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SPRING MIGRATIONS OF ALDER AND WILLOW FLYCATCHERS IN SOUTHERN ONTARIO

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Abstract.—The spring migrations of Willow Flycatchers (*Empidonax traillii*) and Alder Flycatchers (*E. alnorum*) at Long Point, Ontario peaked in early June with median dates for both species on 2 June. Although timing of occurrence of the two species did not differ significantly, Willow Flycatchers tended to have a somewhat earlier, longer migration period, with the middle 90% of the records occurring 20 May–9 June, compared with 30 May–10 June for Alder Flycatchers. Wing lengths indicated that male Willow Flycatchers migrated earlier in spring than females, and the same was probably true of Alder Flycatchers. Molt was negligible. Willow Flycatchers, Alder Flycatchers and Yellow-bellied Flycatchers (*E. flaviventris*) migrated almost simultaneously, but Least Flycatchers (*E. minimus*) arrived an average of 15 d earlier than the other three species.

MIGRACIÓN PRIMAVERAL DE *EMPIDONAX TRAILLII* Y *E. ALNORUM* EN LA PARTE SUR DE ONTARIO

Sinopsis.—El pico de la migración primaveral de *Empidonax traillii* y *E. alnorum* a través de Long Point, Ontario ocurre temprano en junio con fechas medias (2 de junio) similar para ambas especies. Aunque no hay diferencia significativa en el tiempo de partida entre ambas especies, el 90% de los informes de *E. trailii* tiende a indicar un periodo de migración más largo y temprano (20 de mayo al 7 de junio) que el de *E. alnorum* (30 de mayo al 10 de junio). En largo del ala en los machos de *E. traillii* es indicativo de que estos migran más temprano en la primavera que las hembras, y es probable que lo mismo aplique a la otra especie. La muda en estas aves resultó ser vitualmente imperceptible. Las dos especies antes mencionadas al igual que *E. flaviventris* migran casi simultaneamente, pero *E. minimus* llega un promedio de 15 días antes que las otras tres.

The timing of the spring migration of Least Flycatchers (*Empidonax minimus*) and Yellow-bellied Flycatchers (*E. flaviventris*) has been documented at Long Point, Ontario (Hussell 1981, 1982) and elsewhere (Ely 1970, Sealy and Biermann 1983, Sealy et al. 1987). Two other species in the genus *Empidonax,* the Alder Flycatcher (*E. alnorum*) and the Willow Flycatcher (*E. traillii*), are common migrants in southern Ontario, but their migrations are more difficult to study because of the great morphological similarity of these species. Prior to Stein's (1963) research they were considered conspecific and were known as Traill's Flycatcher (American Ornithologists' Union 1973, 1983). (As suggested elsewhere (American Ornithologists' Union 1973), I will use the name "Traill's Flycatcher" when data for the two species are considered together or when individual birds were not identified as Alders or Willows.)

In eastern North America, the Willow Flycatcher breeds in relatively open habitats in the northern United States and southern Canada and has gradually extended its range northward in this century. The Alder Flycatcher has a more northerly distribution. It is primarily a bird of the boreal forest region of Canada and extreme northeastern United States,

but its range overlaps the northern margin of the Willow Flycatcher range and extends southward in the Appalachian Mountains to western Maryland, Tennessee and North Carolina (American Ornithologists' Union 1973, 1983; Godfrey 1986; Stein 1963).

Because Willow and Alder Flycatchers are distinguished primarily by their songs (Stein 1963), relatively little is known about their migrations. One study indicated that spring migration of Alder Flycatchers in Manitoba occurs in late May and early June (Sealy et al. 1987) and this is consistent with Traill's Flycatcher spring migration in Kansas (Ely 1970). No studies have documented the migration periods of Willow Flycatchers. An important objective of studies of *Empidonax* migrations at Long Point was to describe the timing of migration of these two similar species. I used morphological criteria proposed by Stein (1963) to distinguish the two species during migration. This paper presents the results for spring migration.

