Keeping banding records: Writing fall reports

Joan C. Woodward and Paul W. Woodward

Many banders operate fall migration stations in conjunction with the Atlantic Flyway Review (formerly Operation Recovery) (see Schaeffer, 1969, *EBBA News* 32: 83-93; 198-202). Often, because their banding records are not well organized, they are unable to summarize and analyze banding results in a meaningful way. Sometimes this is reflected in an emphasis on rarities or the occasional recovery rather than on the common species captured in large numbers over the long-term period. It is these latter species that will provide the most valuable data.

This paper suggests some procedures for maintaining banding records, with particular emphasis on working them into a brief but useful fall migration report. Examples of various types of record keeping are given using the fall 1972 and 1973 records from the McKee-Beshers Wildlife Management Area Banding Station, Montgomery Co., Maryland (Woodward, 1972, *EBBA News* 35: 253-258).

Record keeping

Although the method chosen for keeping banding records is a personal matter, banders must be sure that their records, regardless of form, can be understood by other workers and by themselves in future years and that the records are organized in a way that permits easy extraction and analysis of the data. Here we describe five forms useful in organizing banding records.

Daily Field Sheet

The daily field sheet (Figure 1) is a modification of the standard Operation Recovery form and is similar to that described by Schaeffer (1971, *EBBA News* 34: 253-260). It is self-explanatory. Separate records are kept for each day and each banding location (if more than one). Birds are listed in order of capture, thus providing a diary of the day. Some workers keep their records by band size, which facilitates filling out banding schedules, but it adds to the number of forms needed in the field and makes it more difficult to reconstruct the day's events and to tabulate totals for analysis.

LOCATION: McKee-Beshers Mont. Co., Md. DATE: 11 Nov. 73 TIME: 1215-1715

WEATHER: Partly cloudy to overcast Cool; little or no wind BANDER: Paul Woodward Joan Woodward

BAND NUMBER	SPECIES	AGE	SEX	WING	FAT	NET	TIME	COMMENTS
1330 35 961	Am. Goldfinch	HY^S	F	67.5	0	3	1220	completing molt
840 70 650	Tree Sparrow	AHY^S		75.5	0	6	1230	
1163 65 025	Com. Grackle	HY^E		127.0	T	4	1300	
026		HY^S		143.0	0	4		
(RR) 1141 51 497	Carolina Wren	HY^S		56.0	0	1		
1330 35 962	Myrtle Warb.	HY^S	M	71.0	0	0		
963	Am. Goldfinch	AHY^S	F	70.5	0	0		Flight feathers very dark
964		AHY^P	M	74.0	0	0	1330	Green-white-yellow sh.

Figure 1. Top section of a daily field sheet. Circled RR indicates a repeat bird.

Superscripts are used in the "Age" column to indicate the method used for aging: S = skulled; ML = mouth lining; P = plumage; E = eye color. Cloacal protuberances or brood patches are noted in the "Fat" column. The "Comment" column is used extensively, noting breeding condition, plumage characteristics, degree of molt, details of any abnormalities or injuries, and behavioral observations. General field notes for the day are also put on the field sheet, including observations on weather, on birds or other animals, and on presence or absence of water holes and food supplies.

Daily Tabulations

Two summaries are made for each banding day. The first (Figure 2) is a summary of all birds captured expressed as birds per net hour. The purpose of this form is to show the abundance of birds captured each banding day and to show quantitatively migration flights and differences in yearly abundances.

The second daily summary is a total of birds captured by species and is generally done in the field on the back of the field sheet. Returns and repeats are indicated by parentheses after the

Fall - 1973								Fall - 1972	
August	Time	Net lanes	No. of nets	Net hours	No. of species	No. of birds	Bird per net hour	Bird per net hour	August
3	0550-2030	0,1,2,3,4,6	11	161.33	10	39	0.24	0.33	2
4	0550-2030			161.33	17	58	.36	.21	5
5	0550-1050			55.00	7	9	.16	.06	6
10	0600-2025			158.58	20	88	.56	.22	9
11	0600-2025			158.58	16	59	.37	.05	10
17	0600-2020			157.83	14	67	.43	.17	12
18	0800-0815*			2.50	1	1	.40	.07	16
23	0610-2010			154.00	17	34	.22	.40*	17
24	0610-2010			154.00	13	44	.29	.15	22
25	0610-2010			154.00	23	65	.42	.16	23
26	0610-1510			99.00	10	12	.12	.08	26
30	0615-2000			151.25	20	46	.30	.18	30
31	0615-2000			151.25	17	38	.25	.17	31
Subtotals				1718.65	41	560	0.33	0.14	
*Rain									

Figure 2. Daily summary sheet for all birds captured in August 1973, a successful nesting year. For comparison, bird per net hour is shown for August 1972 when nesting was disrupted by Hurricane Agnes.

total; for example, "Catbird 9 (3)" indicates 9 catbirds captured and 3 of the 9 were already banded. At the end of each month, these daily species totals are compiled on one table showing totals for the entire month. From this a second table is made by transforming the absolute totals to birds per net hour, which shows variations in abundance for each species throughout the month.

