

Environmental Assessment

**Alternatives for Managing the Size of the Feral Horse
Population of Assateague Island National Seashore**

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Introduction

Assateague Island National Seashore (ASIS) was authorized by Congress as a unit of the National Park Service in the Act of September 21, 1965 (Public Law 89-195). A general statement of purpose for the park was included in Section 1 of the Act, which called for the protection and development of Assateague Island for outdoor recreational use and enjoyment.

This purpose was amended by the Act of October 21, 1976 (P.L. 94-578) which directed the Secretary of the Interior to prepare a "comprehensive plan" which would include, among other things, "measures for the full protection and management of natural resources and natural ecosystems of the seashore." The 1982 General Management Plan (GMP) which evolved from this mandate reflects a systematic approach to park management whereby recreational use and development is balanced with the need to ensure long term preservation of natural resources, processes and values. (13)

The feral horses of ASIS are, perhaps, the park's most well known natural resource. Thousands of visitors are attracted to Assateague each year for the opportunity to view free-roaming horses in a natural barrier island setting. While technically an exotic species, the National Seashore's GMP directs that the horses be managed as a "desirable feral species" within the context of the park's overall purposes. When the National Seashore acquired ownership of the horses in 1968, the herd numbered 28. Since then, the population has expanded to approximately 165.

With this growth has come an increase in the negative effects of horses on the park's other natural resources and processes. Ongoing research has demonstrated that the horses impact the distribution and vigor of certain native plant species, and modify the natural dynamics of plant community composition. Grazing has also been observed to disturb the physical integrity of sensitive dune features and marsh lands through trampling and elimination of soil binding vegetation. Although the horses are considered an important part of the Assateague experience, there is a need to manage the population at a level that will both provide for the long term health and viability of the herd as well as minimize impacts to other park resources and values.

Background

During the mid 1970's, research was initiated to assess the population dynamics and ecological impacts of the feral horse herd within the National Seashore. The results of this effort included quantification of the horses' energetic (forage biomass) requirements, and preferred forage availability within the park. The data were used to estimate a "carrying capacity", defined as the number of horses that would utilize approximately 10% of the annual primary productivity of forage vegetation. In consideration of overall park management objectives, this estimate was adjusted to define an "optimum" number of horses that could be sustained without adversely affecting the native components and natural processes of the park ecosystem. The number was estimated to be between 120 and 150 horses. In 1979, the population had reached 62 and was increasing at a rate of approximately 10-15% a year. (7)

In 1985, the National Seashore approved a Feral Horse Management Plan which established guidelines for management of the National Park Service-owned herd and formally adopted a population limit of 150 horses. Central to this plan was a recognition that the number of feral horses (approximately 130 in 1985) would, if allowed to expand unhindered, soon exceed the 150 limit. Research was initiated in 1986 to develop a safe and humane method of reducing horse reproductive (birth) rates and thereby manage population growth. The result of this effort has been the development of a fertility control technology utilizing porcine zona pellucida (PZP) immunocontraceptives. (1)

PZP immunocontraception is a technique whereby injection of a vaccine derived from the proteinaceous membrane surrounding pig egg cells stimulates the immune system of female horses to produce antibodies. At sufficiently high numbers these antibodies inhibit fertilization and, as a result, prevent pregnancy. The vaccine can be delivered remotely using a .22 cal. cartridge-powered dart rifle firing a barbless, self-injecting syringe, which eliminates the need to capture and handle the horses. Treatment requires an initial inoculation regime of either one or two dosages, dependant upon the desired effectiveness during the first year. Extending the fertility control effect is accomplished through an annual booster shot. (10)

Extensive field trials over a six year period both at Assateague and elsewhere have demonstrated the safety and effectiveness of immunocontraception in feral horses, and confirmed the feasibility of using fertility control as a long term population management tool. Treated horses exhibit normal behavior, produce healthy foals if vaccinated during pregnancy, and regain fertility when antibody counts return to normal levels. Although some questions remain concerning the effects of long term immunocontraception on ovarian function, consecutive treatments for up to three years has been demonstrated to be fully reversible, with no indication of deleterious effect. Investigations into the effect of longer term applications are ongoing. (11, 12)

In 1987 the feral horse population exceeded the 150-horse limit for the first time. Shortly thereafter, the herd reached approximately 170 before mortality associated with an outbreak of

Eastern Equine Encephalitis in 1989/90 and a severe storm in early 1992 resulted in temporary reductions. Annual reproduction in 1992, 1993, and 1994 has since increased the population to approximately 165. Population growth during recent years has, however, been partially offset by field trials of immunocontraceptives and the relocation of 13 horses out of the park due to problematic behavior.

