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Camera Trap Survey Suggests Forestry and Prescribed Burns Attract Wildlife, But May Not Enhance Diversity

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ABSTRACT

This study explored whether habitat management techniques such as forest thinning and burning promoted biodiversity. Fifteen camera trap stations were established at Fort A.P. Hill in Bowling Green, VA across forest stands with low, medium, and high basal area. Camera traps were deployed for a total of 532 trap nights, and trap success and species diversity were calculated using Shannon's index. At each site, the distance to trafficable roadways and water sources, vegetation composition, and the percent groundcover, canopy cover, and understory were measured. The cameras captured nine species and recorded a total of 398 trap events. Linear regression was used with an information theoretic approach to test and rank several possible models exploring the relationship between trap success and environmental factors. The best model included basal area and displayed an inverse relationship between basal area and trap success, although stands with low basal area had lower levels of diversity.

Keywords: camera trap, basal area, Fort AP Hill

INTRODUCTION

Prescribed burns and forestry cuts are land management tools that are used to maintain and enhance wildlife habitat (Main and Richardson 2002; Lashley et al. 2011). Cutting and burning reduces the basal area, clears understory, increases sunlight, and promotes early successional vegetation in forests and consequently attracts a variety of wildlife species (Main and Richardson 2002; Lashley et al. 2011). A rich herbaceous layer promoted by fire harbors insects and seeds ideal for passerine granivores, as well as galliformes such as wild turkey (*Meleagris gallopavo)*, and northern bobwhite (*Colinus virginianus)* (Main and Richardson 2002; McCord et al. 2014). This vegetative growth also provides forage and cover for small mammals (Van Lear et al. 2005) and benefits herbivorous ungulates by enhancing the amount and variety of their food resources (Hobbs and Spowart 1984).

These forest management tools have been used in the southeastern United States to promote and maintain early successional habitats such as pine-grassland (Lashley et al. 2011). Pine-grassland is a rare and important early successional habitat that is home to white-tailed deer (*Odocoileus virginianus)*, northern bobwhite, red-cockaded woodpeckers (*Picoides borealis)*, along with many other species (Van Lear et al. 2005, Mitchell et al. 2006). Pine-grassland systems are known to support high levels of native flora and fauna (Mitchell et al. 2006), with an overstory consisting of relatively few tree species, and a diverse ground cover of herbaceous forbs, shrubs, grasses, and tree seedlings (Gilliam and Platt 2006). These systems are dependent on disturbance regimes and frequent prescribed fires are an important management tool for sustaining this habitat (Mitchell et al. 2006; McIntyre et al. 2019). Frequent fires are necessary to control midstory development, maintain pine dominance, and sustain an herbaceous understory (McIntyre et al. 2019). Sixty-nine percent of the mammal species and a little over one-third of the bird species that inhabit pine-grassland ecosystems forage primarily on or near the ground (Van Lear et al. 2005). Fire regimes are therefore necessary to stimulate an herbaceous understory to support these wildlife species.

Although managed forest stands with a low basal area have been found to attract early successional species, it is unclear whether they support high levels of biodiversity compared to unmanaged forest stands with high basal area. Some studies show that biodiversity is higher in primary unmanaged forests (Bobiec 1998; Gibson et al. 2011), however, a meta-analysis of forest management in Europe found no clear difference in species diversity or species richness among managed and primary forests (Paillet et al. 2010). Managed forests are characterized by frequent disturbances and display a more homogenous tree composition and early successional vegetation, but they lack age dynamics and senescent phases, whereas unmanaged forests display more dead and decaying trees, older and larger trees, and root plates (Paillet et al. 2010). Overall, there is still some debate regarding the effects of forest management on biodiversity. On a local level, unmanaged forests are said to generally contain more species than managed forests, but there is some inconsistency in the literature as to whether this is true or not (Väisänen et al. 1993; Bobiec 1998; Paillet et al. 2010).

In addition to forest management, other landscape features can attract or deter wildlife, such as water, roadways, and vegetative structure. Roadways may deter animals as a result of traffic or a lack of cover, but roads may also attract animals for ease of movement. The response varies by type of road and species, as bobcats (*Lynx rufus)* are found in areas of low road density (Litvaitis et al. 2006) or even deterred by roads (Kelly and Holub 2008) while cougars (*Puma concolor)* avoid two-lane paved roads but may use unpaved roads to facilitate movement (Dickson et al. 2005). Riparian areas also provide resources that may attract a variety of animals. Even when not strictly dependent on riparian areas, a higher diversity of small mammal species is caught along streams in a forested ecosystem (Anthony et al. 1987). Herbaceous vegetation and young shrubs may attract White-tailed Deer and other wildlife as they offer high quality forage, in terms of digestion and crude protein (Main and Richardson 2002).

Camera trapping is a method that can be used to monitor wildlife abundance and diversity, as well as better understand how forest management and natural landscape features attract or deter wildlife (Brodie et al. 2015; Steenweg et al. 2017). Over the past decade, camera traps have emerged as a powerful tool in wildlife research as they noninvasively capture information about wildlife presence and allow long term monitoring in the field with less effort (e.g., Moruzzi et al. 2002; Kelly and Holub 2008; Rovero et al. 2013; du Preez et al. 2014). Camera traps are relatively inexpensive compared to live trapping efforts and can be useful for wildlife monitoring programs (McShea et al. 2016). In addition, compared to line transects, camera traps are better able to record rare and elusive species (Tobler et al. 2008). Camera-trapping is becoming one of the most efficient means for mammal inventories and population studies (Silveira et al. 2003; Steenweg et al. 2017). For example, camera traps have been deployed in the Udzungwa Mountains of Tanzania to estimate the density of the elusive Harvey's duiker *(Cephalophus harveyi)* and were shown to be a valid index of density of the target species (Rovero and Marshall 2009). Camera traps have also been used to survey carnivore distribution in Vermont (Moruzzi et al. 2002), as well as inventory medium and large-sized terrestrial mammals in tropical forests (Tobler et al. 2008), and to monitor wildlife response to recreational trail building (Miller et al. 2020).

