



A STUDY REPORT ON THE USE OF 4-POSTER DEER TREATMENT STATIONS TO CONTROL TICK INFESTATIONS ON WHITE-TAILED DEER (*ODOCOILEUS VIRGINIANUS*) IN FAIRFAX COUNTY, VIRGINIA

EXECUTIVE SUMMARY

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Introduction

Human exposure to high-density tick populations presents serious public health concerns. One is Lyme disease, the most prevalent vector-borne disease in the United States, which is carried by blacklegged ticks (*Ixodes scapularis*). Dense deer populations are inferred to be a principal factor in the increase of ticks in many urban and suburban environments. White-tailed deer (*Odocoileus virginianus*) are the primary food source for adult blacklegged ticks and lone star ticks (*Amblyomma americanum*), although they themselves are not competent reservoirs of the Lyme disease bacterium (*Borrelia burgdorferi*).

Controlling tick populations has been a historically difficult task. Traditional methods of prevention and management alone, including area-wide application of pesticides and deer population control, have not proven to be effective methods for tick control over large geographic areas. Non-lethal means to control the ticks that feed on deer, such as 4-Poster technology, have shown some promise.

The 4-Poster deer treatment station was approved by the United States Environmental Protection Agency for commercial use in 2004. A 4-Poster deer treatment station is a feed station that uses corn to bait deer and treat the deer with a pesticide to kill ticks. A deer rubs against rollers containing an acaricide, a pesticide specially formulated to kill ticks and mites, as it lowers its head to the trough to feed on the corn at the station. The deer further distributes the acaricide over its body while self-grooming.

Study Goals

The objectives of the 4-Poster deer treatment study were to (1) determine the effect of the 4-Poster station on abundance of local tick populations, (2) assess the effect of baiting deer year-round through use of the 4-Poster station, (3) evaluate impacts of deer on vegetation characteristics surrounding 4-Poster stations, and (4) provide a recommendation for future use of these stations in Fairfax County.

Study Overview

Twenty 4-Poster stations (20) were deployed from February 2012-March 2015 across two public parks: five stations at Hemlock Overlook Regional Park (NOVA Parks) and fifteen stations at Sully Woodlands (Fairfax County Park Authority [FCPA]). Two control sites were also selected: Laurel Hill Golf Course and Twin Lakes Golf Course (both FCPA). No 4-Poster stations were deployed at the control sites.

Data Collection

- 1) **Host examination:** From 2012- 2014, tick collection from the ears of 105 harvested deer yielded 11,858 adult, nymphal, and larval ticks of four species (lone star tick, gulf coast tick [*Amblyomma maculatum*], winter tick [*Dermacentor albipictus*] and blacklegged tick).
- 2) **Tick traps:** Routine tick collections were made at treatment and control sites using carbon dioxide-baited sailcloth traps. Pre-treatment collections began in April 2010 and occurred every other week. Weekly collections began in 2012 shortly after deployment of the 4-Posters. A total of 24,179 ticks

(adult, nymphal, and larval) were collected at treatment and control sites from four different species (lone star tick, gulf coast tick, American dog tick [*Dermacentor variabilis*] and blacklegged tick).

- 3) **Camera monitoring:** Infrared motion-sensing digital game cameras were placed within 10 m of each 4-Poster station to monitor site use by deer, other non-target wildlife species, human activity, and/or signs of tampering or damage to equipment.
- 4) **Deer density estimation:** Deer density (deer per square mile) was annually estimated at test sites using infrared motion-sensing digital game cameras over a 14-day period in August.
- 5) **Deer herd health assessment:** Deer were opportunistically harvested at each study site through sharpshooting operations to assess herd health and potential impacts of baiting. A total of 108 white-tailed deer were harvested over the project duration. Biological data were recorded from external examination of each deer including sex, age, weight, body condition, and/or signs of abnormality, injury, or disease. A gross necropsy was completed for each deer harvested and tissue samples were submitted for histological examination by the VDACS Animal Health Laboratory (Warrenton, VA) and testing for Chronic Wasting Disease (CWD) by the Wisconsin Veterinary Diagnostic Laboratory (Madison, WI).
- 6) **Environmental impacts:**
 - a. Deer browse surveys were conducted annually to measure the severity of browse impact at each test site.
 - b. Soil assessments were conducted annually at test sites to estimate the percent coverage of bare soil versus covered ground (vegetation and leaf litter) as a function of soil erosion and/or impacted soil within each sample plot.

Study Results

- 1) **Host examination:** Statistical analysis showed that abundance of lone star ticks and blacklegged ticks collected from harvested deer was similar between control and treatment sites. Winter ticks were not included in analysis due to low capture numbers. Abundance of male gulf coast ticks was significantly greater at control sites. Lone star ticks accounted for 98.22% of samples (n = 11,647). Blacklegged ticks accounted for only 0.75% (n = 89) of captures. The gulf coast tick comprised 0.73% (n = 87) of the total and the remaining 0.30% (n = 35) were the winter tick.

