Cape Lookout National Seashore
Shackleford Banks Horses
2015 Annual Report

"Bachelors" Photo by NPS VIP Sarah Gould, 2015.

National Park Service
Cape Lookout National Seashore
131 Charles Street
Harkers Island, NC 28531

Site Location and Description

Cape Lookout National Seashore is located in the southern Outer Banks of North Carolina between Beaufort and Ocracoke Inlets. Here, the National Park Service (NPS) manages fifty-six miles of barrier islands. Shackleford Banks is the southernmost island in the park between Barden's Inlet to the east and Beaufort Inlet to the west. It is approximately 9 miles long and ranges from less than one half mile wide to more than 1.5 miles wide where eastern marsh islands are included (see Figure 1).

Figure 1 – Shackleford Banks

Management Directives

Federal legislation passed in 1998 as 16 U.S.C. §459g-4 (https://www.gpo.gov) and the subsequent 2005 Amendment by Congress 109-117;119-§2526 (http://uscode.house.gov) to the legislation protects the wild horses within Cape Lookout National Seashore and requires an annual report on the status of the herd . This report covers calendar year 2015.

The horses are cooperatively managed by the NPS and the Foundation for Shackleford Horses, Inc., (Foundation) since 1999, according to legislation (https://www.gpo.gov). The partners are working under a Memorandum of Understanding (MOU, 2007).

Management of the horses has been guided by four National Park Service horse Management Plans (1996), (1999), (amended 2005), (amended 2010). The most recent three include the Foundation as co-managers.

Horse Identification

Horses are identified and monitored during the year. Identification is by a number of criteria including gender, body color, mane and tail color, white face markings, mane side, freeze brand, social group association and home range.

Each horse has an assigned identification (ID) number or number-letter for data purposes. The numbers from 1 to 103 were assigned beginning in 1996. Horses born in 1997 and later are assigned a number-letter ID in which the number represents the birth order within the year and the letter represents the year of birth. For example, horse 1C was the first horse born in 2015 (see Table 1).

1-103	Through 1996	M	2002	W	2009
701 – 710	1997	N	2003	X	2010
G	1997	P	2004	Y	2011
H	1998	R	2005	Z	2012
J	1999	S	2006	A	2013
K	2000	T	2007	B	2014
L	2001	U	2008	C	2015

Table 1 - Horse Numbering and Lettering System

Some horses have this ID number or number-letter freeze branded on their left haunches. Previously, when roundups were conducted, all horses were branded, but now it is done with veterinary sedation on an as-needed basis when positive identification from a distance is difficult. At present, 63% of the horses are branded.

Social group associations are recorded when individuals of the group are identified. The group usually consists of an alpha (dominant) stallion, mares, and the mares' young (which might or might not be sired by the stallion). This is termed a harem. Occasionally, a harem may include a beta (subordinate) male. Young males who have left their natal harems are sometimes found alone and sometimes form loosely related bachelor bands. Young females who have left their natal harems usually associate with a male; if they join a single male this creates a new harem. Young females might also join existing harems. Occasionally older females are found alone, apparently of their own choosing.

Horses and their harems tend to move within an area of the island that is less than one-quarter of the length of the island. These home ranges are recorded as data and are fairly consistent. Knowing the home ranges enables easier field identification and makes finding the horses for management actions like contraception much more efficient.

Data collected in the monitoring process is entered, kept and processed in the Wild Horse Information Management System (WHIMS) Microsoft Access database (Osborn, 2010).