A computer population model based on 15 years of horse birth and death information has been developed to predict and evaluate the outcomes of various management scenarios on the dynamics of the horse population. With no intervention, the model predicts gradually slowing rates of increase due to density dependant effects on reproduction (nutritional stress), but continued overall population growth for the foreseeable future. (15)

Research and monitoring activities conducted over the past five years have substantiated earlier estimates of resource impacts associated with high numbers of horses. Saltmarshes within the National Seashore are significantly different in comparison to similar areas outside park boundaries. Horses preferentially feed on *Spartina alterniflora*, the dominant plant of low saltmarshes, resulting in higher stem densities and lower plant heights - both conditions diagnostic of plant response to grazing pressure and reflecting reduced primary productivity, standing crop, nutrient pools and nitrogen flux. Preferential grazing also manifests as a competitive disadvantage to *S. Alterniflora*, adversely influencing saltmarsh species diversity and community dynamics. *Spartina patens* and *Distichlis spicata*, two grasses normally associated with high saltmarsh habitat, are found at significantly higher densities in low saltmarshes on Assateague than in other similar areas. Such changes may result in reduced system productivity and loss of habitat value. (5, 6, 14)

Ammophila breviligulata, the dominant species of barrier island dunes, is also preferentially consumed by the horses. As the primary colonizer of open sand habitats, *Ammophila* is crucial for the formation and stabilization of dunes. In controlled experiments, horse grazing resulted in reduced plant cover, biomass, and flowering/seed head production as compared to areas protected from grazing. (3, 8)

In addition to direct effects on native plant species and communities, grazing has also been associated with an observed loss of faunal diversity. Comparative inventories conducted on Assateague Island and adjacent mainland saltmarshes found reduced densities of several obligate saltmarsh species, including Clapper Rails (*Rallus longirostris*) and Fiddler Crabs (*Uca sp.*), in heavily grazed areas. Reduced vegetative cover, trampling, soil compaction, and disturbance by the horses are likely causative factors. (4, 6)

The potential for grazing impacts has been worsened by a recent series of severe storms resulting in a net decrease in the areal extent of plant communities used for foraging by the horses. Although non-uniform distribution of the horses produces a gradation of impacts throughout the park, the extent of heavily grazed areas has significantly increased over the past ten years. (3)

Need for the Proposal

It is the goal of Assateague Island National Seashore to manage the population of feral horses inhabiting the park at a size that protects the long term health and viability of the herd while minimizing their adverse effects on other natural resources. At present, the horse population exceeds the maximum number (150) considered necessary to meet this management goal. Widespread resource damage associated with grazing has been documented at the current population size, and will likely increase with growth of the herd.

In order to achieve an appropriate balance between protection of the feral horses and natural resource preservation, there is an immediate need to implement actions to reduce the size of the horse population, and to maintain it at or near the prescribed 150 horse limit. This Environmental Assessment describes a range of alternatives for managing the size of the feral horse population, identifies a preferred alternative, and assesses the impacts of implementing the alternatives.

Description of Alternatives and Environmental Consequences

ALTERNATIVE A - NO ACTION

Under this alternative, no changes would be made to the current practice of non-intervention in the population dynamics of the horse herd. The horse population would continue to expand by approximately 10-15% per year.

Impacts to Natural Resources

Density dependant impacts to park natural resources related to horse grazing are anticipated to escalate with increasing population growth. Resource impacts currently documented, and expected to persist and/or increase include: 1) reduced vigor and reproductive capacity of keystone plant species in dune and saltmarsh communities; 2) unnatural changes in dune and saltmarsh vegetation community structure and dynamics, and; 3) unnatural changes in species diversity (both flora and fauna) in saltmarsh habitats. Taken collectively, these observed impacts degrade both the character and functionality of critical park habitats, and threaten the long term ecological integrity of the barrier island system.

Continued population growth is also expected to result in adverse impacts to the horses. At present, the quality and quantity of winter forage available to the horses falls below that needed to sustain optimum physiologic health. The resultant nutritional stress is believed responsible for an observed increase in the average time between births in individual horses. This, in combination with increased juvenile mortality associated with population growth, has resulted in a declining reproductive rate. Given the finite nature of naturally occurring food resources, continued population growth will likely result in more widespread and severe nutritional stress.

