SOME STUDIES IN BIRD BANDING

Thesis for Degree of M. S.

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THESIS

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By

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THESIS

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HISTORY OF BIRD BANDING

The seasonal disappearance and reappearance of birds has been a source of mystery and speculation to man for ages. We may well suppose that even to primitive man bird migration was a matter of concern, since the movements of the bird groups were a preliminary indication of the changing of the seasons, and probably also necessitated some change in the local bill of fare as well.

Due both to lack of systematic observation, and possibly even more to the lack of transportation facilities which prevented man from any wide-spread degree of travel, this seasonal disappearance and reappearance of birds was a fertile source of speculation until a comparatively recent date. A writer of repute as late as the eighteenth century, quoted by Barrows, soberly advanced the hypothesis that when birds disappeared at the approach of winter they took refuge on the moon; and he even estimated the time necessary to reach that haven, and suggested the possibility of intervening satellites as islands on which the weary songsters might rest before completing the trip. Those who doubted this theory suggested more or less absurd substitutes, and even during the nineteenth

century many good people firmly believed that swallows plunged into lakes and buried themselves in mud at the approach of winter, while other species gathered in hordes in hollow trees and rock caverns, there to lie torpid until wakened to life by the warmth of returning spring. A mass of 'evidence' was painstakingly accumulated in support of this hibernation theory, and the examples of hibernating mammals and reptiles were cited as proving the probability of bird hibernation. As late as 1878 Dr. Elliott Coues, one of America's greatest ornithologists, reviewed some twenty-five papers on the subject, and admitted that the evidence seemed to be indisputable. However, Dr. Coues refused to commit himself to a belief in the hibernation theory, and maintained an open mind regarding the whole matter.

G. M. Allen quotes a scientific journal which gives account of the digging up of some swallows during their winter sleep near Cambridge.

Considering these theories which were current within a century, it is not strange that certain Greek and Roman writers gave circumstantial accounts of the disappearance of multitudes of birds beneath the waves of the Mediterranean Sea in Autumn, and their re-emergence the following Spring. As an example of an absurdity regarding bird migration persisting almost up to the present, might be cited Professor Gätke's work published in 1895, entitled

"Helgoland as an Ornithological Observatory", in which he affirms that migrating birds ascend to a great height, and then taking advantage of inter-planetary winds, are whirled southward at rates of over 200 miles per hour. Gatke gives detailed figures as to speed and routes of 397 species of birds, each of which species he actually did observe at Helgoland. His figures, however, are based on pure guesses and assumptions, none of which have been borne out in the slightest degree by later scientific observations.

During the past fifty years a great deal has been found out regarding the time of migration, and the general routes of migration of most of our migrating birds. The general increase of travel facilities, and the wide increase of systematic observation throughout Europe and America have enabled us to amass a large amount of data bearing on bird migration.

The Bureau of Biological Survey of the United States Department of Agriculture has been collecting data on bird migration for 25 years. Investigations by its field naturalists extending over North America from Panama to the Arctic Ocean have resulted in voluminous notes, and in addition, assistance of ornithologists throughout the country has been enlisted so that each year reports are received in spring and fall from hundreds of experienced observers. Lighthouse

keepers have also supplied valuable information concerning the destruction of birds at their lights. The facts gathered from these sources form the largest body of data on bird migration ever collected, and permit broader and safer generalizations than have hitherto been possible.

While the general facts ascertained, and the broad generalizations derived from them as to the migration of birds apply in the main to migrations of species, they are of little value as information relative to the migrations of individuals, or even of ordinary flocks. Facts concerning individuals can only become known through the experimental study of marking birds in such a way that we can identify the individual should it be recaptured or killed. The realization of this necessity has resulted in the present system of bird banding.

The idea of marking birds so that they might be identified if recaptured is not by any means a new one. In 1749, in Europe, Frisch tied red threads around the legs of a number of swallows, thinking to test the belief that swallows passed the winter buried in the mud like frogs. He reasoned that if they were under water all winter the threads would lose their color by spring, but should the birds go south, as some claimed, the threads would probably retain much of their original brightness. In the following year some of the birds were caught with the threads still bright, thus furnish-

ing Frisch with experimental proof in favor of the southern migration theory, or at least with rather definite disproof of the hibernation theory.

There were other attempts at marking birds in Europe, notably by Baron Van der Heyden of Holland, who placed rings about the necks of wild geese and ducks during the nesting period. He found that many of these birds returned yearly to their accustomed breeding places. One Gray-lag goose came for 35 years to the same nesting neighborhood. The European work, although somewhat sporadic in character, has furnished a considerable mass of data on individual bird migration. The small area of most European countries, and the lack of cooperation between scientists and governments in the different countries, has prevented the work in Europe from being in any way complete and authentic as that done in America under the supervision of the United States Bureau of Biological Survey.

The first authentic report of an attempt at bird banding in America is that of Audubon in 1803, when he placed silver threads around the legs of a brood of phoebes, and was rewarded the next season by having two of his marked birds return to nest in the same vacinity. The earlier investigators marked their birds in a variety of ways, such as dyeing or staining the tail feathers, attaching memoranda on parchment, mutilating feathers, feet, or bill. Such expedients proved

unsatisfactory but out of them was evolved the present system of attaching a numbered aluminum band on the leg.

Active experimental work was begun in the United States in 1901, and several instances of bird banding were planned and carried out to a limited extent during the next few years. The real pioneers in the work were the members of the New Haven Bird Club, who had a number of bands made, and used them locally for several years preceding 1909. At the annual meeting of the Ornithological Union in 1909 the results of this work were read, and through the efforts of Dr. Leon J. Cole, the American Bird Banding Association was formed. This organization came under the guidance of the Linnaean Society of New York, but supervision was officially taken over in 1920 by the Bureau of Biological Survey of the United States Department of Agriculture. This permitted the work to assume a nation-wide scope, which was really essential if the work was to fulfill its part in the National Scheme of Conservation.

Since the Bureau of Biological Survey took charge of the bird banding operations of the United States four regional bird banding associations have been formed. The purpose and plans of these organizations may perhaps be best explained by quoting from the initial bulletin distributed by the New England Bird Banding Association,

later to be termed the Northeastern Bird Banding Association.

"From a study of the situation we came to believe that we could obtain the best results:

"1. By organizing a regional association of bird banders, meaning by this, bringing together a membership from an area possessing one or more migration highways, along which trapping stations could be established to furnish, by intensive attack, fairly speedy answers to certain specific migration problems, thus early demonstrating to members the scientific value of bird banding with the consequent stimulus to continue the work which it is expected will ultimately solve more ornithological riddles, aid in the solution of others, and create new problems not now anticipated.

"2. By having members meet together as often as possible to discuss results, methods, and future plans and to gather inspiration from their fellows after the manner of scientific socities generally, in this way using the combined knowledge of the association to advance the work.

"3. By appealing for the support of the Audubon societies all over the country on the ground that bird banding is a bird protecting movement, since to an important extent it will be possible in the future to substitute a study of a live bird for the study of a dead one.