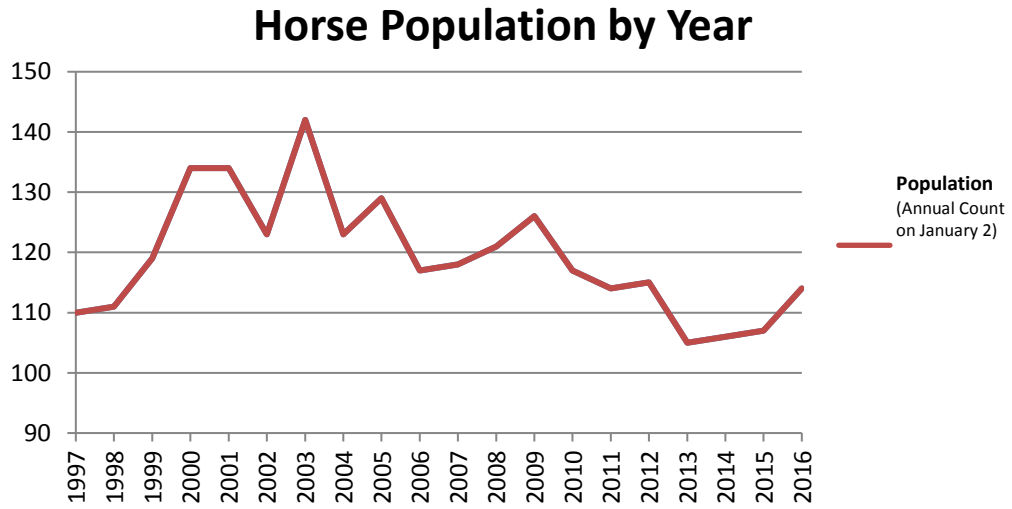
Horse Population

The population is managed with a legislated target range of 120 to 130 horses (http://uscode.house.gov). As of January 2, 2016, the official population on Shackleford Banks was 114.

Before the NPS's first horse management action in 1996, students and faculty of Princeton University, most notably professor Daniel I. Rubenstein, studied the horses on Shackleford Banks. Their work contributed the basis of what is known about the population. The FSH and/or individuals who would become the FSH also tracked the horses. Significant Park Service

data collection began mid-1999, so 2000 is the first year that complete information about the horses is available.

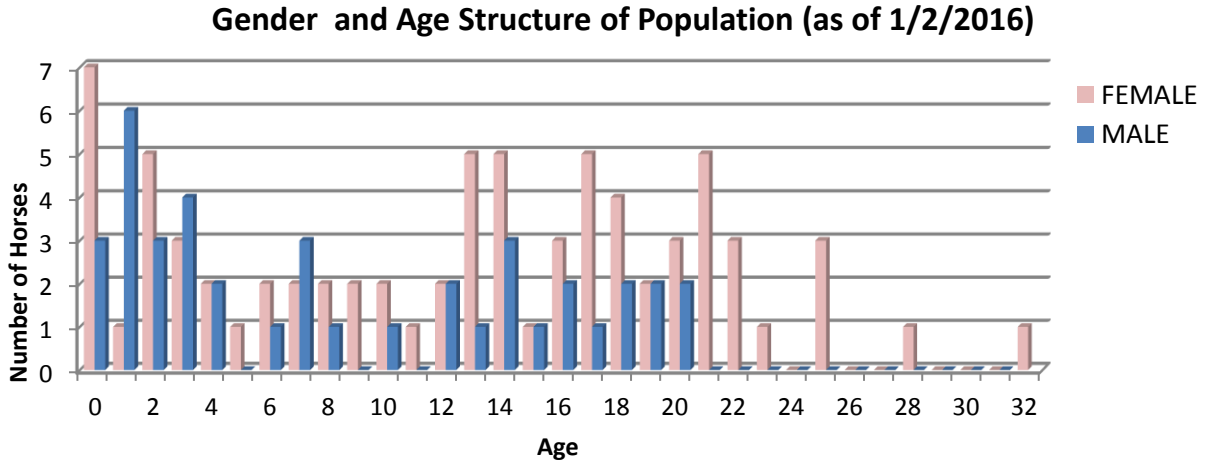
Between 1997 and 2005, population control roundups occurred in 2000 (12 horses removed), 2001 (20 horses removed), 2003 (20 horses removed) and 2005 (18 horses removed). Between 2006 and 2009, horses were removed individually for population control (6 removed in 2006, 4 in 2007, 6 in 2008, and 4 in 2009). Eastern Equine Encephalitis contributed to at least one of the 20 deaths in 2012. Since 2013, the horse population has generally increased. The total population as of January 2 of each year is shown (see Graph 1 and Graph 7).



