

Management of Feral Horses in the National Park Service

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Feral horses are considered non-native species within units of the National Park Service. Feral horse management actions depend heavily on whether they are considered desirable or detrimental within a particular locale. Public sentiment and population visibility has traditionally had substantial influence on actions taken. Author's address: National Park Service, Biological Resource Management Division, 1201 Oakridge Dr. #200, Fort Collins, CO 80525; e-mail: jenny_powers@nps.gov. © 2014 AAEP.

1. Introduction

The National Park Service (NPS) was established nearly a century ago, with the creation of the Organic Act (1916), as an agency with a primary mission "...to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (16 U.S.C. § 1). The National Park Service General Authorities Act (1970) further clarified that "though distinctive in character, [Parks] are united through their inter-related purposes and resources into one national park system as cumulative expressions of a single national heritage; ... these areas derive increased national dignity and recognition of their superb environmental quality through their inclusion jointly with each other in one national park system preserved and managed for the benefit and inspiration of all people of the United States..." (16 U.S.C. § 1a-1). Finally, the Redwood amendment (1978) further strengthened the assertion that all management would be consistent with the Organic Act and

should be for "the common benefit of all the people of the United States" and that management "...shall not be exercised in derogation of the values and the purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress." (16 U.S.C. § 1a-1).

Quite possibly one of the strongest underlying values the NPS embraces is the idea of "naturalness." Although initially "naturalness" may appear to imply noninterference with the resource, active management is often necessary to address significant habitat and ecosystem changes associated with human influences. Sometimes intervention is necessary to restore natural processes. The NPS Management Policies (2006) directs managers to "...understand, maintain, restore, and protect the inherent integrity of the natural resources, processes, systems, and values of the parks while providing meaningful and appropriate opportunities to enjoy them. The Service recognizes that natural processes and species are evolving and the Service will allow this evolution to continue-minimally influenced by human actions." The "natural condition"

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is one that describes the condition of the resource “that would occur in the absence of human dominance over the landscape.” Furthermore, “... in cases of uncertainty as to the impacts of activities on park natural resources, the protection of natural resources will predominate. The Service will reduce such uncertainty by facilitating and building a science-based understanding of park resources and the nature and extent of the impacts involved.” Likewise, the “Service will not intervene in natural biological or physical processes, except when directed by Congress; in emergencies in which human life and property are at stake; to restore natural ecosystem functioning that has been disrupted by past or ongoing human activities; or when a park plan has identified the intervention as necessary to protect other park resources, human health and safety, or facilities. Any such intervention will be kept to the minimum necessary to achieve the stated management objectives.” Finally, “All exotic [non-native] plant and animal species that are not maintained to meet an identified park purpose will be managed—up to and including eradication— if (1) control is prudent and feasible, and (2) the exotic species interferes with natural processes and the perpetuation of natural features, native species or natural habitats; damages cultural resources; or significantly hampers the management of park or adjacent lands...”¹

Herein lies the conundrum. Equids evolved for millennia in North America but were extinct by the end of the Pleistocene, likely due to abrupt changes in climate and vegetation and coinciding with the immigration of humans to the continent.² Europeans re-introduced domesticated horses (*Equus caballus*) to North America in the late in the 15th century.³ Descendants of these domesticated horses lived for hundreds of years in direct contact with humans, including Native Americans and European immigrants, and were instrumental in advancing agriculture and transportation throughout the nation. Donkeys or burros (*Equus asinus*) share a similar introduction to the country, likely coming with Spanish explorers into the desert southwest early in the 16th century.³ As the country became more industrialized, horses were no longer relied upon to provide critical services for the developing country. Many horses were released or abandoned onto western range lands or remained as small remnant herds from early colonial exploration, homesteading, or ranching in areas around the United States.

Feral horses, ponies, and donkeys are found in several National Parks throughout the U.S. Currently, approximately 20 NPS units across the U.S. have horses or ponies and roughly 10 have burros. Population estimates on many NPS lands are unknown but likely total one to two thousand burros and approximately a thousand horses across the Service (all 401 NPS units within the U.S.) although historically there were substantially more.³ Feral

equids residing within NPS units across the Service typically fall into one of four categories.