"4. By ensuring as far as possible the permanence of the movement by means of institutional trapping stations operated by or in connection with Audubon societies, natural history societies, bird clubs, departments of ornithology or zoology at colleges and universities, bird sanctuaries, state and national parks, etc., in addition to stations operated by individuals.

"5. By establishing a convenien t local depository of all bird-banding records for the region (an exact copy of course being sent to the Biological Survey) in appropriate quarters where they may be studied by members of the association and others."

This summary includes in general the purpose behind the organization of each of the four bird-banding associations now in existence in the United States and Canada.

The New England Bird Banding Association was organized in January, 1922. This association included the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont; and the Provinces of Quebec, New Brunswick, Nova Scotia, Newfoundland,and Labrador. In 1924 the name was changed to the Northeastern Bird-Banding Association.

The Inland Bird Banding Association was organized

on October 24, 1922. This association includes the states of Texas, Louisiana, Alabama, Mississippi, Tennessee, Arkansas, Oklahoma, Kansas, Missouri, Kentucky, Ohio, Indiana, Illinois, Michigan, Wisconsin, Iowa, Nebraska, South Dakota, North Dakota, and Minnesota, and the Canadian provines of Manitoba, Saskatchewan, Alberta, and the Northwest Territories. This association gives particular attention to the Mississippi Valley migration route, with its subsidiaries.

The Eastern Bird Banding Association was organized on April 24, 1923. It includes Pennsylvania, Florida, Georgia, North Carolina, South Carolina, Virginia, West Virginia, District of Columbia, Maryland, Deleware, New York, and New Jersey; withthe Canadian provinces of Ontario and eastern Manitoba.

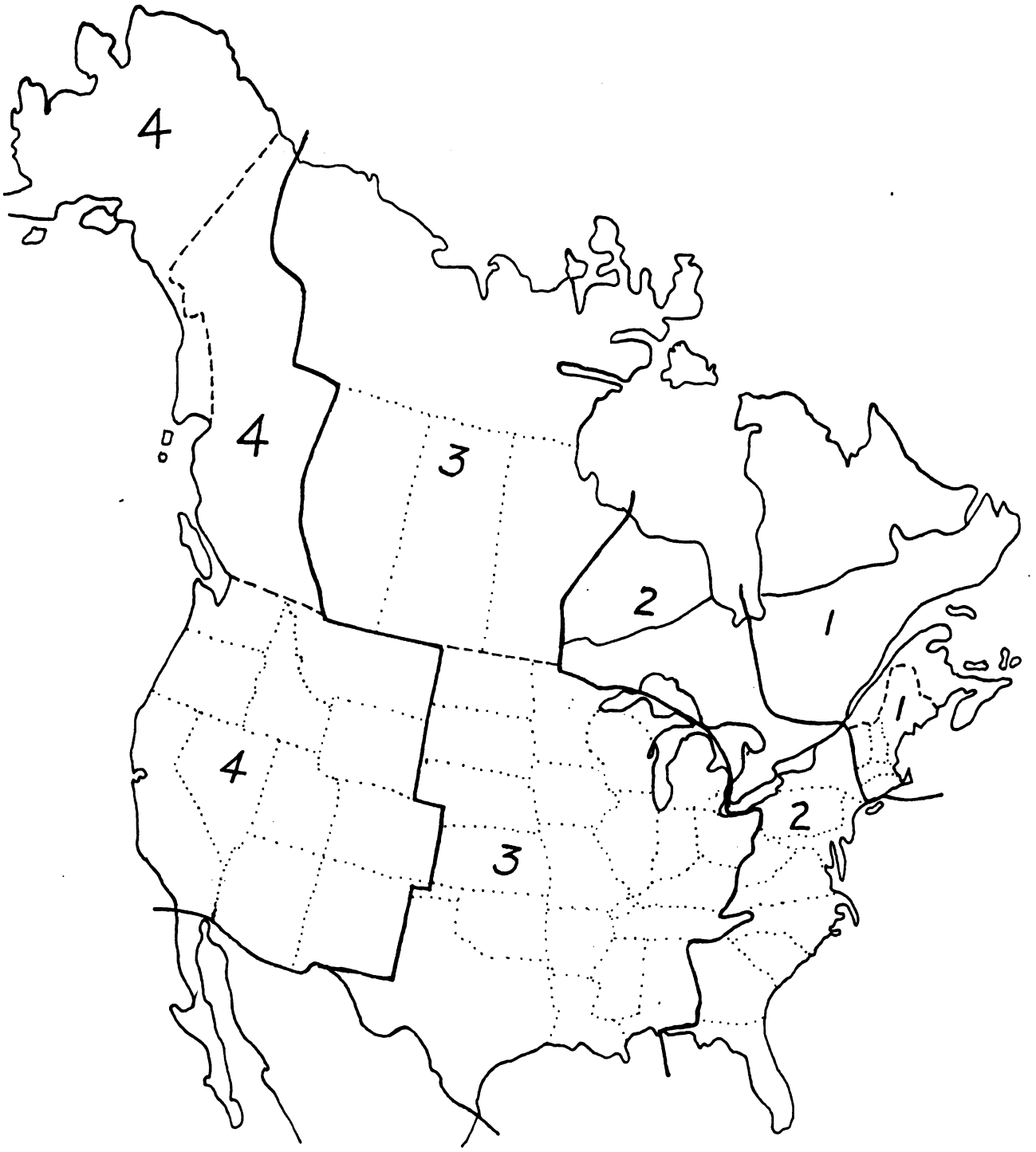
The work along the Pacific Coast was taken care of through the Banding Chapters of the Cooper Ornithological Club. In 1925 this was succeeded by the Western Bird Banding Association. This includes the states of Arizona, New Mexico, California, Nevada, Utah, Colorado, Wyoming, Montana, Idaho, Oregon, and Washington; Alaska; and the Canadian provinces of British Columbia and Yukon.

As an illustration of the rapidity with which the bird banding work is expanding a comparison of the number of birds banded in the entire United States for the year from July 1, 1921 to June 30, 1922, with the number of birds

banded in Michigan alone for the year from December 1, 1924 to December 1, 1925 is given here.

Total number of birds banded in United States as stated above - 5,940.

Total number of birds banded in Michigan for year as stated - 8,174.



1. Northeastern Bird Banding Association

2. Eastern Bird Banding Association

3. Inland Bird Banding Association

4. Western Bird Banding Association

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BIRD BANDING AT MICHIGAN STATE COLLEGE

Bird Banding at Michigan State College began on October 12, 1923, when Prof. J. W. Stack established a single trap in the Forest Nursery across the Red Cedar river. This trap alone was operated until April 1924, when two traps were placed in the wild flower garden. These were supplemented on September 30, 1924, by three more traps in the Forest Nursery. During October, 1924 four more traps were added in the Forest Nursery and vicinity. Four more traps were placed during the spring of 1925, and one during July. Professor Stack is now operating 16 traps.