Graph 1 - Horse Population by Year

Gender and Age Structure

The age and gender structure as of January 2, 2016, is shown (see Graph 2). There is a significantly larger number of females in the oldest age classes. All 14 horses 21 years of age and older are female. Contraception has been linked to increased longevity among treated females (Kirkpatrick, 2008). The average age of the horses living on Shackleford Banks as of January 2, 2016 is 11.7 years.

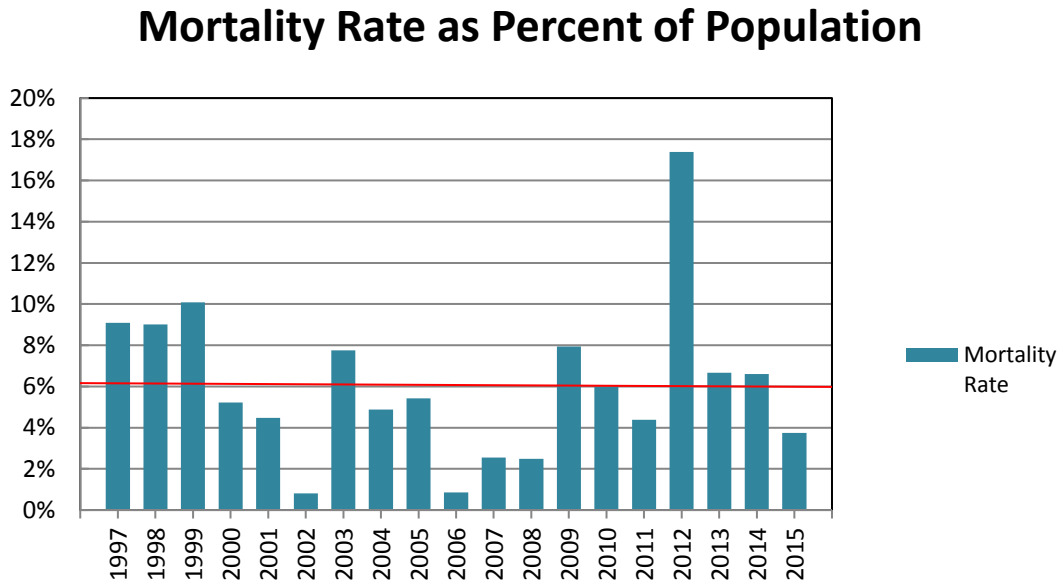


Graph 2 – Gender and Age Structure of Population (as of 1/2/2016)