Species Sheets

Species sheets (Figure 3) are by far the most important and useful form. All birds captured are listed by species along with the standard information from the field sheet. The only "Comment" generally included is that which reflects on the accuracy of the basic data. Questionable data are put in parentheses (see bird number 1310 11 453 on Figure 3). A set of species sheets is made for each season (spring migration, summer, fall migration, winter) of each year. Returns are included in their proper chronological order and are indicated by a "R." "RR" indicates that it is a return for that particular time period (such as fall migration) but is a repeat for the year. Repeats for the season are indicated by inserting the date of recapture and the net lane under the "Repeat" column.

Species sheets are indispensable for extracting, analyzing, and summarizing banding data and also for answering particular questions that arise. For example, we needed to determine what times of day Gray Catbirds *(Dumetella carolinensis)* were most commonly captured in September 1972 and 1973. Within a couple of minutes, the answer was obtained (44.5 percent between 1700 and 2000).

Recapture Cards

For each individual that is recaptured, a 3 x 5 index card is made (Figure 4) that contains as complete a history of that individual as possible. Each subsequent recapture is added to the card. At McKee-Beshers, 99 percent of recaptured birds are residents, and this is where our interest lies. However, for a station that recaptures migrants, the cards are a convenient way to investigate stopover time and weight and fat changes. Cards are filed by species and in band-number sequence.

Like the species sheets, a tremendous wealth of information exists on these cards that can be quickly extracted. Recently we wanted to know what time of the year HY (hatching year) catbirds that returned in subsequent years were originally banded. Using the index cards, this information was summarized in detail within minutes (33.3 percent in August, 61.1 percent in September, and 5.6 percent in October).

Summarizing and analyzing fall migration

At the end of migration banding, it is important to analyze records before enthusiasm and memory have faded. Using the forms just described, which can be compiled daily through the fall, this is relatively simple. The following section outlines

SPECIES: Com. Yellowthroat Page 1 Fall 1973

BAND NUMBER	AGE	SEX	DATE	NET LANE	TIME	WING	FAT	REPEAT	COMMENTS
1310 11 453	(AHY)	(F)	7-28	0	1220	51	0		Body-head molt
1310 11 450	AHY	M		6	1430	52	0		
RR 1310 11 448	AHY	M		6	1830	51.5	0		
1310 11 493	HY	M	8-10	6	0700	50	0		
1310 11 630	HY	M	8-30	6	1930	52	0		
R 123 66 688	A4thy	F	9-08	6	1500	49	0		
1330 35 300	HY	F	9-13	2	0830	(50)	0		wing molt.
RR 113 48 860	ASY	M	9-16	0	1030	53	0	9-28(0)	

Figure 3. Top section of a species sheet.

White-eyed Vireo 113 48 232

5-15-71	AHY	60	0	(0)	
7-27-72	ASY-F	--	0	(3)	BP
5-9-73	ATY-F	58	0	(0)	BP; left leg has been broken and is completely healed (band is on the right leg). Knot on tarsus shows where break was.
6-01-73		60	0	(4)	BP; caught with male no. 113 48 536 in the net beside her.
6-29-73		61	0	(4)	BP; leg with old break is strong; she has full use of toes.

Figure 4. Recapture card. Columns from left to right are: Date; Age-Sex; Wing; Fat; (Net lane); and Comments.

some analyses that can be done and suggests a format for reporting fall migration data.

Summary Sheets

At the end of fall migration, two summaries are made. Data for these summaries are extracted mainly from the species sheets. For each species, a 5 x 8 index card is made showing the number and percent of adult (AHY) and HY birds by time periods throughout the fall (Figure 5). Each month is divided into 10-11 day periods. The catbird card shown illustrates how AHY's dominate in early August with a gradual shift resulting in HY's dominating by late August and peaking in September. In attempting to detect differential migration by age or sex, these cards can be extremely useful, though perhaps with smaller time intervals.

