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Counting Warblers: A Timetable for the Spring Songbird Migration Through Saint Louis

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The John F. Kennedy Memorial Forest in the southwest corner of Forest Park in the city of Saint Louis, Missouri, is one of the best traps for migrant passerines in the St. Louis area. During the spring migration, the density and species diversity of migrant passerines in the ~80-acre forest is many times greater than that of any equivalent area of land outside the city. The main portion of the JFK Forest contains many large trees that are ideal feeding areas for those migrants that prefer treetops. There is also a dense understory for the skulkers. Recent (1997) improvements in the trails by the Missouri Department of Conservation have made the area more accessible to birders. Birding is likely to improve over the next few years as newly planted trees and shrubs grow larger and plans are implemented to construct ponds in the forest, establish a savanna adjacent to the forest, and remove Valley Drive, which currently passes through the heart of the forest.

For 20 spring seasons (1979–1998) I have kept records of the numbers of migrant birds that I have seen or heard in the JFK Forest during morning birding visits in April and May. From these records I have constructed the Migration Timetable to be found at the end of this article. The Timetable is a guide to the number of individuals of each species that birders can expect to find on visits to the JFK Forest on a given date in spring. Within the limitations to be discussed later, it also indicates more generally when various species migrate through the St. Louis area in spring as well as their relative abundances. This article is an update of one I prepared nine years ago after eleven years of observations (*Nature Notes*, Vol. 62, no. 3, March 1990).

Method

Starting in late March and continuing through the end of May, I make regular visits to the JFK Forest. Most years I manage to make 30–40 visits (Fig. 1). I usually begin birding sometime between 7 and 8 a.m. Early in April and late in May, when there are few birds to distract me, I typically bird for about 1 hour. During the height of the migration in early May, I average about 2–2.25 hours a visit, though I have stayed as long as 4 hours on weekends if the birding is good. I record of the duration of each visit to the nearest quarter hour. The area I census is bounded by Skinker Blvd. on the west, the golf course and art museum on the north, the zoo parking lot on the east, and Wells Drive on the south. I have regularly birded the area south of Government Drive, even before the improvements made by the Missouri Department of Conservation. I try to cover as much of the area as possible during each visit. Early and late in the season I usually walk about 2–2.5 miles but during the peak of the migration I walk 2.5–3 miles. In order to cover the route in the time I allot, I move along more quickly than most other birders I encounter. Many of my visits have been on mornings of light drizzle or immediately following or preceding heavy rain. Probably 90% of the time I am birding alone.

I count and record birds one at a time. I probably count conservatively in that I make an effort not to double count birds as I cross and parallel my previous route. Probably 80% of my observations are by ear only. In order to get a better record of the migration times for the rarer species, I have occasionally included observations made by others if they occurred on a day that I did not visit the Forest; far less than 1% of the observations reported here are of this type.

Most species listed in the Timetable are passerines, but cuckoos, nightjars, hummingbirds, and woodpeckers are also listed. In general, I do not count the common resident species (jays, titmice, cardinals) for which numbers do not change much throughout the period, although I count all the woodpeckers and nuthatches because some species of these groups are migrants. In part because I never expected to be doing this for 20 years, I never got into the habit of counting certain common species that are, in fact, more abundant during the spring migration than in winter or summer (robins, grackles, cowbirds). Although I keep records for ducks, herons, and raptors, these are not included in the Timetable.

Three factors (at least) limit the usefulness of the data I have collected for drawing conclusions about long-term trends (below). First, I have not kept record of weather conditions. Second, my coverage from year to year has not been consistent (Fig. 1). A couple of years (1984, 1996) I missed up to 13 consecutive days because I was out of town; other years (1979, 1991) I just birded less frequently. Finally, my high-frequency hearing (>3000 Hz) has degraded over the last few years and I don't observe as many