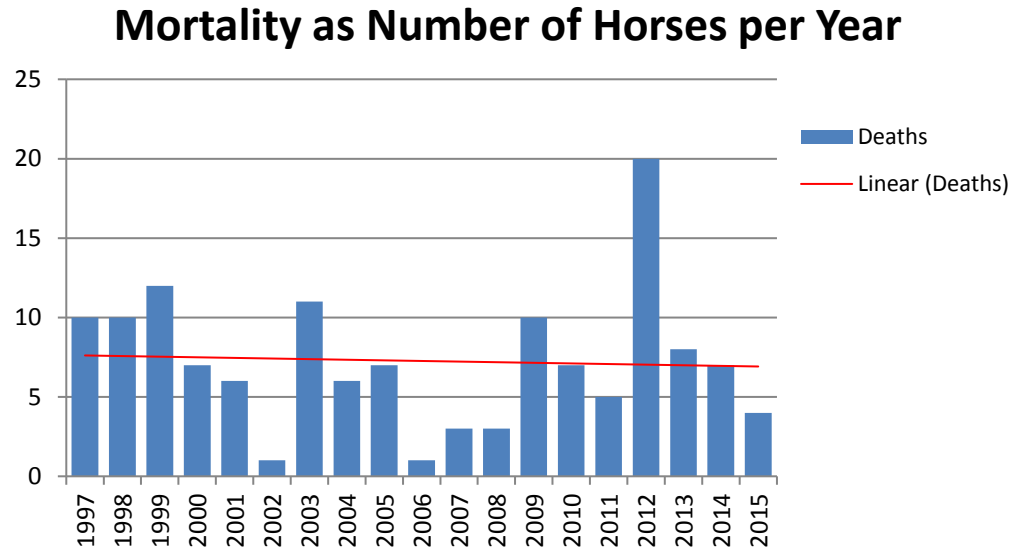
Mortality

Mortalities are recorded either when a body is found or when the horse is not sighted for many months. In this report, 114 horses are considered to have been alive on January 2, 2016. If at a later date a horse is determined to have died prior to this date, future raw data will reflect this.

In 2015 herd mortality was 3.7% (see Graph 3) with 4 deaths (see Graph 4). This is slightly lower than the average mortality from 1997 through 2014 which was 6%. In 2015 two adult males died at ages 17 and 22. One adult female died at 31. A few-week-old filly also died. The horses' average lifespan over the years from 2000 to present is 10 years.



Graph 3 – Mortality Rate as Percent of Population



Graph 4 – Mortality as Number of Horses per Year

Births, Pregnancy Testing, and Foal Mortality

Births are determined by the presence of a foal, or, in rare cases, by the physical signs that the mare carried a foal (for example, development of an udder in a mare that has not foaled previously). Identification data is collected on newborns in order to track them through their lives.

Pregnancy testing is done during the winter with field-collected dung. Knowledge of current pregnancy gives managers the opportunity to make management choices (like contraception, which must be administered before the mare foals in order to be most effective in preventing a subsequent pregnancy). Pregnancy testing was performed in early 2016 and analyzed by a competitive enzyme immunoassay (EIA) procedure (Lyda, 2016) at the Science and Conservation Center of ZooMontana. Forty-six mares were tested. All the mares tested were of reproductive age (2 years of age and older) (Equimed.com, 2010), Generally, older mares who were not expected to be fertile and those who had received birth control were excluded.

Eleven foals were born in 2015. One died before it reached one year of age. The 9% foal mortality in 2015 is below the annual average of 18% calculated since 2000.

