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Preliminary Environmental Assessment

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Pryor Mountain Wild Horse Range (PMWHR)
Joint Herd Management Area Plan (JHMAP) Revision
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) as well as periodically conducting gather operations over a period of ten years to remove excess wild horses.

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 horses are managed to maintain acceptable levels of genetic diversity. The HMAP and gather plan would allow for continued fertility control treatment as well as an initial gather and follow-up maintenance gathers to be conducted for a period of ten years from the date of the initial gather operation in order to achieve and maintain Appropriate Management Levels (AMLs) and to maintain 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.

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 and our federal partners 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 Herd Management Area Plan (HMAP) functioned as an activity level plan to implement established management objectives and actions for the Pryor Mountain horses and resources on the Pryor Mountain Wild Horse Range (PMWHR). The plan managed 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 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 Appropriate Management Level (AML) of 90-120, which is the number of adult horses or burros to be managed within a Herd management Area (HMA). AML Upper Limit refers to the maximum number of WH&B that results in a thriving natural ecological balance (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 that continue to be implemented through remote darting of ZonaStat-H (PZP).

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 a Herd Management Area Plan (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, US District Court decision in the Montana District, Billings Division the court found that the BLM committed to recalculating the 2009 HMAP AML by 2015 in the Decision Record approving the 2009 HMAP but failed to do so. See *Friends of Animals v. Sparks, 200 F. Supp. 3d at 1126*. 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, however, in August 2018, the Montana District Court found that the 2016 Re-Calculation Report did not follow BLM handbook direction, which requires a public 30-day review and comment period before issuance of the decision, as well as it did not include a Decision Record. Further the Court found that BLM failed to consider the loss of patrilineal lines, failed to consider the ramifications of the loss of horses it chose to remove with respect to loss of genetic lines, and failed to explain how BLM is managing to maintain rare colors. BLM was enjoined from conducting a proposed 2018 gather. See *Ginger Kathrens and The Cloud Foundation vs Department of the Interior, et al; CV 18-125-BLG-SPW*.

This Environmental Assessment (EA) re-evaluates the AML to sustain healthy WH&B populations and healthy rangelands over the long-term and discloses the environmental effects 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 Environmental Impact Statement (EIS) if significant impacts could result, or a Finding of No Significant Impact (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 Herd Management Area Plan (HMAP) that will establish short and long-term objectives for managing both the wild horse population and the rangelands, vegetation, and riparian areas within the boundaries of the Pryor Mountain Wild Horse Range (PMWHR). The new HMAP will supersede all previous herd management area plans and serves as the Territory Plan for the USFS and Herd Management Area Plan for the

BLM. The USFS lands are designated as a "territory" and the BLM lands are designated as a "herd area".

2. Re-evaluate the AML to determine the number of horses that may be maintained on the PMWHR while ensuring a thriving natural ecological balance, preserving multiple use relationships, and making progress towards Standards for Rangeland Health. The BLM committed to recalculating the AML in the 2009 Pryor Mountain HMAP within five years, or upon revisions of a new RMP, whichever came first. The Montana court orders cited above directed the BLM to 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 an initial gather and follow-up maintenance gathers to achieve and maintain AML over a period of 10 years or until policy changes occur, or the affected environment changes to an extent that the analysis is no longer valid. The gather plan would allow the BLM to manage the population towards AML, protect rangeland resources from further deterioration associated with the current overpopulation, and restore a thriving natural ecological balance and multiple use relationship on public lands in the area consistent with the provisions of Section 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 certain management and decision making authorities related to their respective roles and jurisdictions in the management of the PMWHR. The BLM has authority for population management, establishing appropriate management level (AML), habitat conditions, and monitoring associated with all portions of the PMWHR. Each agency has authority for management decisions (i.e. fencing, water developments, prescribed fire and fuels reduction, and seeding) on their portion of the PMWHR.

The BLM, in coordination with the USFS and NPS will decide whether or not to adopt a new HMAP and 10-year gather plan, which will include management objectives for both the horse population and rangeland/riparian management. The new plan will identify objectives for fertility control, selective removal criteria, and other objectives to manage the horse population over the next ten years. The plan will also identify management objectives to maintain or improve rangeland health and riparian conditions, thus making progress towards meeting standards and guidelines for rangeland health.

The BLM will also decide the appropriate management level (AML) for the Pryor Horse population based upon the analysis contained in Appendix C.

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

[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.'"

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 f 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 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 PMWHR (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 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 USFS: Proposed BLM 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 Horse and Burro Handbook H-4700-1.

The 2015 RMP does not define "all representations in the herd" in management decision (MD) WH-7:

- 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.

During a proposed 2018 gather, BLM interpreted this management decision 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 in the 2009 HMAP. However, a 2018 Order from Judge Watters in the US District Court, District of Montana, Billings Division found this argument unpersuasive (Case 1:18-cv-00125-SPW, filed 8/31/18). The District Court found that BLM did not discuss the loss of patrilineal lines and established a one progeny rule without further discussion, suggesting to the court that BLM may have acted arbitrarily and capriciously by failing to consider the ramifications of the loss of horses it chose to remove.

In the RMP, it is evident that the intent of MD WH-7 was to limit the loss of genetic diversity, consistent with Goal WH-2 ("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 (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. There are other impracticalities as well. 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 practical matters related to the well-being of animals that are removed from the wild. Wild horse adoption programs tend to place animals into homes more readily with younger horses – 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.

It is important to step back and look at the broader goals identified in the 2015 RMP. The BLM is proposing a change in MD WH-7 that would be consistent with RMP Goal WH 2 ("Maintain a wild horse herd that exhibits…genetic diversity…"). 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. Considering that there has been a history of interbreeding within this herd, one can understand that 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 any offspring from any particular pairing are removed, because there are numerous members of the herd that possessed 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 Horse and Burro Handbook (2010). The 2015 Billings Field Office RMP would be amended so that MD WH-7 to state the following:

- MD WH-7: Maintain desirable levels of genetic diversity, as measured by Observed Heterozygosity (Ho). Observed heterozygosity is a measure of how much diversity is found, on average, within individual animals in the HMA. If Ho drops below thresholds identified in the BLM Wild Horse and Burro 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.

The most recent set of 45 hair follicle-based genetic diversity monitoring samples from the Pryor Mountain herd was collected in February 2013. Laboratory and population genetics analysis (Cothran 2013) indicated that values for observed heterozygosity (0.720) and allelic diversity (4.01) in the Pryor Mountain herd were above the mean for feral horse herds at that time. Dr. Cothran 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 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.

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. Absent gather operations, BLM is attempting to collect a representative sample of feces from identifiable individuals to monitor the current status of genetic diversity. However, it is not necessary to wait until the results of that fecal DNA-based monitoring effort are available for the agency to make decisions about herd management. The results of current and future genetic monitoring efforts, along with previous

monitoring results, would indicate if loss of genetic diversity is a concern and if any of the management actions as noted in the proposed amendment would need to be taken.

Maintaining desirable levels of genetic diversity would also 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 BLM is addressing color in the Selective Removal Criteria. Horses of common colors would be prioritized for removal, whereas horses of less common colors would be given preference to be retained on the range.

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 be in conformance with the applicable BLM land use plan, 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 1971 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 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 WHB Act 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 Zone Pellucida (PZP) 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 lesiciii*)?

Wildlife Habitats

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

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 Fertility Control on Mares

BLM completed an extensive literature review regarding the direct and indirect effects of fertility control (contraceptives) vaccines on wild horses, which is incorporated by reference and summarized in **Appendix I.**

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, 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 pulvinate*) 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-formatting, 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.

Tribal Affiliation

The Crow Tribe has expressed interest in the BLM horses being considered cultural resources as part of the BLM's planning efforts for the HMAP. The Crow Tribe maintains a horse herd on the Crow Reservation and has spoken to the BiFO about horse management techniques in the past. The Crow consider themselves connected to the PMWHR as the tribal horses are believed to have the same or similar origins as those within the BLM horse range.

None of the alternatives would have an effect on tribal affiliation in the horse range.

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 disproportionally 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.

2 Description of the Alternatives

2.1 Introduction

This section of the EA describes the Proposed Action and alternatives, including any that were considered but eliminated from detailed analysis. 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 is a No Action Alternative, as required by NEPA (40 CFR§1502.14). Therefore, this alternative carries forward all management objectives and decisions from the 2009 HMAP and the 2015 fertility control EA. 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. However, the selective removal criteria in the 2009 HMAP conflicts with MD WH-7 in the 2015 Billings Field Office RMP and cannot be implemented without an RMP plan amendment. Therefore, Alternative 1 includes the proposed RMP plan amendment to MD WH-7 as described in Section 1.5.1.
- **Alternative 2 – Proposed Action:** BLM would approve a 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 plants. 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 over the age of 4 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. 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 Horse and Burro Handbook.
- **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 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 ages 5 - 9 would resume treatments upon birth of a second foal. BLM would utilize information from the Pryor Mountain Wild Mustang Center field guides that are publicly available 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 under age 20, but could remove additional offspring or mothers, if necessary, to meet gather objectives. 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 Horse and Burro Handbook.
- **Alternative 4: Continue Existing Management, No RMP Plan Amendment:** Alternative 4 is also a No Action Alternative but does not include the RMP amendment or a gather. This alternative carries forward all provisions in the 2009 HMAP and 2105 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.

