Acadian Flycatcher, *Empidonax virescens*, Nest Site Characteristics at the Northern Edge of its Range

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Information on breeding habitat requirements for the Acadian Flycatcher (*Empidonax virescens*) is scarce but important for managing remnant woodlots for this species considered endangered in Ontario. In 1998, we examined nest site characteristics for 11 Acadian Flycatcher nests in southwestern Ontario. Nests were most often placed in trees of diameter at breast height (DBH) class 7.5 cm–15 cm (n = 6, 54.5%) followed by saplings (DBH < 7.5 cm) (n = 4, 36.4%), and one nest was placed in a tree of DBH class 22.5 cm–37.5 cm (9.0%). Overtree canopy height and sub-canopy height averaged 23.0 ± 2.3 m and 4.7 ± 3.8 m, respectively. The majority of the nest sites had a high percent canopy cover (95.0 ± 5.0%) and a low percent ground cover (42.7 ± 28.0%). Percent understory vegetation cover at four height intervals were uniformly below 50% and the highest total basal area was for trees of a DBH between 22.5 cm and 37.5 cm. Maintaining canopy cover in riparian areas may be an important component in promoting Acadian Flycatcher recovery.

Key Words: Acadian Flycatcher, *Empidonax virescens*, Carolinian forest, endangered species, forest management, habitat, nest site, Ontario.

The Acadian Flycatcher (*Empidonax virescens*) is a small forest-interior neotropical migrant and was designated as Endangered in 1994 by the Committee on the Status of Endangered Wildlife in Canada. Its breeding range in Canada is highly restricted to the most southwestern part of Ontario within the Carolinian Forest Zone. During the 19th Century, the Carolinian forest cover was largely cleared for agricultural and industrial purposes. Current regional forest cover of the Carolinian Forest Zone is estimated between 3 and 22% of the total area (Riley and Mohr 1994*). Not including a few larger protected woodlands where breeding Acadian Flycatchers have traditionally been recorded, the remaining breeding habitat for this species is restricted to small, isolated woodlots many of which are subject to selective logging on a regular basis. An analysis of Acadian Flycatcher nest sites therefore represents an important first step towards management of the habitat and a better understanding of the species’ breeding ecology. This study is the first to provide a quantitative description of the nesting habitat for breeding Acadian Flycatchers at the northern limit of the species’ range.

**Study area**

We studied in two wooded ravines (Elgin 42°35'N, 81°15'W, and Kent 42°30'N, 81°45'W, counties) and seven tableland woods (Haldimand-Norfolk County 42°30'N, 80°20'W) of Canada’s Carolinian forest zone in southwestern Ontario. The Elgin County site lies on a western extension of the Norfolk Sand Plain, a rolling tableland deeply incised (12–15 m) by one narrow creek and three main tributaries. The dominant tree cover on this 142 ha site is Sugar Maple (*Acer saccharum*) and American Beech (*Fagus grandifolia*). The woodlot in Kent County is a 44 ha wooded ravine located on an extension of St. Clair Flats Clay Plain dominated by Sugar Maple, American Beech, and Black Maple (*Acer nigrum*). The Haldimand-Norfolk area is situated along the north shore of Lake Erie and comprises an area of 291 ha mainly occupied by agricultural lands with interspersed woodlots. These tableland woods contained tree species such as Sugar Maple, American Beech, White Oak (*Quercus alba*), Red Oak (*Q. rubra*), Tuliptree (*Liriodendron tulipifera*), cherry (*Prunus spp.*), Sassafras (*Sassafras albidum*), Eastern Hemlock (*Tsuga canadensis*), and plantations of Red Pine (*Pinus resinosa*) and Eastern White Pine (*P. strobus*).

**Materials and Methods**

From late May to late June 1998, we surveyed each woodlot for singing Acadian Flycatcher males. We identified a territory as an area in which a male was heard singing more than once. When a territory was identified, we conducted extensive searches for
females or nests three times for each territory. Because Acadian Flycatchers are known to double brood (Wilson and Cooper 1998), after what we assumed to be the first nesting attempt, we searched for second nests within the given territory.

At the end of the breeding season, we sampled 17 habitat variables (Table 1) within a 0.04-ha (11.28-m radius) circular sampling area around each nest. We recorded canopy cover, ground cover, overstory canopy height, sub-canopy height (top canopy of understory trees that were not part of the overstory), tree basal area for five diameter at breast height (DBH) classes, vegetation profile, number of trees with a DBH 7.5 cm for each species (James and Shugart 1970), distance from the nest to the nearest stream, and nest height. Vegetation profile was sampled using a 3-m vegetation profile board (Nudds 1977; Noon 1981) and the percentage cover was estimated at four height intervals (0–0.3 m, 0.3–1 m, 1–2 m, and 2–3 m). We took readings from the board held at 11.28 m from the nest in each cardinal direction. We used the proportion of trees within each species to calculate the Shannon-Wiener diversity index (Barbour et al. 1987: 164). We recorded the DBH of nest tree and tree species used to support the nest.

