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WINTER COVER TYPE USE BY WHITE-TAILED DEER (Odocoileus virginianus)
IN ST. CROIX STATE PARK, MINNESOTA^{1/}

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Over-use by deer of parts of St. Croix State Park has seriously depleted the browse supply and reduced the regeneration of trees and shrubs. Because availability of adequate food and cover in severe winter conditions is critical to northern deer populations, it was felt that the patterns of winter use of various cover types by deer should be studied. This report focuses on the results of such a study.

Methods

This study took place in the winter and spring of 1970. Four survey methods including aerial, ground surveys by car and snowmobile, and spring pellet-group counts were used. The first phase consisted of aerial flights over the entire park on February 15 and March 14, using a Cessna 172 Skyhawk. The park was covered by systematically flying east-west transects. Each deer sighted was mapped by location and surrounding cover type (Figure 1).

On March 14 and 21-24, a car and snowmobiles were used to make additional surveys of deer occurrence. Routes were chosen to give coverage of all major cover types and all areas of the park (Figure 1). Several snow-plowed roads were surveyed by car at a maximum speed of 5 mph. When an animal was spotted, its map location and associated cover type, the car mileage from the initial starting point, and time of day were recorded. The snowmobiles were used on a trail network to record similar data. General deer activity in the different cover types was also noted by presence or absence of deer trails.

The last phase of the field work was a spring pellet-group count in four areas of the park. The areas were located so as to sample the cover types as surveyed by the previous studies. Only fresh, winter dropped pellets were counted. Circular 1/100 acre pellet-group plots were located randomly along north-south transects. The number of pellet-groups and the cover type were recorded for each plot.

The cover types were grouped as follows: pine, pine-aspen, aspen, upland hardwood, open, and lowland. Pine types were about 95 percent jack pine (Pinus

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banksiana Lamb.) with a few areas of red pine (Pinus resinosa Ait.) or mixed red and jack pine. Pine-aspen types included those with equal representation of jack pine and aspen (Populus tremuloides Michx.) as well as types where aspen predominated, but where jack pine had good representation. Stands typed as aspen were essentially pure aspen, while upland hardwood included various mixtures of bur oak (Quercus macrocarpa Michx.), northern red oak (Quercus borealis Michx.), red maple (Acer rubrum L.), sugar maple (Acer saccharum Marsh.), American elm (Ulmus americana L.), birch (Betula papyrifera Marsh.), aspen and other minor species. Areas classed as open lacked trees or had a few small trees. Lowland included areas of sedges (Carex spp.), willows (Salix spp.), alder (Alnus rugosa (DuRoi) Spreng.), black ash (Fraxinus nigra Marsh.), tamarack (Larix laricina (DuRoi) K. Koch.), and any other low lying areas.

Results

The numbers of deer sighted per section or per mile, the average number of pellet-groups per plot, and the coverage by each survey method are recorded in Table 1. It is evident that all four survey methods show deer were confined, with a few exceptions, to the types having a strong component of pine. Data obtained by car and snowmobile were similar to that obtained by airplane, even though the former entailed looking horizontally into the cover type and the latter provided a vertical view. A difficulty in using deer surveys which depend on sighting deer either from above or from the ground is the variation in visibility between the various cover types. This is a major problem in the coniferous types, especially when using the airplane. In spite of this drawback, the aerial survey revealed a substantially higher number of deer per section in the coniferous types than in any of the other types. It is also important to note that the results of the pellet-group counts, where variations in visibility of deer are not involved, are essentially similar to those obtained by sighting survey methods. The number of pellet-groups would probably be even lower in the non-coniferous types if only those dropped while there was snow on the ground could be counted. Since this was impossible, some of the pellet groups counted were dropped before deer became concentrated in the pine types. The results of the separate survey methods follow.

Aerial Surveys. Each "x" on the map in Figure 1 represents the location of a deer sighted from the air. Shaded areas are the pine and pine-aspen cover types. Of the total of 75 deer seen, 56 were in these two types and only 19 were in all non-coniferous cover types. When these data are converted to an equal-area basis, the differences are even more striking, 4.9 deer per section in the pine and pine-aspen types and only 0.5 deer per section in the non-coniferous types.

Surveys by Car. Car surveys covered a lineal total of 49.5 miles of roadsides with an average of 7.2 deer sighted per mile in pine types, 2.7 in pine-aspen types, and none in non-coniferous types.

Surveys by Snowmobile. A total of 43.8 miles of trails were covered by the snowmobile surveys. On these, an average of 3.7 deer were seen per mile in the pine types, 4.0 in the pine-aspen types, 0.5 in the aspen, 0.7 in the upland mixed hardwood types, and none in the open or lowland types.

Pellet-group Counts. As indicated by winter deposited pellet-groups, deer had been using the pine (4.3 pellet groups per plot) and pine-aspen (3.9 per plot) types far more than the other types (aspen, 1.4; upland mixed hardwoods, 1.0; open, 0.6; lowland, 0.4 pellet groups per plot).