In this study, we used camera traps to explore whether forest management techniques such as forest thinning, and prescribed burns promoted biodiversity in a pine savannah ecosystem located in the eastern piedmont region of Virginia. Specifically, we measured camera trap success and species diversity across stands of varying basal areas (low, medium, and high). We also explored the relationship between camera trap success and natural landscape features including vegetative characteristics to investigate what attracts wildlife to these sites. We predicted that camera trap success and diversity would be highest in a low basal area, with a high percent of grasses, close proximity to water, and greater distance from roads. A low basal area would allow sunlight to reach the forest floor and promote the growth of a variety of vegetation. A high percent of grasses and close proximity to water would provide necessary nutritional resources, and a greater distance from roads would limit anthropogenic disturbance and provide more cover.

MATERIALS AND METHODS

Field-Site Description

The study area was located within Fort A.P. Hill (APH), a 30,329 ha military training installation (U.S. Army) in the upper Coastal Plain of Caroline County, VA. APH is 80% forested with natural re-growth post farming and on-going forest management (Bellows et al. 2001). The study area hosts a variety of habitat types, such as old fields, wetlands, mixed pine and hardwood forest, and pine-dominated stands with open understory. The dominant pines in the study area are loblolly pine *(Pinus taeda)* and Virginia scrub pine *(Pinus virginiana)* and the dominant hardwoods are southern red oak *(Quercus falcata)*, northern red oak *(Q. rubra)*, sweetgum *(Liquidambar styraciflua)*, red maple *(Acer rubrum)*, and tulip poplar *(Liriodendron tuilipifera)*. Biologists and foresters at APH actively manage the area using prescribed burns and forestry cuts to promote habitat diversity. In some pine-dominated stands, silviculture treatments with yearly prescribed burns have been used to promote early successional habitat for northern bobwhite. In mixed pine and hardwood forests, forest thinning and burning is also implemented with longer regeneration periods.

Camera trap sites

We identified forest stands with low (20-35 ft^2acre^{-1}), medium (50-90 ft^2acre^{-1}) and high (110-130 ft^2acre^{-1}) basal areas and set up five camera trap sites in each stand for a total of 15 camera sites (Fig. 1). The low basal area stand had been thinned and burned during the previous winter. The medium and high basal area stands had not been burned for at least 2 years prior to the study. To maintain trap independence, each site was located at least 300 meters apart. We deployed camera traps for six weeks from 18 June – 26 July 2018. We used infrared Moultrie Panoramic 150 game cameras, set to a panoramic display with a 1-minute delay between photographs. We attached cameras to a tree around knee height, approximately 3-5 m away from a baited tree. The camera placement was made to ensure that both large and small animals could be detected and captured. To attract a diverse range of taxa, we set up a scent lure of anise oil and two types of bait, a fish bait to attract carnivores, and a mound of corn to attract herbivores. During the initial set-up, we cleared a small patch of ground at the base of each bait tree and left a small mound of corn. Additionally, we baited each site by nailing a can of anchovies (with holes in it) to the bait tree. During the third week of the study, we replenished the corn and anise oil baits, and we also spread chunks of American gizzard shad *(Dorosoma cepedianum)* around the bait tree. To reduce likelihood of wildlife running away with bait without being detected, in the 4th week we placed new chunks of American Gizzard Shad in suet cages nailed to each bait tree. In the 5th week of the study, we replenished the corn and anise baits again and refilled cages with American Gizzard Shad if needed. We checked camera traps weekly to collect pictures and ensure cameras were properly functioning. We transferred pictures on site from camera SD cards to a laptop to be analyzed later.

Vegetation Sampling

To explore whether landscape features and vegetative characteristics influence trap success, we measured basal area, the distance to trafficable roadways and water sources, vegetation composition, and the percent groundcover, canopy cover, and understory at each camera site. We measured basal area using a forestry wedge prism. We used ArcMap 10.7.1 (ESRI, Redlands, CA) to measure the shortest distance between each site and the nearest trafficable road and water source. We broke down vegetative composition into herbaceous forbs, grass, shrubs, and duff/litter. To measure the percent cover of the vegetation types, we established circular plots using a hula hoop (area of 0.55 m^2) at each site. We chose the location of the plots to be representative of the vegetation of the surrounding area, therefore the center of the plots ranged from 1.3 – 7.2 m from the bait tree. We also identified the dominant plant species in each plot and used Pearson's correlation to examine the relationship between the percent herbaceous forbs and basal area.

