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HOUSE FINCH NEST-SITE SELECTION AT GUELPH, ONTARIO[1]

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Abstract. I studied nest-site selection by House Finches (*Carpodacus mexicanus*) in a residential area of Guelph, Ontario. House Finches preferentially selected spruce trees (*Picea* sp.) and *Euonymus* sp. vines for nesting, and avoided deciduous trees. Most nests abutted the nest tree's trunk and were located between 50% and 70% of the distance up the nest tree. House Finches may select sites which minimize the probability of predation and/or wind damage.

Key words: Nest-site selection; House Finch; predation; wind.

INTRODUCTION

House Finches (*Carpodacus mexicanus*) have been described as extremely flexible in their selection of nest sites (Woods 1968, Harrison 1978), but Hensley (1959) and van Riper (1976) respectively described Sonoran Desert and Hawaiian populations in which finches preferred certain nesting locations. I studied House Finches in residential areas of Guelph, Ontario to see if they preferred certain sites for nesting.

METHODS

Nests were found by observing House Finches during the nesting season. Three House Finch nests were found in May 1985 and 21 between 19 April 1986 and 26 June 1986. Nests (22 of 24) were predominantly located in residential areas of Guelph, Ontario. Residential areas were composed of single-family dwellings constructed 11 to 27 years ago. The House Finch was first seen in Guelph 11 years ago (Brewer 1977).

To determine if House Finches selected nest sites in certain tree genera or in trees of a particular height range, I identified and measured the heights of the trees on one front lawn (average area 199 m^2) randomly selected from the two front lawns adjacent to each nest. I assumed that this was a random sample of trees in the residential areas where nests were found. I compared the random tree sample to the nest trees. Only trees higher than 2.44 m were included in the random sample as this was the height of the shortest tree used for nesting in this study (i.e., only trees taller than 2.44 m were considered potentially suitable for nesting). Tree height was measured directly or by the similar triangle method (Washington 1976). To determine the accuracy of the similar triangle method, 13 objects of known height were measured in this way. The heights obtained by the similar triangle method had an average difference of 4.6% (range = 1.2–7.7%) from the true height. The similar triangle method is therefore an acceptable method for measuring tree height.

For each nest, I identified the genus of supporting tree and measured the tree height, nest height, distance from trunk to nest, distance from trunk to the perimeter of the tree, and orientation of the nest relative to the trunk using a standard compass reading. The distance from trunk to perimeter was measured at the height of the nest in the horizontal plane on the same side of the trunk as the nest was located.

To determine if House Finch nests were randomly distributed throughout the entire distance from trunk to perimeter, I calculated the distance from trunk to nest as a percentage of the distance from trunk to perimeter. For the trunk to nest measurement, two nests located in vines (*Euonymus* sp.) were not included, because these vines do not have a central trunk.

To determine if House Finch nests were randomly distributed throughout the entire height of the nest tree, I calculated the height of each nest as a percentage of the height of the tree in which it was located.

For orientation measurements, seven nests were excluded because they were either within 1 m of houses which might ameliorate microenvironment effects of nest orientation, or placed within a bifurcated trunk.

Selection for tree genera was examined using

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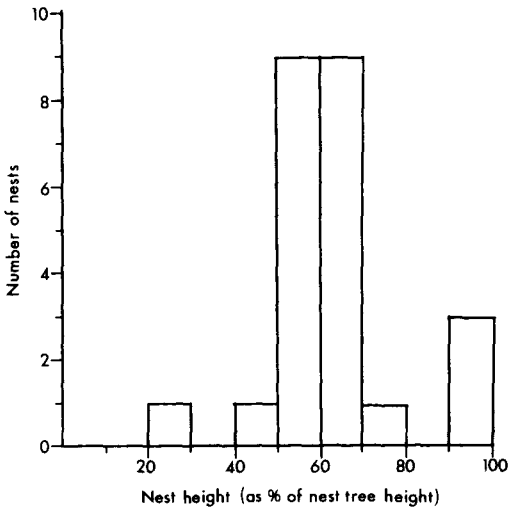

FIGURE 1. House Finch nest height as a percentage of nest-tree height (n = 24).

