

A crossroads in the rearview mirror: the state of United States feral equid management in 2023

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Feral horse (*Equus caballus*) and burro (*Equus asinus*) management is a complex socioecological issue in the western United States. This complexity is partly due to divergent views regarding these animals: they are viewed as national treasures by some but as invasive pests by others. Feral equids are mandated as one of multiple uses on federal public lands (US Congress 1971, 1976), but overpopulation has led to ecological effects that threaten the integrity of other uses (Davies and Boyd 2019). Conflicting opinions concerning these animals' place on public lands renders identifying management policies that sustain equid and land health a persistent wicked problem (Scasta et al. 2018).

Ten years ago, Garrott and Oli (2013) stated that the US Bureau of Land Management's (BLM) Wild Horse and Burro Program was facing a critical crossroads. At the time, the abundance of feral equids on BLM lands was estimated at approximately 40,000 individuals, or approximately 13,000 more than the agency-determined maximum appropriate management level (AML; BLM 2022). To address overpopulation, the BLM removes individuals and feeds them in off-range holding facilities while making them available for public adoption or contracts with private landowners to care for unadopted individuals for the remainder of their lives (BLM 2022). The number of individuals in off-range care was approximately 45,000 in 2013, and Garrott and Oli (2013) estimated that if management practices remained static, the BLM would spend more than \$1 billion by 2030 to care for captive equids.

This year also marks the 10th anniversary of the National Research Council's (NRC) review of the program (NRC 2013). The BLM requested this review to address rising management cost and vocal discourse from a public troubled by the program's lack of transparency (NRC 2013). The NRC concluded that the BLM's management strategy lacked sufficient foundation in science (NRC 2013). Specifically, the NRC stated that population sizes were not estimated with rigorous population-monitoring methodology, the population models were inadequate and opaque, and AML establishment and monitoring was unclear (NRC 2013).

In the ensuing decade, the BLM has increased research and science-driven management. The program has partnered with the US Geological Survey to develop standardized and statistically rigorous survey methods to estimate populations sizes (BLM 2022) and to create a transparent predictive population model (Folt et al. 2023). Furthermore, the BLM has funded research on

the development and application of fertility control, as well as on interactions between equids and their environments (BLM 2022).

Beyond the need for transparency, both Garrott and Oli (2013) and the NRC (2013) highlighted slowing population growth as a critical need. Regrettably, the resources spent on improving scientific rigor have not yet yielded a decrease in populations. On the contrary, on-range equid populations have more than doubled in the last decade, and the off-range population has increased by 33% (figure 1). Concurrently, the annual expenditures for off-range care have increased by 93% (figure 1). Since 2013, the agency has spent more than \$550 million supporting captive equids (BLM 2022), as was predicted by Garrott and Oli (2013). The BLM has increased the number of individuals removed from the wild in each of the past 4 years (BLM 2022), leading to decreases in the on-range population (figure 1). However, the total on-range population is still approximately 50,000 individuals above the maximum AML (figure 1), and the recent moderate decrease in on-range individuals is directly correlated with an increase in the off-range population and subsequent expenditures (figure 1).

Clearly, it was not merely the lack of sound science that was limiting the BLM in meeting its population objectives; increasing the quality and quantity of research cannot overcome fundamental policy flaws. The program is hampered by contrasting societal views regarding the status of equid populations and is neutered by a lack of management options. Current policy melds strategies from both wild and domestic animal population management but lacks the teeth of either approach that make them successful.

The unsustainable chimera of equid management: Wildlife, livestock, or pets?

The Wild and Free-Roaming Horses and Burros Act of 1971 (US House of Representatives 1971), the legislation outlining the protection and management of equids on BLM and US Forest Service (USFS) lands, designates that equids shall be managed at a "minimum feasible level" (US Congress 1971). In other words, the act intended for feral equids to freely roam like the wild animals with which they coexist. However, feral equids are treated differently from native ungulates, because hunting is not permitted. Equid gather and removal practices more closely