Results

We located and sampled 11 Acadian flycatcher nest sites (9 first nestings) in two wooded ravines. Seven nests were placed in American Beech (63.6%), two in Sugar Maple (18.2%), and two in hawthorns (Crataegus spp.) (18.2%). Nests were most often placed in trees of DBH class 7.5 cm–15 cm (n = 6, 54.5%) followed by saplings (DBH < 7.5 cm) (n = 4, 36.4%), and one nest was placed in a tree of DBH class 22.5 cm–37.5 cm (9.0%). All nests were placed on low branches at a mean distance of 4.1 ± 3.3 m (n = 7) from a stream, at an average height of 2.6 ± 1.7 m. Nest sites had a high overstory canopy height compared to the low sub-canopy height and in some sites, sub-canopy was absent all together (Table 1). The majority of the nest sites had a high percent canopy cover and a low percent ground cover (Table 1). Percent cover at the four height intervals was uniformly below 50% and the highest total basal area was for trees of DBH between 22.5 cm and 37.5 cm, followed by trees of DBH 52.5 cm, and of DBH between 37.5 cm and 52.5 cm, all DBH classes representing larger trees.

Discussion

Acadian Flycatchers occupied breeding sites within tall even-aged wooded ravines characterized by very low or absent understory vegetation and a heavy overstory canopy cover. The nests were placed in trees with a small DBH and on average 3 m above the ground near a stream.

Quantitative accounts of nest site characteristics for Acadian Flycatchers are primarily limited to nest tree species and nest height (Bent 1963; Mumford 1964; Walkinshaw 1966; Wilson and Cooper 1998). Our mean nest height (2.6 ± 1.7 m) was significantly lower than the means of both Michigan (x = 4.0 m, n = 37, t = 4.96, P = 0.001) and Arkansas nests (x = 6.5 m, n = 511, t = 4.91, P = 0.001) (Mumford 1964; Wilson and Cooper 1998) most likely as a result of our smaller sample size. Mumford (1964), through detailed observations of the species’ productivity in Michigan, noted that although nests were most often placed in Witch Hazel (Hamamelis virginiana), a wide variety of trees were used to support the nest. In a similar study in Michigan, out of 140
nests, most \( n = 63 \) was placed in American Beech (Walkinshaw 1966). In Arkansas, Acadian Flycatchers appeared to avoid certain tree species within the territory (e.g., Green Ash, *Fraxinus pennsylvanica*) and favored other species (e.g., Sugarberry, *Celtis laevigata*) not in relation to their availability. However, reproductive success was not related to tree species used and Acadian Flycatchers thus appeared to select nesting trees based on their structure (Wilson and Cooper 1998). Our results are consistent with the latter observations. Although American Beech was the most frequently used nesting tree, Acadian Flycatchers used trees close to a stream, with low sloping branches on which they would build their nest. Walkinshaw (1966) and Wilson and Cooper (1998) also report that nests were consistently placed at the end of a branch over an opening such as shaded trails, sloughs, or streams. The association of Acadian Flycatcher nests with streams is poorly understood.

The use of woodlots in Ontario with a heavy overstory canopy by breeding Acadian Flycatchers is similar for nests in Arkansas (Wilson and Cooper 1998) where canopy cover measured directly above the nest was high (94%). Perhaps proximate factors, such as insect abundance or microclimate, are influenced by a heavy overstory canopy. This appears to be an important structural characteristic to consider when managing woodlots used by Acadian Flycatchers, as increased logging will likely contribute to the thinning of the overstory canopy.

Detailed species-specific studies on nesting habitat requirements as reported here are essential for proper forest management. Many species sharing a nesting woodlot select for different habitat characteristics, and an effective logging prescription must include a combination of all requirements. For example Hooded Warblers (*Wilsonia citrina*) and Acadian Flycatchers frequently use the same nesting woodlots but Hooded Warblers require dense understory vegetation (Kilgo et al. 1996; Bisson and Stutchbury), whereas our study shows that Acadian Flycatchers chose sites with relatively no ground cover. Our study represents the first step in identifying habitat characteristics used by nesting Acadian Flycatchers in Canada and provides a good baseline for further ecological studies assisting the conservation of this species.

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