2.1.1 Management Actions Common to Alternatives 1-3

- The initial gather would occur in 2023-2024 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. The 10-year time period of the planned actions would begin with the initial gather.
- Gather operations would be conducted in accordance with the Comprehensive Animal Welfare Program (CAWP); Instruction Memorandum (IM) 2021-002 **(Appendix K).** 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 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.
- An Animal and Plant Health Inspection Service (APHIS) or other veterinarian may be on-site 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 (IM 2021-007).
- 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.

2.2 Alternative 1: Continue Existing Management with RMP Amendment

The Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA require analysis of a No Action alternative (40 CFR§1502.14). This project was initiated in April 2020 and therefore falls under the 1970 NEPA regulations. While the NEPA regulations were updated in 2020 and 2022, the provision to analyze a No Action Alternative has not changed. CEQ's Forty Most Asked Questions concerning CEQ's NEPA regulations (1981) provides guidance for analyzing a No Action alternative in the context of updating a land management plan. In these cases, "no action" is "no change" from current management direction or level of management intensity. Therefore, the "no action" alternative may be thought of in terms of continuing with the present course of action until that action is changed.

Therefore, 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. In the Decision Record for the 2009 HMAP, the BLM committed to continue to collect monitoring data and to re-calculate the AML within five years or after the revision to the Billings RMP, whichever comes first. The 2015 Billings RMP simply carried forward the 90-120 AML from the 2009 HMAP. In 2016, the BLM published an AML recalculation report on e-Planning but did not provide a public comment period and ultimately removed the document without publishing a decision. In order to rectify flaws identified by the Montana District Court in several court cases, the 2016 AML Re-Calculation is provided for review and comment in Appendix C as Method 1.

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 selective removal criteria cannot be implemented without an RMP plan amendment.

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 **Table 1** below. Additional objectives from the 2009 HMAP are incorporated by reference and not summarized in Table 1.

Table 1: Alternative 1 – HMAP Objectives (Continue Existing Management)

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
Population Control		
Appropriate Management Level: Re-establish the AML from 95 plus or minus 10% to a population range from 90 to 120 wild horses (excluding current years foal crop) year-round. The AML is expressed as a population range with an upper and lower limit. During gather cycles reduce the herd to the low range of AML if fertility control is not utilized. Otherwise treat with fertility control to limit herd growth managing the herd for the upper level of AML over an extended period of time.	Conducting helicopter census on a yearly basis as well as on the ground tracking through the use of BLM personnel and volunteers to monitor the population.	Manage the herd within the AML either through removals, fertility control, natural means, or a combination of methods.
Distribution Limit wild horses to the PMWHR. Encourage use of areas (within the range) that are slightly used to limit animal competition for forage and resources while providing for greater nutritional opportunities for each animal.	Tracking wild horse movements and use patterns.	Limiting wild horses to within the boundaries of the PMWHR as well as developing additional water sources to encourage more use within mid-slope areas on a more regular basis.
Herd Characteristics Objective: (Sex Ratio / Age Class) • Manage the population for a phenotype reminiscent of a Colonial Spanish Type horse in order to prevent the loss "Spanish" characteristics. • Manage for a balanced sex ratio. • Manage for an age structure with the core breeding population primarily composed of 5 to 10-year-old animals (bell curve). • Manage to maintain rare or unusual (for the Pryors) colors in order to prevent any one color becoming dominant or being eliminated. • Manage to prevent bloodlines from being eliminated while maintaining a core breeding population.	Monitoring which animals are no longer contributing or have already contributed genetically. Keeping track of which foals are from the same sire and mare and have representation within the herd.	Each active breeding mare would have at least one progeny to carry forward into the next generation. Animals that are no longer breeding or have contributed genetically would be removed unless needed to achieve AML.
Body Condition Manage wild horses in a manner that allows for a minimum of a Henneke Body Class Condition of 4 or greater under "normal" range conditions. References Appendix VIII of the 2009 HMAP.	Tracking wild horse movements and use patterns and Henneke body class condition, vegetation studies and project implementation log.	Maintaining the AML, developing water sources in mid-slope areas of the range, conducting fuel treatments to provide additional areas of forage and aerial seeding of deteriorated areas of the range.
Growth Rate Balance recruitment rate with annual death loss (2015 Fertility Control EA)		Implement fertility control as described below.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
Fertility Control Implement the fertility control prescriptions outlined in the 2015 Fertility Control EA. Mares would be approached on foot or baited in (not trapped) to be treated with ZonaStat-H through remote darting applications. • Mares ages 2, 3, and 4 would be treated. • Young mares in the one-year old age class becoming two year olds could begin primer treatments in the autumn at 18 months of age. • Mares ages 5-9 would not be boostered (unless they meet a threshold). • Mare ages 10 would be brought back onto boosters and mares 10 and older would be treated continuously until twenty years of age. • Mares 21 and older would no longer be treated. • Any mare within a treatment age or meeting a threshold could be treated any time of year. Thresholds: Mares ages 5-9 years old that have two offspring one year and older would be brought back onto treatments. If a mare has one surviving offspring one year and older on the range after having two offspring one year and older, she would remain on treatments, regardless of whether the one offspring was removed or died. When the AML is exceeded and another threshold isn't being met for an individual mare, reverse age treatment would be implemented based upon kinship representation (bloodline) beginning with the 9-year olds, then 8-year olds, and then 7-year olds until 90% of the total mares 20 and younger are treated. If the population falls below 100 animals, then the open age class would increase first with the 10-year olds then with the 11-year olds until the population is within 5% of the high range of AML.	Maintain a list of mares by age class to determine when fertility control needs to be applied. Maintain a list of which mares are treated with fertility control. Maintain a list of non-responders (mares who maintain fertility, even after treatment with fertility control vaccine).	PZP vaccine would be administered through darting by trained BLM personnel or BLM-designated collaborating partners only. For any darting operation, the designated personnel must have successfully completed a nationally recognized wildlife darting course and who have documented and successful experience darting wildlife under field conditions.
Genetic Diversity	Genetic samples would be taken from animals at least every five years to measure the Ho, taking genetic samples during every gather cycle or as necessary. A chart of estimated kinship between animals	Maintaining and promoting the breeding core of the population of 5 to 10-year old's. Ground tracking of wild horse population demographics to monitor sex ratios, kinship, and band size. Maintain

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
Maintain healthy horses in a healthy body condition with a high level of genetic variation within the population to prevent inbreeding depression or genetic drift.	will be developed in order to track relations between breeding animals. Animals would only be considered for augmentation if determined that inbreeding depression is occurring (See mitigation measure section 3.5).	a sex ratio of at least 50 percent stallions to mares and no more than 60 percent stallions to mares in any one year. An even to slightly higher level of stallions ensures that a higher level of genetic exchange occurs. Retaining a high level of genetic variability within a small population is paramount to the continued success of that population. An even or slightly higher male to female ratio also slows the recruitment rate of the population reducing the need for removals as often to maintain the AML.
Gathers During gather cycles reduce the herd to the low range of AML if fertility control is not utilized. Otherwise treat with fertility control to limit herd growth managing the herd for the upper level of AML over an extended period of time.		
Selective Removal Considerations: Remove wild horses with the following considerations: 1. Horses not exhibiting phenotypic "Colonial Spanish Type" utilizing the Colonial Spanish Horse Type Matrix (Appendix X) which score 4 or 5 2. Horses that score 3 utilizing the Colonial Spanish Horse Type Matrix (Appendix X) which are genetically well represented on the range. 3. Animals under five years old which are genetically well represented on the range. 4. Animals between 11 and 15 years old which have contributed genetically and are not band Stallions. 5. Animals between 5-10 years old. 6. Animals 16 and over 7. No animals over 20	Determining which animals are off type by utilizing a scoring system developed by Dr. Philip Sponenberg (**Appendix D**). Monitor which animals are no longer contributing to breeding population and track which young animals are from the same sire and mare.	Follow the removal criteria.
Supplemental Feeding: Supplemental feeding of the Pryor Mountain wild horse herd is a management tool which can be utilized in emergency situations.		
1992 Amendment. Helicopters may be used to move and capture wild horses except during foaling period. Helicopters may be used to spot, monitor, and inventory horses at any time of the year. There would be no designation of a specific number of horses by herd area. Tranquilizers may be used in special circumstances by qualified personnel when approved by the authorized officer.		