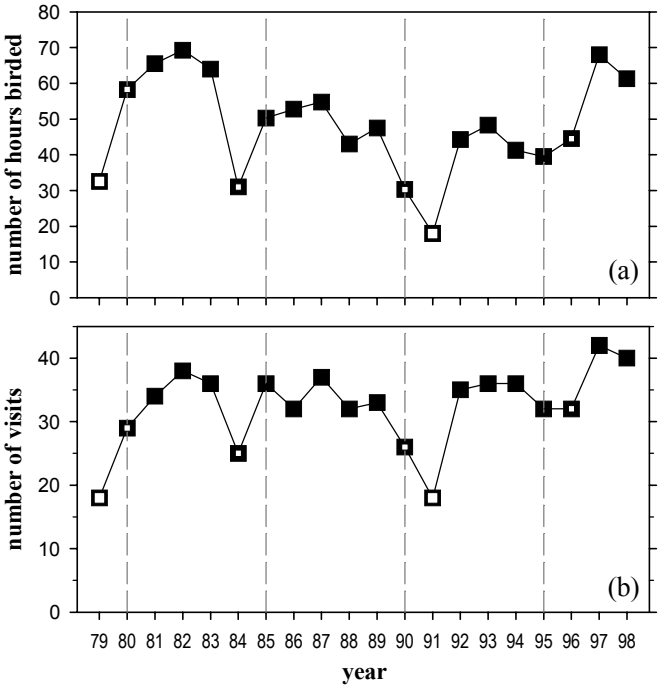

Figure 1. Number of hours birded (a) and number of visits made (b) each year during April and May. Filled points (■) represent years of "good" coverage, i.e., the number of visits was high and uniform throughout the period; ◘ = adequate coverage; □ = poorest coverage (e.g., few visits, large time gaps).

birds with high-pitched songs or calls (e.g., Blackpoll and Blackburnian Warblers) as I used to.

Timetable Description

The Timetable presents the probability of seeing a particular species on a given date in April and May. It is not an exact report of how many of each species I have actually observed because I've smoothed out some bumps and filled in some gaps in order to make it more useful and less confusing. The main portion of the Timetable has 61 columns, one for every day in April and May. These are grouped into blocks of five days to make it easier to locate specific dates. The top and bottom of each column are labeled vertically with the day of the month (e.g., a 1 over a 2 means the 12th of

April or May). The last column (labeled N) lists the total number of individual birds upon which the row of information is based. These range from 1 for Chuck-will's widow, Willow Flycatcher, and Vesper Sparrow to 6103 for Yellow-rumped Warbler. The column labeled Y is the number of years I have observed the species at least once. To save space, I have abbreviated many species names. The row "*emp.* sp?" represents all *empidonax* flycatchers that I could not identify by species. This is followed by a row labeled "*emp.* total," which combines all identified and unidentified *empidonax* flycatchers. Similarly, the row labeled "cuckoo tot." includes observations from the two previous rows plus any cuckoos I could not specifically identify. In total, the Timetable includes 106 species plus 1 hybrid ("Brewster's Warbler").

Some of the migrants that arrive in spring stay to breed in the JFK Forest or elsewhere in Forest Park. I have indicated these by a 2-digit code in the two columns preceding the species name. This information was obtained largely in conjunction with my participation in the Missouri Breeding Bird Atlas project.

Code Values. The code values in the body of the Timetable require explanation because they are an unusual way to present abundance data. The problem is how to present in a useful manner information for Yellow-rumped Warblers, which average

Table 1. Approximate order in which migrants appear in the JFK Forest, with approximate peak date*.

April	4	Fox Sparrow	May	3	Yellow-throated Vireo	May	8	Ovenbird
	5	Winter Wren		3	Summer Tanager		8	Scarlet Tanager
	7	Golden-crowned Kinglet		3	Orchard Oriole		9	Eastern Kingbird
	13	Louisiana Waterthrush		*4*	Cerulean Warbler		9	Veery
	14	Hermit Thrush		4	Lincoln's Sparrow		10	Gray Catbird
	16	Brown Thrasher		5	Warbling Vireo		11	Least Flycatcher
	16	American Goldfinch		5	Nashville Warbler		11	Blackburnian Warbler
	18	Ruby-crowned Kinglet		5	Northern Parula		12	Yellow-billed Cuckoo
	20	Pine Warbler		5	Northern Waterthrush		12	Chestnut-sided Warbler
	20	Field Sparrow		5	Kentucky Warbler		12	Blackpoll Warbler
	21	Swamp Sparrow		5	Blue Grosbeak		13	Magnolia Warbler
	22	Blue-gray Gnatcatcher		6	Wood Thrush		14	Ruby-throated Hummingbird
	22	Yellow-throated Warbler		6	Cape May Warbler		14	Philadelphia Vireo
	24	Red-breasted Nuthatch		6	Black-throated Green Warbler		14	Bay-breasted Warbler
	27	Worm-eating Warbler		6	Rose-breasted Grosbeak		*16*	Black-billed Cuckoo
	28	Yellow-rumped Warbler		7	Gray-cheeked Thrush		16	American Redstart
	28	Prairie Warbler		7	Golden-winged Warbler		17	Red-eyed Vireo
	29	Orange-crowned Warbler		7	Black-and-White Warbler		17	Wilson's Warbler
	28	Chipping Sparrow		7	Common Yellowthroat		18	Great Crested Flycatcher
	29	White-throated Sparrow		7	Yellow-breasted Chat		*18*	Black-throated Blue Warbler
	30	Prothonotary Warbler		7	Indigo Bunting		19	Olive-sided Flycatcher
May	*1*	Hooded Warbler		7	White-crowned Sparrow		19	Canada Warbler
	2	House Wren		7	Northern Oriole		20	Mourning Warbler
	2	White-eyed Vireo		8	Swainson's Thrush		21	Connecticut Warbler
	2	Blue-headed Vireo		8	Bell's Vireo		23	Acadian Flycatcher
	2	Blue-winged Warbler		8	Tennessee Warbler		25	Eastern Wood-Pewee
	2	Palm Warbler		8	Yellow Warbler		27	Yellow-bellied Flycatcher