METHODS

Field methods are described briefly here (further details may be found in Hussell 1981). Flycatcher migration was studied at the Long Point Bird Observatory's field station at the eastern end of Long Point, on the north shore of Lake Erie during April–June, 1966–1968. Alder Flycatchers do not breed on Long Point nor has breeding been confirmed on the adjacent mainland (McCracken et al. 1981, Prescott 1987a), so I assumed that any found on the Point were migrants. Willow Flycatchers breed on the mainland and sparsely at the base of the point, about 27–38 km west of the study area but not elsewhere on Long Point (McCracken et al. 1981, Prescott 1987b), so the possibility of encountering wandering birds rather than true migrants is slightly greater for this species. Each day (15 April–15 June) migrants were captured in Heligoland traps and/or mist nets and the numbers of each species (and "unidentified" *Empidonax*) present in a defined area (covering approximately the easternmost 1 km of Long Point) were estimated. Less intensive observations (with little trapping and netting) continued daily for the remainder of June.

Captured birds were identified as Traill's Flycatchers as described in Hussell (1981). They were banded, wing chord length was measured to the nearest 0.1 mm, the skull was examined for pneumatization and the bird was weighed. In addition dial calipers were used to measure to the nearest 0.1 mm the bill length from the anterior edge of the nostril to the tip (often the average of separate measurements from each nostril) and the distances from the tip of the closed wing to the tips of primaries 10, 6, and 5 (called $T10$, $T6$, and $T5$, respectively). A sample of birds was examined for body molt and a composite body molt score with a possible range of 0 (none)–3 (heavy) was determined.

Stein (1963) found that the equation $B = 7.95 + 0.15\ I$ correctly separated about 91% of Willow and Alder Flycatchers. Stein defined I as (the length of the longest primary minus the length of the sixth primary)

minus (the length of the fifth primary minus the length of the tenth primary), which is equal to $T6 + T5 - T10$. Willow Flycatchers tend to have lower I values (indicating more rounded wings) and longer bills than Alder Flycatchers. B is calculated by inserting the measured I into the equation. Birds with bill lengths greater than B are Willow Flycatchers and those with bills shorter than B are Alder Flycatchers. As this equation did not completely separate the two species (Stein 1963), I attempted to reduce errors by designating as unidentified those birds whose bill lengths were within 0.15 mm of B.

Estimated totals of Alder and Willow Flycatchers present in the sampling area each day were calculated by prorating the daily estimated totals of all identified and unidentified *Empidonax* in proportion to the numbers of Alder, Willow, Least and Yellow-bellied Flycatchers in the banded samples (Hussell 1981). For this purpose each unidentified Traill's Flycatcher in the banded sample was counted as one-half an Alder Flycatcher and one-half a Willow Flycatcher. Five-day moving averages, medians and percentiles were calculated as described previously (Hussell 1981).

Traill's Flycatchers were banded in 1969–1980 at the same location as the 1966–1968 study (station No. 1) and at a second station (No. 2), 19 km west of station No. 1, in the years 1966–1980, but the measurements needed to identify Alder or Willow Flycatchers usually were not taken. As trapping and netting coverage during the migration seasons was incomplete at one or both stations in many years, timing of migration of these Traill's Flycatchers was determined by calculating the average number of birds per day of coverage for each station for arbitrary 5-d periods.

RESULTS

The sample of 80 trapped spring migrants in 1966–1968 consisted of 43 Willow Flycatchers, 20 Alder Flycatchers and 17 birds that could not be assigned to species (see fig. 1 in Hussell 1990).

