THE UNIVERSITY of NEW ORLEANS

DEPARTMENT OF BIOLOGICAL SCIENCES

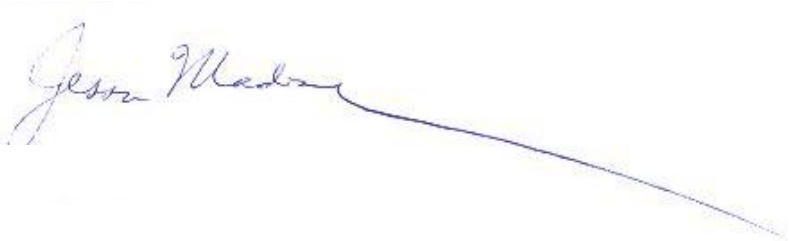
Dear Earthwatch Volunteers,

Thank you so much for all you contributed over the past field season. It was a great success! We collected a vast amount of data on harem changes and activity budgets. The activity budget data is still in the midst of analysis, but I have finished analyzing the harem change data that you collected. Your data shows that contracepted mares changed harems significantly more than uncontracepted mares again this year. One mare even changed harems 27 times! Overall, 73 percent of the mares changed harems at some point in time. Contracepted mares averaged about 5.6 changes over the season, while control mares averaged only about 1.5 changes. This is a dramatic difference and the park service is very interesting in trying to figure out how to mitigate these effects. Your data made all this knowledge possible.

The next step is for us to analyze all the activity budget data you collected and look at if there is any reason we can see for contracepted mares to change harems more often…are they getting harassed? Spending less time eating? Not getting enough water? We'll try to get at these questions from the data you collected. I'm happy to say that I will be out on the island in January to look at behaviour during the nonbreeding season. I'll try to get some pictures of the horses at their fuzziest and some updates on the babies. A couple of quick updates now: Doobie had a foal since the summer, and Soprano and Sacajawea came off the island and are up for adoption.

Thank you for all of your hard work. I know field work is difficult and the days can be long, but I really appreciate your enthusiasm and all the effort you put in over the summer!

Thanks again!



Jessa Madosky

EARTHWATCH INSTITUTE ANNUAL FIELD REPORT

Date completed: 4 December 2008
Completed by: Jessa Madosky
Period covered by this report: May 2008 **to** September 2008
Project title: Wild Horses of the Outer Banks

Reporting on research objectives

1. Provide a summary of progress this year towards each of the objectives stated in your most recent research proposal.

Objective 1: Monitor which horses are in each harem

Earthwatch volunteers and staff monitored each horse on a nearly daily basis over the summer and a complete spreadsheet with all sightings of each horse over the course of the summer was compiled. This spreadsheet was shared with the National Park Service as well.

Objective 2: Calculate the average number of harem changes per contracepted mare and uncontracepted mare (volunteers may help make calculations for this objective if interested, but will not be required to make these calculations).

The spreadsheet completed from Objective 1 was used to count the number of harem changes for each horse and then the average was calculated for the entire field season.

Objective 3: Analyze if contracepted mares change harems more than uncontracepted mares (volunteers will not be involved with this objective).

SPSS statistical software was used to determine if contracepted mares change harems significantly more often than control mares. I found that contracepted mares changed harems significantly more frequently than control mares ($p=.016$). In 2008, the mean number of harem changes for contracepted mares was 5.63 with a standard error of .762, while the mean number of harem changes for control mares was only 1. 50 with a standard error of .732

Objective 4: Collect general data on the horses on the island – data collected may vary depending on the needs of the National Park Service and may also be fine tuned based on preliminary analysis of previous data. The following provides a list of some potential data that may be collected. This data will be used in the analysis as other potential explanatory variables in order to test that contraceptive status is the variable that explains the most variance in number of harem changes.

Volunteers collected a variety of data including GPS points, weather information, and dominance interactions. This data was provided to the National Park Service and will be incorporated into further analysis as well.

Project development

1. If you have removed or modified your original objectives please explain why below.
n/a

2. Please list any new objectives below.

Objective 5: Determine if there is a statistically significant increase in harem changes per season after control mares are contracepted.

The control mares will be contracepted over the next season due to the need to reduce the number of foals born each year. I will use the data collected in Objective 1 to determine if the mares that are contracepted for the first time change harems more often than they did before they were contracepted.

3. What logistical or scientific challenges have you encountered in the past season and how will you address these during the next field season?

Volunteers requested more rest time in evaluations, so efforts will be made to emphasize rest opportunities and a formal rest time between field work and dinner preparation for the majority of days. This rest time was in the schedule previously, but efforts will be made to ensure that volunteers are clear that this rest time is scheduled.

Non-technical summary of results

1. Give an account of the data collected and results (inputs and data) for the period covered by this report, mentioning any emerging trends.

Each harem, or band, of horses was located and the harem members were recorded. This harem composition data was collected on an almost daily basis in order to determine how many harem changes each mare made over the course of the season. During 2008, seventy-three percent of mares changed harem at least once, with a maximum of 27 harem changes for one mare. Contracepted mares changed harems significantly more frequently than control mares (p=.016). In 2008, the average number of harem changes for contracepted mares was 5.63, while the average number of harem changes for control mares was only 1. 50 (See Figure 1)

