

# Counting America's Wild Horses and Burros: Better Estimates for Population Management

The Wild Free-Roaming Horses and Burros Act of 1971, as amended, states that

... It is the policy of Congress that wild free-roaming horses and burros shall be protected from capture, branding, harassment, or death; and to accomplish this they are to be considered in the area where presently found, as an integral part of the natural system of the public lands (PL 92-195, Sec. 1331, Congressional findings and declaration of policy).

The U.S. Bureau of Land Management (BLM)<sup>1</sup> and the USDA Forest Service are responsible for managing the vast majority of wild horses and burros on public lands, although a few U.S. Fish and Wildlife Service and National Park Service units also support wild horses and burros. Pursuant to the Act's requirements, the BLM's overarching goal for wild horse and burro management is to achieve and maintain a "thriving natural ecological balance."



Almost every management issue concerning wild horses and burros depends on accurate population estimates. Reliable, science-based estimates are needed for maintaining everything from herd health to habitat carrying capacity to genetic diversity. In reality, the wild horse and

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Closeup of a feral horse grazing in a field. Public domain.

burro population survey requirements for the BLM are daunting. The agency is responsible for 179

Herd Management Areas (HMAs) located across nearly 32 million acres of public lands in the western United States. Given the number and distribution of these populations, surveys of all burro herds and most wild horse herds are currently made from aircraft.

A stated goal of the [BLM's National Wild Horse and Burro Program](#) is to conduct a population survey of each wild horse or wild burro herd at least every 4 years. Given the demand for reliable information on which to base management decisions, wild horse and burro managers need standardized, tested, defensible, cost-effective, yet easy-to-use aerial population estimation techniques for wild horse and burro herds in a range of habitats and across a range of population sizes and densities. The accuracy and precision of current wild horse survey methods have not been rigorously tested. Thus, a statistically valid estimation technique is needed.

### **Combining resources**

The U.S. Geological Survey, Fort Collins Science Center (FORT) teamed with the BLM and [Colorado State University \(CSU\)](#) to test aerial survey techniques for wild horses and burros in an effort to find a more accurate way to estimate population numbers. By introducing statistical sampling methodology and analysis, and by adapting some well-known survey techniques, FORT scientists are endeavoring to deliver a tool to help get to the bottom of the age-old question, “How many wild horses are on the range?”

Aside from the BLM wild horse specialists who manage the individual herds, there are countless interest groups that can benefit from more accurate population surveys as well. Survey results affect how many grazing units are allowed for ranchers who wish to graze their livestock on public lands, how resources might be affected by potential competition with other wildlife species, and how many horses are allowed to stay on the range.

### **Combining techniques**

Counting wildlife from the air is not new science. Wildlife biologists have been using some techniques for years, but each species and each habitat has its own unique set of challenges. For this study, FORT and CSU scientists narrowed the field to [four promising techniques](#) for wild horses: mark-resight, simultaneous double-count, sightability bias correction modeling, and distance sampling. Each of these techniques has drawbacks when applied to aerial counting of wild horses in the various types of terrain they inhabit. In an effort to create a synergistic effect and alleviate the limitations inherent to the individual techniques alone, the aerial survey team is investigating combinations of these techniques. This pioneering effort could affect the way biologists count many different species in the future.

### **Finding synergy**

A true census (counting every individual) of a wildlife population is seldom possible, but development of techniques to accurately estimate population numbers could reap benefits for wild horse and burro managers across the United States. With accurate and defensible population estimates, managers can better manage the wild horses and burros in their care. FORT and CSU biologists are engaged in

testing and refining such techniques in order to support the BLM in managing America's "living symbols of the historic and pioneer spirit of the West."

### **Helicopter Drive Trapping or Gathers**

These involve herding wild horses or burros into a temporary holding corral in order to sort and remove animals that are in excess of the Appropriate Management Level (AML) for a given Herd Management Area (HMA). Currently, the BLM conducts a gather of each HMA approximately every 4 years. Removed animals are sent to wild horse and burro preparation centers for vaccinations, veterinary examination, and adoption or sale to good homes.

### **Reducing Population Growth Rates: Fertility Control in Wild Horse Mares**

Largely unchecked by natural predators, many wild horse populations grow at rates of 18–25 percent per year. This unregulated growth can overtax vegetation and affect herd health as well as native wildlife populations. [The Wild Free-Roaming Horses and Burros Act of 1971](#) requires the [U.S. Bureau of Land Management \(BLM\)](#) and [USDA Forest Service](#) to manage these free-roaming herds for a "thriving natural ecological balance." To ensure the sustainability and health of both horse herds and the public lands they roam, and to reduce the number of animals requiring either adoption or long-term care in holding areas, managers began to explore fertility control as an alternative management technique.

