

Quarterly Report for Vicksburg National Military Park

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INTRODUCTION

The Vicksburg National Military Park (VICK), located in Warren County, Mississippi, is currently assessing three alternative landscape treatments to better preserve the historical and cultural features of the park as they were during the campaign, siege, and defense of Vicksburg during the Civil War (NPS 2008). Due to the limited viewscape, VICK is unable to provide visitors a better understanding of the historical events. Natural resources will be affected if VICK is to change the landscape. The National Parks Omnibus Management Act of 1998 requires scientific study be provided for park management decisions in situations where actions will have a significant impact on resources.

Monitoring mammalian populations for detectable changes requires the estimation of the parameters of interest, those parameters usually being population size or density. The alternative used most often is an index representing the parameter of interest. For an index to be useful, a known relationship between the index and estimate must be known. Species monitoring, relative to habitat alterations, requires a species that is common, found in the existing and proposed habitats, and is subject to sampling such that estimates may be provided.

Linehan (2007) noted that white-tailed deer were found in every habitat type in the park and were evenly distributed throughout. Given deer are well studied in other national parks with a similar mission (Frost et al. 1997, Porter and Underwood 1999), thought to be evenly distributed throughout the VICK, respond in a predictable manner, both numerically and functionally, white-tailed deer will be used as a model species for monitoring to provide baseline data for potential landscape alterations.

OBJECTIVES

The objectives of this work will be to examine density and distribution of white-tailed deer in Vicksburg National Military Park. Specifically, we will:

- Determine summer (September) and fall (November) 2008 and winter (February) and spring (May) 2009 deer density estimates for VICK by area and park-wide;
- Determine buck to doe and fawn to doe ratios from the summer 2008 survey for VICK by area and park-wide;

Additionally, upon completion of this study we will produce:

- A distribution map of deer locations from summer and fall 2008 and winter and spring 2009 surveys for VICK by area and park-wide; and,
- A distribution map of expected deer densities across VICK from summer and fall 2008 and winter and spring 2009 surveys for VICK by area and park-wide.

METHODS

Deer density will be estimated using distance sampling (Buckland et al. 1993) for each season. Seasonal densities are required to account for seasonal variation in densities, particularly for VICK due to the size and shape of the property. Seasonal densities will be provided by area and park-wide. Area will be delineated by each of the road loops (north, central, and south) in the park. Data will be collected by conducting spotlighting surveys from the bed of a pickup truck while moving at 8-16 kph along the established roads within VICK. Surveys will begin one half hour after sunset for five consecutive nights. An observer will locate deer using a 1,000,000 candlepower spotlight and upon sighting a deer or group of deer, the truck will be stopped. The time, location of truck, distance to deer from the observer, and bearing to the deer will be recorded. If more than one deer is sighted, the estimated center of the group will be used for measuring distance and bearing. Locations will be measured and recorded using a Trimble GeoXH (Trimble, Inc.). Distances will be measured to the nearest meter using a rangefinder and bearing will be measured to the nearest degree using a compass.

Distribution of deer will be provided based on locations determined from the spotlight surveys. Deer locations will be calculated based on the known location of the observer, distance, and bearing to the deer or deer group. The precision of the density estimates depend on the density, the number of surveys (i.e., number of replicates), and the number of observations. In high density populations a coefficient of variation (CV), a measure of precision, can be expected to be < 20%. The CV provides a measure of expectation of the level of change that may be detected given landscape alterations or other management changes.

WORK COMPLETED TO DATE

Data were collected by conducting spotlight surveys from the bed of a pickup truck for five consecutive nights beginning 26 September 2008, and ending on 30 September 2008. A sampling fraction of 0.5 was used to represent the proportion of area surveyed and a line length of 26.3 km to represent the length of road travelled each night.

RESULTS (Preliminary)

We observed a total of 69 groups of deer with a mean group size of 1.97 deer (Figures 1-6). We observed a total of 136 deer across the 5 nights. We found mean buck:doe and fawn:doe ratios of 35.0 bucks per 100 does and 9.4 fawns per 100 does,

respectively (Table 1). Density estimation models were produced based on half normal, uniform, hazard rate, and negative exponential distributions. The half normal distribution provided the best model based on the coefficient of variation being < 20% and being the most parsimonious model (Table 2); all models examined produced Akaike Information Criterion values less than two (2) units apart. The 95% confidence interval of deer density was one deer per 12 ha to one deer per 6.5 ha, with a point estimate of one deer per 9.0 ha.