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
Rangeland Health		
Make significant progress towards meeting **Standards of Rangeland Health** (Appendix I). • Do not allow range conditions to deteriorate below the 2004 and 2007 measured levels at key management areas, by limiting utilization levels on key forage plant species to 45 percent throughout the PMWHR. • Develop additional water sources and mineral supplementation in areas with slight use to encourage more even distribution of wild horses.	Conduct at least one Rangeland Health Assessment within five years and use the rangeland health assessment to determine if progress is being made.	
Maintain the current range condition and/or improve range conditions. • Not allowing the range conditions to deteriorate below the 2004 and 2007 measured level at key management areas by limiting utilization levels on key forage plant species to no more than 45 percent use level throughout the PMWHR and maintaining the Appropriate Management Level. • This would further be accomplished by distributing wild horse use to slightly used areas of the range through additional water development and placement of mineral supplements. Allow for aerial seeding of native grass species appropriate to the corresponding range site to supplement native forage species seed production.	Conduct utilization studies and use pattern mapping on seasonal basis to determine forage off take of current year's production, and track climate and precipitation data for the region. This would be measured at Key Management Areas prior to the end of the lifespan of the plan. Table 3 of the 2009 HMAP identifies desired plant communities for six Key Management Areas.	• Repair and maintain North Boundary Fence • Treat all noxious plant infestations • Develop guzzlers outside WSA, emphasis on mid-slope and within the WSA if they do not impair "wilderness characteristics. Emphasis on mid-slope. Guzzlers include: Horse Trap, Mid-Ridge, Bat, Mine, Boundary, Jacks Farm. Skyline, and BCNRA • Enhance natural water catchments (potholes) • Cottonwood Spring riparian restoration – Removal of salt cedar and Russian Olive. Dismantle old horse trap and use material to make riparian exclosure. Install small spring box and short pipeline down the wash. • Seep to Bad Pass – Construct small spring box or earthen dam & short pipeline with a trough to create a more permanent water source. • Little Sykes Spring – Maintain/rehabilitate riparian exclosure and water development. • Construct drift fence at south entrance • Layout Creek – Move northern Park Service horse range boundary fence closer to horse range boundary. • Prescribed Fire Habitat Enhancement • Supplemental Seeding (aerial)
Noxious and Invasive Species: Treat all areas infested with noxious weeds and eradicate current infestations of noxious plants while continuing to monitor for new infestations. Contain the distribution of invasive species to areas where currently found and prevent new areas from being dominated by these species.	Monitoring treated areas for the recurrence of knapweed and tamarisk and continued monitoring for detection of new infestations of Noxious Plants. For invasive species this would be accomplished by comparing and monitoring current distribution of cheatgrass, halogeton, non-native mustards, and other species classified as invasive against the distribution within ten years after a change in management practices.	**Noxious Plants:** Immediately treating the spotted knapweed along the length of the Burnt Timber Road and adjacent rangelands or any new infestations. Immediate treatment of tamarisk (salt cedar) along all the low elevation drainages and Cottonwood Spring area or any new infestations detected. Treatment of all other noxious plants that are detected including new plants that are identified on the annual state list for noxious plants during the lifespan of this plan.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
		Invasive Plants: Containing the distribution of invasive species (see map #9) and not allowing the ecological conditions to deteriorate below the 2004 and 2007 measured level at key management areas through limiting utilization levels on key forage plant species to no more than a 45% allowable use level throughout the PMWHR by maintaining the Appropriate Management Level. This would further be accomplished by distributing wild horse use to slightly used areas of the range made by wild horses through additional water developments. This may also be accomplished by allowing for aerial seeding of native grass species appropriate to the corresponding range site to supplement native forage species seed production.
Riparian: Manage for proper functioning condition on applicable riparian areas.	Conducting proper functioning condition assessments on all riparian areas within the PMWHR.	Treatment of specified riparian areas for invasive weeds and infrastructure development to protect riparian areas from grazing impacts.

2.2.2 Gather/Removal

The wild horse population would be reduced to the high range of AML with continued application of PZP (120 horses). With a current horse population of 195 horses, the BLM could gather and remove up to 75 wild horses to meet high range of AML. BLM would reduce the population to about 150 horses in the first gather and would complete additional gathers over a period of ten years to manage the horse population towards the high range of the AML. BLM would prioritize removal of 44 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 that do no 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.

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 implement Alternative 1 (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. The remaining five of those horses combined have 38 descendants currently living on the range that would be less than 20 years old at the time of a 2020 gather. Those horses are descendants of Quelle Colour, Conquistador, Coronado, Ireland, and Tecumsah.

Under Tier 1 of the Selective Removal Criteria, the BLM would prioritize removal of all 44 living descendants (**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 with 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 2** below summaries the Tier 1 horses that would be prioritized for removal sorted by sex and age class. Refer to **Appendix E, Table 12** for a list of specific horses.

Table 2: Descendants of Horses Scored by Sponenberg as Non-Spanish Phenotypes prioritized for removal sorted by sex and age class

Birth Year	2018-2021	2012-2017	2003-2011	Total
Mares	6	6	7	19
Stallions	13	6	6	25
Total	**19**	**12**	**13**	**44**

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 between Garcia and Norma Jean
- Norma Jean – lives with natal band and producing offspring with her father
- Greta and Helenium – Non-responders to fertility control. Greta has 7 offspring and Helenium has 3 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. If all 44 horses were gathered from Tier 1, then 31 horses would need to be removed under Tier 2 to meet AML. However, if not all 44 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.

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.

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.

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 representation 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 maintains 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, 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 and guidelines 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, relate them to management goals and decisions in the 2015 Billings Resource Management Plan (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 other wild horse populations are managed across the west.

2.3.1 HMAP Objectives

The AML would be set at 108 to 121 horses, excluding foals less than one year of age, based upon the 2021 AML Re-Evaluation that is part of this analysis. 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 gathers, 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. The initial gather would reduce the population to 150 horses (approximately 45 horses would be removed).

This 10-Year gather plan would enable the BLM to complete additional gathers and removals over a span of 10 years. The WHB Handbook (Section 4.3) requires BLM to make a determination of excess prior to issuing a decision to gather and remove excess WHB. In accordance with the 10-year gather plan, the BLM would

incrementally 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 before initiating another gather.

BLM would continue to collect fecal samples and 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, including introducing wild horses from other herds with similar characteristics. Management, Monitoring, and Implementation Objectives for Alternative 2 are detailed in **Table 3** below.

Table 3: Alternative 2: Horse Population and Rangeland Health Management, Monitoring, and Implementation Objectives

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
Population Control		
Appropriate Management Level Manage the wild horse population within an Appropriate Management Level (AML) of between 108 to 121 wild horses (excluding current years foal crop) to protect the range from deterioration associated with overpopulation.	Conduct population inventories annually. Inventory and monitor the various bands on the PMWHR.	BLM personnel and volunteer partners conduct on the ground population inventories. Maintain a demographic database of wild horses on the range, metrics such as band compositions, age, sex, color, and offspring.
Distribution Limit wild horses to the PMWHR. Encourage use of areas (within the range) that are slightly used to limit animal competition for forage and resources while providing for greater nutritional opportunities for each animal.	Track wild horse movements and use patterns.	Prepare a range utilization report and/or map that identifies heavily utilized and under-utilized portions of the PMWHR. Annually maintain/repair water developments to encourage wild horse distribution across the PMWHR.
Sex Ratio: Adjust the sex ratio of the breeding population to a natural ratio of approximately 50% males and 50% females.	Monitor sex ratios through annual census information and post-gather results.	During any scheduled gathers, use selective removal to help move the population closer to the desired sex ratios. Strive for 50/50 male/female sex ratio, with no more than 60/40 in either direction. Maintain demographic database with this population metric with support from volunteer organizations.
Age Class: Manage wild horses to achieve as closely as possible the following relative age distribution: 15-40% Young Age Class (Ages 0-4) 25-50% Middle Age Class (Age 5-10) 20-40% Old Age Class (Age 11-19 years) <30% Very Old Age Class (Age 20+ years)	Monitor age classes of animals through annual census information and post-gather results.	During any scheduled gathers, use selective removal to help move the population closer to the desired age distribution. Maintain demographic database with this population metric with support from volunteer organizations.
Body Condition Manage wild horses to achieve an average body condition class score of 3+.	Visually observe wild horse body condition (Henneke Condition Class Method) at key watering locations and on the range annually and at different times of the year. Record average body condition and document during periodic gather and population inventories.	Manage the populations towards AML. Maintain records of horse body condition assessments completed at different times of the year. Consider emergency gathers when needed if animal body condition is less than Henneke Condition Class Score 3 due to poor forage conditions, or in response to drought, wildfire or other unplanned/unforeseen events that may significantly limit available forage or adequate water for sustaining a healthy wild horse herd.
Growth Rate: Manage wild horse population for an average annual percent average growth rate of less than 4 percent.	Determine population number and annual growth rate, tracking both deaths and births.	Mares that are non-responders to ZonaStat-H may be treated with another approved immunocontraceptive or removed from the HMA.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
	Monitor natural management's effect on population growth.	
Fertility Control: Implement a fertility control program that supports population growth rate objectives.	Assess effectiveness of population control efforts by conducting post-fertility control monitoring of treated mares following the foaling season in accordance with established procedures.	Use fertility control measures to achieve and then maintain herd size within AML (RMP MD WH-1). Mares would be approached on foot or baited in (not trapped) to be treated with fertility control through remote darting applications. Immunocontraceptive use would be conducted in accordance with the approved standard operating and post-treatment monitoring procedures. Continue the use of the immunocontraceptive ZonaStat-H (native PZP vaccine) as the preferred method for reducing population growth. Other BLM approved fertility control vaccines such as, but not limited to GonaCon-Equine may also be used for reducing population growth. Porcine Zona Pellucida (PZP) vaccine, specifically ZonaStat-H, would be the treatment of choice through remote darting application, however if objectives cannot be achieved and new fertility controls are available, they could be used as directed through the most recent direction of the National Wild Horse and Burro Program. Mares that are non-responders to ZonaStat-H would be considered for removal or treated with another approved fertility control vaccine. The use of any new fertility controls will use the most current best management practices and humane procedures available for the implementation of new controls. Adjust fertility control treatments and removals as needed to manage the populations towards the desired average growth rate. Treatment would be applied as follows: • Treat mares ages 2 and 3 year with ZoneStat-H. • Young mares in the 1-Year old age class becoming two years old could begin primer treatments in the autumn at 18 months of age. • Mares ages 4 and older would not be treated until after they have successfully foaled once. Successfully foaling 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. • 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