The first category includes animals that are resident within an NPS unit and are not specifically maintained or managed as a cultural resource. Often, these populations existed in the area prior to the establishment of a park. They may have been released in the area or migrated from another extant population. They have typically been feral for many generations. Management ranges from attempting to eradicate these animals from within a park, to no management at all, often due to lack of funds or resources. Concerns regarding resource damage (e.g., vegetation grazing, damage to historic structures, soil erosion, competition with native wildlife, etc.) range from minimal to significant, depending on the park enabling legislation (e.g., the document that describes the purpose of the park), horse use and damage to available habitat, interaction with other wildlife species, interaction with humans, and interference with park operations. Tools to remove animals include capture and live removal from the park for sale or lethal removal, if necessary. Examples include burro populations at Virgin Islands Coral Reef National Monument, VI and Mojave National Preserve, CA.

The second category encompasses trespass animals from publically managed herds on neighboring lands. The NPS often agrees to comanage these animals on the edges of their herd management units and manages horses similarly to the Bureau of Land Management (BLM) or the U.S. Forest Service. Management activities may include round-up and removal for adoption or participation in fertility control trials. Examples of parks with this situation are Bighorn Canyon National Recreational Area, MT, which shares management of the famous Pryor Mountain horse herd with the BLM, or horses on the periphery of Death Valley National Park, CA, which are managed similarly to the BLM strategies.

The third category consists of trespass livestock from privately owned property or tribal reservation property. The first priority for park managers overseeing this category is establishing ownership and notifying the responsible party that their animals are trespassing. Once ownership has been established, owners notified, and the animals are considered abandoned, a full range of management options are available from fencing, to round-up and removal, to lethal removal. Examples of parks with these circumstances are Big Bend National Park, TX, with trespass livestock from Mexico and Mesa Verde National Park, CO and Glacier National Park, MT, with trespass horses from neighboring tribal lands.

Finally, the last category of animals is the most popular, celebrated, and often controversial. These are horses and ponies that are maintained as desirable feral species as part of the cultural landscape of the park. These herds tend to be small, highly visible, and with many interested stakeholders.

While park managers often identify significant resource damage due to overgrazing, trampling, or competition with native wildlife species, management options are often curtailed and subject to significant public scrutiny. A few NPS units have specific legislation or significant political pressure which mandates or drives horse management actions. Management actions include fertility control, genetic monitoring and manipulation, occasional veterinary care, capture for branding or microchip identification, round-up and sale, and partnering with non-NPS special interest groups to facilitate adoption. These herds are well-monitored and managers tend to understand not only herd demographics and dynamics but also can identify individual animals. These herds are generally geographically contained either on islands or within fences. Significant energy and resources are expended on maintaining physically and genetically healthy publically visible populations while, at the same time, balancing the needs of native wildlife species, habitat quality, and other park management priorities. Parks with this situation include Assateague Island National Seashore, MD and VA and Cape Lookout National Seashore, NC (16 U.S.C. § 459g-4) along with Theodore Roosevelt National Park, ND.

In those parks where horses are maintained as part of the cultural landscape, significant research has been conducted using immunocontraceptive fertility control agents. Some of the earliest work in free-ranging horses using immunocontraceptives occurred in National Park units, particularly Assateague Island.⁴⁻⁶ At this time, both Assateague Island and Cape Lookout National Seashores use annual remotely delivered porcine zona pellucida (PZP) vaccination to manage their feral horse herds. Cape Lookout augments the use of PZP vaccination with occasional removal from the island and adoption through a non-profit foundation. Notable findings with the use of PZP vaccination on these islands has been an increase in mare body condition and an increase in longevity associated with treatment. This has been attributed to the absence of pregnancy and lactation.⁷ Investigators found extended periods of vaccination increase efficacy and longevity of the vaccine, possibly to the point where mares are permanently infertile.⁸ Additionally, the PZP vaccination extends reproductive cycling past the normal breeding season⁹ and decreases harem fidelity.¹⁰ Finally, for more than 20 years, managers from both Seashores have dedicated significant funds and personnel time to intensively manage these herds ($n = \sim 100$ horses per island) on an annual basis.

