



**White Buffalo Inc.**

Conserving Native Species and Ecosystems

**Year 2 Summary Report**

**2015 Deer Research Program**

**City of Fairfax, Virginia**

**Submitted by:**

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**White Buffalo, Inc.**

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## INTRODUCTION

The City of Fairfax is located in northern Virginia, in the suburbs of Washington, DC, and contains approximately 16.3 km<sup>2</sup>. The City represents one of the most challenging situations for deer managers. The community is nearing the point of being “built out” (2010 census: 22,525 people, 8,347 households) with most of its land area covered by single family homes surrounded by wooded corridors. This provides excellent deer habitat and at the same time can be restrictive to the implementation of some deer management options. There is no hunting permitted within the community. Given the favorable conditions, the deer population in the community has increased to a level that is incompatible with some local land uses. To date, no management actions have been used to control the deer population. These site characteristics, along with deer approachability, make the City of Fairfax a suitable site to conduct a surgical sterilization research project.

## METHODS

### *Capture*

Deer sterilization activities in Year 1 were conducted 31 January - 6 February 2014, every night except 4 February due to weather delays. Year 2 capture efforts were conducted 26 - 31 January 2015, every night except 29 January due to weather delays. We followed the operations protocol outlined in the proposal, contract, and Virginia Department of Game and Inland Fisheries (VDGIF) scientific collection permit number 050238. Female white-tailed deer of all age classes were immobilized using projectors with 2-ml transmitter darts (Pneu-Dart, Inc., Williamsport, PA, USA) to administer Telazol (4.4 mg/kg) and xylazine hydrochloride (2.2 mg/kg). We approached deer in a vehicle on public roadways and private roadways/properties where permission was granted. A police officer accompanied each capture professional. Once a dart was deployed and 15 minutes elapsed, the deer was located via radio-telemetry. Masks were placed over the eyes and ophthalmic ointment was applied to prevent ocular desiccation. Deer were transported to the sally port of the Fairfax Police Department where a temporary veterinary surgical sterilization site was located.

Captured females were fitted with VHF radio-collars containing 8-hour mortality sensors to facilitate future capture efforts and assess survival rates. We used radio-collars with a 5-year battery life that are 1/3 the size (150 grams) of traditional deer collars to lessen the physical burden on each deer (Advanced Telemetry Systems, Isanti, MN, USA). All captured deer were fitted with ear tags for individual identification. The back plate of each tag was labeled “Call Before Consumption” with a contact number included. We also collected data on weight, age, and general health of the deer. Incidentally captured males were tagged at the capture location, administered Tolazine IV (2.0 mg/kg), and released.

### *Surgical Procedure*

All female deer were pre-medicated with flunixin meglumine (1-3 mg/kg IM) and a long acting antibiotic (Excede 3-6 mg/kg IM). To maintain anesthesia supplemental doses of ketamine hydrochloride (5 mg/kg IV) were given as needed. Routine prepubic ventral midline laparotomy was used to expose the uterine horns and ovaries. We performed bilateral ovariectomies using a



combination of clamping, electrocautery and excision for removal of the ovary, and coagulation to prevent hemorrhage. In select cases the ovarian artery was ligated with 0 PDS suture or a titanium hemostatic clip. We conducted one surgical fallopian tubal ligation which was deemed necessary by the veterinarians. Tubal ligation is performed in similar fashion to the ovariectomy, however, ovaries were left undisturbed, while the fallopian tubes were ligated using a single titanium hemostatic clip near the insertion site of each uterine horn and a 1-2cm section of each tube was removed with electrocautery. Routine three layer closure of the abdomen was performed to complete the procedure.

### *Release*

All deer were returned proximate to the capture location, in areas with the lowest likelihood of human disturbance during recovery. The reversal agent tolazoline hydrochloride (2.0 mg/kg IV) was administered and each individual was monitored during recovery.

### *Population Monitoring (Year 1)*

Prior to initiating capture efforts began a camera survey to provide a population estimate. We used Moultrie M-880 IR trail cameras (Moultrie Feeders, Alabaster, AL, USA) set on motion activated single shot with a 5-second delay to optimize capture rates. Due to dense development and limited wooded corridors the 1/130 ha camera coverage tested by Jacobson et al. (1997) was used. The study site was broken into 12 quadrants and the control (Vienna, VA) eight quadrants. One camera was allocated to each quadrant. Public property in each quadrant was scouted for heavily traveled deer trails and pinch points deer are forced to pass through due to natural or man-made barriers. Each camera was elevated 0.6 m, oriented north, and angled 45 degrees to the trail. Because of high human activity in the area each camera was labeled "EQUIPPED WITH GPS TRACKER: Property of White Buffalo, Inc. (860) 790-0224." Cameras were run for a test period of 2-days to ensure adequate positioning and then left operational for a period of 30 days before being collected to download the data. We used the same calculation method as Jacobson et al. (1997) to estimate population density and herd demographics. In addition, we used the camera data collected 7 - 19 February in Fairfax to estimate the ratio of tagged to untagged females.

