

## CONSERVATION

# A Critical Crossroad for BLM's Wild Horse Program

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Although horses evolved in North America, they went extinct 10 to 12 thousand years ago. Spanish conquistadors returned domestic horses to the continent in the mid-1500s, and since then, domestic horses have escaped captivity and also were purposefully released onto western rangelands where they thrive today. Most free-roaming horse populations are managed primarily by the Bureau of Land Management (BLM) of the U.S. Department of the Interior (1).

In 1971, the Wild Free-Roaming Horses and Burros Act (2) was passed, which establishes public ownership of free-roaming horses and instructs federal agencies to “protect and manage” horses as “an integral part of the natural system of the public lands.” The act mandates that BLM and other federal agencies monitor horse numbers, determine appropriate population levels, and remove excess horses from public lands “to preserve and maintain a thriving natural ecological balance.” However, at present, tens of thousands of horses are not living the life of “wild mustangs” as Congress intended in passing the Wild and Free-Roaming Horses and Burros Act; instead, they have reverted back to the status of captive, domestic livestock, and the cost of the captive horse program is increasingly unsustainable.

The BLM currently reports ~33,000 free-roaming horses in the western United States. The National Wild Horses and Burros (WHB) Program has 179 designated Herd Management Areas, with population objectives for each, and an aggregate maximum goal of 23,622 horses (3). Since its inception, the WHB Program has been embroiled in controversy over appropriate population goals, management activities, and the accuracy of its estimates of population size and growth rates (4–7). The BLM monitors numbers using aerial surveys and captures and removes horses from rangelands when horse numbers exceed target population size.

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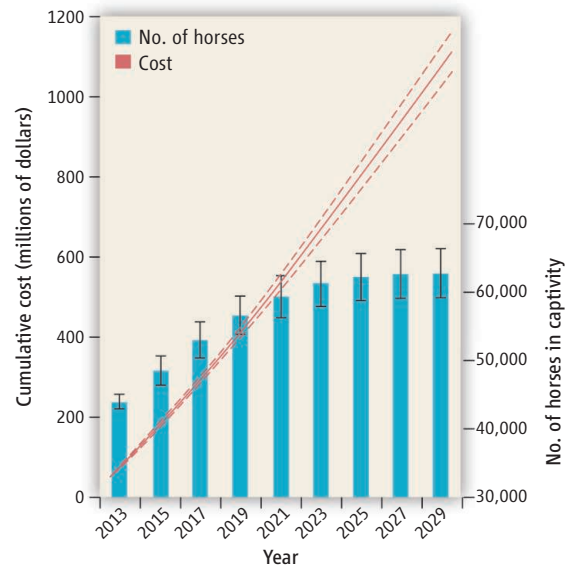
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As of 2012, BLM has removed >195,000 horses from public lands under this program (3). The act requires BLM to place removed horses into “private maintenance and care for which ... an adoption demand exists,” with unadoptable, old, and excess animals, beyond the adoption demand, either sold or “destroyed in the most humane manner possible” (2). The number of horses BLM removes from public lands routinely exceeds adoption demand (8). However, because of pressure from horse advocates, administrative directives and congressional appropriation bills prohibit killing healthy horses (9); therefore, BLM is left with large numbers of captive horses that must be maintained indefinitely.

These policies have led to a complex and costly system for maintaining captive horses. Horses removed from public lands are processed in short-term holding facilities similar to cattle feed lots and held for several months or more. Many mature females are pregnant when captured and foal in the facilities, which adds to the captive population. Most adult males are castrated. Horses can be adopted from the short-term holding facilities, and some are removed through deaths, sales, or release back onto public lands. Excess animals are eventually transferred to private pastures, primarily in the Midwest, that are contracted as long-term holding facilities. Although small numbers are sold, horses typically remain in these facilities until they die of natural causes. Currently, the ~45,000 horses in captivity exceeds the estimated 33,000 free-ranging horses on public rangelands (3).

In a recently released National Research Council (NRC) report (7), a committee of 14 scientists concluded that, left unmanaged, horse numbers on public lands would triple every 6 to 8 years until food and water became limited. Under these conditions, horses would be in poor health, reproduction would be suppressed, and deaths from starvation and dehydration would become

Captive wild horses will cost the United States over \$1 billion by 2030 unless management approaches change



Projections of U.S. captive wild horses and costs (with 95% confidence intervals). (see SM for more details).

common, with mass mortality events possible during periods of drought. High horse populations and limited resources would also degrade rangelands, which would affect all native species and public uses of these lands. Thus, although the NRC committee concluded that BLM must actively manage wild horse populations, it asserts that continuing “business as usual” will impede effective management of wild horses on public lands and recommends management changes to put the WHB Program on a more sustainable course (7).