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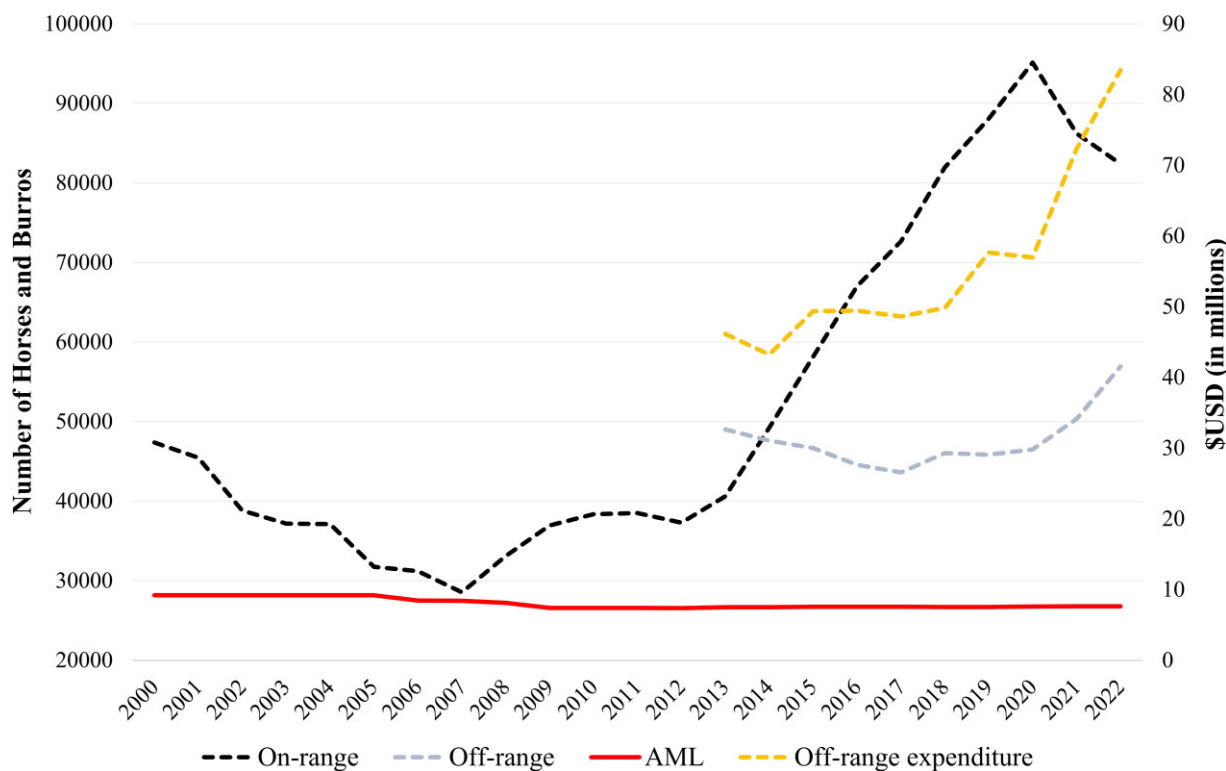


Figure 1. Numbers of feral horses and burros both on (the dashed black line) and off (the dashed blue) range, managed by the US Bureau of Land Management since 2000. The off-range numbers are shown since 2013 (data are not publicly available before 2012). The costs in millions of USD to care for off-range equids are shown in orange. The current nationwide maximum appropriate management level for the on-range population of horses and burros is 26,785 (the solid red line). These numbers do not represent feral equids on US Forest Service, sovereign tribal nations, or myriad other jurisdictions that feral equids inhabit in the western United States. The last equine slaughterhouse in the United States closed in 2007. The numbers are current as of 1 December 2022.

resemble livestock operations than wildlife management, whereas adoption programs, sales restrictions, and the abolition of slaughter have resulted in feral equids effectively serving as society's pets.

Although it was well intentioned, the act was written without evolutionary or ecological processes in mind. *Equus* evolved in North America but went extinct on the continent approximately 10,000 years ago (figure 2; Ransom and Kaczensky 2016). The equids currently inhabiting North America did not coevolve there; they are descendants of livestock that underwent millennia of domestication and artificial selection (Ransom and Kaczensky 2016). Most large predators that would help limit their population growth also went extinct at the end of the Pleistocene, and the Anthropocene has led to further predator reductions. Many wild ungulate populations in North America are limited in part by top-down processes, including predation and hunting (figure 2); however, those mechanisms do not apply to most feral equid populations, because few adults are depredated, and hunting is illegal.