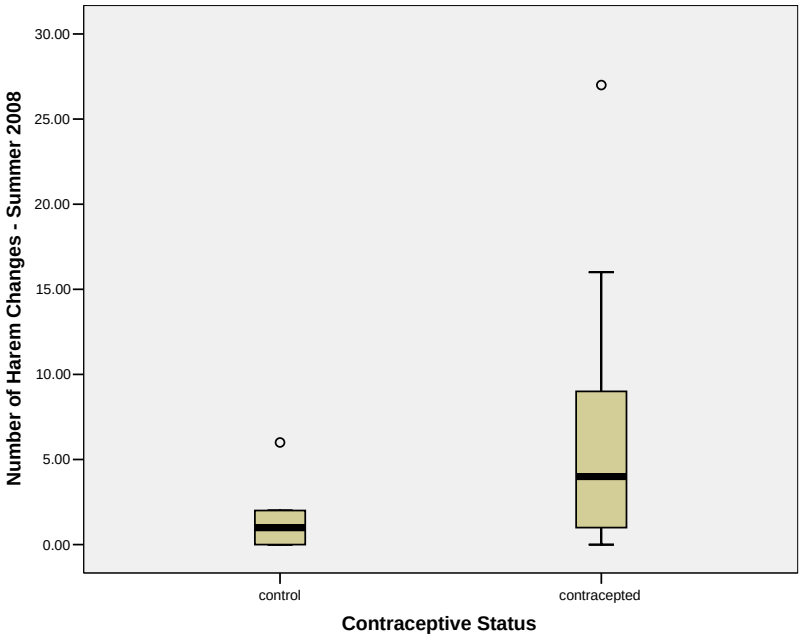


Figure 1. Box plot showing the number of harem changes by contraceptive status for the 2008 field season with median and interquartile range.

These results indicate that the immunocontraceptive used to control population numbers on Shackleford Banks Island is having a significant effect on harem stability. In a season prior to the immunocontraception program only 10.8% of mares changed harems in the same study area (Rubenstein 1981). Harem stability is found to correlate with lifetime reproductive success in females (Kaseda et al. 1995), perhaps because mares in stable harems are able to devote more time to grazing and are in better condition. More work is needed to determine if a reduction in harem stability leads to reduced body condition.

2. How do these data contribute to achieving **conservation impacts?** (e.g. actions based on results, management plans, site protection)

The National Park Service's goal is to manage the horses with minimal impact on their behavior (S. Stuska, personal communication). These results indicate that the immunocontraceptive used by the park is altering harem stability. Further analysis is needed to determine if there is any immunocontraception schedule that may be implemented to minimize deleterious behavioral effects while still managing population growth. This may be possible through limiting consecutive years of administration of the contraceptive or limiting total number of years of administration. Further analysis will be conducted in order to formulate an ideal contraception schedule that will reduce the number of foals born each year while also maximizing harem stability.

3. What is/ are the **significance**/ **benefits** of your research at the following levels?

- Local (to the area of the research site)

This study has direct management implications for the National Park Service and the Foundation for Shackleford Horses in their efforts to manage the feral horse population on the island in a way that is sustainable for the local barrier island environment and minimizes human impacts on the population. Data collected is used to assess the impacts of the contraception program, but also is utilized to monitor the general health of the herd and assist in general management of the herd. In general, the feral horses on Shackelford Banks are important to the local culture and economy. The sustainable management of the population is critical to both the National Park Service and the local tourist industry.

- National / Regional

Nationally, this research will also impact the management strategies of horses in other National Parks and federal lands across the country. Immunocontraceptives have been used in other populations of feral horses and Bureau of Land Management areas including the Pryor Mountain National Wild Horse Range in Montana, Bookcliff National Wild Horse Range in Colorado, various areas in Nevada, and several other North Carolina feral horse populations (ZooMontana 2000). This study will assist in the management of these populations as well.

- International

Internationally, there is interest in using this contraceptive on other horse populations. The immunocontraceptive is also used on African elephants to reduce human/elephant conflicts and prevent rapid elephant population increases without legalizing killing elephants in the National Parks in South Africa, and on feral water buffalo in the US territory of Guam (ZooMontana 2000). The same standards that we apply for minimizing behavioral impacts of management tools should also be applied internationally. PZP immunocontraceptive is an attractive solution to managing population numbers in a variety of species around the world given its temporary nature and non-invasive administration, but this method of managing

population sizes needs to be evaluated fully before it is used in more endangered species or super-abundant native species across the world.

Communication of results

Please list all dissemination outputs for the period covered by this report, or outputs soon to be released, for the categories below.

Printed:
Poster presentation to the International Equine Science Meeting in Regensberg, Germany, October 2008. Earthwatch acknowledged.

Educational resources:
Research presented to local students, Fall 2008 – Earthwatch acknowledged

Educational Opportunities

1. Does your project directly or indirectly involve the following groups in your research topic?

- Local communities

Local community members are utilized to identify and locate horses in cooperation with the National Park Service.

- Students

Students are employed as staff and the PI is a PhD student and early career scientist.

2. How does your research help these groups better understand and act towards the conservation of a sustainable environment?

Students employed by this project have been inspired to continue their education and focus on behaviour and conservation work. Local community members have been educated about the importance of limiting population growth on the island to minimize the environmental impact and how to approach and observe horses without disturbing them. This education has led to increased cooperation with the project members and the National Park Service.

3. Has your project contributed to the completion of Masters' or PhD theses or degrees, or other educational research findings?

This project directly contributes to my PhD thesis.

Other

Is there anything else you would like to tell us about?

The addition of Earthwatch volunteers allowed me to collect additional data points that led to a more powerful analysis and increased statistical significance thus providing more robust support for my hypotheses.

Acknowledgements

Sue Stuska of the National Park Service for all of her continual assistance.
The Foundation for Shackleford Horses, Inc. for their cooperation and assistance.
Dr. Jerry Howard and Dr. Dan Rubenstein for their guidance and support.
Dr. Nicola Anthony, Dr. Carl Weems, and Dr. Barry Bavister for their assistance.