

AN ECONOMIC ANALYSIS OF THE
WILD HORSE AND BURRO PROGRAM

by

Vanessa Valentina Elizondo

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of

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in

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Co-chairs

Dr. Randal R. Rucker
Dr. Timothy W. Fitzgerald

Approved for the Department of Agricultural Economics and Economics

Dr. Wendy A. Stock

Approved for the Division of Graduate Education

Dr. Carl A. Fox

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ABBREVIATIONS

AML: Appropriate Management Level.

BLM: Bureau of Land Management.

HMA: Herd Management Area.

PZP: Porcina Zona Pellucida.

WH&B Act: Wild Free-Roaming Horse and Burro Act, Public Law No. 92-195.

WH&B Program: Wild Horse and Burro Program.

ABSTRACT

In 1971 Congress enacted Public Law 92-195, known as the Wild Free-Roaming Horse and Burro Act, as a result of public concerns about wild horse abuse and population declines. As a consequence, the Wild Horse and Burro program was created to manage these animals under the administration of the Bureau of Land Management (BLM). In recent years as more wild horses have gone into long-term holding facilities, the costs of the program have increased to levels that are not likely to be politically sustainable.

Two aspects of the Wild Horse and Burro program are analyzed in this thesis. First, the BLM's decisions regarding when to conduct a gather of excess animals and how many animals to remove are studied. A political economy analysis is developed to estimate the effects of interest groups on these decisions. Second, this thesis analyzes the relevance of horse characteristics in determining both the likelihood of a wild horse being disposed of and the price paid by adopters and buyers. To estimate the marginal value for each wild horse characteristic a hedonic price regression is estimated. The hedonic regression results are then used to estimate the benefits and costs of various modifications in the BLM's disposal program.

The results obtained from the political economy analysis suggest that the decisions made by the BLM with respect to the removal of excess animals are responsive to the interests of grazing holders. The greater the level of overlap between grazing allotments and a herd management area, the higher the likelihood of the BLM conducting a gather and the more animals will be removed in a given year. The results obtained from the hedonic pricing model show that characteristics such as sex, color, training, and age are statistically significant in explaining the variation observed in fees paid by adopters and buyers. In addition, it is found that reductions in the standard minimum adoption fee would increase the number of wild horses the BLM is able to dispose of to private parties, and would save the taxpayers substantial sums by reducing the costs of keeping wild horses in long-term holding.

CHAPTER 1

INTRODUCTION

In 1971 Congress enacted Public Law 92-195, known as the Wild Free-Roaming Horse and Burro Act (WH&B Act), as a result of public concerns about wild horse abuse and population declines. The WH&B Act authorized and directed the Secretary of the Interior and the Secretary of Agriculture to protect and “...manage wild free-roaming horses and burros in a manner that is designed to achieve and maintain a thriving natural ecological balance on the public lands.”¹ This legislative mandate was implemented and administered by the Secretary of the Interior through the Bureau of Land Management (BLM) and by the Secretary of Agriculture through the Forest Service.

Today, forty-four BLM field units are responsible for managing approximately 37,000 wild horses and burros on 180 Herd Management Areas (HMAs) covering over 34 million acres in 10 western states—Arizona, California, Colorado, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, and Wyoming.²

To achieve and maintain the mandated natural ecological balance and avoid deterioration of the range, the BLM sets appropriate management levels (AMLs) within each HMA. Because wild horse populations can double every four or five years and they have virtually no natural predators, achieving AMLs within each HMA has become a primary objective of the Wild Horse and Burro (WH&B) program. The main tool

¹ 16 U.S.C. § 1333 (2006).

² The BLM manages over 90 percent of the wild horses and burros on public land. The Forest Service manages 2,200 wild horses and about 300 burros (U.S. Government Accountability Office, 2008). This study focuses its analysis on the BLM.

employed by the BLM to achieve and maintain AMLs is to conduct “gathers” to remove excess animals from the range. After being removed, wild horses and burros are managed in short-term holding facilities, where they are prepared for adoption or sale, or in long-term holding facilities, where they live out the remainder of their lives.

The number of excess animals has been increasing over time while the number of adoptions has been decreasing. As a consequence more wild horses have to be managed in long-term holding facilities, thereby increasing the costs of the WH&B program. According to the 2008 US GAO report, in 2008 the average cost for short-term holding per animal was \$5.08 per day, while the average cost for long-term holding per animal was \$1.27 per day, and the program’s direct costs for holding unadopted animals tripled from \$7 million in 2000 (46 percent of the program’s budget) to \$21 million in 2007 (67 percent of the program’s budget).

In fiscal year 2009, the BLM managed 180 HMAs, which held over 36,000 wild horses and burros. Nationally, the AML for animals on the range was about 26,570 animals, suggesting that approximately 9,500 animals will have to be removed from the range in the near future to maintain the mandated natural ecological balance. As of May 2010, the BLM contracts for the maintenance of more than 24,000 wild horses in long-term facilities and more than 10,000 wild horses and burros in short-term facilities, and it is likely that these numbers and the costs of the program will continue growing. There are at least three reasons for this. First, it is very difficult to put all the wild horses that are removed up for adoption because they have limited economic value—they are often relatively small and can be difficult to train—thus more animals will have to be held in

long-term facilities. Second, in recent years, hay and fuel prices rose making it more expensive for prospective private owners to take care of and feed these wild horses and reducing the demand for these animals. Third, at least partly as a result of falling incomes during the recent downturn in the economy, an increasing number of abandoned horses now compete with wild horses for adoption, further reducing the demand for them.³

The increasing number of wild horses that the BLM has to manage and the rising costs of the program in recent years have attracted substantial attention from the media.⁴ Despite criticisms of the BLM's administration of the WH&B program, no formal analysis of the economic impacts of the program has been carried out by either the BLM or its detractors. In fact, limited research on the WH&B program can be found. A research study was mandated to the National Academy of Sciences through the Public Rangelands Improvement Act of 1978. From this study, reports issued in the 1980s by the National Research Council provided relevant information on population estimates, wild horse demography (including reproductive rates), competition with other species such as livestock and wildlife, impacts on range habitat, the role of social factors in decision-making, and research priorities.

The US GAO has written two reports on issues related to the WH&B program. The first, which was published in 1990, examined the treatment of wild horses and the costs of the program. The second, which was published in 2008, investigated the BLM's progress setting and meeting appropriate management levels, the management of wild

³ See, for example, Cowan (2010), Welch (2010), Dawson (2008), and DeLong (2008).

⁴ See, for example, Gearino (2010), Daly (2009), Stark (2009), Mott (2008), and Welch (2008).

horses, and the challenges faced by the BLM for the long-term sustainability of the program.

There are a few studies that examine the effectiveness and costs of fertility control in wild horse populations (Gross 2000; Hobbs, Bowden, and Baker 2000; Bartholow 2007), and one study on the dynamics of the bioeconomic tradeoff between livestock and wild horses was developed by Huffaker, Wilen, and Gardner (1990). Additional studies of food and habitat relations between wild horses, domestic livestock, and wildlife herbivores have been carried out by Hubbard and Hansen (1976); Olsen and Hansen (1977); Hansen, Clark, and Lawhom (1977); Miller (1983); Krysl et al. (1984); McInnis and Vavra (1987).

The main goals of this thesis are to provide a better understanding of the current structure of the WH&B program, how changes in the program could reduce the number of excess animals held in long-term facilities, and what forces influence the decisions made by the BLM with respect to the administration of the program. This is the first analysis of a number of political and economic issues associated with the WH&B program.

Two aspects of the WH&B program are analyzed in this study. First, the “production side” of the program or the decisions regarding when to conduct a gather of excess animals and how many animals to remove are studied. These decisions are examined using a political economy framework. Important questions here include, why was the Wild Horse and Burro Act implemented in 1971? Who gains and who loses from this program? What have been the positions of relevant interest groups and how have

these positions affected the program? To answer these questions, a thorough analysis of congressional hearings related to the WH&B program is conducted. A political economy analysis is then developed to estimate the effects of interest groups on the decisions made by the BLM with respect to whether to conduct a gather on a given HMA and how many animals to remove.

Second, this thesis analyzes the “distribution side” of the program, the relevance of horse characteristics in determining the likelihood of a wild horse being disposed of and the price paid by adopters and buyers.⁵ This aspect of the program is analyzed using a large sample of individual horse level data obtained from the BLM. The objectives are to estimate the probability of a wild horse being disposed of given characteristics such as age, sex, color, and markings, and to estimate the marginal value for each wild horse characteristic by evaluating how the observed price changes as the quantity of the attribute changes. The hedonic regression results are then used to estimate the benefits and costs of various modifications in the BLM’s disposition program.

The results obtained from the political economy analysis suggest that the decisions made by the BLM with respect to the removal of excess animals are responsive to the interests of grazing holders. It is found that the greater the level of overlap between grazing allotments and an HMA, the higher the likelihood of the BLM conducting a gather and the more animals are removed in a given year. The results obtained from the hedonic pricing model show that characteristics such as sex, color,

⁵ Throughout this thesis, the term adopter is used for those who acquire a wild horse or burro through the Adopt-A-Horse Program. The term buyer is used for those who buy a wild horse or burro through the new sale authority given to the BLM since December 2004. Both of these processes are discussed in the next chapter.

training, and age are statistically significant in explaining the variation observed in fees paid by adopters and buyers. In addition, it is found that reductions in the standard minimum adoption fee, would increase the number of wild horses the BLM is able to dispose of to private parties, and would save the taxpayers substantial sums by reducing the costs of keeping wild horses in long-term holding.

CHAPTER 2

BACKGROUND

This chapter provides relevant information to understand the Wild Horse and Burro program. It starts with a brief history of the wild horse and burro in North America and follows with a description of the evolution of the Wild Horse and Burro program over time. It concludes with a discussion of the main features of the program today.

History of the Wild Horse and
Burro in North America

The wild horses and burros managed by the BLM and by the Forest Service are descendants of domestic stock that were released or escaped onto the open range. The Spaniards were primarily responsible for the introduction of the horse and the burro to the Americas. The horse, however, had its ancestral origins in North America, where millions of years ago a small mammal named *Eohippus* evolved into an animal very similar to today's horse, but the final evolution of the horse into *Equus caballus* (the modern horse) took place in Asia. About 10,000 years ago the horse vanished from North America (Thomas 1979, pp. 17-19).

Columbus' second expedition brought back the horses to the New World and as exploration and settlement progressed northward in Mexico, the horse spread into the United States. Feral bands were augmented by horses frightened off during Indian attacks on settlers; by worn-out saddle horses turned loose to fend for themselves; by

escapes from prospectors, miners, ranchers, and travelers; and by natural increase (McKnight 1959, pp. 508-511).

Wild horse numbers reached their peak in the early 1800s, with a population of approximately two million, with most of these animals in the southwest. As the United States grew westward and farms and cities appeared where once the wild horse grazed, the decline of wild horse populations was inevitable. Wild horse herds were a nuisance to the cattlemen; horses consumed the range grass needed for profitable livestock production and drank the limited water in a region characterized for the lack of it. According to Wyman (1945), by 1824 this problem was so great that the government and the ranchers erected special corrals at the edge of towns, held roundups, and killed those horses that were unclaimed or unbranded. From 1870 to 1900, the ranchers reduced the numbers of wild horses by shooting them. At the same time, however, they increased the herds by no longer branding and caring for their own stock.

The demand by English troops for Western horses during the Boer War caused cowmen and mustangers to eliminate the herds on the more accessible ranges.⁶ By 1925, however, the number of wild horses had increased again, especially on the Northern ranges. Many farm horses, which were replaced by tractors, were left to forage for themselves and in the 1930s, when large numbers of wheat farms failed, more animals were left behind to join the feral herds. The final blow came when beef prices began to

⁶ The Boer War took place in today's South Africa between 1899 and 1902. During this war, England fought against the Boer Republic (Boer means farmer in Dutch), where farmers, ranchers, and merchants who were descendants of Dutch settlers established an independent republic. The discovery of gold in 1886 and the independence of this republic were seen as a threat to the supremacy of the British Empire, so on September 8, 1899 England sent additional troops to South Africa. Although the Boer government had issued an ultimatum requesting the removal of the English troops, the British government did not respond to the ultimatum, and on October 11 the war was started. The war ended on May 31, 1902 when the Boer leaders signed a treaty recognizing the sovereignty of the British Empire.

increase in the 1920s. The horse had to go. In the 1920s, the cattlemen of Montana were the first to enact legislation authorizing the gather and destruction of wild horses by the stockmen through county roundups. Following the lead of Montana, other states soon passed similar legislation (Wyman 1945, pp. 144-166).

In 1934 the U.S. Congress enacted the Taylor Grazing Act, Public Law No. 73-482, which created grazing rights on public lands under the jurisdiction of the BLM. These rights were leased to stockmen, who were reluctant to share grass with feral horses and soon more of these animals were removed from the public lands. In addition, new markets demanding horses emerged after 1920, lowering further wild horse populations. New demanders included chicken feed processors, and dog and cat food canners (Wyman 1945, p. 204).

Between 1926 and 1932 the development of a new industry, the processing of horses for human consumption contributed more to the reduction of wild horse populations than either the dog food industry or rendering plants. The meat was exported to Holland and the Scandinavian countries, the hides and hair went to Germany for mattresses, and the casings for sausage, and the other by-products were disposed of in the domestic market—ground bones and scraps for chicken feed, blood for fertilizer, and hooves, tails, and ears for glue (Wyman 1945, pp. 208-212).

Burros (*Equus asinus*) are native species of northeastern Africa. Records show that the burro was first domesticated as early as 3400 B.C. in Egypt and Mesopotamia. Burros were widely used as beasts of burden throughout North Africa, Mediterranean Europe, and southwestern Asia. They were introduced to the Americas in the sixteenth

century by the Spanish, and given their suitability to dry and rugged terrains they were used widely in what is now northern Mexico and the southwestern United States. Prospectors, miners, and sheepherders found them particularly useful, contributing to their rapid dispersal. With the advent of better roads, improved means of transportation, and the decline of the mining boom, the importance of burros as pack or draft animals faded and their “feralization” sped up (McKnight 1958, pp. 163-164).

The most significant problem associated with feral burros involves the competition they represent to other animals for food and water, which is aggravated by population increases of the burros given the nearly complete absence of predators. Burros are hardy competitors, “capable of assuming a role of dominance in determining the fate of the natural vegetation and most of the herbivorous animals in a given area” (McKnight 1958, p. 170). Burro populations have been reduced by shooting, poisoning, capturing, and accidental killing. Most of the campaigns to remove burros from the range were conducted by government personnel and ranchers. Burro meat was used in the Southwest for pet food and for feeding foxes and mink raised on fur farms. The majority of burro removals, however, were undertaken to improve grazing lands for livestock (McKnight 1958, pp. 170-173).

Evolution of the Wild Horse and Burro Program⁷

The first attempt to provide protection against the widespread harvesting of wild horses came from Velma Johnson, who, one day in 1950, saw a cattle truck full of injured

⁷ Appendix A provides a table with the main events that have shaped the structure of the WH&B program over time.

horses, wounded and bleeding. Sickened by the sight of the mutilated horses she decided to do something about it. Mrs. Johnson successfully lobbied for legislation to prohibit the use of aircraft and motor vehicles for the purpose of capturing and killing wild horses on public lands. In September 1959, Congress passed Public Law No. 86-234, known as the Wild Horse Annie Act of 1959. This legislation and the efforts of Velma Johnson, known as Wild Horse Annie, brought the situation of wild horses and burros to the public's attention. It failed, however, to establish a clear legal status for the wild horses, to provide a program for the management of these animals, and to protect wild horses due to the lack of enforcement of the legislation.

Following this new concern for the well-being of wild horses, the first refuge for wild horses was created in Nevada in December of 1962 by the Department of the Interior in cooperation with the Department of Defense. The refuge is located in the northwest corner of the Nellis Air Force Base practice range, northwest of Las Vegas. It initially covered 394,000 acres and had a population of 200 wild horses. A second refuge, the Pryor Mountain Wild Horse Range, was established in the Montana-Wyoming border on September 9, 1968. This refuge was established after the efforts of a small group of Lovell, Wyoming citizens banded together to seek protection for the herd were publicized, and public support for preserving the wild horses was voiced across America. The original wild horse range designation included approximately 33,600 acres and 200 wild horses (Thomas 1979, pp. 73-83).

The ongoing campaign of Velma Johnson to protect wild horses generated more mail to Congress in the late 1960s than any other issue at the time, except for the Vietnam

War. The protection for wild horses sought by Johnson was finally obtained in 1971 when Congress unanimously passed Public Law No. 92-195, the Wild Free-Roaming Horses and Burros Act. The WH&B Act authorized and directed the Secretary of the Interior and the Secretary of Agriculture to protect and manage wild free-roaming horses and burros in a manner designed to achieve and maintain a “thriving natural ecological balance” on the public lands. The Secretary of the Interior fulfills this legislative mandate through the BLM and the Secretary of Agriculture fulfills it through the Forest Service.⁸

The WH&B Act, as passed by Congress in 1971, provided three ways to control increasing WH&B populations: moving them to other locations where wild horses existed on the effective date of the WH&B Act; destroying them in a humane manner; or placing them in the care of private individuals under an agreement with the Federal Government. Animals placed with private parties were to remain the property of the U.S. Government for their lifetime.

Shortly after the implementation of the WH&B Act, problems with the management of wild horse and burro populations emerged. With protection afforded under the 1971 Act, wild horse and burro numbers rapidly increased. The rangelands deteriorated to the point that the animals were dying of starvation. To save the rangeland, the BLM began cutting back on the numbers of animals livestock operators were permitted to graze and, at the same time, the BLM started removing excess wild horses and burros. To dispose of the removed animals, the BLM came to rely on the third

⁸ The BLM is responsible for managing over 90 percent of the wild horses and burros on public lands. The Forest Service manages 2,200 wild horses and about 300 burros (2008 U.S. GAO report, p. 2).

alternative the WH&B Act provided: maintenance by private individuals. In 1973, the first animals were adopted. Twenty-three excess horses removed from the Pryor Mountain Wild Horse Range along the Wyoming-Montana border were placed in adoption. The next year, the BLM began an adoption program in Oregon, followed by one in Nevada in 1975. Favorable public response in these states led the BLM to launch a nationwide adoption program in the spring of 1976 (*Our Public Lands* 1980, p. 9).

In June 1974, the U.S. Senate held a hearing before the Committee on Interior and Insular Affairs to review the adequacy of the implementation and the administration of the WH&B Act of 1971. In the hearings, amendments were suggested to facilitate roundups and transfer of removed animals to individuals and organizations.

Consideration was also given to the feasibility and desirability of new ranges for horses as solutions to control growing horse populations and to protect competing species. These amendments were introduced in several bills during the period 1975-1976, but none of them became law.

In 1976, Public Law No. 94-579, known as the Federal Land Policy and Management Act, was enacted. This act directs the Secretary of Interior to manage the public lands under principles of multiple use and sustained yield and authorizes the Secretaries of the Interior and Agriculture to contract with private parties for the use of helicopters and motor vehicles to round up and transport wild horses. In response to concerns about increasing wild horse populations and the risk of over grazing rangelands, between 1976 and 1978 several bills were presented to the U.S. Congress to control wild

horse populations and to take actions directed towards improving the conditions of the rangeland.

With the enactment of Public Law No. 95-514 (the Public Rangeland Improvement Act), in October 1978, the Secretaries of the Interior and Agriculture were directed to determine the appropriate management levels to “achieve and maintain a thriving natural ecological balance and avoid deterioration of the range.” They were authorized to remove excess wild horses and burros by first destroying old, sick, and lame animals using the most humane methods possible; then humanely capturing and removing wild horses and burros for which an adoption demand existed for private maintenance and care; and then destroying any remaining excess wild horses and burros in the most humane and cost-efficient manner possible. This act mandates that no wild horse or burro or its remains may be sold or transferred for processing into a commercial product. Finally, it authorizes the Secretaries to grant title to wild horses and burros if the adopter has provided humane conditions, treatment, and care for a period of one year.

By 1979, to adopt a wild horse or burro, applicants paid a health fee between \$10 and \$20 to cover vaccination and examination expenses plus a handling and transportation fee of between \$80 and \$140 if the animals were sent to a distribution center (*Managing the Nation's Public Lands* 1980, p. 90). In January 1982, a new policy fee was implemented, establishing a fee of \$200 per wild horse and a fee of \$75 per wild burro, plus transportation costs (*Managing the Nation's Public Lands* 1982, p. 70). In addition, a moratorium on the destruction of healthy excess animals was established, which was made official in 1988 when Congress expressly prohibited the use of

appropriated funds to destroy healthy wild horses and burros (*Managing the Nation's Public Lands* 1988, p. 20). In March 4, 1983 the wild horse adoption fee was lowered to the current amount of \$125 per animal, the BLM's explanation for this was the decline in the number of animals demanded for adoption. In addition, a new provision was implemented, requiring the submission of a nonrefundable \$25 advance payment with the adoption application form to reduce costs and to limit applications to those who really intend to adopt a wild horse or burro (*Managing the Nation's Public Lands* 1983, p. 70).

From 1973 to 1984 the majority of horses removed from the federal range were adopted. In May 1984, an emergency rule was implemented to reduce the number of healthy unadoptable animals removed from the range. It gave the BLM's Director the authority to adjust or waive the adoption fees for animals unadopted at the standard minimum fees of \$125 per wild horse and \$75 per wild burro, when the transaction involved a minimum of hundred animals (*Managing the Nation's Public Lands* 1984, p. 33). Under this authority, the BLM placed about 20,000 wild horses with large-scale adopters. The program was terminated on September 1988, in response to widespread congressional and public criticism, because many of these horses were sold to slaughter houses, once the adopter received the certificate of title (US GAO 1990, pp. 29-32).

To improve the adoptability of older animals (three to six years old) and to increase the chances of long-term adoption success, in 1987, an inmate-wild horse training program was initiated at the Canon City, Colorado prison (*Managing the Nation's Public Lands* 1987, p. 22). By 1991, the BLM had cooperative agreements to provide training to wild horses between five and nine years old with three State

Departments of Corrections in California, Colorado, and Wyoming (*Managing the Nation's Public Lands* 1991, p. 17).⁹

Between 1979 and 1998 several hearings were held by different subcommittees in both the U.S. Senate and House of Representatives. The objectives of these hearings were to review the administration and effectiveness of the Adopt-A-Horse program, to amend the WH&B Act to authorize public sale of unadoptable excess animals and to increase the penalties for illegal sale or processing of wild horses and burros into commercial products. In addition, there was discussion of methods to decrease the population of wild horses and burros, and to improve the management of the WH&B program.

Increases in wild horse populations during the 1990s (see figure 1) and the effects of this overpopulation on watersheds and on the conditions of rangelands, resulted in a plan entitled "Restoration of Threatened Watersheds, Living Legends in Balance with the Land: A Strategy to Achieve Healthy Rangelands and Viable Herds" (henceforth referred as the "Fiscal Year 2001 Presidential Budget Initiative"), which was presented by the BLM to Congress in February 2000. This plan requested additional funding to meet removal targets to achieve nationwide AMLs by 2005. According to this plan a large number of animals would be removed in the early years (the proposed removal target for the first year was 12,855 animals) with a gradual decline over time to maintain the levels. In addition, the plan proposed a four year gather schedule for all HMAs, the

⁹ Wild horses younger than five years of age were not trained because they were deemed by BLM as adoptable.

elimination of age restrictions on removals, the expansion of training and gelding programs, and the promotion and marketing of animals and adoption events.

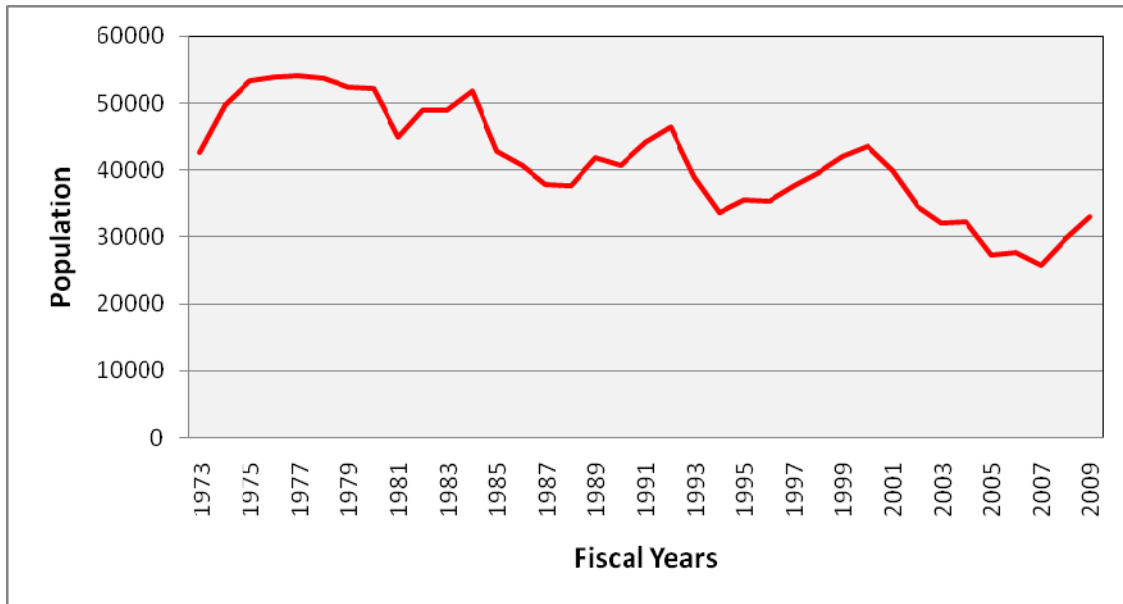


Figure 1. Wild Horse Populations over Time.

