, and it is highly unlikely that the

PMWHR could support that number of horses without causing the population to suffer from some instance or instances of widespread mortality. The projection of those kinds of events is not accounted for in the structure of the WinEquus model program.

Table 7: Summary of Population Size and Growth Rates as modeled in WinEquus

	Alternative 1, 10 years	Alternative 2, 10 years	Alternative 3, 10 years	Alternative 4, 10 years
Population Size in 11 years*	159 {147, 170}	143 {129, 150}	144 {134, 151}	291 {245, 342}
Annual Growth Rate	4.0% {1.2, 6.7}	3.7% {0.4, 5.9}	3.8% {0.9, 6.9}	5.3% {2.4, 7.2}

Median values are shown, as well as average from the 10th and 90th percentile in parentheses. The range in curly brackets conveys an uncertainty interval that contains 80% of the 100 simulated population trials that resulted from the input parameters in the model.

Body Condition: Without an effective means to control population growth, body condition would decline as the population continues to grow, and there is severe competition for a finite amount of resources. Henneke body conditions scores would drop below 3 year-round, the horses would display reduced fitness over time. The BLM would continue to monitor body condition and the only tool available would be an Emergency Gather if conditions warrant.

3.3.7 Cumulative Effects

Cumulative effects to population trends and body condition/health would be similar for all alternatives but could vary by the magnitude of the effect. The Pryor Mountain horses do not have to compete with cattle for forage as there are no cattle allotments on the PMWHR. The BLM authorizes a permittee to trail his cattle across the PMWHR range to access summer pastures, but that effect is limited to only a couple days a year and is confined to a specific travel corridor. The PMWHR is home to a resident herd of big horn sheep (*Ovis canadensis*). Big horn sheep are browsers, whereas horses are grazers. However, when forage becomes limited, horses will consume woody species such as sagebrush, creating competition with local wildlife populations. As noted in the range analysis, the PMWHR currently does not meet standards and guidelines for rangeland health and the quality of both forage (grass) and browse (woody vegetation) is highly departed from normal conditions and in a severely degraded state. Alternatives 1 and 4 would maintain the horse population above AML, which would continue to degrade rangeland health resulting in greater competition for resources and it could be more difficult for horses to maintain adequate body condition. Alternative 4 would not remove any horses from the PMWHR and has the most potential to limit forage resources. Under Alternatives 2 and 3, the BLM would manage the population towards and within an AML of 107-120. With a lower population size, there would be less competition for resources, resulting in greater fitness and the ability to maintain body condition.

The largest single event that could cumulatively impact the Pryor Mountain horse population is a severe winter (see 3.3.2). Record snowpack and ice conditions could reduce herd size similar to the winter of 1978. Population numbers have not been related to drought and reduced forage production alone, however, reduced forage availability and production due to prolonged drought would amplify effects from a severe winter.

As noted in the Drought Report (**Appendix M**), BLM used the Rangeland Analysis Platform Production Explorer to estimate production for the PMWHR (Allred et al. 2021). The drought trends and the Production Explorer trends demonstrated large fluctuations in temperature, precipitation, and production. Record low precipitation combined with record high temperatures indicate unfavorable growing

conditions in the Pryor Mountains and high drought stress is likely to adversely affect production and reproduction of herbaceous vegetation.

3.4 How will proposed management actions affect upland health?

3.4.1 Introduction

Consistent with 43 CFR 4700.0-6 and 36 CFR Part 222 Subpart D, wild horse and burro populations shall be managed in balance with other uses and the productive capacity of their habitat, i.e., populations must be managed to achieve and maintain a thriving natural ecological balance (TNEB) and multiple use relationships on the public lands.

In 1995, Fundamentals of Rangeland Health (FRH) were incorporated into the grazing regulations under 43 CFR 4180. The Montana/Dakotas Standards (Standards) for Rangeland Health guide BLM management practices on public land across Montana/Dakotas to ensure sustainable range management; these standards would apply to the portion of the range in Wyoming.

To achieve a TNEB on the public lands, WH&B should be managed in a manner that assures Significant Progress (as defined by the BLM Rangeland Health Standards Handbook H-4180-1, page I-8) is made toward achieving the Land Health Standards. Standard 1 requires that uplands should be in proper functioning condition.

The BLM completed a rangeland health assessment for the PMWHR and determined that Standard 1 is not being met due to overgrazing and overpopulation of the wild horses, which has resulted in a notable shift in the vegetation community from cool season taller bunchgrass dominated community to a cool season shorter bunch grass community dominated by cool season rhizomatous grasses, sedges, and shrubs. This shift from high forage value to low forage value species indicates that the plant community is altered in ways that are neither beneficial for grazing nor ecological function. This issue is widespread throughout the PMWHR at high, mid, and low elevation sites (**Appendix B**). The analysis presented in Section 3.4 summarizes information from the Rangeland Health Assessment to characterize the affected environment for Upland Health and assesses how the alternatives will make progress towards achieving Standard 1 of the rangeland health standards.

BLM also explored frequency and severity of drought on the PMWHR (**Appendix M**). Recurrent severe drought can exacerbate plant community shifts and soil instability. In addition, reduced forage production can intensify utilization levels of preferred species as well as increasing use on less preferred species, compounding negative effects to land health. Plant communities on the PMWHR are adapted to recurrent drought, but prolonged severe drought coupled with amplified grazing pressure due to plant community shifts and reduced forage production exacerbates negative effects. When preferred forage becomes limited under intense grazing, horses shift to less preferred species which spreads effects to more plant communities and/or larger areas. Data from 2021 indicate both reduced forage production as well as widespread high utilization levels across much of the PMWHR.

3.4.2 Affected Environment

Population Trends Relative to AML

Wild horses are managed with a framework of an appropriate management level (AML), which is based upon the carrying capacity of the habitat, with consideration for preserving multiple-use relationships. The establishment of AML is not intended to be a onetime determination but rather a fluid process where adjustments are made based upon environmental changes and management needs. The Wild Free Roaming Horse and Burro Act mandates the BLM and Forest Service to “protect the range from the

deterioration associated with overpopulation” (PL 92-195). The National Park Service is also mandated to manage lands sustainably.

AML is expressed as a population range within which WH&B can be managed for the long term. The AML upper limit is the maximum number of wild horses that can graze in a thriving natural ecological balance and multiple use relationship on the public lands in the area. The AML lower limit allows the population to grow (at the annual population growth rate) to the upper limit over a 4-to-5-year period, without any interim gathers to remove excess WH&B. Establishing AML as a population range allows for the periodic removal of excess animals (to the low range) and subsequent population growth (to the high range) between removals. Note that any gathers conducted after reaching low AML would be accomplished consistent with the provisions of Section 1333 (b).

The BLM re-evaluated the AML as part of this NEPA analysis in accordance with the process outlined in the BLM Wild Horse and Burro Handbook H4700-1 (**Appendix C**). The WHB Handbook describes a multi-tiered analysis process to establish and adjust the AML. This process includes first determining whether the four essential habitat components (forage, water, cover and space) are present in sufficient amounts to sustain healthy WH&B populations and healthy rangelands over the long-term. In making this determination, the most limiting factor(s) within the HMA should be considered, which may include but is not limited to available water, availability of forage on summer or winter range, capability of dominant ecologic sites, and extended periods of drought. If the four essential habitat components are present, the BLM next determines the amount of sustainable forage available for WH&B use. The Handbook states that if one or more of the essential habitat components is insufficient to maintain a healthy WH&B population and healthy rangelands, the authorized officer should consider amending or revising the LUP to remove the area’s designation as an HMA. The BLM considered effects to genetic diversity in Section 3.2 above and is not considering removing the area’s HMA status.

In the 2009 HMAP, the BLM established an AML of 90 to 120 horses, excluding foals less than one year of age, following an in-depth analysis of habitat suitability and resource monitoring and population inventory data, with public involvement. The AML of 90 to 120 horses was carried forward into the 2015 Billings ARMP. However, the population of the Pryor horses has been consistently maintained at a level above AML over the last 50 years. Population records show that number of Pryor Mountain horses has only been less than 100 horses one time since 1971; in 1978, a severe winter dropped the population down to 87 horses. The average number of horses on the PHWHR has averaged 148 horses since the 1970s and has only been at, or less than high AML of 120 horses six times in the last fifty years. The population of wild horses as of spring 2024 is 200 horses.

Rangeland Health Assessment

The BLM completed a Rangeland Health Assessment for the PMWHR (**Appendix B**). As described in **Appendix B**, the BLM used major land resource areas (MLRAs) and ecological site descriptions (ESDs) as a basis for comparing the affected environment to reference conditions. Approximately 61 percent of the PMWHR is located within the Northern Rocky Mountain Foothills (46) MLRA and approximately 39 percent is located within the Northern Intermountain Desertic Basin MLRA (32). MLRAs are further broken down into Ecological Sites, which are defined as a distinctive kind of land with specific characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation (NRCS, 2022a). Ecological site classifications and descriptions provide a consistent framework for stratifying and describing rangelands and their soil, vegetation, and abiotic features. Land managers utilize ESDs developed by the NRCS to evaluate suitability for various land-uses, predict capability for a landscape to respond to different management activities or disturbance processes, and to assess how an area may sustain productivity over the long term.

The BLM used multiple sources of data to qualitatively and quantitatively describe the affected environment, including:

- Assessment, Inventory and Monitoring (AIM) data: 61 points collected between 2014-2022 which quantified percent cover of vegetation, bare ground, and litter.
- Interpreting Indicators of Rangeland Health Assessment (IRRH): qualitative field assessment completed during the summer of 2021 that assessed soil/site stability, hydrologic function, and biotic integrity.
- Rangeland Analysis Platform (RAP): remotely sensed data that estimated percent cover over time from 1986-2021 compared to annual precipitation.
- Residual Production: utilization data collected in November 2021 that estimated residual forage available for winter use).