During the Fall term of college, 1925, several traps were operated by the members of Professor Stack's class in advanced ornithology, on or near the college campus.

On Spetember 30, 1925, a series of 10 traps was established by G. W. Bradt, with the purpose of conducting an experiment in the study of bird migration and habits during the college year of 1925-26. The results of this experiment are embodied in the remainder of this report.

A atatement of the problems to be studied by means of bird banding follows. The U.S. Bureau of Biological Survey, in Miscellaneous Circular 18, outlines the problems to be studied through bird banding operations as follows:

"1. How fast do the individuals of any species travel on their periodic migrations; that is, how many miles per day will any bird average during these journeys and what is the total time consumed in a trip?

2. Does any one flock continue in the van, or is the advance made by successive flocks passing one over the other in alternate periods of rest and flight?

3. Do individuals of any species always follow the same route, and is the route the same for both spring and fall flights?

4. Do migrating birds make the same stop-overs every year to feed?

5. How long do birds remain in one locality during the migration, the breeding, or the winter season?

6. What is the relation between the breeding and the winter grounds of individuals; that is, do those birds which breed farthest north winter farthest south, thus jumping over those that occupy the intermediate zone, or do they merely replace the latter individuals as winter residents?

7. Do birds adopt the same nesting area, nest site, and winter quarters in successive seasons?

8. For how many broods will one pair remain mated, and

which bird, if not both, is attracted next year to the old nesting site?

9. To what extent do males of a species assist in incubation?

10. How far from the nests do birds forage for food, and after the young have left the nest, will the parent bring them to the feeding and trapping station?

11. To what region do the birds go, particularly the young, that do not return to the vicinity of the original nests?

12. How long do birds live?"

It is obvious that many of these questions can be solved only by the collection of data from the whole of North America at least, and over a period of many years. This collection of data is being handled by the Bureau of Biological Survey at Washington, with the cooperation of local stations operated by private individuals, usually under the supervision of one of the regional bird banding associations previously mentioned.

The Bureau furnishes all bands used in the operation, together with Record blanks which are filled out by the local operator and sent to Washington at regular intervals. Although it is to be hoped that the data sent to Washington from the

local experiment will prove of value when fitted into its proper niche in connection with hundreds of other reports from other sections of the country, only a comparatively small portion of the data collected can be interpreted as in any way conclusive for the space and time actually covered in the experiment.

Of the twelve problems outlined by the Bureau, but five seemed to offer any possibility of solution at a single banding station during a period of less than a year. These were as follows:

1. Does any one flock continue in the van, or is the advance made by successive flocks passing over each other in alternate periods of rest and flight?

2. Do individuals of any species always follow the same route, and is the route the same for both spring and fall migration?

3. To what extent do males of a species assist in incubation and brooding?

4. How far from the nests do birds forage for food, and after the young have left the nest, will the parent birds bring them to the feeding and trapping station?

5. How long do birds remain in one locality during the migration, breeding and winter season?

Of these five problems the one which offered the

best opportunity for conclusive work under the conditions of this experiment was undoubtedly number five. In addition to work along the lines of the problem stated, it was hoped to secure valuable information regarding local migrations of birds, whether these might be related to local food supplies or to other local factors. Since the traps of Professor Stack occupied an area in many ways quite distinct from that covered in this experiment, it was expected that the combined records would prove of much interest. The map and description of the location and environment of each trap show the terrain of the experiment, and the relation of the traps to each other.

ESTABLISHMENT AND OPERATION OF THE BIRD BANDING STATION

Immediately after the opening of the college year on September 21, 1925, application was made to the Bureau of Biological Survey for a Federal Bird Banding Permit, and a supply of bands and record cards. Following this, application was made for the State Bird Banding Permit. A supply of traps was already at hand, and actual work began on September 30, 1925.

The type of trap adopted was the Lyon Improved Sparrow Trap, a modification of the so-called Government Sparrow Trap. This trap has given the best results for general bird banding work throughout the United States. Professor Stack recommended this trap as having proved markedly superior to any other type tried by him in his work here. The construction of this trap may be seen by reference to photographs elsewhere in this paper.

Nine traps were placed at once, and with a few minor changes these remained in the same position throughout the year. The location and changes of locations of traps will be described later.

As the map shows, the traps formed a line reaching almost across the college property from east to west.

Being far from the college buildings and somewhat removed from disturbance by passing people, their environment differed from that of Professor Stack's traps, which were rather more concentrated over a smaller area, and located close to the campus proper.

Since the problem of finding out exactly what sort of bait would be most effective for each species of bird, and the investigation of seasonal differences in bait preferences constitutes a large problem in itself, it was decided to bait the traps alike, and to use a mixture of baits which had already proven satisfactory in trapping operations. Consequently the traps used in this experiment and those of Professor Stack were baited practically alike throughout the year. The bait used consisted of a mixture of the following - whole wheat; whole oats; cracked corn; corn meal; buckwheat; millet; hemp. sunflower seed; bread crumbs; cracker crumbs; with some suet.

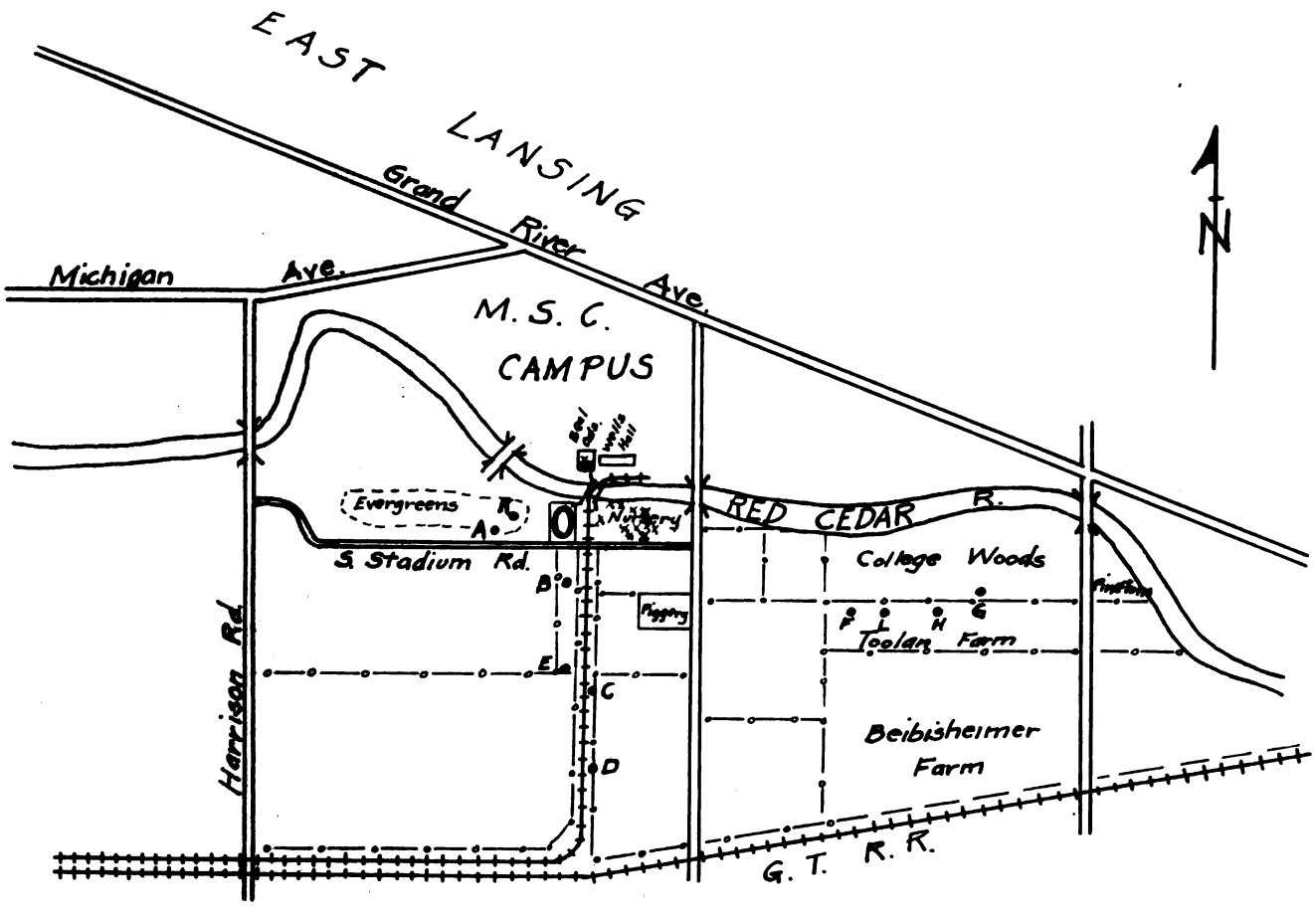
This bait proved attractive not only to many birds, but also unfortunately to some mammals as well. Skunks and weasels entered the traps to get at the suet, or possibly to kill trapped birds, while red and fox squirrels entered to get sunflower seeds or corn.