Source: Public Land Statistics (1973-2009).

The most recent amendment to the WH&B Act was in December 2004 through Public Law No. 108-447, which allows the BLM to sell excess wild horses and burros without limitation if the animal is more than ten years of age or has been offered unsuccessfully for adoption at least three times. Congress placed no limitations or restrictions on who can purchase these animals, and the BLM seeks offers through negotiated sales of groups of animals to organizations or individuals that can provide good homes for the animals. These animals are not sold at public auctions and the prices are determined on a case-by-case basis. Buyers can purchase any number of animals that are available for sale and they will become the buyer's private property upon purchase.

The Wild Horse and Burro Program Today

The WH&B Act requires the BLM to manage wild horses and burros in a manner designed to achieve and maintain a thriving natural ecological balance on the public lands (16 U.S.C. § 1333(a)). To accomplish this legislative mandate, the BLM develops and revises land use planning (LUP), where wild horse and burros are to be considered in the same manner as other resource values. In preparing a LUP, the BLM identifies Herd Areas—areas of the public lands recognized as habitat used by wild horses and burros at the time that the WH&B Act passed (1971), and Herd Management Areas defined as herd areas within which wild horses and burros can be maintained over the long term. For each HMA an appropriate management level is established, which corresponds to a population range within which adult wild horses and burros can be managed for the long term to maintain a thriving natural ecological balance and avoid deterioration of the range (*Wild Horses and Burros Management Handbook* 2010, pp. 7, 17).

The population range set as an AML is determined by (1) the number of acres within the resource planning area allocated for wild horse and burro management, and (2) the proportion of the available forage assigned to wild horses and burros among other species, such as livestock and wildlife; available forage is determined based on climatic data, utilization data, actual use data, and trend data. Additional factors considered in the determination of AMLs are census inventory of wild horses and burros, water resource

availability, herd health, and unique local conditions (US GAO 2008, pp.15-16 and 25-27).¹⁰

The main management tool the BLM uses to achieve an AML is to conduct “gathers” to remove excess animals from the range.¹¹ To remove excess animals from the range, the BLM employs private contractors, who typically use helicopters to guide the animals into temporary on-site corrals. Once the animals are gathered into the temporary corrals, the BLM selects the animals to be removed from the HMA based on age and which animals are more adoptable, as well as the sex ratio and age structure of the herd.¹² Animals that are not selected are released and returned to the open range. After being removed, wild horses and burros are taken to short-term holding facilities, where “they receive vaccinations and other treatment prior to either being adopted, sold, or sent to long-term holding facilities”, where they live out the remainder of their lives (US GAO 2008, p. 19).

The most common mechanism to dispose of removed animals is the maintenance of these animals by private individuals through the BLM’s Adopt-A-Horse or Burro

¹⁰ “Climate data measures the amount of precipitation within a specific area, in addition, temperature and wind data may be collected to evaluate the effect of climate on vegetation; utilization data measures the percent of forage consumed by livestock, wild horses and burros, wildlife, and insects during a specified period; actual use data is the number of grazing animals that used an area within a certain amount of time; and trend data measures the direction of change in ecological status or resources rating observed over time” (US GAO 2008, pp. 25-26).

¹¹ Other mechanisms to control wild horse and burro populations and achieve AMLs are the use of fertility control agents and euthanasia. Today, the BLM is making more extensive use of the immuno-contraceptive agent porcine zona pellucida (PZP) to control wild horse and burro populations on the range.

¹² This policy of selective removal was initiated by the BLM in 1992 and it only applies to wild horses (Instruction Memorandum No. 99-053, 1999). The current selective removal criteria mandates the removal of, first wild horses four years old and younger, then wild horses 11 to 19 years of age, and finally wild horses five to ten years old. In addition, a set of alternatives are considered to slow population growth rates and extend the gather cycle, such as fertility control, adjustments in the sex ratio in favor of males, a combination of fertility control and sex ratio adjustment, and management of selected HMAs for non-reproducing wild horses, which is accomplished by gelding all the stallions of the herd. (Instruction Memorandum No. 2010-135, 2010)

program. Individuals who want to adopt a wild horse or burro must fill out the application shown in Appendix B. Prospective adopters must be at least 18 years of age, maintain the animal in the United States or its territories until title is granted, have no criminal convictions for violations of the WH&B Act or for inhumane treatment of animals, have the ability to provide adequate facilities and equipment to properly transport and humanely care for a wild horse or burro, have adequate feed and water to meet the nutritional requirements of the animal, and have not expressed an intent to use the animal for commercial purposes (slaughter or any other inhumane use) after the passage of title (*Adoption of Wild Horses and Burros Handbook* 1998, pp. II-1, II-2).¹³

The Adopt-A-Horse or Burro program allows individuals to obtain title to up to four horses in a 12-month period for a standard minimum adoption fee of \$125 for each wild horse or burro. Most of the animals disposed under this program are adopted through competitive auctions.^{14,15} A wild horse or burro belongs to the Federal Government until the BLM issues a certificate of title. Adopters are under probation for

¹³ Since 1997, a clause prohibiting the sale of adopted wild horses and burros for commercial processing has been included as part of the adoption application due to a settlement agreement between the BLM and the Fund for Animals, which sought to decrease the number of animals sent to slaughter houses.

¹⁴ According to the *Adoption of Wild Horses and Burros Handbook* (1998), no adoption fee is charged for orphan foals and replacement animals, and the adoption fees can be reduced for wild horses or burros deemed as unadoptable when the BLM's Director considers that such action is in the public interest. The adoption fee, however, cannot be reduced below \$25 per animal.

¹⁵ On March 8, 1997, the BLM changed its regulations to offer wild horses and burros for adoption using the competitive bid process (Congressional Hearing 1998, 50). Today, almost all of the animals are adopted through competitive bids. However other methods are also used: (1) First Come, First Served, where a sign-up sheet is posted in a highly visible area of the adoption site and all potential adopters are processed on a first come, first served basis as their names occur on the sign-up sheet; (2) Application Approval Date, the BLM processes first those applications approved prior to the adoption event and once exhausted the applicant list, adopters are processed under the first come, first served method; and (3) Drawing to Establish Order of Selection, the names of all applicants present in the adoption event with pre-approved applications are drawn to establish the order of selection, once this list is exhausted, adopters are processed under the first come, first served mechanism (*Adoption of Wild Horses and Burros Handbook* 1998, p. III-6).

one year after adoption; during this period the BLM verifies that the animals adopted have received proper and humane care, and if this is the case the BLM will issue the certificate of title to the adopter. Upon receipt of the title, the animal becomes the adopter's private property and loses its status of wild free-roaming horse or burro.

The BLM has developed a set of programs to increase the number of animals adopted and to decrease holding and transportation costs.¹⁶ Generally, the programs used are: (1) Buddy Program, under this program qualified adopters who have adopted one or more animals for the standard minimum adoption fee at satellite adoption events can adopt one or more buddy animals for a \$25 per animal adoption fee. Only untrained wild horses not selected during the initial offering qualify as buddies. The adopter can select one buddy horse per full fee animal adopted, (2) Previous Adopter Reward Program, adopters who have titled an adopted animal are invited to special events or promotions where untrained four to ten year old wild horses are offered for an adoption fee as low as \$25 per animal, (3) Promotional Animal Program, untrained or trained wild horses and burros are offered at adoption fees as low as \$25 when the promotional animal will benefit an organization and generate positive recognition and increased visibility of the adoption program, (4) Special Circumstances, the standard minimum adoption fee is lowered when the animal has been offered unsuccessfully at two previous adoption events or the animal has disfiguring scars (Instruction Memorandum No. 2005-207, 2005), (5) Gelding Policy, all wild horse stallions removed from the range or born in wild horse corral facilities are gelded, however, if adopters prefer the animals as stallions a

¹⁶ The average cost per animal for removal has decreased from \$515 in 1991 to \$390 in 2004, and the long-term holding costs have gone from \$3.24 per animal per day in 1988 to \$1.25 per animal per day in 2004 (all values in 2004 dollars) (BLM Fiscal Year 2005 Budget Justifications, p. III-86).

\$50 voucher is issued to the adopter for taking an animal not gelded (Instruction Memorandum No. 2009-063, 2009).

In addition, the BLM started using the internet to dispose of wild horses and burros through adoptions. The first internet wild horse and burro adoption was announced on April 15, 1998 (Congressional Hearing 1998, p. 50). In these internet adoptions the public sees photos and brief descriptions of the animals offered for adoption, and makes bids during a pre-determined period of time. Adopters wishing to participate in this bidding process must submit applications, which have to be approved before the bidding starts.

Today, one of the biggest problems of the WH&B program is the increasing costs for the BLM to maintain animals in holding facilities. Figure 2 shows the changes in budget shares for seven cost items between fiscal year 2000 and fiscal year 2009. In addition, the amount spent in fiscal years 2000 and 2009 is shown for each cost item (in 2009 dollars).

During fiscal year 2000 the BLM spent \$12.26 million in holding costs (49.7 percent of the WH&B program budget) while by fiscal year 2009 this amount increased to \$35.51 million (67.9 percent of the WH&B program budget). This is one of the most important challenges that the BLM faces. It also has important long-run consequences given that the average life expectancy of a wild horse in captivity is 30 years and according to the BLM wild horses older than five years of age are deemed as unadoptable. Today, for each wild horse that is removed but not adopted or sold, the BLM spends \$475 per year to keep the animal in long-term holding. Consider a five-

year-old wild horse that is not disposed of through adoption or sale and with a life expectancy of 30 years in captivity, the agency will have to maintain this animal for 25 years, so the expected lifetime expenditure is \$11,875 per unadopted horse in long-term holding.¹⁷

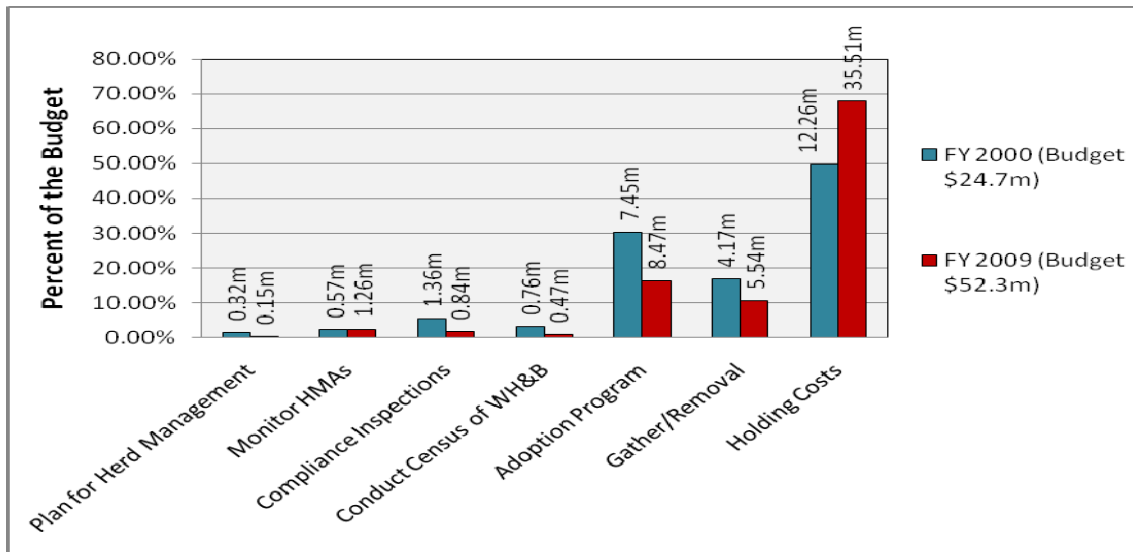


Figure 2. Changes in Budget Shares for Seven Cost Items in Fiscal Years 2000 and 2009.

Source: BLM Fiscal Years 2010 and 2011 Budget Justifications.

To reduce the number of animals held in long-term facilities, since December 2004 the BLM has a new method for disposing of excess animals: the negotiated sale of wild horses and burros more than ten years of age or of those that have been offered unsuccessfully for adoption at least three times. Under the new sale authority there were approximately 8,400 wild horses that became eligible for sale as of March 2004 (Gorey and Boddington, 2005). With this new disposal method, there is no longer a minimum

¹⁷ It is assumed in this calculation that the nominal increase in long-term holding costs equals the discount rate.

fee, or limitations on the number of animals that can be bought, or a probationary period of one year. Now buyers get title to the animals immediately upon purchase. Because buyers get title to the animals immediately, activists contend that more wild horses and burros are at risk of being sold to slaughter. In fact, less than two months after the first 1,000 wild horses were sold and delivered, 41 were slaughtered. On April 25, 2005 the BLM halted all transactions while it began considering additional safeguards to prevent animals from being destroyed (Walker 2005, p. 34). The new safeguards to prevent slaughter came with the creation of a new bill of sale shown in Appendix C, which states expressly that the purchaser agrees not to sell the animal(s) bought to any person or organization with an intention to resell, trade, or give away the animal(s) for processing into commercial products. Since 2005, the BLM has disposed of more than 4,000 wild horses and burros through this sale process.

CHAPTER 3

THE POLITICAL ECONOMY OF THE WILD
HORSE AND BURRO PROGRAM

This chapter presents insights into the political economy of the Wild Horse and Burro Program. Interest groups that influence the decisions made by the BLM with respect to the administration of this program are identified through testimonies given in several congressional hearings. In addition, a framework is outlined for a political economic analysis of the Wild Horse and Burro Program.

Congressional Hearings

Several congressional hearings have been held over the past half century to address aspects of the Wild Horse and Burro Program (WH&B Program). In these congressional hearings the views of numerous people have been expressed and different dimensions of the program have been reviewed. In the following pages, these testimonies are analyzed to determine the political economy factors that have led to current laws and structures, and how they might influence the future of the WH&B Program. The goals are to determine the causes for the implementation of the WH&B Act in 1971, to identify the positions of relevant interest groups (e.g., who gains and who loses with this program), and how these positions influence the decisions made by the BLM with respect to the management of the WH&B program, specifically the control of populations through gathers.

Hearings Held before the
Implementation of the WH&B Act

The first congressional hearing was held on July 15, 1959 before the Second Subcommittee of the Committee of the Judiciary of the House of Representatives. The purpose of this hearing was to consider a group of bills concerning the treatment of wild horses on public lands and the use of aircraft and motorized vehicles in the killing and capture of wild horses and burros on public lands. At this early stage, some people lobbied for the federal protection of wild horses and burros to cease the cruel and inhumane methods of slaughtering and to save these animals from extinction. Those in favor of the ban on the use of aircraft and motorized vehicles in the capture of wild horses and burros on public lands argued that prohibiting this comparatively easy method of capture would make it unprofitable for professional hunters to operate, either by themselves, for individual ranchers, or for the government. Among the supporters of this view were animal protection groups, conservation groups, and wildlife organizations. These groups also argued that federal agencies favor livestock grazing over wild horses and burros. Other organizations, such as the BLM, state wildlife agencies, and livestock associations, opposed the ban because it would be detrimental to an effective range management program and to the maintenance of big game herds. On September 1959, Congress passed Public Law No. 86-234 known as the Wild Horse Annie Act of 1959, which established criminal penalties for using aircraft or motor vehicles to hunt, capture, or kill wild horses and burros on public lands.

Before the passage of the WH&B Act, two other congressional hearings were held. These hearing were held before the Subcommittees on Public Lands of the

Committees on Interior and Insular Affairs of the House of Representatives on April 19-20, 1971 and of the Senate on April 20, 1971. In general, all witnesses shared the concern of the public for the protection of wild horses and burros and the need for proper management. There was disagreement, however, with respect to how to control and protect wild horse and burro populations. For example, the representatives from the Forest Service and from livestock associations argued that wild horses and burros had almost no economic value except for slaughter, and thus a ban on the use of these animals for commercial purposes would generate a disposal problem. Many animals would be removed from the range and only few would be disposed of, and the rest would have to be killed or maintained in other places at the expense of taxpayers. Pro-wild horse and burro groups and animal welfare organizations, however, advocated for a provision prohibiting the commercial use of these animals (e.g., slaughter, rodeo) as a means to discourage over-zealous control measures and to eliminate the potential for financial gain.

Wildlife organizations and State Fish and Game Commissions were concerned about the competition between big game species and wild horses and burros, and how the protection granted to wild horse and burro herds could increase their population and pose a threat for other species such as desert bighorn sheep, deer, and antelope. Livestock associations were concerned about the competition between cattle and wild horses and burros for forage and water. They feared that forage previously allocated to livestock would be allocated to wild horse and burro grazing after the implementation of the

WH&B Act. Finally, conservation groups supported the bills as a means necessary to provide protection to wild horses and burros.

Hearings Held During the 1970s after
the Implementation of the WH&B Act

Shortly after the implementation of the WH&B Act, the BLM and the Forest Service faced problems with the administration of the act as the first lawsuits were filed and as wild horse and burro populations increased. Several hearings were held, some to review the efforts of the agencies, and others to hear comments on proposals to amend the WH&B Act and provide federal agencies with the necessary tools to protect, manage, and control wild horse and burro populations.

On June 26, 1974, a congressional hearing was held before the Committee on Interior and Insular Affairs of the Senate in response to reports of a roundup of wild horses near Howe, Idaho in early 1973. This roundup caused numerous horses' deaths and resulted in a lawsuit by the American Horse Protection Association and the Humane Society against the BLM, the Forest Service, and a number of individual federal officials. The objective of the hearing was to review the adequacy of the implementation of the WH&B Act by the BLM and the Forest Service and the problems encountered by these agencies in the administration of the act. Representatives of the Department of the Interior and the BLM suggested amendments to facilitate roundups of excess wild horses and burros with aircraft or motor vehicles. These animals could then be sold or donated to individuals and organizations, and they would lose their status as free-roaming wild horses and burros upon sale or donation. Finally, the feasibility and desirability of new

ranges for wild horses was discussed by the members of the committee along with the Assistant Secretary of the Interior, representatives of the BLM and the Forest Service, and other people present at the hearing.

Between August 1975 and January 1976 hearings were held before the Subcommittee on Public Lands of the Committee on Interior and Insular Affairs of the House of Representatives. The objectives of these hearings were to hear from the BLM and the Forest Service whether the WH&B Act as enacted was practical and workable and to discuss and review a series of bills that proposed amendments to the WH&B Act. Two amendments were proposed. One amendment would authorize the use of aircraft and motorized vehicles to provide for the protection, management, and control of wild horses and burros. The second amendment would allow the Secretaries of the Interior and Agriculture to sell or donate captured excess wild horses and burros to individuals or organizations. Title to these animals would be transferred upon the sale or donation.

The Departments of the Interior and Agriculture as well as the BLM and the Forest Service supported the amendments. They argued that the law passed in 1971 was inadequate. The original private maintenance arrangements did not encourage people to accept the animals because the animals remained the property of the United States. Also, the 1971 legislation made it very difficult and expensive to gather excess animals by prohibiting the use of aircraft and motorized equipment. BLM and Forest Service representatives argued that the amendments would result in a more efficient and effective management of wild horse and burro herds, because the use of aircraft and mechanized vehicles would be of considerable assistance in conducting roundups. Further, if the

federal agencies were allowed to transfer title of excess animals to individuals or organizations upon sale or donation, more people would be interested in taking care of them. Livestock associations endorsed these amendments because they would provide the federal agencies with the right tools to cull wild horse and burro populations so ranchers would not have to face reductions in grazing allocations.

Other groups supporting the amendments were state fish and wildlife agencies, conservation groups, and wildlife organizations. In general, they were increasingly alarmed with the realization that under the 1971 legislation there was no control over wild horse and burro populations. This posed a serious threat to native habitats and native wildlife by creating greater competition between these species and wild horses and burros for water and forage.

Animal welfare organizations and wild horse and burro advocacy groups were opposed to the amendments because they would encourage removals of wild horses and burros so more forage would be made available to livestock and native wildlife. Further, the amendments would provide the opportunity for economic gain from the publicly owned horses and burros through the sale of the animals to slaughter houses. In addition, they argued that many rangeland improvements were made at the expense of wild horse and burro populations and that the proposed amendments could be used as an excuse to capture and remove more of these animals so livestock operators did not have to suffer reductions in grazing allocations.

The amendment that authorizes the Secretaries of the Interior and the Agriculture to use aircraft and motorized vehicles for the protection, management, and control of wild

horse and burro herds was incorporated in the Federal Land Policy and Management Act of 1976.¹⁸

On May 23, 1977 a hearing was held before the Subcommittee on Public Lands and Resources of the Committee on Energy and Natural Resources of the Senate to review problems with the WH&B Act. Representatives of the Department of the Interior, the Department of Agriculture, the BLM, and the Forest Service discussed the impacts of wild horses and burros on public land resources. They also discussed problems with the disposal of excess animals due to the limited demand for them, the costs of the Adopt-A-Horse program, and the costs of roundups and maintenance of unadopted animals.¹⁹ In addition, they argued for an amendment to the WH&B Act that would allow the Secretaries of the Interior and Agriculture to give ownership title to individuals who adopted a wild horse or burro.

Livestock representatives were concerned about increases in wild horse and burro populations and their effects on range resources and domestic livestock. They were also concerned with the increasingly high costs of roundups due to the requirements supported by wild horse and burro protection groups and proposed amendments to the WH&B Act, such as the transfer of title to adopters upon adoption. Livestock representatives also proposed that roundups not be considered a major federal action under the National Environmental Policy Act and that unadopted animals be offered for sale at auction.

¹⁸ Public Law No. 94-579, 90 Stat. 2775 (1976).

¹⁹ In 1977, the average cost to dispose of each animal was \$400. This figure includes \$200 per animal for removal costs, \$100 per animal for holding and feeding costs, and \$100 per animal to place it under private care. In 2009 dollars value, this average cost corresponds to \$1,416 (Senate Congressional Hearing 1977, pp. 103, 189).

Finally, representatives of wild horse and burro protection groups criticized the BLM data on wild horse and burro populations and its policy of removing these animals. They also complained about the management of wild horses and burros and how it favors livestock interests, and noted the lack of research on population dynamics, food habits, and the interaction between wild horses and burros, livestock, and wildlife species. None of the amendments proposed and discussed during this hearing became law.

In 1978, a hearing was held before the Subcommittee on Public Lands and Resources of the Committee on Energy and Natural Resources of the Senate with the objective of amending the Federal Land Policy Act of 1976 to improve range conditions on public grazing lands under the BLM's administration. Among the tools proposed to achieve this goal was an amendment to the WH&B Act to give title of ownership of the animals to the adopters after a one-year probationary period. By allowing adopters to obtain title to the animals adopted, more wild horses and burros would be adopted and excess animals could be removed from the range without generating large surpluses. These removals would reduce pressures on the rangelands for forage and water, allowing for improvements in range conditions. Representatives of the federal agencies involved in the administration of the WH&B program were in favor of the amendment but they asked for the elimination of the one-year probationary period. Livestock representatives and conservation groups supported the proposed amendment as a necessary tool to manage and dispose of excess animals. Wild horse and burro advocacy groups and animal welfare organizations opposed the amendment. They believed the BLM was not adequately monitoring adopters to make certain the animals were receiving a proper and

humane treatment. They argued that this amendment would result in further economic gain and increased abuse of wild horses and burros. Despite this opposition, the amendment was implemented by the Public Rangelands Improvement Act of 1978.²⁰

A hearing to review the administration and effectiveness of the Adopt-A-Horse program was held on April 24, 1979 before the Subcommittee on Government Efficiency and the District of Columbia of the Committee on Governmental Affairs of the Senate. This hearing was called in response to reports of animal abuse and of commercial profit being earned from wild horses and burros acquired through the WH&B Program. The BLM was accused of failing to enforce regulations designed to prevent such acts. The testimony of the BLM representative pointed to shortcomings in two areas: in roundups, holding practices and the conditions of animals in facilities prior to adoption; and in monitoring after adoptions. In addition, the measures taken by the BLM to solve these problems were highlighted. These included improvement of holding facilities, stricter requirements for screening and monitoring adopters, increased enforcement efforts and prosecution of offenders, and expanded research on wild horses and burros.

Livestock representatives emphasized that the only alternative to the adoption program for disposing of excess animals under current legislation was to destroy them in the most humane and cost-efficient manner. They supported the program, although it was expensive to gather wild horses and burros, maintain them in corrals, screen potential adopters, and monitor the animals after adoption. On the other hand, some wild horse and animal protection groups did not endorse the adoption program because the BLM did

²⁰ Public Law No. 95-514, 92 Stat. 1808 (1978).

not specify minimum standards of humane care for the holding, transporting, and maintenance of the animals. They felt the BLM also did a poor job of monitoring animals after adoption, and they argued that the BLM and the Forest Service should do minimal management because herds could self-regulate, and management practices were wasteful due to inadequate research. Representatives of wildlife protection organizations pointed out the importance of removing excess animals to bring the horse and burro populations into balance with the carrying capacity of the range, and they considered the adoption program to be a necessary tool to achieve this.

Hearings Held During the 1980s

Increases in wild horse and burro populations accompanied by decreases in the adoption demand for these animals (possibly due to the increase in adoption fees in January 1982), motivated the introduction of bills to amend the WH&B Act. To review the provisions of these bills and hear comments about them, congressional hearings were held.