Table 1. Number of deer observed per night by sex and age from 26-30 September 2008 (Nights 1-5, respectively) on the Vicksburg National Military Park.

Night	n	Bucks	Does	Fawns	Unknown
1	12	1	14	3	7
2	16	8	28	0	0
3	11	5	15	1	4
4	15	4	9	1	8
5	15	8	13	1	6
Total	69	26	79	6	25
Mean	13.8	5.2	15.8	1.2	5

Table 2. Point estimates, percent coefficients of variation, and 95% confidence intervals for deer group densities, cluster size, deer density, and estimated strip width calculated from distance sampling from data collected from 26-30 September 2008 on the Vicksburg National Military Park.

	Point Estimate	% Coefficient of Variation	Lower 95% CI	Upper 95% CI
DS ^a	0.056	14.05	0.042	0.074
E(S) ^b	1.992	7.68	1.709	2.322
D ^c	0.111	16.01	0.081	0.152
ESW ^d	94.345	12.17	74.077	120.160

Definitions:

- a.) DS: estimate of density of clusters
- b.) E(S): estimate of expected value of cluster size
- c.) D: estimate of density animals
- d.) ESW: estimate of density animals

We sampled selected vegetation parameters at 20 plots based on deer locations and 20 paired random plots. These data are being processed for analysis currently.

FUTURE WORK

Seasonal densities are required to account for seasonal variation in densities, especially given the size and shape of the VICK. The summer survey provided demographic data (sex, age (adult, young)) in addition to density. Future surveys will provide recruitment as well as a minimum density.

Proposed Timeline of Future Work

2008	November – Conduct field work
	December – Data Analysis
2009	January – Quarterly Report
	February – Conduct field work
	March – Data Analysis
	April – Quarterly Report
	May – Conduct Field Work, Data Analysis
	June – Final Report and Close-out Meeting