There was a tendency for Willows to arrive earlier than Alders (Fig. 1). The first Alder was trapped on 25 May, whereas eight Willows were captured before that date, the earliest on 19 May. The median date for total birds in 1966–1968 was 2 June for both species (Fig. 2), but this is partly an artifact of the exceptionally large numbers of both species present on 2 June 1968 (estimated totals of 77 Alders and 69 Willows). The middle 90% of Willow Flycatchers occurred in a 20-d period 21 May–9 June, whereas the equivalent period for Alders was a mere 12 d, 30 May–10 June (Fig. 2). Despite these apparent differences in the timing of migration, the overall distribution by date of trapped Willow and Alder Flycatchers (excluding unidentified birds) did not differ significantly, perhaps because sample sizes were small (Fig. 1, Kolmogorov-Smirnov 2-sample test, $P = 0.195$).

Other banding data collected over a 15-yr period (Fig. 3) show a similar pattern of migration of Traill's Flycatchers with medians on 2 June and 28 May at stations Nos. 1 and 2, respectively, indicating that the 1966–

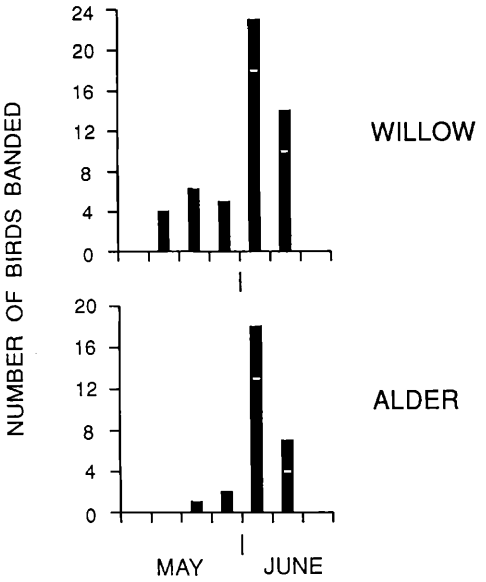

FIGURE 1. Numbers of Willow Flycatchers and Alder Flycatchers banded during spring migration at Long Point in successive 5-d periods 12–16 May through 11–15 June, 1966–1968. Number of birds is combined total for the 3 yr. Sections of columns above the horizontal lines represent unidentified birds, each assigned as 0.5 to Willow Flycatcher and 0.5 to Alder Flycatcher (see text).

1968 results from station No. 1 were not atypical. In all years, the migration was essentially complete by 10 June, the date on which the last trapped birds were recorded (Figs. 1 and 3). No Traill's Flycatchers were captured in 17 d of banding at station No. 1 from 11 to 25 June, and in 1966–1968 only 2 *Empidonax* were observed there after 15 June, one on 16 June 1967 and another (a Least Flycatcher) on 29 June 1968. The earlier median at station No. 2 may partly reflect reduced coverage in early June: an average of only 1.7 d per year in the first 10 d of the month. By far the largest concentration in any year occurred at station No. 1 on 2 June 1968 when 7 Willows, 6 Alders and 4 unidentified Traill's Flycatchers were banded.

Stein (1963) showed that there is sexual dimorphism in wing chord length in both species and that on average Alder Flycatchers have slightly longer wings than Willow Flycatchers. Wing lengths are plotted for the two species by five-day periods in Fig. 4. As with Least and Yellow-bellied Flycatchers (Hussell 1981, 1982), the evidence suggests that males tend to migrate earlier than females. For Willow Flycatchers, date of capture and wing length were negatively correlated (Kendall's $\tau = -0.268$, $P = 0.007$, $N = 43$). In Alder Flycatchers, there was a similar, but non-significant relationship (Kendall's $\tau = -0.185$, $P = 0.142$, $N = 20$). Wing lengths are consistent with the hypothesis that most Willow Flycatchers