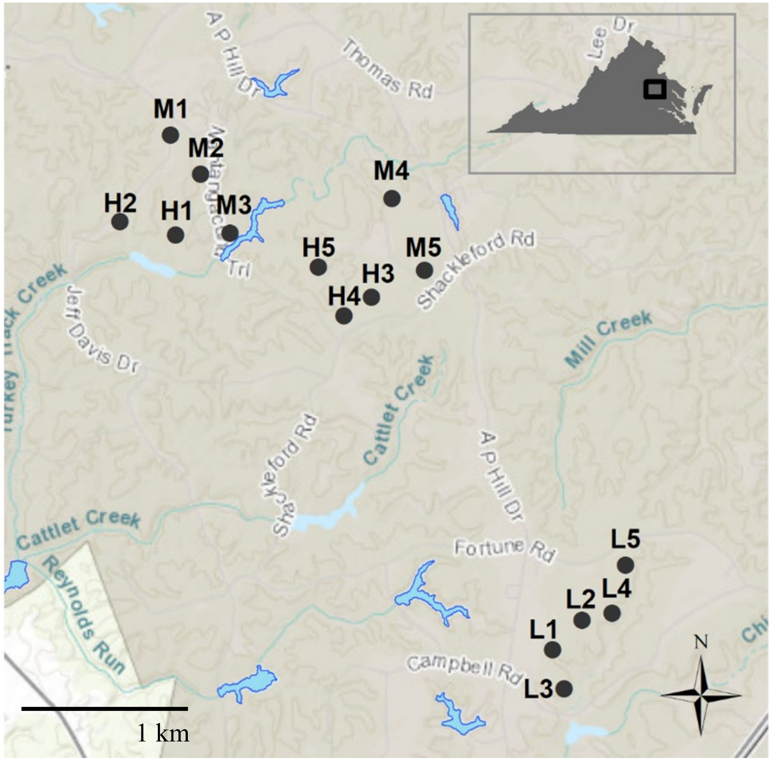

FIGURE 1. Location of the camera trap sites, indicated by numbered dots in areas of low (L), medium (M), and high (H) basal area, at Fort A.P. Hill in Caroline County, VA.

Data Analysis

We reviewed each photograph and recorded the number of trap events, the species captured, any false positives (pictures with no animals present), and the date and time of each event. A trap event was defined as one individual animal identified in a photograph; if we identified two or more individuals in the same photograph it was counted as two (or more) trap events. To ensure each trap event was independent, we eliminated photographs of the same species taken within a 30-minute interval. We determined the trap effort by summing the number of nights each trap was running and subtracting the number of days a camera malfunctioned. We calculated trap success as the number of trap events per 100 trap nights. We calculated overall trap success and trap success by camera station. We then examined trap success by basal area using a one-way ANOVA. We also calculated species diversity using the Shannon's diversity index for each basal area (Shannon 1948),

$$H = -\sum_{i=1}^{k} P_i ln P_i$$

where H is the Shannon index value, P_i is the proportion of the population made up of the species *i, ln* is the natural logarithm, and *k* is the number of species in the community. We used an information-theoretic approach with linear regression to test and rank seven possible models exploring what factors most influenced trap success. We chose to employ an information-theoretic approach as opposed to other multivariate analyses to avoid data dredging and instead rank well-reasoned *a priori* models based on which provides the best inference from the data collected (Burnham and Anderson 2001). Model selection seeks parsimony by balancing bias and precision (Burnham and Anderson 2001). The covariates included basal area, stand type (softwood, hardwood or mixed), percent groundcover, percent grasses and shrubs, and distances to roads and water (See Table 1 for all models). We used package lmtest (Zeileis and Hothorn 2002) and nortest (Gross and Ligges 2015) in R (R Core Team 2016) to test the assumptions of linear regression, including the Breusch-Pagan test to assess homoscedasticity and the Anderson-Darling and Shapiro-Wilk tests to assess the distribution of residuals.

RESULTS

Trap Success

After 532 trap nights, the cameras captured 9 different species in a total of 398 trap events (Fig. 2). The overall trap success was 74.81 trap events per 100 trap nights (Supplementary Table S1). The average trap success for all species at each site was 4.99 / 100 trap nights (range 0.94 – 16.73; Supplementary file Fig. S2). Of the 398 events, White-tailed deer was the dominant species (213 trap events), followed by crows *(Corvus spp.)* and racoons *(Procyon lotor)* (Fig. 2).

Presence and Diversity

Trap success in the low basal area was significantly higher than the trap success in medium and high basal area forest ($p = 0.03$, $F(2,12) = 9.36$; Fig. 3). Camera traps that were in low basal area forest captured a total of 6 species and 241 trap events with an average trap success of 9.21 trap events per 100 trap nights (Table 2). Cameras in medium basal area forest captured 8 species and 58 events, and those in high basal area forest captured 8 species and 84 trap events. Cameras located in the high basal area forest recorded a higher level of diversity (H = 1.47) than those in low basal area forest (H = 1.11) and medium basal area forest (H = 1.01) although the error bars overlapped in the high and medium basal area forest (Fig. 4). The number of trap events of early successional species (e.g., white-tailed deer and wild turkey) decreased in higher basal area stands, whereas the number of trap events of raccoons increased with basal area (Table 2). The number of coyote (*Canis latrans*) trap events decreased as basal area increased ($R^2 = 0.51$, $F(1,13) = 13.43$, $p = 0.003$; Supplementary Fig. S2).

TABLE 1. Models used in linear regression to predict trap success ranked in order of weight and including model selection statistics.

Model	logLik	AICc	ΔAIC	weight
Basal Area	-13.39	34.96	0.00	0.71
Null	-16.64	38.28	3.32	0.14
Percent Groundcover	-15.51	39.20	4.24	0.09
Distances to Roads + Water	-14.36	40.72	5.76	0.04
Basal Area + Stand Type	-13.16	42.98	8.02	0.01
Stand Type + Percent Grasses + Percent	-10.29	43.08	8.12	0.01
Global Model	-2.43	79.87	44.91	0.00