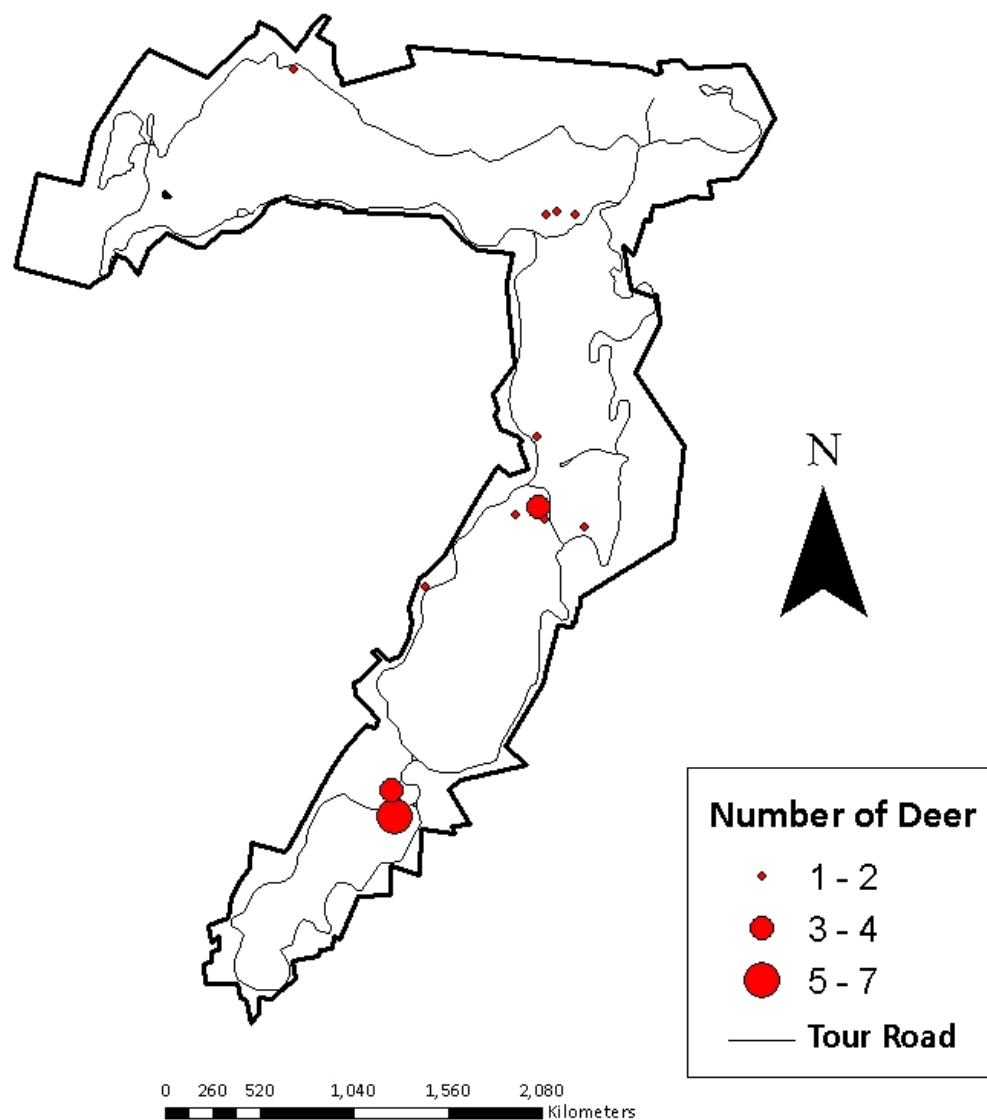


Figure 1. Locations of deer on Vicksburg National Military Park, 26 September 2008.