The second summary is a list of the period of occurrence for each species (Figure 6). Arrival and departure dates are taken from the species sheets, making sure to include repeat dates. The resulting list is used in the calculation of abundances for each species.

Computing Abundances

Numerous variables, such as wind speed, net-mesh size, placement of nets, affect the number of birds captured. It is important to reduce these variables as much as possible. Some banders instead compound the problem by their method of operation, especially by trying to catch as many birds as possible with little or no regard to any future analysis.

To allow comparison between years and even in the same migration period, a banding operation must be as constant as possible. Net lanes must be the same; if they are moved or changed, comparisons of abundance are impossible. If new net lanes are used, records for them should be maintained separately. Even so, it is possible that the presence of new nets in the vicinity of the normal banding operations will influence the capture rate in the standard net lanes.

Ideally, to compare abundances from year to year, nets should be operated every day during migration from dawn to dark with exactly the same net lanes. Then the actual number of birds captured could be used for any summary or analysis. However, this is impossible for most banders, so birds per net hour is used to obtain comparable numbers.

Calculated abundance is an attempt to attain an objective number that will reflect the status of a selected species at a particular location in comparison with other years. Using the daily summary sheet (Figure 2) for the number of net hours per day, the table of periods of occurrence (Figure 6), and the species sheets (Figure 3), an abundance can be calculated for a species as follows:

Catbird — Fall 1973

	AHY	HY	Total	%HY	Monthly subtot.
July 21-31	23	7	30	23.3	23.3%
Aug. 1-10	24	17	41	41.5	
11-20	16	10	26	38.5	
21-31	6	22	28	78.6	51.6%
Sept. 1-10	0	29	29	100.0	
11-20	1	42	43	97.7	
21-30	7	36	43	87.7	93.0%
Oct. 1-10	1	9	10	90.0	
11-20	1	1	2	50.0	
21-31					66.7%
Nov. 1-10					
11-20					
Totals	79	173	252	68.6	

Figure 5. Age ratio card.

Wood Thrush	July 28 - Oct. 8
Swainson's Thrush	Sept. 8 - Oct. 27
Gray-cheeked Thrush	Sept. 11 - Oct. 14
Hermit Thrush	Oct. 9 - Oct. 28
Veery	Sept. 2 - Sept. 20
Ruby-cr. Kinglet	Sept. 27 - Oct. 27
Golden-cr. Kinglet	Oct. 7 - Nov. 12

Figure 6. Small section from a period of occurrence sheet for fall 1973.

	Fall 1973			Fall 1972		
Species	No. of birds	Net hours	Bird per net hour X 100	No. of birds	Net hours	Bird per net hour X 100
Wood Thrush	76	3948.34	1.93	31	2657.91	1.17
Hermit Thrush	20	1210.17	1.65	8	393.33	2.03
Swainson's Thrush	49	1959.34	2.50	10	1115.34	.90
Golden-cr. Kinglet	11	1635.17	.67	5	994.67	.50

Figure 7. Small section from a list of abundance figures.

1. Look up the period of occurrence. Exclude abnormally early or late individuals because they distort the calculations. For example, in 1972 a Hermit Thrush *(Hylocichla fuscescens)* was captured on 10 August; the next was captured 18 October; the August bird was not considered in the calculation.
2. Add the total number of net hours for the period of occurrence.
3. Divide the sum of the net hours into the total number of individuals (including returns but not repeats).
4. To obtain a whole number it is usually necessary to multiply the results by 100 or 1000 to equal birds per 100 or 1000 net hours.

$$\frac{\text{Total number of individuals of a species}}{\text{Total number of net hours for period of occurrence}} \times 100 = \text{abundance in birds/100 net hours}$$

For convenience in preparing the fall migration report, all species are listed with their abundance figures for the current year and the previous year (Figure 7).

As yearly records begin to accumulate, the normal period of occurrence (that is, average arrival and departure dates) for each species should be determined. This period of occurrence is then considered constant from year to year, unless modified by further data. This eliminates the problem of comparing a year when birds come through in a short period of time with a year when they come through over an extended period, resulting in a misleading abundance figure (see Hermit Thrush in Figure 7). At stations where arrival and departure dates are highly variable, determine a core period when a given species is present, and do the abundance calculation on the basis of net hours during this period.