* For most of the species listed, about 50% of the individuals seen in the JFK Forest are seen between 5 days before and 5 days after the listed date, on average. For some species there is no distinct peak; for these species the approximate date on which half the migrants have passed through the area is listed in italics.

over 20 birds per visit in late April (high of 60), on the same scale as Willow Flycatcher, which I have found only once in 20 years. The code values range from 1 to 9 and the key is given at the bottom of the Timetable. The mathematically inclined will note that the scale of code values is roughly logarithmic; a difference of 1 in code values means about a factor-of-two difference in abundance. A blank means that I have never observed the species on that date. Some dates on which I have never observed a given species have a code value of 1, but only if I have observed one or more individuals on nearby dates (the gap filling I mentioned earlier). For every species, however, the first and last non-blank columns represent the earliest and latest dates during April and May that I have observed the species.

As an example of how to interpret the Timetable, for Gray Catbird on May 2 the code value is 5 which, according to the key, indicates that one should expect to find "1 to 2 birds/visit." What that means is that over 20 years the average number of catbirds I've seen and heard on ~2-hour visits on May 2 and a few days on either side is between 1 and 2 (actually, it's 1.7). The fractional code values (1 through 4) are more difficult to interpret. For example, for Rusty Blackbird during the first 5 days of April and for Cape May Warbler the first 5 days of May, the code values are 3 or 4. This indicates that one should be able to find an average of about 0.4 birds per visit. I have, in fact, found a few fractional birds that were the victims of hawks, but in this case the fraction means that 5 visits in one year should yield 2 birds or 20 visits over 4 years should yield a total of about 8 birds. For Cape May Warbler in early May, you will probably find 0, 1, or 2 birds on each visit, but 5 visits, even in the same year, will likely net you a total of only 2 birds. That's not true for Rusty Blackbird, however. I've only seen the species one year (1992), when there were about 6 birds on each of several visits ($6/20 = 0.33 \approx 0.4$) because the species usually occurs in flocks. In general, the code values reflect averages for visits on a given date over many years better than they do visits over consecutive days in a given year.

Interpretation. The Timetable allows one to pick the days most likely to produce a particular species in spring as well as to gauge the relative likelihood of finding it compared to other species. Some species consistently arrive early in spring and others consistently arrive late. Peak dates are evident from the Timetable, but are presented chronologically in Table 1. Keep in mind, however, that Table 1 and the Timetable represent a 20-year average. For any given year the 'pulse' of birds of a given species will usually be narrower than implied by the Timetable and may occur earlier or later. This is shown in Fig. 2 for Tennessee Warbler. In 1987 the peak occurred several days before the average peak date of May 8, whereas in 1980 it occurred nearly a week after. However, the relative *order* in which migrants appear is usually the same every year. Tennessee Warblers always peak after Palm Warblers and before Magnolia Warblers (Table 1).

