

Feral Horses: Grazing Impacts, Genetics and Birth Control

By Dr. Susan Bratton

One of the most complex problems for southeastern National Seashores, and one of the most visible to the public is the management of feral horse or pony herds. Three southeastern parks have "wild" horses and all three have different concerns. Cape Hatteras National Seashore keeps a small number of "Banker" ponies, descendants of original Outer Banks stock, in an enclosure on Ocracoke Island. This management strategy eliminates grazing impacts outside the "pony pen," but limits the number of animals the park can maintain without supporting the herd completely on imported hay. The Hatteras ponies may already be inbred and could eventually cease to reproduce. The park plans to keep a few animals for visitors to observe, but does not wish to reestablish free-ranging herds, nor do they wish to replace the Banker ponies with some other genetic stock. The question is how to manage a small but genetically viable herd.

On Shackleford Bank, Cape Lookout National Seashore, free-roaming horses have long joined other ungulates, including cattle and goats, in grazing marsh and interdune vegetation. Domestic livestock have certainly been present on the Outer Banks at least since the 1600s, and the horses are supposedly of Spanish origin. Over-grazing was reported in the early 1800s on nearby Portsmouth Island and goats and other species may have helped remove maritime live oak forests from the islands. Cape Lookout NS plans to maintain the Shackleford horses as an "historic resource," but is concerned the populations may increase after other feral animals are removed. The question is: Will the Shackleford horse population remain stable and are their present impacts on park vegetation acceptable?

Cumberland Island NS also has free-ranging horses, probably relicts of fairly recent introductions. Both Spanish and English colonists and soldiers brought horses to Cumberland before the Revolutionary War, but it is highly unlikely the Cumberland horses are descendants of Spanish stock. The island was under intensive cultivation during the plantation era, making large herds of feral animals unwelcome. Livestock roamed free on the Sea Islands after the Civil War, but families returning to the devastated farms after the conflict rounded up the more valuable animals. Although some of the Cumberland horses may be descendants of "marsh tackies," most are the progeny of horses introduced by the Carnegies in the late 19th Century or brought over in more recent times to improve island blood lines. Appaloosas on the north end of the island may be descendants of one stallion introduced to the island within the memory of local residents.

Cumberland Island already has serious problems with overgrazing. Park staff have greatly reduced feral hog numbers by live trapping but native white-tailed deer are heavily browsing forest understories. Both horses and deer preferentially graze interdune grasslands. Horses wade out into high salt marsh and consume large volumes of *Spartina* and other marsh plants.

The present General Management Plan for Cumberland calls for maintenance of a representative horse herd. The horses can be considered "historic," but the primary motive for keeping them is their popularity with visitors. The questions for Cumberland are: How many horses can the island sustain without ex-

tensive resource damage and where should the herds be allowed to travel over the island?

Present research efforts centered at the NPS, CPSU at the University of Georgia are attempting to integrate assessment of equine impacts on native ecosystems with behavioral data, population monitoring and genetic profiles of the herds. Park managers should eventually determine optimal population sizes not just in terms of forage availability and ecosystem carrying capacity, but also in terms of inbreeding coefficients.

Evaluating Impacts

Horses are of course not native to the barrier island ecosystem and may have damaging impacts. A study by Monica Turner, for example, has shown large reductions (as much as 98%) in above and below ground productivity in Cumberland Island saltmarshes that can be attributed to grazing and trampling by horses. The reduction in vegetation may also affect the food web and sediment deposition both in marsh and dune areas.

Georgia researchers have erected tandem deer-horse enclosures in oak forest and inter-dune grassland on Cumberland Island. One side of an enclosure is closed to deer, horses and hogs, the other side can be entered by deer and hogs but not by horses. These enclosures will help to discriminate grazing impacts of deer from those of horses.