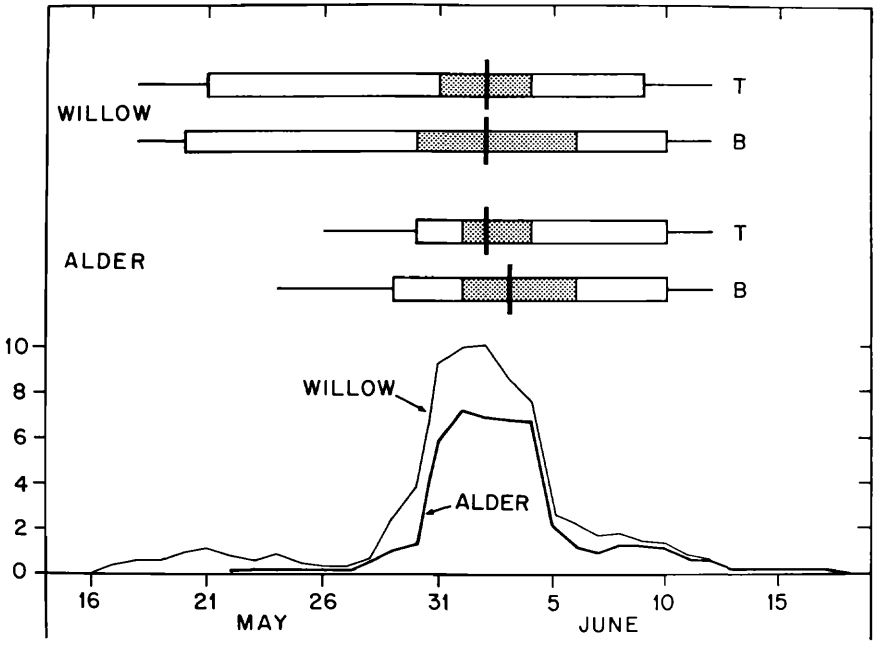

FIGURE 2. Spring migration of Willow and Alder Flycatchers at Long Point, 1966–1968. The lower section shows 5-d moving averages of the daily estimated totals for each species. The bar diagrams in the upper section show median dates (vertical bars), middle 50% and 90% (stippled and open sections of horizontal bars) and middle 98% (horizontal lines) of the daily estimated totals (T) and banded samples (B) for each species.

captured before 27 May were males, those measured between 27 May and 5 June were males and females in approximately equal numbers, and those after 5 June were mainly females. There was a similar pattern in Alder Flycatchers, but Alder males arrived later than male Willow Flycatchers. Two of the three Alders captured before 1 June were definitely males and there appears to have been a slight preponderance of males in the 1–5 June sample. Most Alder Flycatchers captured after 5 June were probably females.

Total numbers differed greatly among years. Spring bird-days (sum of the daily estimated totals over all days) in 1966–1968 were 17.8, 21.4 and 176.6 for Willow Flycatchers, and 12.3, 22.7 and 104.5 for Alder Flycatchers, respectively.

Among 19 Alder Flycatchers, 40 Willow Flycatchers and 17 unidentified birds examined, 1 Alder and 1 Willow (2.6% of the total) had small unpneumatized areas in the skull. This indicates that pneumatization is essentially complete by the time of the first spring migration and may be safely used to age birds in the fall.

There was essentially no molt in spring migrants. Only one of 9 Alder Flycatchers, and 1 of 31 Willow Flycatchers examined between 20 May