The BLM used this data to characterize the affected environment and compare it to a reference condition, or Historic Climax Plant Community (HCPC) described in applicable ESDs. The reference state is the state where the functional capacities represented by soil/site stability, hydrologic function, and biotic integrity are functioning at a sustainable and resilient level under a natural disturbance regime. The magnitude of departure from existing condition to HCPC is described using state and transition models (STMs). Plant communities many naturally shift along community pathways due to succession (changes in plant seral stages as vegetation ages), natural disturbances, weather variation, or changes in management. A community pathway can be reversible in part by changes in natural disturbances, weather variation, or changes in management. Transitions, on the other hand, contribute directly to a loss of resilience, and are generally not easily reversible by simply altering the intensity or direction of factors that produced the change. They often require active restoration to return to the previous state and are often referred to as “crossing a threshold.” Transitions among states at an ecological site are often caused by a combination of feedback mechanisms that alter soil and plant community dynamics that contribute directly to a loss of state resilience.

Penn’s Cabin

The Penn’s Cabin use area is located on the northern end of the PMWHR range and is used as summer range. The data collected in the Penn’s cabin use area indicates that functional and structural groups are dominated by perennial forbs followed to a much lesser extent by mid and short cool season grasses and sedges. Tall cool season grass species such as bluebunch wheatgrass, western wheatgrass, and needlegrass species are absent from this site or present but not dominant. These perennial grass species are important to maintain or improve healthy range site conditions.

Species present at Penn’s cabin include short grasses, such as Idaho Fescue and prairie junegrass, as well as sedges and increaser forbs. The BLM observed that the plants in this use area have very low vigor and very little usable herbaceous production. The plant community has departed to the point that low mat forming phlox and carex species dominate the vegetative community. Carex species are not a preferred forage for horses. The vegetation composition (including both species composition and percent cover) indicates that the area has degraded to State and Transition Model 5 and/or 6 according to the ESD. State 5 represents communities that have crossed over thresholds from the HCPC and may be difficult to restore with grazing management alone. State 6 represents communities that have severely shifted away from the HCPC and probably cannot be restored without mechanical inputs.

Vegetation reflective of State and Transition Models 5 and 6 are less productive than plant communities in a more desirable state (States 1, 2, or 3). The short plant heights result in higher soil temperature, poor water infiltration rates, and high evapotranspiration, thus eventually favoring species that are more adapted to drier conditions. These communities have lost many of the attributes of a healthy rangeland, including good infiltration, minimal erosion and runoff, nutrient cycling, and energy flow.

The BLM rated soil and site stability and hydrologic function as slight to moderately departed from expected conditions mainly due to deposition areas and terracettes. They were most notable along the side hills and occur as “benches” of soil deposition (Figure 8). Terracettes are formed by soil materials being redistributed by water and will increase as utilization remains high on this site.

Figure 8: Penn’s cabin use area. Visible terracettes are a sign of soil instability.



Additionally, the RAP data suggests that amount of bare ground has increased over time, while perennial forbs and grass have declined. The data also shows a consistent tree cover presence, when the ESD for tree is zero. Perennial forbs and grasses are combined and showing a downward trend. This data provides further evidence of a vegetation component that is not representative of the ESD for the area.

Burnt Timber Ridge

Both Burnt Timber Ridge and Sykes Ridge are mid elevation areas on the PMWHR, connecting the low elevation winter range to the summer range at Penn’s cabin, and large portions of these ridges are used year-round by the Pryor Mountain horses.

The BLM’s rangeland health assessment indicates that vegetation on Burnt Timber Ridge is in poor condition. During the IRRH field assessment, the BLM observed that bluebunch wheatgrass is present, but small in stature and low in vigor resulting in very low production, impacting both bare ground and litter production. The other dominant grass species Sandberg’s bluegrass, prairie junegrass and blue grama increase under grazing pressure as larger stature cool season bunchgrasses decrease. Horse numbers consistently above AML have likely contributed to the increase of blue grama, which will eventually replace the more desirable perennial grass species. Blue grama provides little cover and forage, and its short stature makes it less effective at infiltration and reducing runoff compared to desirable species. Biotic integrity rated as moderate departure from the HCPC. Current use is not allowing plants to complete phenological development and plant communities will continue to decline if conditions persist. The BLM observed utilization levels at 50% by early June based on landscape appearance and visual observations. High utilization levels result in poor vigor and performance leaving soils exposed to wind and water erosion. The BLM rated soil and site stability and hydrologic function as slight-moderate departure from expected conditions mainly due to the high percentage of gravel that provides cover and stability.

The vegetation composition (including both species composition and percent cover) is indicative of State and Transition Models 2 (further to the north) or 3 (further to the south). The BLM observed a higher

percentage of bluebunch wheatgrass in the northern portion of Burnt Timber. Prairie junegrass appears to have functionally replaced the bluebunch wheatgrass. Both the northern and southern portions appear to be missing tall needlegrasses, which are an important key species for the ecological site. This site could possibly improve with rest and proper grazing management because of the presence of bluebunch wheatgrass, a desirable perennial grass species. Both State and Transition Models (STMs) 2 and 3 note that the degradation is due in large part to non-prescribed grazing. Under STM 2, biomass production and litter decline as the taller grasses become replaced by shorter ones. Evapotranspiration tends to increase, moisture retention is reduced, and soil surface temperatures increase. STM 3 is the result of heavy disturbance such as long-term, heavy continuous grazing, and a threshold has been crossed. Repeated spring grazing depletes stored carbohydrates, resulting in weakening and eventual death of the cool season tall and medium grasses.

The BLM estimated the amount of residual forage available for winter use in November 2021 ranged from a low of 13 pounds per acre at Cheyenne Flats to a high of 31 pounds per acre on Forest Service (enough to feed 44 horses for one month at 50% utilization). The low production values measured by the BLM in November 2021 may be attributed to long-term, recurring early spring grazing and year-round grazing combined with drought conditions in 2021. Additionally, RAP data show that amount of bare ground has decreased over time, while foliar tree cover has increased. Perennial forb and grass cover is well below what would be expected for these ESDs and is not representative of expected vegetation for this use area under natural disturbance cycles.

Sykes Ridge

Both Burnt Timber Ridge and Sykes Ridge are mid elevation areas on the PMWHR, connecting the low elevation winter range to the summer range at Penn's cabin, and large portions of these ridges are used year-round by the Pryor Mountain horses.

During the IRRH field assessment, the BLM observed that the bluebunch wheatgrass that was present displayed very poor vigor and was even difficult to identify at times. Many of the bunchgrasses observed did not form a traditional bunch but occurred as a single plant or as a few culm plants, often appearing as new seedlings rather than established plants, even though they are not seedlings. Monitoring data and field observations indicate that the area is dominated by short cool season bunchgrass, sedges, and perennial forbs, followed by shrubs and mid cool season bunchgrass in a more minor extent. While there are remnants of bluebunch wheatgrass present, there is a clear shift from the desirable cool season species to the less productive and less desirable short cool season grasses. Biotic integrity, soil and site stability and hydrologic function were similar to Burnt Timber Ridge.

The vegetation composition (including both species composition and percent cover) is reflective of State and Transition Model (STM) 3, which is the result of heavy disturbance from continuous, non-prescribed grazing. It is dominated by short increaser grasses such as Sandburg's bluegrass, and prairie junegrass and needle and thread. Bluebunch wheatgrass is still present but with very low vigor and with continued high utilization rates and may be reduced to non-existent in the near future. Very little bluebunch is present in the innerspaces and grows only under the canopy of sagebrush, where it receives some protection from grazing. Once this species is absent, the site could further degrade to STM 4 or 5 where the tall cool season grasses are completely gone, and the site will require substantial restoration efforts and time to improve productivity.

The BLM estimated only 5 pounds per acre of residual forage available for winter use in November 2021 (sufficient to feed 1 horse for one month at 50 percent utilization). The low production values may be attributed to long-term, recurring early spring grazing, and year-round grazing combined with drought conditions in 2021. Additionally, RAP data suggests that amount of bare ground has decreased over time, while foliar tree cover has increased. Perennial forb and grass cover is well below what would be expected for these ESDs and is not representative of expected vegetation for this use area.

National Park Service

Both National Park Service (NPS) and Britton Springs are low elevation areas on the PMWHR, used year-round by a subset of the Pryor Mountain horses and as winter range for the entire population.

During the IRRH field assessment, the BLM observed heavy utilization and very poor site conditions. While bluebunch wheatgrass and needle-and-thread grass were present, they displayed poor vigor with very few seed heads were present and percent cover for graminoids was substantially less than what would be expected for the site. The low amounts of grass correlated to the low amounts of litter. Biotic integrity rated as moderate departure from expected conditions. The BLM observed minor water flow patterns, and rated soil site stability and hydrologic attributes as slight to moderate. The higher-than-expected bare ground and low litter percentage were contributing factors. The BLM determined this was rated as moderate degree of departure for biotic attributes, with over grazing and drought contributing to the existing condition.

The vegetation composition (including both species composition and percent cover) is reflective of State and Transition Model (STM) 3. Larger amounts of needle-and-thread and blue grama appear to be replacing the bluebunch wheatgrass. Shrubs and bare ground have increased and grass and grasslike species are far reduced from expected for this site. Both state and transition models (STMs) 2 and 3 note that the degradation is due in large part to non-prescribed grazing. While STM 2 may respond favorably over time to improved grazing management, STM 3 may require restoration efforts and time to increase productivity.