Kathryn Davison has completed a productivity study of the Ocracoke Pony Pen, which indicated the area could support the present herd during the summer, but winter forage was very limited. Productivity of the pen could only be improved by intensive management, including repeated fertilization. The park thus can only increase herd size with substantial financial inputs for pasture management and hay. Increasing the size of the pony pen is a poor alternative because exotic herbs and grasses presently dominate the enclosure and could spread into new grazing areas.

Populations and Behavior

All the parks have accurate population census data. Cumberland's population appears to still be increasing and the age structure may be changing, with the number of foals and yearlings proportionately. Chief Ranger Kevin Kacer and interpreter Marlene Finley not only improved the 1985 census by adding an aerial survey that could locate horses in marshes remote from the shoreline, but also began to monitor foal mortality. The 1985 Cumberland census counted about 180 horses, an increase of 25% over 1981. Dan Rubenstein of Princeton University has several years of data on family group structure of Shackleford horses. Mark Lenarz of the University of Georgia has completed a study of stallion territories on Cumberland, indicating an average of two mature mares per stallion with harems and the presence of bachelor herds of stallions without harems.

Genetics

A critical item for managing a small number of large vertebrates is a genetic profile of the population. Robert Warren and Robin Goodlow, a graduate student from the University of Georgia, are planning to obtain blood and muscle tissue samples from all three

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island horse herds. Using electrophoresis they can determine how inbred the herds are. Mike Smith of Savannah River Ecology Laboratory, a collaborator on the project, suspects the Shackleford herd already has passed through "a genetic bottleneck" and is viable in the long-run. This may not be true for Cumberland's horses and the Ocracoke population may simply be too small. Genetic study may also allow researchers to determine if any of the island populations are closely related to one another and can assist in a search for suitable studs for outbreeding local groups, such as the Ocracoke herd.

This research also has implications for management of small, isolated populations of endangered vertebrates that may collapse when the gene pool becomes too limited.

Computer Models

Cape Lookout NS has taken the lead in requesting a computer model that will allow managers to predict the effects of different-sized horse populations on Shackleford Bank. Lee Graham of the University of Georgia is developing a model for an IBM-PC micro-computer that allows a manager to select the vegetation productivity deemed acceptable. The model then

suggests a removal strategy if there are too many horses in the population. The model not only considers vegetation health, but also attempts to minimize inbreeding coefficients for the horses. The model imitates horse movement from marsh to dune communities and attempts to reproduce actual conditions on Shackleford Bank by using vegetation maps prepared by North Carolina State University. Monica Turner has developed a grazing model for Cumberland horses. The model predicts that a population of 60-75 horses will allow the marshes to maintain productivity without a great decline in vegetative cover. Although models are only an imitation of ecological reality, they can serve as important guides for managerial decision-making, and can warn managers of potential errors or undesirable management strategies.

Birth Control

A final element in the research concerns reducing or stabilizing horse populations. Dr. Robert Warren and Goodlow began in Spring 1986, to test the effects of birth control techniques on Cumberland horses. The first experimental method was vasectomization of stallions through injection of a chelating agent into the vas deferens, rather than through surgery. If a suitable

chemical can be obtained, this will be followed by application of long-term hormonal control, agents to mares, probably by implantation. Monitoring following treatment will not only assess inhibition of foaling, but will also evaluate other effects, such as behavioral changes and modifications of harem structure.

Although all three southeastern National Seashores with feral equines should ultimately have individually tailored horse management plans, all three will move to reduce undesirable impacts while maintaining viable populations. The strategies will be based on carefully collected vegetation data, studies of natural behavioral patterns, genetic analysis, and long-term data on population change. With the use of computer models, managers should be able to respond to catastrophic events, such as storm mortality, and should be able to adopt action plans to long-term population fluctuations. The implementation of hormonal birth control for mares is potentially reversible, allowing an animal to reenter the breeding pool if necessary. The ultimate management program should preserve highly visible historic resources, while protecting fragile biological systems.

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