

Tick Population Analysis and the Use of 4-poster Devices by White-Tailed Deer (*Odocoileus virginianus*)

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Abstract

Tick populations on Long Island are a problem for its residents because they carry diseases, such as Lyme (*Borrelia burgdorferi*). Fire Island and Shelter Island have both used 4-poster systems to decrease the tick populations. Fourteen 4-poster devices have been set-up at Brookhaven National Laboratory during spring 2013. The “4-poster” device feeds deer corn and uses this attractant to apply pesticide to a deer’s neck, ears, and head via rollers. This study examines the current tick population, habitat ticks prefer, and white-tailed deer usage of “4-posters.” The “4-poster” systems were monitored using wildlife cameras and corn and permethrin usage. Tick surveys were also conducted at each “4-poster” location and two control sites. Deer usage was calculated based on corn usage. Forested areas did not contain significantly more ticks than grass areas. Twenty-one white-tailed deer visited a 4-poster per day on average in July 2013, which is more than April.

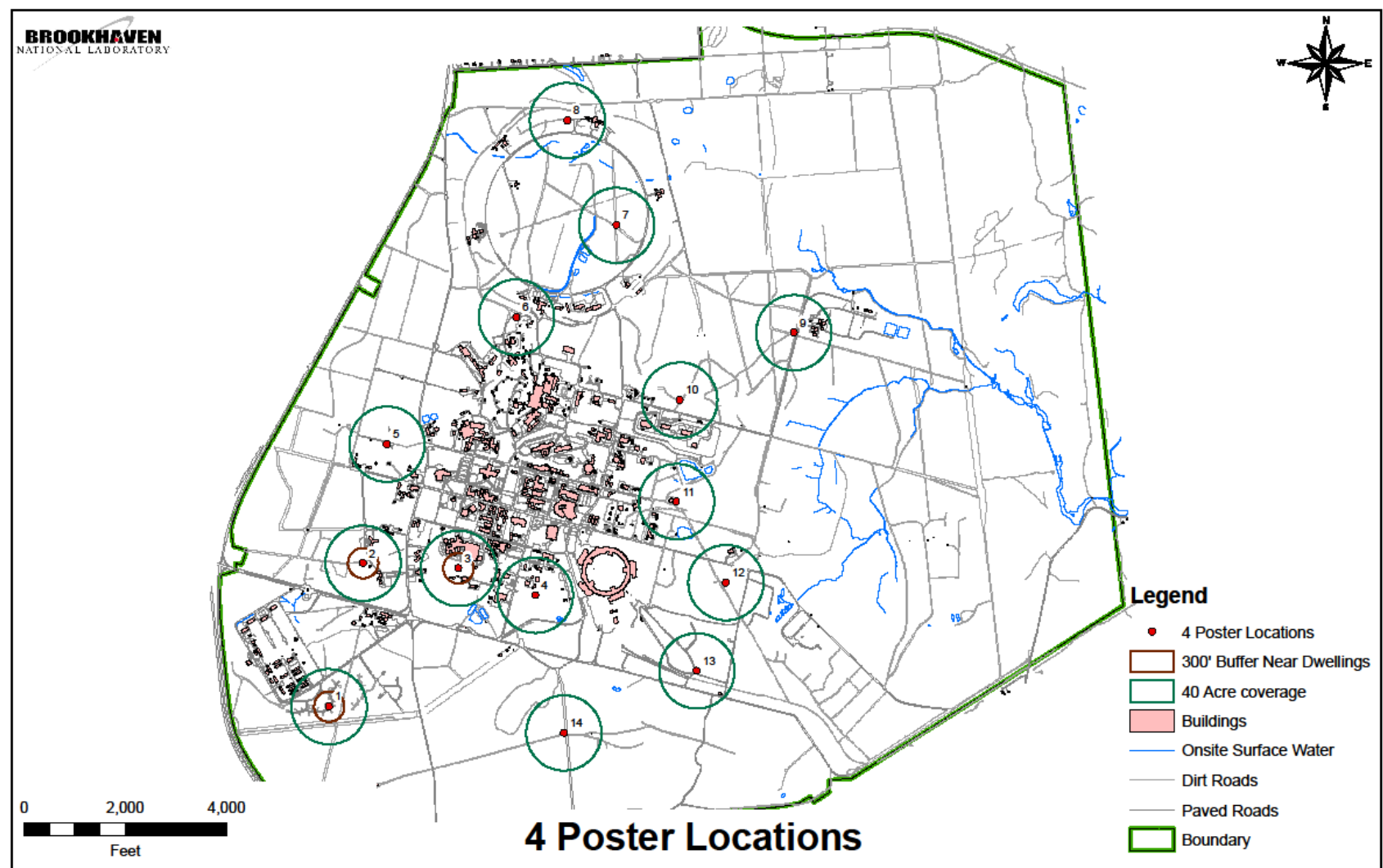


Fig. 1. Map displaying the location of the fourteen “4-posters”