Similar to Assateague Island and Cape Lookout National Seashores, Theodore Roosevelt National Park in western North Dakota has free-ranging feral horses. These animals reportedly descended from ranch horses turned loose in the badlands area of ND prior to establishment of the park. They

have received local, state, and national attention as culturally and historically important animals; some even suggest they are the founders of the “Nakota” breed. The park is fully fenced and the south unit where the horses reside encompasses approximately 46,000 acres. The park currently uses helicopter round-up and local sale as a means of limiting the number of horses. Horses share the range with other large ungulates including bison (*Bison bison*), elk (*Cervus elaphus nelsoni*), pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), and white-tailed deer (*Odocoileus virginianus*), necessitating careful resource allocation.

Park managers would like to limit the expense and safety liability of using helicopters to round-up animals and minimize the need to sell excess horses. This led to the current research project using an immunocontraceptive vaccine^a, directed towards the mare's own gonadotropin releasing hormone (GnRH) to limit fertility.¹¹ In October 2009 the park performed a round-up and removed approximately half of the herd. In a randomized complete block design, remaining mature adult females were blocked based on age, body condition, and reproductive status and assigned to a treatment ($n = 29$) or control ($n = 28$) group. Treatment animals received 2.0 ml of GnRH vaccine^a, which likely acts by antibody neutralization of endogenous GnRH and thereby decreases leuteinizing hormone and follicle stimulating hormone release from the anterior pituitary, in turn preventing ovulation. Control females received 2.0 ml physiologic saline. Most mares were pregnant at the time of treatment ($\sim 90\%$ pregnant).

In the following 4 years mares were observed for evidence of foaling, foal survival, changes in body condition, changes in reproductive behaviors as well as time budgets (i.e., time spent eating, moving, resting, or doing other behaviors), and possible injection site reactions. During the first foaling season (April–July 2010) after treatment there was no statistical difference in foaling success ($P = 0.65$) or foal survival ($P = 0.09$) between groups; though not statistically significant foals born to mares treated with GnRH vaccine^a were more likely to survive. Thus, it was concluded that there was no negative effect on foal survival of vaccination during mid-gestation. During the second foaling season (2011), or the first season treatment effects would be expected, the proportion of treated mares that foaled was 35% less than control mares ($P = 0.04$). In the third season, the proportion of treated mares that foaled was approximately 30% less than in control mares ($P = 0.07$). Three years post-treatment there was no difference ($P = 0.59$) in foaling proportions between experimental groups.¹²

There were minimal treatment effects on time budgets or reproductive behaviors; however, significant changes in herd dynamics and band fidelity were seen after removal of half of the herd at the time of round-up.¹³ Approximately 80% of mares treated with GnRH vaccine^a had evidence of swell-

ing at the injection site 1–4 years post-injection; whereas control mares did not have similar swelling. While most treatment mares had injection site reactions, only one had a draining abscess and none showed evidence of lameness. There were no differences in body condition between groups. The mean body condition scores for all study mares were between 4 and 6 throughout the study, indicating good nutritional status.¹⁴

The study concluded that a single vaccination with this GnRH vaccine offers a moderate decrease in fertility in free-ranging female horses for two years post-treatment, does not disrupt the current pregnancy, and is consistently associated with injection site reactions that do not appear to decrease fitness or animal welfare. A project is currently underway investigating the efficacy of revaccination four years after the initial immunization using the same product. The efficacy and persistence of the vaccine may be extended and behavioral effects may be more evident when a greater proportion of the mares are infertile.

Feral equids are currently managed as non-native species throughout the Service and may be considered either desirable or adverse, depending on the purpose and goals of the park unit in which they reside. Fertility control is a tool that may be appropriate to use in small intensively managed populations of horses and donkeys within the NPS to maintain cultural resource herds; however, a full range of management techniques, including lethal removal, remain necessary to meet management goals of more extensively managed populations. There is unlikely to be a “one size fits all” management approach to feral horses within the U.S. and flexibility as well as a full range of tools is necessary to allow managers to balance the competing needs of many natural and cultural resources.

Acknowledgments

Conflict of Interest

The Author declares no conflicts of interest.

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^aGonaCon-Equine™, National Wildlife Research Center, USDA, APHIS, Wildlife Services, Fort Collins, CO.