

## **BAMBI'S BED: A STUDY OF THE BEDDING BEHAVIOR OF WHITE-TAILED DEER (*ODOCOILEUS VIRGINIANUS*) IN VARYING TOPOGRAPHICAL REGIONS OF CENTRAL PENNSYLVANIA**

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### **ABSTRACT**

White-tailed deer (*Odocoileus virginianus*) in Central Pennsylvania are a popular game species that has very particular bedding habits. We hypothesized that the resting bed locations of white-tailed deer should vary with topography and vegetation, including slope, canopy cover and distance from a clearing. We found that deer bed localities are associated significantly with percent canopy cover ( $\chi^2= 19.166$ ;  $df = 6$ ;  $P = 0.004$ ) and degree of slope ( $\chi^2= 6.765$ ;  $df = 2$ ;  $P = 0.034$ ). Our research suggests that canopy cover is the most important factor affecting the location of deer beds, whereas slope is of secondary importance and distance from a clearing is not important at all.

*Keywords: bedding behavior, habitat preferences, topography, vegetation, whitetail deer (Odocoileus virginianus)*

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### **INTRODUCTION**

White-tailed deer (*Odocoileus virginianus*) appear to choose their bedding areas based on temperature, wind direction and humidity. Deer also take into account the security of an area, based on its physical attributes. Closed canopy forests are preferred because they provide shade during hotter temperatures and reduce cold stress in the winter months. Also, slopes are common bedding sites for white-tailed deer due to easy lookouts for predators, as well as taking advantage of the shade and sun. White-tailed deer tend to bed on slopes facing the sun in the winter and shady slopes in the summer. A deer's sense of smell is used to detect danger, and therefore wind direction is expected to play a major role in choosing a bedding site. Bedding on a slope permits the deer to smell their predators and also see them from afar (Hudson 2001). White-tailed deer appear to intuitively understand convection breezes and this may be the reason why they often feed and bed along shoulders of hills and at the top of a ridge where breezes flow more consistently. White-tailed deer will always seek a higher elevation when bedding (Barsness 2001). Beds are usually found in a thicket with plenty of trails, droppings, tracks and rubs (Clancy 2001). Deer prefer not to bed in particularly dense cover, especially around large predators because surrounding cover can hide the stalk of a coyote, wolf, or mountain lion. Instead, deer often bed on the edge of openings that are close to their escape trails (Barsness 2001).

White-tailed deer are ruminant animals, which means that they have chambered stomachs allowing them to store food and regurgitate it later. Often times when they are feeding, deer will lie down to chew their cud. White-tailed deer typically feed in large groups, especially in the winter when food is scarce, but bed in small groups. Local movements of white-tailed deer are related primarily to seasonal changes in food sources or cover, but they typically stay within an average annual home range of 0.5-1.5 square miles (Schwartz 2000).

Deer are primarily crepuscular animals; they usually spend the day in concealing cover, but towards evening come out to feed and drink. On bright moonlight nights they may feed all night, but on dark nights they are more active in the evening and again early in the morning. During winter when food is scarce, they may feed longer hours and even during the day. In stormy, windy weather they are restless; they browse more than usual, and often change their bed spot several times a day (Schwartz 2000).

Our hypothesis was that white-tailed deer should bed differently based upon the topography of the land so that they are most protected and aware of their surroundings. The topographical features we considered included slope, canopy cover and distance from a clearing. Previous research has suggested that the most important topographical feature for a whitetail deer bedding site is canopy cover, with slope being secondary, and the distance from any clearings being the last important feature. Our null hypothesis was that these topographical features should not play any role in a whitetail deer's preference for bedding sites.

Originally our hypothesis included wind direction, temperature, humidity, and precipitation. However, it was discovered that these variables are not reliable because whitetail deer beds that were seen could have been new or old and may have depended on the weather conditions of another day.

## MATERIALS AND METHODS

Bedding sites of white-tailed deer were located at the Raystown Field Station (Entriken, Pennsylvania) and on land of the Huntingdon County Prison (Pennsylvania). These areas were chosen because they differed topographically: the field station land includes rolling hills, whereas the prison land is primarily open fields with low slopes and surrounding areas of trees. At each site, we measured wind direction and velocity, degree of slope, percentage of canopy cover, and distance from any clearings (see Appendix I for data sheet used). To measure wind direction we used a compass and looked for which direction grass and twigs/leaves were blowing. We estimated the velocity of the wind using the Beaufort scale (see Appendix II). We measured the degree of slope using a clinometer, and the percentage of canopy cover using an ocular tube. We sampled approximately five meters in perpendicular directions to record the percentage of cover (out of a five meter square). We measured the distance from the clearing using a metric measuring tape. All features were consistently recorded on the data sheet, along with other descriptions of deer markings such as feces, tracks, and buck rubs. On each outing, we looked for bedding sites for a time span of about an hour during the afternoon. We looked at various regions within our two sites, including north of Lake Raystown, below the field station cabin, and behind the Superintendent's house on the prison grounds. At each site, we photographed representative bedding sites using a digital camera.