The BLM estimated 31 pounds per acre of residual forage available for winter use in November 2021 (sufficient to feed 64 horses for one month at 50 percent utilization). The low production values may be attributed to long-term, recurring early spring grazing, and year-round grazing combined with drought conditions in 2021. Additionally, RAP data suggests that the amount of bare ground has decreased over time, while the amount of tree cover has increased. Perennial forb and grass are pretty consistently between 10 – 20 percent, which correlate to field measurements and are below the expected values for the ESDs for the area (limy 20-40 percent, other ecological sites in the 75-90 percent range). The RAP data is another line of evidence suggesting that the existing conditions are departed from the reference condition and do not meet standards for rangeland health.

Britton Springs (Turkey Flats)

Both National Park Service and Britton Springs are low elevation areas on the PMWHR, used year-round by a subset of the Pryor Mountain horses and as winter range for the entire population. The Britton Springs portion of the PMWHR contains a highly variable landscape, and transitions from MLRA 46 on the northern portion, mostly in Montana, to MLRA 32 on the far southern edge of the horse range in Wyoming. This portion of the PMHWR contains the area commonly known as Turkey Flats, which historically has received concentrated horse use in the winter.

During the IRRH field assessment the BLM observed that the bluebunch wheat grass that was present displayed very poor vigor, as evidenced by weakened plants and nutrient reserves and shallow root systems. Blue grama and Sandberg's bluegrass have functionally replaced the more desirable cool season grass species. The BLM also observed that sagebrush is declining. Blue grama and Sandberg's bluegrass do not provide the structural component needed to minimize erosion. As a result, soils are actively moving and eroding both by wind and by water. Though highly departed and actively eroding, some of the building blocks for recovery continue to be present in trace amounts. For these reasons, the BLM rated biotic integrity as moderate departure from expected conditions rather than a moderate to extreme rating. The BLM observed signs of erosion and pedestalling and rated soil and site stability and hydrologic function as slight to moderate departure from expected conditions.

Monitoring data and field observations indicate that the functional and structural groups for the area are being dominated by warm season grasses followed by short cool season bunchgrasses which occur as a minor component. The clear change in functional/structural groups from mid cool season bunchgrasses to warm season grasses indicate that Britton Springs is best represented by State and Transition Model 3 and 4. These sites are characterized by early stages of degradation and non-prescribed grazing can cause the community to be dominated by medium and short grasses such as needle-and-thread grass, Sandbergs bluegrass, blue grama and prairie junegrass. The difference in vegetation at HCPC versus STM 3 and 4 is readily apparent by comparing vegetation inside of and outside of the grazing enclosure at Turkey Flats (Figure 9).

Figure 9: Turkey Flats, January 3, 2022. The area to the right of the fence lies within a long-term grazing enclosure, and the area to the left is grazed by the Pryor Mountain horses.



The BLM estimated only 8.3 pounds per acre of residual forage in November 2021 (sufficient to feed 8 horses for one month at 50 percent utilization). The low production values may be attributed to long-term, recurring early spring grazing, and year-round grazing combined with drought conditions in 2021. Additionally, RAP data suggests that the amount of bare ground has decreased over time, while the amount of tree cover has increased. Perennial forb and grass are consistently between 10 – 20 percent, indicating that graminoids have been below the range for the ESD for at least the last 30 plus years.

3.4.3 Effects of Alternative 1

Under Alternative 1, the AML would remain set at 90-120 with a gather to upper AML as long as fertility control is administered. BLM would initially reduce the population to about 150 horses in a 2025-2026 gather, and then manage the populations towards high AML over time. While the AML would not change, the BLM has consistently maintained a horse population well above AML and this effects analysis assumes BLM will continue to manage the population above AML. The horse population has only been within AML six times in the last fifty years and the average number of horses has been at or above 155 since 2010. This overstocking of the horse population has resulted in over- utilization of available forage, which contributed to declining range conditions, and BLM's finding of not meeting standards 1, 2, and 5 of the Standards and Guidelines for Rangeland Health. Under current management, if horses were to average 155 over the next ten-year lifespan of this plan, rangeland health would continue to worsen. A population size of 155 horses is 35 over the top range of AML and would equate to about

350 extra horses over the next ten years. To put that in perspective, this would nearly triple the number of horses over that time-period, and result in an excess number of horses than what the landscape and herd management area can support. The stocking rate analysis in **Appendix C** describes how many horses can be sustained on the range without further degrading the area. Current management of horse numbers consistently above AML has resulted in range conditions that have deteriorated to and within state and transition models common with long-term of overuse of an area.

The majority of the rangelands range from States 3-6, with a few areas around Upper Burnt Timber, Sykes Ridge, and NPS in a slightly less degraded State 3 due to heavy disturbance and year-long non-prescribed grazing. Repeated spring grazing depletes stored carbohydrates, resulting in weakening and eventual death of the cool season tall and medium grasses. Remnant populations of desirable vegetation are present but continued over-population would further change the plant community to include an increase in annuals, weedy species, and short grasses, which are less desirable, produce less forage, and are less palatable.

The more highly departed ecological sites such as near Turkey Flats and Penn's cabin area would continue to decline with horse numbers above AML, although, at a slower ecological rate than under Alternative 4 (no removal). These sites are missing late-seral perennial grass species and are completely dominated by short cool season and warm season grasses. Undesirable forbs and pincushion plants have become the dominant vegetation community in the area around Penn's cabin, which most closely resembles State 5 or 6 (**Appendix B**). If horse numbers remain above AML and forage demand exceeded the forage resource, the area would become completely dominated by increaser forb species and plants that are adapted to drier conditions. The remaining cool season grasses that are present would be completely lost.

Maintaining horse numbers above AML under current management will not result in any improvement among soil resources. During the 2021 field survey, the BLM noted larger areas of bare ground resulting in water flow patterns and pedestalling, which is common across the horse range and indicates soil loss. Soil erosion, most notable as terracing at Penn's Cabin use area was observed and has resulted from over-utilization and the change in plant community composition. Terracettes (see Figure 8 above) are formed by soil materials being redistributed by water and will worsen as utilization remains high on the site. The relatively higher elevation of the soil on the upslope side of a terracettes is an indication of soil deposition by moving water or of soil erosion below the terracette. The BLM noted large innerspaces with higher-than-expected bare ground common throughout the horse range and maintaining numbers above AML would result in a continued decline in soil resource condition. Alternative 1 would not be consistent with 43 CFR 4700.0-6, which directs the BLM to manage wild horse and burro populations to achieve and maintain a thriving natural ecological balance (TNEB) and multiple use relationships on the public lands.

3.4.4 Effects of Alternatives 2 and 3

Under Alternatives 2 and 3, the AML would be adjusted to 107-120. The BLM would continue to administer fertility control and would initially reduce the population to about 150 horses in a 2025-2026 gather. The BLM would then complete subsequent gathers to manage the population towards lower AML of 107 horses and allow the population to grow to the upper AML of 120 before conducting another gather. Any future gathers conducted after achieving low AML would be accomplished consistent with the provisions of Section 1333(b). Positive impacts to vegetation and soils may occur under Alternatives 2 and 3 by reducing the current level of horses to AML under these alternatives. Ecological condition would stabilize in the low elevation desert areas and the high elevation mountain meadows. The mid-elevation would be expected to stay static with perhaps an upward trend of ecological condition.

Ecological condition would likely stabilize or improve for portions of the PMWHR that more closely resemble States 2 and 3 described in the Ecological Site Description (Upper Burnt Timber and NPS).

These sites are closer to the HCPC, mainly due to the higher coverage of bluebunch wheatgrass and needle-and-thread grass, which could increase in abundance with reduced grazing pressure. Areas where late seral, desirable perennial vegetation is more prevalent will have the greatest chance of naturally improving cover, composition, vigor, and production of the vegetative community along with favorable weather conditions and precipitation compared to sites that are more degraded.

As described above, the Burnt Timber and Sykes Ridge use areas most closely resemble State 3 which is often the result of long-term, heavy, continuous grazing and/or annual, early spring seasonal grazing. Alternatives 2 and 3 would reduce the likelihood that this community is further degraded. Remnant populations of desirable vegetation are present, and balancing forage demand with forage resources could see a positive improvement in percent cover of the desirable vegetation already present.

The Penn's cabin use area (State 5/6) would stabilize if horse numbers are reduced and maintained at AML. These communities will respond to improved grazing management, by increasing the coverage of desirable herbaceous vegetation. However, management intervention such as prescribed grazing, fire, and/or re-seeding as well as time would likely be required to revert these communities toward a more productive plant community and towards the reference State (State 1). Management practices would be difficult to implement without interior fences to prescribe grazing or to defer grazing following prescribed fire or re-seeding.

Much like the Penn's Cabin Use area, the Turkey flats use area would see an improvement among the plant community under Alternatives 2 and 3. Remnant herbaceous cover of desirable perennial vegetation is still present but is mostly dominated by short and mid grasses such as blue grama and Sandberg's bluegrass. Balancing forage demand with available forage resource would see an improvement among desirable vegetation which is already minimally present. However, significant management intervention and time would also be required to revert the Turkey Flats use area towards the reference state.