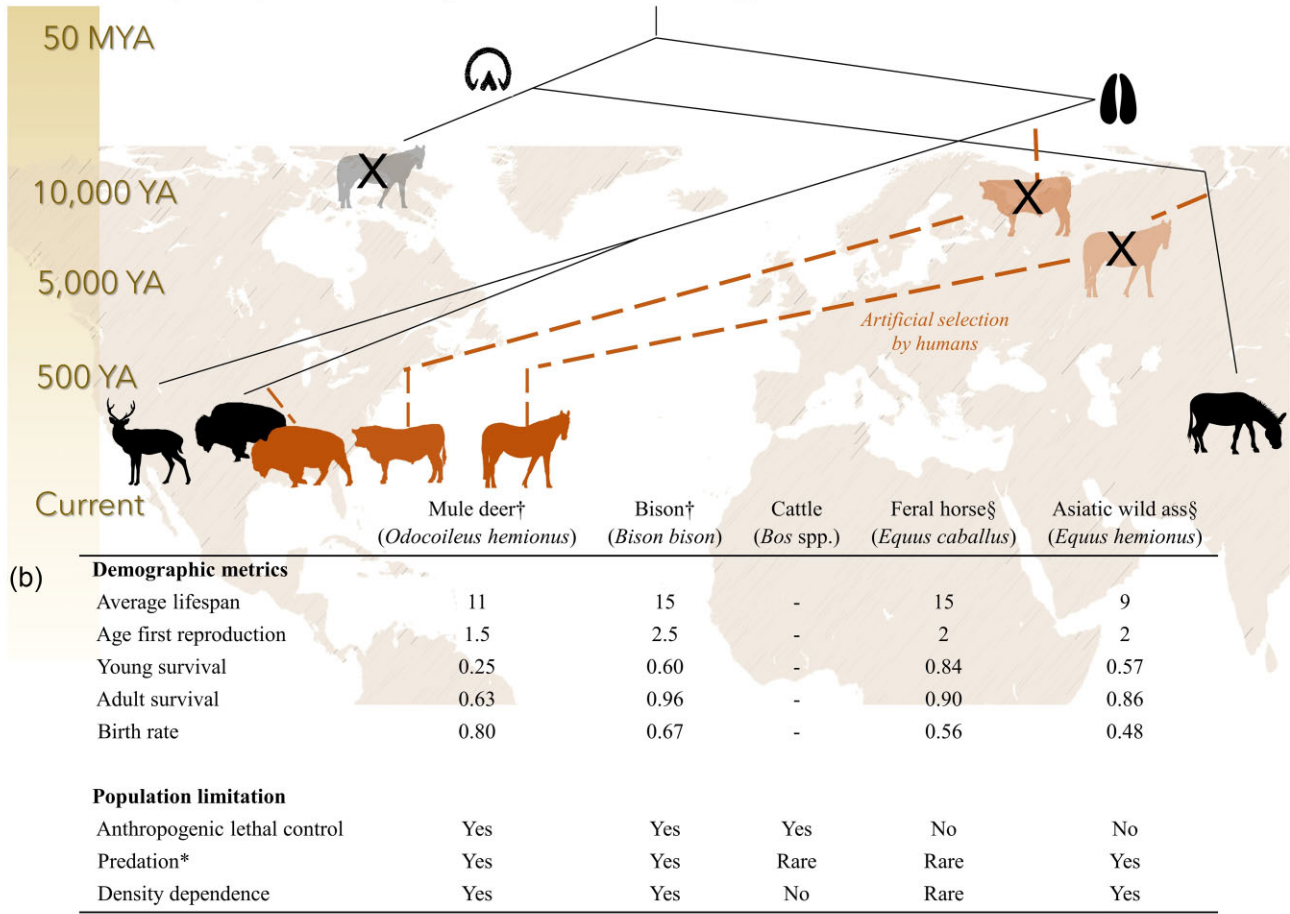
Density-dependent resource limitation also regulates wild ungulate populations, but this mechanism provides dual challenges to feral equid management. First, unlike native ungulates and most livestock species, equids are hindgut fermenters, not ruminants (Janis 1976). Hindgut fermentation is comparatively inefficient, which leads to greater forage and water consumption than an equivalently sized ruminant (Janis 1976); consequently, overpopulated equids place extra stress on the forage- and water-limited environments in the arid western United States. Second, artificial selection has shifted feral horse demographic response to density dependence relative to wild ungulates, favoring reproduction over adult survival (Grange et al. 2009). In unmanaged

populations, this would yield extreme population oscillations and range degradation; therefore, current management sustains high rates of reproduction and survival (figure 2).

The act includes text for the humane sale or destruction of unadopted individuals (US Congress 1971), but public pressure led to a prohibition of euthanasia or sale to slaughterhouses of healthy, federally owned horses (GAO 1990). Moreover, the slaughter of privately owned horses is distasteful to many US citizens; the last equine slaughterhouse in the country closed in 2007 (figure 1; Baca 2017). Coincidentally, or not, feral equid populations began to dramatically increase at the same time (figure 1). An unintended consequence of slaughterhouse closures is the intentional release of private equids onto public or sovereign tribal lands when owners cannot care for them (Baca 2017). Equid population estimates from tribal lands are incomplete but are far greater than on BLM or USFS lands (Schoenecker et al. 2021). Tribal nations are less restricted in management options than the federal government but have limited resources to manage feral equids, and their food sovereignty has suffered from the lack of abattoirs.

