# White-tailed Deer Wintering Area in a Hemlock–Northern Hardwood Forest

J. EDWARD GATES and DAN M. HARMAN

Appalachian Environmental Laboratory, Center for Environmental and Estuarine Studies, University of Maryland, Frostburg State College Campus, Gunter Hall, Frostburg, Maryland 21532

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Environmental factors affecting White-tailed Deer (*Odocoileus virginianus*) utilization of a hemlock – northern hardwood wintering area in western Maryland were evaluated for the unusually severe winter of 1976–1977. Deer activity was concentrated within microhabitats having the highest evergreen basal area and canopy cover, greatest total basal area and canopy cover, minimum wind velocity, and lowest snow depth. The number of deer beds appeared to provide the best means of assessing the cover value of a habitat or vegetation type. Coniferous bottomland dominated by Eastern Hemlock (*Tsuga canadensis*) served as the primary source of shelter and food for the wintering deer herd; however, deer readily foraged for mast where snow cover was scant on the southwest-facing slope dominated by Sugar Maple (*Acer saccharum*).

Key Words: Deer wintering area, deer winter habitat, deer yard, environmental factors, hemlock – northern hardwood forest, *Odocoileus virginianus*, White-tailed Deer.

On northern range, severe winter weather and deep snow usually restrict White-tailed Deer (*Odocoileus virginianus*) to the protective cover of evergreen stands. The winter habitat requirements and the environmental factors affecting "yarding" behavior have been described by many authors (Verme 1968; Telfer 1970; Moen 1968a,b, 1976; Ozoga 1968; Verme and Ozoga 1971; Ozoga and Gysel 1972; Huot 1974). Level coniferous bottomland with a dense overstorey is reportedly favored because of lesser snow depths, more infrared radiation flux, little or no wind, narrower thermal ranges, and warmer mean temperatures. But, few such studies have dealt specifically with hemlock – northern hardwood winter concentration areas.

Throughout most of Maryland, White-tailed Deer are seldom confined to protective cover for prolonged periods because of winter weather. The Allegheny Plateau region differs from the rest of the state, however, in that temperatures are decidedly colder, snowfalls heavier, and storms more intense and of longer duration. During the unusually severe winter of 1976–1977, high winds and low temperatures lasting several days repeatedly occurred during January and February. Deep snow also prevailed from December to late February in western Maryland. This offered an opportunity to study White-tailed Deer in a mid-Appalachian location under winter conditions generally associated with more northern parts of their range. The objective was to determine the relationships between environmental factors, habitat type, and deer utilization of different parts of their winter concentration area.

## Study Area

This study was conducted in the Allegheny Plateau region of northeastern Garrett County, Maryland. The deer wintering area bordered Blandy Run Creek which flows from the east into the Frostburg Reservoir (Figure 1). The topography is formed of rolling tableland having 10–35% slopes and nearly level alluvial bottomland along Blandy Run. Moderately deep, well-drained, silt-loam soils are found on the uplands; while poorly-drained, very stony soils formed in mixed, variable material are found on the floodplain (Stone and Matthews 1974). Elevations along Blandy Run range from 716 m at the Reservoir to 823 m above sea-level on bordering ridge crests.

The forests of the high tableland in western Maryland are considered to be a southern extension of the Eastern Hemlock (*Tsuga canadensis*) – White Pine (*Pinus strobus*) – northern hardwood forest (Braun 1950; Brown and Brown 1972). Forested uplands on the study area are composed of Sugar Maple (*Acer saccharum*), American Beech (*Fagus grandifolia*), Red Oak (*Quercus rubra*), Cucumber Tree (*Magnolia acuminata*), Black Cherry (*Prunus serotina*), and a scattering of Eastern Hemlock. Bottomland forests include Eastern Hemlock as the dominant species, along with Yellow Birch (*Betula lutea*), Red Maple (*A. rubrum*), and Rosebay Rhododendron (*Rhododendron maximum*).

This region has a humid continental climate with general atmospheric flow from the west to east. Annual precipitation averages more than 114 cm. The coldest most severe weather occurs in January and February, when minimum temperatures average 0°C