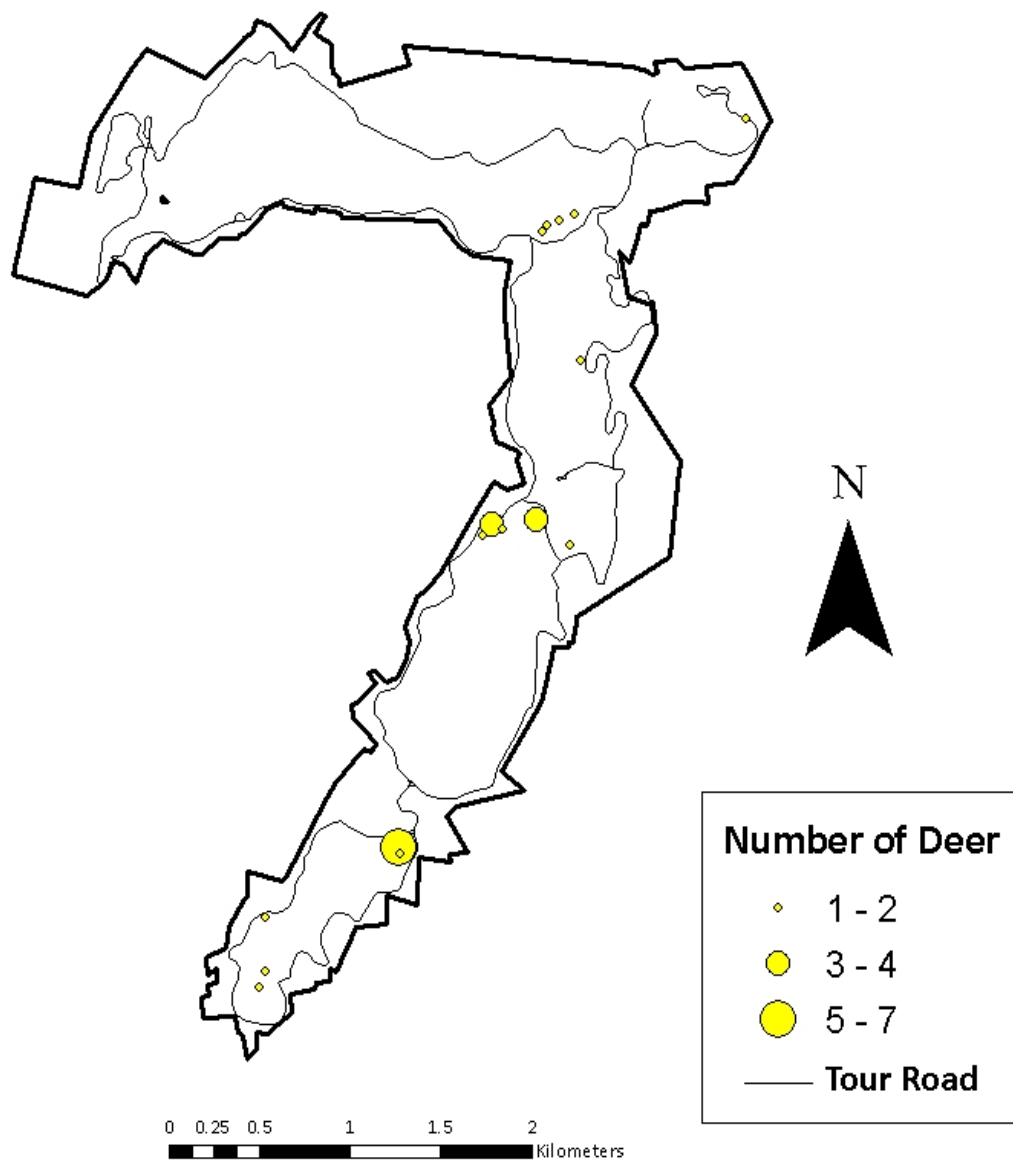


Figure 2. Locations of deer on Vicksburg National Military Park, 27 September 2008.