2) Tick traps:

Lone star tick – No significant changes were seen in the abundance of male and female lone star ticks at treatment sites throughout the study; however, a significant decrease in abundance was seen at control sites between years two and three of the study. When compared to pre-treatment levels, significantly fewer lone star tick nymphs were collected at treatment sites following the third year of 4-Poster deployment; however, a significant reduction was also found at control sites. A significant reduction in abundance of larval lone star ticks was seen at treatment sites in the second year of 4-Poster deployment compared to previous years; whereas, larval lone star ticks at control sites fluctuated significantly from year-to-year. Analysis indicated control and possible treatment effect of the 4-Poster on the larval lone star tick; however, no control was indicated for the male, female or nymphal stages of the lone star tick.

Blacklegged tick – A reduction was seen in abundance of blacklegged tick nymphs between study years one and two, prior to 4-Poster implementation; however, there was no difference or reduction in the number of blacklegged ticks collected at the treatment or control sites after the 4-Posters were deployed. Analysis indicated control and possible treatment effect of the 4-Poster on the female blacklegged tick; however, no control was indicated for male or nymphal stages of the blacklegged tick.

- 3) **Non-target wildlife:** Non-target wildlife species were observed inside the circular fence plots surrounding each 4-Poster including black bear (*Ursus americanus*), red fox (*Vulpes vulpes*), groundhog (*Marmota monax*), raccoon (*Procyon lotor*), gray squirrel (*Sciurus carolinensis*), Virginia opossum (*Didelphis virginiana*), Canada goose (*Branta canadensis*), and turkey vulture (*Cathartes aura*).
- 4) **Deer density estimation:** From 2012-2014, deer density estimates at Hemlock Overlook Regional Park and Sully Woodlands increased over 1.6 times since the initial population surveys were conducted. Surveys conducted in 2012 estimated 184 deer per square mile at Hemlock Overlook Regional Park and 113 deer per square mile at Sully Woodlands. Surveys conducted in 2014 estimated 317 deer per square mile at Hemlock Overlook Regional Park and 177 deer per square mile at Sully Woodlands.
- 5) **Deer herd health:** The most frequently diagnosed conditions found during herd health checks included verminous pneumonia, enterocolitis, multiple organ inflammation and variable internal parasites. No CWD was detected in any sampled lymph nodes of harvested deer. Although none of the deer tested in our study were found to be positive for CWD there are serious concerns regarding the potential spread of CWD in Virginia.
- 6) **Environmental impacts:**
 - a. At Hemlock Overlook Regional Park, there was no difference in the level of browse damage detected during the study. Browse levels at Sully Woodlands significantly differed over study years with variable results depending on survey plot. There were no trends, with browse being heavy to severe across both sites over time.
 - b. Treatment locations saw a significant increase in damage to ground cover and soil exposure associated with 4-Poster station use by deer. Mean percent coverage of bare ground increased by 70% at Hemlock Overlook Regional Park and 32% at Sully Woodlands from 2012-2014.

Conclusions

Based on this study's results, further implementation of 4-Poster stations in Fairfax County is not recommended. The 4-Poster deer treatment station may have helped reduce tick loads on individual deer within the treatment area, but the impact on the tick population is unclear. Although the numbers of blacklegged ticks were low, no significant difference or reduction was seen within the treatment sites after the introduction of the 4-Poster. Reductions in the numbers of lone star ticks collected were seen within the treatment areas of the study during the 4-Poster deployment, but reductions in numbers of lone star ticks collected were also seen within the control areas which suggest that other factors were also contributing to the changes in tick abundance during the study.

In addition to the limited efficacy for tick control, the year-round operation of 4-Poster stations resulted in negative environmental effects including sustained high levels of deer browse, damage to ground cover and increased soil exposure as the result of deer activity at feeding stations.

The potential for disease spread at feeding stations remains a serious concern for deer and non-target wildlife. Given the close proximity of the CWD Containment area to Fairfax County and the dense herds present within the county, it is not advisable to implement a method that would require year-round supplemental feeding of deer and increase potential for spread of the disease at the feeding site. Supplemental feeding also has potential to increase disease transmission among non-target wildlife, including rabies vector species such as raccoons and foxes that were frequently seen at stations.

Lastly, feeding of deer conflicts with current management objectives for deer population reduction in Fairfax County. It would be counter-productive to current deer control efforts to introduce practices that may encourage population growth in local deer herds through provision of an ample, year-round food source. A special permit would be required from DGIF to authorize supplemental feeding of deer during most of the year.

This executive summary was assembled from the complete final report:

Edwards, K.E., J. Smith, C.A. Bankert, K.M. Auer, J.L. Everitts, A.W. O'Donnell, V. Monroe, and J.R. Arias. 2016. A study report on the use of 4-poster deer treatment stations to control tick infestations on white-tailed deer (*Odocoileus virginianus*) in Fairfax County, Virginia.

This pilot study was conducted by the Fairfax County Police Department – Animal Services Division in collaboration with the Fairfax County Health Department - Disease Carrying Insects Program. Park locations used in the study were provided by the Fairfax County Park Authority and Northern Virginia Regional Park Authority. This study was approved under a scientific collection permit by the Virginia Department of Game and Inland Fisheries. Funding for the pilot study was provided by Fund 40080, Integrated Pest Management Program.

This report is also available online at:

<http://www.fairfaxcounty.gov/living/wildlife/pilotstudy/4-poster.htm>

To request this information in an alternate format, call the Fairfax County Police Department, Animal Services Division – Wildlife Section: (703) 246-6868 TTY 711