Also important to note is that the Timetable is for *migrant* birds. Nearly any species listed that breeds in the St. Louis area (e.g., Blue-winged Warbler) can be found locally on its breeding grounds a week or

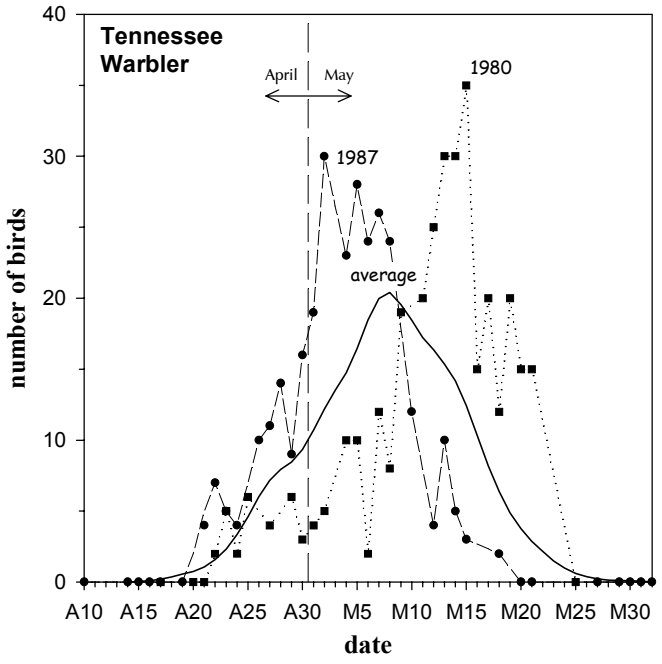

Figure 2. Daily numbers of Tennessee Warblers observed during April and May in 1980 and 1987 and the average number observed for the 20-year period 1979-1998, inclusive (solid line).

more before it is first seen in migrant traps like the JFK Forest or Tower Grove Park. Similarly, many species that have disappeared from the JFK Forest by the end of May can be found in June elsewhere as breeders. This includes House Wrens and Warbling Vireos that breed elsewhere in Forest Park in more suitable habitat. Some species that are relatively common as breeders in proper habitat outside the city (e.g., Yellow-throated and Prothonotary Warblers) are only rarely seen in the JFK Forest as migrants. Thus the Timetable may not represent well for the St. Louis area as a whole the arrival dates or relative abundances of species that breed locally.

With those caveats, the *dates* in the Timetable and Table 1 are probably applicable elsewhere in the city, such as in Tower Grove Park. However, it is likely that the *relative abundances* (code values) of species inferred from the Timetable are different for Tower Grove Park because of the differences in habitat. Thrushes and certain species of sparrows are often mentioned as being more evident in Tower Grove Park (e.g., I have never seen a Clay-colored Sparrow in the JFK Forest although they are seen almost every year in Tower Grove Park).

Other Species

In total, I have observed 158 species of birds in, over, and around the JFK Forest during my spring birding visits. In addition to the resident passerines and species listed in the Timetable, these include (1) migrants that are often seen flying high over the Forest but which are not principally forest species (cormorants, herons, egrets, geese, hawks, shorebirds, gulls, swifts, swallows), (2) migrant non-passerines that sometimes rest in or feed in or over the JFK Forest (Green Heron, both night-herons, Turkey Vulture, Mississippi Kite, Sharp-shinned Hawk, Cooper's Hawk, Broad-winged Hawk, Red-tailed Hawk, American Kestrel, and Merlin), (3) some park-resident nonpasserines (Wood Duck, Mallard, Eastern Screech-Owl, Great Horned Owl, all of which have bred in the Forest), (4) resident birds of the St. Louis area that are not usually found in the JFK Forest, but which occur there some years (Wild Turkey, Northern Bobwhite, Barred Owl, Pileated Woodpecker, Eurasian Tree Sparrow), and (5) birds that don't belong there at all (Peacock – twice!).

The spring migration is not usually noted for out-of-range rare passerines, but a few observations from the JFK Forest that are not in the Timetable are noteworthy. On

May 12, 1982, Carmen Patterson and Dave Jones identified a Black-headed Grosbeak and on May 10, 1984, several other birders and I enjoyed a Lazuli Bunting. On March 29, 1998, much earlier than expected based on the Timetable, Ken Cohen and I saw an Orange-crowned Warbler that I believe to have been the *lutescens* (Pacific coast) subspecies.

Long Term Trends, and Some Opinions

Several years ago a birder who has birded in St. Louis for a long time said to me, "There just aren't as many Black-throated Green Warblers as there used to be. When I started birding, I would often see 20–30 in a day." I have often heard others voice similar sentiments.