Genetics Data

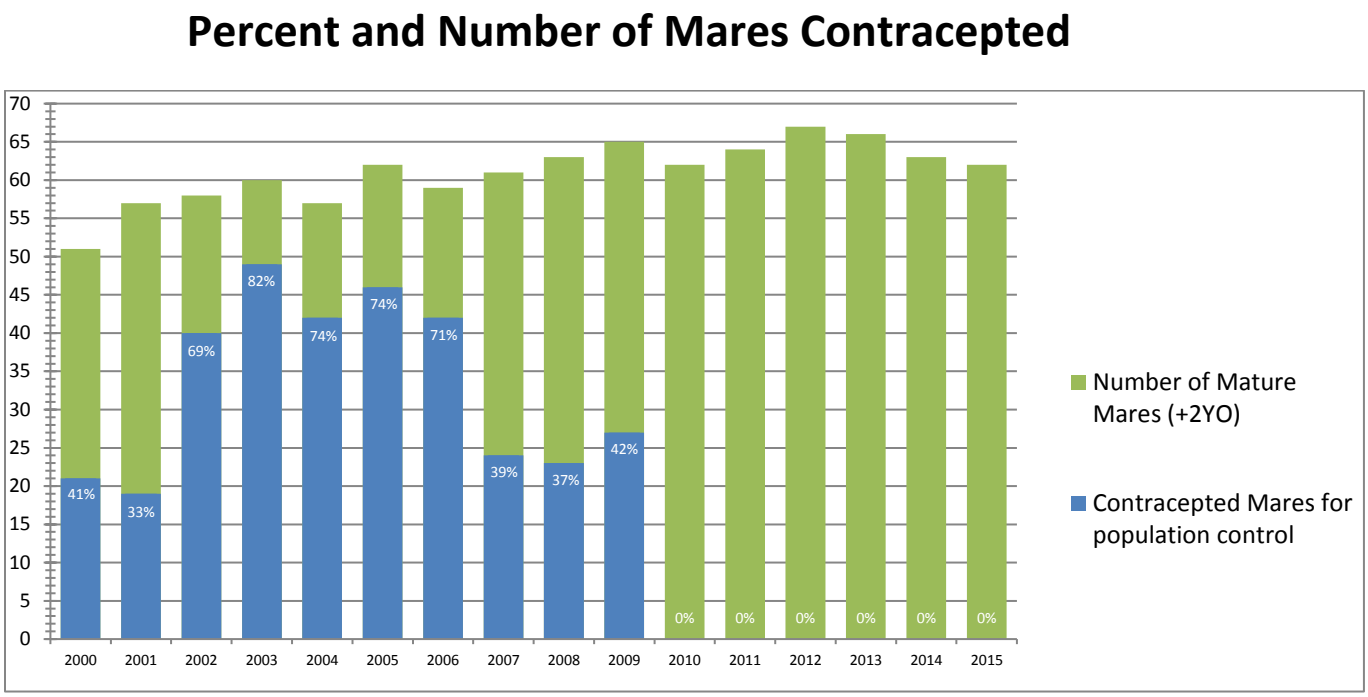
Dung was collected from the foals of 2015 by standard collection protocol (Waits, 2009) to determine their genotypes. Analyses were done according to protocol by the Laboratory for Ecological, Evolutionary and Conservation Genetics at the University of Idaho (Adams, 2016). The maternal and paternal genotypes are known from previous analyses, and, using them, foal paternity was determined. The resulting lineage data is used for decision making for management actions by the NPS and Foundation.

Mean Kinship analysis was run by Purdue University using the genetics data (Willoughby, 2016). Mean Kinship is a measure of relatedness of individuals in the population and is also used for decision making in adaptive management. Horses that are highly related to others are more likely candidates for removal or contraception than those that are not in order to make the least impact on the gene pool.

Contraception

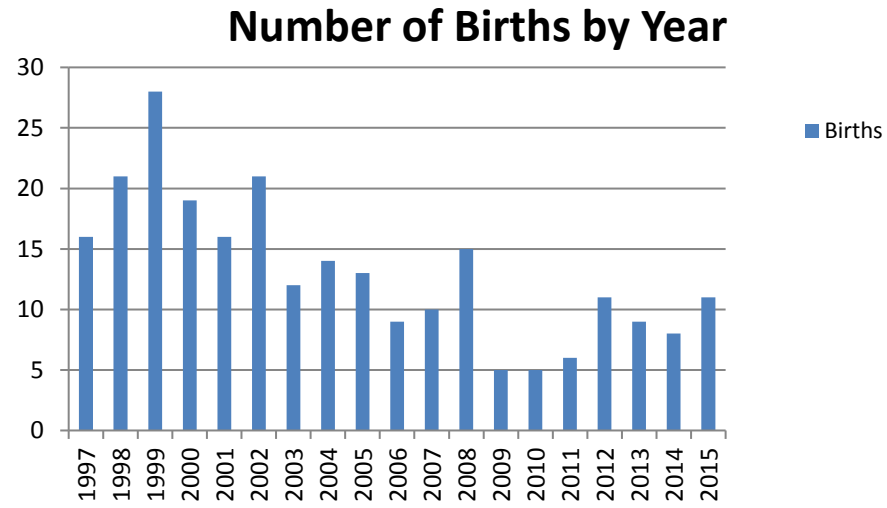
Contraception has been used adaptively to manage the wild horse population beginning in 2000 (National Park Service, 1996, 1995, 2005, 2010). No mares have been contracepted for population control reasons since 2009 (see Graph 6).