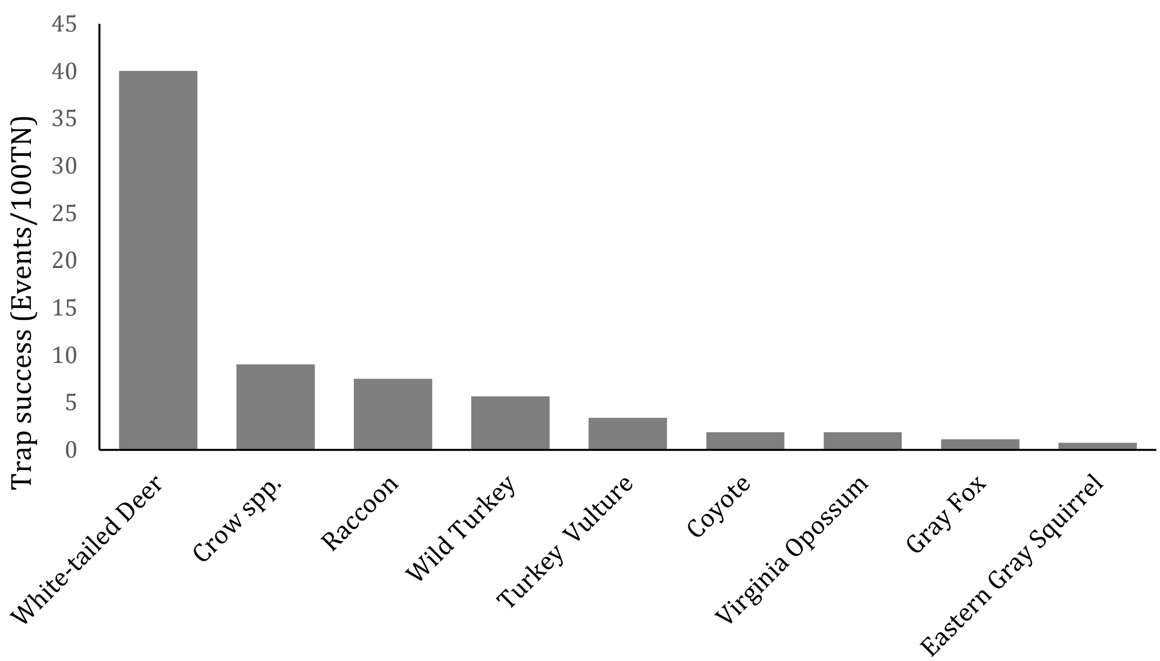

FIGURE 2. Trap success of the nine species captured by 15 camera trap sites set in Fort A.P. Hill, Caroline County, VA. Trap success defined as the number of individuals identified (trap events) per 100 trap nights (TN).

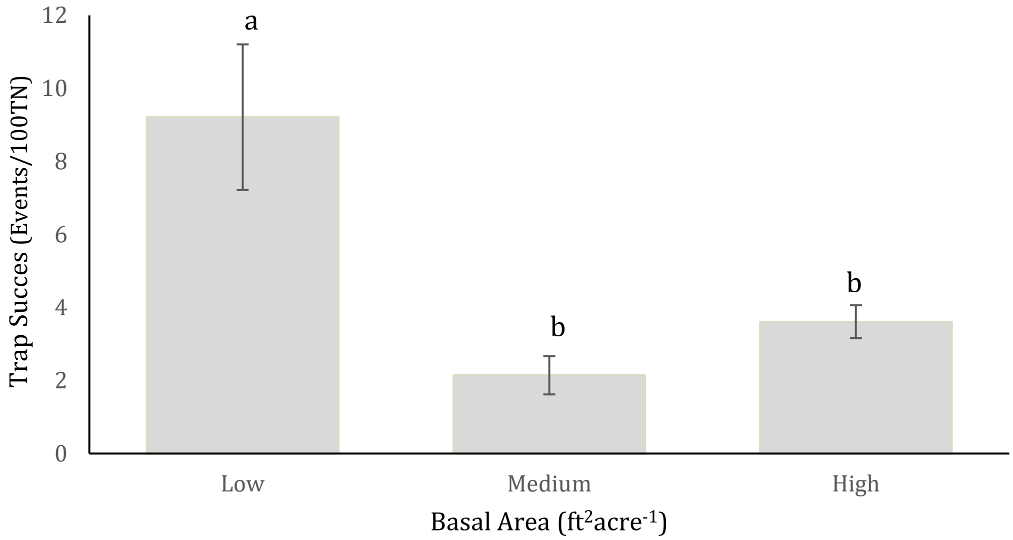

FIGURE 3. Average trap success of camera trap sites set up in in low (20-35 ft^2acre^{-1}), medium (50-90 ft^2acre^{-1}), and high (110-130 ft^2acre^{-1}) basal area stands with error bars that represent standard error. Each stand had 5 camera trap sites. A one-way ANOVA found trap success was significantly different across stands ($p = 0.03$, $F (2,12) = 9.36$). A Tukey's post-hoc test evaluated the difference between levels and levels that are not significantly different are represented by the same letter.