These impression may be correct, but I'm not as pessimistic. Impressions don't always represent the facts well and I suspect birders have selective memory about good birding days of the past. We all remember those few special days when the warblers were as thick as Christmas tree ornaments, but we tend to forget about the ho-hum days, and ho-hum days were just as prevalent 20–30 years ago as they area now. Some species are clearly decreasing and others are increasing in abundance. However, according to the results of the Breeding Bird Survey I reviewed a few months ago (*Nature Notes*, November, 1998) the Black-throated Green Warbler is doing neither (0.0% change from 1966–1996 for the entire BBS area, 95% confidence). Even when one has "facts" in the form of many years of recorded data, like I do, I don't believe one can draw many valid conclusions about long-term trends from birds observed in migration. There are too many variables that influence the number birds we see in spring that have nothing to do with long-term decreases or increases.

Weather is probably the most important factor. No two springs are the same with respect to weather and how the plants, insects, and birds respond to it. On any given day or any given spring, the birds we see in Tower Grove Park or Forest Park have been influenced by local, regional, and global weather. The overall effect is that in some years those weather patterns cause a lot of birds to descend on St. Louis in spring. If we're lucky, those same weather conditions cause the birds to stay here for several days. If we're very lucky, those days happen to include Saturday and Sunday, everybody gets to see the birds, and we all think it's a great year. Over the years I've had a number of great Tuesdays, birdwise, and there was no one else around for me to share them with.

Keeping these caveats in mind, I have taken the liberty to give each of the last 20 years a score on a 1-to-10 scale based on the number and variety of migrant birds I've seen each year (Fig. 3). I've used

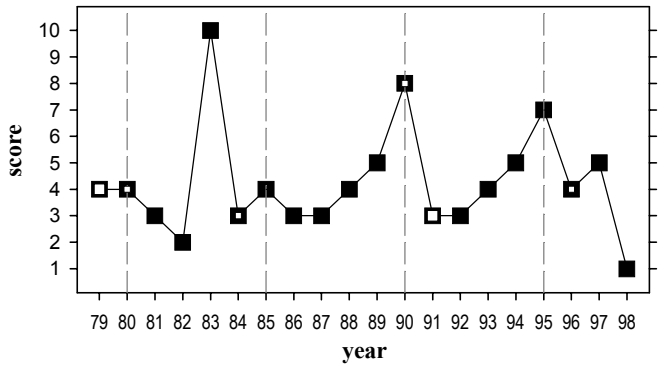

Figure 3. The years scored on a 1-to-10 scale, based on the numbers and variety of flycatchers, thrushes, vireos, warblers, tanagers, grosbeaks, and orioles observed each year. Scores for years with filled points are probably more reliable than those for years with partially filled points (Fig. 2)

different recipes to arrive at these scores and they all come out about the same, so the figure shows the averages.

Clearly, 1983 was a good year. On 3 successive days that year I saw 11–13 Blackburnian Warblers and on May 7, I found 28 species of warblers. So I defined 1983 as a 10. As many people noticed, last year was a dud (I saw only one Blackburnian Warbler all spring), so 1998 defines a score of 1. On that scale, most years have been in the 3 to 4 range. Different people might interpret Fig. 3 differently, but I don't see evidence for a decline over time. There appear to be occasional great years and bad years, with most years being fair to good.

It would be interesting if someone who had similar data for Columbia or Kansas City, MO, or Springfield or Chicago, IL, would also rate the years. Given what I said above about the effects of weather, it would not surprise me if different years scored high and low in other Midwest cities because of differences in local weather.

On numerous occasions I've encountered some unusual species, such as Prairie Warbler, only to find a bird of the same species the next day in about the same spot. That has led me to suspect that some individual birds arrive on a good migration day and then stay for several days. The most extreme case occurred in 1982 when I first heard a Blackpoll Warbler in the tree across the street from where I parked on the early date of April 19th (the earliest date on the Timetable). Nearly every day for the rest of the month I heard what I suspected to be the same bird calling from the same tree. Not until April 30th did I encounter more than one Blackpoll Warbler. In 1997 I spotted a Gray-cheeked Thrush with a couple of white feathers in its wing. For the next 6 days, I or someone else saw the same "marked" bird, always in the same general area, confirming my suspicions that some birds, at least, stay around for a while. Thus, if some years weather conditions are such that a number of birds arrive and then do not leave for a while, it gives the impression that there are many birds compared to years when they pass through quickly.

May 8

In the previous 11-year version of this article I ended by saying that if you only have one day to bird in spring, do it on May 8. I'll stick with that date. On average, the total number of warbler species peaks on May 8 (Fig. 4), as do the total number of birds. In any given year, however, the peak may be several days before or after.