The fox squirrels were released when found, and the red squirrels and weasels killed, while the skunks were

permitted to escape at their leisure through a cautiously opened rear door. At first some trouble was encountered in getting at the weasels and red squirrels in order to kill them. This difficulty was finally overcome by carrying a number 1 steel trap when making the rounds. In case an animal was found in the trap the steel trap was set and pushed through the rear door into the wire cage bottom. The animal was then worried into stepping into the steel trap, then pulled out and dispatched easily. On several occasions birds were killed in the traps by skunks and squirrels, and on one occasion a junco was eaten by a large black cat. (This cat was disposed of satisfactorily by immersing trap, cat and all in the Red Cedar river for a few minutes). The disagreeable part of the mammal catching was that these animals damaged the bird traps so severely. Their frantic efforts to escape when they realized that they were caught often resulted in so smashing and bending the wires as to almost ruin the traps for bird work. Some traps had to be brought in and practically rebuilt. For a permanent bird banding station it would certainly be a wise thing to build a fence around each trap, although even this of course would not eliminate all trouble from mammals.

The traps were visited twice daily during the greater part of the year. The first trip was made starting about 7:20 A.M.;and the second starting about 4:30 P.M. This

schedule was sometimes interrupted due to conflicting class periods, or severe weather in winter, but in general was well maintained. The time necessary for each trip varied with the number of birds to be handled, but averaged between one and a half and two hours. The afternoon trip was made near dusk, to avoid the possibility of birds remaining in the traps over night. For this reason the trip was made after supper during most of the spring term. Only those traps located in the college woods were operated during the winter, as the other traps were covered with snow and not in places frequented by birds in winter.



LOCATION OF BIRD TRAPS

Bradt — •

Stack - x

Scale in Feet

1000 2000 3000 4000 5000

PLATE

LOCATION AND INDIVIDUAL RECORDS OF TRAPS

1. Trap A.

Located about 8 feet north of woven wire fence between alfalfa field and young evergreen planting. Before the establishment of the alfalfa and evergreen this land was a sand dune. Evergreen trees near the trap average about 8 feet in height. The trap was situated in a little opening where a tree is missing from one row. The environment of the trap is shown by the map and photograph. Trap A was operated from October first to December first; and from April fifth to June fifth. The trap location was buried under snow almost continuously during the winter months, and the evergreen planting as a whole was almost deserted by birds during this period, hence there was nothing to be gained by attempting to operate the trap in winter.

A

Record of Trap A

	Oct.	Nov.	April	May
Song Sparrow	1		5	1
Junco	30	9	23	2
White-throated Sparrow	2		3	13
Blue Jay		1		2
White-crowned Sparrow	1			5
White-breasted Nuthatch		1		
Cardinal			3	
Robin			1	
Chewink				1
Catbird				3
Lincoln's Sparrow				1
Bronzed Grackle				1
Mourning Dove				1
Individuals	34	11	35	30
Species	4	3	5	10

Total individuals	110
Total species	13

2. Trap B.

Trap B was located in a hemp patch in an open field, as shown by the map. This field was plowed late in the autumn, and was under cultivation during the spring, so the trap was not operated after December first. Although the hemp seemed to attract many birds, the trap was never very successful.

Record of Trap B

	Oct.	Nov.
Tree Sparrow	4	
Song Sparrow	5	
Junco		1
Pine finch	3	1
White-winged crossbill		1
American crossbill		2
Individuals	12	5
Species	3	4

Total individuals 17
Total species 6

Trap C

Located between the railroad spur and the fence to the east, in a grassy plot, near a clump of small willow shrubs. This trap was operated from October first to December first, and from April fifth to June fifth. Its location was not suitable for winter operation.

Record of Trap C.

	Oct.	Nov.	April	May
Song Sparrow	5	1	4	1
Junco	2	5		
White-throated Sparrow	1			1
White-crowned Sparrow	1			8
Tree Sparrow	11			
Fox Sparrow	1			
Field Sparrow	1			
Chewink	1			1
Bronzed Grackle				1
Quail	1			1
Individuals	24	6	4	13
Species	9	2	1	6
Total individuals	47			
Total species	10			


C

Trap D

Located in about the same relative position to the railroad spur and fence as C, but about 1000 feet farther south, on slightly higher ground, with no shrubbery near by.

Record of Trap D

	Oct.	Nov.	April	May
Tree Sparrow	1			
Song Sparrow	4		2	2
White-Crowned Sparrow	1			1
Field Sparrow				4
Junco	10			
Chewink	2			1
Bronzed Grackle				2
Individuals	18		2	10
Species	5		1	5
Total individuals	30			
Total species	7			

Trap E

Located a few feet north of the wire fence between a low pasture and the experimental berry patch, west of the railroad spur. On bare ground near low berry bushes, but with no trees within some distance. Not operated during the winter months

Record of Trap E.