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
		a minimum of three more fertility control treatments or treated with another approved immunocontraceptive.
Genetic Diversity Maintain or increase genetic diversity within the herd, as evidenced by observed heterozygosity (Ho).	Collect hair follicle, fecal samples, and/or other genetic material samples periodically, to monitor levels of observed heterozygosity.	During gathers, reduce the dominance of specific bloodlines by removing horses with a disproportionally high number of closely related horses that would remain in the herd (such as siblings, half-siblings). If Ho drops below the thresholds of concern identified in the BLM Wild Horse and Burro Handbook (currently defined as one standard deviation below the mean, which is 0.66 for DNA-based (hair) samples), BLM may take any one or more of the following actions to increase genetic diversity: • Maximize the number of breeding age wild horses within the herd. • Adjust the sex ratio in favor of males to increase the number of harems and effective breeding males (but not greater than 60% males). • Introduce 1-2 young mares and/or stallions every generation (about 10 years), from other herds living in similar environments; also consider introducing stallions. Priority would be given to introduce wild horses from herds with similar characteristics, including but not limited to the Sulphur herd in Utah, the Cerbat herd in Arizona, or others. Young, fertile horses that are determined excess could be sent to other wild horse herds to enhance genetic diversity in the overall wild horse population across the west.
Gathers: Gather to the **lower range** of AML to allow the population to grow to the upper AML over a four-to-five-year period without any interim gathers. Emergency gathers can be utilized in emergency situations when body conditions deteriorate and/or in response to an unexpected event that threatens the health and safety of the wild horse population or their habitat, including fire, insect infestation, disease, or other events of a catastrophic and unanticipated nature.	Document the number of mares/stallions residing on the PMWHR and those released following each gather. Document the circumstances necessitating an emergency gather.	A gather will be initiated when monitoring data indicates that excess wild horses must be removed from the HMA to prevent a deterioration in range ecological conditions that will adversely affect rangeland health. BLM will make a determination of excess animals in accordance with BLM Wild Horse & Burro Handbook, H-4700-1. For an emergency gather, follow BLM handbook direction described in the Wild Horse and Burro Handbook H-4700-1 (Section 4.7.2) and the NEPA Handbook H-1790-1 (Section 2.3.2). Gather horses through bait and/or water trapping. Follow the selective removal criteria to identify horses for removal.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
Selective Removal Criteria: Remove wild horses with the following considerations: 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 pairings. 3. Remove horses to meet desired sex ratios and age classes post gather (see above). 4. Preference would be to remove horses from the younger age classes first (0-4 followed by 5-10). Remove horses from the older age class (11-19) only if necessary to meet AML and desired age class ratios. Do not remove any horse 20 years or older. 5. If horses must be removed from the 11-19 age class, the preference would be to remove mares that have offspring on the HMA, followed by bachelor stallions. Do not remove band stallions. Attempt to remove horses on the younger range of this age class and retain the older horses if possible. 6. Mares that are non-responders to fertility control treatments would be prioritized for removal. 7. Consider color last. If possible, make removal selections to maintain a variety of colors on the PMWHR.	Maintain photos and demographic data of wild horses residing on the HMA and/or that are introduced to the HMA to inform removal decisions. Monitor post-gather results to ensure selection criterion are followed.	Prior to a gather, the BLM would identify a complete list of horses on the range sorted by age class and sex. No horse over 20 years of age would be removed. For the remainder, BLM would identify an acceptable number of horses to be removed by age class, and any horse in that age class could potentially be removed if they enter the trap. When making final removal decisions, BLM will consider the overall sex ratio for remaining horses (striving for 50/50 with no more than 60/40 in either direction). Every effort would be made to remove horses meeting Criterion 1 (genetic defect) and 2 (representative of close inbreeding). When considering color as the final removal factor, horses caught in a trap that are of a common color would be prioritized for removal, while less common colors would be retained to the range. For example, if 2 horses must be removed in a group of 3 bay and 1 sorrel horse, the decision would be to remove 2 bay horses, and return 1 black and 1 sorrel to the range. Trapped horses that would be retained on the PMWHR may be either held in an on-range corral or at Britton Springs in order to limit them from repeatedly entering a trap. Post gather, every effort would be made to release them near their capture site. To the extent possible, gather sites (traps) would be located in previously disturbed areas. An Animal and Plant Inspection Service (APHIS) or other veterinarian may be on-site or on call during future gathers, as needed, to examine animals and make recommendations to BLM for the care and treatment of the wild horses. Decisions to humanely euthanize animals in field situations will be made in conformance with BLM policy.
Rangeland Health (Same for Alternatives 2 and 3)		
Standards for Rangeland Health Manage wild horses within the HMA to maintain a thriving ecological balance while achieving or making significant progress towards meeting Standards of Rangeland Health.	Assess rangeland health on the HMA approximately every ten years.	Conduct a Rangeland Health Assessment in accordance with procedures outlined in Technical Reference 1734-6 and/or the most recent rangeland health technical reference. An evaluation report documenting the findings and conclusions of the Rangeland Health Assessment will be prepared and made available to the public.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
		Evaluate and adjust AML or identify management actions to address/resolve rangeland health issues if it is determined that wild horses are a causal factor for not meeting standards and guidelines for Rangeland Health. Any adjustments to AML will be based on both resource condition and herd monitoring.
Rangeland Vegetation Maintain or improve the trend in vegetation communities within the HMA. • Limit utilization by all herbivores to 45% of the current year's above ground primary production for key forage species. • Disperse wild horse use throughout the HMA so that on average no portions of the HMA receive greater than 45% utilization. • Maintain or reconstruct existing water structures to encourage wild horse dispersal across the HMA. • Do not allow additional fencing within the HMA that would restrict wild horse movements and eliminate interior fencing whenever possible. • Treat areas infested with noxious/invasive plants, eradicate current infestations where feasible, and contain the distribution of noxious/invasive plants to areas where currently found and prevent new areas from being dominated by these species. • Consider vegetation treatments such as prescribed fire or seeding to improve forest/rangeland health while ensuring treated areas could be excluded from grazing for two growing seasons (subject to additional NEPA).	Track climate and precipitation data for the region. Monitor drought indicators. Collect vegetation trend information at established long-term trend sites within the HMA at a minimum of 5 to 10-year intervals. Collect qualitative/quantitative ecological condition monitoring data to assess the health and productivity of existing vegetation communities. Collect utilization data annually or when visual observations indicate that utilization levels withing the HMA are approaching 45% for key forage species at existing or new key monitoring sites, and/or at other randomly located points within the HMA that are representative of the vegetation communities on the HMA. On range utilization data may be compared to off range reference plots. Monitor utilization levels at high elevations in the late summer/early fall, and at low elevations in late fall/winter in order to capture the current year utilization on forage plants. Monitor movements of identified wild horses to determine use patterns, seasonal migrations and range of travel using population inventories, photos, field reports, mapping, or other tracking methods. Collect forage production information within the HMA. Monitor condition of existing water developments to assess whether they are functioning as designed. Inspect boundary fences to ensure they are properly maintained and identify locations that need repair.	Enter monitoring data into centralized electronic database and prepare summary reports. Develop use pattern maps of the HMA to identify over utilized areas. Annually inspect existing water developments, and complete repairs on any development that is not functioning as designed. Maintain or reconstruct exiting fencing along boundaries of the HMA to be wildlife friendly while being a true barrier to wild horses. Complete weed treatments annually. Identify and establish additional site-specific resource management objectives and management actions within the HMA as needed to address range conditions.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
	Monitor/inventory areas treated for noxious/invasive species annually for reoccurrence as well as survey areas for detections of new infestations.	
Riparian Ecosystems Maintain or improve existing riparian conditions.	Quantitatively/qualitatively assess riparian function of identified riparian areas every five to ten years utilizing Proper Functioning Condition (PFC), MIM, lentic/lotic AIM, or other applicable methodologies that assess riparian health.	Establish specific implementation Objectives for each Riparian Area. **Cottonwood Creek:** Temporarily close Cottonwood Creek to horses while riparian enhancement work is completed. Remove defunct overland piping and stock tank. Construct Beaver Dam Analogues (BDAs) across the valley bottom near the point of the groundwater seepage as well as upstream. BDAs are a permeable, channel-spanning structure constructed with a mixture of woody debris and fill material to promote temporary ponding of water and flushing of salts. Remove invasive Salt Cedar and Russian olive to encourage sprouting of cottonwood and willow. After about one year, open the exclosure to horses and monitor new leader growth for browse. If monitoring shows that about 50 percent of new growth survives, then remove all exclosure fencing around Cottonwood Spring. If the above measures do not improve riparian condition and the site remains functioning at risk, then BLM may consider permanently excluding horses from the bottom of the wash and installing a solar pump well that pipes water to a stock tank on the first terrace, in the vicinity of the old trap. **Sykes Spring:** Treat spotted knapweed infestation at the site. Seed treated areas with native seed mix to encourage regrowth of native riparian vegetation. Reconstruct the existing gravity fed well to provide a more reliable water source. This work may include, but is not limited to: 1. Disconnect and plug the existing overflow pipe, which may be contributing to drainage of groundwater from the well. 2. Construct a Zuni Bowl at the point where current overland discharge is creating a headcut along the riparian exclosure fence line. A Zuni Bowl is an in-channel rock structure that prevents headcuts from continuing to migrate upstream by dissipating the energy of falling water. 3. Install a new overflow pipe to discharge excess water approximately five to ten feet away from the well on armored ground so that it will not result in a headcut and can disperse downstream through the riparian area. 4. Install a float to control water levels.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
		5. Raise the height of the overflow pipe inside the well to maintain a higher column of groundwater and saturate the surrounding soil. 6. install a pressure transfuser to measure water levels and monitor how water responds to drought. 7. If the reconstructed gravity fed well does not maintain water, then install a solar-powered pump to provide consistent water. **Layout Creek:** Continue existing management. Remove juniper and dead shrubs to open the understory within the riparian exclosure and promote new growth of cottonwood, willow, and choke cherry. **Crooked Creek:** Continue current management and periodically assess fish barrier to ensure it is still functioning.
Sensitive Plants Conserve and recover special status plant species and at-risk species, and the ecosystems on which they depend to prevent the need to list any of these species as threatened or endangered. Protect or enhance areas of ecological importance for special status plants species. Manage for no net loss of habitat for any special status plant species. Habitats of special status plants will be managed to meet or exceed the Montana Standard for Rangeland Health. Manage specific environmental hazards, risks, and impacts in a manner compatible with special status plant species health.	Conduct and maintain inventory and monitoring data to determine extent, trend, and impacts of special status plant populations and habitats. Complete Land Health Assessment, evaluation writeup and determinations.	If monitoring/studies indicate that the presence of wild horses are having a detrimental effect to a BLM special status plant species, and/or USFS At-Risk-plants then site specific mitigation measures will be implemented to protect special status species and at-risk-plants. Ensure treatments for invasive species are not detrimental to the long-term persistence of special status or at risk plants.