The porcine zonae pellucidae (PZP) vaccine is delivered remotely under field conditions by Pneu-Darts with a projector/capture gun appropriate to the darts and distances. The drug is generally administered in the spring before breeding season begins and prevents the dosed mares from conceiving that year and foaling the following year. The vaccine does not harm unborn foals (Kirkpatrick, 2009).



Graph 6 - Percent and number of mares contracepted

The general decrease in the number of births is due to the contraception program between 2000 and 2009 (see Graph 7). Since the last birth control for population reasons was administered in 2009, the birth rate has been generally rising (see Graph 7).



Graph 7 – Number of Births by Year

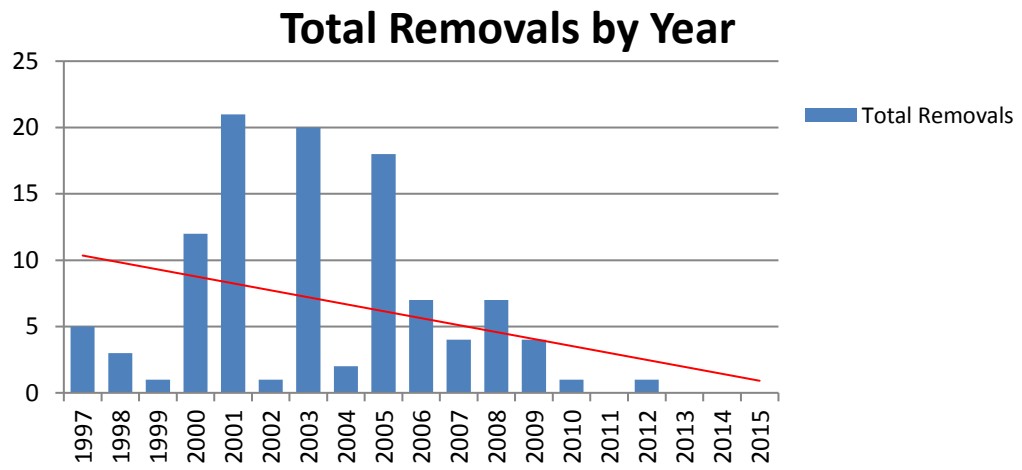
Two very thin mares received birth control in 2015. They were pregnant and had produced foals recently. The birth control gave them a chance to regain body condition before potentially foaling again.

Three young mares with recent foals were given initial doses of PZP. These initial doses do not result in contraception, but are a primer for any future doses.

Removal

Horses have been removed from Shackleford Banks for population control reasons according to the 1996, 1999, 2005 and 2010 Management Plans (National Park Service, 1996, 1995, 2005, and 2010). While one horse was removed in 2010 and another in 2012 because of health conditions, no horses have been removed for population reasons since 2009 (see Graph 8). No horses were removed in 2015 because the population is below the legislated range.

Historically, horses were removed during roundups when a number of horses needed to be removed at once when the population exceeded the target number but now, with fewer births and with effective remote-delivery sedatives available, horses may be removed individually as needed. Therefore, no roundups are planned for the foreseeable future.



Graph 8 – Total Removals by Year

Public Education and Partnerships

The Wild Horse Public Education Campaign (WHPEC) was begun in 2011. WHPEC involves Cape Lookout National Seashore, the Foundation for Shackleford Horses, and the nearby Rachel Carson Reserve National Estuarine Research Reserve. The aim of the campaign is to educate people about the horses with an emphasis on safety of the horses, NPS/Reserve visitors, and pets. The general message is to watch the horses without interacting with them or interrupting their natural behavior. Facebook and Twitter postings during the year are designed to keep the horse protection message fresh in the minds of social media followers.

