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whether conditions are similar elsewhere. If decline is confirmed I hope this will bring concern to environmentalists so that they will seek to identify the cause or causes of the decline and will direct their efforts toward reversing the trend before wood warblers join Passenger Pigeons (*Ectopistes migratorius*) in oblivion.

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Seven Multiple-recapture Encounters of Banded Birds

Robert P. Yunick
1527 Myron Street
Schenectady, New York 12309

When Montgomery (1979) described the round-trip capture of a Brown-headed Cowbird (*Molothrus ater*) banded in Illinois, recaptured in Wisconsin, and returned to Illinois, there were at least two other such round-trip captures reported in the literature. They included Dexter's (1979) report of a Chimney Swift (*Chaetura pelagica*) banded in Georgia, recaptured in Ohio and returned to Georgia; and Laskey's (1973) Purple Finch (*Carpodacus purpureus*) which was banded in Tennessee, captured twice in Connecticut four days apart, and returned to Tennessee where it was captured twice in four days. In all three cases, the banding and return occurred within a span of about one year, with the intermediate foreign recapture occuring as part of the bird's intervening migration.

Since then, four nearly similar multiple recaptures have been reported (Middleton 1979), differing only in that the birds were banded at one location and recaptured twice at a foreign location. They were reported incidentally as part of another study as footnotes. The purpose of this paper is to call attention to them in this multiple-recapture context; and to report on seven other multiple recapture encounters among my own banding records. Another purpose is to assess the frequency with which these encounters may be expected to occur and to encourage additional reporting of them.

The four cases reported by Middleton (1979) involved House Finches (*Carpodacus mexicanus*) banded elsewhere and retrapped in the Philadelphia area by either him or William Pepper. In two of the cases, the birds were banded in Maryland in winter and retrapped in Philadelphia in the next two consecutive years during the spring or summer seasons. Presumably these birds bred at Philadelphia and wintered in Maryland. A third bird, banded in late autumn in Maryland, was retrapped in Philadelphia late the following autumn and again the following spring. The last bird was banded in winter in Virginia and was retrapped in Philadelphia the next two consecutive winters and the autumn following the second winter.

The seven multiple-recapture encounters I have had are as follows. The abbreviations used are: AHY = after-hatching year; ASY = after-second year; BP = brood patch; CP = cloacal protuberance; F = female; FC = fat class, scale 0-3; M = male; SY = second year; U = unknown sex; WC = wing chord, mm; and WT =weight, g; HY = hatching year.

1. **Blue Jay** (*Cyanocitta cristata*) banded by Stuart S. Wilson.

Banded:	5 Feb 1968	Deposit, NY	as SY U			
Recaptured:	29 Apr 1968	Schenectady, NY	as SY U	WC 130	WT 88.7	FC0
Recaptured:	19 May 1969	Schenectady, NY	as ASY F/BP	WC 130	WT 94.3	FC0

These results suggest that the bird was on winter range at Deposit and bred at Schenectady about 153 km northeast. The second recapture confirmed breeding.

2. **Purple Finch** retrapped by C. W. Hacker.

Banded:	6 Apr 1977	Schenectady, NY	as AHY U	WC 77	WT 23.6	FC0
Recaptured:	23 Mar 1978	Yorktown, VA	as ASY M	WC 80		
Recaptured:	29 Jan 1981	Yorktown, VA	as ASY M	WC 81		

This bird was banded at Schenectady as a passing SY (brown-plumaged male at the time of first capture) spring migrant and appeared to winter in the Yorktown area 660 km to the south southwest.

3. **American Goldfinch** (*Carduelis tristis*) retrapped by Roy S. Slack.

Banded:	15 Apr 1977	Schenectady, NY	as ASY M	WC 72	WT 15.0	FC0
Recaptured:	22 Jun 1980	Palermo, NY		WC 71.5		
Recaptured:	18 Jul 1981	Palermo, NY		WC 72		

This bird was banded as a spring migrant and then retrapped three and four years later 213 km west northwest, where it was found nesting.

4. **House Finch** retrapped by S. E. Boyer.

Banded:	18 May 1981	Schenectady, NY	as AHY F/BP	WC 76	WT 24.1	FC0
Retrapped:	7 Dec 1982	Marysville, PA		WC 77	WT 21.0	
Returned:	13 May 1983	Schenectady, NY	as ASY F/BP	WC 77	WT 20.5	FC0

When banded and returned to Schenectady, this bird was breeding. At Marysville, 375 km southwest, it was either on winter range or migrating to it.

5. **American Goldfinch** retrapped by Judith Bell.