χ^2 tests, and selection for tree height was assessed with a Mann-Whitney U-test. To investigate whether nest height as a percentage of nest-tree height, and trunk to nest distance as a percentage of trunk to perimeter distance, was randomly distributed, Kolmogorov-Smirnov one-sample tests were used (Conover 1980). A possible preference in nest orientation was assessed with a Rayleigh test (Batschelet 1981).

RESULTS

House Finches nested only in spruce (*Picea* sp.), juniper (*Juniperus* sp.), cedar (*Thuja* sp.), and *Euonymus* sp. The percentage of trees in each genera in the nest-tree and random tree samples is shown in Table 1. Although deciduous trees made up 44% of the random tree sample, I located no nests in them ($P < 0.005$). Spruce and *Euonymus* were preferentially selected for nesting compared to their frequency in the random tree sample ($P < 0.005$ for both). Blue spruce (*Picea pungens*) was preferentially used for nesting relative to its frequency among spruce species in the random tree sample ($P < 0.005$; Table 2).

TABLE 2. Percentage of each spruce species in nest-tree and random tree samples. Only spruce trees are included in the table.

Sample	Tree species		
	Blue spruce (*Picea pungens*)	Norway spruce (*Picea abies*)	White spruce (*Picea glauca*)
Nest trees	93% (13)[a]	7% (1)	0%
Random trees	54% (7)	31% (4)	15% (2)

[a] Number of spruce trees.

The median height of nest trees was 4.48 m (range = 2.44–8.55 m). Nest-tree height did not differ significantly from tree height in the random sample ($P > 0.05$).

Nineteen of 22 (86.4%) nests abutted the main trunk. The trunk to nest distribution differed significantly from the null hypothesis distribution in which nests are spaced randomly from trunk to perimeter ($P < 0.01$).

Eighteen of 24 (75%) nests were located between 50% and 70% of the distance up the nest tree. The distribution of nest heights relative to the heights of their supporting trees is shown in Figure 1. This distribution is significantly different from the null hypothesis distribution where all relative heights would have been equally likely ($P < 0.05$). Thus, House Finches appear to select sites from the mid- to upper regions of the tree.

Nests had an average orientation of 168.7° and an angular deviation of 65.1° (Batschelet 1981), but the distribution of orientations was not significantly concentrated in any particular direction ($P > 0.05$).

DISCUSSION

House Finches in Guelph showed a high degree of consistency in the sites selected for nesting. Thirteen of 24 (54%) nests were located in blue

TABLE 1. Percentage of each tree genus in the nest-tree and random tree samples.

Sample	Tree genera				
	Picea	*Juniperus*	*Euonymus*	*Thuja*	Other[a]
Nest trees	58% (14)[b]	25% (6)	8% (2)	8% (2)	0%
Random trees	12% (13)	19% (20)	1% (1)	5% (5)	64% (69)

[a] Includes pine (*Pinus* sp.), yew (*Taxus* sp.), cherry (*Prunus* sp.), locust (*Gleditsia* sp.), maple (*Acer* sp.), lilac (*Syringa* sp.), apple (*Malus* sp.), pear (*Pyrus* sp.), birch (*Betula* sp.), basswood (*Tilia* sp.), ash (*Fraxinus* sp.), aspen (*Populus* sp.), and honeysuckle (*Weigela* sp.).
[b] Number of trees.

spruce, a species which made up only 6% of the random tree sample. Although conifers made up 55% of the random tree sample, 22 of 24 (92%) nests were located in conifers. The remaining two nests were located in the evergreen vine *Euonymus* sp. Most (86%) nests abutted the nest tree's trunk and most (75%) were located between 50% and 70% of the distance up the nest tree.