2.3.2 Gather/Removal

The wild horse population would incrementally be reduced to the lower range of AML (108 horses) to allow the population to grow to the upper limit over a 4 to 5-year period without interim gathers. With a current horse population of approximately 205 horses (January 2023), the BLM would initially gather and remove approximately 55 horses to bring the population down to about 150 horses. Additional gathers would be conducted over a period of ten years to reduce the population towards low AML if rangeland health assessments indicate that the range continues to function at risk or remains non-functioning. The number of horses removed in subsequent gathers would depend on the population size relative to AML. 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 pairings.
3. Remove horses to meet desired sex ratios and age classes post gather. Horses would generally be gathered and removed as they enter the 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: Strive for 50/50 male/female sex ratio, with no more than 60/40 in either direction.
    - Age Class: Manage wild horses to achieve as closely as possible the following relative age distribution:
        - 15-40% Young Age Class (Ages 0-4)
        - 25-50% Middle Age Class (Age 5-10)
        - 20-40% 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 that are non-responders to fertility control treatments would 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 a 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. Every effort would be made to remove hoses meeting Criterion 1 (genetic defect) and 2 (representative of close inbreeding). The selective removal criteria for Alternative 2 most closely aligns with BLM guidance 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 a list of horses that could be gathered/removed under Alternative 2.

Table 4: Horses that could be Removed in 2023-2024 Gather Sorted by Age Class and Sex

Birth Year	Age Class	# Females Removed	# Males Removed	Total Remaining	Total Females Remaining	Total Males Remaining	Age Class Post Gather (%)
2019-2022	1 - 4	16	17	32	16	16	22
2013-2018	5 - 10	9	6	40	20	20	27
2004-2012	11 - 19	7	0	56	28	28	37

Birth Year	Age Class	# Females Removed	# Males Removed	Total Remaining	Total Females Remaining	Total Males Remaining	Age Class Post Gather (%)
2003 or older	20+	0	0	22	20	2	14
Total		32	23	150	84	66	100
Sex Ratio Age Classes 1-19					50%	50%	
Sex Ratio All Age Classes					56%	44%	

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. This alternative utilizes best available information derived from Pryor Mountain horse field guides publicly available from the Pryor Mountain Wild Mustang Center and BLM data. The BLM developed lineage spreadsheets tracked by the mother, identifying offspring and grandchildren. The BLM attempted to verify the accuracy of the data present herein, but recognizes that errors may exist, which highlights the challenge when 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 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

Table 5 below summarizes the Management, Monitoring, and Implementation Objectives that would guide management of the Pryor Mountain horses for the next ten plus years. 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 between the ages of 5 - 9 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 and sibling relationships, Mean Kinship (MK) Analysis (refer to Section 2.6 below), and/or the results of genetic sampling, if available.

Table 5: Alternative 3 HMAP Management, Monitoring and Implementation Objectives

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
Overall Management Goals: • Manage wild horses and resources to preserve and maintain a thriving natural ecological balance and multiple use relationships. • Manage for healthy wild horses and maximize genetic diversity through use of Mean Kinship Analysis, or genetic samples if available, to inform selective removal decisions. • Manage population growth using a combination of techniques including gathers, fertility control, natural means, or a combination of prescriptions.		
Population Control		
Appropriate Management Level: Manage the wild horse population within an Appropriate Management Level (AML) of between **108-121** wild horses (excluding current years foal crop) to protect the range from deterioration associated with overpopulation.	Conduct population inventories annually. Inventory and monitor the various bands on the PMWHR.	BLM personnel and volunteer partners would be used to conduct on the ground population inventories. Maintain a demographic database of horses on the range, including band compositions, age, sex, color and assumed parentage of each new foal.
Distribution Limit wild horses to the PMWHR. Encourage use of areas (within the range) that are slightly used to limit animal competition for forage and resources while providing for greater nutritional opportunities for each animal.	Track wild horse movements and use patterns.	Prepare a range utilization report and/or map that identifies heavily utilized and under-utilized portions of the PMWHR. Annually maintain/repair water developments to encourage wild horse distribution across the PMWHR.
Sex Ratio: Manage for a long-term sex ratio close to a natural ratio of approximately 50% males and 50% females.	Monitor sex ratios through annual census information and post-gather results.	During any scheduled gathers, ensure MK selections do not result in an overly skewed sex ratio. Strive for 50/50 male/female sex ratio, with no more than 60/40 in either direction. Maintain demographic database with this population metric with support from volunteer organizations.
Age Class: Manage wild horses to achieve as closely as possible the following relative age distribution: 15-40% Young Age Class (Ages 0-4) 25-50% Middle Age Class (Age 5-10) 20-40% Old Age Class (Age 11-19 years) <30% Very Old Age Class (Age 20+ years)	Monitor age classes of animals through annual census information and post-gather results.	During any scheduled gathers, ensure selections do not result in an undesirable age class distribution. Maintain demographic database with this population metric with support from volunteer organizations.
Body Condition Manage wild horses to achieve an average body condition class score of 3+.	Visually observe wild horse body condition (Henneke Condition Class Method) at key watering locations and on the range annually and at different times of the year.	Manage the populations towards AML. Maintain records of horse body condition assessments completed at different times of the year.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
	Record average body condition and document during periodic gather and population inventories.	Consider emergency gathers when needed if animal body condition is less than Henneke Condition Class Score 3 due to poor forage conditions, or in response to drought, wildfire or other unplanned/unforeseen events that may significantly limit available forage or adequate water for sustaining a healthy wild horse herd.
Growth Rate: Manage wild horse population for an average annual percent average growth rate of less than 4 percent.	Determine population number and annual growth rate, tracking both deaths and births. Monitor natural management's effect on population growth.	Mares that are non-responders to ZonaStat-H may be treated with another approved immunocontraceptive or removed from the HMA.
Fertility Control: Implement a fertility control program that supports population growth rate objectives.	Assess effectiveness of population control efforts by conducting post-fertility control monitoring of treated mares following the foaling season in accordance with established procedures.	Use fertility control measures to achieve and then maintain herd size within AML (RMP MD WH-1). Mares would be approached on foot or baited in (not trapped) to be treated with fertility control through remote darting applications. Immunocontraceptive use would be conducted in accordance with the approved standard operating and post-treatment monitoring procedures. 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. Adjust fertility control treatments and removals as needed to manage the populations towards the desired average growth rate. Treatment would be applied as follows: • Treat mares ages 2 and 3 year. • Young mares in the 1-Year old age class becoming two years old could begin primer treatments in the autumn at 18 months of age. • Mares ages 5 - 9 would resume 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). • 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 be removed from the range.
Genetic Diversity: Maintain or increase genetic diversity within the herd, as evidenced by observed heterozygosity (Ho).	Collect hair follicle, fecal samples, and/or other genetic material samples periodically, to monitor levels of observed heterozygosity.	If Ho drops below the thresholds of concern identified in the BLM Wild Horse and Burro Handbook (currently defined as one standard deviation below the mean, which is 0.66 for DNA-based samples), BLM may take any one or more of the following actions to increase genetic diversity: • Maximize the number of breeding age wild horses within the herd. • Adjust the sex ratio in favor of males to increase the number of harems and effective breeding males (but not greater than 60% males).