On August 7, 1982, a hearing was held before the Subcommittee on Public Lands and Reserved Water of the Committee on Energy and Natural Resources of the Senate. The objective of the hearing was to review a bill that would amend the WH&B Act by authorizing the sale of excess wild horses and burros, which would lose the protection granted by the WH&B Act upon the sale. These sales would provide revenue for federal rangeland and related management programs. To prevent the animals sold through this process from being sent to slaughter, the bill proposed an increase in criminal penalties for illegal sale or processing of wild horses and burros into commercial products.

Testimonies of an unusual number of livestock representatives supporting the amendments were heard. According to their testimonies, they felt the BLM was subsidizing the adoption of wild horses and burros, because the costs to gather and prepare these animals for adoption were not compensated by the adoption fee paid. They argued this amendment was necessary to provide the federal agencies with a new tool to manage and control wild horse and burro herds. The Adopt-A-Horse program, it was argued, had proven to be incapable of disposing of all the animals that had to be removed from the public lands to avoid irreparable damage to the natural resource base, wildlife, the wild horses and burros, and to cattlemen that rely on use of the public lands for their livelihoods.

Animal and wild horse and burro protection groups were opposed this amendment arguing that it was unnecessary because increases in the numbers of unadopted animals were due to the substantial increase in the adoption fees (from \$20 plus transportation costs to \$200 per wild horse in 1982), which discouraged adoptions. They maintained that by lowering or changing the structure of the adoption fees (e.g., different fees for different animals) all excess animals would be disposed of. In addition, they were against the proposed bill because it would allow commercial exploitation of the animals disposed of through sales. Finally, they emphasized that ranchers were the most powerful and organized interest group arguing for the reduction or elimination of wild horse and burro herds, and that more dollars were spent on subsidies to the livestock, ranching, farming, and dairy industries than on the wild horse and burro adoption program. The bill discussed during this hearing did not become law.

In light of increased herd populations and decreased public demand for adoption of excess animals due to new adoption fees, a new bill was introduced in the U.S. Senate to authorize public sale of unadopted excess animals. Hearings were held before the Subcommittee on Public Lands and Reserved Water of the Committee on Energy and Natural Resources on March 19, 1983 and on April 11, 1983 to look into problems with the WH&B Program and to hear comments on this new bill. Support for the amendment of the WH&B Act was expressed by livestock organizations, wildlife groups, State Fish and Wildlife agencies, conservation groups, and by the BLM and the Forest Service. These groups, argued that the adoption program was not capable of disposing of all the excess animals, because the demand for these animals was insufficient due to the costs to adopters of taking care of these animals and the fact that some of these animals were not adoptable. In addition, they maintained that more removals were needed to reduce competition between wild horses and burros, native wildlife species, and domestic livestock for available forage and water. This would further increase the pool of animals to be disposed of by the BLM and the Forest Service.

Wild horse and burro protection organizations and animal welfare groups were against the bill because individuals would be able to profit from buying and selling these animals. These groups believed that with some improvements, such as better education and preparation of adopters, all the excess animals could be disposed of through the Adopt-A-Horse program, and the use of alternative methods to control wild horse and burro populations on the range would limit the number of animals to be removed. They argued that by supporting the amendment, livestock owners and other special interest

groups were serving their own self-interest, and thus their testimonies should be viewed in that light.

Hearings Held During the 1990s

A report issued by the GAO, in August 1990, exposed the shortcomings of the administration of the WH&B program. As a consequence, two hearings were held to examine the program, discuss its problems, and consider new mechanisms for the protection, management, and control of wild horses and burros.

On June 30, 1991, the Subcommittee on Department of the Interior and Related Agencies of the Committee on Appropriations of the Senate held a hearing to look at current federal policies for the protection, administration, and control of wild horse and burro herds. Testimony was offered by scientists, conservationists, policy makers, managers of the WH&B program, animal and wild horse and burro protection groups, and livestock representatives. During this hearing several issues were addressed. Common topics included overpopulation of wild horses and burros and its effects on the animals, public lands, wildlife species, and livestock; increasing costs to manage wild horses and burros in short-term facilities and in long-term sanctuaries; insufficient adoption demand to dispose of excess animals, and the need for alternative methods to control and dispose of wild horses and burros. Additional problems brought to light were the lack of data and the need for additional research so the agencies can make informed decisions, implementation of fertility control programs and how desirable such programs were to animal welfare groups, and the failure of the BLM to adequately justify removals and to complete environmental impact statements.

A field hearing before the Subcommittee on National Parks and Public Lands of the Committee on Resources of the House of Representatives was held on July 13, 1998. The objective of the hearing was to give environmentalists, federal, state and local government officials and concerned citizens the opportunity to discuss problems with the administration of the WH&B Act and to give people an occasion to present ideas for improving the management of the WH&B program. During this hearing the BLM's removal policy, the option to sell excess animals without limitation, the increasing costs and funding appropriations of the WH&B program, and the allocation of Animal Unit Months (AUMs) between wild horses and burros, livestock and wildlife species were discussed.

The representative of the BLM emphasized topics such as the use of the internet to increase public awareness of the adoption program, the increased research on fertility control, and the need to have sufficient financial resources to gather and adopt wild horses and burros and conduct additional research. Measures proposed by the Arizona Game and Fish Department were to improve inter-agency planning and management, evaluate all available methods for reducing wild horse and burro populations, exclude these animals from sensitive wildlife habitats, and increase funding for WH&B management.

The livestock representative recommended amending the WH&B Act to give the BLM authority to sell excess animals at auction and to gather animals to achieve appropriate management levels. He emphasized the fact that taxpayers subsidize the adoption program because the costs of removal, preparation and adoption of wild horses

and burros outweigh the adoption fees paid by adopters. Wild horse and burro advocacy groups responded that the BLM's removal policy was extinguishing wild horse and burro populations, and recommended that removals of these animals must be accompanied by an equivalent reduction in the number of grazing livestock. They proposed that the BLM make improvements in the marketing of wild horses and the screening of adopters. Finally, they opposed the sale authority as a device to dispose of wild horses and burros because it would increase the number of animals sent to slaughter.

Framework for a Political Economy Analysis of the WH&B Program

The discussion of the congressional hearings in the previous section suggests that by the time of the implementation of the WH&B Act in 1971, all potential interest groups—animal and wild horse and burro welfare groups, livestock industry, wildlife organizations, and environmental groups—agreed that wild horses and burros required protection and management. But, once protection was granted to wild horse and burro herds, their numbers started to increase and the agencies in charge of the administration of the WH&B Act found themselves in a dilemma: how could they protect wild horses and burros, while at the same time control their populations to protect the rangelands, as well as other species that share food and habitat with wild horses and burros? On one hand, animal welfare organizations and wild horse and burro advocacy groups sought protection for these animals with minimum management and intervention from the federal agencies. On the other hand, livestock groups, wildlife organizations, and wildlife agencies, saw the wild horses and burros as burdens on the public lands. These

groups sought a stringent management of wild horse and burro populations, so these animals could be controlled as wildlife and domestic livestock.²¹

Two main interest groups have been involved in the debates regarding the administration of the WH&B Act: livestock associations (particularly those holding permits to graze on public lands) and wild horse and burro advocacy groups (including animal rights groups). Two articles by Buckley and Buckley (1983a and 1983b) describe the opposing interests between these two groups, the arguments made and the lawsuits filed by these groups before courts, and the efforts of the BLM to reconcile both points of view in the administration of the WH&B program. These conflicting views and their impacts on the program have their origin in the WH&B Act itself due to the tension within section 1333(a), where the Secretaries are directed to “manage wild free-roaming horses and burros in a manner that is designed to achieve and maintain a thriving natural ecological balance on the public lands,” while at the same time keeping all management activities “at the minimal feasible level.”²² The tension originates with the wording of the first part of this rule, which has been interpreted as a mandate to the BLM to actively manage wild horse and burro populations and to use all available mechanisms to achieve an ecological balance. The second part of the rule, however, has been used by pro-wild horse and burro groups to keep the BLM’s management activities at a minimum, and this position has been argued before courts with positive results.

²¹ Wildlife populations are controlled through the sale of hunting tags, while the number of domestic livestock on public lands is controlled through the allocation of AUMs.

²² 16 U.S.C. § 1333(a).

Since the first years of the WH&B Act, both interest groups have generated substantial judicial and administrative activity that has shaped many of the managerial tools employed by the BLM in the administration of the WH&B program. Holders of grazing permits on public lands have complained of wild horses destroying water sources or appropriating them for their own use. They have also claimed that wild horses consume forage allocated for domestic livestock grazing, and have emphasized the necessity of keeping wild horse and burro herds under stringent control to prevent further damage to the range. Their legal actions have been directed at correcting or preventing these situations, requesting compensation, and forcing the BLM to remove wild horses from certain areas.

Wild horse and burro advocacy groups have frequently criticized the BLM's policies with respect to the numbers of animals removed from the range, the necessity of removals, and the methods employed by the BLM to count wild horses and burros and to set AMLs. They have complained about how the BLM seems to favor livestock interests when making decisions about improvements in the rangelands. Their legal actions have sought to halt removals, challenge AMLs and population estimates, and request accurate data to implement roundups and file environmental impact statements, as well as to consider methods other than removals of wild horses and burros to improve rangeland conditions.²³

The BLM's management of the WH&B program has been openly criticized by both livestock organizations and wild horse and burro advocacy groups. This is likely

²³ For a more complete and detailed analysis of the judicial and administrative activity generated around the WH&B program, see Iroala (2005), Buckley and Buckley (1983a), and Buckley and Buckley (1983b).

because any decision made by the BLM affects wild horse and burro populations, or domestic livestock grazing on public lands, or both given the considerable overlaps existing in habitat and food between wild horses and burros and livestock. Studies on food habits and dietary overlap between wild horses and cattle in the Wyoming Red Desert show that wild horses and cattle have diet overlaps of 69 percent during the fall, 61 percent in the summer, 28 percent during the spring, and 21 percent during the winter. Moreover, a positive and significant correlation coefficient between wild horses and cattle diets of 0.64 suggests that these animals eat similar plant species (Olsen and Hansen 1977, pp. 18-19).²⁴ In a more recent study by Krysl et al. (1984), it was found that wild horses and cattle have dietary overlaps of 71-73 percent during summer, and 80-88 percent during winter (p. 75). Finally, Miller (1983) found that cattle and feral horse habitat use patterns reflect three needs: food, water, and cover. According to this author when cattle, pronghorn antelope, and feral horses concentrate on the same water resources, direct competition for water is observed and his findings also suggest direct competition for forage in the fall (pp.197-198).

Similar results were found by Hansen, Clark, and Lawhorn (1977) in the Douglas Mountain Area, Colorado, where a strong and positive correlation between cattle and wild horse diets was found; and by Hubbard and Hansen (1976) in the Colorado Piceance Basin, where food eaten by wild horses and cattle was significantly and positively correlated within each vegetation zone considered. The substantial degree of dietary overlap between feral horses and cattle found in these studies indicates a strong potential

²⁴ Dietary overlap according to Olsen and Hansen (1977) corresponds to the similarity of diets, which can be measured by a similarity index that represents the percentage of two diets that was identical.

for dietary competition between these animals. McInnis and Vavra (1987) found that wild horses and cattle have an average dietary overlap of 70 percent on an annual basis in Southeastern Oregon. They concluded, however, that this is not sufficient evidence to determine the existence of competition between the two species.

The information provided in this section suggests that wild horse and burro advocacy groups and livestock organizations are the main interest groups involved in the debates and discussions over the administration of the WH&B program. During the 1970s, animal rights groups and wild horse and burro organizations disapproved of the methods employed by the BLM to round up excess animals and the data used to justify such removals. These groups were particularly concerned about the policies implemented by the BLM to improve rangeland conditions because the preferred tool to achieve their objective was reductions in wild horse and burro populations without consideration of alternative methods (e.g., reductions in the number of AUMs allocated for livestock grazing). During the 1980s, these groups censured the BLM's fee waiver and massive adoption programs, because they led to the abuse and slaughter of large numbers of wild horses. In the 1990s, the same issues continued to be the focus of discussions. In addition, the lack of enforcement of private maintenance and care agreements and of post-adoption monitoring of the conditions under which wild horses and burros are kept by the adopters were emphasized.

Today, many wild horse and burro advocacy groups claim that wild horse and burro populations are reduced, so more forage can be allocated (i.e., AUMs) to domestic

livestock grazing.²⁵ Figure 3 shows forage allocation from 1985 to 2009 for domestic livestock and wild horses and burros. Contrary to the claims of wild horse and burro advocacy groups, AUMs used for livestock grazing have been decreasing over time, with a sharp decline between 1998 and 2003, a moderate recovery between 2003 and 2006, and a stable usage from 2006 to 2009. Over this period, the number of AUMs used by wild horses and burros has been relatively stable. A decline in the use of AUMs by wild horses and burros is observed starting in 2002 due to the implementation by the BLM of an aggressive plan to bring wild horse and burro populations close to the AMLs or authorized forage allocations.²⁶

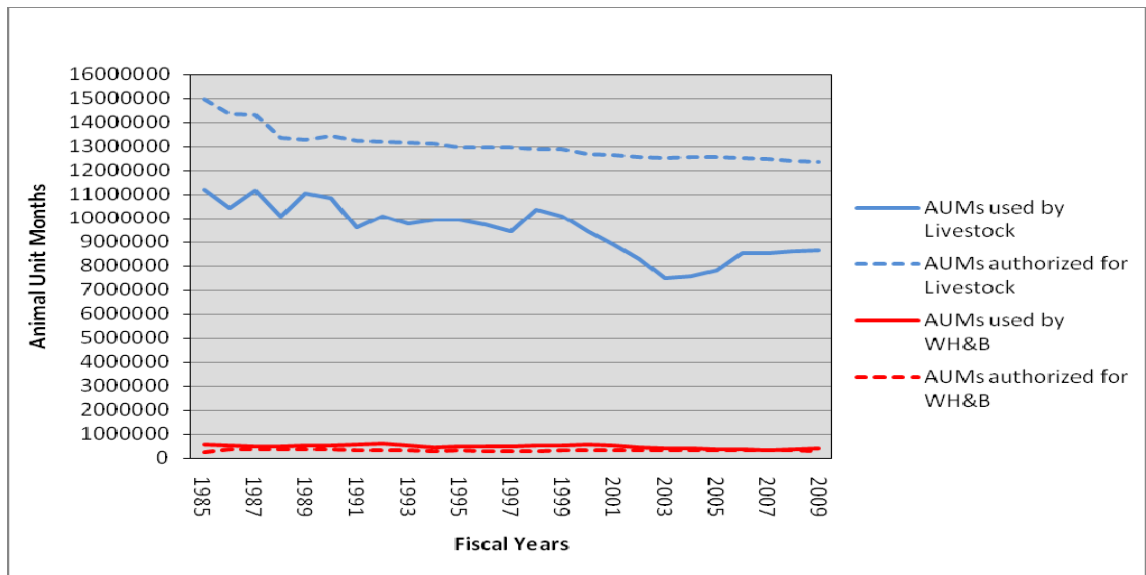


Figure 3. Forage Allocations between Livestock and Wild Horses and Burros.

Source: Public Land Statistics 1985-2009 and the BLM's Information System.

²⁵ See: American Wild Horse Preservation Campaign (2010), Dorell (2010), Mullen (2010), Animal Welfare Council (2007), and Nieves (2002).

²⁶ A correlation coefficient of 0.704 was estimated between AUMs used by livestock and AUMs used by wild horses and burros, and a correlation coefficient of 0.146 was estimated between AUMs authorized for livestock and AUMs authorized for wild horses and burros. The positive correlation coefficient implies that an increase in the number of AUMs authorized for livestock does not reduce the number of AUMs allocated for wild horses and burros grazing.

In June 2003, the state of Wyoming threatened to sue the BLM because the agency failed to keep wild horse populations at the AMLs set for the state. As a consequence, the state of Wyoming, the United States Department of Interior, and the BLM negotiated a consent decree, which was accepted by a U.S. district court judge on August 13, 2003. According to this agreement, by no later than December 2003, the BLM was to remove all excess wild horses from half of Wyoming's HMAs, and by no later than December 2004, the BLM was to remove all wild horses in excess of the AMLs from the other half of Wyoming's HMAs. For a period of ten years after the entry of the decree, if the BLM determines that wild horse populations will exceed the AMLs in the following fiscal year, the BLM is directed to remove the excess animals by December 15 of the year of the next budget cycle. A representative of The Fund for Animals, a wild horse protection group, considered the agreement as "another example of the BLM bending over backwards to appease the state's unreasonable demands that are made at the behest of ranching interest" (Luckett and Monoson, 2003).

This thesis considers livestock organizations and wild horse and burro advocacy groups as the main interest groups influencing the decisions made by the BLM with respect to the administration of the WH&B program. In the next chapter the political economy analysis is developed, and several explanatory variables are used to test the influence of these two interest groups on the BLM's decisions of whether to conduct a gather and how many animals to remove. The political economy analysis is based on the following null and alternative hypotheses:

Null Hypothesis: BLM's decisions of whether to conduct a gather and how many animals to remove are based on the legislative mandate of the WH&B Act (remove wild horses and burros that exceed AMLs).

Alternative Hypothesis: BLM's decisions of whether to conduct a gather and how many animals to remove are influenced by interest groups.

According to the alternative hypothesis, the following predictions are anticipated:

- (1) Where the overlap between grazing allotments and HMAs is greater, more pressure from holders of grazing leases and permits will be observed. As a result, more wild horses and burros will be removed and the probability of a gather being conducted will be greater.
- (2) Where the number of AUMs allocated to holders of permits and leases to graze their livestock is larger, more wild horses and burros will be removed to free forage to be made available for livestock.
- (3) Where a lawsuit is filed by a pro-wild horse and burro advocacy group, fewer wild horses and burros will be removed and the probability of a gather will be lower if the injunction requested by the group is granted by the court.
- (4) Where the concentration of people affiliated with wild horse and burro advocacy groups is higher, more pressure against wild horse and burro removals will be observed, and thus the number of animals removed will be fewer.

CHAPTER 4

POLITICAL ECONOMY ANALYSIS

Using the discussion and information provided in the previous chapter, a political economy analysis is developed in this chapter. In the first section, the empirical models are outlined, one at the state level and other at the HMA level, the state political economy model and the HMA political economy model. In the second section the data used in both political analyses are described. Finally, the results obtained using the different models are presented.

Empirical Models

The objective of this analysis is to identify whether interest groups have influence on the management of the WH&B program and if they do, to estimate those effects. In chapter 3, two main interest groups were identified: livestock organizations and wild horse and burro advocacy groups. The political economy analysis focuses on estimating the potentially important and disparate influence of these two groups. Two variables are used to estimate the effect of livestock associations on the management of wild horses and burros; the first is the number of authorized AUMs by state for livestock grazing, which is included in the state political economy model. The second variable is the number of grazing allotments that overlap each particular HMA, which is used in the HMA political economy model. Two variables are also used to test the influence of pro-wild horse and burro groups: Sierra Club membership in the state political analysis, and

in the HMA political analysis a binary variable that equals one when one of these groups filed a lawsuit to challenge a gather of wild horses and burros.

Analyses at both the state and HMA levels are conducted due to considerations of data. For example, the number of authorized AUMs for livestock grazing is reported only by state over time, and thus the AUM measure can only be included in regressions at the state level. The number of grazing allotments overlapping an HMA can be obtained at the state level, however, when these figures are aggregated to the state level, much of the variability is lost and the significance of the variable is weakened. Another constraint imposed by the data is with respect to information about the number of animals removed, which can be obtained at the state level for fiscal years 1992 through 2009. At the HMA level, however, data on the number of animals removed are only available for the years 2000 through 2009. Finally, data on whether a gather was conducted by the BLM is only available at the HMA level.

State Political Economy Model

With this analysis, whether interest groups influence the decisions made by the BLM is tested, specifically with respect to the number of animals removed from the rangelands. To test whether livestock organizations and wild horse and burro advocacy groups affect the number of animals to be removed by the BLM, the following empirical specification is used:

$$\begin{aligned} \text{Animals Removed}_{it} = & \beta_0 + \beta_1 * \text{Authorized AUM}_{it} + \beta_2 * \text{Excess Animals}_{it} + \\ & \beta_3 * \text{Sierra Club Membership}_{it} + \beta_4 * \text{WY Consent Decree}_{it} + \\ & \beta_5 * \text{Excess Animals} * \text{WYCD}_{it} + \beta_6 * \text{LCV House}_{it} + \beta_7 * \text{LCV Senate}_{it} + \varepsilon_{it} \end{aligned}$$

Where,

i = state (AZ, CA, CO, ID, MT, NV, NM, OR, UT, WY)

t = year (1992-2008)

The dependent variable *Animals Removed_{it}* measures the total number of wild horses and burros that were removed from the range in state i during year t and varies from a minimum of 0 to a maximum of 6,701. The variable *Authorized AUM_{it}* corresponds to the total number of authorized Animal Unit Months (AUMs) allocated for domestic livestock grazing by the BLM in state i during year t . This variable is a measure of the possible influence of federal grazing permit and lease holders on the management and control of wild horse and burro populations. The expected sign for the coefficient on this variable is positive. An increase in the number of authorized AUMs is predicted to lead to more removals because fewer AUMs are available for wild horse and burro herds.

The variable *Excess Animals_{it}* is a measure of the difference between the actual estimated population of wild horses and burros and the appropriate management level in state i during year t . The estimated coefficient for this variable is expected to be positive, because according to Public Law 92-195 appropriate management levels are to be achieved by the removal or destruction of excess animals (i.e., wild horse and burro populations in excess of the appropriate management level). Thus, the more excess animals there are, the more animals are expected to be removed.

The variable *Sierra Club Membership_{it}* corresponds to Sierra Club Membership per thousand inhabitants in state i during year t .²⁷ The Sierra Club membership is used as

²⁷ Efforts were made to collect membership information from WH&B advocacy groups. Such information was not available for a period long enough to allow a meaningful econometric analysis. Information was

an indicator of the potential influence of pro-WH&B groups. The Sierra Club was represented in the hearings held prior to the enactment of the WH&B Act, where its president expressed support for the protection of wild horses and burros. In recent years, however, the Sierra Club has expressed concern about the health of the rangelands and wildlife populations; which are threatened by overpopulations of wild horses and burros. The effect of this variable is therefore ambiguous, so no prediction is made with respect of the algebraic sign of its estimated coefficient.

WY Consent Decree_{it} is a binary variable that is assigned a value of one for the state of Wyoming after the year 2003 to control for the consent decree signed by the state of Wyoming, the Department of the Interior, and the BLM in August 2003. Under this consent decree, the BLM is mandated to remove wild horses from HMAs in Wyoming whenever it is determined there is an excess of animals.²⁸ The sign of the coefficient on this variable is expected to be positive, because it is likely that after the consent decree more wild horses were removed in Wyoming by the BLM to comply with the terms of the agreement.

The variable *Excess Animals*WYCD_{it}* is an interaction term between the variables *Excess Animals* and *WY Consent Decree* for state *i* and year *t*. By introducing this variable, the effects of a Consent Decree on the number of animals removed can be estimated inside and outside of Wyoming. It is expected that if the consent decree works

requested from four WH&B advocacy groups. Two responded: the National Wild Horse Association and the American Mustang & Burro Association, Inc. The first association provided membership data for the years 2006-2010, but only five of the western states have members that belong to this association. The second association could not provide membership data because they lost the records.

²⁸ More details regarding this consent decree can be found near the end of chapter 3.

in Wyoming, the number of animals removed will be very close to the number of animals in excess of AMLs, thus an estimated coefficient close to one and positive is expected.

The League of Conservation Voters (LCV) produces the National Environmental Scorecard, which provides information on how members of Congress vote on environmental issues. The scores are based on the votes cast by congressional members with respect to key environmental issues, such as energy, global warming, environmental health and safety protection, public lands and wildlife conservation, and spending on environmental programs. The scores are reported in terms of percentages, where a score close to 100 percent indicates high concerns about environmental issues.

The variables $LCV\ House_{it}$ and $LCV\ Senate_{it}$ correspond to the average state LCV scores reported for the Representatives and Senators for each state i in year t .²⁹ These variables provide a measure of the priority that the ten western states in the sample give to environmental issues. The estimated coefficients on these variables provide an indication of whether (and how) these views affect the number of wild horses and burros removed from public lands within their borders. An increase in a state's average LCV scores could result in more animals being removed if the high score of congressional members from Western states reflects the high priority that those states placed on issues such as the conservation of public lands and wildlife. It is not clear, however, that a high average LCV score reflects a priority on the conservation of public lands and wildlife over the conservation of wild horse and burro populations, therefore the sign for the estimated coefficients on these variables is ambiguous.

²⁹ The correlation between House and Senate LCV scores is 0.59. This suggests that patterns of environmental voting differ across the House and Senate, therefore separate effects are estimated for the two LCV scores.

HMA Political Economy Model

The primary purpose of this analysis is to test whether interest groups (livestock organizations and wild horse and burro advocacy groups) influence the BLM's decisions of whether to conduct a gather of excess wild horses and burros and how many animals to remove. The following empirical models are used to examine this issue:

- $$(1) \quad Gather_{it} = \beta_0 + \beta_1 * Overlap_i + \beta_2 * Excess\ Animals_{it} + \beta_3 * Lawsuits_{it} + \beta_4 * Lag\ Lawsuits_{it} + \epsilon_{it}$$
- $$(2) \quad Animals\ Removed_{it} = \beta_0 + \beta_1 * Overlap_i + \beta_2 * Excess\ Animals_{it} + \beta_3 * Lawsuits_{it} + \beta_4 * Lag\ Lawsuits_{it} + \epsilon_{it}$$

Where,

i = HMA (197 in the sample)

t = year (2004-2008)

The dependent variable $Gather_{it}$, used in specification (1), is a binary variable equal to one if a gather was conducted in HMA i during year t and zero otherwise. The dependent variable $Animals\ Removed_{it}$, used in specification (2), corresponds to the number of animals removed in HMA i during year t . Both specifications share the same explanatory variables and their effects are expected to be the same for both types of decisions tested, so they are described jointly in the following paragraphs.