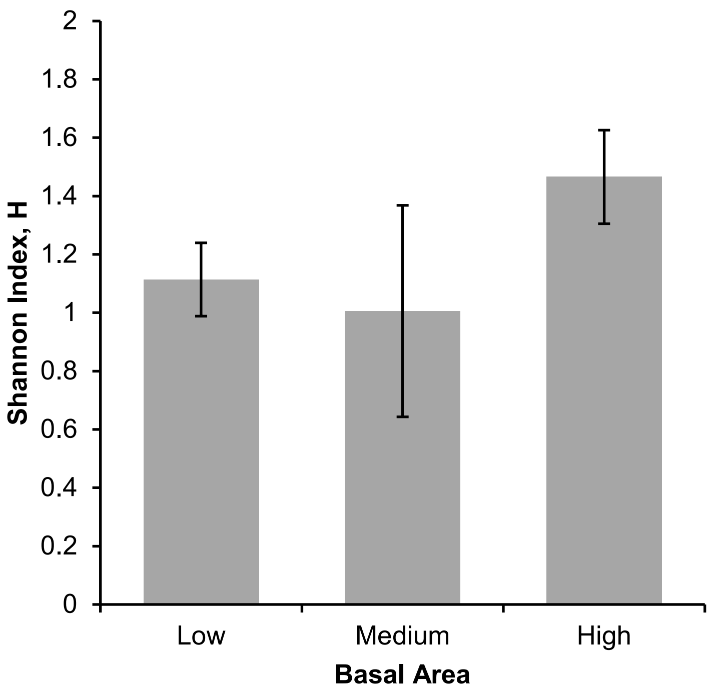

FIGURE 4. Diversity values of camera trap sites set in in low (20-35 ft^2acre^{-1}), medium (50-90 ft^2acre^{-1}), and high (110-130 ft^2acre^{-1}) basal area stands. Diversity values were calculated using Shannon's Diversity Index. Each stand had 5 camera trap sites.

TABLE 2. Presence of species by basal area. Trap events for each species captured in low, medium, and high basal area stands.

Species (common name)	Low	Medium	High
Odocoileus virginianus (White-tailed Deer)	152	41	20
Corvus spp. (Crow)	44	2	2
Meleagris gallopavo (Wild Turkey)	28	2	0
Procyon lotor (Raccoon)	4	5	35
Cathartes aura (Turkey Vulture)	6	3	9
Canis latrans (Coyote)	7	2	1
Didelphis virginiana (Virginia Opossum)	0	0	10
Urocyon cinereoargenteus Schreber (Common Gray Fox)	0	1	4
Sciurus carolinensis Gmelin (Eastern Gray Squirrel)	0	1	3
Total trap events	241	58	84

Vegetation Characteristics

The vegetative composition differed at each trap site, with a greater percent of herbaceous forbs in low basal areas and a greater percent of duff/litter in high basal areas (Supplementary Fig. S3). We found a negative correlation between basal area and herbaceous forbs across sites ($r(13) = -0.86$, $p = 0.000033$, Supplementary Fig. S4). The dominant plant species varied across all sites, although in the low basal areas, the dominant species were primarily herbaceous forbs (48%) and included either fireweed *(Chamaenerion angustifolium)* or American pokeweed *(Phytolacca americana)* (Supplementary Table S2). Sites in the medium basal area had the highest percent of shrubs (38%) and grasses (33%) on average, compared to sites in low and high basal area. The sites in the high basal area had the most duff/litter (70.8%) on average and vegetation plots at these sites usually consisted of only one or two plant species, unlike sites in the other basal areas.

With regards to the landscape features that best predicts trap success, we log transformed trap success and basal area and square root transformed percent shrubs and percent grass to meet the assumptions of linear regression. After these transformations, the assumptions of normality and homoscedasticity were confirmed for all models. We found that the basal area model ranked the highest, followed by the null model, and both of these models had a ΔAIC < 4. Basal area exhibited an inverse relationship with trap success ($R^2 = 0.30$, $F(1,13) = 7.049$, $p = 0.0198$; Fig. 5). The other models that included vegetative and landscape covariates were not predictive of trap success (Table 1).

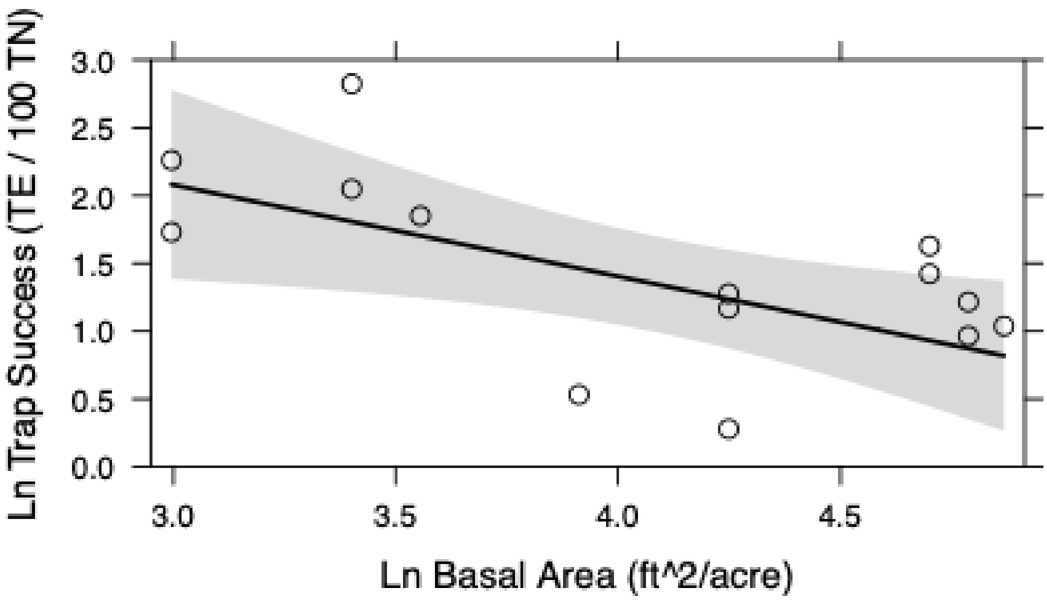

FIGURE 5. Effects plot of the top model with basal area regressed on trap success ($R^2 = 0.30$, $F(1,13) = 7.049$, $p = 0.0198$). Black line represents the predictive model with 95% confidence interval shaded.