### *Population Monitoring (Year 2)*

The same non-baited survey methodology was used in Vienna and Fairfax in Year 2. In addition, a baited survey was conducted in Fairfax using the Jacobson et al. (1997) method with 1/130 ha camera coverage. We used bait site camera data collected 1 - 11 February in Fairfax to estimate the ratio of tagged to untagged females after the capture efforts.

## **RESULTS**

### **Year 1**

#### *Capture and Sterilization*



We captured 21 deer with remote-injection tranquilizer darts (Table 1). Of the deer captured 18 were females (14 adults and 4 fawns) and three were males (2 yearlings and 1 fawn). All males captured were misidentified as either female fawns or yearling females. All of the females captured were sterilized via ovariectomy with the exception of one that received a tubal ligation because of reproductive tissue adhesions to the abdominal wall. Females received white ear tags and males received orange. There were no mortalities associated with capture or the surgical procedures 1 month post-handling.

**Table 1.** Deer capture data 31 January – 6 February 2014 in Fairfax City, VA.

Ear Tag	Frequency	Sex	Age	Sterilization	Dart Location
1L/1R W	151.803	F	4.5	OV	Blenheim
2L/2R W	151.754	F	2.5	OV	Blenheim
3L/3R W	151.823	F	3.5	OV	Van Dyke
4L/4R W	151.794	F	6.5	OV L – TL R	Ratcliff
5L/5R W	151.832	F	0.5	OV	Ratcliff
6L/6R W	151.763	F	3.5	OV	Plantation Pkwy
7L/7R W	151.692	F	5.5	OV	Spring Terrace
8L/8R W	151.734	F	2.5	OV	Spring Terrace
9L/9R W	151.674	F	1.5	OV	Spring Terrace
10L/10R W	151.782	F	5.5	OV	Van Dyke
11L/11R W	151.703	F	1.5	OV	Van Dyke
12L/12R W	151.813	F	0.5	OV	Van Dyke
14L/14R W	151.853	F	1.5	OV	Blenheim
13L/13R W	151.744	F	1.5	OV	Plantation North Pool
15L/15R W	151.722	F	4.5	OV	Heritage
16L/16R W	151.682	F	6.5	OV	Heritage
17L/17R W	151.713	F	0.5	OV	Old Lee & Queen Anne
18L/18R W	151.663	F	3.5	OV	Plantation Pkwy Park
7L/8R O	N/A	M	0.5	N/A	Blenheim
1L/2R O	N/A	M	1.5	N/A	Providence
3L/4R O	N/A	M	1.5	N/A	Daniels Run

#### *Camera Estimates Fairfax*

From the camera sites we obtained a total of 5,126 pictures. The population survey 20 - 30 January 2014 estimated Fairfax to have 91 deer, 6.6% adult males, 40.7% adult females, and 52.7% fawns. The estimated density is 5.6 deer per square kilometer and the estimated recruitment rate is 1.29 fawns per female. If a 1:1 male to female birth ratio is assumed then based on the survey data alone were sterilized 30.0% of the female population. Analyzing the pictures from 7 - 19 February 2014 (the data after capture ended) the tagged to untagged ratio of females estimates 30.5% of the females were sterilized.

#### *Camera Estimates Vienna*

From the camera sites we obtained a total of 5,359 pictures. The calculations estimated Vienna to have 149 deer, 14.7% adult males, 39.1% adult females, and 46.1% fawns. The



estimated density is 13.1 deer per square kilometer and the estimated recruitment rate is 1.18 fawns per female.

## Year 2

### *Capture and Sterilization*

We captured 20 deer with remote-injection tranquilizer darts (Table 2). Of the deer captured 18 were females (15 adults and 3 fawns) and two were male fawns. All males captured were misidentified as female fawns. All of the females captured were sterilized via ovariectomy. Females received white ear tags and males received orange. There were no mortalities associated with capture or the surgical procedures.