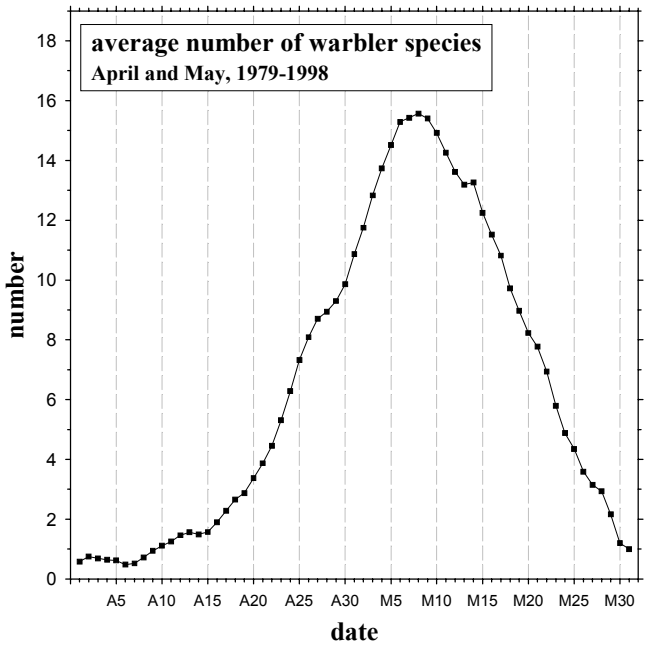

Figure 4. Average number of warbler species seen each day of April and May over 20 years (9-point smooth).

Timetable for Spring Migration of Birds Through Forest Park, St. Louis — 1979 –2003