From 1978 into the 1980s, the BLM worked through a series of research contracts focusing primarily on development of a chemosterilant for wild stallions. In the early 1990s, research turned to silicone implants in mares in an effort to achieve fertility control. Although both routes produced fertility control, they had too many drawbacks and were eventually abandoned.

In light of these problems and the continuing need for some form of contraception, in 1991 researchers identified the desired characteristics for an ideal wild horse fertility control agent.

Specifically, the agent should:

- be at least 90% effective
- be capable of administration by remote delivery
- either be immediately reversible, or its effects should passively wear off
- be safe to pregnant animals
- not pass through the natural food chain
- be inexpensive
- have no debilitating side effects on the health of the horses
- not influence the social behavior of the horses

### **How PZP works**

In order for sperm to attach to the ovum and fertilize the egg, there must be complementary proteins on both the surface of the sperm and the zona pellucida (ZP) of the ovum. PZP acts as a foreign protein against which the treated mare produces antibodies (thus, the PZP fertility control agent is actually a vaccine). These antibodies attach to the mare's zonae sperm receptors on the ovum and block fertilization. Domestic pig ovaries (obtained from slaughterhouses) are minced and the PZP is obtained from screening filtration. An adjuvant is mixed with the PZP to enhance its effectiveness when it is injected into mares intramuscularly. Once injected, it causes an immune response, making the mare infertile. Over time, the

antibody titers fall and fertility returns. With the liquid vaccine, a booster injection can be given at 10 months to raise the titers back to the infertile range. This can be done each year for at least 4 years, after which time the effects may be more likely to become permanent. For this reason, current individual-level field trials involve only 1–4 years of treatment.

This list of needs would drive much of the U.S. research on wild horse contraception during the 1990s, including research funded by both the BLM and the U.S. Geological Survey (USGS). To meet the stated criteria, a [National Park Service](#) research team on [Assateague Island National Seashore](#) turned to an immunocontraceptive agent, porcine zona pellucida (PZP), which had been reported to block fertilization in dogs, rabbits, and primates. Experimental PZP application on the wild horses of Assateague Island commenced in 1988, resulting in promising reductions in the pregnancy rates of mares: by 1994, population growth began to stabilize solely through the use of PZP immunocontraception.

### **The Outlook for PZP**

The PZP agent appears to meet most of the safety concerns of the BLM. The fact that PZP is a glycoprotein suggests that it should be digested before it can enter the food chain. Its effects passively wear off with time if annual injections are terminated; normal reproduction can be resumed following at least 4 years of use, and perhaps more. It does no harm if injected into mares that are already pregnant — they carry foals to term. Initial research suggests that PZP does not affect ovarian function or hormonal health. Life span seems to increase with improved health of treated mares, apparently due to the absence of stresses from pregnancy and lactation. Treated mares can live 5–10 years longer than untreated mares that continue to get pregnant and produce young. An initial study suggested that harem behaviors are not influenced, and more in-depth investigations are currently underway. There appear to be no generational effects; offspring of treated mares are able to reproduce normally. Finally, at least some forms of PZP may be 90% effective in blocking fertility in mares.

PZP has been successfully applied to control fertility in several small populations of wild horses on eastern barrier islands since the early 1990s. Population-level field trials of an injectable, time-release, pellet form of PZP that will allow almost 2 years of fertility control with a single treatment are currently underway in many western herds. The Assateague team also developed noninvasive methods to assess the pregnancy rates of, and detect ovulation in, free-ranging treated and nontreated, individually recognizable mares by analyzing reproductive steroid metabolites in their feces and urine.

### **PZP Field Trials**

The USGS, BLM, and [USDA Animal and Plant Health Inspection Service](#) (APHIS) have essentially completed individual-level field trials of PZP in free-roaming wild horses at three locations: [Pryor Mountain Wild Horse Range, Montana and Wyoming](#); [McCullough Peaks Herd Management Area, Wyoming](#); and [Little Book Cliffs Wild Horse Range, Colorado](#). Application of PZP began in 2001 at Pryor Mountain, in 2002 at Little Book Cliffs, and in 2004 at McCullough Peaks. Results of this work in terms of horse behavior are reported in [Ransom et al. \(2010\)](#), and efficacy results are detailed in [Ransom et al. \(2011\)](#). In addition, in 2011 the USGS, BLM, and the Animal and Plant Health Inspection Service (APHIS; Department of Agriculture) began studies on the safety and efficacy of SpayVac®, a form of PZP

made using a proprietary technology developed by Immunovaccine Inc. (Halifax, Nova Scotia, Canada).

<sup>1</sup>We focus here on management by the BLM, our primary research partner.

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Below are partners associated with this project.

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**Bureau of Land Management (BLM)**

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