DISCUSSION

Our results suggest that low basal area sites attract higher numbers of wildlife, although these stands have lower levels of diversity compared to stands with a high basal area. Additionally, contrary to our hypotheses, vegetative and landscape features were not highly predictive of trap success, instead basal area alone was the most predictive model. We found a negative correlation between basal area and herbaceous forbs, confirming that forest thinning and burning promotes sunlight and increases ground vegetation.

Actively managed open canopy forest may attract wildlife for a number of reasons. Forest thinning and prescribed burning opens the forest canopy and stimulates forage production (Van Lear et al. 2005; Lashley et al. 2011), as well as fosters high levels of plant diversity (Mitchell et al. 2006). Plant regrowth after a fire has been found to be more palatable and of a higher nutritional quality for mammalian herbivores (Eby et al. 2014; Cherry et al. 2017). Along the coastal plain in the southeastern United States, studies have found that burning can increase nutrients such as Phosphorus in the soil, which is needed for antler development (Grasman and Hellgren 1993; Van Lear and Harlow 2002). In addition, a 2011 study found that canopy reduction combined with prescribed burning increased forage availability for white-tailed deer, and that retention cuts followed by prescribed fire maintained a large nutritional carrying capacity (Lashley et al. 2011). An open-canopy forest structure is also attractive to herbivores including small mammals, ground-dwelling birds and birds that forage in open spaces within forests (Mengak et al. 1989; Mitchell et al. 2006).

In our study the high trap success in low basal areas was predominantly from species that prefer early successional habitats such as white-tailed deer, crow, and wild turkey. In addition, the trap success of coyotes was also high in low basal areas. This is likely due to a connection of predator and prey, where coyotes were attracted to these sites because of the high numbers of white-tailed deer and turkey. In the southeastern United States coyotes are a top predator of white-tailed deer and have been linked to declines in fawn survival and population growth (Cherry et al. 2017). Our results are similar to Richer et al. (2002) and Cherry et al. (2017), that both found greater coyote abundance in open areas compared to forests. These studies suggest that coyotes are poorly adapted to hunting in dense forests (Richer et al. 2002) and that their higher abundance in open areas is likely due to utilization of prey such as rodents and white-tailed deer (Cherry et al. 2017).

Unlike open canopy forests with low basal area, higher basal area forests have a thicker canopy that offers shade but limits vegetative ground cover (Mitchell et al. 2006). These forests may have features besides ground vegetation that appeal to a variety of wildlife species. The limited ground cover in dense forests may result in open pathways for easier movement. In addition to movement, a high tree density with understory shrubs and coarse woody debris provides important resources and shelter for certain species. For example, although gray fox *(Urocyon cinereoargenteus)* and racoons are both habitat generalists, they tend to spend more time in mature forests rather than open habitats (Haroldson and Fritzell 1984; Chamberlain et al. 2002). In this study both gray fox and racoons were photographed more in high basal area stands.

The other vegetative and landscape factors we tested may have been less predictive of trap success for a number of reasons. While herbaceous forbs were predominantly found in the low basal area sites, grasses and shrubs were found across low, medium, and high basal areas, which makes it harder to determine their direct influence on trap success. In addition, Fort A.P. Hill has a high density of roads with relatively low traffic levels, therefore, wildlife may be acclimated to or undeterred by roads. Kelly and Holub (2008) found higher bobcat camera trap success as the distance to the main road increased but found no other significant relationships between roads and camera trap success in other carnivores. Additionally, wetlands and riparian areas are abundant in this landscape and may not be a limiting factor that drives habitat preferences in this area.

In this study we baited the camera traps in order to maximize trap success and the baits used may have introduced some bias. Initially, with the bait of corn, anise oil, and anchovies, we found that corn was the main attractant. We primarily recorded white-tailed deer and wild turkey eating the corn at the sites during this period. When we put out the gizzard shad, we began capturing more omnivores and scavengers, including turkey vulture *(Cathartes aura)* and Virginia opossum *(Didelphis virginiana)*, and we noticed an increase in the number of raccoons. Although somewhat controversial (Rocha et al. 2016), we felt that the advantages of using bait outweighed the costs, in that adding bait increases capture probability, facilitates identification as an organism stops to inspects the bait, and can aid in age and sex determination (du Preez et al. 2014; Austin et al. 2017).

Overall, our results suggest that open forests promote early successional habitat and attracts wildlife but may not maximize species diversity. Low basal area stands have thick groundcover which provides quality herbaceous forage and attracts greater numbers of wildlife, while high basal area stands have more open pathways for efficient movement, provide better habitat for species relying on trees for shelter and may support higher levels of diversity. Similar to our findings, a 2001 small mammal survey at APH found higher small mammal numbers in open canopy sites but higher species richness in closed canopy sites (Bellows et al. 2001). Ultimately, to attract more wildlife and promote diversity within wildlife populations, natural resource managers should aim to create a heterogeneous landscape with forested patches of varying tree densities and a variety of herbaceous food resources.

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APPENDIX: Supplementary Tables and Figures

TABLE S1. Trap events and calculated trap success for each species captured during the study. 15 total camera traps and 532 trap nights.

Species (common name)	Trap Events	Trap Success
Odocoileus virginianus (White-tailed Deer)	213	40.04
Corvus spp. (Crow)	48	9.02
Procyon lotor (Raccoon)	40	7.52
Meleagris gallopavo (Wild Turkey)	30	5.64
Cathartes aura (Turkey Vulture)	18	3.38
Canis latrans (Coyote)	10	1.88
Didelphis virginiana (Virginia Opossum)	10	1.88
Urocyon cinereoargenteus (Common Gray Fox)	6	1.13
Sciurus carolinensis (Eastern Gray Squirrel)	4	0.75
unknown	19	-
Total	398	74.81

TABLE S2. Percent cover of herbaceous forbs, shrubs, grasses, duff/litter, and the top three dominant plant species at each camera trap site, in areas of low (L), medium (M), and high (H) basal areas.

