

one egg and a successful nest fledged at least one young.

House Wrens (*Troglodytes aedon*) were discouraged from nesting in the bluebird boxes by placing the boxes away from shrubby, brushy areas and thickets. Tree Swallow competition was reduced by placing an additional nest box within 3 - 6 m of each of the nest boxes that was favored by the swallows. House Sparrows (*Passer domesticus*), a rare nest competitor at our sites, were discouraged by removing the nesting material immediately. Wasps (*Polistes sp.*) and their nests were removed from in or under the nest boxes. Where wasps were a persistent problem, petroleum jelly applied to the inside roof of the box discouraged them from attaching their nests.

Bluebird nest and egg characteristics, including laying and hatching dates, clutch size and color, length and width of eggs (measured with dial calipers to nearest 0.1 mm), num-

ber of nestlings and fledglings, and presence of ectoparasites such as blowfly larvae (*Protocalliphora sp.*) were all recorded.

Bluebird nestlings were banded when 8 - 12 days old with a standard aluminum U.S. Fish and Wildlife Service (USFWS) size 1B band and a unique combination of one to three plastic, butt-end type colored leg bands. Adult bluebirds, which were banded in a similar manner, were captured in mist nests or usually, in the nest box, either by placing a hand over the entrance hole or by using a cardboard "trap door" that had been taped to the inside top of the entrance hole and propped up with a stiff grass stem. The trap door, which was tripped when an adult bird entered the box, flapped down over the entrance hole trapping the bird inside. See Read (1990) for an illustration of this method.

To minimize possible desertion of the territory or nest, adults were

not captured until the latter stages of the nesting cycle. Most captures took place near the end of incubation or when very young (1-5 day old) nestlings were present. Banding was not attempted in rainy weather or when the temperature was below normal, and nests were never disturbed for more than 10 minutes at any one time. Adults were banded whenever possible, especially at the Morton Arboretum site, but priority was placed on banding all nestlings at each study site. Individual bluebirds, identifiable by their color bands, were observed with binoculars and spotting scopes to document behavior and dispersal to new sites.

Nest box characteristics and the habitat surrounding each nest box were assessed to try to determine uniqueness of each study site, significant nest site selection factors, and relevance to nesting success. Fifteen variables were measured at each nest box (Table 1). Measurements were taken by a single observer within a five-day period during the nesting season. Entrance hole length and width and height from the ground to the bottom rim of the hole were measured with a tape measure. The direction each box faced was determined with a hand-held compass. Distance to nearest perch (> 1 m in height) and nearest closed canopy cover were measured with a surveyor's measuring wheel, as were distances to the nearest water, road, and building. Distances over 100 m were estimated by pacing. Height of the grass within a 3 m radius of each box was estimated by standing a tape measure parallel to three to five representative stems, measuring the heights in their "natural" positions, then averaging the results. The density of the grass within this same area was estimated as sparse (up to 50% bare ground), high (thick carpet with little or no bare ground visible) or medium (between the two extremes). Dominant grasses were estimated by

Table 1. Nest box characteristics and habitat variables evaluated at three DuPage County, Illinois study sites.

Variables	Units or Categories Recognized
Hole height from ground	Measured in centimeters
Hole length	Measured in centimeters
Hole width	Measured in centimeters
Direction entrance faces	N, NE, E, SE, S, SW, W, or NW
Box mount	Round metal pole, steel T post, wooden post, tree
Predator guard	Grease, wire hole guard, wren guard, or any combination
Distance to perch	Measured in meters
Distance to cover	< 30 m, 30-100 m, > 100 m
Distance to water	< 30 m, 30-100 m, > 100 m
Distance to roads	< 30 m, 30-100 m, > 100 m
Distance to buildings	< 30 m, 30-100 m, > 100 m
Height of surrounding grass	0-30 cm, 30.1-50 cm, 50.1-70 cm, >70 cm
Density of surrounding grass	Sparse, medium, high
Dominant grass	<i>Andropogon sp.</i> , <i>Bromus sp.</i> , <i>Dactylis sp.</i> , <i>Festuca sp.</i> , <i>Phleum sp.</i> , <i>Poa sp.</i> , <i>Sorghastrum sp.</i>
Habitat in which box was placed	Oak savanna; scattered deciduous trees or orchard; grassland bordering woodland; tree-lined fence-row along grassland or pasture; open grassland