**Table 2.** Deer capture data 26 - 31 January 2015 in Fairfax City, VA.

Ear Tag	Frequency	Sex	Age	Sterilization	Dart Location
19L/19R	151.773	F	2.5	OV	Pickett
20L/20R	150.934	F	1.5	OV	Blenheim
21L/21R	150.473	F	4.5	OV	Woodland
22L/22R	N/A	F	0.5	OV	Woodland
23L/23R	150.244	F	3.5	OV	Plantation Pkwy
24L/24R	N/A	F	0.5	OV	Plantation Pkwy
25L/25R	151.734	F	1.5	OV	Roberts Road
26L/26R	150.914	F	4.5	OV	Plantation Pool House
27L/27R	150.235	F	4.5	OV	Roberts Road
28L/28R	150.256	F	1.5	OV	Eaton Place/Plantation
29L/29R	150.483	F	1.5	OV	Oak Place
30L/30R	150.463	F	0.5	OV	5 Chimneys
31L/31R	150.453	F	2.5	OV	Plantation Pool House
32L/32R	N/A	F	4.5	OV	Ranger Road
33L/33R	150.974	F	4.5	OV	Ranger Road
34L/34R	N/A	F	2.5	OV	Plantation Pool House
35L/35R	N/A	F	2.5	OV	Roberts Road
36L/36R	N/A	F	2.5	OV	5 Chimneys
5L/6R	N/A	M	0.5	N/A	Roberts Road
9L/10R	N/A	M	0.5	N/A	Mosby Woods

### *Camera Estimates Fairfax*

From the non-baited camera sites we obtained a total of 3,374 pictures. The non-baited survey 11 - 25 December 2014 estimated Fairfax to have 51 deer, 15.7% adult males, 56.5% adult females, and 27.8% fawns. The estimated density is 3.1 deer per square kilometer and the estimated recruitment rate is 0.49 fawns per female. From the baited camera sites we obtained a total of 7,750 photos. The baited survey estimated Fairfax to have 66 deer, 13.6% adult males, 58.0% adult females, and 28.4% fawns. The estimated density is 4.0 deer per square kilometer and the estimated recruitment rate is 0.48 fawns per female. Analyzing the pictures from 1 - 11



February 2015 (after capture ended) the tagged to untagged ratio of females estimates 91.3% of the females were sterilized.

### *Camera Estimates Vienna*

From the camera sites we obtained a total of 1,920 pictures. The calculations estimated Vienna to have 76 deer, 22.3% adult males, 37.8% adult females, and 39.9% fawns. The estimated density is 6.6 deer per square kilometer and the estimated recruitment rate is 1.06 fawns per female.

## **DISCUSSION**

In Year 1, the initial population estimate based on observations while spotlighting was consistent with the camera survey results in the City of Fairfax. We initially projected there to be 50-100 deer based on spotlighting efforts, and we then estimated there to be approximately 91 deer with the camera survey. We believed this estimate to be biased slightly high as there was a large group of antlerless deer on the southern boundary that were inaccessible and had limited use of the city based on development patterns in the area. Furthermore, >60% of females were not observed by the cameras when assessing the tagged to untagged ratio after capture. Therefore, our camera estimate is not as precise as it could be because of the low detection rate. The low percentage of tagged females captured in the camera images reflects the deficiency when using cameras, or capture methods, without bait. We initially attempted the non-baited camera survey technique because of baiting restrictions coupled with low deer densities in the City of Fairfax.

We questioned the legitimacy of the non-baited method leading to a small scale research project conducted in conjunction with the Fairfax County Parks Authority comparing baited and non-baited camera surveys. To date, the project has shown non-baited surveys to produce inconsistent data and yield a low detection rate of individuals. This result is reflected in the variation in the Vienna data as well. In contrast, only one of the females captured in Year 1 in Fairfax was not detected on the initial baited camera survey. Therefore, we believe our camera estimate is now much more precise because of the higher detection rate with the use of bait. The baited survey estimated a low recruitment rate and we believe this will decrease even further next year. We are only aware of one adult female that we were not able to capture, the remainder of females were fawns. This will tremendously reduce the recruitment rate. The untagged to tagged ratio calculated from the baited camera data suggests that we have successfully captured >90% of the females. Based on the untagged to tagged ratio, baited camera survey estimate, and observational data, we are confident we have successfully sterilized >90% of the female population currently in the City of Fairfax.

In Year 1, we expended 7.84 person-hours per acquired shot opportunity. In Year 2, we expended 7.22 person hours per acquired shot opportunity. Of greater importance is to note that we began capture efforts in Year 2 with 30-40% of the females already captured. Considering the relative starting point on the capture effort curve, and relative diminishing returns from that stage forward, having fewer person-hours per shot opportunity is a strong statement for the value of using bait as a tool. These data support our previous contention that bait is a critical component in capturing a high percentage of a population.



We did not experience any mortalities related to capture or the surgical procedure in either year. There also were no complaints filed by members of the public during operations. This clearly demonstrates that these types of research actions are compatible with humaneness standards and human activities in a developed environment. In addition, we were able to train three local veterinarians, several veterinary technicians, and local support volunteers. This should prove even more valuable in Year 3 to facilitate repeating the capture and sterilization process with minimal professional staff.