Although the NRC report focused on scientific issues, a major impetus for changing the WHB Program is the escalating costs of maintaining increasing numbers of horses in captivity. The WHB Program budget grew from \$19.8 million in 2000 (10) to \$74.9 million in 2012 (3). More than 60% of the 2012 budget was used to maintain captive horses, 11% expended to capture and remove animals from public lands, and 10% for adoption programs (3). To inform the policy debate, we extend the implications of the NRC report to provide a projection of the captive horse population and associated costs if current policies and management approaches continue.

### The Consequences of Business as Usual

We used records of the sex and age of 165,459 horses removed from public lands and placed in captive facilities between 1990 and 2011 to develop demographic projections and associated costs (see the chart) [see supplementary materials (SM) for details]. We made two basic assumptions. First, we projected the life span of 33,946 unadoptable horses currently in long-term holding facilities. Under this scenario, BLM will accrue 366,846 horse-years of maintenance costs over a 30-year period before all animals currently in captivity die. Given that \$45.9 million was budgeted to maintain 42,835 horses in captivity during 2011 (10), annual per-horse maintenance costs would be ~\$1074. Thus, the 30-year cost of maintaining horses currently in long-term holding facilities would be ~\$394 million (\$449 million with 2% annual inflation).

Second, we assumed the current management program would continue, with a mean of 9412 horses in short-term holding facilities and 3803 horses transferred annually to long-term holding facilities. Expenses would be ~\$1.1 billion between 2013 and 2030, and annual costs thereafter would be \$67 million. Although some citizens may support such expenditures, these projections reinforce assertions (7, 8) that BLM's current approach to managing horse numbers is not sustainable.

### A Way Forward

More than 30 years of research on contraceptive agents for feral horses have resulted in the development of effective vaccines that prevent pregnancy in both captive and free-ranging mares for 1 to 3 years (7). Experimental application of these vaccines has contributed to the control of a small horse population on an Atlantic Coast barrier island, and limited experiments on western horse herds have also produced encouraging results. The Environmental Protection Agency recently sanctioned two contraceptive vaccines, which enables their routine use for horse population management on western rangelands (7). The average life-expectancy of horses entering long-term holding facilities is about 15 years (see SM). Therefore, every horse that does not enter long-term holding facilities would save, because of contraceptive application, \$16,110 in maintenance cost (or savings of \$1 million for every 62 horses), not considering the modest costs of contraceptive application.

Uncertainties exist when attempting to deliver vaccines to large numbers of horses. Although concerns have been raised regarding behavioral, physiological, and demographic consequences of contraceptive vac-

cines, none of these concerns preclude their use for managing rapidly increasing populations (7). The level of reduction in population growth that can be realistically attained for western horse herds through application of contraceptive vaccines remains unclear. Large-scale management experiments, perhaps within an adaptive management framework, would help address some of this uncertainty (11).

We estimate that the typical 15 to 20% annual population increase of western horse herds (7) could be halved by means of contraceptive vaccines. If a gather-and-removal effort reduced the western horse population to the BLM's goal of 23,622 horses and aggressive contraception treatment was initiated, then BLM need only remove 2000 to 3000 horses annually to maintain its goal. The number of horses annually removed would then more closely match adoption demand and that would minimize or eliminate the need for long-term maintenance of unadopted animals.

Although broad-scale use of contraceptives can help reduce the number of horses that BLM must remove to control populations, it is not a panacea. Current contraceptive vaccines are most effective when hand-injected, and remote delivery of vaccines via dart is impractical for most free-ranging horse populations (7). Accordingly, vaccine delivery will require continuing, and perhaps increasing, the frequency of horse captures. It may also take a decade of experiment and refinement of treatment regimens and contraceptive methods to scale-up management to include the entire population of horses on western rangelands. Furthermore, most populations already exceed management objectives, and population modeling efforts indicate that current contraceptives can only reduce, not stabilize or reverse, population growth. Thus, even with the changes suggested by the NRC report, BLM must continue removing horses from public lands for the foreseeable future.

It is up to society to decide how they want their government to manage wild horses, how many wild horses should be accommodated on public lands, what should be done with excess horses, and how much they are willing to spend. The debate has gone on for many decades; however, we are at a critical juncture. BLM recently announced that because of funding constraints and lack of additional capacity for maintaining captive animals, it will substantially reduce scheduled removals of horses from public lands this year. This decision has been made despite worsening drought conditions that are causing severe

shortages of forage and water for horses, wildlife, and livestock (12). Terminating or reducing active management will lead to a rapid increase in the number of horses, further exacerbating resource limitations.

The current situation in Australia provides a sobering view of what might be in store for western rangelands in the United States if the current management dilemma is not resolved. The wild horse population in Australia is estimated to exceed 400,000 animals (13), and severe drought conditions in central Australia have reportedly forced government agencies to propose shooting 10,000 horses from helicopters to reduce animal suffering and environmental degradation (14). One can only hope that there is the political will to change current policy and place BLM's WHB Program on a more sustainable trajectory.

### References and Notes

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### Supplementary Materials

[www.sciencemag.org/cgi/content/full/341/6148/847/DC1](http://www.sciencemag.org/cgi/content/full/341/6148/847/DC1)

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