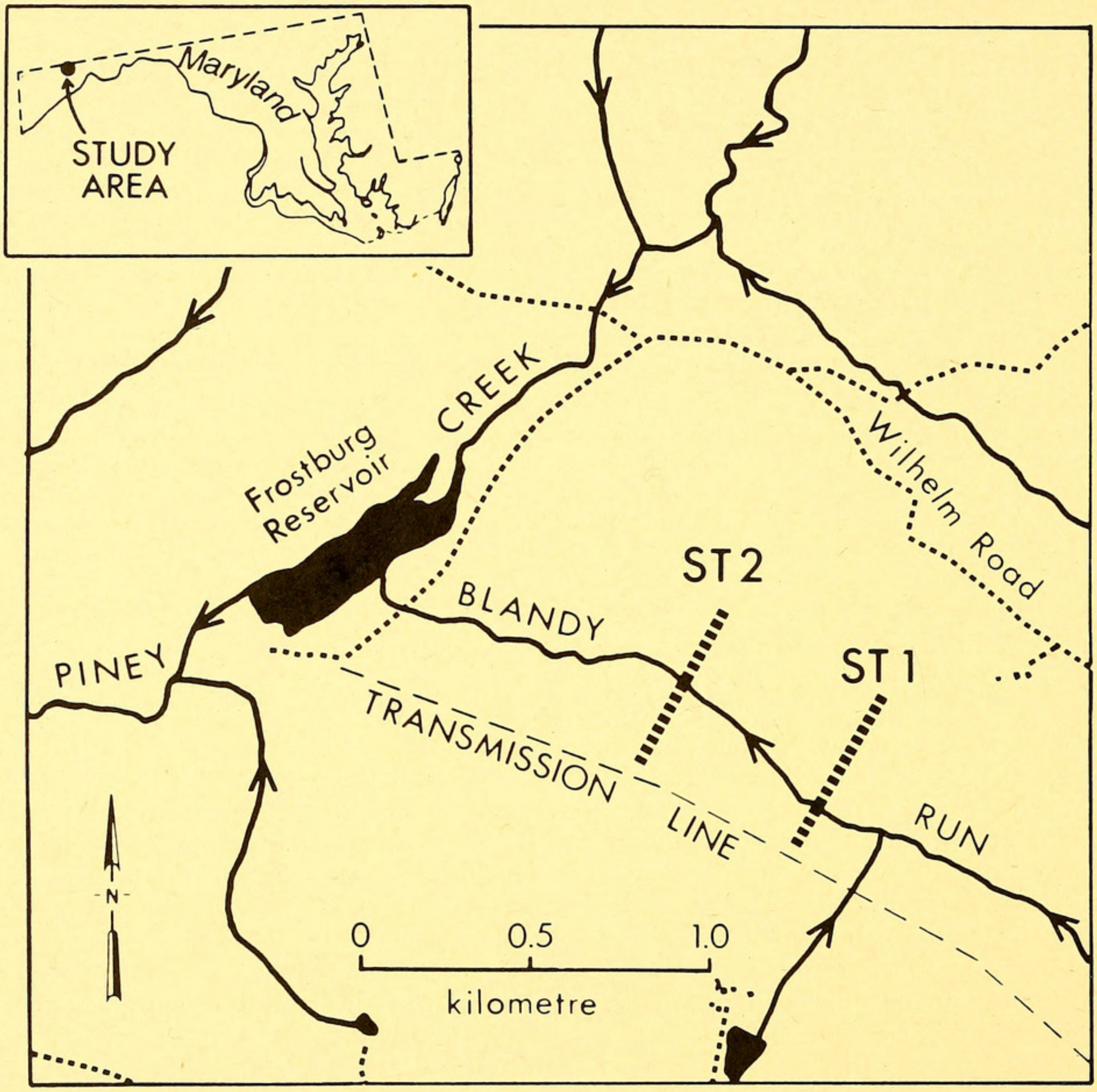


FIGURE 1. Map of the Blandy Run deer wintering area in Garrett County, Maryland, showing location of sampling transects (ST 1, ST 2).

or lower. Annual snowfall averages 180 cm, but has ranged from a high of 320 cm to a low of 99 cm. Prevailing winter winds, clocked at 80.5 to 96.6 km $\cdot$ $h^{-1}$ during storms, are from the west to northwest (climate description from Stone and Matthews 1974).

The severe winter of 1976–1977 was characterized by below-normal temperatures, above-normal snowfall, and prolonged periods of high winds. The mean temperature for January was about 10°C lower than during an average winter. Total snowfall was 238.5 cm, or 58.5 cm greater than normal. January's snowfall alone was 85.6 cm. Periodic blizzard conditions prevailed throughout Garrett County during January and February, and caused deer to concentrate in protective cover. Deer began to disperse from concentration areas with a warming trend in late February.

The Blandy Run deer wintering area has been observed continuously over the last 10 yr by D. M. Harman, who lives near the watershed. Deer have used the area for protective cover at least during this time period. The extent of utilization has varied with the severity of the winter. Based on counts of deer in open fields and on deer sign, the herd size appears to have remained fairly constant.

## Materials and Methods

Weekly observations of the deer wintering area began in January and continued through March 1977. Quantitative data on wintering behavior in relation to habitat, weather, and topography were collected in early February after a 13-cm snowfall had obliterated all prior signs of deer activity. At that time, maximum snow depths in the study area measured approximately 55 cm, which was sufficient to impair deer mobility seriously (Kelsall 1969). Two transects located about 0.5 km apart were established through the deer concentration area perpendicular to Blandy Run (Figure 1). Each transect was 61.0 × 549.0 m and consisted of 18 plots, 61.0 × 30.5 m, with the long axis parallel to the stream. Each plot was then divided into two 30.5 × 30.5 m sample plots. The area covered by both transects totaled 6.7 ha.

Three indices of deer utilization were used to evaluate the environmental factors associated with wintering behavior. Systematic counts of trails (i.e., one deer moving through an area), beds, and pellet groups were made simultaneously in adjoining sample plots within the same elevation interval. The tally of trails, beds, and pellet groups within pairs of adjoining sample plots was used to calculate a mean number per sample plot per day within an elevation interval. Disturbance by humans and/or predators that could have affected deer movement patterns appeared minimal during the sampling period.