	Oct.	Nov.	April	May
Blue Jay	2			
Myrtle warbler	1			
Quail	13	3	2	1
Junco	10	9		1
White-throated Sparrow	2			1
Vesper Sparrow	1		2	1
Song Sparrow	1		4	3
Field Sparrow			4	1
Tree Sparrow				1
White-crowned Sparrow				10
Red-headed woodpecker				3
Bronzed grackle				2
Mourning dove				1
Individuals	30	12	12	25
Species	7	2	4	11
Total individuals	79			
Total species	13			

Trap F

Located in the edge of a pasture field just south of the college woods, near the junction point of a bushy clearing and the woods. The photograph brings out the position of the trap relative to the woods and field. This trap was operated continuously from October first to June first, except for vacation periods and a few other exceptional days.

Record of Trap F

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Junco	4	10		1			8	3
White-throated sparrow	22							8
Chewink	1							1
White-breasted nuthatch	1	2		2		1		
Black-capped Chickadee		3						
Downey woodpecker		1						
Cardinal		1						2
Song Sparrow							5	1
Tufted titmouse							2	
Cowbird							1	
Brown Thrasher								1
Rose-breasted grosbeak								1
Individuals	28	17		3		1	16	17
Species	4	5		2		1	4	7
Total individuals	83							
Total species	12							

E

F

Trap G

Located a few rods inside the college woods from the south border, on a spot of hard land projecting into a swampy area toward the south. Surrounded by typical beech-maple forest, but not immediately under a tree. Some short grass in the open space around the trap. Operated from October to June.

Record of Trap G.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
White-throated sparrow	12	1						16
Chewink	1	1						
White-breasted nuthatch	1			3	1		2	
Tree Sparrow	1						1	
Black-capped chickadee			1	1			1	
Cardinal								1
Junco							4	
Brown Thrasher								1
Hairy Woodpecker				1				
Quail				2				
Individuals	15	2	1	7	1		8	18
Species	4	2	1	4	1		4	3

Total individuals 52
Total species 10

Trap H

Located in pasture field at south edge of college woods, at point where an old barb wire fence meets the woods at right angles from the south. Operated from October to June

Record of Trap H

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Hermit Thrush	12							
Olive-backed thrush	1							2
Quail	5							
White-throated sparrow	1							1
Blue jay		3						
Black-capped chickadee		4				1	4	
Song Sparrow							1	
White-breasted nuthatch			2				2	
Junco				2			1	
Tufted Titmouse							1	
Cowbird							1	
Flicker								
Downey woodpecker				1				
Individuals	19	7	2	3		1	10	3
Species	4	2	1	2		1	6	2
Total individuals	45							
Total species	13							

H

Trap L

Located in pasture at south edge of college woods, near point where a little ravine enters woods from pasture. Operated from October to June.

Record of Trap L

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
White-throated sparrow	2							
Junco		4	2		1			
Cardinal		1	1					
Black-capped chickadee		2			1	1		
Tufted titmouse		1				1		
Song Sparrow							2	1
Catbird								1
Chewink								1
Individuals	2	8	3		2	2	2	3
Species	1	4	2		2	2	1	3

Total individuals	22
Total species	8

Trap K

This trap was located nearly in the center of the young evergreen planting west of the stadium. The soil here is almost pure sand, without grass or weed covering. The trap was surrounded by small evergreens, averaging about three feet in height, with taller evergreen on every side. The trap was operated from October first to December first, and from April first to June first.

Record of Trap K.

	Oct.	Nov.	April	May
Song sparrow	1		1	1
Junco	20	4	12	2
White-throated sparrow	2	1		1
White-crowned sparrow	1			6
Cowbird				5
Bronzed grackle				1
Mourning dove			1	2
Catbird				1
Tree sparrow	1			
Blue jay	1			
Chipping sparrow			1	1
Vesper sparrow				1
Quail				1
Individuals	26	5	15	22
Species	6	2	4	11

Total individuals	67
Total species	13

On the following pages will be found the records for each species captured, together with such conclusions as could be drawn regarding each species.

In the first column is recorded the number of the band placed upon the bird's leg. These numbers are forwarded to Washington, together with the common and scientific name of the bird, and the date and trap in which the bird was taken. Any repeats are also recorded on the record card when it is sent to Washington.

The second column records the date of banding, or of recovery as the case may be.

The third column records the sex, where such was known. m stands for male; f for female; and imm. for immature.

The fourth column records the particular trap in which the bird was taken.

The fifth column records the repeats. By repeats is meant all recaptures of the bird during the same season, or a different season if it is reasonably certain that the bird has not left the vicinity in the meanwhile.

The sixth column records those cases in which the bird was taken by Professor Stack, after having been banded in the traps of the writer.

The last column records those cases in which the bird was originally banded by Professor Stack, and later recaptured in the traps of the writer. Birds falling in this category have their band numbers underlined in the first column, and are listed as recoveries by Bradt.

Table I

Order Passeres Family Fringillidae

Junco hyemalis hyemalis Junco, Snowbird

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
	Oct.					
A28382	1		F		Oct.16	
A28376	7		A	Oct.16,K;29,A Nov.1,2,K		
A28375	7		A			
A28374	7		A			
A24184	7	f	A			Sept.28
A24179	7	f	A	Oct.13,A		Sept.28
A24181	7		K	Oct.18,K;31,D; Nov.1,A; 2,B.		Sept.28
A28371	8		A			
A28372	8		A			
A37283	8		A			
A37281	9		A			
A24188	9	m	A			Oct.1
A24198	9	f	A			Oct.5
A37280	12	f	A		Oct.29	
A37279	12	f	A			
A37278	12	m	K	Oct.14,A		
A24211	12	f	K			Oct.8
A37277	13	m	A			
A37276	13	f	A	Oct.14,17,Nov.4,A		
A46443	15		A		Oct.28	
A46444	15		A			
A46445	15		A			
A36450	17	f	F			

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
A46450	Oct. 17		K		Oct.28	
A46453	17	m	K			
A46453	17		K			
A46455	17		K	Oct.19, A		
A24225	17	f	K	Nov.1,E		Oct.14
A24215	17	f	K	Oct.22,29,A;31,K; Nov.1,3,K; 4,5,A; 10,C;11,E;12,C	Nov.6	Oct.9
A24194	17	f	K	Oct.26,D		Oct.5
A46456	18		F			
A46457	18		A	Oct.27,D;28,A;29,K; Nov.1,2,K;4,A(dead)		
A46458	18		A	Oct.21,K;28,A;29,K; Nov.1,2,K;4,A,(dead)		
A46459	18		A	Nov.1,K;4,K		
A46460	18		A			
A46461	18		K			
A46462	18		K	Oct.31,D		
A46463	18		K	Oct.21,A		
A46464	18		K	Oct.21,A		
A46465	18		K			
A24222	18	m	K			Oct.14
A24229	18	m	A			Oct.16
A24216	18	f	A	Oct.19,K		Oct.10
A46466	19		A			
A24217	19		A			Oct.10
A46467	21		A			
A46468	21		A			