Fertility control is an attractive option to manage populations while avoiding the contentious issue of lethal control. However, most equids inhabit expansive, remote, and topographically complex areas. This limits the efficacy of finding and treating enough individuals to effectively control populations (Ransom and Kaczensky 2016). Similarly, removing equids from these lands and placing them in long-term holding acts as a temporary band-aid; it simply exports the issue elsewhere—including the imperiled tallgrass prairie ecosystem—with unknown ecological effects. Oklahoma now supports approximately 23,500 feral equids, or five times more than the on-range population of Wyoming (BLM 2022).

(a) In terms of evolutionary history, key demographic parameters, and population regulation, feral equids in North America are unlike sympatric native ungulates (examples: mule deer, American bison), or native equids in other regions (example: Asiatic wild ass). Feral equids did not evolve in the areas they currently inhabit, they demonstrate greater survival and/or reproduction than other large ungulates, and are rarely limited by hunting, predation, or density-dependence. Further, unlike cattle or bison populations managed as livestock, feral equids are not subject to euthanasia or slaughter.



†Thompson et al. 2003

§ Ransom and Kaczensky 2016

*Rare here indicates that substantial predation pressure on both neonates and adults is not common throughout the range. We acknowledge that where cattle and horses overlap with large predators that predation may indeed be high, but this represents a relatively small proportion of their distribution in North America.

Figure 2. (a) Evolutionary timelines of selected odd-toed (i.e., equids) and even-toed (i.e., bovids, cervids) ungulates across the globe. The vertical axis represents time, with the separation of odd- and even-toed ungulates occurring between 50 million and 60 million years ago, with the *Equus* genus originating in North America. The species marked with Xs are those that are no longer extant (i.e., original North American equids and the ancestors of domestic horses and many cattle breeds in Eurasia). The species and the dotted lines in orange represent pathways of domestication. The geographic locations are not to scale. (b) The average demographic rates and mechanisms of population regulation in selected wild and domestic ungulates. Anthropogenic control includes hunting, culling, or slaughter. The superscripts denote data sources for each species (the reported metrics are averages from those reported in each source).

It also burdens the agency with the exorbitant cost of caring for individual equids in perpetuity. Off-range expenditures, currently increasing because of inflation and drought, directly limit the BLM from allocating sufficient resources to keep all on-range populations within AML.

Moving forward: Integrating ecology into equid legislation

Feral equids are simultaneously treated as wild, livestock, and pet populations. For the federal government to sustain healthy populations, ecosystem health, and fiscal responsibility, lawmakers

must properly define how feral equids should be labeled. Each label (wild, livestock, pet) has validity, and management plans can be implemented to optimize equid populations with other land uses. Furthermore, providing a clear definition of feral equids will determine the legal tools that can be applied for their management. As a wild species that lacks sufficient predation to keep most populations in check, a hunting or culling program, like those for other wild ungulates, could slow their population growth. As livestock, gathers and removals that lead to sale or slaughter would limit growth and give the animals the monetary value they currently lack. As pets, simultaneously conducting large-scale removals and administering fertility control, includ-

ing permanent sterilization (and potentially euthanasia), could reduce population sizes and slow growth. In fact, this is what Garrott and Oli (2013) recommended a decade ago. They posited that increased research into fertility control could reduce the number of animals removed annually to a number concordant with adoption demand; therefore, decreasing the number in long-term care (Garrott and Oli 2013). However, a key component of their proposition was to first remove equids from the range to meet population targets (Garrott and Oli 2013). Although the BLM has admirably increased fertility control research and application, if they are unable to also remove tens of thousands of equids, this process is doomed to be a Sisyphean task.

The current state of feral horse and burro management in the United States is unsustainable and will continue to be a painful resource sink without fundamental changes to the law. We recommend that the US federal government should officially declare the status of feral equids as either wild, livestock, or pets and should provide the BLM and USFS the legal latitude and funding to develop and implement respective management options. Furthermore, because more feral equids inhabit sovereign tribal lands than public lands, the burden of negative effects disproportionately falls on them. Consequently, the US Congress should appropriate funds for tribal nations to manage their equid populations.

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