Eleven habitat, weather, or topographic variables were measured in each sample plot. Habitat variables included evergreen and deciduous basal area in square metres per hectare and evergreen and deciduous canopy cover percentage. Basal area was determined with a 10-factor angle gauge by averaging two random measurements, one in each sample plot pair. Canopy cover was determined with an ocular tube (Emlen 1967) from 40 random points, 20 in each sample plot pair. Weather variables included wind velocity in kilometres per hour and snow depth in centimetres. Wind velocity was measured with a small hand-held anemometer at a random location in each sample plot. The highest sustained wind observed over a 60-s time interval was recorded. At the time of measurement, winds were constant and from the west-northwest at approximately 35.4 km · $h^{-1}$ in the open. Wind speeds recorded in adjacent plot pairs were then averaged. Although wind velocities were recorded in all 72 sample plots during only one period of sustained high winds, measurements taken in the area on other days supported our results. Snow depth was measured with a ruler at five random points in each sample plot. Ten measurements from adjacent plot pairs were used to calculate the mean snow depth for that elevation interval. Elevation in metres above sea-level was determined to the nearest 0.6 m at the up-slope and down-slope positions of each sample plot pair with a surveying altimeter corrected for barometric pressure. These measurements were averaged to determine a mean sample-plot-pair elevation.

The deer wintering area was divided into three distinct habitat types based on differences in plant species composition and structure. These habitat types were Eastern Hemlock – Sugar Maple on the northeast-facing slope, Eastern Hemlock – Yellow Birch on the bottomland, and Sugar Maple on the southwest-facing slope of the Blandy Run deer concentration area.

A stratified random-sampling design using nested plots was employed to sample the habitat types in late summer 1977. A 90-$m^2$ sample plot was used to sample plant species >1.5 cm diameter at breast height (dbh). A 22.5-$m^2$ sample plot was used to sample plant species ≥50 cm in height but ≤1.5 cm dbh. This stratum is the one usually available to deer for winter browse. A 3-$m^2$ sample plot was used to sample those plant species <50 cm in height, which are usually beneath the snow and unavailable to deer, except by cratering. Nomenclature of plant species was based on Gleason (1952).

## Results

*Sign, Environmental Factors, and Elevation*

Because increasing distance from Blandy Run was directly associated with increasing elevation, variables were related to elevation for ease in interpretation; however, the influence of elevation on habitat utilization by deer was probably indirect.

Patterns of habitat utilization based on trail, bed, and pellet-group counts gave similar results, although there were several minor but interesting differences (Figure 2). For example, the number of trails generally increased with decreasing elevation. Deer activity was highest near Blandy Run. Trail counts were also especially high on the southwest-facing slope, and trails extended farther up that slope than the northeast-facing slope. Deer seemed to avoid the upper part of the northeast-facing slope. Beds increased with a decrease in elevation and were found most often on bottomland of Blandy Run, but never close to the stream. Pellet-group counts usually increased with a decrease in elevation, but high counts were recorded from the upper portion of the southwest-facing slope. As with beds, low numbers of pellet groups were recorded near Blandy Run.

The habitat variables showed definite trends with decreasing elevation (Figure 3). Evergreen and total basal area generally increased with decreasing elevation, but then decreased at the stream. But evergreen and total canopy cover continued high at the stream, probably because the forest canopy somewhat overtopped the stream. Deciduous basal area and canopy cover decreased with decreasing elevation.

Microclimate conditions also changed with decreasing elevation (Figure 4). Wind velocity generally decreased with decreasing elevation but increased near the stream. Snow depths also generally decreased with a decrease in elevation. Snow cover was deepest on the northeast-facing slope and shallower on the