Starvation, increased susceptibility to environmental stressors, and further declines in reproductive success are possible outcomes. (9, 15, 17)

Computer population modeling predicts continued growth in the Assateague population up to a ceiling in the range of 240-280. At that point, density-driven increases in juvenile mortality and reduced reproductive capacity associated with nutritional stress is predicted to approximate birth rate. (15, 16)

Impacts to Cultural Resources

No known historic or cultural resources would be affected.

Socio-economic Impacts

Much of the feral horse population inhabits portions of the park where contact with the visiting public is common, and results in routine interactions between humans and horses. Despite significant efforts by the National Seashore to warn the public of potential dangers (both to

themselves and the horses), and to enforce existing regulations prohibiting close contact with horses, a significant number of these interactions result in negative outcomes. Although the relationship between horse population size and frequency of negative human-horse interactions has not been formally defined, anecdotal evidence indicates that the frequency of incidents has increased with horse population growth. (2)

With continued growth of the horse population and the predicted increase in nutritional stress, foraging for human food by horses will probably increase. Actions to mitigate the potential for negative human-horse interactions will continue, but are not likely to completely eliminate conflicts. Existing impacts which may become more frequent include: 1) human injuries resulting from accidental/aggressive horse behavior; 2) horse deaths caused by injuries sustained in automobile collisions; 3) property damage to automobiles from collisions with horses, and; 4) property damage caused by "raiding" horses seeking food from within tents or automobiles.

The presence of rabies has been confirmed within the small mammal community inhabiting Assateague Island. Although uncommon in domestic stock, horses are susceptible to, and can transmit, the rabies virus. As such, continued growth of the horse population could increase the potential for infection, and the possibility of transmission to humans.

The scenario of unchecked horse population growth and resultant widespread nutritional stress is thought to be incompatible with the expectations of many park visitors. The commonly held romantic view of "wild" horses living as part of the barrier island environment generally does not include the ramifications of overpopulation. Allowing the horse population to self-regulate is expected to generate considerable controversy and denunciation.

ALTERNATIVE B - *PREFERRED* IMPLEMENT IMMUNOCONTRACEPTIVE FERTILITY CONTROL PROGRAM

Under this alternative, a program of horse fertility control using immunocontraceptives would be implemented. The goal of this program would be to reduce reproductive rates so that in concert with natural mortality, the horse population would gradually be reduced back to 150. Subsequently, the program would be continued, but at a reduced level such that the population would remain relatively stable at the 150 horse limit.

The number of horses to be treated on an annual basis will be determined through analysis of past rates of reproduction and mortality. Reducing the population to 150 is expected to require 3 to 5 years of intensive suppression of fertility. Approximately 70 horses will be treated per year (~ 85% of adult female population) during this period. Maintaining the population at 150 horses will require the treatment of fewer animals each year (approximately 30 - 45).

The selection of horses to be treated will follow a hierarchical approach based upon

documented breeding success to ensure that all females are given opportunity to reproduce. For example:

Treatment	- horses having produced two or more generations of surviving offspring
	- horses having produced more than one surviving offspring
	- horses having produced one surviving offspring
	- horses less than 4 yrs old
No Treatment	- horses greater than 4 yrs old not having produced a surviving offspring

This approach is believed to provide a reasonable expectation that genetic diversity will be maintained within the population, particularly during the initial period of intensive fertility control. It does not expressly seek to maximize genetic diversity, but rather to minimize the possibility that immunocontraceptive treatment will prevent any horse from ever reproducing. As the program transitions to the maintenance phase where fewer horses will require treatment, the selection process will be modified to introduce a measure of randomness. In any given year, the pool of horses available for treatment (within the above criteria) will exceed the number requiring treatment to meet the population growth goal. This provides opportunity to randomize the selection process and avoid the possibility that long term immunocontraception will be overly biased towards those horses with demonstrated reproductive success.

No horses will be treated for more than three consecutive years except for those having successfully produced at least three surviving offspring, or two generations of offspring. Reproductive success of this magnitude is considered to offset the risk of permanent ovarian dysfunction resulting from long term immunocontraception. Research investigating the effects of up to six consecutive years of treatment is nearing completion.

Monitoring activities will be conducted to evaluate changes in the effects of a reduced horse population, and assess the compatibility of future impact levels with overall park management objectives. Long term effects on horse band composition, patterns of dispersal, and general herd health will also be monitored.

Impacts to Natural Resources

Density dependant impacts to park resources resulting from horse grazing would be expected to decline with reductions in overall population size, and then stabilize as the herd is maintained at 150. The scope and magnitude of impacts may still be significant, but will be reduced from the present state.