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
		• Introduce 1-2 young mares every generation (about 10 years), from other herds living in similar environments; also consider introducing stallions. Priority would be given to introduce wild horses from herds with similar characteristics, including but not limited to the Sulphur herd in Utah, the Cerbat herd in Arizona, or others. Young, fertile horses that are determined excess could be sent to other wild horse herds to enhance genetic diversity in the overall wild horse population across the west.
Gathers: Gather to the lower range of AML to allow the population to grow to the upper AML over a four-to-five-year period without any interim gathers. Emergency gathers can be utilized in emergency situations when body conditions deteriorate and/or in response to an unexpected event that threatens the health and safety of the wild horse population or their habitat, including fire, insect infestation, disease, or other events of a catastrophic and unanticipated nature.	Document the number of mares/stallions residing on the PMWHR and those released following each gather. Document the circumstances necessitating an emergency gather.	For routine gathers, make a determination of excess animals to support the need to gather and remove excess wild horses in accordance with BLM Wild Horse & Burro Handbook, H-4700-1. For an emergency gather, follow BLM handbook direction described in the Wild Horse and Burro Handbook H-4700-1 (Section 4.7.2) and the NEPA Handbook H-1790-1 (Section 2.3.2). Gather horses through bait and/or water trapping. Follow the selective removal criteria to identify horses for removal.
Selective Removal Considerations: 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 pairings. 3. Remove as many horses as need to meet gather objectives while striving to meet desired age class and sex ratios. Use lineage data to inform removal decisions. ➢ First identify mares with 3 or more offspring. Remove 1 or more offspring such that each mare retains at least two offspring. Half-siblings acceptable. ➢ If necessary to meet population objectives, next identify mares with two or more offspring, and either remove the mother, or one of the offspring. ➢ If these first two removal metrics do not achieve desired population objectives, then identify and remove mares that do not have offspring, but have siblings (full or half) on the range. ➢ If/when it becomes available, removal decisions may be informed by Mean Kinship (MK) analysis and/or	Maintain photos and demographic data (including assumed parentage) of wild horses residing on the HMA and/or that are introduced to the HMA to inform removal decisions. Monitor post-gather results to ensure selection criterion are followed.	BLM would maintain a data set supplied by the Pryor Mountain Wild Mustang Center that tracks siblings and offspring. This data set would be used to inform removal decisions and follow the selective removal criteria.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
results of genetic testing. Horses with higher MK scores would be prioritized for removal as they are highly related to other horses in the herd; horses with lower scores would be prioritized for retention as they may represent an important component of the genetic legacy of the founders that is not present in other individuals. If this approach is used, it may not be necessary to identify and track all the siblings as MK scores would identify individuals that are highly related. 4. Prioritize removal of younger horses first (1-4 followed by 5-10), while meeting desired age class and sex ratios. Horses in the 1-4 age class may be removed before they reach sexual maturity and have produced offspring. If horses must be removed from the 11-19 age class to meet desired population objectives, preferentially remove mares, as they generally live longer than stallions. Do not remove any horse greater than 20 years old. 5. Lineage data is tracked by the matrilineal line and paternal lines are identified if known. Not all stallions reproduce; some become band stallions while others remain bachelors. Preference would be to retain band stallions and remove bachelors if possible. However, when making decisions to remove siblings, they will be tracked by the mother. 6. Consider color as final factor. If all the above metrics are met and deciding between which horse to remove, preferentially retain a horse with a rare color (such as sorrel, buckskin or palomino).		
Rangeland Health		
Same as Alternative 2. See Table 4.		

2.4.2 Gather/Removal

BLM would complete an initial gather in 2023-2024 to incrementally move the population towards low AML (108 horses) and would remove about 56 excess wild horses to bring the population down to about 150 horses, excluding foals. Additional gathers could be conducted over a period of ten years to further reduce the population towards low AML if rangeland health assessments continue to indicate that the range continues to function at risk or remain non-functioning. The number of horses removed would depend on the population size relative to AML. 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, and Mean Kinship analysis and/or genetic sampling (if available) to identify a targeted list of horses that could be removed.

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.

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.

3. Remove horses to meet desired sex ratios and age classes post gather. Use lineage data to make removal decisions as identified in **Table 5** above. Strive for 50/50 male/female sex ratio, with no more than 60/40 in either direction, with the following relative age distribution:
    - 15-40% Young Age Class (Ages 0-4)
    - 25-50% Middle Age Class (Age 5-10)
    - 20-40% Old Age Class (Age 11-19 years)
    - <30% Very Old Age Class (Age 20+ years)

BLM prepared a list of horses that could be removed under Alternative 3. Refer to **Appendix G** for a list of specific horses that would be retained/removed in a 2023-2024 gather. Following the criteria in Table 5:

- 1 – Remove horses with genetic defect (1 horse)
- 2 – Remove horses that are inbred (1 horse)
- 3A – Identify mares with 3 or more offspring, and remove horses while retaining two offspring (39 horses)
- 3B – Identify mares with 2 offspring, and remove 1 of them or the mother (14 horses)
- 3D – If necessary to meet population objectives, remove mares without offspring but that have siblings on the range. (1 horse from 3B above also meets this criteria).
- 4 – Prioritize removal of younger horses first (1-4 followed by 5-10). Horses in the 1-4 age class may be removed before they reach sexual maturity and have produced offspring. If horses must be removed from the 11-19 age class to meet desired population objectives, preferentially remove mares. This alternative would remove 32 horses in the 1-4 age class, 40 horses in the 5-10 age class, and 7 mares in the 11-19 age class. No horse over 20 years old would be removed.
- 5 – MK data is currently unavailable.
- 6 – Consider color as final factor. If all the above metrics are met and deciding between which horse to remove, preferentially retain a horse with a rare color (such as sorrel, buckskin or palomino). Appendix G identifies horses with rare colors to remain on the range.

Table 6: Alternative 3 - Horses that could be Removed in 2023-2024 Gather Sorted by Age Class and Sex

Birth Year	Age Class	# Females Removed	# Males Removed	Total Remaining	Total Females Remaining	Total Males Remaining	Age Class Post Gather (%)
2019-2022	1 - 4	16	17	32	16	16	22
2013-2018	5 - 10	9	6	40	20	20	27
2004-2012	11 - 19	7	0	56	28	28	37
2003 or older	20+	0	0	22	20	2	14
Total		32	23	150	84	66	100
Sex Ratio Age Classes 1-19					50%	50%	
Sex Ratio All Age Classes					56%	44%	

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 representation 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

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 to inform removal decisions is not feasible at this time because the genetic accuracy of the lineage data provided by the Pryor Mountain Wild Mustang Center has not been verified.

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 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 given the 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 represents the best available information concerning Pryor Mountain herd lineage, 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 are in the process of collecting fecal samples on the Pryor herd for the purposes of genotyping individuals at a set of microsatellite loci, but do not have any results that would allow for such a pedigree analysis. 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. In summary therefore, the necessary data do not exist at this time, and no results of MK analysis are available to inform herd management at this time.

2.6.2 Gather the HMA to the Upper AML Limit

Some commenters expressed a concern that a gather to 90 horses could result in a significant loss of genetic diversity in the event of a severe weather event, such as in 1979 when a severe winter dropped the population down to 87 horses and asked that the new HMAP carry forward a management objective from the 2009 HMAP, where gathers would reduce the population to the upper AML as long as fertility control is applied.

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, and is inconsistent with the WFRHBA, which requires immediate removal when a determination is made that excess horses are present (43 CFR 4700.0 et. seq). If the population were gathered to the upper AML limit, then AML would be exceeded the foaling season following the gather. This would result in the need to conduct yearly gathers to maintain AML, which would result in increased stress to individual wild horses and the herd. Or in the absence of yearly gathers, this alternative and would continue to degrade rangeland health from overpopulation.

Under Alternatives 2 and 3, the AML would be modified to a range of 108-121 horses (excluding foals less than one year of age) based upon an annual population growth rate of 2.25 percent over the last five years with fertility control but no gathers (refer to Section 3.3). The BLM would need to gather horses approximately every four to five years to reduce the herd to the lower AML of 108 horses under Alternatives 2 and 3. With the lower AML adjusted from 90 to 108 horses, Alternatives 2 and 3 are responsive to public concerns that a gather to 90 horses could result in a significant loss of genetic diversity from a severe weather event and is consistent with BLM guidance, the 1971 WFRHBA, as amended, and the implementing regulations in 43 Code of Federal Regulations (CFR) 4700.

2.6.3 Remove Only Young Horses from the PMWHR

Comments noted that horses 10 years and older should be left on the PMWMR 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, 5-9, 10-19 and 20 plus years, with each category having a desired percentage of the population (see **Table 5**). Approximately 41 percent of the current population falls into the old (11-19) or very old age (20+) category.

Under both Alternative 2 and 3, BLM proposes to remove approximately 55 horses from the range in a 2023-24 gather, of which only seven mares would be removed from the 11-19 age class in order to meet desired age class and sex ratios. Once the initial gather is completed, approximately 48 percent of the population would be less than 10 years old, and 52 percent would be over the age of 10 representing a balanced population. 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 205 horses were reduced immediately to the proposed AML of 108, 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 120 horses under age 10 and 85 horses 10 and older. To reach low AML, 97 horses would need to be removed. If they were all taken from the under 10 age group, that would leave only 23 young horses on the range, which is not desirable.