The variable $Overlap_i$ corresponds to the total number of grazing allotments that overlap HMA i in the year 2006. This variable does not vary over the time period analyzed.³⁰ The variable is used in the analysis, however, because it is reasonable to assume that the level of overlap between grazing allotments and an HMA does not

³⁰ The BLM only reports the size and location of grazing allotments at one point in time. In this case, the information used in the analysis was reported as of October 2006.

change considerably over time. The expected sign for this coefficient is positive, indicating that the more grazing allotments that overlap an HMA the higher the probability of a gather and the larger the number of animals removed, because more holders of grazing allotments permits would put pressure on the local BLM office to keep wild horses and burros under control.

The variable *Excess Animals_{it}* is the difference between the estimated population of wild horses and burros and the appropriate management level in HMA *i* during year *t*. The estimated coefficient on this variable is expected to be positive, because according to Public Law 92-195 appropriate management levels should be achieved by the removal or destruction of excess animals (i.e., wild horse and burro populations in excess of the appropriate management level). Thus, more excess animals raises the probability of the BLM implementing a gather on the particular HMA and also is predicted to increase the number of animals removed.

The variable *Lawsuits_{it}* is a binary variable equal to one if pro-WH&B groups filed a lawsuit to challenge the removal of wild horses and burros from HMA *i* during year *t*, and zero otherwise. Only three lawsuits were filed during the time period covered by this analysis. When the lawsuit is filed, the plaintiff can request an injunction, which suspends the BLM's proposed gather if it is granted by the court. The sign of the estimated coefficient is predicted to be negative, indicating that a lawsuit lowers the probability of having a gather and the number of animals removed in the year it is filed.

Finally, the variable *Lag Lawsuits_{it}* is a binary variable that corresponds to the variable *Lawsuits* lagged by one year. By including this variable, the effects of a lawsuit

on the probability of future gathers can be estimated. The sign for the estimate on this variable cannot be anticipated, because the effect of a lawsuit on future gathers will depend on the outcome of the trial and on the response of the BLM with respect to the lawsuit. For example, if the BLM suspends or postpones a gather as a consequence of a lawsuit filed by a pro-wild horse and burro groups, the probability of conducting a gather next year will be higher and the number of animals to remove the following year will be larger. Alternatively, if the outcome of the trial is against the BLM, and as a consequence, conducting a gather becomes more difficult or more costly, then a lawsuit will lower the probability of future gather and fewer animals will be removed.

Data

The data for the political economy analysis were primarily obtained from the BLM. At the state level, the annual information collected and obtained from the BLM includes data on wild horse and burro populations, AMLs for wild horses and burros, number of authorized AUMs, and number of used AUMs. Membership to the Sierra Club was obtained from the Sierra Club, and human population for the ten western states that manage wild horses and burros (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, and Wyoming) for the period 1992-2008 was collected from the U.S. Census Bureau.

The annual number of wild horses and burros removed as well as the number of authorized AUMs for domestic livestock grazing were obtained from volumes of the Public Land Statistics. Wild horse and burro populations and AMLs were gathered from

the BLM's Information System. Information about the terms of the consent decree signed by the state of Wyoming, the Department of the Interior, and the BLM was obtained from the web page of the Sweetwater County Conservation District.³¹ Summary statistics for the variables used in the analysis are displayed in table 1.

Table 1. Summary Statistics for the State Political Economy Model.

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Total Removed	170	897	1,495	0	6,701
Authorized AUM	170	1,277,902	595,684	310,189	2,461,921
Excess Animals	170	1,337	2,502	-608	17,132
Sierra Club Membership	170	2.646	1.258	1.141	6.098
WY Consent Decree	170	0.029	0.169	0	1
Excess Animals* WYCD	170	9	73	-286	656
LCV House	170	33	23	0	85
LCV Senate	170	34	31	0	100
Total WH&B population	170	4,095	6,264	32	34,677
Total AML	170	2,758	4,073	50	17,545

At the herd management area level, annual information was gathered on wild horse and burro populations, AMLs, the number of gathers that took place each year in each of the 197 HMAs included in the sample during the years 2004-2008, and the number of animals removed in each gather. This information was obtained from the BLM's Information System. Data were also collected on the number of grazing allotments that overlap each one of these 197 HMAs in the year 2006 according to the BLM's Geocommunicator. Figure 4 presents a map that shows the level of overlap

³¹ The consent decree document is available online at: http://www.swccd.us/images/BB.consent_decree.pdf Last accessed 18 November 2010.

between grazing allotments and HMAs. It is observed that a significant level of overlap exists between HMAs and grazing allotments. In fact, out of the 197 HMAs in the sample, 194 are completely overlapped by one or more grazing allotments.

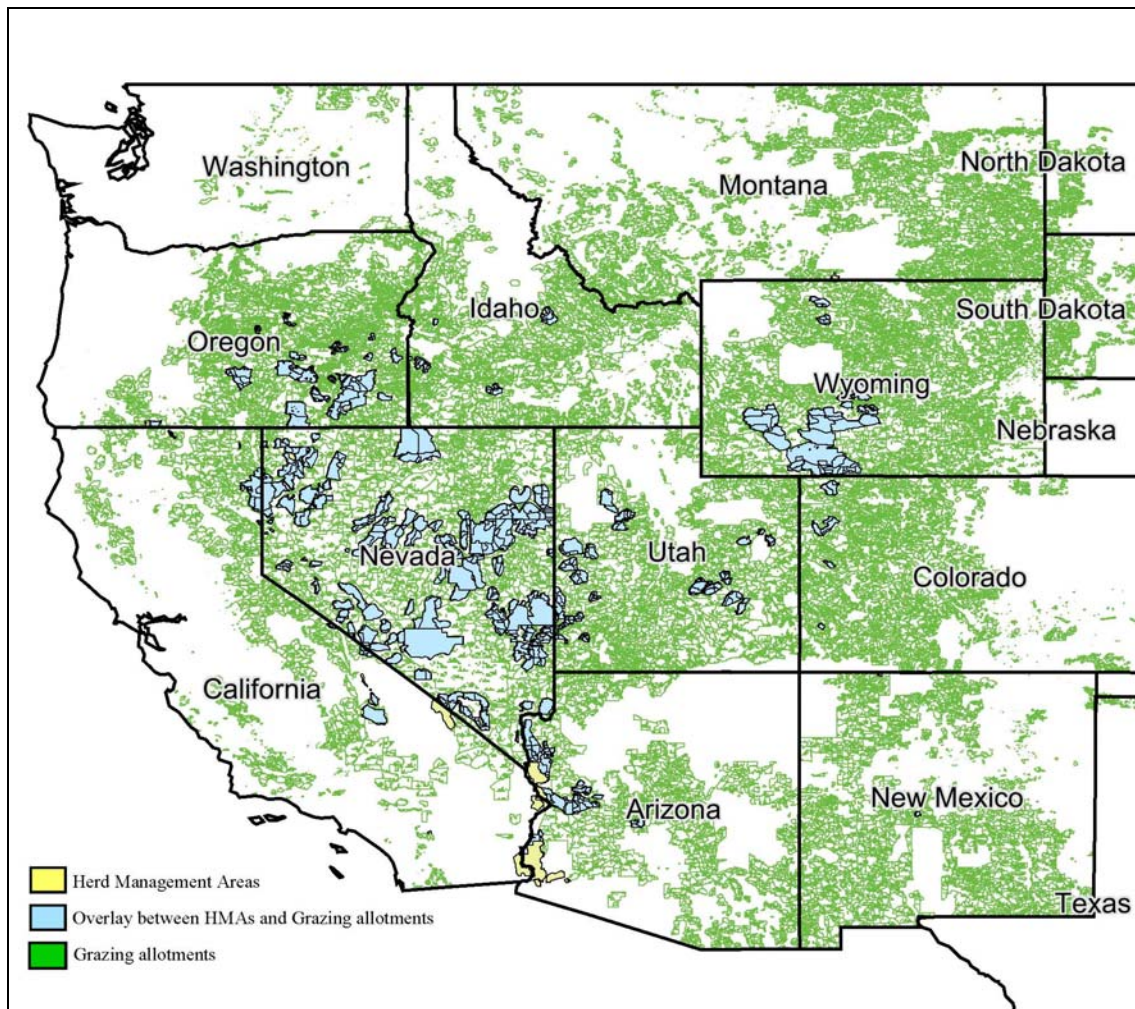


Figure 4. Overlap between HMAs and Grazing Allotments.

Finally, data on the number of lawsuits filed by pro-WH&B groups to halt gathers of wild horses and burros were collected by using LexisNexis Academic news and legal cases searches. Only three lawsuits were found for the time frame covered by this analysis. The first lawsuit was filed by the Cloud Foundation in 2006 and involved the

Pryor Mountain Wild Horse Range, an HMA located in Montana. This lawsuit objected to the BLM's finding of an overpopulation of wild horses in the HMA, the BLM's decision to use the immuno-contraceptive agent porcine zona pellucida (PZP) for fertility control on wild horses, and the finding of no significant impact in its use. The second lawsuit was filed by America's Wild Horse Advocates in 2006 and concerned three HMAs located in Nevada: Johnnie, Red Rock, and Wheeler Pass. The objective of the lawsuit was to stop a plan to gather wild horses and burros from these three HMAs mentioned. The third lawsuit was filed by several pro-WH&B groups in 2008 involving the Piceance-East Douglas HMA located in Colorado. The lawsuit sought the implementation of a restraining order to prevent the removal of wild horses from this HMA. Summary statistics for the variables used in this analysis are presented in table 2.

Table 2. Summary Statistics for the HMA Political Economy Model.

Variables	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Gather	997	0.23771	0.42590	0	1
Animals Removed	997	40	123	0	1,235
Overlap	997	10	9	0	62
Excess Animals	997	13	113	-578	770
Lawsuits	997	0.00502	0.07067	0	1
Lag Lawsuit	997	0.00401	0.06325	0	1
Total AML	997	143	151	0	1,000
Total WH&B population	997	156	178	0	1,484

Although the analysis at the HMA-year level includes 197 HMAs and five years, the number of observations is 997 because more than one gather event was recorded for some HMAs located in Arizona, Oregon, and Wyoming during fiscal years 2004, 2006, and 2008. These additional gathers added twelve observations to the analysis.

Results

The results obtained for the different regression specifications estimated at the state and at the HMA level according to the framework outlined in section one above are presented in this section.

State Political Economy Model Results

The sample used to test the influence of interest groups on the BLM's decision of how many animals to remove consists of 170 annual observations on wild horses and burros removed between 1992 and 2008 in the ten western states. The results obtained are presented in table 3.

Table 3 columns (1) through (4) show the results of the ordinary least squares regression. A Breusch-Pagan test was conducted to check for the presence of heteroskedasticity. A chi-squared statistic of 159.76 and a p-value of 0.0000 reject the null hypothesis of homoskedasticity. Thus, all ordinary least square regressions are run using the Huber/White estimator of variance. When fixed effects are used, Arizona is the base state, and year 1992 is the base year. Year and state fixed effects are jointly significant at the 0.01 level, therefore the interpretation of the results offered below is based on the results reported in column (4) of table 3.

Table 3. State Political Economy Model Results.

VARIABLES	Ordinary Least Squares			
	(1)	(2)	(3)	(4)
	Animals Removed	Animals Removed	Animals Removed	Animals Removed
Constant	-826.760*** (248.056)	-435.179 (1,210.314)	-1,162.100*** (332.920)	-929.216 (1,506.211)
Authorized AUM	0.001*** (0.000)	0.001 (0.002)	0.001*** (0.000)	0.002 (0.002)
Excess Animals	0.329*** (0.084)	-0.039 (0.063)	0.359*** (0.083)	-0.064 (0.060)
Sierra Club Membership	-87.082 (86.870)	149.673*** (56.346)	-264.641** (114.623)	13.769 (54.029)
WY Consent Decree	598.811*** (223.643)	-113.079 (277.954)	806.767*** (224.230)	164.141 (239.976)
Excess Animals* WYCD	1.157*** (0.201)	1.308*** (0.180)	0.306 (0.373)	0.945*** (0.182)
LCV House	7.250* (3.945)	-2.877 (3.190)	14.405*** (5.220)	-1.481 (3.289)
LCV Senate	9.004** (4.258)	2.216 (2.698)	8.530** (4.133)	7.518** (2.958)
State Fixed Effects	NO	YES	NO	YES
F-statistic	—	26.03	—	25.85
P-value	—	0.0000	—	0.0000
Year Fixed Effects	NO	NO	YES	YES
F-statistic	—	—	2.15	2.28
P-value	—	—	0.0090	0.0055
Observations	170	170	170	170
R-squared	0.644	0.905	0.711	0.923

Notes: Robust standard errors in parentheses. *, **, and *** denote estimates are statistically significant at the 0.10, 0.05, and 0.01 levels, respectively.

Most of the explanatory power of the model is due to the state fixed effects. This suggests that there is something happening at the state level that determines the number

of animals removed, for example budgets constraints or environmental conditions (e.g., droughts, fires).

The estimate for the variable *Authorized AUM* is not statistically significant at conventional levels. This may be due to the fact that *Authorized AUM* is not a good proxy for the effects of grazing permit holders on the decision of how many animals to remove, or it may simply indicate that this interest group does not influence the BLM's decision of how many animals to remove. Neither of the estimated coefficients on *Excess Animals* and *WY Consent Decree* is individually statistically significant. However, the estimated coefficient on the interaction variable (*Excess Animals*WYCD*) is statistically significant at the 0.01 level. The estimate is close to one, which indicates that in the state of Wyoming there is a close association between the number of animals in excess of AMLs and the number of animals removed from the range.

The estimated coefficient on the variable *Sierra Club Membership* is not statistically different from zero at conventional levels. This indicates that the Sierra Club as a pro-wild horse and burro group or as group against the protection and preservation of these animals does not influence the BLM's decision of how many animals to remove from the range.

The estimated coefficient for *LCV House* is not statistically significant different from zero at conventional levels. The estimate on the variable *LCV Senate*, however, is statistically significant at the 0.05 level and indicates that a one standard deviation (31 percentage points) change in the LCV Senate variable in a given state will increase the number of wild horses and burros removed annually by the BLM by 223 animals, on

average. This result suggests that in those states where the Senators are more environmentally conscious, there is a preference to protect public lands and wildlife over wild horses and burros, and therefore, the BLM faces political pressures to maintain wild horse and burro populations close to AMLs.

In conclusion, at the state level, interest groups do not affect the management decisions made by the BLM. Instead, the results provided in table 3 column (4) suggest that the decision of how many animals to remove is largely influenced by factors that are unique to each state and that change over time.

HMA Political Economy Model Results

The full sample used to test the influence of interest groups on the BLM's decisions of whether to conduct a gather and how many animals to remove consists of 997 observations on 197 HMAs for the time period 2004-2008. The results of the ordinary least squares regression (linear probability model) for specification (1) are shown in table 4 columns (1) to (4). A Breusch-Pagan test was conducted to check for the presence of heteroskedasticity. A chi-squared of 7.65 and a p-value of 0.0057 reject the null hypothesis of homoskedasticity. Thus, all ordinary least square regressions are run using the Huber/White estimator of variance. Because a linear probability model has drawbacks (most notably the possibility of obtaining predicted probabilities of success that are less than zero or greater than one), a probit model is also used to estimate the probability of disposal.

Columns (5) to (8) in table 4 report the results obtained from the probit model. Marginal effects at the means are reported for continuous variables. Effects from a

discrete change from zero to one are reported for the binary variables. When fixed effects are used, Arizona is the base state, and year 2004 is the base year.³² Year and state fixed effects are jointly significant at the 0.01 level, therefore the interpretation of the results below is based on the results reported in column (4) for the ordinary least squares regressions and in column (8) for the probit model.

³² It would be useful to be able to include HMA fixed effects in the political economy analyses presented in tables 4 and 5. This is not possible, however, because the variable of interest *Overlap* does not vary over time, therefore perfect collinearity would be introduced in the model by including *Overlap* and HMA fixed effects. The omission of HMA fixed effects increases the likelihood that omitted variable bias is a problem, especially for the estimated coefficient on the *Overlap* variable if omitted variables are correlated with both *Overlap* and *Gather*.

Table 4. HMA Political Economy Model Results, Specification (1).

VARIABLES	Linear Probability Model				Probit Model			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Gather	Gather	Gather	Gather	Gather	Gather	Gather	Gather
Constant	0.186*** (0.019)	0.538*** (0.080)	0.221*** (0.034)	0.559*** (0.083)	— —	— —	— —	— —
Overlap	0.005*** (0.002)	0.006*** (0.002)	0.005*** (0.002)	0.006*** (0.002)	0.004*** (0.001)	0.005*** (0.002)	0.004*** (0.001)	0.006*** (0.002)
Excess Animals	0.0003** (0.000)	0.0003** (0.000)	0.0003** (0.000)	0.0003** (0.000)	0.0003** (0.000)	0.0003** (0.000)	0.0003** (0.000)	0.0003** (0.000)
Lawsuits	0.158 (0.225)	0.185 (0.247)	0.118 (0.216)	0.145 (0.237)	0.162 (0.218)	0.213 (0.229)	0.113 (0.213)	0.168 (0.227)
Lag Lawsuits	0.532** (0.219)	0.583*** (0.169)	0.559** (0.221)	0.607*** (0.172)	0.533** (0.209)	0.609*** (0.193)	0.561*** (0.199)	0.633*** (0.181)
State Fixed Effects	NO	YES	NO	YES	NO	YES	NO	YES
F-statistic	—	4.30	—	4.17	—	37.06	—	36.26
P-value	—	0.0000	—	0.0000	—	0.0000	—	0.0000
Year Fixed Effects	NO	NO	YES	YES	NO	NO	YES	YES
F-statistic	—	—	6.15	5.95	—	—	20.75	19.92
P-value	—	—	0.0001	0.0001	—	—	0.0004	0.0005
Observations	997	997	997	997	997	997	997	997
R-squared	0.023	0.067	0.043	0.086	—	—	—	—

Notes: Standard errors in parentheses. For the linear probability model, robust standard errors are reported. For the probit model, marginal effects at the means are reported for continuous variables and from a discrete change from zero to one are reported for the binary variables. *, **, and *** denote estimates are statistically significant at the 0.10, 0.05, and 0.01 levels, respectively.

The estimated coefficient on *Overlap* is statistically significant at the 0.01 level and has the expected sign. According to this estimate, on average, an increase in the number of grazing allotments that overlap an HMA by one standard deviation (9.415) increases the probability of a gather by 5.6 percentage points using the linear probability model and the probit model (columns 4 and 8). The variation in the magnitude of the coefficient across the specifications in table 4 is fairly small. These results indicate that grazing permits holders have a significant economic impact on the decisions made by the BLM of whether to gather wild horses and burros.

For the variable *Excess Animals*, the estimate is statistically significant at the 0.05 level and has the expected sign. The magnitude of the estimated coefficient indicates that, on average, a one standard deviation (112 animals) change in the number of animals in excess of the AML will increase the probability of a gather by 3.4 percentage points. The magnitude and significance of this estimate are the same under the linear probability model and under the probit model, and they do not change across specifications.

For the variable *Lawsuit* the estimated coefficient is not statistically significant. This result may be due to the small number of lawsuits that were found for the time period used in the analysis. Alternatively, this result may simply indicate that pro-WH&B groups do not have a significant impact through their legal efforts on the management decisions made by the BLM, at least not with respect to the BLM's decision of whether to conduct a gather of wild horses and burros.

Finally, the variable *Lag Lawsuits* is positive and statistically significant at the 0.01 level. According to the estimate reported for this variable in column (4), a lawsuit

filed this year will increase the probability of a gather next year by almost 61 percentage points. The estimated coefficient obtained from the probit model and reported in column (8) indicates that a lawsuit filed this year will increase the probability of a gather next year by 63 percentage points.

The results of the ordinary least squares regression for specification (2) are shown in table 5 columns (1) to (4). A Breusch-Pagan test was conducted to check for the presence of heteroskedasticity. A chi-squared of 339.21 and a p-value of 0.0000 reject the null hypothesis of homoskedasticity. Thus, all ordinary least square regressions are run using the Huber/White estimator of variance.

In the sample, 765 out of 997 observations report zero for the number of animals removed, therefore a tobit model censored at zero is also estimated. Columns (5) to (8) in table 5 report the results obtained from the tobit model. Marginal effects at the means are reported for continuous variables. When fixed effects are used, Arizona is the base state, and year 2004 is the base year. Only state fixed effects are jointly significant at the 0.05 level using ordinary least squares, therefore the interpretation of the results below is based on the results reported in columns (2). For the probit model, state and year fixed effects are jointly significant at the 0.05 level, therefore the interpretation of the results below is based on the results reported in column (8).

Table 5. HMA Political Economy Model Results, Specification (2).

VARIABLES	Ordinary Least Squares				Tobit Model			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Animals Removed	Animals Removed	Animals Removed	Animals Removed	Animals Removed	Animals Removed	Animals Removed	Animals Removed
Constant	25.812*** (4.895)	-16.936* (9.861)	27.591** (11.056)	-15.427 (13.354)	-307.399*** (27.884)	-205.103*** (63.183)	-278.166*** (37.428)	-186.254*** (66.979)
Overlap	1.164*** (0.402)	1.926*** (0.574)	1.166*** (0.399)	1.927*** (0.569)	4.600*** (1.385)	6.368*** (2.019)	4.663*** (1.383)	6.494*** (2.017)
Excess Animals	0.204** (0.103)	0.206** (0.105)	0.206** (0.104)	0.207** (0.106)	0.498*** (0.114)	0.494*** (0.115)	0.499*** (0.114)	0.495*** (0.115)
Lawsuits	-31.016** (13.457)	-23.946 (21.592)	-33.140** (14.897)	-25.991 (22.170)	53.690 (176.193)	103.414 (181.792)	15.840 (178.542)	72.013 (183.640)
Lag Lawsuits	182.567** (76.642)	194.416*** (61.179)	188.697** (77.149)	201.079*** (61.615)	440.481** (171.088)	476.147*** (176.688)	476.604*** (172.403)	509.589*** (178.119)
State Fixed Effects	NO	YES	NO	YES	NO	YES	NO	YES
F-statistic	—	4.90	—	5.00	—	2.23	—	2.16
P-value	—	0.0000	—	0.0000	—	0.0184	—	0.0228
Year Fixed Effects	NO	NO	YES	YES	NO	NO	YES	YES
F-statistic	—	—	1.88	1.95	—	—	4.05	3.90
P-value	—	—	0.1117	0.1007	—	—	0.0029	0.0038
Observations	997	997	997	997	997	997	997	997
R-squared	0.041	0.064	0.047	0.070	—	—	—	—

Notes: Standard errors in parentheses. For ordinary least squares, robust standard errors are reported. *, **, and *** denote estimates are statistically significant at the 0.10, 0.05, and 0.01 levels, respectively.

The estimated coefficient on *Overlap* is statistically significant at the 0.01 level and has the expected sign. According to this estimate, on average, an increase in the number of grazing allotments that overlap an HMA by one standard deviation (9.415) increases the number of animals removed annually by 18 using the estimated coefficient obtained from the ordinary least squares regression. According to the estimated coefficient obtained from the probit model, the same change will increase the number of animals removed annually by 61. These results indicate that grazing permits holders have a significant economic impact on the decisions made by BLM regarding how many wild horses and burros to remove.

For the variable *Excess Animals*, the estimate reported in column (2) is statistically significant at the 0.05 level and has the expected sign. The magnitude of the estimated coefficient indicates that, on average, a one standard deviation (112 animals) change in the number of animals in excess of the AML will increase the number of animals removed by 27. Using the tobit model, the magnitude and significance of this estimate increases, and according to the estimated coefficient reported in column (8), a one standard deviation change in the number of animals in excess of the AML will increase the number of animals removed by 55. The estimate on this variable does not change much across the ordinary least squares specifications or across the tobit specifications.

For the variable *Lawsuit*, the estimated coefficient is not statistically significant. This result may be due to the small number of lawsuits that were found for the time period used in the analysis. Alternatively, this result may simply indicate that pro-

WH&B groups do not have a significant impact on the management decisions made by the BLM, at least not with respect to the BLM's decision of how many wild horses and burros to remove.

Finally, the variable *Lag Lawsuits* is positive and statistically significant at the 0.01 level. According to the estimate reported for this variable in column (2), a lawsuit filed this year will increase the number of animals to remove next year by 194 animals. The estimated coefficient obtained from the tobit model and reported in column (8) indicates that a lawsuit filed this year will increase the number of wild horses and burros removed next year by 510 animals.

The results obtained at the HMA level are consistent with the prediction that holders of permits and leases to graze on public lands have important impacts on the management of the WH&B program. The more grazing allotments that overlap an HMA, the higher the probability of the BLM conducting a gather and the larger the number of wild horses and burros removed. This outcome is in line with prediction (1) proposed in chapter 3, and it is expected given the competitive interaction between domestic livestock and wild horses and burros for forage. With respect to the other interest group, it is found that lawsuits filed by pro-WH&B groups do not affect the likelihood of a gather being conducted that year. It does, however, increase the probability of having a gather and the number of animals removed next year. Finally, it should be noted that the BLM's behavior is consistent with its legislative mandate to remove wild horses and burros when populations exceed AMLs, because under both specifications the variable *Excess Animals* is statistically significant at conventional levels.