Direct effects on the horse population would be limited to a decrease in the size of several consecutive age cohorts resulting from the initial, intensive suppression of reproduction for 3 - 5 years. Given the typically long life span of feral horses on Assateague Island (15+ years), the relative importance of individual age classes to the overall health and viability of the population is believed to be limited. However, reduced cohort size, particularly during the

period of intensive fertility suppression, may have behavioral consequences. Potential indirect effects of immunocontraception include temporary changes in horse band size and juvenile dispersal dynamics, and increased aggression between females within bands. The long term significance of these behavioral effects is not known.

Treatment of horses for more than 3 consecutive years has the potential to result in a prolonged or permanent loss of those individuals' reproductive capability. However, because this treatment regime will be rarely, if ever, needed and limited exclusively to horses which have demonstrated a high degree of reproductive success (successfully contributing genetic material to the population genome), the potential impact to the population as a whole is considered minimal.

Impacts to Cultural Resources

No known historic or cultural resources would be affected.

Socio-economic Impacts

In the short term, negative human-horse interactions which result in property damage and/or injury would be expected to continue at approximately the same magnitude as presently occurs. Some minor reduction in frequency of interactions may result as the population reaches the target level.

Reducing the number of feral horses inhabiting the National Seashore may decrease visitor opportunity to view horses. However, because the horses tend to segregate into small bands with distinct home ranges, and the proposed program would result in only a slight decrease in the size of any given band, horse density in high visitor use areas should remain relatively constant. As such, the potential for impacts to horse viewing opportunity is considered minimal.

ALTERNATIVE C - OFFSET REPRODUCTION THROUGH REMOVAL OF SELECTED HORSES

Under this alternative, approximately 15 adult horses would be removed from the park to reduce the population to the target goal of 150 animals. Subsequently, approximately 15 - 20 weanling foals would be removed from the park on an annual basis to offset population growth. The actual number of foals to be removed annually would depend upon mortality in the overall population during the previous year.

The selection of horses for the initial, one-time removal of adults would likely target females with a high degree of past reproductive success, but could also include males, or individuals of both sexes with known problematic behavior. Selection of weanlings for annual removal

would likely be made randomly, without regard to sex.

Selected horses would be captured using one of several techniques (baiting into corrals, tranquilization, mass roundups), and isolated from the remaining population in temporary corrals. Because the Assateague horses are in quarantine for Equine Infectious Anemia, any animals leaving the island must be tested for, and declared free of the disease. The testing and certification process would require the horses to be isolated for a minimum of three to four weeks. Final removal and distribution of the horses would be accomplished through an adoption program or sale/auction. Although there are many potential options, the most expeditious method may be to include the horses in the Chincoteague Volunteer Fire Department's annual "Chincoteague Pony" auction.

Monitoring activities will be conducted to evaluate changes in the effects of a reduced horse population, and assess the compatibility of future impact levels with overall park management objectives. Long term effects on horse band composition, patterns of dispersal, and general herd health will also be monitored.

Impacts to Natural Resources

Density dependant impacts to park resources related to horse grazing would be expected to decline, and then stabilize as the population is maintained at the 150 horse level. The benefits of reduced population size would be achieved sooner than the estimated 3 - 5 years needed under Alternative B.

Depending upon what criteria is used to select individuals for removal, some impact to the horse population as a whole may be anticipated. If mares with a high degree of past reproductive success are targeted for the initial, one-time removal, then the potential for adverse impact to the genetic diversity of the population is considered minimal. However, if selection is based on other factors, such as history of problematic behavior, then the possibility of impact due to the loss of genetic contribution increases. Any removal of adult horses will result in significant, though likely temporary, impacts to horse behavior and social organization, such as changes in band composition and increased aggression both within and between bands.

The long term consequences of annual removals of weanling foals on the overall health and viability of the horse population are not clearly understood. Possible effects may include a generalized increase in the reproductive rate resulting from reduced weaning periods, and changes in band behavior and dynamics.

The need to confine horses for disease testing and quarantine prior to removal from the park will require that a temporary corralling area be established on an annual basis. Concentrating horses in a confined space for up to several weeks will result in significant impacts to the corral area(s), including soil compaction, loss of vegetative cover, and the introduction of large amounts of nitrogen and organic material. The impacts would be repetitive over time, but

limited to a relatively small area (estimate less than one acre).

Impacts to Cultural Resources

No known historic or cultural resources would be affected.

Socio-economic Impacts

An annual program of removing horses from the park would involve actions which depart from the park's current management philosophy of minimizing the physical handling of horses. The capture and corraling of large numbers of horses as would be required on an annual basis may increase the number of horses which are habituated to humans, and ultimately lead to a denigration of the horses' wild, free-roaming character.