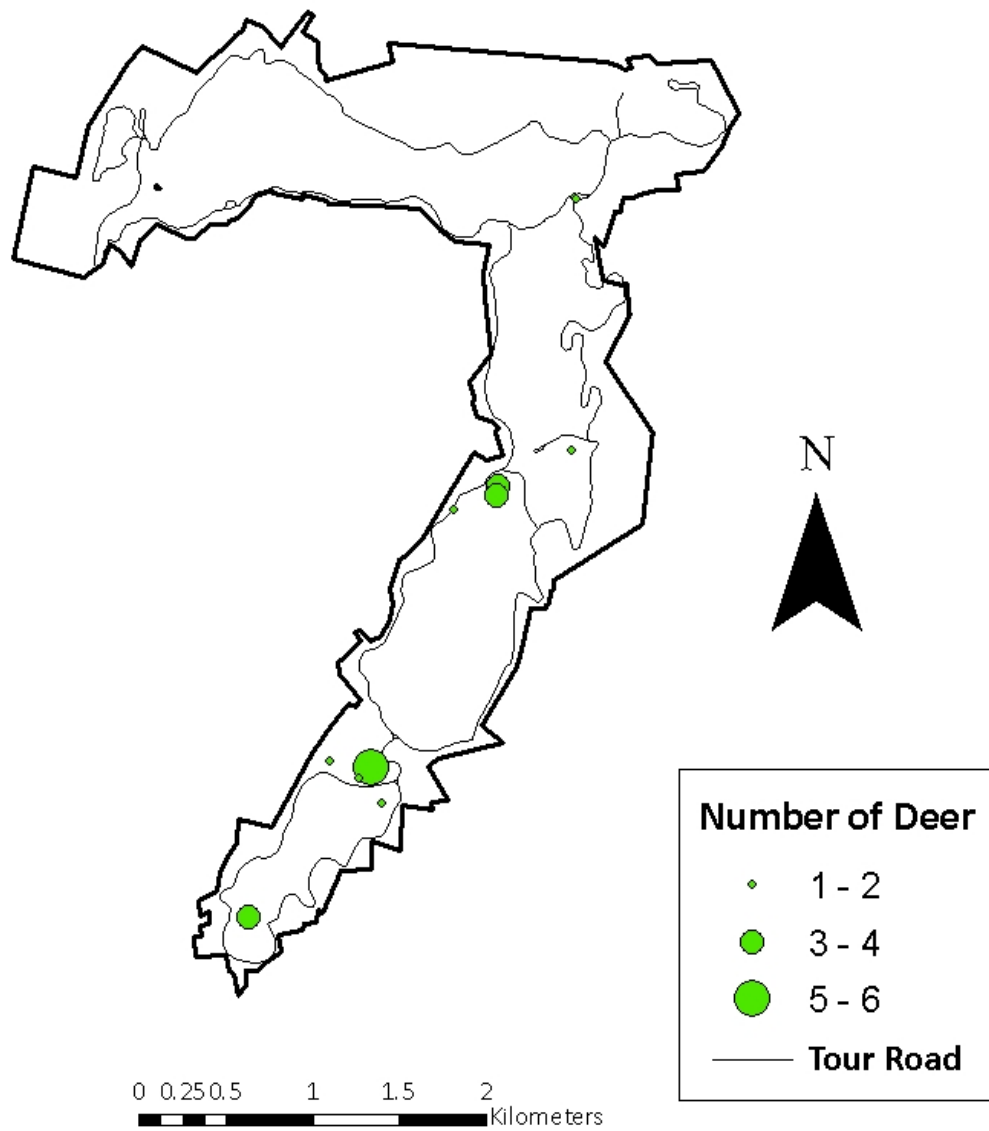


Figure 3. Locations of deer on Vicksburg National Military Park, 28 September 2008.

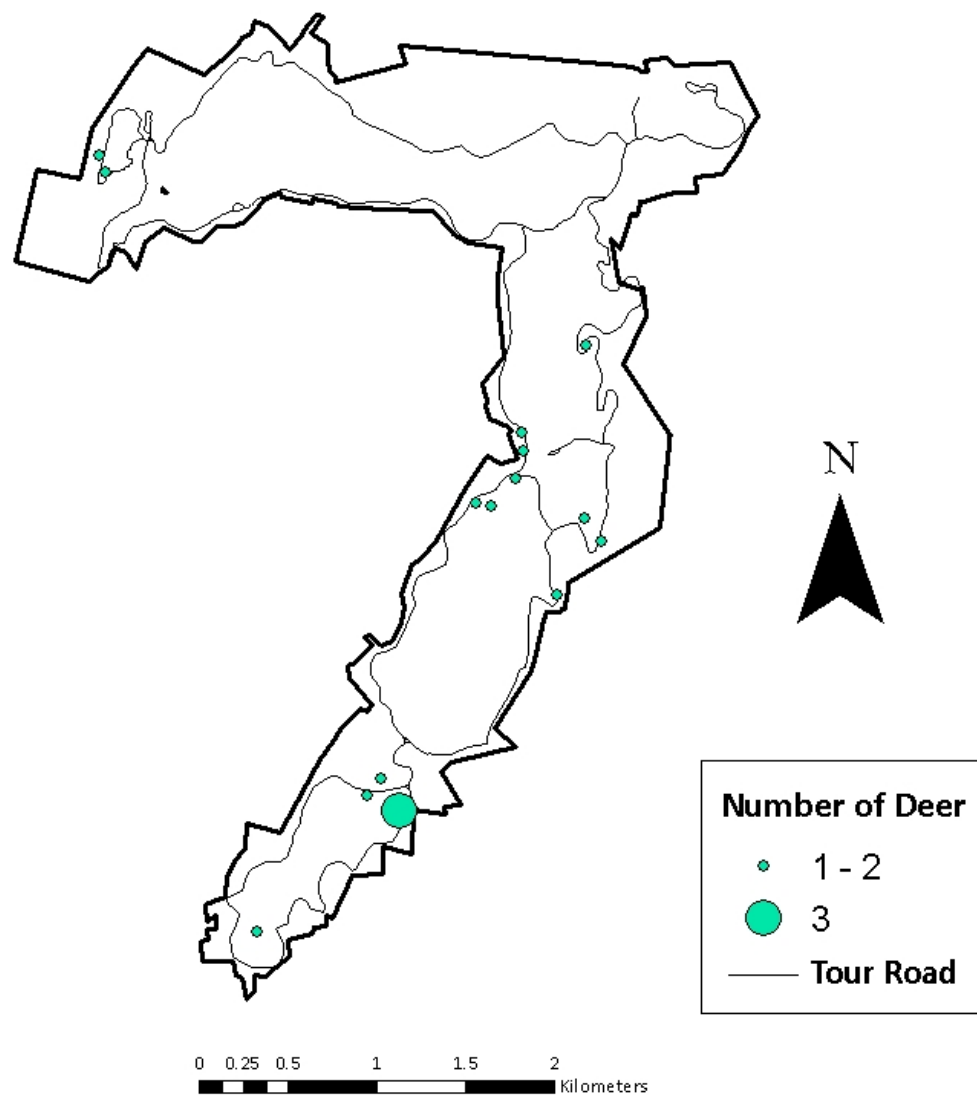


Figure 4. Locations of deer on Vicksburg National Military Park, 29 September 2008.