CHAPTER 5

HEDONIC PRICING THEORY

Goods can be considered to be bundles of attributes, with consumers valuing the goods based on their individual attributes (Lancaster, 1966; Rosen, 1974). A hedonic model determines the price of a good by the implicit prices of attributes that are revealed to economic agents from observed prices of differentiated products and the specific amounts of characteristics associated with them (Rosen, 1974).

According to Lancaster (1966) consumers do not get utility from the good itself, but from the characteristics of the good. When the commodity under consideration is a wild horse, people make their adoption or purchase decisions by evaluating the set of available wild horse characteristics that will maximize their utility given the choices offered. Characteristics of wild horses valued by adopters or buyers may include observable attributes such as sex, color, age, or white marks in legs and face, and unobservable aspects such as docility, potential for desirable uses (e.g. riding, pet, competition events), or endurance.

Hedonic models have been used in a number of studies to estimate the implicit value of physical and genetic attributes of breeding and racing horses in auctions (Chezum and Wimmer 1997; Vickner and Koch 2001; Neibergs 2001; Taylor et al. 2006; Maynard and Stoeppel 2007; Lange et al. 2010). These models provide estimates of the impact of physical characteristics as well as performance, pedigree, and health information on the market value of these horses. There are some similarities between

these private horse auctions and the wild horse adoptions, specifically the emphasis by the BLM on phenotypic (physical) descriptions of animals to potential adopters.

Suppose each wild horse has a set of attributes $\mathbf{z} = (z_1, z_2, \dots, z_n)$ where z_i measures the amount of the i^{th} characteristic possessed by the particular wild horse in question. Assume that a continuous variety of alternative characteristic combinations are available. The price of a wild horse, p , is a function of its attributes,

$$p(\mathbf{z}) = p(z_1, z_2, \dots, z_n)$$

The market price, $p(\mathbf{z})$, is determined by the equilibrium conditions of utility-maximizing consumers and profit-maximizing agencies.³³

Consider the utility maximization problem faced by consumers. Define each z_i to be a “good” with positive marginal value so that $p(\mathbf{z})$ is increasing in all z_i . Suppose consumers adopt or buy only one wild horse, the utility function is

$$U(x, z_1, z_2, \dots, z_n),$$

where x is a numeraire good. Assuming income equals expenditures, then income y will equal the quantity of x consumed plus the price of the wild horse with attributes $\mathbf{z}$,

$$y = x + p(\mathbf{z}).$$

Each consumer maximizes his utility subject to a budget constraint by choosing optimal levels of x and $z_1, z_2, \dots, z_n$. The Lagrangian for this objective function is

$$L = U(x, z_1, z_2, \dots, z_n) + \lambda(y - x - p(\mathbf{z})).$$

³³ The BLM is not a profit maximize per se. Profit maximization, however, is used as a reasonable assumption to describe the behavior of this agency with respect to a resource value, in this case wild horses. The BLM chooses the number of animals to be removed given exogenous factors such as the conditions of the range, the carrying capacity of the range, the use of forage by other species, and subject to a price constraint.

Maximization of utility subject to the budget constraint requires choosing x and $(z_1, z_2, \dots, z_n)$ to satisfy the budget and the first-order conditions, which imply the standard equilibrium conditions that the marginal rate of substitution between any two characteristics must equal the respective marginal price ratios,

$$(1) \quad \left(\frac{\frac{\partial p}{\partial z_i}}{\frac{\partial p}{\partial z_j}} \right) = \frac{U_{z_i}}{U_{z_j}} \quad \forall \quad i, j = 1, \dots, n, \quad i \neq j \quad \text{and}$$

$$(2) \quad \frac{\partial p}{\partial z_i} = p_{z_i} = \frac{U_{z_i}}{U_x} \quad \forall \quad i = 1, \dots, n$$

Define a consumer's value or bid function as the maximum amount a consumer is willing to pay for alternative amounts of $\mathbf{z}$ at a given utility level u and income y ,

$$(3) \quad \theta(z_1, z_2, \dots, z_n; u, y).$$

The bid function is defined implicitly by

$$U(y - \theta, z_1, z_2, \dots, z_n) = u.$$

The consumer's optimal utility (u^*) is then a function of income and the characteristics of the good.

Differentiate equation (3) with respect to z_i to get the following first-order condition

$$(4) \quad \theta_{z_i} = \frac{U_{z_i}}{U_x} > 0 \quad \text{by structure of } \mathbf{z} \text{ and } x, \quad \forall \quad i = 1, \dots, n$$

This is the implicit marginal valuation the consumer places on z_i at a given utility level and income.

From first-order conditions (2) and (4), optimization occurs when the marginal bid for an attribute equals its marginal price, $\theta_{z_i} = p_{z_i}$. In other words, the optimum corresponds to the tangency between $p(z)$ and $\theta(z; u^*, y)$. Figure 4 shows two different buyers, one with bid function θ^1 and the other with θ^2 .

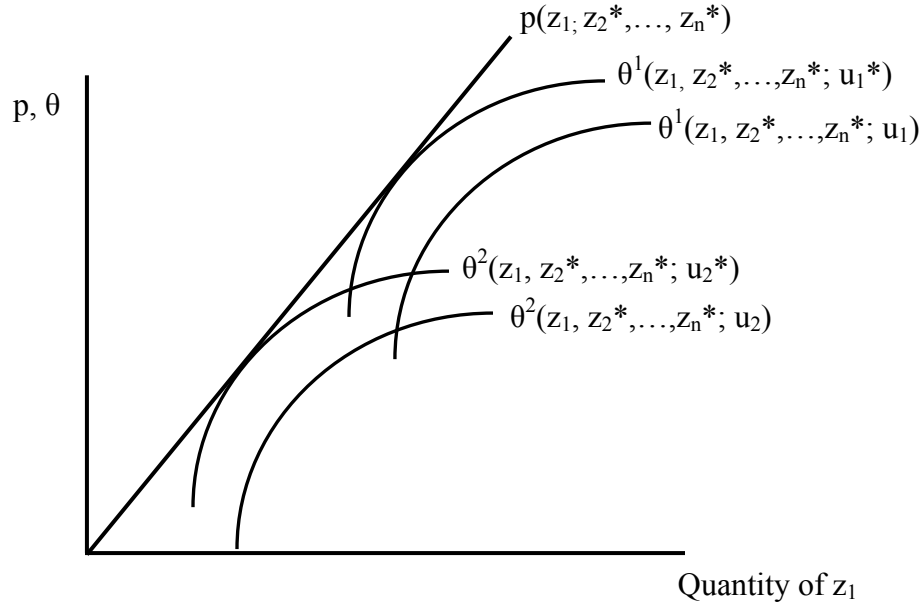


Figure 5. Consumption Decision under a Hedonic Model.
A constant marginal price is assumed.

On the production side, the agency must choose how many animals to offer for adoption and with what combination of characteristics. The total cost of production (removals) depends on the attributes $\mathbf{z}$, the number of animals removed, and cost shifters such as input prices, technology and other factors affecting the removal budget (e.g. political pressures). Profits are therefore

$$\pi = M \cdot p(z) - C(M, z_1, \dots, z_n; \beta)$$

where $p(\mathbf{z})$ is the implicit price function for the characteristics of one wild horse, M corresponds to the number of wild horses removed from the range with characteristics $\mathbf{z}$, and β denotes cost shifters. The first-order conditions for the agency are

$$(5) \quad \frac{\partial \pi}{\partial z_i} = \pi_{z_i} = M \cdot p_{z_i} - C_{z_i} = 0 \quad \Rightarrow \quad p_{z_i} = \frac{C_{z_i}}{M}, \quad \forall i = 1, \dots, n$$

$$(6) \quad \frac{\partial \pi}{\partial M} = \pi_M = p(\mathbf{z}) - C_M = 0 \quad \Rightarrow \quad p(\mathbf{z}) = C_M, \quad \forall i = 1, \dots, n$$

According to equation (5), the agency should only remove those animals with a set of characteristics such that the marginal revenue from each attribute is equal to the attribute's marginal cost per animal removed. Equation (6) requires that the number of animals to be removed by the agency be determined so that the animal price equals the marginal cost of one additional animal removed.

Following Rosen (1974, p. 42), define an offer function as the unit price the agency will accept for an animal with characteristics $\mathbf{z}$ to yield profits π given the agency cost shifters β ,

$$\phi(z_1, z_2, \dots, z_n; \pi, \beta)$$

The offer function is obtained from

$$(7) \quad \pi = M \cdot \phi - C(M, z_1, \dots, z_n)$$

and solving for ϕ

$$(8) \quad \phi = \frac{\pi - C(M, z_1, \dots, z_n)}{M}$$

Differentiate equation (8) with respect to z_i to get the following first-order condition

$$(9) \quad \phi_{z_i} = \frac{C_{z_i}}{M} > 0 \quad \forall \quad i = 1, \dots, n$$

This is the marginal reservation supply price for attribute i at a given profit level and cost shifters.

From first-order conditions (5) and (9), optimization requires that the marginal offer for an attribute equals its marginal price, $\phi_{z_i} = p_{z_i}$. The optimum corresponds to the tangency between $p(z)$ and $\phi(z; \pi^*, \beta)$. Figure 5 shows two different agencies, one with bid function ϕ^1 and the other with ϕ^2 .

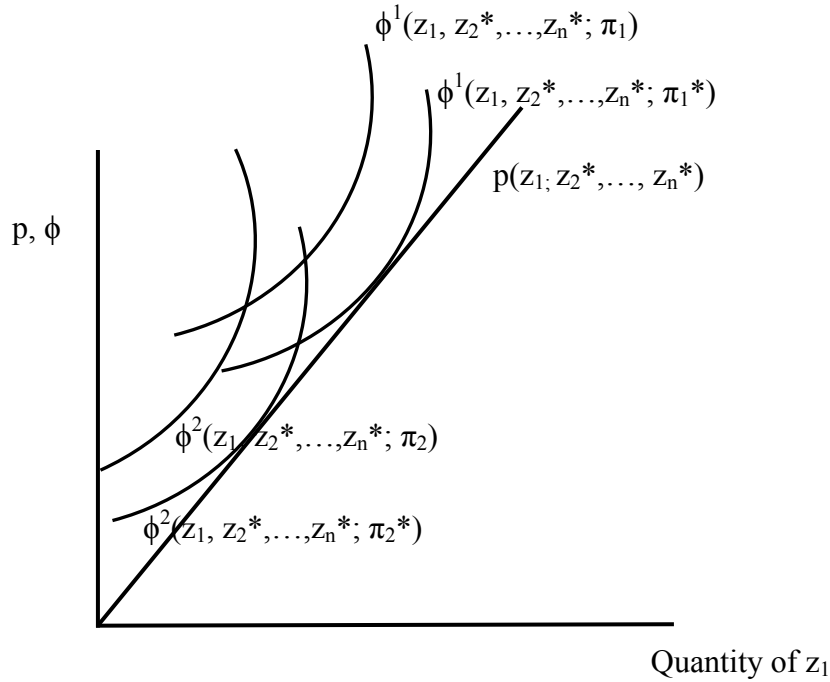


Figure 6. Production Decision under a Hedonic Model.
A constant marginal price is assumed.

The market equilibrium price function, $p(z)$, is determined by the interaction of heterogeneous consumers' bid functions and heterogeneous producers' offer functions (wild horses removed from different HMAs). Consumers would like to pay the lowest bid to maximize their utility and producers would like to receive the highest offer to maximize their profits. Equilibrium occurs where the two functions are tangent. For simplicity, it is assumed that the attribute z_i has a constant marginal price, p_{z_i} . Figure 6 graphically shows the generation of the price function through the interaction of consumers and producers.

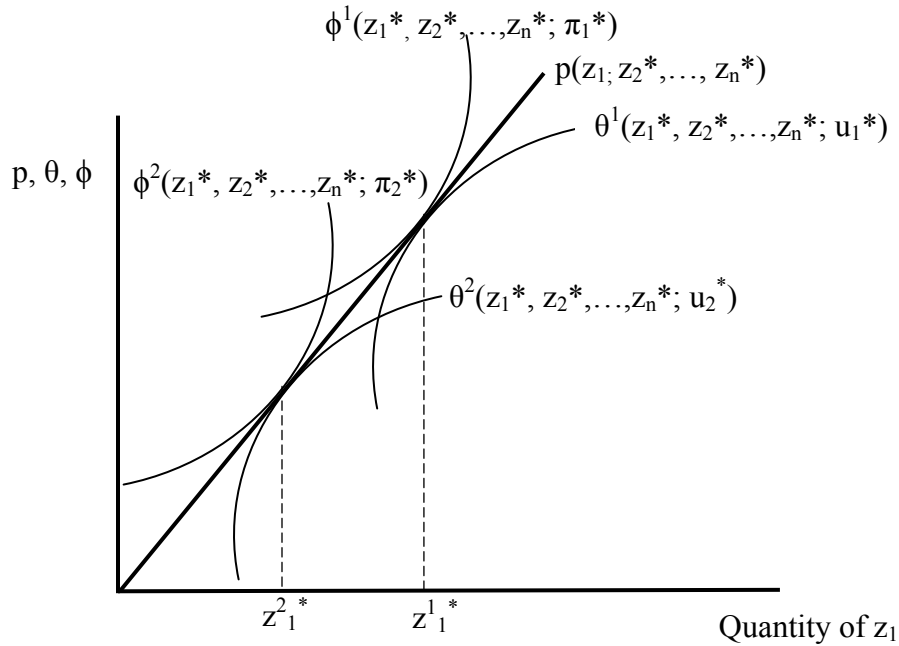


Figure 7. Production Decision under a Hedonic Model.
A constant marginal price is assumed.

The analysis in this thesis estimates the marginal price, p_{z_i} , for each wild horse characteristic by evaluating how the observed price changes as the quantity of the

attribute changes (for the binary variables a discrete change from 0 to 1). This analysis does not attempt to estimate the marginal willingness to pay or the marginal supply function and the associated demand and supply parameters so the identification problem highlighted in many hedonic method critiques is not relevant (see for instance Brown and Rosen, 1982).

CHAPTER 6

ANALYSIS OF DISPOSAL PROCEDURES

Using the theory summarized in the previous chapter, an analysis of disposal procedures is performed in this chapter. In the first section, the empirical models are outlined, one to estimate the probability of disposal for a wild horse and the other to estimate the marginal price for wild horse characteristics. These are referred to as the probability of disposal model and the hedonic pricing model, respectively. In the second section, the data used in both analyses are described. Then, the results obtained from both models are presented, fees for wild horses that were not disposed of are predicted, and the potential benefits from changes in the BLM's policies for the disposal of wild horses are estimated.

Empirical Models

The purposes of this analysis are (1) to estimate the probability of a wild horse being disposed of as a function of characteristics such as age, sex, color, and markings, and (2) to use a hedonic pricing model to estimate the marginal value of wild horse characteristics.

Probability of Disposal Model

The objective of this analysis is to estimate the likelihood of disposal for wild horses based on characteristics such as age, sex, color, and markings, so those

characteristics that make a wild horse more likely to be adopted or sold can be identified.

To do this, the following empirical model is used:

$$\text{Horse Disposed}_i = \alpha + \beta_1 * \text{Age at Capture}_i + \beta_2 * \text{Face Whorls}_i + \beta_3 * \text{Face Markings}_i + \beta_4 * \text{Leg Markings}_i + \delta * \text{Sex}_i + \gamma * \text{Color}_i + \varepsilon_i$$

The dependent variable *Horse Disposed_i* is a dichotomous variable that is equal to one if the horse was adopted or sold and zero otherwise. The variable *Age at Capture_i* corresponds to the age of a wild horse at the year of its capture. The estimated coefficient on this variable is expected to be negative indicating that older horses are less likely to be adopted or sold because they are more difficult to manage and their behavior is harder to modify through training.

The model also includes a number of physical characteristics of wild horses that are typically used to estimate hedonic models for horse sales. These characteristics are sex (mare, stallion or gelding), color (white-gray, roan, grulla-dun, pinto, black, brown-bay, Appaloosa or palomino), the presence of white markings in the legs (*Leg Markings_i*), the presence of white markings in the face (*Face Markings_i*) and the number of face whorls (*Face Whorls_i*).³⁴ A positive sign is expected for mare and gelding, indicating a higher likelihood of disposal than stallions, because mares and geldings are expected to be more docile. Also a positive sign is expected for face whorls because, according to Gorecka et al. (2007) a higher number of face whorls signals a higher level of intelligence in the horse, and hence the horses would be more manageable. No predictions can be made for the algebraic sign of the estimated coefficients for the other variables.

³⁴ The color variable *Grulla-Dun* also includes buckskin horses, and the color variable *Brown-Bay* also includes sorrel and chestnut horses.

Hedonic Pricing Model

The analysis estimates the marginal price of wild horse characteristics and identifies the characteristics of wild horses that are valued by adopters and buyers (hedonic pricing regressions). To estimate the potential benefits from changes in the BLM's policies for the disposal of wild horses, a second set of counterfactual regressions is estimated. This second set of regressions is called simulation regressions. The model to be estimated for both types of regressions, which is based on the theory provided in chapter 5, is:

$$\begin{aligned} \text{Fee Paid}_i = & \alpha + \beta_1 * \text{Age}_i + \beta_2 * \text{Trained}_i + \beta_3 * \text{Sold}_i + \beta_4 * \text{CPI}_i + \\ & \beta_5 * \text{Face Whorls}_i + \beta_6 * \text{Face Markings}_i + \beta_7 * \text{Leg Markings}_i + \delta * \text{Sex}_i + \\ & \gamma * \text{Color}_i + \beta_8 * \text{Lambda}_i + \varepsilon_i \end{aligned}$$

Unless otherwise specified, the variables are the same for the hedonic pricing regressions and for the simulation regressions. The dependent variable *Fee Paid_i* corresponds to the price paid by an adopter or buyer for a wild horse. The variable *Age_i* is the age of a wild horse when it was adopted or sold (age at disposal) and is used to estimate the hedonic pricing regressions. To predict fees for those wild horses that were not adopted or sold, it is necessary to use explanatory variables that are available for both, wild horses that are disposed of and those that are not. Therefore, when estimating the simulation regressions, the variable *Age* is the age of a wild horse at the time of capture plus one year.³⁵ The estimated coefficient on this variable is expected to be negative indicating that people are willing to pay a higher price for younger horses because they are easier to manage and train.

³⁵ One year is added to the age at capture, because on average, a wild horse spends 276 days in holding facilities before being adopted.

The variable $Trained_i$ is a binary variable, equal to one if the horse is trained and zero otherwise. For trained wild horses, the BLM only reports the fee paid by the adopter in excess of the training costs paid by the BLM. That is, the fee for trained horses corresponds to the difference between the actual fee paid and training costs. A positive sign is expected for the estimated coefficient insofar as the BLM is making money out of these transactions. The regressor $Sold_i$ is a dichotomous variable whose value is equal to one if the wild horse was sold under the new sale authority of the BLM and zero otherwise. A negative estimated coefficient is expected because under this authority, there is no minimum price to buy wild horses. Moreover, the animals available for sale are ten years of age or older, or are wild horses that have been offered for adoption three times without success.

The variable CPI_i corresponds to the Consumer Price Index, with year 2009 as the base year. This variable only changes over time, according to the year of disposal of each wild horse (1997-2010). When estimating the simulation regressions, the CPI variable is linked to the year after the year of capture of each wild horse. This variable is expressed as a percentage of the base year, where year 2009 is 100 percent. The CPI variable is included to control for the effects of inflation on the fees paid by adopters and buyers. It is used as an explanatory variable because the fees could not be adjusted given the need of using a tobit model to account for the censored nature of the dependent variable. A positive sign for the estimated coefficient is expected because the higher the inflation rate the higher the fee adopters and buyers will pay.

The model includes a number of physical characteristics of wild horses that are typically used to estimate hedonic models for horse sales. These characteristics are the same as in the probability model. A positive sign is expected for mare and gelding, indicating that would-be adopters and buyers are willing to pay higher prices for them than for stallions. This is because mares and geldings are expected to be more docile and hence easier to train and use as substitutes for domesticated horses in activities such as riding. Also a positive sign is expected for face whorls because, according to Gorecka et al. (2007), a higher number of face whorls signals a higher level of intelligence in the horse, and hence such horses will be more manageable, so people will pay more for wild horses with more face whorls, all else equal. No predictions can be made for the algebraic sign of the estimated coefficients for the other variables.

Finally, the explanatory variable Λ_i corresponds to the “Inverse Mill’s Ratio,” which is obtained from the probability of disposal model described in the previous section. This variable is included to account for potential selection bias in the sample. The sample of gathered horses is treated as though it is random, even though the BLM may non-randomly select horses to gather and try to offer them for adoption. It is possible that horses that are disposed of are a non-random sample of all that were gathered. Therefore a statistically significant estimated coefficient for this variable implies the presence of disposal selection, and the inclusion of the variable in the model would be justified.

Data

For this analysis, data were obtained from the BLM's Information System on about 200,000 wild horses captured between 1985 and 2010. Each of these wild horses has a unique individual identification number (referred to as freemark). For each individual horse, the data set contains the year and state of capture, the year of birth, and a series of physical characteristics, such as color, sex, number of face whorls, and leg and face markings. In addition, for each wild horse disposed, information was obtained on the date of adoption or sale, whether the horse was trained or not, the age at the year of adoption or sale, and the price paid. For the probability of disposal analysis the full sample is used. Summary statistics for the data set are reported in table 6.

On average wild horses have slightly more than one face whorl, which according to the study by Gorecka et al. (2007), suggests that these animals can potentially be difficult to train. About 75 percent of the horses in the sample have white marks on their face and around 58 percent of the wild horses have some kind of white marks on their legs. Of the wild horses in the sample, 52 percent of them are mares, 20 percent are geldings and 28 percent are stallions. With respect to color, 64 percent of the horses have some brownish coloration, the remaining 36 percent is distributed evenly between white-gray, roan, grulla-dun, pinto, black, palomino, and Appaloosa horses; however, this last category has the smallest representation with only 0.7 percent of the total wild horses removed in the sample. The average age of the animals captured between fiscal years 1985 and 2010 is four years, with a standard deviation of almost five years. Finally, 69 percent of the animals captured are disposed of through either adoption or sale.

Table 6. Summary Statistics for the Probability of Disposal Model.

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Other Variables					
Horse Disposed	200,063	0.69100	0.46208	0	1
Year of Capture	200,063	1998	7	1985	2010
Age of Capture	200,063	3.95856	4.78615	0	33
Marking Variables					
Face Whorls	200,063	1.04014	0.20288	1	4
Face Markings	200,063	0.74727	0.43458	0	1
Leg Markings	200,063	0.58000	0.49356	0	1
Sex Variables					
Mare	200,063	0.52342	0.49945	0	1
Gelding	200,063	0.19975	0.39981	0	1
Stallion	200,063	0.27683	0.44743	0	1
Color Variables					
White-gray	200,063	0.07664	0.26601	0	1
Roan	200,063	0.05797	0.23368	0	1
Grulla-dun	200,063	0.07614	0.26522	0	1
Brown-bay	200,063	0.63980	0.48006	0	1
Black	200,063	0.08979	0.28588	0	1
Pinto	200,063	0.02918	0.16831	0	1
Palomino	200,063	0.02026	0.14088	0	1
Appaloosa	200,063	0.00693	0.08294	0	1

More details about the distribution of the wild horses in the sample by age is presented in figure 8, which depicts the distribution of wild horses by age at capture, and in figure 9, which shows the distribution of wild horses for three categories of age over time.

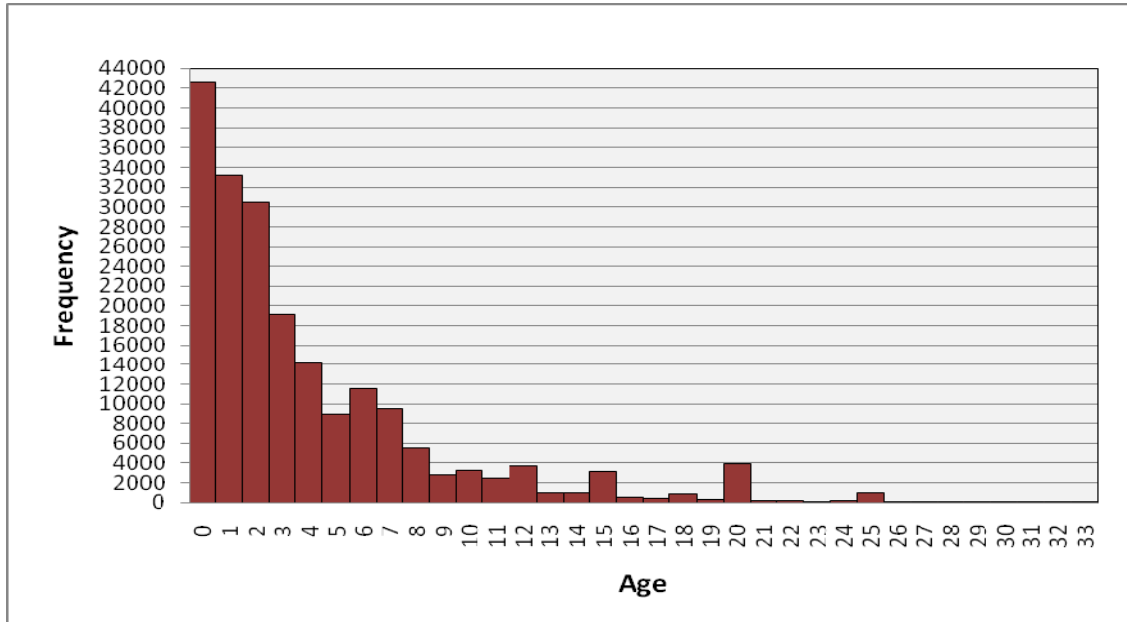


Figure 8. Distribution of Wild Horses Removed by Age of Capture.