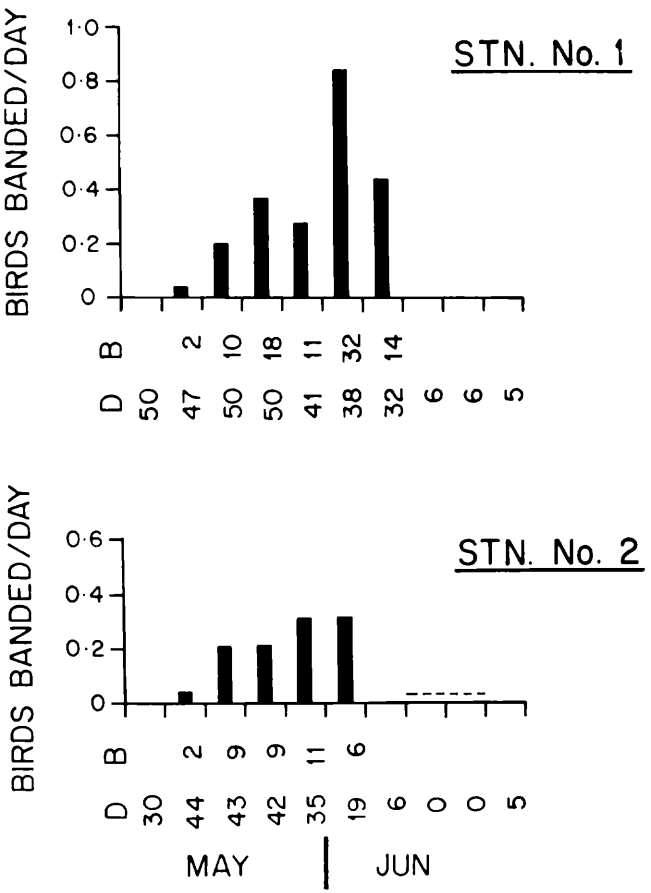

FIGURE 3. Average number of Traill's Flycatchers banded per day during spring migration at Long Point in successive 5-d periods from 7–11 May through 21–25 June. Upper: station No. 1, 1969–1980. Lower: station No. 2, 1966–1980. Broken horizontal line = no data. D = days of coverage, B = Traill's Flycatchers banded for each 5-d period.

and 10 June (1967 and 1968) showed any sign of body molt. Composite body molt scores were 0.1 and 0.2, respectively. None of the 10 unidentified Traill's Flycatchers examined was molting.

DISCUSSION

Alder and Willow Flycatchers were very much more abundant at Long Point in 1968 than in 1966 and 1967, a pattern that was not shared by the Yellow-bellied Flycatchers migrating at the same time. (In this section, all results discussed for the Least and Yellow-bellied Flycatchers at Long Point are from Hussell 1981, 1982.) Although the largest numbers of Least Flycatchers in spring also occurred in 1968, differences among