2.6.4 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. As such, the delay in bringing the mares back onto treatment could give them an opportunity to become pregnant with a second foal. Under Alternative 3, mares ages 5 - 9 would resume 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).

Under Alternative 3, selective removal criteria would first target any horse with genetic defects or that is closely inbred. The next criteria would identify horses with three or more offspring and retain at least two under the age of 20 years. Under the proposed 2023-2024 gather/removal, two horses would be removed meeting criteria one and two, and 40 horses would be removed from mares with three or more offspring, retaining at least two. However, that only would bring the population down to about 163 horses, which is still above AML and above the population target of 150 horses for an initial gather. Additional horses would be need to be removed that have not produced two offspring. 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 AML.

2.6.5 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 paper by Dr. Cothran 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 108-121 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.

2.6.6 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 are areas are known as territories and for the BLM they are known as herd areas. Under section 1339 "Limitation of Authority" the Wild Free-Roaming Horsed 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 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 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 comprises about 42,000 acres in the southeastern portion of Carbon County, Montana and northern Big Horn County, Wyoming. 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).

The PMWHR is composed of a very small amount of private land, United States Forest Service, National Park Service, and BLM administered lands. For the USFS these are areas known as territories and for the BLM they are known as herd 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 (**Figures 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

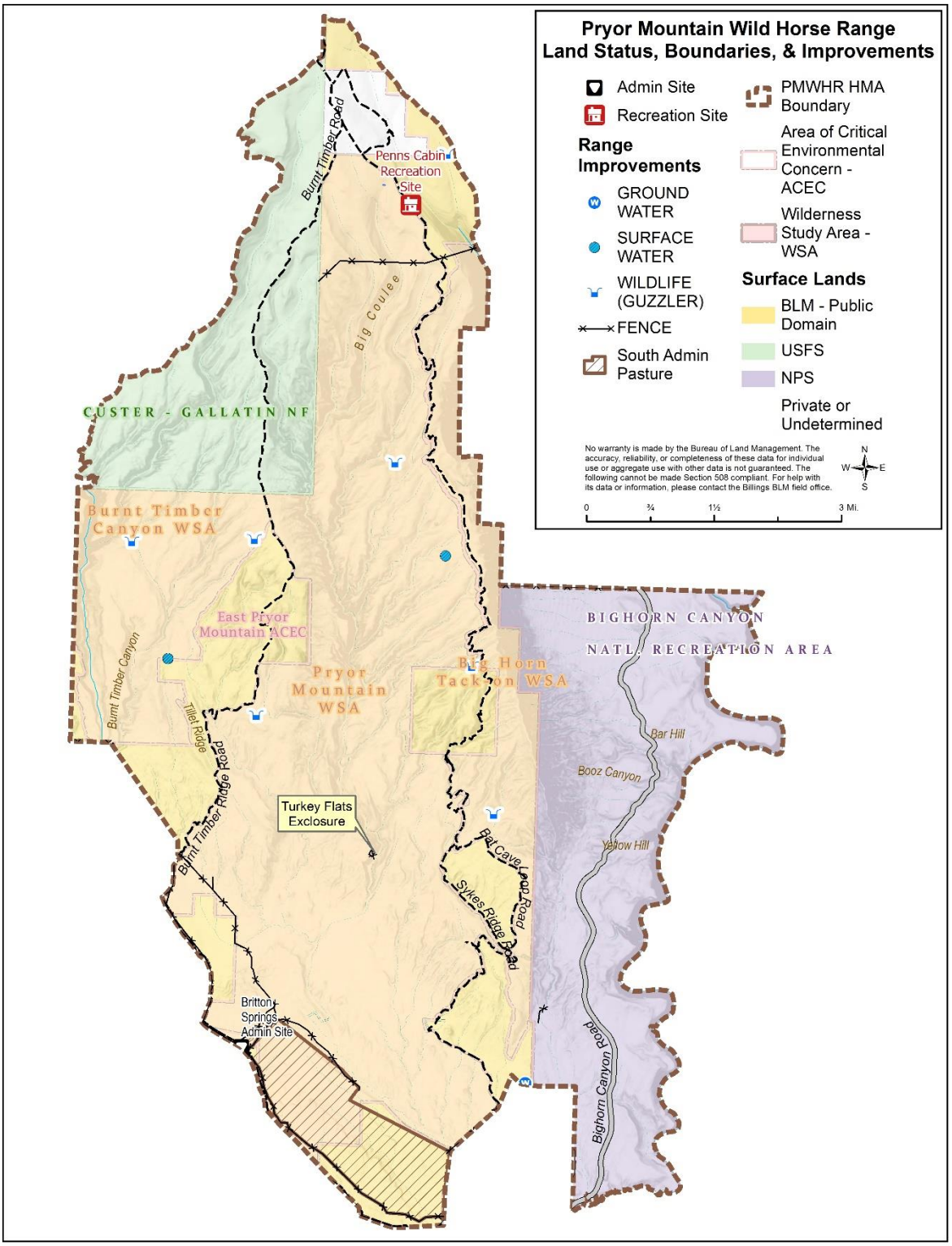

Figure 2: High elevation alpine meadow on the PMWHR (summer range)

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. The US Drought Monitor is reporting abnormally dry conditions (January 17, 2023). Forecasted seasonal trends suggest drought conditions will continue to improve across much of Montana due to favored above normal precipitation and below normal temperatures (US Drought Monitor seasonal outlook January 19-April 30, 2023).

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 82,384 animals as of March 1, 2022, 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 (Fst) 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 domestic breeds (Cothran, 2013).
- 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 (Ho) 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 Ho 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. 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 a pairing between The Rock and Phoenix that 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 completed research on 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. As part of this analysis, he quantified the Fixation Index (Fst), which is a measure of genetic distance between pairs of samples, 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. This data shows 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 and several different states of origin.

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 Word Breeds such as the Paso than to Old World breeds such as the Andalusian. In Cothran's 2009 and 2013 report, 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 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 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 older Iberian type, although that is blurring as this influence diffuses through the herd.

The 2013 NRC report identifies several HMAs that have higher than average levels of Spanish ancestry, including the Cerbat Mountains, AZ herd (Cothran 2020) which is largely isolated, and the Pryor Mountains, MT herd and the Sulphur, UT herd (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 are also thought to have some moderately elevated evidence of Spanish ancestry, though that may come indirectly, such as from associations with domestic Quarter Horses.

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 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. 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. Cothran also documented a decline in allelic diversity over time 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).

Heterozygosity: Observed heterozygosity (Ho) 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 Ho 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. Additionally, the BLM has been collecting and sending fecal DNA samples to the USGS for additional genetic analysis (King et al. 2018). Preliminary measures of Ho for available fecal samples, based on the same set of microsatellite loci as are used by Cothran (NRC 2013), measured 0.731 in 2021 (Personal communication with Sara Oyler-McCance, USGS Fort Collins Science Center, May 5, 2022). The preliminary data indicates Ho is still above the 0.66 threshold and that, therefore, inbreeding is 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). Cothran's research, 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, the Pryor horses are genetically more similar to herds such as Calico, NV, Warm Springs Canyon, NV and Warms Springs, OR herds (pairwise Fst values <0.033) than they are to the Big Summit, OR herd (pairwise Fst 0.123 in 2009).

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 a 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, S.J., J.A. Fike, and S. J. Oyler-McCance. 2022). 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**). 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 10-Year 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 10-Year 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 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 studies have 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, Ho 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 likely 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, Ho could potentially decline at a faster rate under Alternative 2 with random removal, compared to Alterative 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 108 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 (Ho = 0.66) in the 10-year

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 Ho 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 Ho 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 Ho 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 (Fst). If the Pryor Mountain herd were truly managed as an isolated population, pairwise Fst values with respect to other wild horse herds would increase over time, with Fst 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, 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 would not change. 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 Garrott 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 January 1, 2023, is about 205 horses (several of the older horses are considered missing). This number is based on annual ground survey population inventories completed by the BLM and volunteer partners. There are currently 118 females and 89 males on the range, with an overall sex ratio of 57 percent female to 43 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 52 percent female to 48 percent male.

Table 7: Population demographic characteristics, in terms of age and sex in 2022

Age	0-4	0-4	5-10	5-10	11-19	11-19	20+	20+	All Horses
Sex	F	M	F	M	F	M	F	M	
Number Horses	32	33	29	26	35	28	20	2	205

Population records of the Pryor Mountain herd show that the population has averaged 148 horses from 1971 to 2021, with a low of 87 horses in 1978 to a high of 195 in 2009. 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 birth, death, 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. Between 2001 and 2021, the horse population grew 11.25 percent overall, at a net growth rate of 0.56 percent annually; in those years fertility control was used, and 195 horses were removed. The BLM and its partners have been able to treat a greater number of mares with fertility control in recent years. In the last five years from 2016 (population 160) to 2021 (population 178), the horse population grew 11.25 percent overall at an average annual rate of 2.25 percent, in this time period with fertility control but when no horses were removed from the range. The current population is about 1.5 times over 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 and do not survive (such as Petra's 2021 foal). BLM assessed body conditions using the Henneke scoring matrix 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, the BLM and NPS annually administer ZonaStat-H (PZP) 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 (Appendix H) whereas some studies have found that PZP-22 can confer multiple years of contraception, particularly when boostered with subsequent liquid PZP vaccination. 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. 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 that do no 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 52 descendants of horses scored by Sponenberg as a 4 or a 5 during his field visit in 2009. Removal of these 52 horses would reduce the population to about 154 for an initial gather. If horses scoring 4 and 5 cannot be captured, 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. The BLM would complete 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.