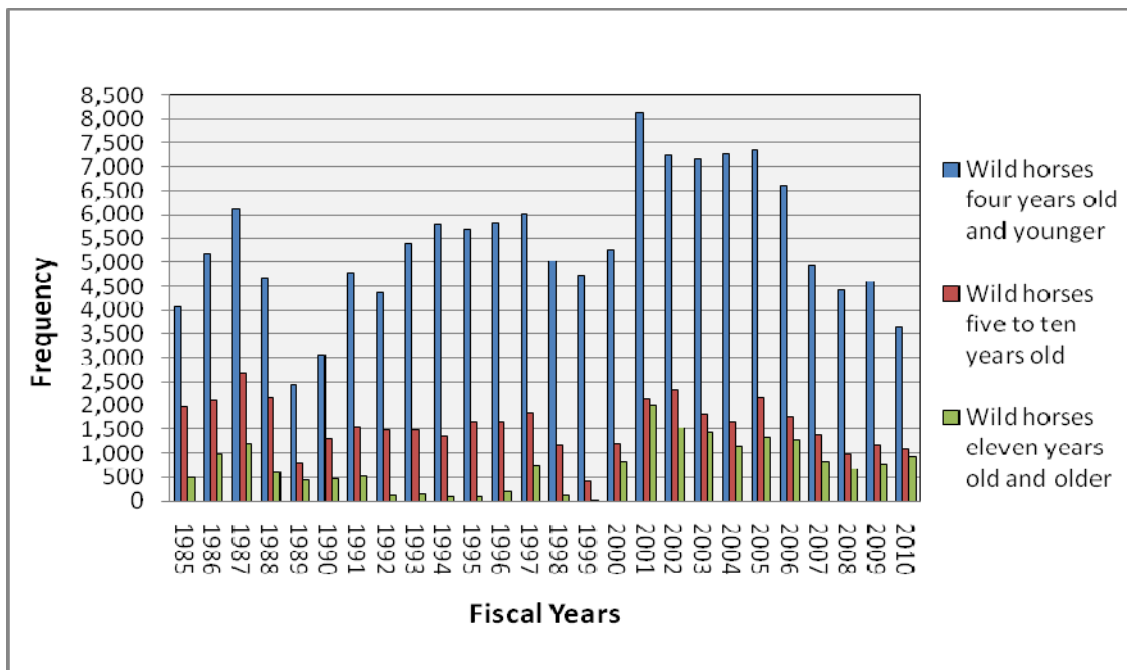


Figure 9. Distribution of Wild Horses Removed for Three Age Categories over Time.

Looking at these graphs, it is clear that most of the horses in the sample were captured when they were between zero and four years old and this pattern is constant over time. Wild horses five to ten years old constitute the second age category and horses eleven years old or older make-up the third age category, their share changes over time according to different policies implemented by the BLM. For example, between fiscal years 1985 and 1991 a significant number of the animals captured were older than ten years, however their representation decreases considerably during fiscal years 1992 through 1995 when the selective removal policy focused on gathering animals five years of age or younger. During fiscal years 1996 and 1997 the share of wild horses older than ten years increased because of emergency removals conducted during that time due to a drought affecting the Western states. Also an increase in the share of this category is observed since fiscal year 2000 due to the “Fiscal Year 2001 Presidential Budget Initiative” that eliminated age restrictions for the removals of excess animals and allowed the capture of older wild horses.

Figure 10 shows the distribution of wild horses by gender over time. Mares are the preferred target for removals given that they are potentially easier to put up for adoption. By taking mares from the range the reproduction rate can be lowered especially if the mares removed are in their prime reproductive age. Stallions had the second highest annual frequency of removal until fiscal year 2000. After that, the number of stallions removed as a share of the total number of animals removed decreases significantly due to the “Fiscal Year 2001 Presidential Budget Initiative.” This initiative promoted the castration of stallions to improve their chances of adoption and the

implementation of gelding policies, which mandate that wild horses of a certain age be gelded, shortly after capture.

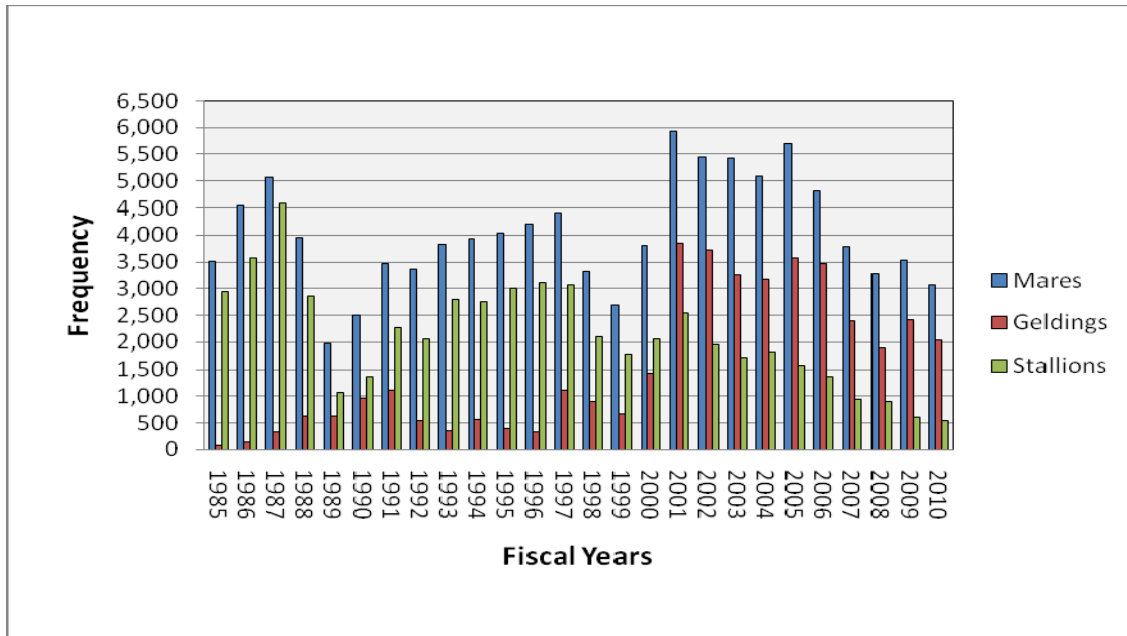


Figure 10. Distribution of Wild Horses Removed by Gender over Time.

For the hedonic pricing model, a subsample of wild horses disposed of during the years 1997 through 2010 is used. This subsample is used because the BLM only began to make use of uniform competitive auctions for adoptions of wild horses and burros in 1997. In addition to the information about wild horses, CPI data for the years 1997 through 2010 were obtained from the Bureau of Labor Statistics, Consumer Price Index History Table. Table 7 reports summary statistics for the variables used in the hedonic pricing analysis.

On average disposed wild horses have slightly more than one face whorl. About 76 percent of the horses in the sample have white marks on their face, and roughly 59 percent of the wild horses have some kind of white marks on their legs. Of the wild

horses in the sample, 53 percent of them are mares, 18 percent are geldings, and 29 percent are stallions. With respect to color, around 60 percent of the horses have some brownish coloration, the remaining 40 percent is distributed evenly between white-gray, roan, grulla-dun, pinto, black, palomino, and Appaloosa horses. The smallest representation is for appaloosa horses with only 0.9 percent of the total number of wild horses adopted or sold in the sample.

Table 7. Summary Statistics for the Hedonic Pricing Model.

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Other Variables					
Fee Paid	64,858	141	191	0	19,000
Year of Disposal	64,858	2003	4	1997	2010
Age at Disposal	64,858	3.17161	3.57970	0	28
Trained	64,858	0.06952	0.25434	0	1
Sold	64,858	0.05716	0.23214	0	1
CPI	64,858	86.26815	8.41625	74.81227	101.55280
Lambda	64,858	0.48807	0.38068	0.00303	3.96855
Marking Variables					
Face Whorls	64,858	1.03116	0.17943	1	4
Face Markings	64,858	0.76250	0.42556	0	1
Leg Markings	64,858	0.59484	0.49093	0	1
Sex Variables					
Mare	64,858	0.52720	0.49926	0	1
Gelding	64,858	0.18457	0.38795	0	1
Stallion	64,858	0.28823	0.45294	0	1
Color Variables					
White-Gray	64,858	0.07166	0.25793	0	1
Roan	64,858	0.06752	0.25092	0	1
Grulla-Dun	64,858	0.09595	0.29452	0	1
Brown-Bay	64,858	0.59795	0.49032	0	1
Black	64,858	0.08870	0.28431	0	1
Pinto	64,858	0.04077	0.19775	0	1
Palomino	64,858	0.02607	0.15935	0	1
Appaloosa	64,858	0.00891	0.09398	0	1

The average age of the animals disposed of between 1997 and 2010 is three years, with a standard deviation of almost 3.5 years. On average, around 7 percent of the wild horses disposed of are trained, and only 5.7 percent of the wild horses in the sample were disposed of through the sale process, which has been in effect since December 2004. Finally, the average fee paid for the animals disposed of is \$140 with a standard deviation of \$191. Figure 11 depicts the distribution of wild horses by age at the time of adoption or sale and figure 12 shows the distribution of wild horses for three categories of age over time.

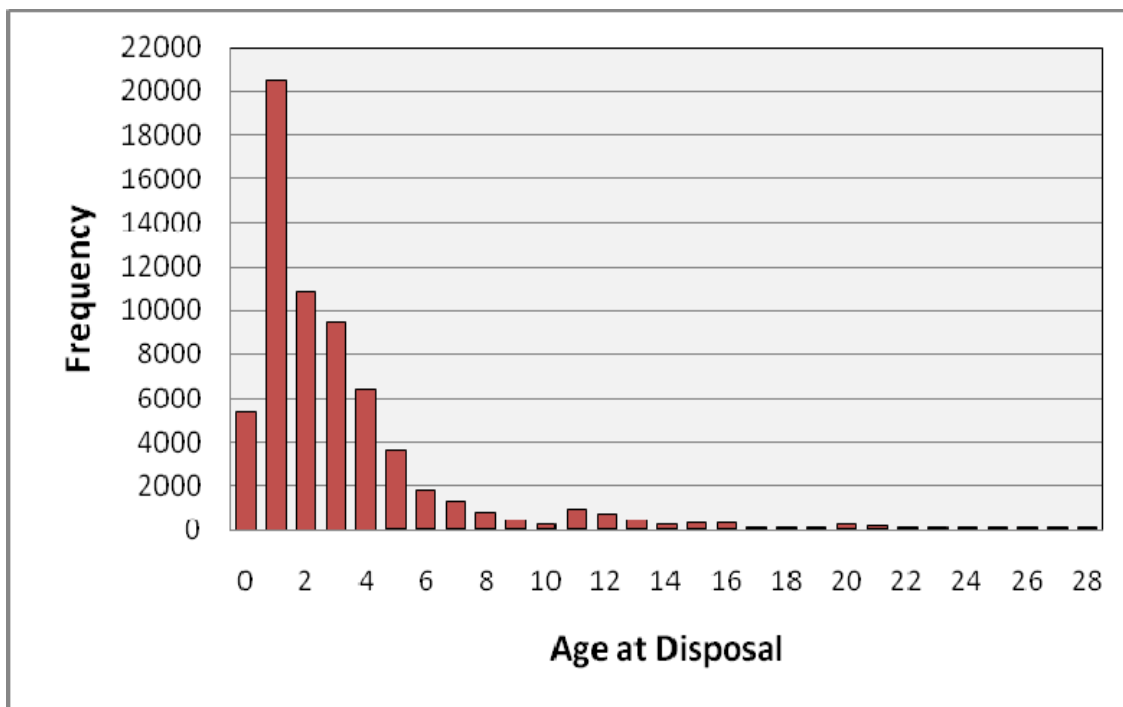


Figure 11. Distribution of Wild Horses Disposed of by Age at the Time of Adoption or Sale.

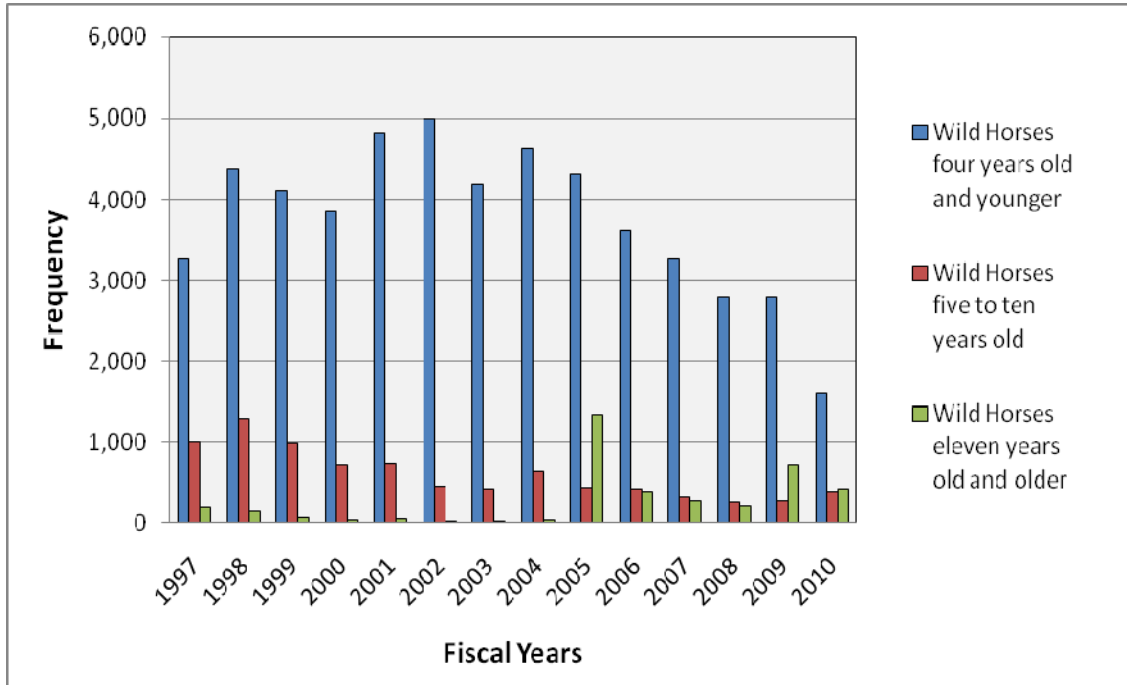


Figure 12. Distribution of Wild Horses Disposed for Three Age Categories over Time.

According to these graphs, most of the wild horses disposed of are one year old, and over time the age category with by far the highest number of animals disposed of is wild horses four years old and younger. In 2005 the new sale authority given to the BLM was implemented, which allows for the sale of animals ten years of age or older. As a result, since 2005, it can be seen that the number of wild horses eleven years old and older as a share of the total number of wild horses disposed has increased.

Results

This section presents the results obtained for the probability of disposal model as well as the estimates of the marginal price for each wild horse characteristic included in the hedonic pricing model using the theory described in chapter 5. Finally, the potential

benefits that could be obtained from changes in the BLM's policies for the disposal of wild horses are detailed.

Probability of Disposal Model Results

The sample used to estimate the probability of disposal of a wild horse consists of 200,063 observations on wild horses captured between 1985 and 2010. Unless otherwise specified, the base groups in the regressions are *Stallion* for sex and *Brown-Bay* for color. When fixed effects are added to the model, the base groups are Arizona for state and the year 1985 for year of capture.

The results of the ordinary least squares regression for the model specified in the first section are shown in table 8 columns (1) to (4). A Breusch-Pagan test was conducted to check for the presence of heteroskedasticity. A chi-squared of 2989.83 and a p-value close to zero indicate rejection of the null hypothesis of homoskedasticity. Thus, all ordinary least squares regressions are run using the Huber/White estimator of variance. Because of the shortcomings of a linear probability model such as the possibility of obtaining predicted probabilities of success that are less than zero or greater than one, a probit model is also used to estimate the probability of disposal. Table 8 columns (5) to (8) report the results obtained from a probit model that corrects for heteroskedasticity. Marginal effects at the means are reported for continuous variables. The estimated effects of discrete changes from zero to one are reported for the binary variables.

Table 8. Probability of Disposal Model Results.

VARIABLES	Linear Probability Model				Probit Model			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Horse Disposed	Horse Disposed	Horse Disposed	Horse Disposed	Horse Disposed	Horse Disposed	Horse Disposed	Horse Disposed
Constant	0.894*** (0.005)	0.908*** (0.028)	0.952*** (0.007)	1.012*** (0.027)	— —	— —	— —	— —
Age at Capture	-0.030*** (0.000)	-0.030*** (0.000)	-0.030*** (0.000)	-0.029*** (0.000)	-0.030*** (0.000)	-0.030*** (0.000)	-0.022*** (0.001)	-0.020*** (0.001)
Face Whorls	0.031*** (0.004)	0.052*** (0.005)	0.001 (0.004)	0.009** (0.004)	0.031*** (0.005)	0.046*** (0.005)	0.006 (0.005)	0.010* (0.005)
Face Markings	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.014*** (0.002)	0.014*** (0.002)
Leg Markings	0.002 (0.002)	0.002 (0.002)	0.005*** (0.002)	0.005*** (0.002)	0.003* (0.002)	0.003* (0.002)	0.005*** (0.002)	0.006*** (0.002)
Mare	-0.126*** (0.002)	-0.125*** (0.002)	-0.055*** (0.002)	-0.051*** (0.002)	-0.087*** (0.002)	-0.088*** (0.003)	-0.065*** (0.003)	-0.063*** (0.003)
Gelding	-0.332*** (0.003)	-0.329*** (0.003)	-0.154*** (0.003)	-0.145*** (0.003)	-0.237*** (0.005)	-0.239*** (0.005)	-0.167*** (0.004)	-0.161*** (0.005)
Roan	0.040*** (0.004)	0.039*** (0.004)	0.043*** (0.004)	0.042*** (0.004)	0.038*** (0.004)	0.038*** (0.004)	0.043*** (0.004)	0.043*** (0.004)
Grulla-Dun	0.036*** (0.003)	0.039*** (0.003)	0.066*** (0.003)	0.067*** (0.003)	0.040*** (0.003)	0.043*** (0.003)	0.069*** (0.003)	0.070*** (0.003)
Pinto	0.048*** (0.005)	0.050*** (0.005)	0.094*** (0.005)	0.083*** (0.005)	0.040*** (0.005)	0.043*** (0.005)	0.093*** (0.005)	0.086*** (0.006)
Black	-0.000 (0.003)	0.001 (0.003)	0.006* (0.003)	0.008** (0.003)	0.002 (0.003)	0.003 (0.003)	-0.001 (0.003)	0.004 (0.004)

Table 8. Probability of Disposal Model Results (continued).

VARIABLES	Linear Probability Model				Probit Model			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Horse Disposed	Horse Disposed	Horse Disposed	Horse Disposed	Horse Disposed	Horse Disposed	Horse Disposed	Horse Disposed
White-Gray	0.020*** (0.004)	0.019*** (0.004)	0.019*** (0.003)	0.009*** (0.003)	0.023*** (0.003)	0.025*** (0.004)	0.014*** (0.004)	0.005 (0.004)
Appaloosa	0.019 (0.012)	0.024** (0.012)	0.050*** (0.011)	0.043*** (0.011)	0.030*** (0.011)	0.032*** (0.0121)	0.038*** (0.012)	0.025* (0.013)
Palomino	0.058*** (0.006)	0.057*** (0.006)	0.073*** (0.006)	0.070*** (0.006)	0.056*** (0.006)	0.055*** (0.006)	0.079*** (0.007)	0.077*** (0.007)
State Fixed Effects	NO	YES	NO	YES	NO	YES	NO	YES
F-statistic	—	106.52	—	267.41	—	552.25	—	1,632.33
P-value	—	0.0000	—	0.0000	—	0.0000	—	0.0000
Year Fixed Effects	NO	NO	YES	YES	NO	NO	YES	YES
F-statistic	—	—	1,946.26	1,994.95	—	—	19,304.99	19,196.17
P-value	—	—	0.0000	0.0000	—	—	0.0000	0.0000
Observations	200,063	200,063	200,063	200,063	200,063	200,063	200,063	200,063
R-squared	0.196	0.199	0.340	0.347	—	—	—	—

Notes: Standard errors in parentheses. For the linear probability model, robust standard errors are reported. For the probit model, marginal effects at the means are reported for continuous variables and from a discrete change from zero to one are reported for the binary variables. *, **, and *** denote estimates are statistically significant at the 0.10, 0.05, and 0.01 levels, respectively.

To control for the impact of omitted variables related to geographical or temporal factors that can make horses of one region different than horses in other region, state of capture and year of capture fixed effects are added to the original model. Year and state fixed effects are jointly significant at the 0.01 level of significance, therefore the interpretation of the results is based on the results reported in column (4) for the linear probability model and in column (8) for the probit model.

According to the results obtained from the linear probability model, the estimated coefficient on *Age at Capture* indicates that a one year increase in age decreases the probability of adoption by 3 percentage points, all else equal. This estimate has the expected sign and is significant at the 0.01 level. The estimates for *Face Whorls*, *Face Markings*, and *Leg Markings* are all statistically significant at conventional levels. According to the estimates provided in column (4), one more face whorl increases the probability of disposal by 0.9 percentage points. This result is consistent with the prediction based on the work by Gorecka (2007). Wild horses with face marks are 0.9 percentage points more likely to be disposed of than wild horses without such marks. Finally, a wild horse with leg marks is 0.5 percentage points more likely to be disposed of than a wild horse without leg marks.

The estimates for the coefficients on the sex variables are statistically different from zero at the 0.01 level of significance and their estimated coefficients indicate that mares are 5.1 percentage points less likely to be adopted than stallions, while geldings have a 14.5 percentage point lower probability of being adopted than stallions. The estimates for the coefficients on the color variables are all statistically different than zero

at conventional levels. Their estimates indicate that roan, grulla-dun, pinto, black, white-gray, Appaloosa, and palomino horses are more likely to be adopted than brown-bay horses.

The model specified in the first section was also estimated using a probit model. The results are reported in Table 8 columns (5) through (8). Some differences in results are observed between the linear probability model and the probit model. Using the probit model, the magnitude of the estimate on *Face Markings* is noticeably larger when year and state fixed effects are added. Also, the magnitude of the estimates on *Mare* and *Gelding* are larger in absolute value when state and year fixed effects are included. Under the probit model, it is observed that the estimate on *Black* is no longer statistically different than zero, and that the estimate on *White-Gray* is not statistically significant at conventional levels when both state and year fixed effects are added.

Hedonic Pricing Model Results

The sample used to estimate the hedonic pricing model consists of 64,858 observations on the fees paid for wild horses adopted or sold between 1997 and 2010. The same sample is used to estimate the second set of regressions called simulated regressions, whose estimates are used to predict fees for those wild horses that were not adopted or sold, to estimate then the potential benefits from changes in the BLM's policies for the disposal of these animals. Unless otherwise specified the omitted groups in the regressions are *Stallion* for sex and *Brown-Bay* for color. When fixed effects are added to the model, the omitted groups are Arizona for state and the year 1997 for year of disposal.

There are concerns about the presence of a sample selection problem. Selection bias concerns arise because the information on fees paid by adopters and buyers is only available for those wild horses that were adopted or sold. Information on which of the wild horses still under the authority of the BLM were actually offered for adoption or sale could not be obtained. It is possible that the wild horses adopted or sold in the sample were in fact the wild horses offered for adoption or sale, and they were offered for adoption because they were more likely to be adopted.

To test for the presence of sample selection bias, the approach outlined by Heckman (1971) is used. The inverse Mill's ratio is included in the hedonic pricing model as the explanatory variable called *Lambda*. This variable was constructed using the estimates on wild horse characteristics obtained from the probability model estimated using the probit model with state and year fixed effects. If the estimated coefficient on *Lambda* is statistically different from zero, then the data suffer from sample selection bias, and the inclusion of the inverse Mill's ratio is an appropriate approach to correct this problem and obtain unbiased coefficient estimates.

The results of the hedonic pricing model are reported in table 9 columns (1) to (4) under the heading of hedonic pricing regressions. The results obtained from the ordinary least squares regressions are shown in table 9 columns (1) and (2). A Breusch-Pagan test was conducted to check for the presence of heteroskedasticity. A chi-squared of 2989.83 and a p-value of 0.0000 reject the null hypothesis of homoskedasticity. Thus, all ordinary least squares regressions are run using the Huber/White estimator of variance. Because the BLM sets a minimum fee to adopt wild horses, down to a minimum of \$25, a tobit

model is used to take into account the fact that the data are censored at \$25. The results using the tobit model are reported in table 9 columns (3) and (4).

Due to concerns about omitted variable bias in the basic model that could lead to biased estimates, state and year fixed effects are included. State of capture fixed effects could control for the variation in fees paid due to difference in horses across states (e.g., breeding, appearance). Year of disposal fixed effects control for omitted factors that result in adopters and buyers paying higher or lower annual fees (e.g., forage costs, transportation costs). Year and state fixed effects are jointly significant at the 0.01 level, therefore the interpretation of the results is based on the results reported in column (2) for ordinary least squares regressions and in column (4) for the tobit model.

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Table 9. Hedonic Pricing Model Results.