## RESULTS

Number of deer beds increased significantly in relation to canopy cover ( $\chi^2 = 19.166$ ,  $df = 6$ ,  $P = 0.004$ ; see Figs 1 & 2) and to terrain slope ( $\chi^2 = 6.765$ ,  $df = 2$ ,  $P = 0.034$ ; see Figs. 3 & 4). A marginally significant relationship was found between number of deer beds and distance of the beds from the nearest clearing ( $\chi^2 = 5.679$ ,  $df = 2$ ,  $P = 0.058$ ; see Figs 5 & 6). White-tailed deer especially prefer areas with high cover and low slope ( $\chi^2 = 8.312$ ,  $df = 3$ ,  $P = 0.040$ ; see Fig. 7).

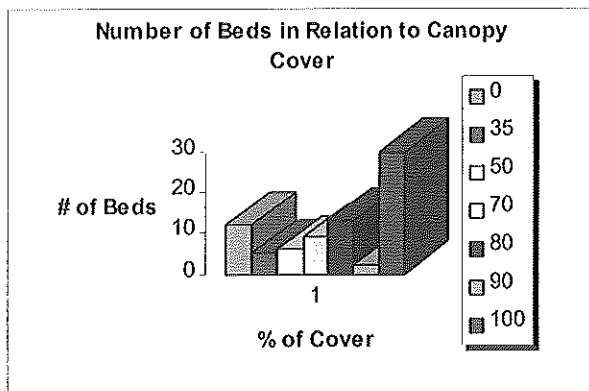


Figure 1. Number of white-tailed deer beds in relation to canopy cover: 1: 80-100%, 2: 50-79%, 3: 0-49%.

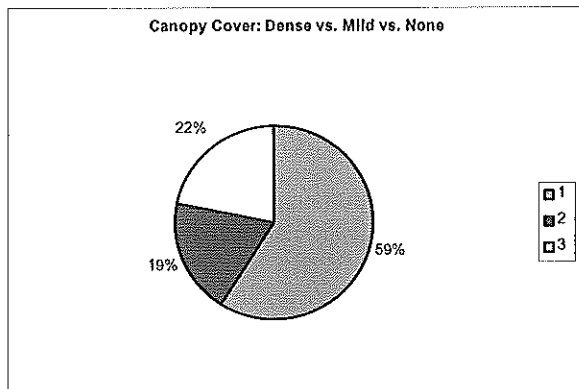


Figure 2. Percentage of deer beds in three categories of canopy cover: 1: 80-100%, 2: 50-79%, 3: 0-49%.

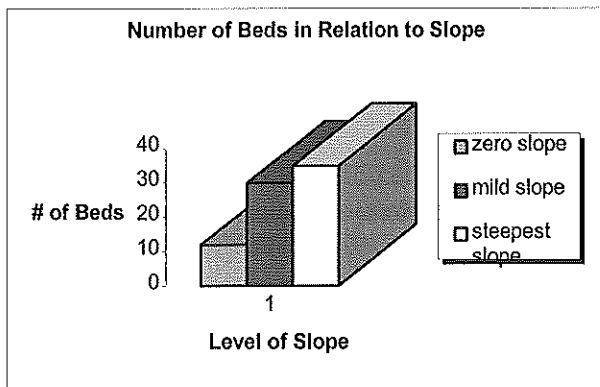


Figure 3. Number of deer beds in relation to slope of the terrain (Steepest: 15-35°, Mild: 1-14°).

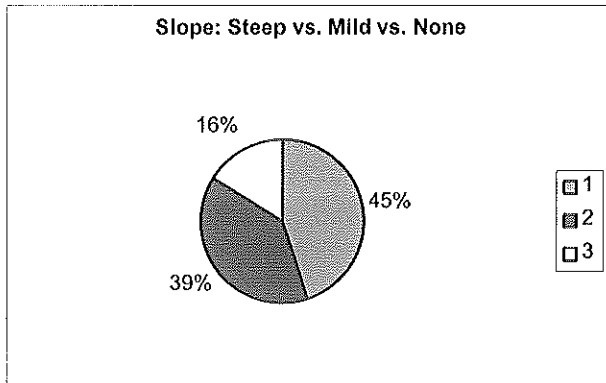


Figure 4: Percentage of deer beds for three slope categories (1: 15-35°, 2: 1-14°, 3: no slope).