Soils would be expected to stabilize after horse numbers have been reduced and maintained at the AML of 107-120 horses. Erosion in the form of pedestalling, waterflow patterns, and terracing were noted across the horse range and these indicators would be expected to stabilize and recover as grazing pressure is reduced. Appropriate utilization among key forage species will improve the basal cover, composition, vigor, and production which will have an overall positive impact on soil health and nutrient cycling. The BLM noted large innerspaces with higher-than-expected bare ground common throughout the horse range, and with appropriate utilization, the bare ground will decrease because of more vegetation cover. As key species begin to improve in cover, production, and vigor with horse numbers at AML the capacity of the area to capture, store, and release water from rainfall, runoff, and snowmelt will improve.

Overall, ecological sites in States 5 or 6 would likely stabilize and sites in States 2 and 3 would improve in vigor and resiliency as cool season grasses grow in abundance as a result of reduced grazing pressure. The reduction in grazing pressure under Alternatives 2 and 3 therefore should improve rangeland health and productivity consistent with 43 CFR 4700.0-6, which directs the BLM to manage wild horse and burro populations to achieve and maintain a thriving natural ecological balance (TNEB) and multiple use relationships on the public lands.

3.4.5 Effects of Alternative 4

Under Alternative 4, the BLM would continue to administer fertility control but would not gather/remove horses from the range. The number of wild horses on the range would steadily increase over the life of this plan. BLM calculated an 25% population increase between 2016-2024, with the population growing from 160 to 200 adult horses while implementing fertility control measures, but no gathers. During that period, the population high was 205 horses, and population growth averaged 4.4% annually. BLM's population model predicted an even higher growth rate, with an average population size of 291 horses in 10 years with a median growth rate of 5.3 percent (Section 3.3).

Maintaining a horse population above AML would result in an ecological condition continuing to deteriorate across the horse range. Recurring drought conditions along with the number of wild horses has led to a decrease of desirable cool season bunchgrass such as bluebunch wheatgrass and needle-and-thread grass, to a less desirable and less productive vegetative community. BLM data and field observations indicate blue grama appears to have functionally replaced bluebunch wheatgrass. Blue grama is a warm season grass that increases under heavy grazing pressure, provides little cover and forage, and its short stature makes it less effective at infiltration and reducing runoff compared to desirable species.

Similarly, the Penn's cabin area has seen an increase and complete dominance of pincushion forb plants which provide little in terms of forage for wild horses and indicate overutilization and downward ecological trend, when compared to desirable cool season grass species. The trend, based on monitoring data, across all ecological sites has been a shift in composition from desirable tall to mid cool season grass species to short cool season and warm season grass species, and a dominance of pincushion type plants in the high elevation mountain meadows. As plants become overutilized by increasing horse numbers above AML they begin to lose vigor, which is especially important during years of below average precipitation or drought conditions that we are experiencing now. Grass plants that are grazed to maintain high levels of metabolic reserves typically have long, healthy root systems. Holecheck et al. (2001) summarizes that when a range is repeatedly overgrazed the metabolic reserve is depleted, the root system shrinks, and the plant dies. This leaves the site vulnerable to erosion and invasion by unpalatable and often poisonous plants.

Soil loss within ecological sites would be expected to continue since desirable vegetation would not be adequate to stabilize soils with the wild horses managed at levels beyond the capacity of the habitat. Soil erosion and terracing would be expected to increase as well. As horse numbers would increase under this alternative over the next ten years, ecological conditions would continue to worsen and would see a continuation of the downward trend across the range.

With an increasing population of horses without any removals to manage population size towards AML, range conditions would continue to degrade under Alternative 4, and would not be consistent with 43 CFR 4700.0-6, which directs the BLM to manage wild horse and burro populations to achieve and maintain a thriving natural ecological balance (TNEB) and multiple use relationships on the public lands.

3.4.6 Cumulative Effects

Livestock trailing is authorized across the PMWHR for one day in spring and one day in the fall for a total of 80 AUMs. Although the trailing operators will be billed the full AUMs, actual use will be much less and the potential environmental effects are considered minimal and effectively mitigated through implementation of the following terms and conditions – trailing through on an existing county road, and moving straight through so as not to exceed one day.

3.5 How will proposed management actions affect riparian condition at Crooked Creek, Cottonwood Spring, Sykes Spring, and Layout Creek?

3.5.1 Introduction

The 2015 Billings Field Office RMP states that riparian areas will be managed to meet the Standards for Rangeland Health and to ensure that riparian areas and wetlands are in Proper Functioning Condition (2015 BiFO RMP, MD Veg/R&W-2). Further, the 2015 RMP has a goal to manage for healthy native plant communities and desirable nonnative plant communities by reducing, preventing expansion of, or eliminating the occurrence of undesirable invasive species, undesirable nonnative, or noxious weeds

(predatory plant pests or disease) by implementing management actions consistent with national guidance, state, and local weed management plans (Goal Veg/IS&NW 1).

The BLM completed a rangeland health assessment of the PMWHR and determined that the PMWHR is not meeting Standard 2 for riparian areas and wetlands at Cottonwood Springs, which is Functioning at Risk (FAR) due to the lack of recruitment among Cottonwood trees and other riparian obligate species and due to the high mineral content in the soil and overuse by wild horses (**Appendix B**). Standard 2 specifies that riparian areas and wetlands should be in proper functioning condition.

During the summer of 2021, the BLM assessed Cottonwood Spring, Sykes Spring, Crooked Creek, and Layout Creek to determine if the systems were meeting Standard 2 of the Standards and Guidelines of Rangeland Health for functionality of three main categories – hydrologic function, erosion and depositional factors, and vegetative attributes. Each system was then rated for existing condition, assigned a rating of Proper Functioning Condition (PFC), Functional at Risk (FAR), or Non-Functional (NF). If a site rated Functioning at Risk or Non-Functional, the BLM identified management, monitoring, and implementation objectives that were incorporated into Alternatives 2 and 3 that could improve the function of the system.

Crooked Creek: Crooked Creek is a perennial stream running through BLM for approximately 3.3 miles. It lies at the bottom of a gorge that is nearly inaccessible to horses and humans. The system is well armored with large rock, dense woody vegetation, and multiple wood jams that create important channel complexity. The system was determined to be PFC.

Cottonwood Spring: Cottonwood Spring is a lentic riparian system at approximately 0.12 acres. The BLM determined that this site is Functioning at Risk (FAR), primarily due to limited age distribution of cottonwood trees and willows as well as high levels of salts accumulating in the soil. The lack of herbaceous obligate species was noted by the BLM at the site, which could be attributed to the high mineral content and overuse by wild horses (historic and current).



Figure 10: Cottonwood Spring

Skyes Spring: Sykes spring is a small seep located on the Wyoming side of the PMWHR. The spring consists of a small enclosure around the spring head with a pipe to a trough located outside the enclosure. The area is comprised of a small saline meadow with no surface water.

Layout Creek: Layout Creek is a small stream supporting riparian resources on NPS lands within the PMWHR. The stream flows 3.9 miles (intermittent in the lower reaches) to Yellowtail Reservoir, an impoundment of the Bighorn River. The riparian area is narrow and consists primarily of shrubs,

cottonwood, and conifers with a limited diversity of riparian obligate herbaceous species. It is very well armored with rock and cobble. A portion of the stream and riparian area is within a deep gorge or very rocky canyon that is inaccessible to wild horses while the portion outside of the natural barrier has been incorporated into an exclosure. Impacts to the riparian area from wild horses using the stream for a water source are minimal due to the lack of favorable forage and limited accessibility. BLM assesses Layout Creek in 2021 and found it to be PFC in the upper reach and FAR with an upward trend in the lower reach (exclosure).



Figure 11: Layout Creek, with the PMWHR to the right of the fence line and land excluded from grazing on the left.

3.5.2 Effects of Alternative 1 and 4

Under Alternative 1 and 4, the management goals state that riparian areas will be managed for Proper Functioning Condition, which is consistent with the Management Decision of the 2015 RMP.

Crooked Creek: Crooked Creek was determined to be PFC. Implementation of Alternatives 1 and 4 would have little to no affect. The system would continue to function in its current condition.

Cottonwood Springs: Cottonwood Springs was assessed as Functional at Risk. The BLM would continue to manage this area as described in the 2009 HMAP and would continue to treat invasive species such as salt cedar and Russian olive. The BLM constructed a perimeter fence around Cottonwood Spring in 2014 to exclude horses from the spring and constructed an offsite water catchment, which was designed to carry water approximately 100 yards down the channel with an overland hose to a trough. The development has proven to be ineffective as flash flood events generate a large volume of water and sediment that consistently wash the hose downstream and disconnect the trough from the spring. Additionally, members of the public have been known to vandalize the fence to allow horses access to the spring location. Implementation of Alternatives 1 and 4 would result in the system continuing to function in the current condition but with ineffective results.



Figure 12: Disconnected hose and vandalized fence at the entrance to Cottonwood Spring



Figure 13: Dry trough, disconnected from the spring

Sykes Spring: Under Alternatives 1 and 4 the existing fence enclosure and spring development infrastructure would be maintained in its current condition. Sykes Spring was dry when the BLM completed the site assessment in the summer of 2021 likely due to extreme drought conditions. However, the current configuration of the overflow pipe may be contributing to the drainage of the groundwater well. The BLM would continue to assess Sykes Spring for riparian functionality and availability of water for horses but would not redesign the infrastructure. The existing development could provide water for horses should the water table rise in subsequent years, albeit a non-reliable water source.

The pattern of overland flow would continue, which is currently resulting in a headcut and formation of an incised trench along the enclosure fence. If continued unabated, this channel formation could undermine the stability of the enclosure fence over time.



Figure 14: Incised channel forming near enclosure fence at Sykes Spring.



Figure 15: Incised channel forming near enclosure fence at Sykes Spring is exposing pipe infrastructure that was installed to convey water down spring.