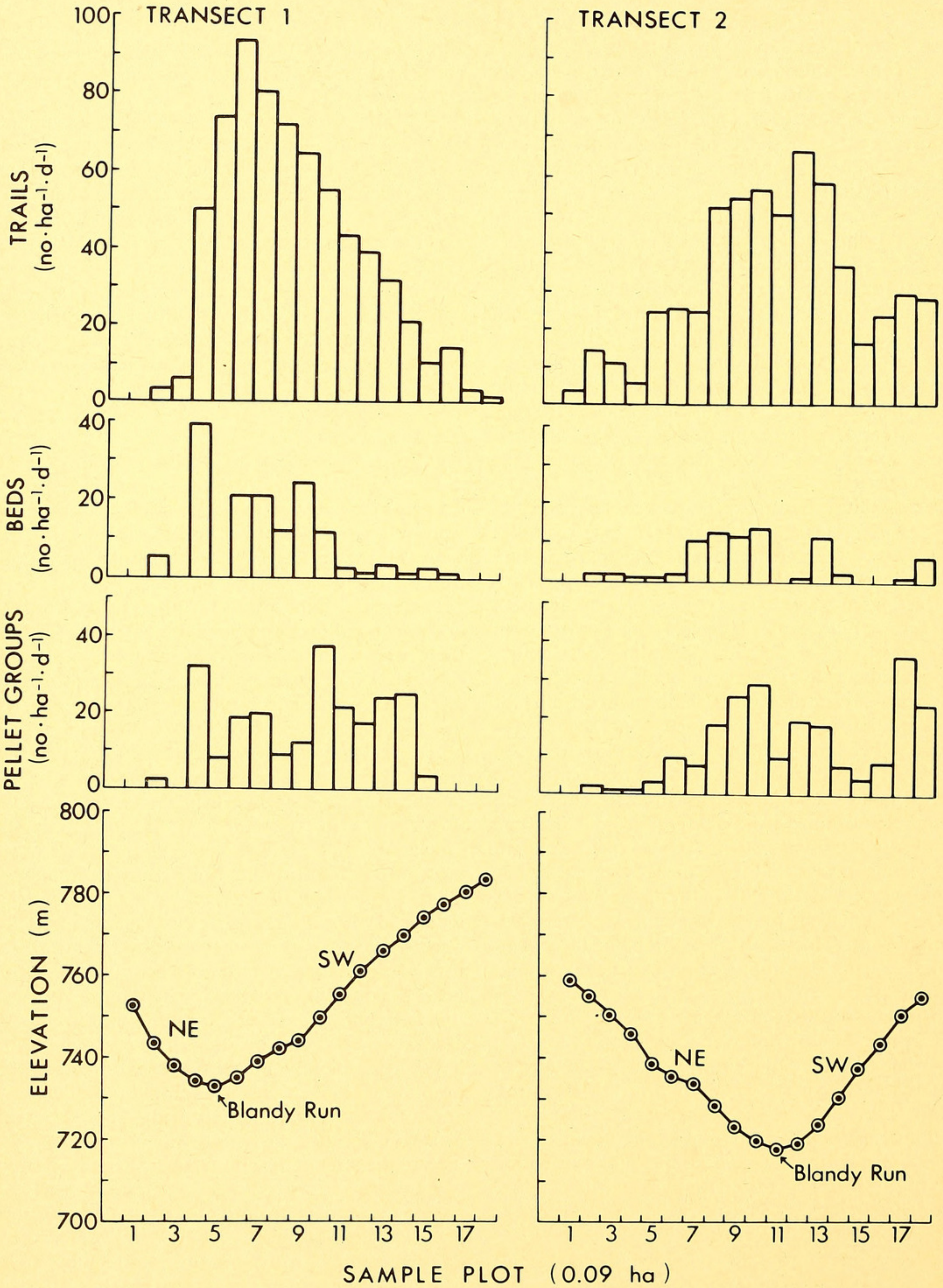


FIGURE 2. The relationship of trail, bed, and pellet-group counts to the elevational gradient across the Blandy Run deer wintering area.