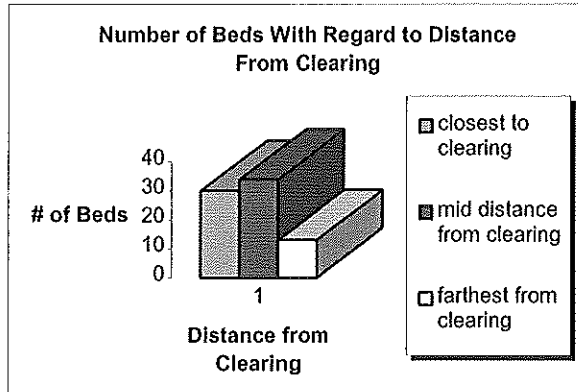


Figure 5: Number of deer beds in relation to distance from a clearing (Close: 7-15 m, Mid: 16-25 m, Far: 26-50 m)

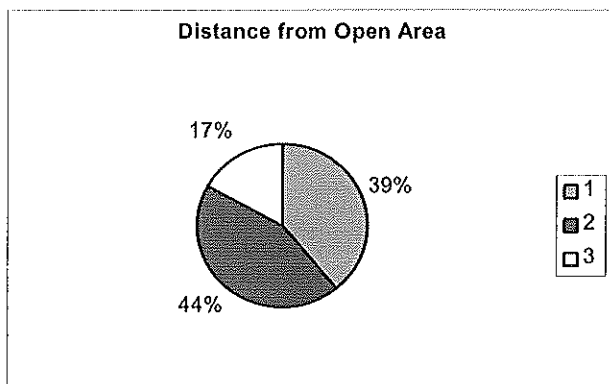


Figure 6: Percentage of beds in three categories of distance from an open area (1: 7-15 m, 2: 16-25m, 3: 26-50 m)

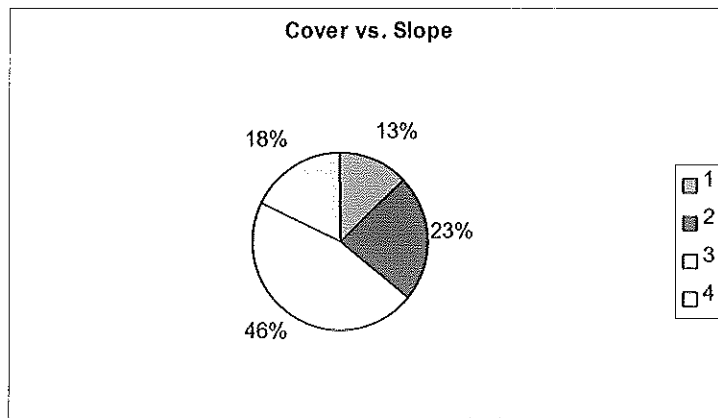


Figure 7: Percentage of white-tailed deer beds in relation to vegetation cover and slope combined (1: High Cover-High Slope = 10, 2: Low Cover-Low Slope = 18, 3: High Cover-Low Slope = 35, 4: Low Cover-High Slope = 18).

## DISCUSSION

As we predicted, canopy cover and slope were ranked first and second in importance in determining the location of white-tailed deer beds. Distance from a clearing was only marginally related to the location of bedding sites, and thus its importance is uncertain.

White-tailed deer tended to most often bed in areas of dense coverage and medium slope (15-35°; see Fig. 7). The only deviation from this pattern was the existence of some resting sites in areas of zero canopy cover, which may have been used for brief periods of feeding and cud chewing. We also noticed that beds were usually clustered close together, suggesting that white-tailed deer bed in groups. Perhaps this bedding arrangement provides security from predators during resting.

Although our data supports our hypothesis, our data collection may not have been fully unbiased. It is possible that certain topographies were represented more often than others, thus biasing the results. Further research should be done to examine this possibility.

## ACKNOWLEDGMENTS

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## APPENDIX I

## General Ecology Lab Data

Date \_\_\_\_\_

Temperature \_\_\_\_\_

Time \_\_\_\_\_

Humidity \_\_\_\_\_

|                            | Site 1 | Site 2 | Site 3 | Site 4 |
|----------------------------|--------|--------|--------|--------|
| Cover                      |        |        |        |        |
| Slope                      |        |        |        |        |
| Wind<br>Direction          |        |        |        |        |
| B. Scale                   |        |        |        |        |
| # of Beds                  |        |        |        |        |
| Distance from<br>Top/field |        |        |        |        |
| Description                |        |        |        |        |

## APPENDIX II

## Beaufort Scale

**Force 0** *Calm*: smoke rises vertically

**Force 1** *Light air*: direction of wind shown by smoke drift but not by wind vanes

**Force 2** *Light breeze*: wind felt on face; leaves rustle; ordinary vane moved by wind

**Force 3** *Gentle breeze*: leaves and small twigs in constant motion; wind extends light flag

**Force 4** *Moderate breeze*: raises dust and loose paper; small branches are moved

**Force 5** *Fresh breeze*: small trees in leaf begin to sway; crested wavelets form on inland waters

**Force 6** *Strong breeze*: large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty