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Foraging Site Selection of the Brown Creeper (*Certhia americana*) in Relation to Temperature in Central Iowa

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From 20 February to 4 April 1983, 423 observations were made of foraging brown creepers (*Certhia americana*) in central Iowa. Diameter at breast height (DBH) of the tree used as a foraging site, time, temperature (°C), and general weather conditions were recorded during each observation. Ambient temperature was related to foraging site selection; as temperature decreased, brown creepers selected larger diameter trees more exclusively as foraging sites. As ambient temperature increased, the creepers included smaller diameter trees.
INDEX DESCRIPTORS: *Certhia americana*, Creepers, Foraging Behavior.

Although foraging behavior of the brown creeper has been studied (Franzreb 1985, Morse 1970, Willson 1970, Yahner 1981), few reports of this small passerine's feeding habits exist. Gates (1969) mentioned that some bird species might adjust foraging techniques to conserve energy in thermally stressful environments. Two birds with foraging habits similar to those of the brown creeper, the white-breasted nuthatch (*Sitta carolinensis*) and downy woodpecker (*Picoides pubescens*), foraged on larger branches at lower ambient temperatures (Grubb 1975). Since the brown creeper inhabits central Iowa woodlands during winter, it might modify its foraging habits in response to cold weather.

This study is intended to see how temperature variation affects brown creeper foraging site selection.

STUDY AREA AND METHODS

The study was conducted in Brookside Park (Sec. 5, T84N, R24W), Ames, Story County, Iowa. The north section of the park consists of an 11 ha deciduous woodlot. The east and north sides of the woodlot are bordered by Squaw Creek, a 25m wide stream. Adjacent to the west and south sides are pasture and parkland respectively. Vegetation was sampled by the point-quarter method (Cottam et al., 1953) at a total of 86 points on two transects through the woodlot. Hackberry (*Celtis occidentalis*) and maple (*Acer* spp.) are the dominant trees. Other trees include ash (*Fraxinus* spp.), cottonwood (*Populus* spp.), honey locust (*Gleditsia triacanthos*), Kentucky coffee-tree (*Gymnocladus dioica*), oak (*Quercus* spp.), and black walnut (*Juglans nigra*).

Brown creeper foraging was observed on 20 days during the period 20 February to 4 April 1983. All observations were made between 0700 and 1700 CST. Weather conditions during observation periods were variable; temperatures ranged from −7 to 13 °C. Foraging data were collected while walking slowly along the nature trails in the woodlot. Generally, the same route was followed each day. When a brown creeper was located, it was observed for as long as possible, and each foraging site the creeper selected was considered an observation. During these observations, the trees used as foraging sites were identified and their diameter at breast height (DBH) in cm was measured.

RESULTS AND DISCUSSION

The frequencies of trees calculated from the point-quarter samples indicates that hackberry and maple were the dominant tree species (Figure 1). All tree species were used as foraging sites by brown creepers but not in proportion to their availability (Chi-square = 1513, df = 7, $P < 0.005$). Comparison of frequencies of tree species in the woodlot with their frequencies of use as foraging sites by brown creepers (Fig. 1) indicates the creepers preferred using ash, oak and walnut over hackberry and maple. Willson (1970) found that in a woodlot containing 15 percent oak and 6 percent hackberry, brown creepers foraged on oaks 51 percent of the time in winter and 8 percent in spring. Hackberry was used 13 percent and 30 percent, respectively. Since the oaks are of larger diameter than hackberry species, these results show that brown creepers may be selecting foraging sites in response to ambient temperature.

Regression analysis indicated that the size of trees used by brown creepers was negatively correlated with ambient temperature (Fig. 2). It was suspected that in addition to ambient temperature, wind velocity may be determining foraging site selection of brown creepers. In this study I found that wind speed did not significantly affect foraging site selection since the creepers were frequently observed in the interior of the woodlot where wind velocity was minimal. Brown creepers were also observed ascending trees in a spiral pattern regardless of ambient temperature and wind velocity.

Ambient temperature has been shown to influence foraging behavior of various bird species (Grubb 1975, 1977). As smaller animals have greater surface area per unit body weight, heat loss is greater in proportion to metabolic rate (Moen 1973). The brown creeper is

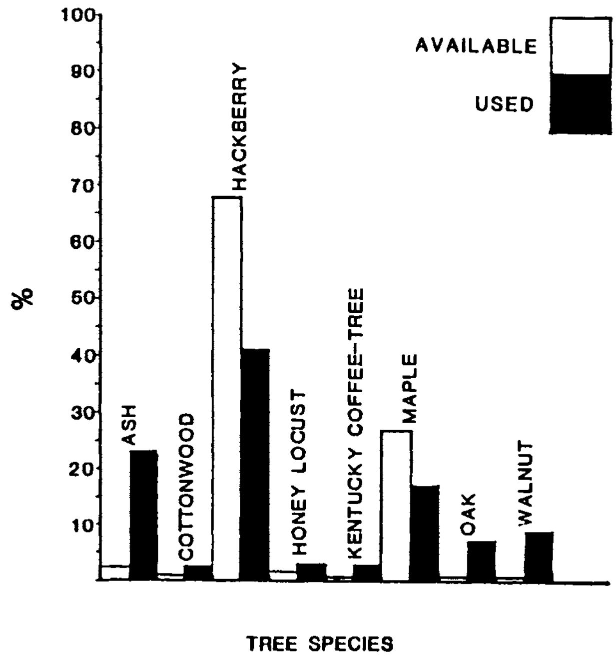

Fig. 1. Frequency of tree species availability and use by brown creepers as foraging sites.

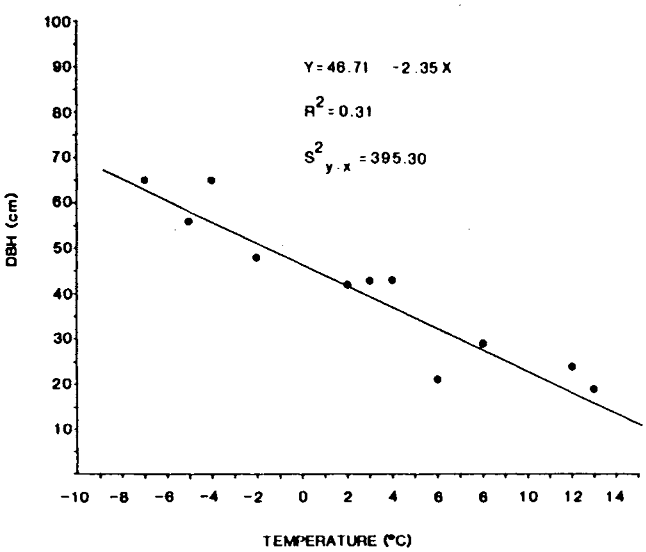

Fig. 2. Relationship between size of trees (DBH in cm) used by brown creepers and ambient temperature (°C) (n = 423). (Plotted points represent mean tree sizes for 11 different sampling temperatures).

relatively small (8.4 gms, Dunning 1984) and forages in cold climates; thus it can be exposed to thermal stress. Willson (1970) noted that foraging brown creepers used medium and large trees (> 94 cm DBH) more frequently during the winter. Use of smaller trees increased during spring. Franzreb (1985) mentioned that brown creepers foraged on larger trees and reduced the number of flights between trees, thus conserving the bird's energy.

To further illustrate the importance of reducing metabolic heat loss, Lennerstedt (1975) found that brown creepers have a reduction in the number of papillae on the ventral portion of the foot compared to other passerines. The decreased number of foot papillae reduces the surface area contacting the substrate, perhaps lessening conductive heat flow to the substrate.

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REFERENCES

COTTAM, G., J. T. CURTIS and B. W. HALE. 1953. Some sampling characteristics of a population of randomly dispersed individuals. Ecology 34:741-757.

DUNNING, J. B. 1984. Body weights of 686 species of North American birds. Western Bird Banding Association Monograph No. 1. 38 pp.

FRANZREB, K. E. 1985. Foraging ecology of brown creepers in a mixed-coniferous forest. J. Field Ornithol. 56(1):9-16.

GATES, D. M. 1969. Climate and stability. Brookhaven Symp. Biol. 22:115-127.

GRUBB, T. C., Jr. 1975. Weather-dependent foraging behavior of some birds wintering in a deciduous woodland. Condor 77:175-182.

———. 1977. Weather-dependent foraging behavior of some birds wintering in a deciduous woodland: horizontal adjustments. Condor 79:271-274.

LENNERSTEDT, I. 1975. Pattern of pads and folds in the foot of European oscines (Aves, Passeriformes). Zool Scripta 4:101-109.

MOEN, A. N. 1973. Wildlife Ecology — An Analytical Approach. W. H. Freeman and Co., San Francisco. 458 pp.

MORSE, D. H. 1970. Ecological aspects of some mixed-species foraging flocks of birds. Ecol. Monogr. 40:119-168.

WILLSON, M. F. 1970. Foraging behavior of some winter birds of deciduous woods. Condor 72:169-174.

YAHNER, R. H. 1981. Avian winter abundance patterns in farmstead shelters: weather and temporal effects. J. Field Ornithol. 52:50-56.