Table 1. Displays tick abundance between grass fields and forested Areas where LS is lone star ticks, BL is black-legged ticks, and dog is dog ticks

Sample	C1 G	C2 F	4P-11 G	4P-11 F	4P-13 G	4P-13 F
LS Male	0	0.667	0.643	0.733	0	0.133
LS Female	0.033	0.533	0.733	0.6	0	0.133
LS Nymph	0.6	13.167	1.867	4.067	0.467	4.667
LS Larval	148.667	6.667	0	0	0	0
BL Male	0	0	0	0	0	0
BL Female	0	0	0.0667	0	0	0
BL Nymph	0.033	1.233	0	0.333	0	0
BL Larval	0	0	0	0	0	0
Dog Male	0.033	0	0	0	0.067	0
Dog Female	0	0	0	0	0	0
Dog Nymph	0	0	0	0	0	0
Dog Larval	0	0	0	0	0	0



Fig. 2. “4-Poster” 3 with deer feeding

Introduction

Brookhaven National Laboratory (BNL) is 5,265 acres composed of mainly forested areas and open fields. It also has an abundance of white-tailed deer present on site. The forest areas have been fragmented due to building and recreational area development, along with the construction of a solar farm. Tick populations on Long Island have caused problems for residents for years. These ticks carry various diseases including Lyme (*Borrelia burgdorferi*), Babesiosis (*Babesia microti*), Ehrlichiosis, and others [1].

The “4-poster” program that took place at Shelter and Fire Island were the first studies of “4-posters” in the area. These areas were carefully monitored for three years and the NYDEC allowed the use of the “4-poster” system on Long Island after this study [2]. In an attempt to decrease the population of ticks, BNL has set up fourteen “4-poster” devices around the entire site during spring 2013 (Figure 1). The 4-poster works by attracting deer to it with a bait source of corn (Figure 2). The feeding tray is accessed by white-tailed deer by sticking their head down along a slanted wall. This slant forces the deer to tilt its neck, head, and ears against the rollers on each end. These rollers contain a pesticide, permethrin. The permethrin stays on the deer’s neck, head, and ears for an extended period [3].

This study looks at the effectiveness of the first summer’s deployment of the 4-Poster devices. The number of deer using the device is calculated, and the first year tick surveys are completed. The tick population will also be compared between open grass and forested areas.