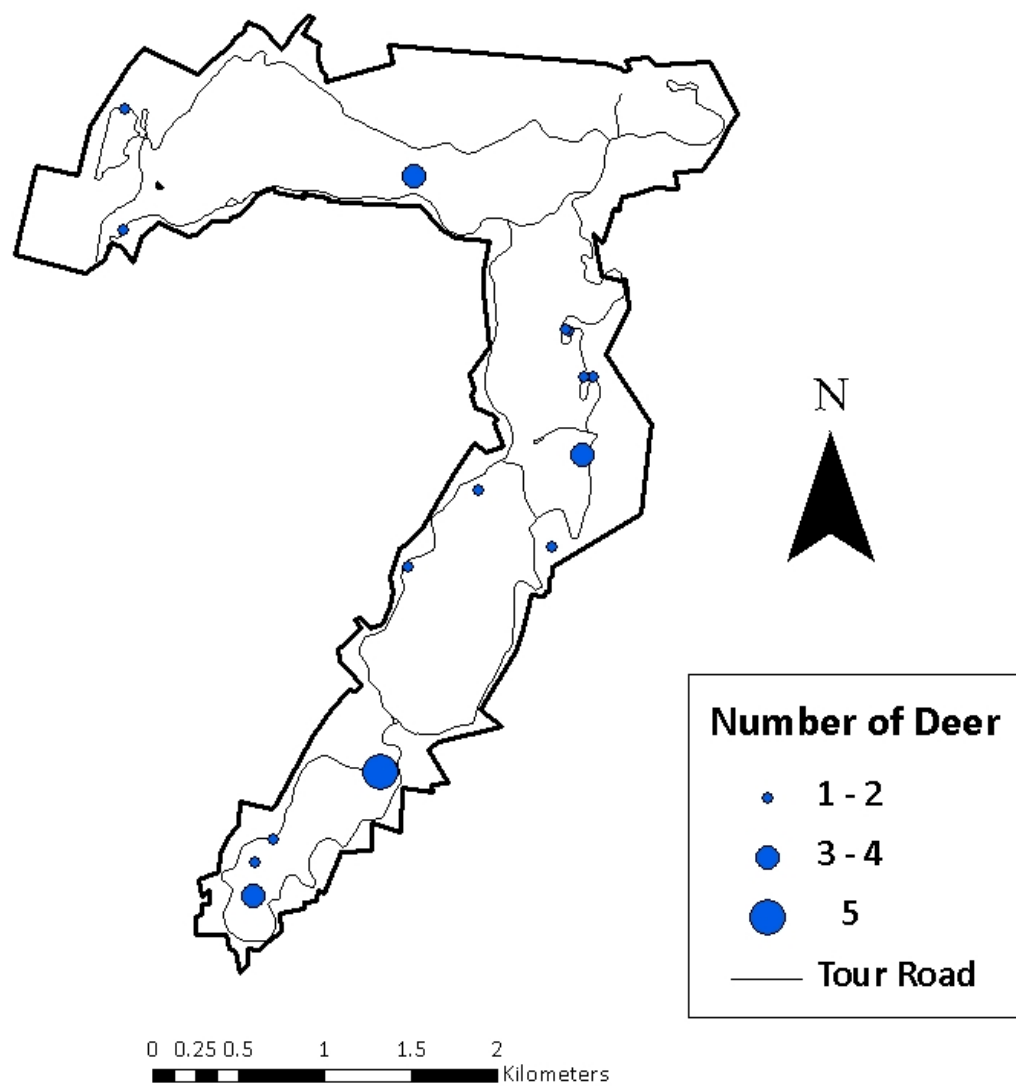


Figure 5. Locations of deer on Vicksburg National Military Park, 30 September 2008.