VARIABLES	Hedonic Pricing Regressions				Simulation Regressions			
	Ordinary Least Squares		Tobit Model		Ordinary Least Squares		Tobit Model	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fee Paid	Fee Paid	Fee Paid	Fee Paid	Fee Paid	Fee Paid	Fee Paid	Fee Paid
Constant	233.233*** (11.796)	766.465*** (97.130)	404.244*** (27.731)	817.985*** (110.686)	148.123*** (4.678)	52.192 (32.487)	138.428*** (5.571)	-50.707 (121.187)
Age	-2.046*** (0.269)	-1.511*** (0.251)	-4.255*** (0.524)	-3.658*** (0.502)	-0.719*** (0.255)	-0.057 (0.265)	-0.893** (0.401)	-0.695 (0.467)
Sold	-82.297*** (3.314)	-79.382*** (3.248)	-255.691*** (16.991)	-258.731*** (17.462)	-99.615*** (3.052)	-102.178*** (3.347)	-299.810*** (6.890)	-299.757*** (7.324)
Trained	124.074*** (5.099)	128.630*** (5.272)	150.602*** (6.325)	157.811*** (6.702)	120.902*** (5.109)	124.011*** (5.203)	142.514*** (3.445)	145.665*** (3.460)
CPI	-1.084*** (0.140)	-9.090*** (1.293)	-3.391*** (0.332)	-9.922*** (1.473)	-0.302* (0.165)	2.378*** (0.627)	-1.616*** (0.180)	2.284*** (0.850)
Face Whorls	-3.543 (3.069)	-8.442*** (3.134)	-1.902 (3.721)	-6.693 (3.766)	-4.012 (3.077)	-10.489*** (3.170)	-3.136 (4.695)	-9.041* (4.692)
Face Markings	-3.928* (2.239)	-2.926 (2.193)	-2.390 (2.420)	-0.860 (2.349)	-4.209* (2.247)	-4.834** (2.210)	-2.981 (2.077)	-2.675 (2.081)
Leg Markings	-5.141*** (1.516)	-3.926*** (1.466)	-4.879*** (1.737)	-3.386* (1.679)	-5.119*** (1.520)	-4.610*** (1.497)	-4.777*** (1.787)	-4.038** (1.782)
Mare	9.504*** (1.851)	8.384*** (1.714)	12.948*** (2.162)	10.129*** (1.996)	10.312*** (1.883)	12.293*** (1.659)	14.611*** (2.050)	13.291*** (2.346)
Gelding	26.994*** (2.489)	24.321*** (2.488)	29.839*** (3.005)	22.307*** (3.097)	29.299*** (2.538)	34.904*** (2.646)	34.513*** (3.166)	30.860*** (4.519)
Roan	23.002*** (2.148)	21.181*** (2.137)	33.312*** (2.637)	32.230*** (2.678)	21.916*** (2.156)	17.652*** (2.151)	30.840*** (3.408)	28.326*** (3.494)
Grulla-Dun	81.573*** (5.097)	72.735*** (4.588)	97.381*** (6.333)	89.500*** (5.895)	79.729*** (4.989)	69.355*** (4.909)	93.466*** (2.971)	86.759*** (3.344)

Table 9. Hedonic Pricing Model Results (continued).

VARIABLES	Hedonic Pricing Regressions				Simulation Regressions			
	Ordinary Least Squares		Tobit Model		Ordinary Least Squares		Tobit Model	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fee Paid	Fee Paid	Fee Paid	Fee Paid	Fee Paid	Fee Paid	Fee Paid	Fee Paid
Pinto	44.114*** (3.503)	40.182*** (3.564)	56.465*** (4.210)	54.450*** (4.262)	42.357*** (3.539)	37.369*** (3.690)	52.789*** (4.340)	53.674*** (4.679)
Black	10.800*** (1.988)	6.175*** (2.020)	14.947*** (2.431)	10.049*** (2.429)	10.864*** (1.987)	6.698*** (2.004)	15.147*** (3.045)	10.858*** (3.028)
White-Gray	18.288*** (2.321)	16.631*** (2.395)	25.474*** (2.722)	24.385*** (2.814)	18.236*** (2.338)	15.480*** (2.398)	25.496*** (3.332)	23.045*** (3.373)
Appaloosa	23.267*** (6.229)	15.498** (6.406)	28.610*** (7.472)	20.202** (7.594)	22.438*** (6.245)	14.438** (6.425)	27.033*** (8.969)	19.951** (8.946)
Palomino	31.369*** (3.434)	29.811*** (3.445)	43.687*** (4.119)	42.829*** (4.127)	29.859*** (3.448)	24.253*** (3.558)	40.450*** (5.267)	37.002*** (5.472)
Lambda	-24.240*** (3.881)	-21.971*** (4.973)	-16.116*** (4.950)	2.805 (6.967)	-42.711*** (4.410)	-69.775*** (7.419)	-58.669*** (5.410)	-52.061*** (13.012)
State Fixed Effects	NO	YES	NO	YES	NO	YES	NO	YES
F-statistic	—	29.12	—	77.10	—	35.82	—	82.28
P-value	—	0.0000	—	0.0000	—	0.0000	—	0.0000
Year Fixed Effects	NO	YES	NO	YES	NO	YES	NO	YES
F-statistic	—	64.91	—	44.39	—	41.77	—	34.83
P-value	—	0.0000	—	0.0000	—	0.0000	—	0.0000
Observations	64,858	64,858	64,858	64,858	64,858	64,858	64,858	64,858
R-squared	0.072	0.090	0.0123	0.0140	0.071	0.089		

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Notes: Standard errors in parentheses. For ordinary least squares, robust standard errors are reported. *, **, and *** denote estimates are statistically significant at the 0.10, 0.05, and 0.01 levels, respectively.

According to the results obtained using ordinary least squares (column 2), the estimate on *Age* indicates that a one year increase in age decreases the price paid by almost \$2, all else equal. This estimate has the expected sign and is significant at the 0.01 level. The estimate on *Sold* is statistically significant at the 0.01 level, has the expected sign and indicates that wild horses that have been sold since 2005, received on average \$79 less than wild horses that were adopted.

The estimate on *Trained* is statistically significant and has the expected sign. According to this estimate, on average, the fee paid in excess of the training costs for trained wild horses is almost \$129 higher than the fee paid for untrained wild horses. For the variable *CPI*, the estimated coefficient is statistically significant at the 0.01 level and does not have the expected coefficient. The estimates for *Face Whorls* and *Leg Markings* are statistically significant at the 0.01 level. According to the estimates provided in column (2), one more face whorl decreases the fee paid by \$8.40.³⁶ On average, people pay around \$4 less for wild horses with leg marks than for wild horses without leg marks. The estimate for *Face Markings* is not statistically different than zero at conventional levels of significance.

The estimated coefficients on the sex variables are statistically different from zero at the 0.01 level of significance, have the expected signs and their estimated coefficients indicate that the fee paid for mares is \$8 higher than the fee paid for stallions, while the price paid for geldings is \$24 higher than the one paid for stallions. The estimates on the color variables are all statistically different from zero at conventional levels of

³⁶ Note that this result is inconsistent with the prediction based on the work by Gorecka (2007).

significance. Their estimates indicate that the fees paid for roan, grulla-dun, pinto, black, white-gray, Appaloosa, and palomino horses are higher than the prices paid for brown-bay horses. The estimated coefficient on *Lambda* is statistically significant at the 0.01 level, which indicates that the sample suffers from selection bias and that the inclusion of the inverse Mill's ratio is appropriate.

Lastly, the hedonic pricing model was estimated using a tobit model to take into account the fact that the data were censored at \$25, these results are reported in table 9 columns (3) and (4). In general, the estimates obtained from this model are larger, with the exception of the estimated coefficients on *Leg Markings* and *Gelding*. Some other differences in results are observed between the ordinary least squares regressions and the tobit model. The estimate on *Face Whorls* is no longer statistically significant at conventional levels and the estimated coefficient on *Leg Markings* is only statistically significant at the 0.10 level. The other main difference observed is with respect to the significance of the estimate on *Lambda*, which is no longer significant when state and year fixed effects are added to the model indicating that when these effects are including in the model, the sample no longer suffers from selection bias. This result can be due to the fact that since 2005, unadopted wild horses (valued at less than the minimum standard adoption fee) can be sold.

Using the tobit model and according to the results reported in column (4), the estimate on *Age* indicates that a one year increase in age decreases the price paid by almost \$4, all else equal. The estimate on *Sold* is statistically significant at the 0.01 level,

has the expected sign and indicates that wild horses that have been sold since 2005, received on average \$258.70 less than wild horses that were adopted.

The estimate on *Trained* is statistically significant and has the expected sign. According to this estimate, on average, the fee paid in excess of the training costs for trained wild horses is almost \$158 higher than the fee paid for untrained wild horses. Finally, the estimated coefficients on the sex variables indicate that the fee paid for mares is \$10 higher than the fee paid for stallions, while the price paid for geldings is \$22 higher than the one paid for stallions.

Simulation Regressions

The results obtained for this alternative hedonic pricing model, are presented in table 9 columns (5) to (9) under the heading of simulation regressions. Due to concerns about omitted variable bias in the basic model that could lead to biased estimates, state and year fixed effects are included. State of capture fixed effects could control for the variation in fees paid due to difference in horses across states (e.g., breeding, appearance). Year of capture fixed effects control for omitted factors that result in adopters and buyers paying higher or lower annual fees (e.g., forage costs, transportation costs). State and year fixed effects are jointly significant at the 0.01 level, therefore to predict fees for those wild horses that were not disposed of, the estimates reported in column (6) obtained from the ordinary least squares regression and the estimates reported in column (8) obtained from the tobit model are used.

In general, the results reported in columns (5) to (8) do not differ from those reported in columns (1) to (4). The estimated coefficients reported on columns (6) and

(8) on *Leg Markings* and on the color variables are similar to those reported on columns (2) and (4), respectively. The estimates reported in columns (6) and (8) on *Sold* and on the sex variables are higher than those reported on columns (2) and (4) and the estimated coefficients reported in columns (6) and (8) on *Trained* are slightly lower than those reported in columns (2) and (4).

Main differences between the results obtained from the simulation regressions and the hedonic pricing regressions are observed with respect the estimates on *Age*, *CPI*, *Face Whorls*, and *Lambda*. Using the simulation regressions, the estimated coefficient on *Age* is not statistically significant at conventional levels when state and year fixed effects are included. The estimates on *CPI* reported on columns (6) and (8) are statistically significant at the 0.01 level and have the expected sign. Finally, the estimates on *Face Whorl* and *Lambda* obtained from the tobit model are statistically different than zero at conventional levels of significance.

The estimates obtained from the simulation regressions are used to predict fees for those wild horses that were not disposed of. Different minimum adoption fees are then simulated, and based on the predicted fees obtained, the number of additional wild horses that the BLM would dispose of under these different scenarios is calculated as well as the potential savings for the BLM in long-term holding costs and additional revenue. In the sample, there are a total of 55,566 wild horses captured between 1985 and 2010 that were not adopted or sold as of April 2010, and for each one of these horses two predicted fees were obtained. The first set of predicted fees is based on the estimates reported in column (6) obtained from the ordinary least squares regression including state and year

fixed effects. The second set is calculated using the estimates reported in column (8) obtained from the tobit model.³⁷ Table 10 shows the predicted number of animals that the BLM would have disposed as well as the potential savings in long-term holding costs and the additional revenue that would have been obtained under different minimum adoption fee scenarios.

The potential savings shown in table 10 were calculated based on an average life expectancy for wild horses in captivity of 30 years, the fact that the BLM must take care of all wild horses that were not disposed of for the remainder of their lives, and that current long-term holding costs for each wild horse are \$475 per year.³⁸ For each wild horse that was not disposed of, long-term holding costs were estimated for the entire time that the BLM must take care of the animal, which corresponds to the difference between 30 and the estimated age at which the animal was sent to a long-term facility. To estimate the age when a wild horse was sent to a long-term facility, one year was added to the age of the animal at the time of capture. This calculation was made based on the observation that in the sample obtained from the BLM, the average time spent by wild horses in preparation facilities (during this time the animals are vaccinated, dewormed, and stallions are castrated) was 276 days.

³⁷ The fees are predicted using a linear prediction for both the OLS regression and the tobit regression, so in the last case predicted fees under \$25 can be obtained.

³⁸ It is assumed that the nominal increase in long-term holding costs equals the discount rate.

Table 10. Potential Benefits by Lowering the Standard Minimum Adoption Fee.

	Predicted Fees from Ordinary Least Squares	Predicted Fees from Tobit Model
Proposed Fee: \$75		
Extra Number of Animals Disposed	47,675	33,274
Revenue from Additional Disposals	6,109,695	3,879,621
Savings in Long-Term Holding	513,000,000	356,000,000
Total Benefits	519,109,695	359,879,621
Proposed Fee: \$25		
Extra Number of Animals Disposed	54,341	45,543
Revenue from Additional Disposals	6,495,901	4,517,461
Savings in Long-Term Holding	595,000,000	491,000,000
Total Benefits	601,495,901	495,517,461
Proposed Fee: \$0		
Extra Number of Animals Disposed	55,086	47,887
Revenue from Additional Disposals	6,505,575	4,546,706
Savings in Long-Term Holding	604,000,000	516,000,000
Total Benefits	610,505,575	520,546,706
Proposed Fee: \$-50		
Extra Number of Animals Disposed	55,566	53,987
Revenue from Additional Disposals	6,505,575	4,546,706
- Subsidy Costs	-3,980	-114,500
Savings in Long-Term Holding	610,000,000	591,000,000
Total Benefits	616,501,595	595,432,206

The results reported in table 10 suggest that significant savings can be obtained if the BLM lowers the standard minimum adoption fee of \$125. For example, a minimum adoption fee of \$75 would allow for the disposal of 33,274 additional wild horses, which represents \$3,879,621 in revenues and long-run savings in holding costs of approximately \$356,000,000 for the BLM.³⁹ These savings are larger when the adoption fee is lowered more.⁴⁰

³⁹ To calculate the savings in long-term holding, for example, a wild horse that was captured at age 5, would be sent to long-term holding at age 6, so it would spend 24 years in long-term facilities, at a cost of \$11,400; therefore the savings for this particular animal would be \$11,400. The disposal of 33,274 additional wild horses is assumed to take place during the period 1985-2010.

⁴⁰ There are some other non-financial impacts associated to lowering the minimum standard adoption fee as it happened in the period 1984-1988 when the BLM waived the adoption fee. For example, more animals could be sent to slaughter houses and more abuses to the animals could be observed. This could result in significant public criticism to the program and considerable judicial activity. By retaining the title to the animals, however, some abuses would be avoided.

CHAPTER 7

DISCUSSION

The HMA political economy results suggest that holders of permits and leases to graze on public lands have significant influence on the management of the WH&B program. According to these results, the more grazing allotments that overlap an HMA, the greater will be the probability of the BLM conducting a gather and the higher will be the number of animals removed from the range. This outcome supports prediction (1) proposed in chapter 3. The result is expected given the competitive interaction between domestic livestock and wild horses and burros for forage. With respect to the other interest group analyzed in this study, the filing of a lawsuit by a pro-WH&B group does not influence the likelihood of a gather being conducted. It does, however, increase the probability of having a gather, as well as the number of animals removed the year after the filing.

Many coefficient estimates from the hedonic pricing model are highly significant with the expected algebraic signs. Nonetheless, the horses' characteristics explain a small proportion of the variability in the fees paid by adopters and buyers. The lack of explanatory power in the hedonic pricing model suggests that there are important factors omitted from the analysis that have important impacts on the determination of the prices paid by adopters and buyers. Among these, one potentially important factor is hay prices. According to North et al. (2005), the average spending per month per horse on hay is \$80. Feed is the largest cost component in the maintenance of a horse (around 40 percent

of the total cost). One would therefore expect that increases in hay prices would lead to decreases in wild horse adoptions and to reductions in the fees paid for horses, holding all other factors constant. Figure 13 presents a graph of the index of hay prices paid between 1997 and 2010. This graph shows an upward trend in the price paid for hay between 2003 and 2008.

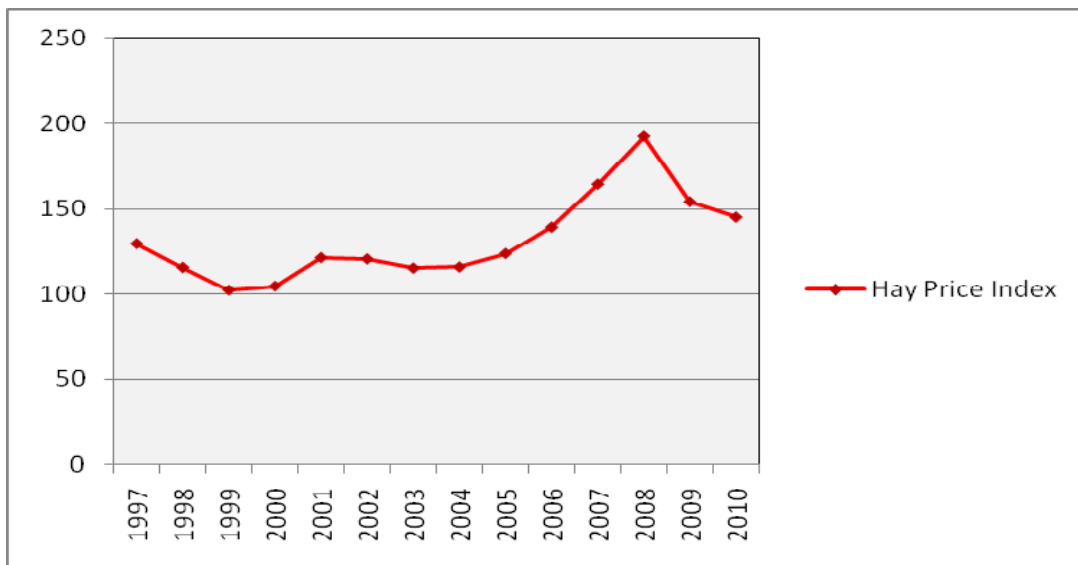


Figure 13. Hay Price Index (Base Period: 1990-1992).

Source: University of Wisconsin Dairy Marketing and Risk Management Program.

North et al. (2005) point out other factors that can affect the demand for wild horses. In 2007 the last two U.S. slaughter houses that processed horses for human consumption were closed. This has led to an increase in the supply of domestic horses for adoption or sale, because these old horses would have been sent to the slaughter houses previously. These horses compete with wild horses for adopters and buyers, decreasing the number of wild horses adopted or sold and lowering the price paid for them.

Policy Options

The findings of this study suggest it may be useful to consider new alternatives to control wild horse populations, because adoptions and sales are not sufficient to dispose of the wild horses removed each year from the range. The fact that the BLM sets a minimum fee for the adoption of wild horses that exceeds the value of many of these animals results in a surplus of wild horses. The number of horses adopted or sold is less than the number of horses captured. This situation significantly increases the costs of management and care of wild horses for the WH&B program. As of May 2010, the BLM held a total of 24,472 wild horses in grassland pasture facilities (long-term holding). Table 13 shows the age distribution for these animals.

Table 11. Age of Wild Horses in Long-Term Holding Facilities.

Age of Horses in Long-Term Holding Facilities*		
0 - 4 Years	5 - 10 Years	11 + Years
148	11,457	12,867

* Number and age distribution of wild horses in long-term facilities as of May 2010.
Source: BLM's WH&B Program Statistics.

Based on the number of wild horses held in long-term pastures as of May 2010 and their age distribution, the BLM will spend a total of \$177,899,375 to maintain all these animals for their entire life.⁴¹ This is an underestimation of these costs, given that

⁴¹The BLM estimates that the average life expectancy of a wild horse in captivity is 30 years. Long-term holding costs for each horse are \$475 per year. The total spending estimate was calculated using the upper bound of the first two age categories. For the last category, 19 years was used as the average. This number corresponds to the average age (as of 2010) of wild horses that were not adopted or sold in the sample. It is assumed that the nominal increase in long-term holding costs equals the discount rate.

the number of animals in long-term facilities is increasing over time (as of October 2010 the number of wild horses in long-term holding had increased to 26,377 animals).

One policy option that could decrease the costs of the WH&B program is to lower the standard minimum adoption fee. In fact, the results obtained in chapter 6 section 3 suggest that the BLM could have achieved significant gains by lowering the standard minimum adoption fee from \$125 to \$75, because more animals could have been disposed of, which would have provided the BLM with considerable savings in long-term holding costs. According to table 10 in chapter 6, given the estimated additional number of wild horses that would have been adopted under a minimum adoption fee of \$75, the BLM would have saved \$356,000,000 in long-term holding costs between 1985 and 2010. These savings would have been larger if the minimum adoption fee were lowered further. Although, this policy modification would reduce some costs of the WH&B program, additional measures also have the potential to promote the adoptability of “unadoptable” wild horses. Measures such as a reduction in the length of the probationary period to acquire title to the animals adopted or the elimination of this requirement could result in the disposal of additional hard-to-adopt wild horses.⁴²

An alternative method that could reduce some of the costs of the WH&B program is a more extensive application of fertility control tools. Since 1978, the BLM has been

⁴² Several programs have been developed by the BLM to increase the number of animals adopted. Some of them were discussed in chapter 2. Other programs created by the BLM are the Training Incentive Program, where private individuals train wild horses and the agreement signed with the Mustang Heritage Foundation to promote and train wild horses. Finally, a pilot program was initiated in the BLM-New Mexico region (this region comprised New Mexico, Texas, Oklahoma, and Kansas) that offers adopters a voucher for \$500 for each untrained wild horse adopted that is four years or older (the limit is four wild horses). The voucher can be exchanged for cash at the end of the one-year probationary period when the adopter sends the title application along with the voucher to the BLM.

seeking to develop a safe, effective, reversible, and humane fertility control agent. The immuno-contraceptive agent PZP, which meets most of these requirements and has been used since 1992, has shown an effectiveness of 90 percent in preventing pregnancies in mares. Its application, however, requires an initial “primer” dose, followed by annual “booster” shots making it an expensive agent to control fertility in mares. Cost considerations motivated the development of an experimental 22-month PZP vaccine, which has been used in field trials since January 2000. Results suggest an efficacy of 94 percent during the first year, 82.4 percent in the second year, and 68 percent in the third year. Bartholow (2007) found that the most cost-effective fertility treatment is one that includes an agent that can block fertility in mares for three years combined with adjustments to the sex ratio in favor of stallions (this could be accomplished by removing more mares than stallions).

According to the BLM’s Instruction Memorandum No. 2009-90, the costs associated with the use of the one-year PZP vaccine are \$4,000/month (labor and equipment costs) plus \$25 per wild horse (treatment cost), while the costs to administer the 22-month PZP vaccine is \$1,250 per mare treated (this amount includes capture and vaccine costs). The savings for each wild horse not born due to the fertility control in one year can be between \$2,100 and \$2,600 ($2,100 = 500 + 1,100 + 500$ or $2,600 = 500 + 1,100 + 1,000$) if the animal would have been adopted or \$2,075 ($2,075 = 500 + 1,100 + 475$) if the animal would not have been adopted. In the not adopted scenario, an additional \$475 will be saved for each year that the animal would not be held in long-

term facilities, leading to substantially larger savings.⁴³ The use of the 22-month PZP agent offers net benefits (savings minus costs) of between \$850 to \$1,350 ($850 = 2,100 - 1,250$ or $1,350 = 2,600 - 1,250$) if the animal had been adopted, but if the animal had not been adopted, the net savings could reach \$825 ($825 = 2,075 - 1,250$) during the first year plus \$475 for each additional year that the BLM would not need to hold the animal in long-term facilities. The net savings could be as high as \$12,225 ($12,225 = 825 + 475 \times 24$) per wild horse.⁴⁴

The results found here, as well as those obtained by Bartholow (2007), suggest that fertility control mechanisms can offer significant cost reductions to the WH&B program, while at the same time allowing the BLM to fulfill its mission of protecting wild horses and burros. The BLM is cognizant of the potential offered by a fertility control program in reducing costs, so it has been working to develop a longer-acting agent that can increase the infertility window in mares. In addition, the BLM has signed a memorandum of understanding with the Humane Society of the United States to facilitate research and extend the use of contraception in wild horse populations, and to educate the public in the use of this tool. In March 2009, the BLM issued a nation-wide instruction memorandum promoting the use of fertility measures to control wild horse populations (Instruction Memorandum No. 2009-090).

⁴³ These calculations were made based on a spending per wild horse of \$500 for capture, \$1,100 for preparation and short-term holding, \$500-1,000 for adoption costs, and \$475 per year in long-term holding. These numbers were obtained from Instruction Memorandum No. 2009-090.

⁴⁴ The upper bound of net benefits is calculated assuming a five-year-old wild horse that would have to be held in long-term pastures for 25 years. It is assumed that the nominal increase in long-term holding costs equals the discount rate.

Another approach that might be considered by the BLM to reduce the costs of the WH&B program is to decrease the number of AUMs allocated for domestic livestock grazing under leases and permits and to re-allocate these AUMs to wild horses. In fiscal year 2009, the BLM allocated 12,366,018 AUMs for domestic livestock grazing and 301,446 AUMs for wild horse and burro forage. The fee charged for grazing use on public lands was \$1.35 per AUM during the time period March 1, 2009 through February 28, 2010. If the BLM reallocated some of the AUMs assigned for livestock grazing, fewer wild horses would have to be removed.⁴⁵ For example, a 0.1 percent reduction in the current number of AUMs allocated for livestock grazing would free approximately 12,366 AUMs. The BLM assigned 1.25 AUMs to wild horses in regions with poor forage; so each wild horse needs 15 AUMs per year. Thus, the decrease in livestock grazing would allow leaving 824 ($824 = 12,366 \text{ AUMs divided by } 15 \text{ AUMs}$) additional wild horses roaming free on the public lands. This means that 824 animals would not be removed from the range, which, based on the figures reported in footnote 43, would save the BLM approximately \$2,100 per adopted or sold wild horse and \$2,075 per wild horse that would not be adopted, plus \$475 for each additional year that the BLM would not have to hold the animal in long-term pastures. The monetary costs of implementing this alternative to the BLM would be the forgone grazing fees, which with a reduction of

⁴⁵ A similar trade-off can be applied to AUMs allocated for wildlife grazing. The effects of this alternative were not estimated due to the lack of data on the number of AUMs allocated by the BLM to wildlife grazing.