Layout Creek: Under Alternatives 1 and 4, the current boundary configuration and enclosure fence around much of the creek would be maintained. The BLM determined Layout Creek was in PFC in the upper reach and FAR with an upward trend in the lower reach (enclosure) during the 2021 field visit, and the system would continue to maintain its current functionality.

3.5.3 Effects of Alternative 2 and 3

Crooked Creek: Crooked Creek was determined to be PFC. Implementation of Alternatives 2 and 3 would have little to no affect. The system would continue to function in its current condition.

Cottonwood Spring: Under Alternatives 2 and 3, the BLM would remove the nonfunctional water structures and temporarily close the spring to horses to complete riparian enhancement activities. The BLM would construct a series of Beaver Dam Analogs (BDAs) across the valley bottom at and above the point where groundwater seepage overflows on the ground to promote temporary ponding of water and to eventually help flush salts from the soil. BDAs are a type of low-tech riparian restoration technique used in arid environments that are constructed with a mixture of woody debris and fill material that span the channel to catch water and sediment, thereby increasing surface and subsurface water storage. The increased water storage also improves vegetative productivity and benefits hydrology and nutrient storage and cycling (Pilliod, et al., 2017). The increased water and nutrient cycling would eventually help flush some of the salinity. This would result in more favorable conditions for riparian vegetation recovery and create a system that is more in balance with the water and sediment being supplied by the watershed. Silverman et.al 2019 found that such restoration techniques increased productivity in magnitude and duration, in some studies by as much as 25 percent.

The BLM would remove invasive salt cedar and Russian olive to encourage sprouting of willows and cottonwoods. After one year, the BLM would open the spring to horses and would monitor vegetation response for both woodies and herbaceous obligate vegetation. If monitoring shows that about 50 percent of new woody growth survives (Keigley 1998), then the BLM would remove all enclosure fencing around Cottonwood Spring. If, however, monitoring shows that horses are browsing more than 50 percent of new leader growth and the amount of altered streambanks from both wildlife/horses and natural disturbance remains goes above 20 percent (Benneyfield 2006 and Cowley 2002); then the BLM would continue to exclude horses from the spring, and construct an off-site water trough, with a solar pump and locate it in the general vicinity of the historic trap site on the terrace above the spring. The actions proposed by the BLM should improve riparian condition so that it trends towards proper functioning condition as well as provide a more reliable water source for the Pryor Mountain horses.

Sykes Spring: Alternatives 2 and 3 outline several management actions to improve the habitat and functionality of the spring including vegetation treatments and additional infrastructure.

Vegetation treatments include spraying spotted knapweed around the spring and follow up by seeding a native perennial grass, forb, and shrub mix. Controlling the noxious weeds and improving the native vegetation habitat would improve soil and site stability, hydrology, and biotic component of the spring. Though the current system is a seasonal spring with a saline meadow below, improving the native vegetation around systems will improve groundwater recharge by reducing runoff and increasing infiltration, thereby raising groundwater levels.

BLM would redesign and reconstruct the water structure to try to provide a more reliable water source. Such actions may include disconnecting and plugging the existing overflow pipe, installing a new overflow pipe to disperse water back more efficiently into the saline meadow system in order to reduce headcutting, raising the height of the overflow pipe inside the well to maintain a higher column of water and improve groundwater recharge, and installing a float with a pressure transfuser to monitor and control water levels. The BLM may also install a system of “Zuni Bowls” around the area of the current discharge location. Zuni bowls are in-channel rock structures that help prevent headcuts migration by

dissipating the energy of falling water. Stabilizing the area from further headcutting will allow the system to capture more water after it is discharged and return it back into the system as well as stabilize the exclosure fence. If the above measures do not provide reliable water, the BLM may install a solar-powered pump that could access a deeper water source.

Layout Creek: The BLM assessed Layout Creek in 2021 and determined that it was in in PFC in the upper reach and FAR with an upward trend in the lower reach (exclosure). The BLM would continue existing management as well as remove juniper and dead shrubs to open the understory within the riparian exclosure to promote new growth of cottonwood, willow, and chokecherry. Promoting new growth of desirable riparian vegetation will continue to improve the hydrologic function of that area by improving infiltration, reducing runoff, and returning more water into the riparian system.

3.5.4 Cumulative Effects

There are no other planned or reasonably foreseeable actions that would contribute to the cumulative effects for any alternatives.

3.6 How would proposed management actions affect the known habitat and plant population of BLM Sensitive Species, Pryor Mountains Bladderpod (*Lesquerella lesicii*)?

3.6.1 Introduction

The BLM Manual 6840-Special Status Species Management establishes procedures for implementing measures to conserve sensitive status species and their habitats to promote their conservation and reduce the likelihood and need for them to be listed pursuant to the Endangered Species Act (ESA).

In 2022, the Billings Field Office completed a land health assessment, evaluation report, and determination document for the Pryor Mountain Wild Horse Range (**Appendix B**). The determination document concluded that Standard 5 was not being met for sensitive plant species. Standard 5 is, "Habitats are provided for healthy, productive, and diverse native plants and animal populations and communities. Habitats are improved or maintained for special status species (federally threatened, endangered, candidate or Montana species of concern)." Current wild horse management was determined to be a casual factor for not meeting this standard due to the documented loss of habitat of the Pryor Mountains Bladderpod (*Lesquerella lesicii*).

The Pryor Mountains Bladderpod (Figure 16) is a BLM sensitive species that is a short-lived perennial in the Mustard Family (Brassicaceae). It is known to occur only in the Pryor Mountains in south-central Montana within three populations: Big Coulee, Mystery Cave, and Sykes Ridge. All are at mid-elevations in the Pryor Mountain Wild Horse Range in sparsely vegetated soil of grasslands and mountain mahogany and juniper woodlands.



Figure 16: Pryor Mountains Bladderpod (*Lesquerella lesicii*)

3.6.2 Affected Environment

A study was completed in 2019 to determine whether the presence of wild horses have been detrimental to the Pryor Mountains bladderpod and to install permanent transects in all three populations to determine long-term trends in the abundance of this species. The data collected was percent bare ground, number of plants, number of plants with nurse plants, and general observations. A nurse plant is a plant whose close spatial association with another species has a positive effect on them. If a Pryor Mountains Bladderpod plant occurred under a shrub or within 1 cm of the base of an herbaceous plant, it was scored as having a nurse plant.

Big Coulee Population: This population occurs on gentle upper east-facing slopes at 5800 to 6180 feet in elevation. The slopes are dominated by Utah juniper, bluebunch wheatgrass and Idaho fescue. One permanent transect was established. This population has an estimation of 1,000-4,000 plants distributed over an area of 100-150 acres in 1995. In 2019 there were no more than a dozen plants in the same area. Only four plants were documented in the transect. There were no indicators as to why there was a decline in the population. It was documented that horse trailing/trampling was minimal at this site and not the causal factor for the decline of the population.

Mystery Cave Population: Numerous subpopulations occur on narrow ridge tops at 6680 to 7600 feet in elevation. Soils are shallow and dominated by bluebunch wheatgrass and low-growing cushion plants amongst Douglas-fir forests on adjacent slopes. The species is common in stony soil with scattered bunchgrass. Two permanent transections were established, one in each subpopulation. The total number of plants was slightly lower in 2019 from 2017, this difference was not statistically significant. Bare ground occupied a mean of 65% and 50% in 2017 and 2019, respectively. More than half of the bladderpod plants had occurred under nurse plants. However, these results were not statistically significant, suggesting that the association between bladderpod presents and nurse plants were weak at best with this population. It was documented that horse trailing/trampling was minimal at this site. There were no apparent threats to this population.

Sykes Ridge Population: This population occurs on steep west-facing slopes at 6080 to 6160 feet in elevation. Slopes are dominated by Utah juniper, black sagebrush, and mountain mahogany. The species is common in areas with mountain mahogany and juniper. There were four permanent transects established in 2017 and two additional in 2018. The mean number of bladderpod plant numbers and bare

ground were stable across the three years of the study. An average of 67% of the bladderpod plants occurred under nurse plants. This indicates a positive association between the occurrence of bladderpod and nurse plants. With this population being on a southwest facing slope it is expected for this population to be more stressed therefore nurse plants expected to be more beneficial for this site than the others. There were numerous parallel trails on the west-facing upper slopes of Sykes Ridge. The density of the species was approximately four times greater in untrampled habitat than on the horse trails, indicating that trampling has resulted in an estimated 18% loss of this plants primary habitat.

3.6.3 Effects of Alternative 1

Under Alternative 1 horses would be managed above upper AML of 120 with application of fertility control and removal through gather. The horse population has averaged 148 horses since the 1970s and has averaged about 155 horses since 2010. The Big Coulee and Mystery Cave Populations have been identified as areas that see little to no use by the historic and current horse population; therefore, the plant population and the habitat is not expected to be affected through implementation of this alternative. By reducing the number of horses from the current number of 200 to a population ranging from 120 to the 150s, it would be anticipated that trampling would be reduced at the Sykes Ridge Population and therefore habitat would be maintained and/or improved.

3.6.4 Effects of Alternatives 2 and 3

Under Alternative 2 and 3 horses would be initially reduced to low AML before future decisions would be considered to keep the population within the range of 107-120. The Big Coulee and Mystery Cave Populations have been identified as areas that see little to no use by the historic and current horse population; therefore, the plant population and the habitat is not expected to be affected through implementation of this alternative. By reducing the number of horses from the current number of 200 to a high of 120, it would be anticipated that at the Sykes Ridge Population that trampling would be reduced causing the current habitat to be maintained and/or improved.