This year the cooperators staged a Wild Horse Day at the North Carolina Aquarium at Pine Knoll Shores. Approximately 350 people were reached including children who participated in the wild horse knowledge scavenger hunt and took the Wild Horse Protector pledge.

Research

Evan Lamb and Kelly Wilson of Warren Wilson College planned and carried out pilot studies to establish methodology for future research. They compared horse behavior with and without the presence of park visitors during the summer of 2015. The trial run of the methodology was the most important outcome; the actual findings were limited by the short study duration. Lamb found that the horses grazed more and stood less in the presence of tourists; in this case, standing was categorized as a resting behavior (Lamb, 2016). Wilson's data indicated that visitor presence was not a strong indicator of behavioral differences (Wilson, 2016).

Haley Carr of Iowa State University studied horse behavior on Shackleford Banks during the summer of 2015. Kaylee Monore and Maggie Kent, students of Princeton University, also conducted research for their senior papers. The results are due at the end of Spring Semester, 2016, so are not available for this report.

Foundation for Shackleford Horses, Inc., Work

During the year the Foundation for Shackleford Horses, Inc., contributed well over 2600 volunteer hours performing diverse work related to the Shackleford Banks horses both on and off the island (Poindexter, 2015). Their Board of Directors is comprised of ten volunteers; additional volunteers contribute significantly.

Citations

1. US Government Publishing Office Federal Digital System document, accessed February 22, 2016, https ://www.gpo.gov/fdsys/granule/USCODE-2011-title16/USCODE-2011-title16-chap1-subchapLXIII-sec459g-4.
2. US Government Publishing Office Federal Digital System document, accessed February 22, 2016, http://uscode.house.gov/statutes/pl/109/117.pdf
3. Cape Lookout National Seashore Memorandum of Understanding between The United States Department of the Interior National Park Service and the Foundation for Shackleford Horses, Inc., June 6, 2007.
4. National Park Service, Cape Lookout National Seashore, Management Plan for the Feral Horse Herd on Shackleford Banks, 1996.
5. National Park Service, Cape Lookout National Seashore, Management Plan for the Feral Horse Herd on Shackleford Banks, 1999.
6. National Park Service, Cape Lookout National Seashore, Management Plan for the Shackleford Banks Horse Herd, 2005.
7. National Park Service, Cape Lookout National Seashore, Management Plan for the Shackleford Banks Horse Herd, 2010.
8. Osborn, Ronald G. "Wild Horse Identification & Management System." Access Database. 2010.
9. Jay Kirkpatrick, et al., "The practical side of immunocontraception: Zona proteins and wildlife." *Journal of Reproductive Immunology* 83 (2009): 151-157.
10. Robin Lyda, e-mail message to author, February 12, 2012.
11. "Equine Reproductive Maturity in Mares and Stallions." *Equimed.com*. EquiMed LLC, 13 Mar. 2010. Web. 21 June 2016
12. Jennifer Adams and Lisette Waits, "Paternity Analysis of Nine Foals Using Fecal Samples", Preliminary Report, January 11, 2016.
13. Lisette Waits, "Scat Collection Protocol," January 10, 2009.
14. Janna Willoughby, "Mean Kinship", e-mail message to author, February 1, 2016.
15. Jay Kirkpatrick and Allison Turner, "Achieving Population Goals in a Long-Lived Wildlife Species (Equus caballus) with contraception," *Wildlife Research* 35 (2008):513-519.
16. Evan Lamb. "Energetic Impact of Tourist Activity on the Horses of Shackleford Banks," Senior Paper, Warren Wilson College, 2016.
17. Kelly Wilson. "Effect of Tourist Presence on Social Behavior of the Feral Horses of Shackleford Banks, NC," Senior Paper, Warren Wilson College, 2016.

18. Margaret Poindexter. "Foundation for Shackleford Horses, Inc. Annual Status / Progress Report: October 2014 – September 2015."