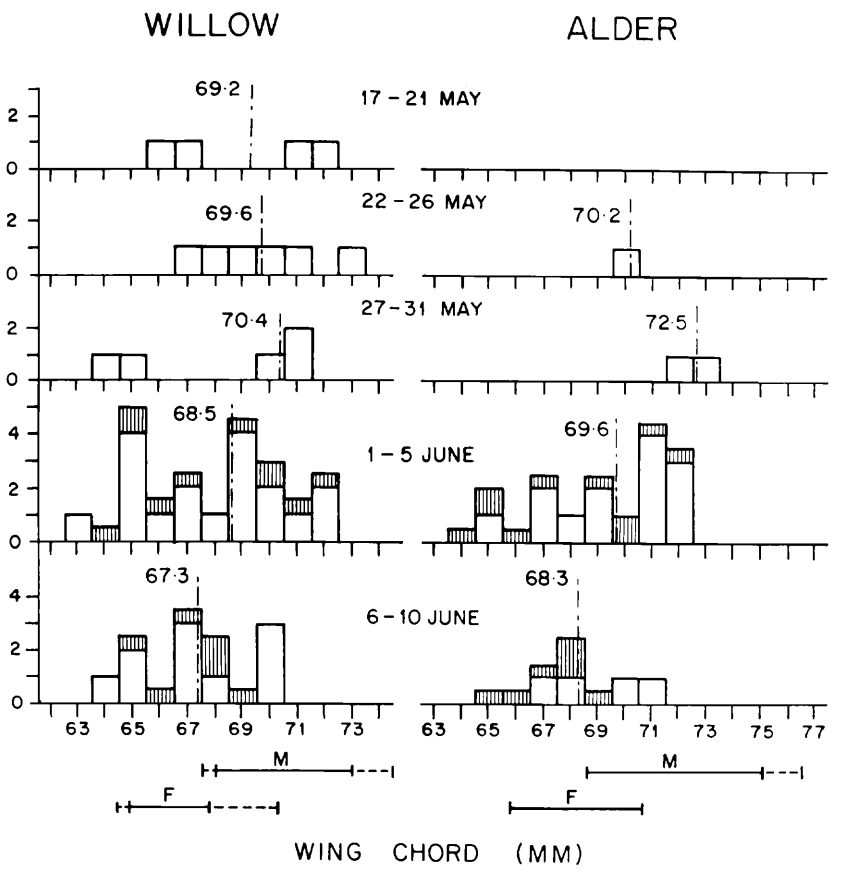

FIGURE 4. Distribution of wing lengths of banded Willow and Alder Flycatchers in relation to date, 1966–1968. Open columns = birds identified as Willow or Alder Flycatchers; stippled columns = unidentified birds assigned as 0.5 to each species (see text). Vertical broken lines indicate median wing lengths. Solid horizontal lines at the bottom of the figure indicate ranges of wing chords for eastern males (M) and females (F); broken lines show additional range for western birds; both according to Stein's (1963) data.

years were not as great as in Alder and Willow Flycatchers. Over the 3 yr, there was a moderate preponderance of Willows over Alders (Fig. 4; Willows 215.8, Alders 139.5 bird-days). Annual differences in numbers of flycatchers may reflect the influence of weather conditions on migration, changes in population sizes, or both.

With median dates of occurrence on 2 June, the spring migrations of Alder, Willow and Yellow-bellied Flycatchers at Long Point were almost simultaneous, but Least Flycatchers migrated about 15 d earlier than the other three species (Table 1). In all four species males migrated earlier than females, but this was least certain in Alder Flycatchers. There was essentially no molt in spring migrants of any of the four species.

TABLE 1. Timing of spring migration of four species of *Empidonax* at Long Point, Ontario, 1966–1968.

Species	Percentile dates[a]		
	5th	50th	95th
Least[b]	11 May	18 May	1 June
Willow	21 May	2 June	9 June
Yellow-bellied[c]	22 May	2 June	9 June
Alder	30 May	2 June	10 June

[a] From 5-d moving averages of daily estimated totals for each species.
[b] From Hussell (1981).
[c] From Hussell (1982).

The only other quantitative information on the migrations of Alder or Willow Flycatchers is that of Sealy et al. (1987) for five spring migrations of Alder Flycatchers in Manitoba. Their data indicated that the median date for spring migrants was in the period 31 May–4 June, and that the 5th and 95th percentiles occurred in the periods 26–30 May and 10–14 June. Despite the higher latitude of the Manitoba locality, these results correspond very closely to those at Long Point (Table 1). Sealy et al. (1987) demonstrated that longer-winged birds, presumably mostly males, migrated significantly earlier than shorter-winged birds, which is in accordance with the non-significant trend noted at Long Point.

Spring migration of Traill's Flycatchers at latitude 38°50′N in west-central Kansas (where neither Alders nor Willows breed) spanned the period 12 May–12 June, but 87% of 115 records were in the period 20–25 May (Ely 1970). This peak is presumably the precursor of the similar strong peak in numbers of Alder Flycatchers about 10 d later at 50°11′N in Manitoba (Sealy et al. 1987).

Yellow-bellied and Willow Flycatcher migrations were almost identical in timing at Long Point, but there was some indication that Alder Flycatchers arrived later and had a shorter migration than the other two species. Later arrival of Alders relative to Willows is consistent with Stein's (1963) findings. Late spring arrival of Alder and Yellow-bellied Flycatchers is not unexpected in view of the northerly location of their breeding grounds, but Willow Flycatchers are also late migrants relative to most other species of northward migrants, despite their more southerly breeding distribution. Least Flycatchers arrive about 15 d earlier to a breeding range which broadly overlaps those of the other species. These differences among four morphologically similar flycatchers indicate that the timing of spring migration is not determined solely by the location of the breeding range. Rather, they suggest that the migration strategies of these flycatchers may have evolved, at least in part, as a consequence of specific ecological requirements in the habitats occupied by each species in the breeding season.

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