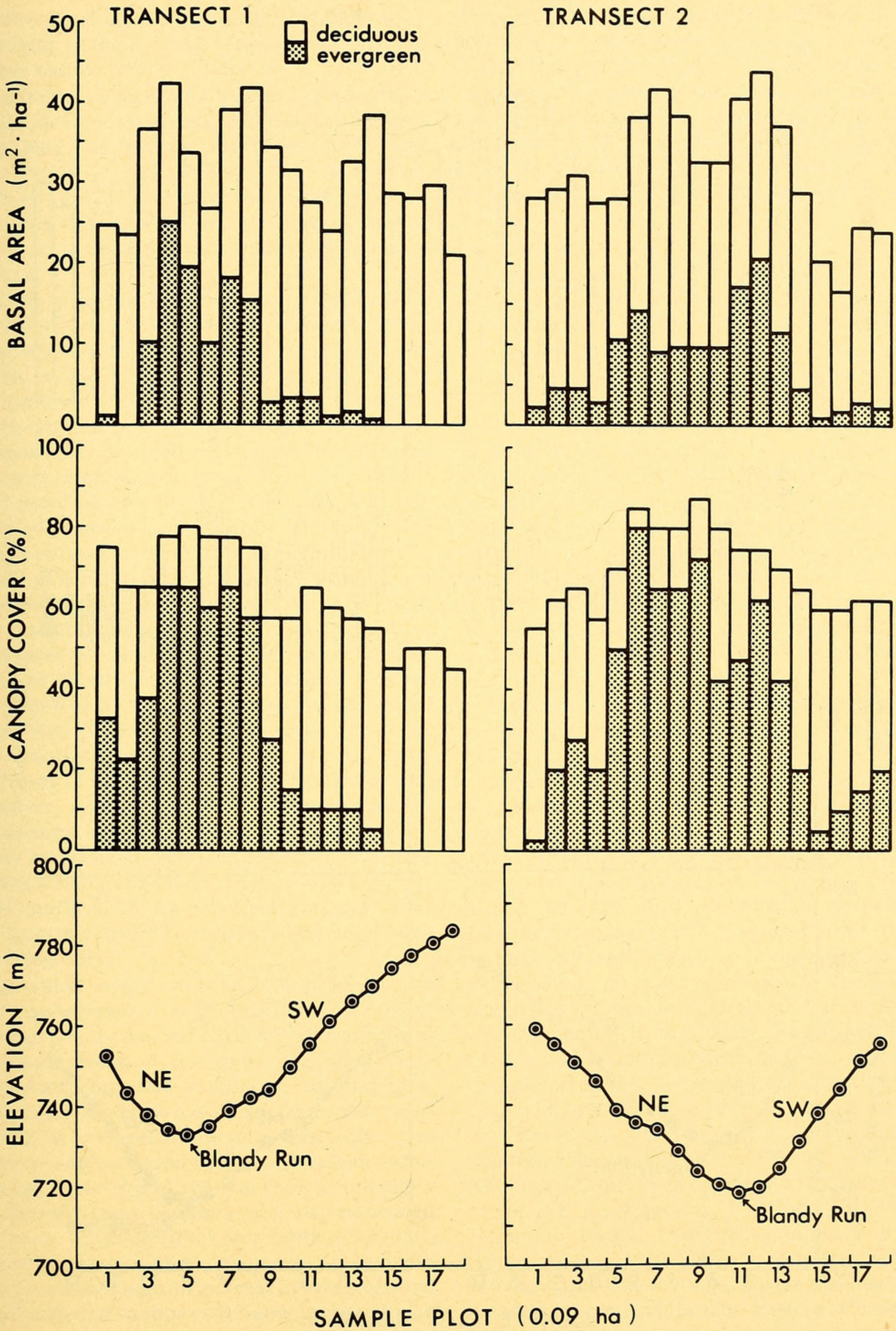


FIGURE 3. The relationship of basal area and canopy cover to the elevational gradient across the Blandy Run deer wintering area.

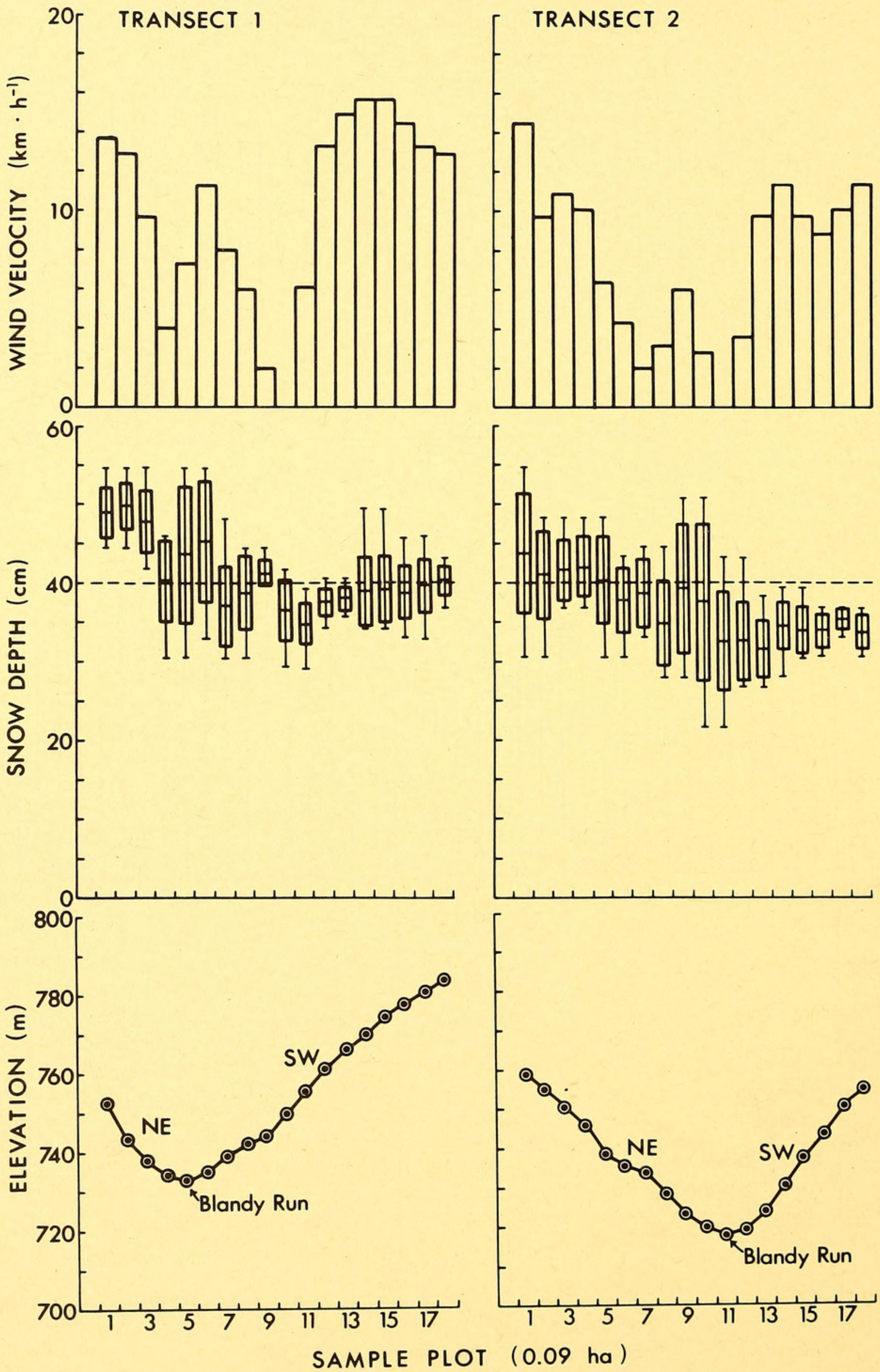


FIGURE 4. The relationship of wind velocity and snow depth (mean ± SD, range) to the elevational gradient across the Blandy Run deer wintering area. The critical snow depth seriously impairing deer mobility is indicated by a dashed line.

southwest-facing slope. Snow depths were more variable at the base of the northeast-facing slope near the stream than elsewhere.