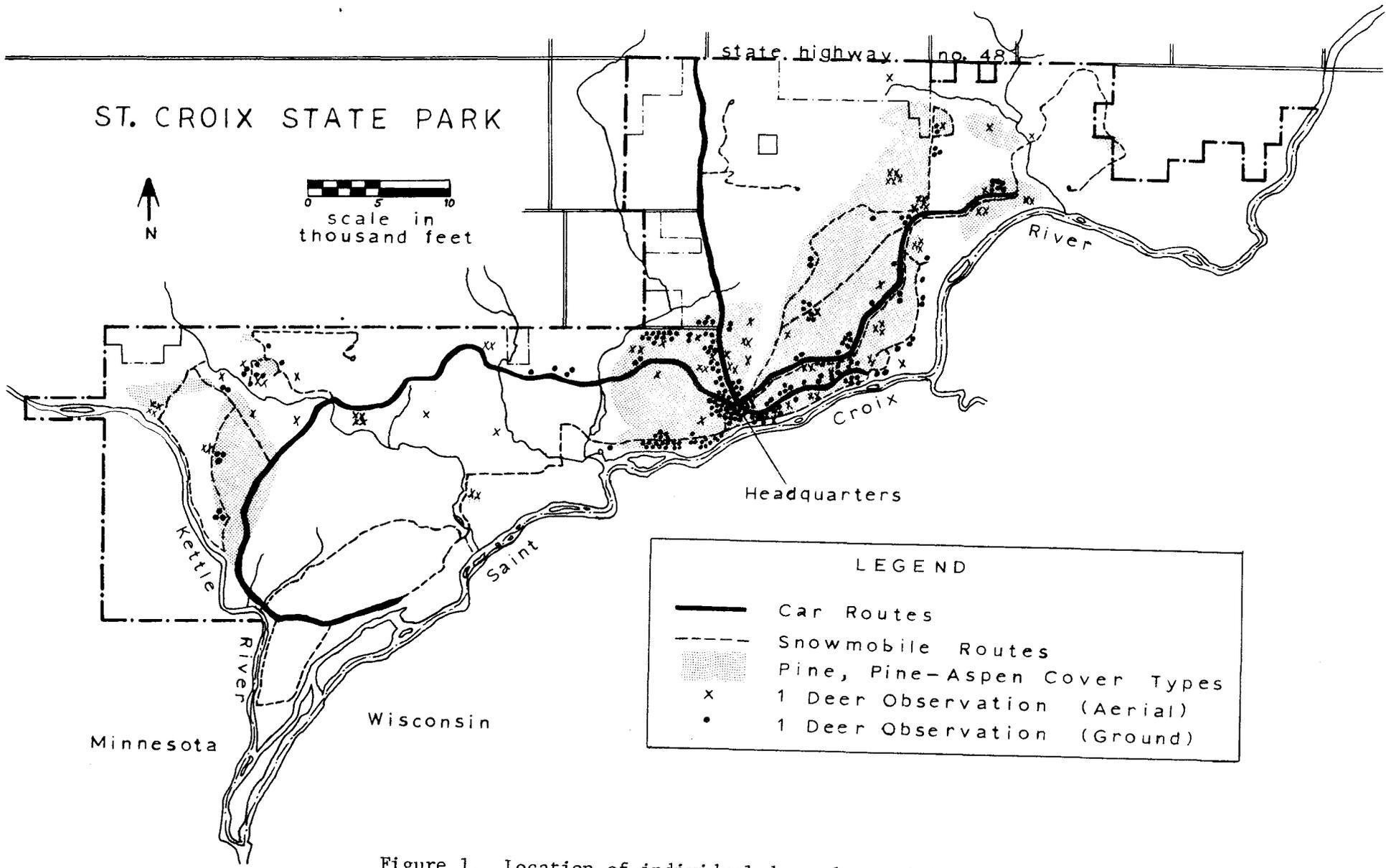


Figure 1. Location of individual deer observed during the various surveys.

The concentration of deer within or near conifer types is shown in the comparative data in Table 1 and on the map (Figure 1). Where deer were sighted in predominantly aspen and other hardwoods they were close to a pine plantation to which they had access for cover.

The deer use pattern of forest cover types is remarkably consistent as determined by four separate survey methods. However, because of some variability in the timing of surveys and in the relative visibility in the various cover types, no attempt was made to use the data as a basis for a total census of the deer herd.

Management Implications

These results emphasize the great importance of the pine cover types in providing winter cover for the deer. The study area originally had a large acreage of pine in pure stands or mixed with hardwoods. If some of this area is to be restored to pine, it will be necessary to integrate reforestation efforts with the present occurrence of deer.

The deer are an important asset of interest to park visitors. However, they have badly overbrowsed portions of the park, totally eliminating any young pine that may have started through either natural regeneration or planting. It is common knowledge that deer seldom browse red pine except in winter and only when more desirable species are not available. The findings of these surveys suggest that pine could be planted in clearings made in large stands of aspen and other hardwood types seldom used by deer in winter. Since they do not browse the pine in summer, these planted trees could have a good chance to become established. Further, as such planted trees get large enough they would provide winter cover that might attract the deer to portions of the park presently given little winter use by the herd.

The present study was limited to one winter period when a blanket of 17-20 inches of snow covered the area for about 4 months. It would be desirable to continue the surveillance of winter use patterns in connection with efforts to maintain a substantial deer herd and at the same time to restore some of the red pine to the park vegetation.

Table 1. Deer Observations in Different Cover Types and the Amount of Coverage by Various Sampling Methods

Cover Type Group	Number of Deer Observed and Coverage Per Type						Ave. No. Pellet Groups Per Plot	No. of Plots
	Airplane		Car		Snowmobile			
	No. per section	No. of sections	No. per mile	No. of miles	No. per mile	No. of miles		
Pine	7.7	3.0	7.2	2.8	3.7	5.0	4.3	68
Pine-Aspen	5.0	6.6	2.7	23.2	4.0	17.6	3.9	31
Aspen	0.7	13.0	0.0	7.4	0.5	7.6	1.4	43
Upland Hardwood	0.5	11.5	0.0	13.5	0.7	12.6	1.0	28
Open	0.0	2.9	0.0	1.0	0.0	0.2	0.6	20
Lowland	0.3	12.4	0.0	1.6	0.0	0.8	0.4	8