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
A37280	Oct 21		A			Oct.12
A24231	21	m	K	Oct.30,A		Oct.18
A46469	22		C			
A46470	22		C	Oct.31,E		
A46471	22		D			
A46472	22		D			
A46473	22		D			
A46474	22		A			
A46475	27	f	E			
A46476	27	m	E			
A46477	27		D			
A46478	27		E			
A37276	27	m	E	Oct.28,E;31,D		Oct.13
A46479	28		D			
A46480	28		D			
A46481	28		C		Oct.30	
A46482	28		E			
A46483	28		E	Oct.29,E;30,D;		
A46484	28		A			
A46485	28		A	Oct.29,K;Nov.2,A		
A46486	29		E			
A46487	29		D	Nov.5,B	Mar.18 1926	
A46488	29		K			
A46489	29		K			
A46490	29		K			
A46491	29		K			

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
	Oct.					
A46492	30		E			
A46493	31		D			
A46494	31		D			
A46498	31		F			
A24228	31	f	D			Oct.15
	Nov.					
A46499	1		F			
A46500	1		A	Nov.3,K		
A46501	1		A			
A46502	1		K			
A46503	1		K			
A24203	1	m	B			Oct.6
A46504	1		K			
A46505	1		E			
A24233	1	m	A	Nov.2,C		Oct.19
A24257	1	f	C			Oct.29
A24253	1	m	F			Oct.28
A46506	1		E			
A46507	1		E			
A46508	2		A			
A46510	5		E			
A24232	5	m	E	Nov.13,E		Oct.19
A46512	11		C			
A46513	11		C	Nov.11,E		
A46514	11		F			
A37221	12		E	Nov.13,E		

Band	Date	Sex	Trap	Repeats	Recovered by Stack	Banded by Stack
A 46515	12		C	Nov.13,E		
A 46516	12		C			
A 46519	13		E			
A 46520	17		F			
A 46521	17		F	Nov.25,F		
A 46522	17		F	Nov.17,18,F		
A 46523	18		F			
A 46524	18		F	Nov.21F;24,L; Dec.2,A		
A 46525	19		A	Nov.25,A		
A 46526	21		A		Dec.1	
A 46527	21		F			
A 46528	21		A			
A 46529	21		A			
A 46530	21		A			
A 46537	Dec. 10		L	Dec.16,L;Feb,4,H; Mar.12,H; 25,L; Apr.13,F		
A 46538	10		F	Dec.26,F;27,G		
A 46539	Jan. 26		H	Jan.27,G; Feb.4,L		
A 46540	26		H	Jan.27,H.		
A 50464	Feb. 4		L	Mar.25,L; Apr.22,G		
A 50474	Apr. 9		G			
A 50479	13	m	F			
A 50490	16		A			
A 50491	16		A	Apr.18,A		
A 50492	16		A			
A 50493	16		A			

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
A50494	Apr. 17		A			
A50495	17		A			
A50498	18		F			
A50500	18		A			
A50502	18		A			
A50503	19		A			
A50504	19		A			
A50507	19		A			
A50509	20		A			
A50510	20		A	Apr.23,F		
A50511	20		A	Apr.22,23,A		
A50512	20		A			
A50513	21		A			
A50514	21		A			
A37242	21	f	A	Apr.22,23,29,A		Nov.30, 1925
A50515	22		A			
A50516	22	m	H	Apr.23,H		
A50517	22		H			
A50518	23		K			
A50519	23		A			
A50520	23	m	K	May 1,A;5,K		
A50521	23		K			
A50522	23		K			
A50523	23		K			
A50527	24		K	Apr.26,30,K; May 1,A.		

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
A50528	Apr. 24		K	Apr.28,May1,K		
A50529	24		K		Apr.28	
A50531	25	f	A			
A50533	26	f	K	Apr.27,28,30,K		
A50534	26	f	A	Apr.29,30,May 1,A		
A50538	27		F	May 1, F		
A50539	27		F	Apr.30,F		
A50543	28	m	F			
A50544	28	f	F			
A50545	29	f	K			
A50546	29	f	G			
A50547	29	f	G			
A50548	29	m	G			
A50549	30	m	K			
A50550	30	f	F			
A50551	30	f	F			
A50552	30	f	K			
A50553	30	f	K			
171379	May 1	m	F			
171380	1	f	F			
171381	1	f	F			
171383	1	f	K			
171385	1	m	A			
171387	1	m	A			
171407	5	m	E			
A50558	6	m	K			

Table II

Record of Repeats. Juncos

Band	Date	Trap	Period of Repeats in days
A 28382	Oct. 1	F	
	16	Stack	16
A 28376	Oct. 7	A	
	16	K	
	29	A	26
	Nov. 1	K	
	2	K	
A 24184	Sept. 28	Stack	9
	Oct. 7	A	
A 24179	Sept. 28	Stack	
	Oct. 7	A	15
	13	A	
A 24181	Sept. 28	Stack	
	Oct. 18	K	
	31	D	35
	Nov. 1	A	
	2	B	
A 24188	Oct. 1	Stack	
	9	A	9
A 24198	Oct. 5	Stack	
	9	A	4
A 37280	Oct. 12	A	
	29	Stack	17
A 37278	Oct. 12	K	
	14	A	3
A 24211	Oct. 8	Stack	
	12	K	5
A 37276	Oct. 13	A	
	14	A	
	17	A	
	Nov. 4	A	23
A 46443	Oct. 15	A	
	28	Stack	14
A 46452	Oct. 17	K	
	28	Stack	12
A 46455	Oct. 17	E	
	19	A	3

Band	Date	Trap	Period of Repeats in days
A24225	Oct.14	Stack	
	17	A	
	Nov. 1	E	19
A24215	Oct. 9	Stack	
	17	K	
	22	A	
	29	A	
	31	K	
	Nov. 1	K	
	3	K	
	4	A	
	5	A	
	10	C	
	11	E	
	12	C	26
A24194	Oct. 5	Stack	
	17	K	
	26	D	22
A46457	Oct.18	A	
	27	D	
	28	A	
	29	K	
	Nov. 1	K	
	2	K	
	4	A	19
A46458	Oct.18	A	
	21	K	
	28	A	
	29	K	
	Nov. 1	K	
	2	K	
	4	A	19
A46459	Oct.18	A	
	Nov. 1	K	
	4	K	19
A 46462	Oct.18	K	
	31	D	14
A46463	Oct.18	K	
	21	A	4
A46564	Oct.18	K	
	21	A	4
A24222	Oct.14	Stack	
	18	K	5

Band	Date	Trap	Period of Repeats in days
A24229	Oct.16	Stack	
	18	A	3
A24216	Oct.10	Stack	
	18	A	
	19	K	10
A24217	Oct.10	Stack	
	19	A	10
A37280	Oct.12	Stack	
	21	A	10
A24231	Oct.18	Stack	
	21	K	
	30	A	13
A46470	Oct.22	C	
	31	E	10
A37276	Oct.13	Stack	
	27	E	
	28	E	
	31	D	19
A46481	Oct.28	C	
	30	Stack	2
A46483	Oct.28	E	
	29	E	
	30	D	3
A46485	Oct.28	A	
	29	K	
	Nov. 2	A	5
A46487	Oct.29	D	
	Nov. 5	B	8
	Mar.18	Stack	Return?
A24228	Oct.15	Stack	
	31	D	17
A46500	Nov. 1	A	
	3	K	4
A24203	Oct. 6	Stack	
	Nov. 1	B	27
A24233	Oct.19	Stack	
	Nov. 1	A	
	2	C	15