3.6.5 Effects of Alternative 4

Under Alternative 4, the BLM would continue to treat mares with fertility control but not conduct any future horse gathers. The WinEquus model calculated an average population size of 291 horses at the end of the 10-year plan. Currently, the Big Coulee and Mystery Cave plant populations have been identified as areas that see little to no use by the current horse population, but with a steady increase of horses the use in these areas could increase which could impact the habitat and/or the plant population. If horse numbers steadily increase, trampling within the Sykes Ridge Population would increase. With increased trampling, the already existing impact to the habitat would increase. It would be anticipated to start seeing a decline in the plant population number and increase in the bare ground, therefore having an impact on not only the habitat but the population of Pryor Mountains Bladderpod at the Sykes Ridge Population.

3.6.6 Cumulative Effects

The BLM has not identified any actions that would cumulatively affect the Pryor Mountains bladderpod under any alternative. The Pryor Mountain Travel Management Plan does not reroute any roads near the Pryor Mountains Bladderpod populations, and an existing livestock trailing permit does not currently utilize a route through the Pryor Mountains Bladderpod populations and is not anticipated to in the future. The duration of the permit is for two days of the year.

3.7 How would grazing pressure by wild horses affect health and integrity of habitats for wildlife?

3.7.1 Introduction

The BLM evaluated the Pryor Mountain Wild Horse Range in 2021 to determine whether it was meeting Standards for Rangeland Health (refer to Section 3.4 and **Appendix B**) and found that the PMWHR was not meeting land health Standard 5: “Habitats are provided for healthy, productive, and diverse native plant and animal populations and communities. Habitats are improved or maintained for special status species (federally threatened, endangered, candidate or Montana species of special concern).” BLM identified grazing as the causal factor for not meeting Standard 5.

3.7.2 Affected Environment

See Sections 3.1 and 3.4 for detailed description of the affected environment. A 24-hr bioblitz (short duration intensive survey/inventory effort conducted by subject matter experts and volunteers) covering an area from Burnt Timber Ridge in the PMWHR to about 5 miles west and extending from the Montana/Wyoming border north to approximately the headwaters of Crooked Creek took place in 2012 (Ostovar 2012). The bioblitz documented over 507 animal species (395+ invertebrates, 112 vertebrates; Ostovar 2012). Structured wildlife survey data for the PMWHR include bat surveys, fish surveys, herpetological surveys, butterfly and aquatic invertebrate surveys, bird point counts, and raptor nest surveys, most of which were conducted by Montana Natural Heritage Program between 2007 and 2019. This is an area of high floral and faunal diversity. BLM frequently observes mule deer (*Odocoileus hemionus*), bighorn sheep (*Ovis canadensis*), cottontail rabbits (*Sylvilagus* spp), sagebrush lizards (*Sceloporus graciosus*), Mountain Chickadees (*Poecile gambeli*), Townsend’s Solitaires (*Myadestes townsendi*), Dark-eyed Juncos (*Junco hyemalis*), Black-billed Magpies (*Pica hudsonia*), and a variety of other migratory birds in the PMWHR. BLM sensitive species known to occupy the PMWHR include but are not limited to greater short-horned lizard (*Phrynosoma hernandesi*), Brewer’s Sparrow (*Spizella breweri*), Blue-gray Gnatcatcher (*Poliophtila caerulea*), Peregrine Falcon (*Falco peregrinus*), Townsend’s big-eared bat (*Corynorhinus townsendii*), and western bumblebee (*Bombus occidentalis*). Additionally, Pinyon Jay (*Gymnorhinus cyanocephalus*), a species recently petitioned for listing under the Endangered Species Act, breeds in the area. Plant and animal communities at low to mid elevations in the PMWHR are similar to those in the Great Basin.

Overgrazing has affected species and ecological processes through removal of vegetation biomass, shifting plant community composition to lower seral states, reducing litter, and compacting soil through trampling. These factors affect species that perform important ecological functions such as soil aeration and seed dispersal (e.g., ants, rodents, etc.), affect those that serve as important food sources to other organisms (e.g., caterpillars and other invertebrates, small mammals, etc.), and affect larger herbivores, granivores, and insectivores (e.g., mammals and birds). For example, ants are a primary food source for BLM sensitive greater short-horned lizard, which occupy the PMWHR. Research in the Great Basin found that short-horned lizards were found to be less abundant in horse-occupied areas, presumably due to lower density of ants (Beever & Brussard 2004). Another study in the Great Basin found that ant mounds were less abundant in areas with horse occupancy than in areas where feral horses had been removed within the previous 10-14 years (Beever & Herrick 2006). Additionally, Beever & Brussard (2004) found differences in small mammal community completeness/biotic integrity between horse-removed and horse-occupied sites in the Great Basin. Beever & Brussard (2004) and sources therein note that most small mammals live below ground and therefore are often sensitive to soil characteristics such as compaction. Invertebrates and small mammals are important soil aerators, nutrient cyclers, and seed dispersers. Monitoring and Rangeland Health Assessments indicate that plant community health and vigor

have declined since monitoring began in 1981 and that vegetation metrics at most sites are outside of desired ecological site condition (see Section 3.4).

BLM documented shifts in plant communities to degraded states at all sites except the National Park Service KMA (N=6). Percent cover and percent litter were found to be lower than desired while bare ground was higher across the range, including the National Park Service KMA. Refer to **Appendix M**, pages 123-148, for photos of range condition during 2021 assessments. Grazing interacts with variation in seasonal and annual precipitation to affect plant production and community composition annually and over time, and these effects tend to be patchy based on herd use areas and population size in the PMWHR (Singer & Schoenecker 2000). Consequently, effects of grazing on the PMWHR are not equally distributed across the area but are concentrated on those sites both accessible to and selected by horses. Recurring drought conditions exacerbate effects of overgrazing on the vegetation component of wildlife habitats. All evaluation sites in 2021 were found to be not meeting one or more land health standards due to overgrazing or a combination of overgrazing and drought. Refer to Section 3.4 Affected Environment for discussion of rangeland condition.

3.7.3 Effects of Alternative 1

Management direction in the 2009 HMAP is to gather to upper AML (120) if fertility control is used. However, the BLM has effectively managed the population at an average of 148 individuals since the 1970s. See analysis in Section 3.4 for details regarding effects to vegetation communities and shifts from expected and desired to lower seral states. Horse populations greater than AML continue to degrade habitat where horse use is highest. Maintenance of habitats in degraded states and continued shifts to lower seral states degrade ecosystem integrity, lower biodiversity of wildlife species, shift biological community composition, and lower density of wildlife in affected areas. Reductions in species density and abundance reduce prey base for raptors and terrestrial predators. While dietary overlap between horses and native ungulates in the PMWHR is typically small (Kissell 1996, Wockner et al. 2003), unsustainable grazing pressure and drought reduce preferred forage leading horses to browse woody vegetation. This puts horses in greater competition with wildlife dependent on shrub habitats and over time affects shrub community health and composition which would begin to affect local distribution and populations of species like bighorn sheep, mule deer, Pinyon Jay (petitioned for listing as federally threatened April 2022) and Brewer's Sparrow. Monitoring of KMAs in the PMWHR and studies in the Great Basin (e.g., Beever et al. 2008, Davies et al. 2014) demonstrate reduction in sagebrush abundance/cover in areas with feral horse grazing. Important ecosystem functions such as nutrient cycling, soil aeration, and seed dispersal conducted by invertebrates and other wildlife are negatively affected by overutilization by horses. Horse gathers may briefly displace wildlife, the effects of which would be outweighed by reduced grazing pressure on habitats from herd reductions.

3.7.4 Effects of Alternatives 2 and 3

Under Alternatives 2 and 3, wild horse numbers would be reduced to around the low AML of 107 horses which would reduce grazing pressure across sites in the PMWHR. As described in Section 3.4, certain areas (e.g., high elevation meadows near Penn's Cabin) within the horse range have shifted far enough from desired condition that reduced grazing alone is unlikely to result in transition to historical condition without aggressive interventions. However, reduction in grazing pressure through management actions proposed in Alternatives 2 and 3 would increase vegetation structure, biomass, and reproductive capabilities while decreasing bare ground and stabilizing soils. These factors would improve security habitats and food resources and improve availability and quality of resources for wildlife over time. Areas in the Great Basin where feral horses had been removed for 10-14 years had more abundant ant mounds (Beever & Herrick 2006) and more abundant greater short-horned lizards (Beever & Brussard 2004) than areas still occupied by feral horses. Beever et al. (2008), working in the same area, found that plant

biodiversity, shrub and native perennial grass cover where greater in areas where horses had not been present for 10-14 years than in areas with horse grazing. Studies in the PMWHR found litter and plant biomass to be greater in exclosures than outside, and cover of dominant perennial grass species at lowland sites differed significantly between those excluded from and those with long-term grazing (Singer & Schoenecker 2000). Long-term shifts in vegetation communities, stabilization of soil, and consequent improvements to wildlife habitat would take time, even decades, under favorable climatic conditions and adherence to proposed AML.