Because the variables measured at transects 1 and 2 showed similar trends with changes in elevation, data were combined and further analyzed using Kendall rank correlation (Siegel 1956, pp. 213–223). This procedure was used to determine the degree of association between the variables and the level of significance. The reported associations were significant at the 0.05 level.

All indices of habitat utilization were significantly correlated with one another, and all variables except number of beds were significantly correlated with elevation. An increase in trails was associated with a decrease in snow depth and wind velocity, and surprisingly with an increase in snow-depth variability. Because deer often selected shallow patches of snow for movement, high variability was probably an asset. Increased numbers of trails were also directly correlated with increased evergreen and total basal area and canopy cover. Deer seemed to avoid areas where the amount of deciduous cover was high. Association of bedding sites with the variables measured followed a pattern similar to the one described for trails, except that there were no significant correlations with snow conditions or elevation. The only measured weather variable with which increased numbers of beds were associated was decreased wind velocity. The other variables associated with an increase in bed counts were increases in evergreen and total basal area and canopy cover, and decreases in deciduous canopy cover. Increased numbers of pellet groups were associated with increases in evergreen and total basal area and canopy cover and with decreases in wind velocity and snow depth. Based on pellet-group counts, deer were not associated with deciduous cover, either positively or negatively.

The measured weather variables appeared to be affected by an increase in the proportion of evergreen-to-deciduous basal area and cover which was related to a decrease in elevation. Higher proportions of evergreen cover also occurred with increased total basal area and canopy cover. Wind velocity decreased with an increase in evergreen and total basal area and canopy cover and increased with an increase in deciduous canopy cover. An increase in snow depth and a decrease in snow-depth variability was also associated with increased wind velocity. Snow depth was significantly correlated only with wind velocity. Snow-depth variability increased with an increase in evergreen and total basal area and canopy cover and decreased with an increase in deciduous canopy cover and wind velocity. At higher elevations, where winds blew unimpeded by evergreen cover, snowfall was uniformly deep. At lower elevations, especially near the stream, snow depths were less and snow-depth variability was greater apparently owing to a combination of interception by evergreen canopy cover and passage through pockets of deciduous cover and/or the more open canopy at the stream. Snow depths could also have been more variable at the stream owing to increased wind velocity causing some drifting.

*Habitat Types*

The three habitat types found within the deer wintering area differed both in overstorey and understorey species composition and structure (Table 1). Eastern Hemlock and Sugar Maple dominated the habitat on the northeast-facing slope, making up 82.9% of all individual species and 84.8% of the basal area. On the southwest-facing slope, these two strata were dominated by Sugar Maple, comprising 37.4% of all individual species and 55.0% of the basal area. Red Oak was also an important species with 22.1% of the basal area. Many of the oaks were large, mast-producing trees (> 41.5 cm dbh). The bottomland was dominated by Eastern Hemlock and Yellow Birch. These species made up 53.2% of all individual species and 44.9% of the basal area. Red Maple and Red Oak increased the relative density and basal area to 59.8 and 70.2%, respectively.

Differences in the species composition and structure of the ground-layer stratum among the three habitat types resulted in different amounts and quality of food available to the wintering deer herd (Table 2). The ground-layer stratum on the northeast-facing slope (Eastern Hemlock – Sugar Maple) was composed primarily of Sugar Maple and Black Cherry. In the winter, the major browsable species (≥50 cm in height, ≤1.5 cm dbh) available for browsing were American Beech, Striped Maple (*A. pensylvanicum*), and Sugar Maple. Beech and Sugar Maple were the most heavily browsed species. On the southwest-facing slope (Sugar Maple), the ground-layer stratum was dominated by Red Oak, Sugar Maple, Black Cherry, and American Beech. In winter, the common species for browse were American Beech and Black Cherry. Black Cherry showed signs of receiving some use. The most common species on the bottomland (Eastern Hemlock – Yellow Birch) was Rosebay Rhododendron, which comprised 32.9% of all species. Three evergreen species, Rosebay Rhododendron, Mountain Laurel (*Kalmia latifolia*), and Eastern Hemlock, made up 56.4% of all species. The major browse species in the winter were Rosebay Rhododendron, American Beech, Eastern Hemlock, and Mountain Laurel, all of which showed signs of heavy use.

The bottomland, which provided primary shelter

TABLE 1—Density (stems·$ha^{-1}$) and basal area ($m^2 \cdot ha^{-1}$) (B.A.) of woody plant species composing the understorey (> 1.5–21.5 cm dbh) and overstorey (> 21.5 cm dbh) strata of habitats in the Blandy Run deer wintering area