Fig. 4. Raccoons sitting on “4-poster” 9

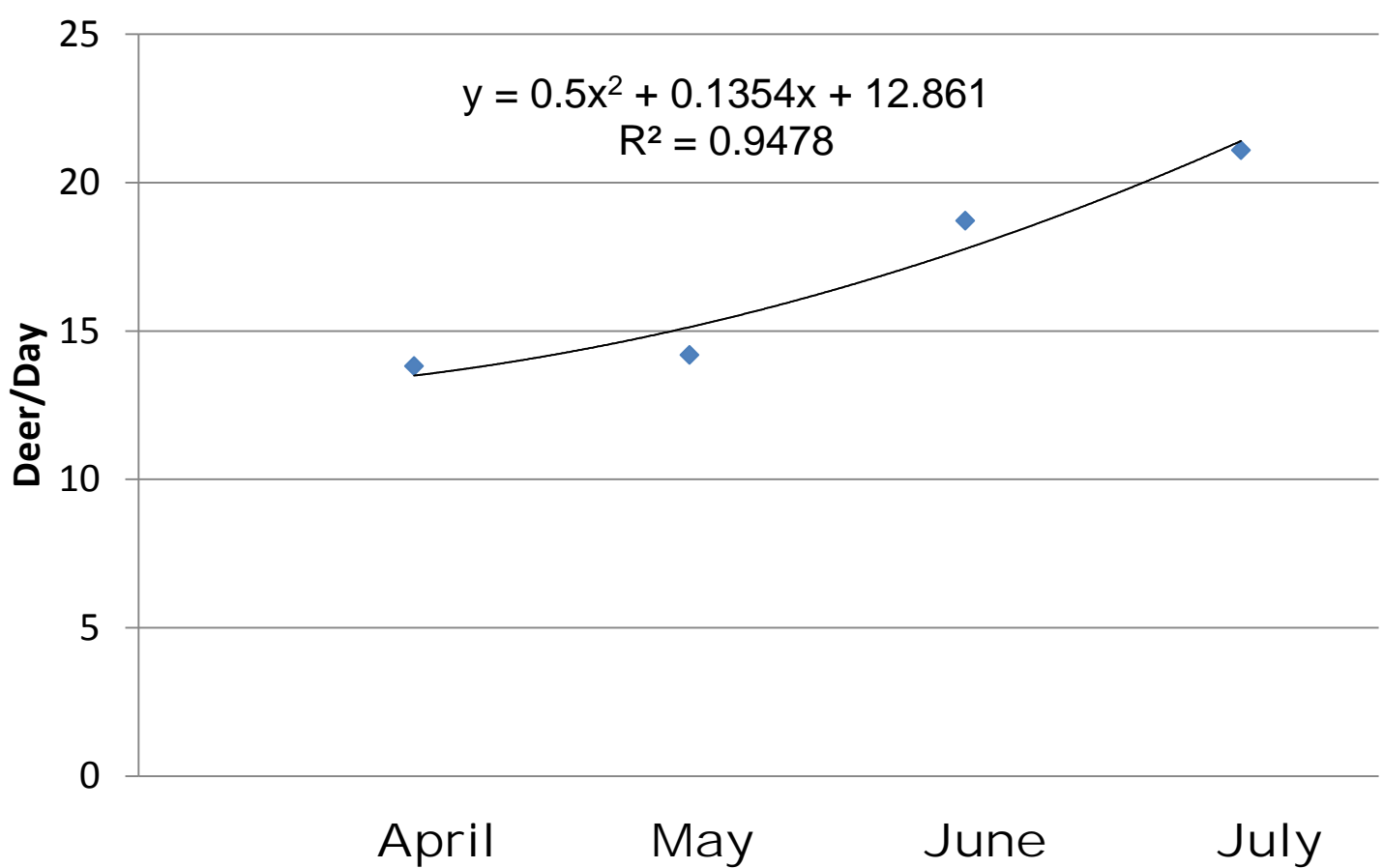


Fig. 6. Chart displaying average deer use of “4-posters” from April through July 2013

Table 2. Displays tick abundance at the 14 “4-posters” and 2 control sites

Sample	4P-1	4P-2	4P-3	4P-4	4P-5	4P-6	4P-7	4P-8	4P-9	4P-10	4P-11	4P-12	4P-13	4P-14	C-1	C-2
LS Male	0.1	0.133	0.067	0	0.133	0.267	0.067	0.067	0.067	0.233	0.69	0.433	0.067	0	0	0.667
LS Female	0.067	0.167	0.233	0.033	0.067	0.2	0.233	0.033	0.167	0.667	0.467	0.067	0.033	0.033	0.033	0.533
LS Nymph	1.367	25.6	2	0.567	6.167	8.4	1.533	0.433	0.6	7.4	2.967	2.233	2.567	4.367	0.6	13.167
LS Larval	0	0	0	0	0	0	0	0	0	2.533	0	0	26.667	0	148.667	6.667
BL Male	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BL Female	0	0	0	0	0	0	0	0	0	0	0.033	0	0	0	0	0
BL Nymph	0.467	0.633	0.167	0	0.667	0.7	0.133	0.033	0.233	0.067	0.167	0	0	0.333	0.033	1.233
BL Larval	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Dog Male	0	0	0	0	0	0	0	0.033	0	0	0	0	0.033	0	0.033	0
Dog Female	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dog Nymph	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dog Larval	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Methods and Materials

4-poster devices are maintained with corn and permethrin twice weekly. The amount of corn used, corn added, permethrin added, time, and date were recorded. Each device is monitored by a Wildlife Innovations Model W5EGC wildlife camera. Pictures were organized based on content. Categories for sorting included white-tailed deer, wild turkey, raccoon, other animal, or no animal. A picture with a deer always went into the deer folder no matter what other animal was present.

Corn consumption was used to calculate usage of “4-posters” by deer. A week’s worth of corn usage was averaged into corn consumed per 24 hours. This was divided by 1.5 to give the deer usage per day [2]. Tick surveys were completed at the fourteen 4-poster systems and two control sites (Figure 3). The surveys were completed in July. Each tick survey was conducted using a white flag. The flag was dragged through vegetation for thirty seconds and each site had this completed thirty times.



Fig. 5. “4-poster” 13 with American kestrel perched on top

Results

Pictures from all cameras contained both mammals and birds. Mammals include white-tailed deer, opossums, raccoons (Figure 4), and squirrels. Birds included wild turkeys, blue jays, northern cardinals, American kestrels (Figure 5), and various other species. In July “4-poster” 11 and 12 had the greatest deer usage, and “4-poster” 9 and 1 had the lowest.

The difference between tick numbers in grass versus forest is not statistically significant (Table 1). Adult male dog ticks, one adult female black-legged tick, nymph and larval black-legged ticks, and all stages of lone star ticks were found at BNL (Table 2).



Fig. 3. Ticks collected during sampling

Discussion

With extended deployment of the “4-posters”, more deer use them each month on average (Figure 6). Supplemental feeding can bring deer closer together than during normal grazing and is discouraged and even banned in some states due to the possibility of transmitting diseases [4]. The disease of main concern is chronic wasting disease, but this danger can be mitigated through careful observation.

No significant difference were found between forested and grass field tick surveys, but it is possible more data will reveal different results. Tick surveys were completed as the baseline in a three year longitudinal study. They will be used for comparison in later years.

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