ID	Herbaceous Forbs	Shrubs	Grasses	Duff/Litter	Dominant Plant Species
L1	35	20	10	35	*Chamerion angustifolium* Holub (Fireweed), *Phytolacca americana* L. (Pokeweed), *Poaceae* spp. L. (Grasses)
L2	35	40	25	0	*C. angustifolium*, *Chamaecrista nictitans* Moench (Sensitive Partridge Pea), *Eupatorium capillifolium* Small (Dogfennel)
L3	60	5	10	25	*P. americana*
L4	50	0	0	50	*P. americana*
L5	60	15	0	25	*P. americana*, *C. angustifolium*, *Ailanthus altissima* Swingle (Tree of Heaven)
M1	15	30	40	15	*Panicum virgatum* L. (Switchgrass), *Populus alba* L. (White Poplar), *Smilax rotundifolia* L. (Common Greenbrier)
M2	15	35	35	15	*P. virgatum, Poaceae* spp., *P. alba*
M3	10	40	40	10	*P. virgatum, Gaylussacia baccata* Koch (Black Huckleberry), *Eupatorium rotundifolium* L. (Roundleaf Thoroughwort)
M4	0	70	10	20	*G. baccata, Poaceae* spp.
M5	20	15	40	25	P. *virgatum, E. capillifolium, Rubus cuneifolius* Pursh (Sand Blackberry)
H1	0	50	0	50	*Clethra alnifolia* L. (Summersweet)
H2	0	5	0	95	*Ilex opaca* Aiton (American Holly)
H3	5	0	45	50	*Poaceae* spp.
H4	1	10	5	84	*G. baccata* *Poaceae* spp.
H5	0	25	0	75	*G. baccata*

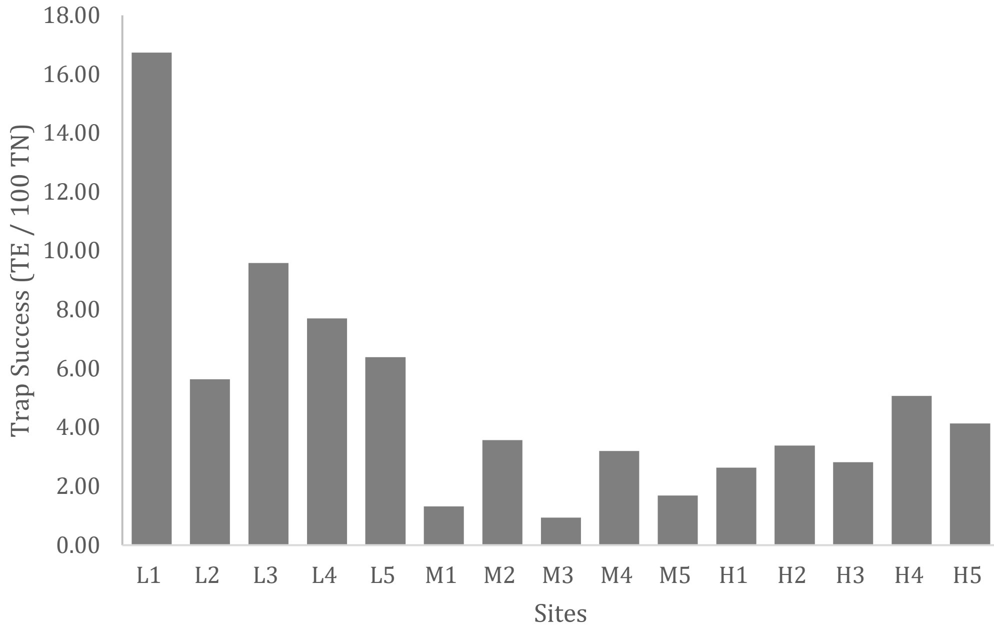

FIGURE S1. Trap success pooled across species at each camera trap site in low (L), medium (M), and high (H) basal areas at Fort A.P. Hill, VA.

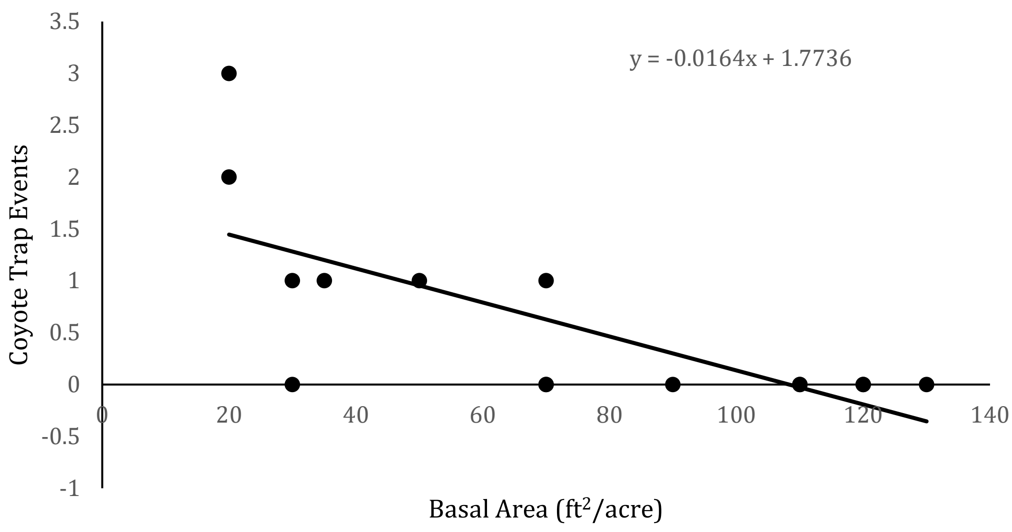

FIGURE S2. Coyote presence by basal area ($R^2 = 0.51$, $F(1,13) = 13.43$, $p = 0.003$). Number of Coyote trap events captured by cameras located in varying basal areas (20-130 ft^2/acre). 15 total camera trap sites.