Band	Date	Trap	Period of Repeats in days
A24257	Oct.29	Stack	
	Nov. 1	C	4
A24253	Oct.28	Stack	
	Nov. 1	F	5
A24232	Oct.19	Stack	
	Nov. 5	E	
	13	E	27
A46513	Nov.11	C	
	11	E	1
A37221	Oct.19	Stack	
	Nov.12	E	
	13	E	26
A46515	Nov.12	E	
	13	E	2
A46521	Nov.17	F	
	25	F	9
A46522	Nov.17	F	
	18	F	2
A46524	Nov.18	F	
	24	L	
	Dec. 2	A	15
A46525	Nov.19	A	
	25	A	7
A46526	Nov.21	A	
	Dec. 1	Stack	
A46537	Dec.10	L	
	16	L	
	Feb. 4	H	
	Mar.12	H	
	25	L	
	Apr.13	F	124? Return?
A46538	Dec.10	F	
	26	F	
	27	G	18
A46539	Jan.26	H	
	27	G	
	Feb. 4	L	10
A46540	Jan.26	H	
	27	H	2

Band	Date	Trap	Period of Repeats in days
A50464	Feb. 4	L	
	Mar. 25	L	
	Apr. 22	G	77 ?
A50491	Apr. 16	A	
	18	A	3
A50510	Apr. 20	A	
	23	F	
A50511	Apr. 20	A	
	22	A	
	23	A	4
A37242	Nov. 30	Stack	
	Apr. 21	A	
	22	A	
	23	A	return
	29	A	9
A50516	Apr. 22	H	
	23	H	2
A50520	Apr. 23	K	
	May 1	A	
	5	K	13
A50527	Apr. 24	K	
	26	K	
	30	K	
	May 1	A	8
A50528	Apr. 24	K	
	28	K	
	May 1	K	8
A50529	Apr. 24	K	
	28	Stack	5
A50533	Apr. 26	K	
	27	K	
	28	K	
	30	K	5
A50534	Apr. 26	A	
	29	A	
	30	A	
	May 1	A	6
A50538	Apr. 27	F	
	May 1	F	5
A50539	Apr. 27	F	
	30	F	4

The total number of juncos captured, including recoveries, was 174. Of this number, 67 repeated, or 38%. Of the total number taken, 111 were caught during October and November, the period of Fall migration. The number of repeats during the Fall was 49, or 44.1% ± 3.2% .

During the Spring migration, from April 9 to May 6, there were 57 birds caught, of which number 13 repeated, or 22.8% ± 3.8% .

The probable error of the difference between the percentages of repeats for Fall and Spring is 21.3 ± 5.0%. Thus the ratio of the difference to its probable error is 3.6, which seems to indicate a significant variation between Spring and Fall repeats. This difference is probably due to the fact that the juncos lingered in the vicinity for considerable periods during their trip south in Fall, whereas in Spring, their local stopovers were apparently much more brief.

Of the 49 Fall repeats, 17 repeated more than once, and 40 repeated in traps other than that in which they were originally taken. Whether this tendency to repeat in different traps represented restlessness during the migration stopovers, or indicated a wide feeding range, it is difficult to say. Those repeating in different traps represented 35% of the total Fall repeats, showing at least that the juncos did not confine their range to any particular spot.

The longest stopover during Fall migration was the case of #24181, which was banded by Professor Stack on September 28, and was caught for the last time in Trap B on November 2. However, there were 24 cases in which juncos were trapped over a period of two weeks or more. From the data at hand it seems probable that the flocks of juncos which come from the north in the Fall are rather loosely combined, and that individuals or groups remain behind when the main flock passes southward. There is no positive evidence that the entire flock does not remain as long as do the individuals which are caught over a long period, but observation indicates that the flock as a whole does leave before many of the individuals which came at the same time do so.

Although the junco migration is practically completed by December 1, a few individuals remain during much of the winter, if not during the entire winter. Thus #46537 was banded December 10, and at intervals during the winter and spring until April 13. #46538, banded the same day, was also with us at least until December 27.

The length of stop-over in Spring, as indicated by the time elapsed between original capture and the latest recapture. was much less than that in the Fall.

The longest stopover in Spring was the case of A50520, 13 days, but most of the stopovers were from one to three days. The entire data for Spring points to a rather hurried flight northward as compared to the leisurely flight south during the Fall migration. There is no evidence to show any breaking up of flocks such as may have been the case in the Fall.

The only evidence to indicate that juncos may return north in Spring over the same route used to go south in Fall is the afforded by numbersA46487 and A37242. A46487 was banded on Nov. 5 and recovered March 18. A37242 was banded on Nov. 30 and recovered April 22. In neither case were the birds recovered at the same trap at which they were banded. Whether these birds remained near here all winter, or were really taken on the southward flight and retaken on the northward flight we do not know.

Order Passeres Family Fringillidae -

Melospiza melodia melodia Song Sparrow

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
	Oct.					
A28392	1	imm.	C			
A28391	1	imm.	C			
A28390	1	imm.	A			
A28389	1	imm.	B		Apr.14,1926	
A28388	1	imm.	B			
A28387	1	imm.	B			
A28385	2	imm.	K			
A28384	2	imm.	B			
A28383	2	imm.	B			
A28381	2	imm.	B			
A37275	13	imm.	D			
A46441	14	imm.	D			
A46442	14	imm.	D			
A46446	15	imm.	D			
A46448	16	ad.	C			
A46451	17	C	Oct.18,6			
171341	27		C			
171346	28		E			
A14816	28		C			Mar.20 1925
	Nov.					
171355	10		C			
	Apr.					
A50470	8		F	Apr.10,11,12,13,17 19,23,26,27,28,29,F May 2,5,16,F		
A50471	9		H	Apr.22,H		
A50472	9		H			
A50473	9		H			
A50475	9		H	Apr.30,May9,L(dead)		

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
A50480	Apr. 13		D	Apr.13,E;14(dead)		
A50481	13		D	Apr.15,16,18,19, 21,22,23,C; 24,26, 27,28,D; May 16,C.		
A50482	13		E	Apr.22,C;24,D;25, 26,C;27,D;28,29,30, C;May1,2,3,4,5,6,C; 8,9,11,12,13,14,15,E		
A50483	13		L	May 28,L		
A50484	14		C			
A50488	15		A	Apr.29,30,C; May 3, 15,C.		
146401	15		A	Apr.16,17,19,20,21, 22,23,24,25,A.		
A50496	17		A	Apr.19,F;(dead)		
A50497	17		H			
A50499	18		A			
A50501	18		H			
A50506	19		F			
A50508	20		F			
A14784	20		A	Apr.22,A; 26,K;27, A; 29,K,30,A,K.		Nov.16 1924
A50524	23		A			
A50525	23		E			
A50526	23		F			
A14830	23		A	Apr.23,30,May 1,K		Apr.7 1925
A50528	24		K	Apr.28,May 1,K		
A50530	24		A			
A50532	25		C	Apr.28,29,May 12, 20, E; May 22, C.		
A50536	27		E			
A50537	27		E	May 2,E		