3.7.5 Effects of Alternative 4

Under the no action alternative, the wild horse population would continue to grow well above AML to approximately 291 animals in ten years (**Appendix J**) which would continue to move vegetation communities into lower seral states, reduce vegetation biomass, reduce litter, and increase bare ground and compaction. This would affect wildlife up and down trophic levels by limiting preferred and available habitats and forage provided by thriving native vegetation communities and healthy soils. This may also drive negative feedback loops in which organisms important for nutrient cycling and soil aeration are reduced to levels unable to effectively maintain these functions or contribute to system restoration in the future. This could affect the landscape's ability to recover long-term and would likely reduce biodiversity in affected areas. Reductions in species density and abundance reduce prey base for raptors and terrestrial predators. Increasing horse numbers over time under this alternative would increase demand for forage which is already limited in the PMWHR due to long-term overgrazing, climate, and recurring drought. As forage quality and quantity decline with increasing horse numbers and are exacerbated by long-term drought conditions horses will rely more heavily on shrubs for browse. This will increase competition for browse forage favored by native big game species such as deer and big horn sheep and would reduce habitat quantity and quality for other shrub-dependent species like Pinyon Jay and Brewer's Sparrow. Monitoring of KMAs in the PMWHR and studies in the Great Basin (e.g., Beever et al. 2008, Davies et al. 2014) demonstrate reduction in sagebrush abundance/cover in areas with feral horse grazing.

3.7.6 Cumulative Effects

Cumulative effects to wildlife habitat condition would be similar for all alternatives but could vary by magnitude of the effect. Livestock trailing occurs for two days each year across a designated corridor within the PMWHR. Trailing may temporarily disturb wildlife but is not expected to contribute substantially to effects to wildlife habitat in the PMWHR due to the short duration of trailing events and relatively low amounts of vegetation utilization by cattle during those periods. Magnitude of effect to habitats from trailing is expected to be small across alternatives, although effects would be greatest under Alternatives 1 and 4 due to higher horse populations under these alternatives and subsequently decreased habitat condition. Recreational use of existing trails by OHV users, other vehicle traffic, and administrative use creates additional disturbance through noise and activities along routes during periods of use. Duration and intensity of use varies throughout the year and may displace certain species from habitat near trails during use. This may increase physiological stress on some species already stressed by lack of forage and degraded habitat condition, especially during periods of high trail use. Effects from noise and activity stressors would be greatest under Alternatives 1 and 4 due to higher horse populations and subsequent stresses to wildlife from overstocking and habitat degradation. The overall cumulative effects from these ongoing activities are expected to be relatively small across all alternatives due to their periodic nature with greatest compounding effects expected under conditions predicted in Alternatives 1 and 4.

3.8 How would proposed management actions affect Cultural Resources?

3.8.1 Introduction

The Pryor Mountains hold special meaning for many communities, including Tribes, whose presence can be seen in material cultural remains throughout the range. ‘Cultural Resource’ does not have a consistent legal definition, but for the purpose of this analysis is not limited to historic properties, archaeological sites, ACECs, TCPs, NAGPRA items, and the like, but includes resources identified as important in the establishment and maintenance of a society’s identity. While effects to non-listed species are not typically examined from a cultural perspective, the BLM is including such an analysis as the result of Tribal consultation. Crow Nation has expressed that the Pryor Mountain horses are a resource that plays and has historically played an important role in shaping and maintaining Crow identity.

3.8.2 Affected Environment

The Pryor Mountains have a high density of archaeological materials, including a district listed on the National Register of Historic Places. As the activities proposed do not authorize ground disturbance, nor are they expected to produce substantial auditory or visual effects, they are not types of activities that could affect historic properties if they were present, and BLM has no further obligations under Section 106 of the National Historic Preservation Act or its implementing regulations (36 CFR 800.3[a]). Should it become necessary to establish new gather locations, proposed locations will be subject to review on a case-by-case basis. The potentially affected environment includes the attributes and characteristics of the Pryor Mountain horses that make them an important resource in Crow identity both historically and contemporarily.

Crow Tribe acquired horses at around the end of the first quarter of the 18th century (Big Man 2011; Kornfeld et al. 2016). The introduction of horses to Crow lifeways led to increases in incidental mobility that would affect hunting and gathering practices, settlement patterns, trade capabilities, warfare, and social status (Big Man 2011). Crow are known for their horsemanship and quality of the horses they breed. Crow horses are known for their speed, stamina, strength, and resilience. The conformation and elements of Iberian ancestry of the Pryor Mountain horses is consistent with Crow Nation’s identification of these particular horses as a cultural resource.

3.8.3 Effects of Alternatives 1 and 4

Alternative 1 could increase the percentage of horses who demonstrate Spanish or Iberian phenotypes which may be more similar to the historic horses of the Crow Nation based on removal decisions which would prioritize removal of the descendants of individuals who scored the least phenotypically “Spanish”. Analyses in Sections 3.2.3 indicated that allelic diversity and observed heterozygosity would be expected to decline under Alternative 1 as a result of removal decisions, but this impact could be ameliorated by introductions from other herds if observed heterozygosity drops below critical levels. Section 3.2.6 analyzed the effects of Alternative 4 on genetic diversity. Allelic diversity and observed heterozygosity would also be expected to decline under Alternative 4 due to genetic drift. As discussed in Sections 3.3.3 and 3.3.6, both alternatives would be expected to result in lower Henneke Body Class Condition scores. Issues with body condition would be expected to occur sooner and be more pronounced under Alternative 4 because population growth rates and total population size would be higher under this alternative. Low Henneke Body Class Condition scores are not consistent with the perception of horses as being “robust and resilient.” As these are characteristics valued by the Crow in identifying the horses as significant to their identity, the integrity of these horses as a cultural resource would remain at their presently lower level or continue to decrease as the overall health of the herd is expected decrease. This would not impact

the history of significance of the resource but may not reflect the care for the resource consistent with its contemporary importance as part of Crow identity.

3.8.4 Effects of Alternatives 2 and 3

Populations would be managed at a level where, as discussed in Sections 3.3.4 and 3.3.5, Henneke Body Class Condition scores would increase, resulting in an increase of the qualities and characteristics of resilience and robustness valued by Crow. Analysis in Section 3.2.4. showed that the genetic diversity is expected to increase or remain stable with the introduction of horses from other HMAs. This would be expected to maintain acceptable levels of genetic diversity the population. This would be consistent with Crow Tribe’s historic practice of occasionally introducing new horses into their herds.

It is unlikely that the result of implementing these alternatives would impact the history of significance of the resource, or the importance of the Pryor Mountain horses to Crow identity. However, the other analyses indicate that implementation of either of these alternatives would maintain or increase both the body condition and genetic diversity of the herd and would be reflective of the care for the resource consistent with its contemporary significance as part of Crow identity.

3.8.5 Cumulative Effects

As previously noted, BLM has analyzed each alternative with respect to genetic diversity in the Pryor Mountain horses in Section 3.2. There have been no known instances of domestic horses or tribal horses interbreeding with Pryor Mountain horses on the PMWHR in recent years, although historic presence of privately-owned horses on the PMWHR is well-documented (see Section 3.2.2). However, as noted in Section 3.3.7 in reference to the range analysis, the PMWHR currently does not meet standards and guidelines for rangeland health and the quality of both forage (grass) and browse (woody vegetation) is highly departed from normal conditions and in a severely degraded state. Alternatives 1 and 4 would maintain the horse population above AML, which would continue to degrade rangeland health resulting in greater competition for resources and it could be more difficult for horses to maintain adequate body condition. Alternative 4 would not remove any horses from the PMWHR and has the most potential to limit forage resources. Under Alternatives 2 and 3, the BLM would manage the population towards and within an AML of 107-120. With a lower population size, there would be less competition for resources, resulting in greater fitness and the ability to maintain body condition.

4 Cooperation, Coordination, and Public Participation

4.1 Summary of Cooperation and Coordination

Persons/Groups/Agencies consulted/coordinated with	Nature of Coordination
National Park Service – Big Horn Canyon NRA	Cooperating Agency; Inter-agency review and coordination
USFS – Custer Gallatin National Forest	Cooperating Agency; Inter-agency review and coordination
US Fish and Wildlife Service	Section 7 Consultation for ESA-listed species; BA and concurrence letter in Appendix R
Montana Fish, Wildlife & Parks	Coordination on Biological Assessment development for Section 7 Consultation

Because the proposed action is not associated with new surface disturbance, it is not a type of activity that has the potential to cause effects on historic properties. Consequently, the BLM has no further obligation

regarding this project under Section 106 of the National Historic Preservation Act (NHPA) or its implementing regulations (36 CFR 800.3). In the event that it would become necessary to establish new gather locations, proposed locations will be subject to review on a case-by-case basis. On March 14, 2023, BLM sent letters to Blackfeet Nation, Comanche Nation, Confederated Salish and Kootenai Tribes, Confederated Tribes of the Colville Indian Reservation, Crow Tribe, Eastern Shoshone Tribe of the Wind River Reservation, Fort Belknap Indian Community (Assiniboine, Gros Ventre), Fort Peck Tribes (Sioux and Assiniboine), Kiowa Nation, Little Shell Chippewa Tribe, Nez Perce Tribe, Northern Arapaho Nation, Northern Cheyenne Tribe, Oglala Sioux Tribe, Rocky Boy (Chippewa Cree Tribe), Shoshone-Bannock Tribes at Fort Hall Reservation, Three Affiliated Tribes (Mandan, Hidatsa, and Arikara Nation), and Turtle Mountain Band of Chippewa. The letters alerted Tribal leadership and their associated Tribal Historic Preservation Officers (THPO) as to the availability of the EA for their review and comment. No response was received from these letters.

Letters to these same Tribes were again sent on October 28, 2024, as a way to ensure there were no other concerns that needed to be addressed and whether the Tribe would be interested in any government-to-government consultation. No response has been received by the publishing of this document.