| | Eastern Hemlock – Sugar Maple[a] | | | | Eastern Hemlock – Yellow Birch[b] | | | | Sugar Maple[c] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Understorey | | Overstorey | | Understorey | | Overstorey | | Understorey | | Overstorey | |
| | Density | B.A. | Density | B.A. | Density | B.A. | Density | B.A. | Density | B.A. | Density | B.A. |
| *Tsuga canadensis* | 370 | 1.923 | 103 | 15.201 | 1283 | 9.313 | 81 | 5.573 | 56 | 0.326 | 8 | 1.303 |
| *Populus grandidentata* | — | — | — | — | 10 | 0.251 | 40 | 2.078 | — | — | — | — |
| *Carya glabra* | 28 | 0.389 | 9 | 1.056 | — | — | — | — | 24 | 0.261 | — | — |
| *Corylus americana* | — | — | — | — | 10 | 0.005 | — | — | — | — | — | — |
| *Betula lenta* | 9 | 0.005 | — | — | 20 | 0.128 | 10 | 0.415 | — | — | — | — |
| *B. lutea* | 19 | 0.009 | — | — | 102 | 1.433 | 70 | 5.374 | — | — | — | — |
| *Fagus grandifolia* | 93 | 0.328 | 9 | 0.793 | 444 | 1.238 | 20 | 1.664 | 715 | 1.844 | — | — |
| *Quercus alba* | — | — | — | — | — | — | — | — | — | — | 8 | 0.679 |
| *Q. rubra* | — | — | — | — | — | — | 20 | 5.610 | 16 | 0.209 | 16 | 5.831 |
| *Magnolia acuminata* | — | — | 9 | 1.694 | — | — | — | — | — | — | — | — |
| *Hamamelis virginiana* | 9 | 0.019 | — | — | — | — | — | — | 8 | 0.004 | — | — |
| *Amelanchier arborea* | — | — | — | — | 253 | 2.636 | — | — | — | — | — | — |
| *Prunus serotina* | 28 | 0.699 | 9 | 0.919 | 70 | 0.752 | 30 | 2.732 | 48 | 0.430 | 8 | 0.326 |
| *Acer saccharum* | 528 | 5.846 | 121 | 10.072 | 101 | 1.147 | — | — | 461 | 3.884 | 143 | 11.152 |
| *Acer pensylvanicum* | 9 | 0.005 | — | — | — | — | — | — | 8 | 0.016 | — | — |
| *Acer rubrum* | — | — | — | — | 131 | 0.512 | 40 | 6.112 | 72 | 1.029 | — | — |
| *Cornus florida* | — | — | — | — | — | — | — | — | 24 | 0.048 | — | — |
| *Rhododendron maximum* | — | — | — | — | 121 | 0.076 | — | — | — | — | — | — |
| *Kalmia latifolia* | — | — | — | — | 10 | 0.005 | — | — | — | — | — | — |
| *Fraxinus americana* | — | — | — | — | — | — | 20 | 1.280 | — | — | — | — |
| Total | 1093 | 9.223 | 260 | 29.735 | 2555 | 17.496 | 331 | 30.838 | 1432 | 8.051 | 183 | 19.291 |

[a]Computations are based on twelve 90-$m^2$ sample plots.
[b]Computations are based on eleven 90-$m^2$ sample plots.
[c]Computations are based on fourteen 90-$m^2$ sample plots.

and food for the wintering deer herd, had a greater variety of species than the other two habitat types. There, density and basal area of the overstorey and understorey were greater than that of the other two habitat types. Eastern Hemlocks composing the ground-layer and understorey strata were especially dense. On the bottomland, evergreen species comprised 51.8% of all species; in contrast, on the northeast- and southwest-facing slopes, they comprised only 35.0 and 3.9%, respectively.

## Discussion

Of the three indices of habitat utilization, the number of beds provided the best means of assessing areas of protective cover. High trail counts were not necessarily associated with time spent in an area or utilization. Although trail counts were high at the stream, bed and pellet-group counts were low. Based on this information, deer apparently spent little time at streamside. In places where the stream was ice-free, deer undoubtedly used it as a water source, but the high trail counts at the stream probably resulted from individuals quickly crossing from one area of protective cover to another. Pellet-group counts were also related somewhat to foraging areas rather than solely to protective cover.

High numbers of beds were found most often on the bottomland of Blandy Run, but never adjacent to the stream. Bedding areas were characterized by the highest evergreen and total basal area and cover values. But wind velocities appeared to influence choice of bedding sites directly, and could explain why deer failed to bed in the bottomland near the stream. The stream was oriented in the direction of prevailing winds, and winds probably funneled down the stream valley almost unobstructed by vertical evergreen cover. The resulting increase in wind chill is believed to have encouraged deer to bed in the densest evergreen cover away from the stream. Robinson (1960), studying shelter requirements of penned White-tailed Deer in Maine, found that deer survived equally well in sparse, moderate, and dense coniferous cover because they selected bedding sites with similar microclimates. In his study, a typical site had dense conifers overhead, trunks of trees or slash to the north, and a southern exposure. Bedding sites were

