



## Horse (*Equus caballus*)

### Background



Evidence suggests that domestic horses (*Equus caballus*) were on Assateague as early as 1669 when settlers put their livestock, including horses, on the island. Descendents of

these animals have been living in the wild on Assateague for well over 300 years.

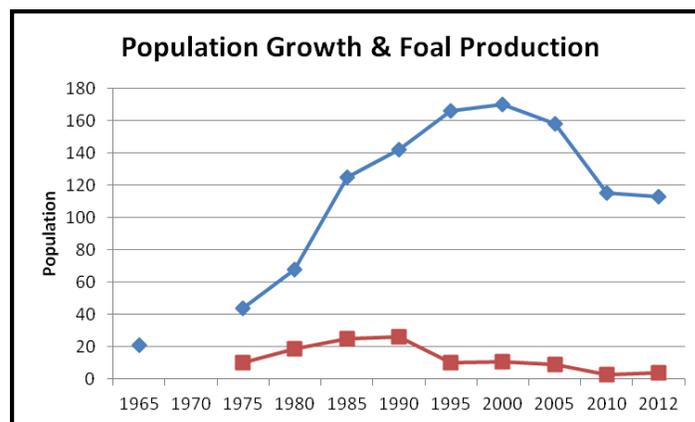
### Monitoring Trends

When Assateague Island became a national seashore in 1965, there were 21 horses on the Maryland portion of the island. However, it was not until 1975 that scientists began to survey the island's horse population. Surveys continue today over a 35 km (21 mile) area between the Ocean City Inlet and the Virginia state line where the horses roam freely. During the surveys, which are completed six times a year by vehicle and foot, each horse in the population is be accounted for.

A sighting record is completed as each horse is identified by a combination of features including color, sex, markings, scars or conformational differences. This information is then added to a data base where scientists and seashore managers track biological data such as age structure and maternal ancestry of the herd, the ratio of male to female horses, mortality and frequency of foaling.

Early surveys revealed that the original population of 21 horses present when the seashore was established was increasing at a rate of 10 to 15% annually. With a ballooning population, important concerns surfaced for managers: how to protect the long-term health and viability of the horses while at the same time minimizing their impact on the environment.

Subsequently, a series of studies were launched to determine the impact of the horses on island vegetation. The studies focused on the species of vegetation that the horses prefer— saltmarsh cordgrass (*Spartina alterniflora*), American beachgrass (*Ammophila breviligulata*), and three-square sedge (*Scirpus americana*)- and revealed that these species were being over grazed. Additionally, scientists determined that the island could only support a limited number of horses if impacts to island vegetation were to be minimized. Later ecological studies revealed that heavy grazing contributed to a reduction in the abundance, density, size and diversity of plants in both wetland and dune habitats. Scientists also noted that fauna found within those habitats were impacted negatively by the reduction of habitat quality.



**Figure 1:** Horse Population Growth and Foal Production on Assateague Island National Seashore, 1965-2012 (Blue line - horse population, Red line - foal births, Blank space - unavailable data)

With ecological studies and horse population surveys in hand, seashore managers decided it was necessary to set a horse population management goal. In the early 1980s, after carefully examining grazing and behavioral studies, managers decided on an initial population goal of 150 animals.

Scientists and seashore managers then explored a variety of methods to reduce and stabilize the population, knowing that removing or selling animals for population control was not acceptable. Based on

on results of limited field trials with a wild mustang population in the west, managers agreed to allow scientists to test the feasibility of controlling the horse population with some type of contraception.

In 1986, the initial fertility control studies on Assateague focused on using steroids to inhibit sperm production in stallions and ovulation in mares. This approach proved ineffective with the Assateague horse population. Researchers then focused their efforts on the promising field of immunocontraception. Ideally, the contraceptive would be effective, reversible and safe. It would not affect social behavior and would be remotely deliverable so that no animal would have to be captured.

In 1988, scientists began field trials that focused on administering the contraceptive Porcine Zona Pellucida (PZP) to 26 mares. Six untreated mares were added to the trial for comparison. That fall, pregnancy tests revealed that no treated mares were pregnant. However, three untreated mares were.

## Management

PZP is an immunocontraceptive vaccine that works with a mare's immune system. One cc of the vaccine is loaded into a dart that is fired from a gun at a range of 25 to 50 meters from the receiving mare. The dart's impact with the mare's hip sets off a cap charge which injects the vaccine, and then the dart drops off the animal.

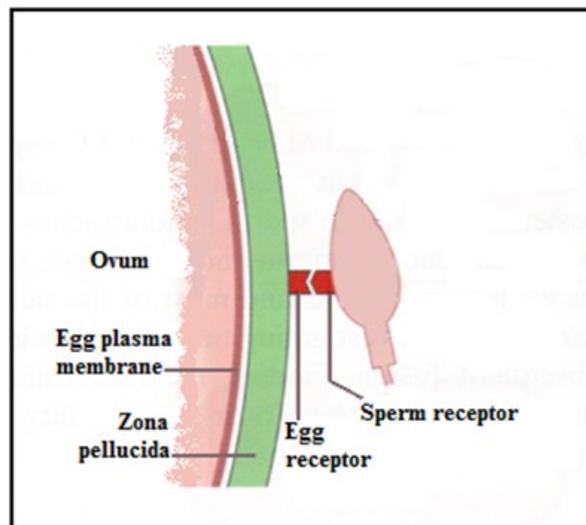


**Image 1:** Dart used to remotely administer 1cc of PZP to Assateague mares. The dart is approximately 10.8 cm (4.25 in) long.

The vaccine stimulates the mare's immune system to produce antibodies that work by blocking sperm receptor sites on the zona pellucida. This thin proteinaceous membrane surrounds all mammalian eggs and contains sperm receptors that allow sperm to attach to the egg.

When a mare enters the contraceptive program at age two, she is treated twice in the first year and once the following year. The first dose primes the immune system. The second and any subsequent booster doses provide full stimulation of the immune system to produce the antibodies that prevent conception for a year.

As these antibodies circulate through the mare's system, they attach themselves to the sperm receptors on the zona pellucida and distort the shape of the receptor. As a result, the receptor on the sperm no longer matches the receptor on the egg and the egg cannot be fertilized.



**Illustration 1:** Image represents an unaffected ovum (egg) without distorted sperm receptor sites.

A mare is taken off contraception at age four and remains off until she delivers a live foal. She is then put back on the contraceptive for the rest of her reproductive years. An unexpected, but not surprising benefit of contraception is that mares are living longer and healthier lives. Prior to the initiation of the contraception program, few mares lived beyond their late teens. Now it is not uncommon for them to live into their late twenties or early thirties.

Adaptive management of the seashore's horses is an evolving process. In 2006, based on current genetic and ecological studies, managers revised the initial population goal down to 80 to 100 animals. A population of this size will remain genetically viable and still have minimal impacts on island vegetation and habitat. As managers continue to monitor the horse population, they will be proactively engaged in protecting the island and its resources for future generations.

## References

- National Park Service. (2008). *Environmental Assessment of Alternatives for Managing the Feral Horses of Assateague Island National Seashore* Retrieved from <http://bit.ly/WYIX06>
- National Park Service. (2006). *Horses of Assateague Island Population and Habitat Viability Assessment Workshop* Retrieved from <http://bit.ly/WMmS56>