Reducing the number of feral horses inhabiting the National Seashore may effect visitor opportunity to view horses. If horses inhabiting high visitor uses areas are specifically targeted for removals, horse viewing opportunity may be reduced. However, if removals do not specifically target horses in the high visitor use areas, then viewing opportunity should remain relatively constant.

Some minor reduction in the frequency of negative human-horse interactions may occur as the population is reduced to the target level. If the one-time removal specifically targets horses with known problematic behavior, then an additional reduction in frequency of negative incidents may result.

Based upon past experiences at Assateague Island and elsewhere, government-sponsored removal of feral horses from public lands is a highly controversial issue which has the potential to generate significant opposition in certain segments of the community. In counterpoint, the annual auction of "Chincoteague Ponies" by the Chincoteague Volunteer Fire Department has proven itself to be an popular and enduring event.

ALTERNATIVE D - REDUCE POPULATION THROUGH ONE-TIME REMOVAL OF SELECTED HORSES, AND MAINTAIN POPULATION USING IMMUNOCONTRACEPTIVE FERTILITY CONTROL

Under this alternative, approximately 15 adult horses would be removed from the overall population and transferred out of the park on a one-time basis to reduce the population to the target goal of 150 animals. Concurrently, a program of immunocontraceptive fertility control would be implemented to maintain that reduced level.

As described under Alternative C, appropriate mechanisms for the selection, capture, processing, removal and distribution of horses would need to be developed and implemented.

The one-time removal would most likely target adult females with a history of successful reproduction, but could also include animals with known problematic behavior. Long term population control using immunocontraception would be conducted as described under Alternative B.

Monitoring activities will be conducted to evaluate changes in the effects of a reduced horse population, and assess the compatibility of future impact levels with overall park management objectives. Long term effects on horse band composition, patterns of dispersal, and general herd health will also be monitored.

Impacts to Natural Resources

Density dependant impacts to park resources resulting from horse grazing would be expected to decline with reductions in overall population size, and then stabilize as the herd is maintained at 150. The benefits of reduced population size would be achieved sooner than the estimated 3 - 5 years needed under Alternative B.

Potential impacts to the horse population could occur depending upon the criteria used to select horses for the one-time removal. If selection is restricted to horses with a high degree of reproductive success, the potential for impacts resulting from the loss of these animals' genetic contribution is considered minimal. If, however, selection is made without consideration of past reproductive performance, there is the possibility that removals could effect the genetic diversity of the population as a whole.

A one-time removal would eliminate the potential impact to the horse population's age structure associated with 3 - 5 years of reduced cohort size as described under Alternative B, but would be expected to result in a more significant disruption of the horse's social structure and behavior (as described under Alternative C).

The need to confine horses for disease testing prior to removal will require that a temporary corralling area be established. The impact associated with this activity would be similar to that described under Alternative C, but would occur on a one-time basis only.

The potential risks associated with the use of immunocontraceptives would be as described under Alternative B.

Impacts to Cultural Resources

No known historic or cultural resources would be affected.

Socio-economic Impacts

Some minor reduction in the frequency of negative human-horse interactions may occur as the population is reduced to the target level. If the one-time removal specifically targets horses with known problematic behavior, then an additional reduction in frequency of negative incidents may result.

Reducing the number of feral horses inhabiting the Seashore may decrease visitor opportunity to view horses. As described under Alternatives B and C, potential impacts may occur depending upon whether or not removals and/or fertility control specifically target horses inhabiting high visitor use areas.

As described under Alternative C, removing horses from the National Seashore may engender disapproval and opposition in certain segments of the community.

Consultation and Coordination

Federal Agencies

US Fish and Wildlife Service - Chincoteague National Wildlife Refuge

US Fish and Wildlife Service - Annapolis Field Office

State Agencies

State of Maryland, Department of Natural Resources, Assateague State Park

State of Maryland, Department of Natural Resources, Forest, Park and Wildlife Division, Nongame and Endangered Species Program

Compliance Requirements

National Historic Preservation Act - None of the proposed alternatives involve actions considered to be Section 106 "undertakings" with potential to affect cultural resources.

Coastal Zone Consistency - Not applicable to this action

Wetland and Floodplain Compliance - Not applicable to this action

Threatened and Endangered Species Act - Informal consultation with the U.S. Fish and Wildlife Service has been conducted with the determination that no threatened or endangered species will be affected by the proposed action.

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