12,366 AUMs would amount to \$16,694.⁴⁶ Thus, the net benefits of this alternative could be \$4,759,931 ($4,759,931 = 1,713,706 \times 0.675 + 11,086,706 \times 0.325$).⁴⁷

Even though this last alternative appears promising, it may be difficult to implement for political reasons. The results obtained from the political economy analysis conducted in chapters 5 and 6 suggest that the livestock industry is an influential stakeholder that has significant effects on the administration of the WH&B program. A reduction in the number of AUMs allocated for livestock grazing is likely to be opposed by this interest group, and the amount of litigation that could be generated might decrease considerably the net benefits of implementing the reduction. Therefore, to reduce litigation costs, the BLM could make lump sum payments to compensate those grazing holders that would be affected by reductions in AUMs.

Another interesting alternative to politically contentious changes in administrative practices that could reduce litigation costs would be to allow grazing holders to voluntarily surrender their AUMs to wild horse and burro advocacy groups. These groups could negotiate a fee to compensate those grazing permit holders that surrender their AUMs for wild horse grazing. Given the nature of the federal grazing permits and

⁴⁶ There are other costs associated to this alternative: the losses that holders of permits and leases to graze on public lands will experience due to the loss in the value of their leases and permits. Based on LaFrance and Watts (1995, p. 455) a crude estimate of the average value of these permits and leases is \$8 per AUM, therefore the losses for grazing permit holders would be \$6.65 per AUM per year (\$8 minus a grazing fee of \$1.35). A reduction of 12,366 AUMs (assuming a discount rate of 5 percent and that leases are held in perpetuity) would result in a loss, the present value of which would be \$1.67 million.

⁴⁷ The figures in this paragraph are calculated based on the numbers reported in footnotes 43 and 44. Therefore, for the last figure, total benefits if the animals were disposed of would be \$1,713,706 and if the animals were held in long-term facilities total benefits would be \$11,086,706. It is assumed that on average 67.5 percent of the animals removed are disposed of, and 32.5 percent of the animals removed are not disposed of (these percentages are based on BLM's annual statistics on the number of removed wild horses and the number of wild horses disposed of for years 1997 to 2009).

leases, however, this alternative could be hard to implement and would need the active participation of the BLM to authorize and monitor the reallocation of the AUMs.

Wild horse and burro advocacy groups through the American Wild Horse Preservation Campaign have proposed some solutions to reduce the costs of the WH&B program and to keep larger numbers of wild horses and burros on public lands. Among the proposed solutions are self-stabilizing herds, ecotourism, fertility control, and cooperation with ranchers. With self-stabilizing herds, wild horse populations would be placed in HMAs with natural limits, where natural predators such as mountain lions would be introduced, and where no active management from the BLM would be needed. Ecotourism would allow Americans to observe and enjoy wild horses in HMAs, so wild horses could be viewed as an economic resource by themselves. Cooperation with ranchers as a solution to the wild horse problem might be obtained through BLM contracts with grazing holders to manage wild horses in their grazing allotments. In exchange they “could be granted a tax-credit or paid a per-horse fee.”⁴⁸ Some of the solutions proposed by wild horse and burro advocacy groups are similar to those discussed previously. These alternatives, however, seek to increase the number of wild horses on the range and almost eliminate gathers of excess animals, thus they only would be short-term solutions that would generate a bigger problem in the future.

A plan to reduce the costs of administering the WH&B program might include more than one of the tools discussed in the preceding paragraphs. In general, none of the proposed mechanisms individually solve the cost problem of the program. For example,

⁴⁸ For more information on the solutions proposed by wild horse and burro advocacy groups visit <http://www.wildhorsepreservation.org>

a decrease in the standard minimum adoption fee would allow for the disposal of additional wild horses, reducing the costs associated with the maintenance of these animals in long-term facilities.⁴⁹ Without a mechanism to control wild horse and burro populations, however, costs incurred by the BLM in the capture, preparation, and adoption of wild horses may remain unacceptably high.⁵⁰ A more intensive use of fertility control programs combined with reductions in the number of AUMs allocated for livestock grazing, would control wild horse and burro populations and decrease the number of animals that have to be removed from the rangelands. If fewer animals have to be removed from the public lands and the populations on the range reproduce at lower rates, spending on capture, preparation, adoption, and long-term holding would be reduced. Thus, various combinations of the mechanisms discussed in this section have the potential to result in considerable savings for the WH&B program and to enhance its long-run political viability.

⁴⁹ Even though the new sale authority allows for the sale of wild horses and burros without a minimum price, this mechanism has limited application. Only a wild horse or burro older than ten years or that has been offered for adoption at least three times can be disposed of through this mechanism.

⁵⁰ Information on the BLM's cost to dispose of wild horses is provided in footnote 43. **Error! Bookmark not defined.**

CHAPTER 8

CONCLUSION

This thesis analyzed two aspects of the WH&B program. First, it studied the political economy behind the decisions made by the BLM with respect to the administration of the WH&B program, in particular when and how many animals to remove. The results obtained suggest that at the state level the decision of how many animals to remove is mainly influenced by factors that are unique to each state and to aspects that affect the program and change over time (e.g., wild fires, droughts). The results obtained from the HMA political economy model suggest that the BLM's decisions of when and how many animals to remove respond to the interests of grazing permit holders. The main findings from these analyses are that the more grazing allotments overlap an HMA, the higher the likelihood of the BLM conducting a gather to remove excess animals and the larger the number of wild horses and burros removed in a given year.

The second aspect of the WH&B program analyzed in this study is the BLM's policies for the disposal of captured wild horses. A hedonic pricing model was used to estimate the marginal value for each wild horse characteristic. The results obtained show that characteristics such as sex, color, training, and age are statistically significant. Horses' characteristics, however, do not explain much of the variability observed in the fees paid by adopters and buyers. The lack of explanatory power of the hedonic pricing model suggests that the presence of other factors such as the costs to maintain a horse

after adoption or purchase have important impacts on the prices paid by adopters and buyers.

Finally, several alternatives to reduce the increasing costs of the WH&B program were discussed. The implementation of any of these mechanisms alone or in combination, could save the BLM considerable sums of money in long-term holding costs and could put the program on a politically sustainable track.

On June 2010, the Secretary of the Interior initiated a strategy plan to achieve a sustainable management of the WH&B program. This plan is based on five basic principles and several of them are in line with the mechanisms discussed in chapter 7 to attain cost reductions and healthy wild horse and burro populations. It seems that the BLM is on the right track to develop a sustainable program while at the same time protecting these “living symbols of the historic and pioneer spirit of the West.”⁵¹ The more difficult task might be to walk the razor’s edge between the interests of competing constituent groups.

⁵¹ Prelude of the WH&B Act of 1971.

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APPENDICES

APPENDIX A

SUMMARY TABLE OF THE
WH&B PROGRAM OVER TIME

Table 12. Summary of the WH&B Program over Time.

Date	Change
September, 1959	Congress passed Public Law No. 86-234 known as Wild Horse Annie Act of 1959. It establishes criminal penalties for using an aircraft or motor vehicle to hunt wild horses or burros on public lands, for capturing or killing, and for polluting watering holes on public lands to trap, kill, wound, or main wild horses or burros.
December, 1962	The first refuge for wild horses was created in Nevada within the boundaries of the Nellis Air Force Base.
September, 1968	The Pryor Mountain Wild Horse Range was established in the Montana-Wyoming border.
December, 1971	Public Law No. 92-195 known as the Wild Free-Roaming Horses and Burros Act was enacted by Congress. It recognizes and protects wild horses and burros as an integral part of the natural system of the public lands, establishes criminal penalties for those who capture, brand, harass, kill or process these animals into commercial products, and provides three methods to control WH&B populations: moving them to other locations where WH&Bs existed on the effective date of the Wild Free-Roaming Horse and Burro Act, destroying them in a humane manner, or placing them in the care of private individuals under an agreement with the Federal Government, remaining these animals under the property of the U.S. Government for their lifetime.
1973	The first wild horses were placed into adoption in Montana.
March 4, 1974	The State of New Mexico, the New Mexico Livestock Board and its director, and a purchaser of three burros filed a complaint in the United States District Court for the District of New Mexico against the Secretary of the Interior, seeking a declaratory judgment that the Wild Free-Roaming Horse and Burro Act is unconstitutional and an injunction against its enforcement. The District Court held the Act unconstitutional and permanently enjoined the Secretary of the Interior from enforcing its provisions. The Secretary of Interior appealed this decision and in June 17, 1976 the Supreme Court upheld the WH&B Act, finding that congressional regulation and protection of wildlife on public lands is constitutional under the Property Clause, section 3, clause 2 of Article 4 of the U.S. Constitution.
1976	The Adopt-A-Horse Program went nationwide.
October 21, 1976	Congress passed Public Law No. 94-579 known as the Federal Land Policy and Management Act of 1976. This act directs the Secretary of Interior to manage the public lands under principles of multiple use and sustained yield and authorizes the Secretaries of the Interior and Agriculture to contract for the use of helicopters and for using motor vehicles to round up and transport wild horses.

Table 12. Summary of the WH&B Program over Time (continued).

October 25, 1978	Public Law No. 95-514 known as the Public Rangeland Improvement Act of 1978 was enacted by Congress. This act directs the Secretaries of the Interior and Agriculture to determine the appropriate management levels (AMLs) to achieve and maintain a thriving natural ecological balance and avoid deterioration of the range, and authorizes the Secretaries to grant title to wild horses and burros if the adopter has provided humane conditions, treatment, and care for a period of one year.
1979	The freemark program was initiated to facilitate the monitoring of captured wild horses and burros.
1979	The first WH&B distribution center in the East was established in Cross Plains, a town 30 miles north of Nashville, Tennessee.
1980	The Little Bookcliffs Wild Horse Range was created in Colorado.
January 2, 1982	A new policy fee was implemented, establishing a fee of \$200 per wild horse and a fee of \$75 per wild burro, plus transportation costs (if any).
January, 1982	A moratorium on the destruction of healthy unadopted excess animals was established.
March 4, 1983	The wild horse fee adoption was lowered to the current amount of \$125 per animal due to a decrease in the adoption demand. In addition, a new provision was implemented, requiring the submission of a nonrefundable \$25 advance payment with the adoption application form to reduce costs and to avoid the submission of non serious applications.
May, 1984	An emergency rule was implemented to reduce the number of healthy unadoptable animals removed from the range. It gave to the BLM's Director authority to adjust or waive the adoption fees for animals unadopted to the standard fees of \$125 per wild horse and \$75 per wild burro. This authority was used in transactions involving a minimum of hundred animals.
1984	The BLM eliminated transportation costs to adoption sites as part of the adoption fees, making them uniform throughout the country.
December, 1985	After a competitive bidding process, three contracts were awarded for holding facilities in Bloomfield, Nebraska; Lovelock, Nevada; and Muleshoe, Texas to place the animals that exceeded the capacity of the BLM's corrals.
1986	Experimentation with fertility treatment in mares and vasectomy in stallions was initiated.
1987	The inmate-wild horse training program was initiated at the Canon City prison, Colorado to improve the adoptability of older animals (three to six years old) and to increase the chances of long-term adoption success.
1988	Congress expressly prohibited the use of appropriated funds to destroy healthy WH&Bs in the Appropriation bill for fiscal year 1988. Since 1988, the same prohibition has been included in all appropriations bills.
Summer, 1988	The first sanctuary for unadopted excess wild horses was established in western South Dakota through the cooperation of the State of South Dakota, the South Dakota Community Foundation, the Institute of Range and the American Mustang, and the BLM.
1989	A second sanctuary for unadopted excess wild horses was established in Bartlesville, Oklahoma.

Table 12. Summary of the WH&B Program over Time (continued).

1991	The BLM had cooperative agreements to provide training to wild horses between five and nine years old and make them more adoptable with three State Departments of Corrections in California, Colorado, and Wyoming.
1992	A policy of selective removals was initiated to balance the need to achieve appropriate management levels, minimize the time excess wild horses and burros are held in BLM facilities awaiting adoptions. According to this policy only animals five years of age or younger would be removed from the range.
1996	The selective removal policy changed due to drought conditions in western states. Animals nine years of age and younger would be removed from the range.
February, 1997	The BLM's Law Enforcement personnel finished an investigation about wild horses going to slaughter facilities. According to their results, in one year 0.25 percent of the animals slaughtered correspond to titled wild horses.
1997	A settlement agreement between the BLM and the Fund for Animals was reached. According to the agreement, the BLM will not place wild horses and burros with adopters whose intentions are to sell the animals for commercial processing. As a result a clause prohibiting the sale of these animals for commercial processing has been included as part of the adoption application.
1998	A new selective removal policy is issued. Wild horses five years of age and younger may be removed and offered for adoption. Wild horses six to nine years of age may be removed and offered for adoption if stallions are gelded, and mares and geldings receive gentling or training to improve their adoptability.
February, 2000	The BLM presents to Congress a budget initiative entitled "Restoration of Threatened Watersheds, Living Legends in Balance with the Land: A Strategy to Achieve Healthy Rangelands and Viable Herds". The objective of the plan is to achieve nationwide AMLs by 2005 through a four year gather schedule for all HMAs, the removal of larger numbers of animals, the elimination of age restrictions on removals, the expansion of training and gelding programs, and the promotion and marketing of animals and adoption events.
August 13, 2003	The state of Wyoming, the United States Department of Interior, and the BLM have agreed to a Consent Decree. According to this agreement, the BLM has to remove no later than December, 2003 all excess wild horses from the following HMAs: Adobe Town, Great Divide Basin, Salt Wells, White Mountain, Green Mountain, Crooks Mountain, Stewart Creek, and Little Colorado; and no later than December, 2004 the BLM has to remove all wild horses in excess of the AML from the following HMAs: Conant Creek, Lost Creek, Dishpan Butte, Antelope Hills, Muskrat Basin, Rock Creek, Fifteenmile, and McCullough Peaks. Thereafter, excess wild horses have to be removed by December of the year of the next budget cycle.

Table 12. Summary of the WH&B Program over Time (continued).

December 8, 2004	Congress enacted Public Law No. 108-447, which directs the Secretaries to sell excess wild horses and burros without limitation if the animal is more than ten years of age or has been offered unsuccessfully for adoption at least three times. This is the so-called sale authority inserted by Senator Conrad Burns into the 2005 Appropriation Bill.
April 25, 2005	BLM halted all transactions under the new sale authority, while it began considering additional safeguards to prevent animals from being sent to slaughter. The new safeguard consists on a clause included in the bill of sale, which prohibits the purchaser to sell the animals bought to any person or organization that will resell the animals for commercial processing.
2006	A new gelding policy is implemented by the BLM. According to this new rule wild horse stallions four years of age and older would be gelded. Before this change, stallions aged six years and older were gelded.
2009	The gelding policy is modified. All wild horse stallions removed from the range or that are born in holding facilities would be gelded once they are weanlings or older.
2010	The selective removal criteria are modified. Wild horses four years of age and younger would be removed first, then wild horses eleven to nineteen years of age, and finally animals five to ten years of age if necessary to achieve AMLs.

APPENDIX B

ADOPTION APPLICATION

Form 4710-10
(October 2004)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR ADOPTION OF WILD HORSE(S) OR BURRO(S)

FORM APPROVED
OMB NO. 1004-0042
Expires: August 31, 2007

Applicant's Last Name		First Name		Middle Initial
Street Address or P.O. Box		City	State	Zip Code
Driver's License Number	State	Birth Date	Social Security Number or Tax Identification Number	
Home Phone (Include area code)		Alternate Phone (Include area code)		E-Mail Address
Number of animals requested:				
Burros _____ Horses (Younger than 18 mos.) _____ Horses (Older than 18 mos.) _____ Geldings _____ Trained Animals _____				

Question 1. Describe your existing facility and transportation:

a) Corral

Dimension: Length _____ Width _____ Height of Corral _____

Gate Height _____ Gate Width _____

Materials used in Corral _____ Materials used in Gate _____

b) Shelter

Maximum Height _____ Minimum Height _____ Gate Height _____ Gate Width _____

Materials used in Shelter _____

Attached to Corral? Yes No; If not attached, how is it accessible? _____

c) Feed

Type of Hay or Pasture _____ Amount per Day _____

Supplemental Feed _____

d) Access to Water

Water Tank Size _____ Source of Water _____

e) Trailer

Interior Length _____ Interior Width _____ Interior Height _____

Covered with _____ Type of Doors _____

Question 2. Have you previously adopted animals through the Wild Horse and Burro Program? Yes No

If your answer is yes, are these animals titled? Yes No

How many untitled animals do you have? _____

Question 3. Will more than four untitled animals be kept at the location described? Yes No

Question 4. Have you ever adopted under another last name? Yes No If yes, what other name did you use? _____

Question 5. Have you ever been convicted of abuse or inhumane treatment of animals, violation of the Wild Free Roaming Horse and Burro Act or the Wild Horse and Burro Regulations? Yes No

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212 make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representation as to any matter within its jurisdiction.

(Continued on page 2)

Applicant's Name

MAP OF LOCATION OF ADOPTED WILD HORSES AND/OR BURROS

Facility Address

City

State

Zip Code

Property Owner(s) Name

Phone Number

Draw a map to the location where animal(s) will be kept (from the nearest major highway).	Draw a layout of corral(s) and shelter(s).
N	N

Directions to the Facility

INSTRUCTIONS

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Carefully read the PROHIBITED ACTS and TERMS OF ADOPTION printed below. 2. Carefully read information provided in the pamphlet "Adopting a Wild Horse or Burro." 3. Submit your completed Application for Adoption of Wild Horse(s) or Burro(s) to the Bureau of Land Management (BLM) office serving your | <p>State. (For the correct address, refer to the pamphlet "Adopting a Wild Horse or Burro" or take it to an adoption event.)</p> <ol style="list-style-type: none"> 4. So that we may notify you when and where the animal(s) you requested are available, provide the Bureau of Land Management office serving your State within 10 days of any change in your address or telephone number. |
|---|---|

PROHIBITED ACTS

- | | |
|---|---|
| <ol style="list-style-type: none"> (a) Maliciously or negligently injuring or harassing a wild horse or burro; (b) Treating a wild horse or burro inhumanely; (c) Removing or attempting to remove a wild horse or burro from the public lands without authorization from the BLM; (d) Destroying a wild horse or burro without authorization from the BLM, except as an act of mercy; (e) Selling or attempting to sell a wild horse or burro or its remains; | <ol style="list-style-type: none"> (f) Branding a wild horse or burro; (g) Removing or altering a freeze mark on a wild horse or burro; (h) Violating an order, term, or condition established by the BLM under this part; (i) Commercially exploiting a wild horse or burro; <p>Any person who commits a prohibited act is subject to a fine of not more than \$2,000 or imprisonment for not more than one year, or both, for each violation.</p> |
|---|---|

(Continued on next page)

Applicant's Name _____

TERMS OF ADOPTION

The following terms apply to all wild horses and burros adopted under this Private Maintenance and Care Agreement:

- (a) Adopters are financially responsible for providing proper care;
- (b) Adopters are responsible, as provided by State law, for any personal injury, property damage, or death caused by animals in their care, for pursuing animals that escape or stray, and for costs of recapture;
- (c) Adopters must not transfer animals for more than 30 days to another location or to the care of another individual without the prior approval of the BLM;
- (d) Adopters must make animals available for physical inspection within 7 days of receipt of a written request by the BLM;
- (e) Adopters must notify the BLM within 7 days of discovery of an animal's death, theft or escape;

(f) Adopters must notify the BLM within 30 days of any change in the adopter's address;

(g) Adopters must dispose of remains in accordance with applicable sanitation laws; and

(h) Title will remain with the Federal Government for at least 1 year after the Private Maintenance and Care Agreement is executed and until a Certificate of Title is issued by the BLM.

(i) Adopters are entitled to a replacement if within 6 months of the adoption date the animal(s) dies or is required to be destroyed due to a condition that existed at the time of adoption and if the adopter provides a veterinarian's statement that certifies that reasonable care would not have corrected the condition.

Failure to comply with these terms may result in the cancellation of the agreement, repossession of the animals, and disapproval of requests for adoption of additional animals. In addition, violation of any term of a Private Maintenance and Care Agreement is a prohibited act.

I have read and understand the above TERMS OF THE ADOPTION and PROHIBITED ACTIONS.

(Applicant's Signature)_____
(Date)

Under penalty of prosecution for violating 18 U.S.C. 1001, which makes it a federal crime to make false statements to any agency of the United States, I hereby state that I have no intent to sell this wild horse or burro for slaughter or bucking stock, or for processing into commercial products, within the meaning of the Wild and Free Roaming Horse and Burro Act, 16 U.S.C. 1331 et seq., and regulations 43 CFR 4700.0-5(c). I have read the above statement, understand the terms of this agreement and agree to comply with them.

(Applicant's Signature)_____
(Date)

Approved for: _____ No. of Burros _____ No. of Horses Younger than 18 mos. _____ No. of Geldings
 _____ No. of Horses Older than 18 mos. _____ No. of Trained Animals

_____ Total No. of Animals Approved for Adopter's Facility

☐ **Disapproved** (*Disapproval will be accompanied by a decision letter to the applicant with appeal rights.*)

(BLM Official's Signature)_____
(BLM Official's Printed Name)_____
(Office)_____
(Date)

This application expires one year after the date of approval by the BLM Official's Signature.

NOTICES

The Privacy Act of 1974 and the regulation in 43 CFR 2.48 (d) provide that you be furnished the following information in connection with information required by this agreement.

AUTHORITY: 16 U.S.C. 1333 and U.S.C. 7701

PRINCIPAL PURPOSE: The BLM will use this information to process your agreement for private maintenance and care of wild horses or burros. BLM will use your driver's license and social security numbers for debt collection purposes under the authority of the Debt Collection Act, 31 U.S.C. 7700 et seq.

ROUTINE USES: The primary uses of the information are to: (1) Identify individuals who have applied to obtain custody of a wild horse(s) or burro(s); (2) Document disposition of the application, that is, whether rejected, suspended, granted, or title issued to the animal(s); (3) Record administrative and adjudicative actions; and (4) Collect debts, when applicable. Disclosures outside the Department of the Interior will be made only according to the provisions at 43 CFR 2.56.

EFFECT OF NOT PROVIDING INFORMATION: Disclosure of your social security number is mandatory for debt collection purposes. Disclosure of your driver's license number is required to keep track of the location of the animal(s). Disclosure of the other information is required to obtain a benefit, that is, one or more wild horses or burros.

The Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.) requires us to inform you that:

This information is collected to process your application to adopt a wild horse or burro.

This information will be used to determine your qualifications to provide proper care to one or more wild horses or burros.

Response to this request is required to obtain a benefit, except for your driver's license number, which is required to keep track of the location and condition of the animal(s), and for your social security number, which is mandatory for debt collection purposes.

BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

BURDEN HOURS STATEMENT

Public reporting burden for this form is estimated to average 10 minutes per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to U.S. Department of the Interior, Bureau of Land Management (1004-0042), Bureau Information Collection Clearance Officer, (WO-630), 1849 C Street, N.W., Washington, D.C. 20240.

APPENDIX C

BILL OF SALE SAMPLE

Form 4710-23
(May 2005)

United States
Department of the Interior
Bureau of Land Management
Bill of Sale for Wild Horse(s) and Burro(s)

This is to certify that on this _____ at _____
(Date) (City)

USDI, Bureau of Land Management _____
(Office or Facility Name)

Address _____
(Address of BLM Office or Facility)

Sold the following (number) _____

To _____
(Name of Purchaser)

Of _____
(Purchaser's Address)

Telephone number with area code _____

This document serves as both a sales contract and proof of ownership.

Purchaser may be subject to criminal penalties if in this Bill of Sale he/she knowingly and willfully falsifies, conceals, or covers up a material fact; makes any materially false, fictitious, or fraudulent statement or representation; or otherwise violates 18 U.S.C. § 1001.

Purchaser agrees to provide humane care to the listed wild horse(s) and/or burro(s).

Purchaser agrees not to knowingly sell or transfer ownership of any listed wild horse(s) and/or burro(s) to any person or organization with an intention to resell, trade, or give away the animal(s) for processing into commercial products.

Purchaser understands the listed wild horse (s) and/or burro (s) is/are wild, ungente animals, and due to their age and temperament may never become accustomed to human contact or be trainable for handling like domestic livestock.

Purchaser agrees to provide adequate facilities to contain and care for these animals.

Purchaser acknowledges that the seller makes no express or implied warranties as to the merchantability or fitness for any particular purpose for any wild horses or burros purchased under this program.

Purchaser has read the above statements, and understands and agrees to these terms.

Per Public Law 92-195, as amended, the listed wild horse (s) and/or burro (s) "shall no longer be considered to be a wild free-roaming horse or burro." Sale of animals is final upon pick-up and will be the responsibility of the purchaser.

Authorized Officer

Signature of Purchaser

(Date)

(Date)

Form of Payment: _____