In summary, the use of bait significantly increased our efficiency as it does on nearly all research or nontraditional deer management operations and will be vital to the future success of this research project. We also will need to continue to use bait for the camera surveys to increase the percentage of the population captured in images and ultimately to provide a more accurate estimate.

## **ACKNOWLEDGEMENTS**

First and foremost, this project would not have been feasible without the kind and generous donations of all those involved, particularly those donations facilitated by Gina Lynch, Elaine Miletta through Pets Limited and by Enid Feinberg through Wildlife Rescue, Inc. We also would like to thank the following individuals and organizations for assistance provided prior to and during the sterilization project; Mayor Scott Silverthorne and the other Council members that supported the research project, Chief Carl Pardini and his staff who were instrumental in the implementation of this research, all the volunteers from 21<sup>st</sup> Century Deer and Pets Limited, and numerous veterinary technicians. We are particularly grateful for the veterinary support from Jeff Newman (Caring Hands Animal Hospital) and his staff, and for all his time and equipment. We also thank Kevin Rose and his colleagues for their continued support of this research, including the amended permit in Year 2 to allow baiting and spotlighting on private property.

## **PRINCIPAL INVESTIGATORS**

**Dr. Anthony J. DeNicola** is President of White Buffalo, Inc., a non-profit research organization dedicated to conserving ecosystems through wildlife population control. He received a M.S. degree from the Yale School of Forestry and Environmental Studies and a Ph.D. from Purdue University. Dr. DeNicola has conducted contraceptive and sterilization projects throughout the United States over the last 22 years. Dr. DeNicola's research interests include ecological approaches to control wildlife damage, control of introduced vertebrate species, and wildlife reproductive control.

**Dr. Jeffrey Newman** the owner of Caring Hands Animal Hospital, and President of the Virginia Veterinary Medical Association.

**Dr. Steven Timm** graduated from the University of Minnesota, College of Veterinary Medicine in 1986. In addition to his training and expertise in soft tissue and orthopedic surgery, he has diverse experience in wildlife capture and disease investigation, to include experience with capture, restraint, tissue sampling, pathology, diagnostics and treatment of carnivores (Channel Island skunks, Channel Island foxes, Red foxes, Bald and Golden eagles, Red Tailed hawks, Great Horned owls), ungulates (White-tailed deer, Mule deer, Black-tailed deer, Fallow deer, elk, bison,



Rocky Mountain and Desert Bighorn sheep) and feral species (feral cats, pigs, goats and wild horses). Dr. Timm and White Buffalo Inc. recently established a protocol for rapid ovariectomy and tubal ligectomy using both direct surgical approaches and with the use of rigid endoscopy. This work involves the combined experience of the White Buffalo team of researchers and the surgical and field experience of Dr. Timm, and has established a technique to provide surgical (definitive) sterilization in a field environment. Currently, Dr. Timm lives in southwestern Wisconsin and provides mobile surgical services to companion animal clinics in southern Wisconsin. He has interests in veterinary surgery and intensive care, and free-ranging wildlife disease research.

**Dr. Robert “Bob” Warren** received his B.S. in zoology/wildlife ecology from Oklahoma State University, and his M.S. and Ph.D. in wildlife biology and management from Virginia Polytechnic Institute and State University. Dr. Warren’s areas of research include the ecology and management of wildlife populations, especially in parks and urban/suburban areas; predator ecology and management; wildlife damage management; and physiology, nutrition, and genetics in wildlife management. He and his graduate students have conducted deer research in Georgia, Maryland, Minnesota, South Carolina, and Texas. Dr. Warren has authored or co-authored with students more than a hundred technical articles in scientific journals and edited or co-edited four books.

**Charles Evans, AWB<sup>®</sup>** is a Georgia native with deep outdoor roots. From a young age he has been an avid conservationist. He has an intense interest in white-tailed deer management. This led him to the Warnell School of Forestry and Natural Resources at UGA. While attending Warnell Charles became involved by being a member of multiple wildlife organizations. He worked on deer capture efforts in Georgia, Pennsylvania, and Connecticut. He graduated in 2012 with a Bachelor of Science in Forest Resources. After graduation he worked for the Georgia Department of Natural Resources compiling and editing the information that will be published in *Georgia’s Statewide Deer Management Plan 2015–2024*. Charles has returned to Warnell working toward a M.S. Degree in wildlife under Dr. Robert Warren. His research will be conducted in conjunction with Dr. Anthony DeNicola of White Buffalo Inc. The project will focus on methods for effectively lowering white-tailed deer densities in suburban environments.

## LITERATURE CITED

Jacobson, H. A., J. C. Kroll, R. W. Browning, B. H. Koerth, and M. H. Conway. 1997. Infrared-triggered cameras for censusing white-tailed deer. Wildlife Society (USA).