Aaron Brien, THPO of the Crow Tribe, requested that a section of the EA discuss the horses as cultural resources, showing the cultural affiliation between the horses and Crow Tribe, and connecting the provenience and context of the horses discussed in this document with that connection between Crow Tribe and horses that is historically an important part of Crow identity. This issue is discussed in Section 3.8. Additionally, BLM has routinely met with the Crow Tribe and when doing so has discussed the progression of this EA. To date, there has not been an expression of an issue with the analysis nor a desire to have greater involvement in this particular project.

4.2 Summary of Public Participation

The BLM offered the following public comment periods:

- **HMAP Scoping Comment Period; April 9, 2020 - May 15, 2020.** BLM reviewed scoping comments to identify analysis issues and developed Alternative 3 in response to public comments.
 - Alternatives 3 incorporates the following elements -
 - Uses available lineage data to inform removal decisions.
 - PZP vaccines would be the only fertility control administered.
 - Mares ages 5 - 9 would resume fertility treatments upon birth of a second foal.
 - See Appendix Q below for more information on scoping comment response.
- **Proposed Plan Amendment Comment Period; Federal Register Notice March 30, 2022, comment period March 30-April 29, 2022.** BLM reviewed comments to identify analysis issues and evaluate the need to modify proposed language. Issues of concern that directly related to the proposed amendment include, but are not limited to:
 - BLM should clarify that the intent of WH-7 is to manage for matrilineal lines with patrilineal bloodlines as a secondary measure of diversity.
 - Concerns whether measuring heterozygosity is a reliable way to manage genetic diversity, with a need to be proactive not reactive.
 - Concerns that the threshold in the BLM handbook is out of date.
 - Concerns about how heterozygosity would be measured (entire population v. breeding individuals).
 - There was a suggestion that genetic diversity could be enhanced by allowing older mares to reproduce.

- See Section 4.2.1 below.
- **Public Review of and Comment on the Preliminary EA: March 14, 2023-April 28, 2023.** BLM received extensive public comment which were addressed in Appendix P. Additionally, noteworthy changes to the Preliminary EA are identified in Section 4.2.2 below.

4.2.1 Amendment Comment Response

Under the Wild Free Roaming Horse and Burro Act of 1971, as amended, and its implementing regulations at 43 CFR 4700, the BLM is responsible for the protection, management and control of wild free-roaming horses and burros (WH&B), to manage healthy WH&B populations on healthy rangelands, and to maintain free-roaming behavior at the minimal feasible level of management necessary. A RMP management decision that requires BLM to manage for certain lineage would be too prescriptive and would not be consistent with regulations directing the BLM to manage the population at a minimal level to ensure healthy horses. However, the proposed plan language would still enable BLM to implement any of the action alternatives proposed in this EA.

The threshold value for heterozygosity in wild horse herds (H_o less than 0.66) is not expected to have changed substantially in the last 10 years. That value was based on sampling from a large number of sampled wild horse herds, the resulting mean value of H_o , and the estimated standard deviation around that mean value. Based on principles of statistical sampling, the larger the sample size that is used to describe the mean and standard deviation of the H_o value for wild horse herds, the better the estimate of that mean and standard deviation is expected to be. The results of recent fecal sampling show H_o has increased from 0.720 in 2013 to 0.731 in 2021 (See Section 3.2). The proposed amendment would be compatible with any action alternative, whether removal of horses is random or based upon lineage.

The BLM's historic practice has been to sample genetic diversity from living members of a herd. Genetic diversity would continue to be measured via fecal DNA sampling or hair follicle sampling during a gather. In the event that H_o drops below the threshold value, the BLM proposed actions detail the responses to boost genetic diversity. Additionally, delaying the age of reproduction and increasing the generation interval, (which is proposed in all action alternatives) would reduce the loss of genetic variation (6). In response to public comment, the BLM in MD WH-7 (1) increased the age range identified for fertile, breeding age wild horses from 6-10 to 6-15 years as a possible management action to increase diversity within the herd.

4.2.2 Notable Updates Resulting from the Preliminary EA Comment Period

Response to comments from the Preliminary EA comment period can be found in Appendix P. However, it is important to highlight the notable changes that have occurred since that document was published for public review and comment. The changes discussed below resulted from public comment or an identified need for clarification.

- **10-year Gather Plan to Maintain AML:** Under the Preliminary EA, BLM proposed conducting additional gathers to maintain the population within AML once AML was achieved. However, based on public comments, BLM has determined that clarification is needed as to the gathers to be conducted under the Final Gather Plan. Therefore, BLM updated Alternatives 2 and 3 to make clear that BLM would conduct gathers until *lower* AML is achieved. Once lower AML is realized, BLM would conduct a new excess determination and issue a new decision, with the appropriate level of NEPA analysis, before conducting any subsequent gathers to maintain the population within AML.
- **Identification of Specific Horses to be Gathered:** BLM had stated mixed intent as to whether the horses identified for gather in Appendices E, F, and G were the exact horses that BLM

intended to gather. Clarifying edits and language have been added to the EA and appropriate appendices to state that the horses named in the appendices are there to illustrate which horses *could* be gathered when applying the removal criteria. Having a list now that talks to the exact horse that would be gathered in the future is unworkable given the timing of such factors, including when the actual gather would be conducted. During this time, many things can change (births, deaths, etc.) that would necessitate a different horse being gathered in order to reach AML.

- **Change in AML Calculation:** The AML changed from 121-120 due to an addition error when summarizing the AML in Appendix C. Appendix C calculated AML by ecological site, and those individual findings did not change, nor did the summarizing table at the end of the document. However, when calculating the total, an error was made by one and has been corrected in the document.
- **Analysis of Impact of Project on Cultural Resources:** The Crow Tribe had conveyed concerns as to how the project would impact the wild horses with which the Tribe has expressed a history of cultural affiliation. In the Preliminary EA this issue was listed as being eliminated from detailed analysis. However, it is now fully analyzed in the Final EA. See Section 3.8.
- **Age Class Management Objectives for Alternatives 2 and 3:** In response to comments suggesting age structure management goals should provide for a stationary population, BLM used annual survival rates for each year-class from Roelle et al. (2010) to conceptualize a stationary population. Under a scenario where recruitment of yearlings would equal deaths of older horses, the population would comprise 26% in the 1-4 age class, 32% in the 5-10 age class, 32% in the 11-19 age class, and 10% in the 20+ age class. While this analysis provides useful information to inform management, attaining a stationary population in the PMWHR may be unrealistic for two main reasons. First, wild populations exhibit variable survival among years based on natural factors and stressors (e.g., severe winter weather, drought, predation, habitat condition), and thus annual survival rates are expected to vary among years. Secondly, while administration of fertility control can be an effective method to reduce population growth rates, balancing births with deaths using fertility control may not be achievable under field conditions. Growth rate management objectives identified in Alternatives 2 and 3 are to manage the wild horse population for an average annual percent growth rate of less than 4%. Further, retaining flexibility to allow for population growth might be desirable following a natural population decline, and conversely allowing for an aging population might be desirable to slow population growth. Recognizing these factors, BLM adjusted age class distributions under Alternatives 2 and 3 as follows: 15-40% Young Age Class (Age 1-4 years), 20-45% Middle Age Class (Age 5-10 years), 20-45% Old Age Class (Age 11-19 years), <30% Very Old Age Class (Age 20+ years)
- **Sex Ratio Management Objectives for Alternatives 2 and 3:** In response to comments suggesting that BLM should allow the Pryor horse herd to remain female-biased based on higher female survival, Language in Alternative 2 was updated to clarify how sex ratio management objectives would apply to horses 1-19 years old versus the population as a whole: “Manage the sex ratio toward a ratio of approximately 50% males and 50% females in horses 1-19 years old. Manage the overall population such that the sex ratio is no more than 60/40 of either sex. If Observed Heterozygosity thresholds are not met, defer to RMP guidance.” Language in Alternative 3 was similarly updated: “Where Selective Removal Considerations allow for a choice between sexes, make removal decisions that would adjust the sex ratio of the population toward a 50/50 sex ratio in horses 1-19 years old. Manage the overall population such that the sex ratio does not exceed 60/40 of either sex. If Observed Heterozygosity thresholds are not met, defer to RMP guidance.” Implementation objectives were also updated to clarify how lineage-based decisions would be prioritized relative to sex ratio management objectives based upon comments that this was unclear: “Prior to scheduled gathers, identify individuals available for

removal following Selective Removal Considerations below. Calculate expected sex ratios post-gather. If necessary, modify removal decisions to prevent the sex ratio of the overall population exceeding 60/40 of either sex. For example, if 25 males are available for removal under Selective Removal Consideration 3A, but only 20 can be removed before the resulting sex ratio would be <40% males, managers should only remove 20 males.” Updated language in Alternatives 2 and 3 would allow for the Old and Very Old Age Classes to be skewed female based on higher female survival for these groups. Alternative 2 prioritizes managing toward balanced sex ratios in gathered age classes, whereas Alternative 3 prioritizes lineage-based decisions without overly skewing sex ratios as a result of removal decisions.

- **Changes in Appendix L SOPs for Fertility Control Vaccine Application:** Change to language saying two people required when darting to language saying when possible. This is due to maximize manpower in tracking different groups of horses by having personnel splitting up. Change was made on distance of shooting, no formal distance requirements given in Science and Conservation Center darting training manual. Changes made to a shot taken at 90 degrees being the only acceptable shot angle, darting training manual from Science and Conservation Center has no language regarding shot angles, it only mentions shot locations. Change made to language regarding requirement to transferring vaccine from one dart to a different dart if original dart wasn't used. The training manual only specifies that the emulsification should be used within 24 hours, be refrigerated, and not be used if the emulsification separates. Language was added to specify that a follow up booster is needed to be administered two weeks after initial treatment of Freund's Modified Adjuvant.