Banded:	15 Aug 1982	near Corinth, NY	as ASY M/CP	WC 71	WT 13.4	FC0
Returned:	15 May 1983	near Corinth, NY	as ASY M	WC 74	WT 13.5	FC0
Recaptured:	10 May 1984	Newark Valley, NY		WC 74		FC2
Returned:	20 May 1984	near Corinth, NY	as ASY M	WC 75	WT 12.1	FC0

When banded, this bird was in breeding condition and had just begun to molt. Primary 1 was newly regrown to the extent of 5 mm. The bird returned the following May but was not yet breeding, as is typical for this species in May. It was captured a year later at a location 222 km southwest, where it either had wintered or was pausing as a migrant. At this location it had fattened considerably. Ten days later, it was back at point of banding, less the fat, and lighter in weight than during its previous captures at this site. At this time, the bird was nearing at least its fourth year of age. It was looked for eagerly in 1985 but was not encountered.

6. **Purple Finch** retrapped by Patrick K. Garland[1].

Banded:	21 Jul 1971	near Corinth, NY	as HY U	WC 81	WT 22.2	FC0
Repeated:	24 Jul 1971	near Corinth, NY	as HY U	WC 80	WT 22.7	FC0
Repeated:	14 Aug 1971	near Corinth, NY	as HY U	WC 82	WT 22.2	FC0
Retrapped:	5 Aug 1972	near Wilton, NY				
Returned:	13 May 1973	near Corinth, NY	as AHY F/BP	WC 81	WT 24.7	FC0
Returned:	14 Jul 1975	near Corinth, NY	as AHY F/BP	WC 82	WT 22.9	FC0
Repeated:	3 Aug 1975	near Corinth, NY	as AHY F/BP	WC 81	WT 21.3	FC0

This bird was banded at the peak of the season when newly fledged young came to the feeders. Most likely it was a local fledgling and remained on its natal grounds for over three weeks. Next year, as a SY F, it was captured about 20 km SE. It is not certain whether it bred at the recapture location or had dispersed to that location following breeding at its original banding site. One year and three years later it appeared at its natal grounds in breeding condition.

7. **Purple Finch** retrapped by Patrick K. Garland.[1]

Banded:	23 Jul 1972	near Corinth, NY	as HY U	WC 79	WT 23.5	FC0
Retrapped:	6 Aug 1972	near Wilton, NY				
Returned:	22 Jun 1974	near Corinth, NY	as ASY M/CP	WC 82	WT 23.7	FC0
Repeated:	23 Jun 1974	near Corinth, NY	as ASY M/CP	WC 81	WT 25.3	FC0
Repeated:	4 Jul 1974	near Corinth, NY	as ASY M/CP	WC 83	WT 24.9	FC0
Returned:	3 Jul 1975	near Corinth, NY	as ASY M/CP	WC 85	WT 24.6	FC0

This is another example of a newly fledged bird banded at the peak of capture of young at the feeder. In two weeks it had wandered to about 20 km SE. Two years and three years later it was recaptured in breeding condition on its natal grounds.

[1]Attempts at locating this bander for further information were unsuccessful.

Encounters of this type appear to be rarely reported. I attempted to assess their expected occurrence by using U.S. Fish and Wildlife Service encounter data. Annual reports published by the U.S. Fish and Wildlife Service list the numbers of each species banded in the year, and the number of foreign retraps (Code 89) and recoveries (Code 99) reported for the birds banded in the five preceding years in North America.

I used the assumption that Code 89 recaptures approximate the likelihood of a banded bird being re-encountered alive; and that, based on the theory of probability when that rate were multiplied by itself, it would approximate the likelihood of a multiple recapture. I did not use Code 99 recovery data because by definition a recovery is a terminal encounter, i.e., the bird was killed or found dead. Such a bird is not available to the population to be re-encountered again and, therefore, its statistics should not be included in the calculation.

I used U.S. Fish and Wildlife Service retrap data for the 13-year period of 1971 through 1983. This covered birds banded in the period 1967 through 1979. I totalled all the Code 89 encounters for each species, divided this number by the total captures for that species, squared the resultant number and used that re-encounter rate to calculate how many bandings were required to obtain one double re-encounter. For example, for the American Goldfinch, the total 1971-1983 Code 89 encounters (470) divided by the total 1967-1979 bandings (300,652) = 1.5633×10^{-3}. When squared, = 2.4439×10^{-6}. The reciprocal (1 divided by this number) = 1 in 409,000 bandings, when rounded to three significant figures. The results were as follows:

American Goldfinch	1 in	409,000 bandings
Blue Jay	1 in	1,241,000 bandings
House Finch	1 in	117,000 bandings
Purple Finch	1 in	277,000 bandings

These estimates suggest that multiple-recapture encounters are indeed rare; in fact, far rarer than my data would indicate. In each of the five cases I have reported here, I have banded far fewer individuals of these species than these estimates call for to produce a multiple-recapture encounter. To explain this apparent discrepancy, I examined further some of the circumstances related to the banding data.