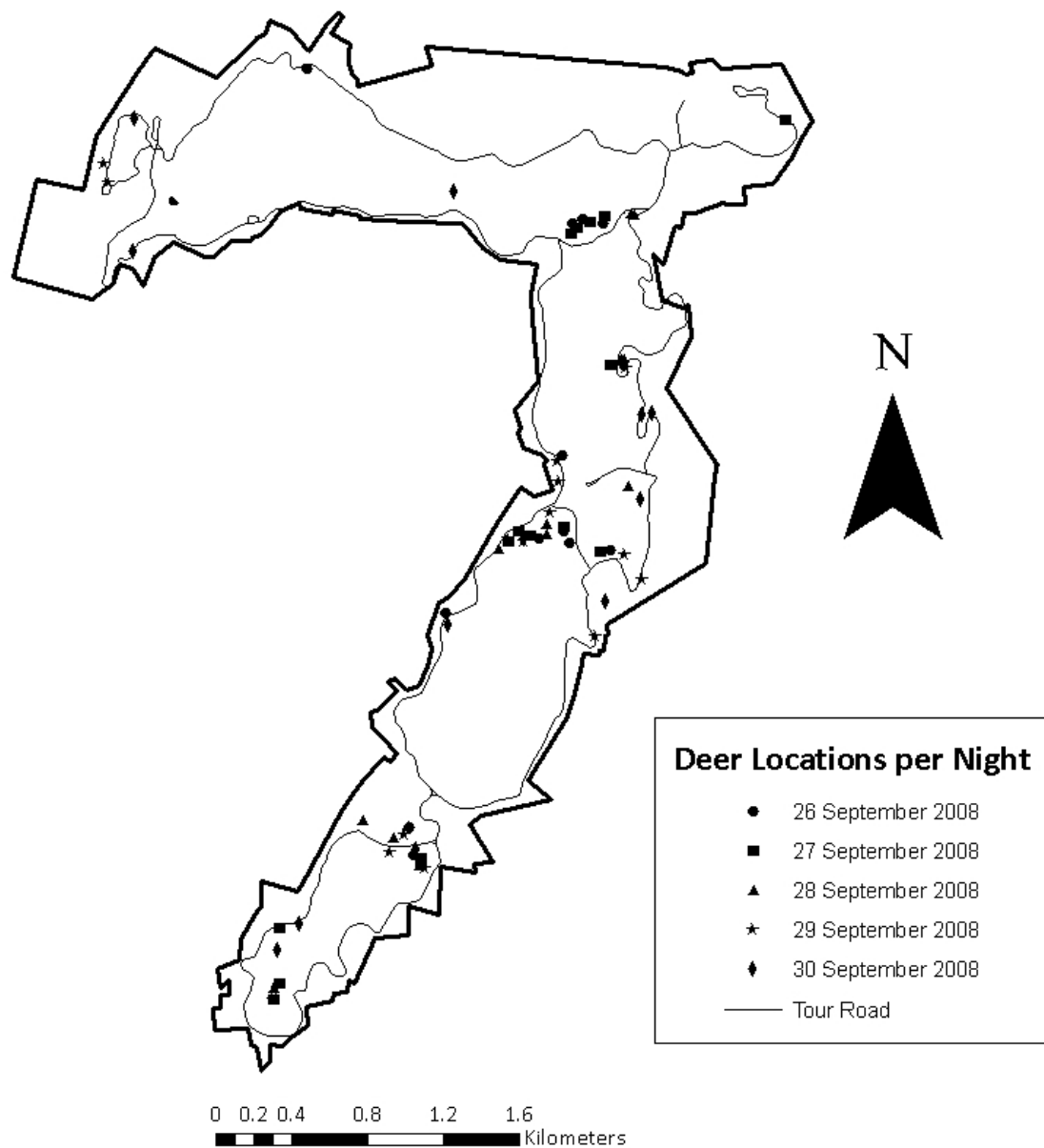


Figure 6. Locations of deer on Vicksburg National Military Park, 26 September – 30 September 2008.

LITERATURE CITED

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