I did not collect data on nest-site concealment or protection from wind. However, I observed that certain sites were selected, and suggest that sites were chosen to maximize nest concealment and/or protection from wind, as has been suggested for other species (Reynolds and Knapton 1984, Woodall 1984). Conifers and evergreen vines may provide better concealment for House Finch nests than deciduous trees, particularly for nests initiated before deciduous leaves bud out. Sites abutting the trunk are roughly at the center of the foliage and may therefore provide better concealment than sites further from the trunk. Moreover, such sites are relatively inaccessible to climbing predators such as cats because dense, sharp-tipped needles abut the trunk and probably discourage climbing. In addition, sites abutting the trunk may receive maximum protection from the wind by being at the center of the foliage, and by being physically supported by the trunk and thick proximal ends of branches. Nests placed in tree tops might be visible to avian predators and more susceptible to destruction by strong winds. Nests placed low in trees could be vulnerable to detection from ground-based predators. Sites in the mid- to upper (50% to 70%) regions of nest trees would therefore minimize the probability of detection by predators and provide greater nest stability.

House Finches in Long Island (Elliott and Arbib 1953), the Sonoran Desert (Hensley 1959), California (Thompson 1960), Hawaii (van Riper 1976) and Guelph, Ontario (this study) appear to exhibit nest-site preferences. Woods (1968) and Harrison (1978), however, emphasized variety in the nest sites chosen by House Finches. This variety may be an artifact of the large geographical area over which Woods (1968) and Harrison (1978) described House Finch nesting. This approach could obscure regional preferences. In the northeastern states and Ontario, the House Finch appears to select coniferous trees and evergreen, broad-leafed vines for nesting (Elliott and Arbib 1953, this study). California populations apparently prefer vines and other dense vegetation (Thompson 1960), while birds in the Sonoran Desert appear to select cholla cactus, *Opuntia* sp. (Hensley 1959). Site selection in Hawaii, however, appears to vary between locations (van Riper 1976).

Because of its large geographic range, the House Finch cannot rely on a single genus of plant for nesting. However, throughout their range, House Finches may maximize nest concealment and protection from wind by placing nests in dense vegetation such as conifers and ivy, or inaccessible sites such as the cholla cactus.

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LITERATURE CITED

BATSCHELET, E. 1981. Circular statistics in biology. Academic Press, New York.

BREWER, A. D. 1977. The birds of Wellington County. Guelph Field Naturalist Publication.

CONOVER, W. J. 1980. Practical nonparametric statistics. 2nd ed. John Wiley and Sons, New York.

ELLIOTT, J. J., AND R. S. ARBIB, JR. 1953. Origin and status of the House Finch in the eastern United States. Auk 70:31–37.

HARRISON, C. 1978. A field guide to the nests, eggs and nestlings of North American birds. Collins, New York.

HENSLEY, M. M. 1959. Notes on the nesting of selected species of birds of the Sonoran Desert. Wilson Bull. 71:86–92.

REYNOLDS, J. D., AND R. W. KNAPTON. 1984. Nest-site selection and breeding biology of the Chipping Sparrow. Wilson Bull. 96:488–493.

THOMPSON, W. L. 1960. Agonistic behavior in the House Finch. Part 1: Annual Cycle and display patterns. Condor 62:245–271.

VAN RIPER, C., III. 1976. Aspects of House Finch breeding biology in Hawaii. Condor 78:224–229.

WASHINGTON, A. J. 1976. Introduction to geometry. Cummings Publ. Co., Menlo Park, CA.

WOODALL, P. F. 1984. Nest height of the Red Bishop (*Euplectes orix*). S. Afr. J. Zool. 19:261–265.

WOODS, R. S. 1968. *Carpodacus mexicanus frontalis* (Say), House Finch, p. 290–314. *In* O. L. Austin, Jr. [ed.], Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows and allies. U.S. Natl. Mus. Bull. 237.