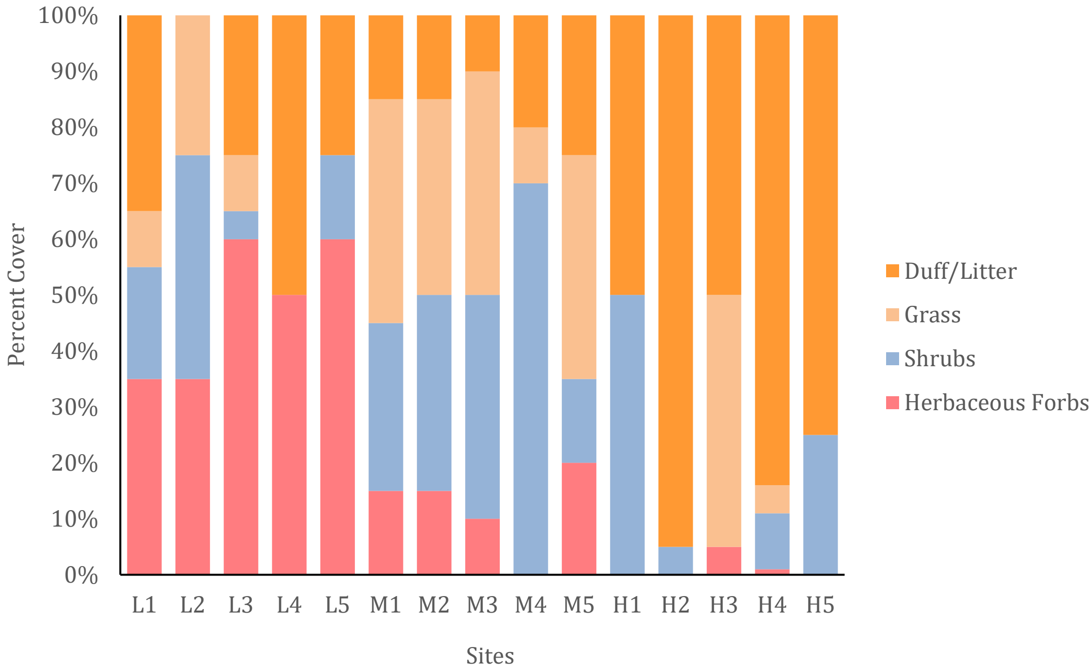

FIGURE S3. Percent of cover of vegetation types at ground level, including, herbaceous forbs, shrubs, grasses, and duff/litter at each camera trap site in low (L), medium (M), and high (H) basal areas at Fort A.P. Hill, VA

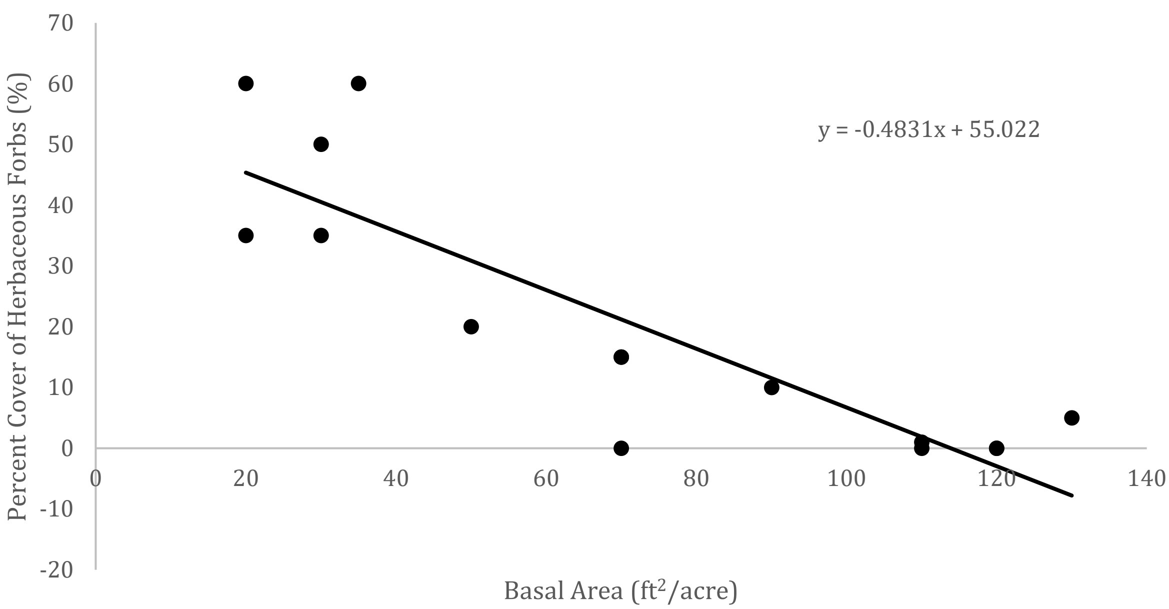

FIGURE S4. Plot of percent cover of herbaceous forbs across the various basal areas found at each camera trap site with trendline. Herbaceous forbs and basal area Pearson's correlation r (13) = -0.86, p = 0.000033).