The estimates derived from Code 89 recapture data are based on mixed populations of birds including birds banded in migration, on breeding grounds, and on wintering grounds. Each of my multiple encounters, except for perhaps one, however, involved a bird believed to be either on breeding or wintering grounds for at least two of its captures. Since I knew from previous experience with these species that return rates were generally far higher than the Code 89 (0.090 to 0.19% for these four species) encounter rates, I examined my capture data in detail and determined the return rates for these species. They are given in Table 1. For comparison purposes, I included Middleton's and Pepper's rates reported by Middleton (1979). The subject of return rates of certain species to breeding or wintering grounds has been addressed by Loftin (1977), Thurber and Villeda (1980), Yunick (1983), and Kricher and Davis (1986), and the references therein.

It is apparent that return rates in Table 1 vary with age and with the status of the bird at the site of banding. The American Goldfinch and Purple Finch data show large variations in return rates of migrating, breeding, and wintering populations. From these values, I picked the following representative rates of return to multiply by the Code 89 encounter rate to obtain a more accurate estimate of the expected rate of multiple recapture.

Table 1. Observed rates of return of banded birds to the site of banding.

SPECIES	LOCATION	STATUS	AGE	BANDED SAMPLE SIZE	RETURN % RATE
American Goldfinch	Schenectady	Winter visitor, Nov-Mar	Mixed	1250	3.28
	Schenectady	Spring migrant, Apr-May	Mixed	1870	0.91
	Vischer Ferry	Banded in May	Mixed	201	7.96
	Vischer Ferry	Banded in Aug-Oct	Mixed	153	9.80
	Corinth	Breeding	Mixed	83	14.45
Blue Jay	Schenectady	Resident and Breeding	HY	45	22.22
	Schenectady	Resident and Breeding	AHY	215	18.14
	Schenectady	Resident and Breeding	Mixed	260	18.85
	Corinth	Breeding	HY	212	9.91
	Corinth	Breeding	AHY	118	12.71
	Corinth	Breeding	Mixed	330	10.91
House Finch	Schenectady	Resident and Breeding	Mixed	3523	11.64
	Philadelphia	Middleton Station	Mixed	1517	9.62
	Philadelphia	Pepper Station	Mixed	4914	10.40
Purple Finch	Corinth	Breeding	HY	2930	9.93
	Corinth	Breeding	AHY	3451	19.01
	Corinth	Breeding	Mixed	6381	14.84
	Schenectady	Winter irruption	Mixed	1388	0.07
	Schenectady	Spring migrant, Apr-May	Mixed	500	2.40

SPECIES	RETURN RATE %	EXPECTED MULTIPLE-ENCOUNTER RATE
American Goldfinch	14.45	1 in 4430 bandings
Blue Jay	18.85	1 in 5890 bandings
House Finch	11.64	1 in 2940 bandings
Purple Finch	14.84	1 in 3540 bandings

In all cases, except that of the Purple Finch, I used return rates which reflect closely the circumstances of the multiple encounters reported here. For the Purple Finch, I used a return rate to the breeding grounds because I lacked southern wintering data.

Based on my bandings through the end of 1985, these estimates compare as follows with actual experience.

SPECIES	ENCOUNTER RATES, 1 per number of given bandings		
	Estimated Multiple Encounter	Actual Multiple Encounter at Same Banding Site	Actual Multiple Encounter at all Sites
American Goldfinch	4430	268[1]	2254
		3323[1]	2254
Blue Jay	5890	279	768
House Finch	2940	4913	4933
Purple Finch	3540	1473[1]	3314
		3191[1]	3314
Average	4200	2241	2817

[1]Two different sites.

Except for Purple Finch, no one species comes close to matching in actual experience the expected rate of multiple encounter estimated by multiplying the Code 89 rate by the observed return rate. This is not too unexpected considering that most of the multiple encounters (except for the American Goldfinch and Purple Finch) are only one of its kind of event for that species; and that the populations dealt with are complex mixtures of individuals not all sharing the same migratory path or regimen. The Purple Finch sample was the largest (N = 9942) and comes closest to matching the actual encounter rate with the estimated encounter rate.

Given this, it appears that many more of these multiple encounters should appear in print. They are valuable in providing confirmatory interpretation to recapture data or new insight on such data. I encourage banders to make these events known in order to further the understanding of avian migration.

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