	MONTH:	April								May							
				1	11111	11112	22222	22223			1	11111	11112	22222	222233		
		12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	678901		Y		N
	Bl-b. Cuckoo							11	11111	11111	12121	21221	1 1 1 1		12		35
X-	Y.-b. Cuckoo							1	11111	12333	33222	22222	22222	2221	21		66
	cuckoo tot							11	22222	22333	33333	33332	22222	22222	22		114
	Ch.-w.-Wid.												1		1		1
	Wh.-p.-Will					1	11111	111			1				9		10
X+	R-thr.H'bird								1111	22222	22233	22222	11111	111111	19		55
C+	R.-h. Woodp.	44444	44444	44444	44444	55555	55555	55555	54545	44444	44444	44444	444333		25		622
C+	R.-b. Woodp.	66555	55555	55555	55555	55556	66666	66666	66555	55555	55555	55555	555555		25		1529
	Y.-b. Saps.	44444	44444	44444	33322	11111	11111								20		131
C+	Downy Woodp.	66666	66666	66666	66666	66666	66665	55555	55555	55555	55555	55555	555666		25		1711
C+	Hairy Woodp.	11111	11222	22222	22221	11222	22111	11111	11233	33221	11111	11111	111111		25		85
C+	N. Flicker	77777	77777	77666	66666	66666	66665	55555	55555	55555	55555	55555	555555		25		1772
	Ol.-s. Flyc.								1	11111	11223	33333	33332	222222	22		59
P+	E.Wood-Pewee							122	33444	55555	55555	55666	66666	666666	25		773
	Y.-bel.Flyc.									11	11112	22222	23222	333221	20		45
	Acad. Flyc.							11111	11111	11111	11122	22222	33333	333333	20		53
	Alder Flyc.										1 1 1		1 1	1	7		7
	Willow Flyc.												1		1		1
	Least Flyc.						11	11111	11233	44444	44444	33222	11111	1	22		142
	emp. sp?							11111	11122	22222	22222	22333	22222	211111	19		75
	emp. tot.						11	11111	12334	44444	44444	44444	44444	444443	23		311
P-	E. Phoebe	55544	44444	44333	33332	21111	11111	11111	11111	11111					24		175
C+	Gr.-cr.Flyc.				1111	22344	45555	56666	66666	66666	66666	66666	66666	666666	25		1245
C-	E. Kingbird			11	11112	22222	22334	44444	55444	44444	44332	21111	12222		25		312
	Wh.-e.Vireo				11112	22233	33333	44333	33333	21111	11111	111			24		117
	Bell's Vireo								1	1					3		3
	Y.-thr.Vireo			1111	12222	22333	33333	33333	34433	33222	11111	11111	111		25		151
	Bl.h. Vireo				11	11233	33444	44444	44333	33322	11111	11111	1		24		175
C-	Warbl. Vireo				1222	33333	33444	44444	44444	33211	11111	111			25		208
	Phil. Vireo						1111	11112	33333	44444	43333	33333	322111		25		127
	R.-e. Vireo	11	11111	11111	11111	23444	44445	55566	66666	67777	77777	66666	665554		25		1586
	R.-br.Nuth.	11111	11111	11111	11111	11112	22222	12121	2111		1				9		44
P+	Wh.-br.Nuth.	44444	44444	44444	44444	44444	44444	44444	44444	44444	44444	44444	444444		25		518
	Br. Creeper	44444	44444	44433	33333	33221	11111	1111							22		133
C+	Car. Wren	55555	55555	55555	55555	55555	55555	55555	55555	55544	54454	45445	445444		19		911
C-	House Wren				1	11123	34444	44555	55555	55444	44444	44434	34343	434343	25		441
	Winter Wren	33222	23333	33222	22211	12221	11111	1111							16		52
	G.-cr.K'let	55566	66666	55444	44444	33221	21212								23		299
	R.-cr.K'let	44555	55667	77777	77777	77777	66666	55555	44443	32111	1111				25		1808
X+	Bl.-g.Gnatc.	12222	22333	34444	44444	55554	44444	44443	33222	11111	11111	11111	11111		24		369
C-	E. Bluebird		1			1			11	3		3		3	4		13
	Veery							12222	22333	33333	33333	33333	22221	111	23		101
	Gr.-c.Thrush					111	12223	33334	44444	44444	44443	32222	21111	1 1 1	24		199
	Swain.Thrush				23444	55666	67777	77888	88877	77777	77776	66555	444432		25		3397
	Herm.Thrush	44444	44445	55555	44444	44444	33332	221							22		274
C+	Wood Thrush						22333	33333	44444	44444	33333	33222	21111	11111	24		172
C+	Gr. Catbird					11	11233	44445	56666	66666	66666	65555	55555	555555	25		987
C+	Br. Thrasher	55666	66666	66666	66666	66666	66666	66666	65555	55555	55555	55555	555555		25		1659
	Cedar Waxw.		45444	55554	45566	55555	66665	55555	54444	56666	66665	555			23		990
	Bl.-w. Wb.				12222	22334	44444	44444	44433	33222	11111	1 1 1	1 1 1		25		202
	G.-w. Wb.						112	34444	45555	55555	54444	43221	11111	11	25		383
	Brewst.Wb.							1	11	11	1	1			4		8
	Tenn. Wb.					1	12344	55667	77777	88888	89988	88888	77776	65544	332111	25	5403
	Or.-cr. Wb.	1			1111	11223	33444	44444	33333	33332	11111	11111	11		25		182
	Nashv. Wb.				2	34455	56677	77788	88888	88887	77666	55443	2211		25		4002
	N. Parula		1	11122	22222	33333	33444	44444	44445	55554	44433	32222	21111	111	25		434
	Yellow Wb.						1111	11111	12222	33333	22222	21111	11111	111	23		80
	Ch.-s. Wb.						111	12334	45566	67777	77777	77666	55444	443321	25		1459
	Magn. Wb.							11111	23345	56666	77777	76666	55444	33211	25		969
	Cape May Wb.							11122	33344	44443	32111	11			19		99
	Bl.-t.Bl.Wb.										1	11	1		4		4
	Y.-r. Wb.	44455	56667	77777	88888	89999	99999	99888	88777	65543	322				25		8421
	Bl'burn. Wb.						11	11122	33444	45555	55555	54443	33322	211111	25		353
	Bl.-t.Gr.Wb.	111	11111	11122	33333	34445	55555	66666	66666	65555	55444	33333	3321		25		1046

MONTH:	April								May							
			1	11111	11112	22222	22223			1	11111	11112	22222	222233		
	12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	678901		Y		N

Timetable for Spring Migration of Birds Through Forest Park, St. Louis — 1979 –2003