TABLE 2—Density (stems·ha$^{-1}$) by height class of woody plant species composing the ground-layer stratum of habitats in the Blandy Run deer wintering area

| | Eastern Hemlock – Sugar Maple[a] | | Eastern Hemlock – Yellow Birch[b] | | Sugar Maple[c] | |
|---|---|---|---|---|---|---|
| | < 50 cm in height | ≥ 50 cm in height, ≤ 1.5 cm dbh | < 50 cm in height | ≥ 50 cm in height, ≤ 1.5 cm dbh | < 50 cm in height | ≥ 50 cm in height, ≤ 1.5 cm dbh |
| *Tsuga canadensis* | — | 37 | 6061 | 364 | — | — |
| *Carya glabra* | 278 | — | — | — | — | — |
| *Betula lenta* | — | — | — | — | — | 127 |
| *B. lutea* | — | — | 6212 | — | — | — |
| *Fagus grandifolia* | 1250 | 407 | 4394 | 768 | 1190 | 1778 |
| *Quercus alba* | — | — | — | — | 952 | — |
| *Q. rubra* | 1389 | — | 1818 | 40 | 9524 | 32 |
| *Magnolia acuminata* | — | — | 152 | — | 119 | — |
| *Hamamelis virginiana* | — | 74 | — | 40 | — | — |
| *Amelanchier arborea* | — | — | 2576 | — | — | — |
| *Crataegus* sp. | — | — | 152 | — | — | — |
| *Prunus serotina* | 10 833 | — | 6515 | 40 | 6667 | 1270 |
| *Acer saccharum* | 14 861 | 222 | — | — | 8333 | 63 |
| *Acer pensylvanicum* | 139 | 259 | 455 | — | — | — |
| *Acer rubrum* | — | — | 1364 | — | 238 | — |
| *Cornus florida* | — | — | — | — | 119 | — |
| *Rhododendron maximum* | — | — | 16 061 | 2424 | — | — |
| *Kalmia latifolia* | — | — | 6515 | 323 | — | — |
| *Sambucus pubens* | 139 | — | — | — | — | — |
| Total | 28 889 | 999 | 52 275 | 3999 | 27 142 | 3270 |

[a] Stems·ha$^{-1}$ based on twenty-four 3-m$^2$ and twelve 22.5-m$^2$ sample plots for the < 50 cm height class and ≥ 50 cm, ≤ 1.5 cm dbh height class, respectively.
[b] Stems·ha$^{-1}$ based on twenty-two 3-m$^2$ and eleven 22.5-m$^2$ sample plots for the < 50 cm height class and ≥ 50 cm, ≤ 1.5 cm dbh height class, respectively.
[c] Stems·ha$^{-1}$ based on twenty-eight 3-m$^2$ and fourteen 22.5-m$^2$ sample plots for the < 50 cm height class and ≥ 50 cm, ≤ 1.5 cm dbh height class, respectively.

seemingly chosen for their protection from wind and slightly warmer temperatures, especially during periods of cold weather. Temperatures under thick conifer cover are known to have the narrowest thermal ranges and warmest mean temperatures (Ozoga 1968). Moen (1968a, b) has also shown that radiant and convective heat loss from deer is minimized under dense conifer cover. Surprisingly, deer at Blandy Run selected bedding sites without regard to snow depth, within the range of snow depths encountered in this study. In contrast, Huot (1974) found that deer tended to bed in areas of lesser snow depths within conifer stands in Quebec. Moen (1976), however, has indicated that bedding in deep snow may afford some insulation and reduce the effective wind velocity around the animal. The lack of significant correlation of bed counts with elevation is understandable as energetic cost, once the animal has lain down, remains the same whether the surrounding topography is flat or hilly (Moen 1976).

Of the three habitat types, the Eastern Hemlock–Yellow Birch habitat on the bottomland along Blandy Run served as the primary wintering area. Based on pellet-group counts, we estimated that about 54 deer occupied this 31 ha of prime winter habitat, or about 1.75 deer · ha$^{-1}$. Here, Eastern Hemlock basal area ranged from 10 to 25 m$^2$ · ha$^{-1}$, and total basal area ranged from 30 to 45 m$^2$ · ha$^{-1}$. Canopy cover of the dominant hemlocks exceeded 50%, and total canopy cover was greater than 70%. Although deer browsing was heavy on hemlock (twigs and leaves) and rhododendron (flower and vegetative buds and leaves) in certain locations, both species seemed to provide substantial browse for the wintering deer herd. Foliage and branches often extended down to the snow level within easy reach of browsing deer. The other two habitat types received proportionately less use; however, the Sugar Maple habitat type on the southwest-facing slope was used heavily on milder days. The lesser snow depths probably influenced this activity, although even here deer were never far from evergreen cover. The southwest-facing slope, in contrast to the northeast-facing slope, also provided excellent sunning sites for the deer and a high-energy food source, the bumper fall acorn crop. Here, many cratering areas were located near seeps where snow depths were much less than elsewhere. Based on the accumulation of pellet groups, we assumed that deer spent some time at these sites taking advantage of the food source, lessened snow depths, and increased solar radiation on calm cloudless days. The importance of this supplemental food source should not be underestimated, as it undoubtedly helped to keep the herd in good condition throughout the winter. Although evergreen cover was available in the Eastern Hemlock – Sugar Maple habitat type on the northeast-facing slope, deer seemed to avoid the upper part of this habitat type, possibly because of deep snow conditions and few browse stems. Here, mean snow depths exceeded the critical 40-cm depth reported by Kelsall (1969) to impair deer movement considerably. The snow was so soft that deer were observed to sink nearly to ground level.

In conclusion, White-tailed Deer within the Blandy Run wintering area seemed to respond to microspatial differences in weather. These microhabitat differences were apparently related to the proportion of evergreen to deciduous canopy cover and to topographic position.

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