The abundance calculation is only an index of what is occurring and not an absolute number to be used without caution. It is of no use for a species captured in small numbers. Early or late stragglers must be ignored. Different patterns in the timing of migration, as mentioned above, must be taken into account. However, for most species, if used with common sense and in conjunction with the total data picture, the abundance figure is helpful in analyzing data and rarely presents problems.

Preparation of a Final Report

A fall migration report should give an overall view of migration at a station and should give a clear comparison with the previous fall's results in a format that will allow quantitative comparisons between banding stations.

One useful comparison is between families or subfamilies rather than between individual species. At McKee-Beshers, four groups are captured in large numbers: flycatchers, thrushes (excluding robins, which are not sampled accurately), warblers, and sparrows. These groups are looked at in terms of (1) total birds of each group captured per 100 net hours, (2) percent that each group composed of the total birds captured, and (3) percent of HY birds in each group (Table 1). Return birds are counted as new and repeats are not used. This table shows clearly where changes occurred between 1972 and 1973.

Total birds captured each month (Table 2) reflects the relationships shown in Table 1. The increase of August and September 1973 over 1972 corresponds to the increase in flycatchers, warblers, and thrushes, and the decrease in October corresponds to the decrease in sparrows.

The list of abundance calculations pinpoints the species that had noticeable increases or decreases (± at least 1 bird/100 net hours) from the previous fall. This information, along with any unusual birds, recoveries, or other items thought important, should be included in the final report.

Table 1. — Comparison of 1972 and 1973 fall migration by species groups (from Woodward and Woodward, 1975, EBBA News 38: 36-37).

	Birds/100 NH*			Percent of total birds captured		Percent HY	
	1972	1973	Percent change	1972	1973	1972	1973
Flycatchers	1.1	1.7	+55	3	5	36	69
Thrushes (excluding robins)	1.9	3.2	+68	5	10	67	67
Warblers	6.2	7.8	+26	18	25	63	78
Sparrows	9.7	4.5	−54	28	14	62	66

*Warblers and sparrows are calculated using total net hours for the fall; thrushes, net hours between 28 July and the end of October; and flycatchers, net hours between 28 July and 23 October.

Table 2. — Monthly capture rates for new birds in 1972 and 1973 (Woodward and Woodward, op. cit.)

	Birds/100 NH		
Month	1972	1973	Percent change
August	13.8	20.4	+48
September	21.6	29.1	+35
October	58.9	34.6	-41

The above report informs and fits in a limited space, but it is not a detailed analysis. It is one possibility out of many of what may be done with fall migration data. The type of banding station (coastal, inland, mountain, etc.), the species composition and numbers, and the goals of the bander will all determine the most effective presentation. The important thing is that once basic data is organized, there is no end to the type of analysis that can be done. The only limitation is in the mind of the bander.

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Orange-crowned Warbler:
A near return

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The return of a banded transient wood warbler during migration is a very unusual event. Foy *(EBBA News,* 38:128-130, 1975) totalled but 13 definite returns, most of them for the year following banding. Johnson and Ellis *(IBB News,* 46:67) list another. Leberman and Clench (P.N.R. Research Rept. No. 35:14, Carnegie Mus. Nat. Hist., Pittsburgh, 1975) gave a detailed account of a Cape May Warbler *(Dendroica tigrina)* that returned to Powdermill two years after banding.

Our ten years of mist-netting in west-central Kansas has provided a similar return. An immature Orange-crowned Warbler *(Vermivora celata)* banded by Ely at Hays on 12 October, 1969 was recaptured by Weber near Ellis on 15 October 1971. Both of our banding stations are on Big Creek with Ellis 11 airline miles northwest of Hays. This individual was one of 159 (129 HY) banded by Ely in fall 1969 and one of 83 handled by Weber in fall 1971. Like the Cape May Warbler described by Leberman and Clench, this individual seems to have been migrating (as an adult) along the same fall route that it used previously as an immature.

Under normal weather conditions, the Orange-crown is the most common fall transient wood warbler in the Hays-Ellis area. During a seven-year period (1966-1972), Orange-crowns averaged 40 percent of all the wood warblers netted each fall. The fall migration period is from mid-September through October with peak bandings in late September and early October.

The single foreign recovery from a total of 1738 birds banded is from the probable wintering grounds. An individual (U-U) banded 12 October 1972 at Hays was recovered the same winter near La Yerbabuena, Michoacan, Mexico.

Like most returns of transient wood warblers, ours is from an inland station. It supports the premise that at least some immature wood warblers establish their fall migration routes with the first southward flight.

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