	MONTH:	April							May							Y	N
		1	11111	11112	22222	22223			1	11111	11112	22222	222233				
		12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	678901				
	Y.-thr. Wb.	1		1	11	1	1	1111	11	1	111	11	1			11	20
	Pine Wb.	1	1	1	1	1	11112	22223	3232	1	1	1		1		16	44
	Prairie Wb.				1		1		1	1	22	1		1		9	11
	Palm Wb.			1	11111	12344	55666	77777	77777	66655	43221	11				25	1354
	Bay-br. Wb.							11111	22334	45566	66666	66655	54443	3222		25	603
	Bl'poll Wb.						11	11234	44445	56667	77777	77777	76666	55444	433321	25	1445
	Cerul. Wb.						11	11122	21121	11222	11211	22			1	18	45
	Bl.& Wh. Wb.	11111	12332	11121	11112	22333	33444	44445	55555	44444	44333	22211	1111			25	394
	Am. Redstart						111	11112	23444	55666	66676	66666	65554	444433		25	911
	Proth. Wb.					111	11111	11111	11111	11111			11111	111		14	26
	Worm-e. Wb.				11	11122	23333	33333	22222	21212	12121	11111	1111			22	89
	Ovenbird					112	33334	44445	55666	66666	66665	55444	44433	222221		25	848
	N. Waterthr.					11	23334	44444	55555	55555	44443	32211	11111	111111		25	453
	L. Waterthr.	111		11	22322	11112	21111	21111	1111	1	1	1	1			14	25
	Kentucky Wb.					111	12333	33444	34444	44444	43333	33222	21111	111111		25	210
	Conn. Wb.								1		11	11111	11222	22221	111111	16	27
	Mourning Wb.								1	11223	33344	44444	44444	332211		25	124
	C.Yellowthr.					11	12222	22333	33444	44444	44333	33332	33221	111111		24	208
	Hooded Wb.	11111	11111	11111	11111	11111	12333	33333	32222	22212	12111	11111	111122			23	89
	Wilson's Wb.						111	11112	33444	45555	55555	54443	3322			25	339
	Canada Wb.							111	12233	44444	44444	44444	432211			25	195
	Y.-br. Chat							11	11	1	1					5	6
	Summer Tan.					12	22222	22233	33344	43333	22232	22111	11111	111111		22	139
	Scarlet Tan.					111	22223	34444	44455	55555	44444	44443	33321			25	351
	Spot. Towh.		1		1											1	2
	R.-s. Towhee	44444	44444	44444	44444	44444	33333	33333	32333	33222	22211	11111	1111			25	274
	Chipping Sp.	33334	44444	44444	55666	66677	77776	66655	55555	44443	32211	11111	111111			25	1451
	Field Sp.	22333	33221	11233	44444	33333	32111	11111	11111	11						20	122
	Vesper Sp.		1													1	1
	Fox Sp.	54444	44444	33211	1111											19	95
	Song Sp.	33333	32222	22221	11111	11111				111						14	55
	Linc. Sp.					1	1	1	1	1	11111	12222	12212	12111		15	43
	Swamp Sp.			11	11111	11111	11111	11111	1111		1					11	19
	Wh.-thr. Sp.	66777	77777	77777	77777	77888	88888	77777	77766	54443	33322	11				25	4441
	Wh.-cr. Sp.							11222	23344	44444	33332					22	124
	D.-e. Junco	77776	66666	65566	66543	11111	11111									22	751
	R.-br.Gr'bk.						1234	44555	66666	66665	55544	43332	2211			25	690
	Blue Gr.bk.						1		2	1	2	1	1			4	8
	Lazuli Bunt.									1						1	1
C+	Indigo Bunt.					122	33444	55566	66666	67777	66665	55554	44444	444444		25	1352
	Bobolink							1								1	1
	Rusty Blkb.	33333	33333													1	34
	Orch. Oriole						1112	21121	21212	23111	12112	1				16	45
X-	Balt. Oriole					1111	12333	44445	55556	65555	55554	44332	22111	111111		25	538
	Purp. Finch	12333	33221	11111	22333	34444	33333	22111	1							15	141
C+	House Finch	33222	11122	22222	22111	22222	22223	33333	22223	34444	32223	22222	233333			14	163
	Pine Siskin	23		111	3123		1	1	2		3					5	23
X-	Am. Goldf.	77777	77777	77777	77777	77777	77766	66655	55544	44444	33333	33333	322222			25	2871
	Ev. Gr'bk.						3	1								2	7
	MONTH:	April							May							Y	N
		1	11111	11112	22222	22223			1	11111	11112	22222	222233				
		12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	678901				

BREEDING KEY:

C	Confirmed
P	Probable
X	Suspected
+	in JFK Forest
-	near JFK Forest

ABUNDANCE KEY:	code	birds/visit*
	1	>0 to 0.1
	2	0.1 to 0.2
	3	0.2 to 0.4
	4	0.4 to 1
	5	1 to 2
	6	2 to 4
	7	4 to 10
	8	10 to 20
	9	20 to 60

*1–2 hour visits, 7–10 a.m.

Y = number of years species observed
N = total no. of individuals observed

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1979-2003, rev. 2003a