Table 8 below identifies the resulting age class and sex ratio distribution if all identified Tier 1 horses were removed. The resulting sex ratio would be skewed heavily towards females.

Table 8: Population demographic characteristics before and after 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.

Birth Year	2019-2022		2013-2018		2004-2012		2003 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	32	33	29	26	35	28	20	2	205
No. Removed	6	19	9	3	7	8	0	0	52
No. Remaining	26	14	20	23	28	20	20	2	153
Percent in age class	26		28		31		15		

- Number Females (all age classes): 94
- Number Males (all age classes): 59
- Sex ratio: 61% Female to 39% Male

- Number Females (BY 2002-2021, discounting age 20+): 74
- Number Males (BY 2003-2021, discounting age 20+): 57
- Sex ratio: 56 percent Female to 44% Male

Of the 52 horses prioritized for removal, 15 of them are older horses that range between 11 and19 years, including six band stallions over the age of ten and seven older mares. Of the 52 horses prioritized for removal, the majority are common colors including black, bay, dun, grulla, and roans; only 5 are uncommon colors: chestnut, sorrel, buckskin or palomino. As such, the removal of descendants of non-Spanish phenotypes contemplated under Alternative 1 would still maintain a variety of color on the PMWHR.

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 2021, the horse population grew 21.9 percent overall, at a rate of 2.25 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 2.25 percent annually, then there would be about 135 horses at Year 5, which is 15 more than the upper AML. Counting the 17 foals born in 2021, the population growth rate grew 21.9 percent growth over the previous 6 years, or an average of 3.6% annually. At this growth rate, a population that is reduced to 120 would grow to about 140 in five years. The BLM/NPS darted 44 mares with PZP in 2020 and 69 in 2021. It could be that the 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 15-20 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) 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 195 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. Over grazing, 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 9 below summarizes population demographics before and after an initial gather that would be completed in 2023-2024.

Table 9: Population demographic characteristics before and after removal of an initial 2023-2024 gather, under Alternative 2.

Birth Year	2019-2022		2013-2018		2004-2012		2003 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	32	33	29	26	35	28	20	2	205
No. Removed	16	17	9	6	7	0	0	0	55
No. Remaining	16	16	20	20	28	28	20	2	150
Percent in age class	22		27		37		14		

- Number Females (all age classes): 84
- Number Males (all age classes): 66
- Sex ratio: 56% Female to 44% Male

- Number Females (BY 2004-2022, discounting age 20+): 64
- Number Males (BY 2003-2021, discounting age 20+): 65
- Sex ratio: 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 younger reproductive age horses would be equal. 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 56 horses that would be removed, 7 of them would be older mares between 11 and 19 years. 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 manage the herd in a way that brings population size closer to AML. For example, a second gather could reduce the population to upper AML (121 horses) and a third gather could reduce the population to lower AML (108). Upon reaching lower AML, the BLM would allow the population to grow to upper AML, and then complete a gather to reduce the population to lower AML. Similar to Alternative 1, the specific social relations would shift after gathers, as a result of changes in the specific animals remaining on the range. Some bachelor or satellite stallions would be expected to fight to become band stallions, and some mares would establish a new hierarchy within their harems and new bands could form with new band stallions and the mares they are able to collect.

Growth Rates: Alternative 2 would initially reduce the population from 205 to about 150 in a 2023-2024 gather. BLM would complete subsequent gathers to maintain the population between lower and upper AML. A second gather could reduce the population to 121, a third to 108, and then maintenance gathers

thereafter. 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 6 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 remain above AML 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) 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 Table 5 for the removal criterion. The BLM applied these criteria to identify the horses that would be removed in a 2023-2024 gather to reduce the population to 150 horses. Refer to **Table 10** and **Appendix G**.

Table 10: Population Demographics before and after removal, under Alternative 3.

Birth Year	2018-2021		2012-2017		2003-2011		2002 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	32	33	29	26	35	28	20	2	205
No. Removed	16	17	9	6	7	0	0	0	55
No. Remaining	16	16	20	20	28	28	20	2	150
Percent in age class	22		27		37		14		

- Number Females (all age classes): 84
- Number Males (all age classes): 66
- Sex ratio: 56% Female to 44% Male

- Number Females (BY 2004-2022, discounting age 20+): 64
- Number Males (BY 2003-2021, discounting age 20+): 65
- Sex ratio: 50% Female to 50% 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 equal. The percentage of horses in each age classes would fall within the desirable age ranges identified in the HMAP objectives (see **Chapter 2**). Of the 56 horses that would be removed, 7 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 and are non-responders to fertility control. Their removal would be consistent with design 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. Additionally, BLM considered color last when determining which specific horses to remove. For example, after considering the number of horses to meet age class and sex ratio objectives, the BLM would target removal of horses with common colors such as grullos and bays, and retain buckskins, which is an uncommon color. Alternative 3 may be more difficult to implement than Alternative 2 because the BLM has to target specific named horses for removal; there are no substitutions. A horse caught in a trap may have to be released, and the named horse may never get caught.

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 6 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 as 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 (**Table 8**). The model shows the horse population would remain 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 (108-121).

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 195 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 (**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 11: 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 PMWRH 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 108-121. 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 the effects of long-term drought. 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. As noted in the Drought Report (Appendix M), BLM used the Rangeland Analysis Platform to estimate production for the PMWHR (Allred et al.

2021). For 2021, the RAP model depicted the second lowest estimated production over the last 36 years. While production is the second lowest, the wild horse population in 2021/2022 is tied with the largest on record, 195 individuals. The last time the herd was this large was in 2009, when the model estimated production for that year 101.5% of average. A record high number of horses combined with record low production can exacerbate both the overall fitness of the horses and accelerate degradation of the range resource as the horse population is placing an extreme amount of pressure on an environment that is impacted by severe to extreme drought.

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.

To achieve a TNEB on the public lands, WH&B should be managed in a manner that assures significant progress 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 seasonal 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.

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. The Interior Board of Land Appeals 109 IBLA 118 and 119 stated “We interpret the term AML within the context of the statute to mean that optimum number of wild horses which results in a thriving ecological balance and avoids deterioration of the range.”

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.

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 January 2022 is 195 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 2012-2022 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 and prairie junegrass are increaser species. 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, sustained 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.

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, but 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 obvious 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, sustained 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, sustained 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 (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. 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 (STM) 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 exclosure 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 exclosure, 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, sustained 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, 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 2023-2024 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 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 (**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 1would 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 108-121. The BLM would continue to administer fertility control and would initially reduce the population to about 150 horses in a 2023-2024 gather. The BLM would then complete subsequent gathers to manage the population towards lower AML of 108 horses and allow the population to grow to the upper AML of 121 before conducting another gather. 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 to 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 108-121 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 next ten years or the life of this plan. BLM calculated an 11.25 percent growth rate over a 5-year period from 2016-2021, with the population growing from 160 to 178 adult horses while implementing fertility control measures, but no gathers during that period. At that same growth rate, the population would grow to 204 horses after ten years. 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. Current 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

A livestock trailing permit has been issued in the past on the wild horse range and is expected to continue in the future. The authorization has been for one day each in April and in November totaling approximately 14 AUMs each year. Under Alternatives 2 & 3 the upper end of the AML would be established at 1826 AUMs for 121 horses and 1800 AUMs for 120 horses under Alternative 1, current management with RMP amendment. The Authorization of the trailing permit is not a substantial enough portion of the use on the horse range and will not contribute to the effects towards rangeland health or carrying capacity of any of the alternatives. Fourteen AUMs are equivalent to about one horse and under normal conditions, while administering PZP, the population of wild horses can grow by 2 to 3 each year. Under all alternatives one horse would represent approximately 1% or less of the total population on an annual basis, and as such the impacts could not be measured or quantified.

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 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 exclosure around the spring head with a pipe to a trough located outside the exclosure. 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 exclosure 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 exclosure fence. If continued unabated, this channel formation could undermine the stability of the exclosure fence over time.

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

Figure 15: Incised channel forming near exclosure 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 exclosure 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 (exclosure) 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 exclosure 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 (Bengeyfield 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 17) 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 a 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 where 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 195 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 managed between the population range of 108-121. 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 195 to a high of 121, 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 (*Polioptila 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. 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 AML of 108-121 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 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.

4 Cooperation and Coordination, EA Preparation

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

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.
- **Proposed Plan Amendment Comment Period; Federal Register Notice March 30, 2022, comment period March 30-April 29, 2022.** BLM reviewed scoping 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.

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 (Ho 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 Ho, 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 Ho value for wild horse herds, the better the estimate of

that mean and standard deviation is expected to be. While the last set of hair follicle samples for the Pryor Mountain horses was collected about ten years ago, the results of recent fecal sampling show Ho 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, and the BLM is currently collecting fecal DNA samples. Genetic diversity would continue to be measured via fecal DNA sampling or hair follicle sampling during a gather. In the event that Ho 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 (Gross, 2000). In response to public comment, the BLM increased the age range from 6-10 to 6-15 years as a possible management action to increase diversity within the herd.