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
171396	May 4		K	May 7,12,17,K	May 13	
171401	4		C	May 6,11,12,14, 16,18,20,29,30, 31,C		
178256	14		D	May 15,18,20,23 24,25,29,D		
178267	18		F			
178271	21		F			
178275	21		E	May 22,E		
178278	22		E			
178281	23		D			

Table IV

Record of Repeats. Song Sparrow

Band	Date	Trap		Period of Repeats in days
A28389	Oct. 1	B		
	Apr. 24 '26	Stack		return
A46451	Oct. 17	C		
	18	C		2
A14816	Mar. 20, '25	Stack		
	Oct. 28	C		return
A50470	Apr. 8	F	*	
	10	F		
	11	F		
	12	F		
	13	F	*	
	17	F		
	19	F	*	
	23	F		
	26	F		
	27	F		
	28	F		
	29	F		
	May 2	F		
	5	F		
	16	F		40
A50471	Apr. 9	H		
	22	H		14
A50475	Apr. 9			
	30	H		
	May 9	H		
		L		30
A50480	Apr. 13	D		
	14	C		2
A50481	Apr. 13	D		
	15	C		
	16	C		
	18	C		
	19	C		
	21	C		
	22	C		
	23	C		
	24	D		
	26	D		
	27	D		
	28	D		
	May 16	C		35

* Such breaks in continuity of repeats are not due to intermittent operation of traps, since every trap was operated every day without interruption.

Band	Date	Trap	Period of Repeats in days
A50483	Apr. 13	L	
	28	L	16
A50482	Apr. 13	D	
	22	C	
	24	D	
	25	C	
	26	C	
	27	D	
	28	C	
	29	C	
	30	C	
	May 1	E	
	2	E	
	3	E	
	4	E	
	5	E	
	6	E	
	7	E	
	8	E	
	9	E	
	11	E	
	12	E	
	13	E	
	14	E	
	15	E	34
A50488	Apr. 15	A	
	29	C	
	30	C	
	May 3	C	
	15	C	31
146401	July 9, '25	Stack	
	Apr. 15	A	
	16	A	
	17	A	
	19	A	
	20	A	
	21	A	
	22	A	
	23	A	
	24	A	return
	25	A	11
A50496	Apr. 17	A	
	19	F	3
A14784	Nov. 16, '24	Stack	
	Apr. 20	A	
	26	K	
	27	A	
	29	K	
	30	A, K	return 11

Band	Date	Trap	Periods of Repeats in days
A14830	Apr. 7, '25	Stack	
	Apr. 23, '26	A	
	30	K	return
	May 1	K	9
A50528	Apr. 24	K	
	28	K	
	May 1	k	8
A50532	Apr. 25	C	
	28	E	
	29	E	
	May 12	E	
	20	E	
	22	C	29
A50537	Apr. 27	E	
	May 2	E	6
171396	May 4	K	
	7	K	
	12	K	
	17	K	14
171401	May 4	C	
	6	C	
	11	C	
	12	C	
	14	C	
	16	C	
	18	C	
	20	C	
	29	C	
	30	C	
	31	C	28
178256	May 14	D	
	15	D	
	18	D	
	20	D	
	23	D	
	24	D	
	25	D	
	29	D	16
178275	May 21	E	
	22	E	2

Some very interesting points are suggested by this table of repeats. It seems evident that certain individual birds form definite habits of returning to particular traps to feed. Number A50402 acquired the habit of feeding at trap E to a marked degree. This bird broke a habit of feeding at traps C and D to form this "E habit". Number 146401 formed an "A habit", and number 17401 formed a " C habit". Thus it seems clear that birds: (1) remember definite locations, and (2) form the habit of going there to feed. This may be due, of course, to the birds having a very small range of operations, or it may be that they roam more widely, but return to a particular spot to feed at more or less regular intervals. This point might be cleared up by careful field observation of an individual bird, to determine whether the bird remains in the near vicinity of the trap between captures, or flies away and returns after an interval to feed again.

The total number of song sparrows banded was 56, of which 20 were banded during Fall migration, and 36 during Spring. There was but one repeat in the Fall giving a percentage of 5.0± 3.3%. During Spring migration there were 19 repeats giving a percentage of 52.8 ± 5.6%. The probable error of the difference between the percentages of repeats in Fall and Spring is 47.8 ± 6.5%. Thus the ratio of the difference to its probable error is 7.4, a significant ratio.

The difference between Fall and Spring repeats is probably due to the fact that many, if not most, of the birds caught during the Spring remained to nest here during the Summer. These birds, being in the vicinity of the traps continually after their arrival, naturally were caught frequently.

On the other hand, the birds caught during October were probably from farther north, and were passing southward without delay. Fall migration was almost completed during October, and judging from the records of Professor Stack and the Wing Brothers, much of it was completed during September.

At least five cases of return to the same vicinity during different seasons are shown by the records.

NumberA14784 was banded by Professor Stack

on November 19,1924, and was recovered April 22, 1926 at Trap A.

NumberA14830 was banded by Professor Stack April 7, 1925, and was recovered at Trap A on April 23, 1926.

NumberA28389 was banded as an immature bird at Trap B on October 1, 1925, and was recovered by Professor Stack April 14, 1926.

Number 146401 was banded by Professor Stack July 9,1925, was recoved April 15,1926 at Trap A.

NumberA14816 was banded by Professor Stack on March 20,1925, and was recovered at Trap C on October 28, 1925. This bird, of course, might have been a summer resident here, but those listed previously were almost certainly migrants between the dates of banding and recapture.

Frederick C. Lincoln, in the Auk for April 1926, gives some figures from the U. S. Bureau of Biological Survey relating to song sparrows. Out of some 10,000 song sparrows banded in the United States, over 500 have been recorded as returns during a different season, after migration. This amounts to about 5% of the total banded. Most of these returns were to the original banding station.

Table V

Order Passeres — Family Fringillidae

Zonotrichia albicollis — White-throated Sparrow

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded By Stack
160082	Oct. 7	imm.	F			
160087	7	imm.	F			
160090	7	imm	A	Oct.9,A;10,K.		
160093	8	im.	G	Oct.12,G.		
160094	8	ad.	G			
160095	8		G			
160096	8		G	Oct.9,D	Oct.11-23	
160100	8		F	Oct.13,F	Oct.11-28 Dec.,Jan, Feb. 19	
166426	8		F	Oct.13,14,16, 17,19,21,22,26,F		
166428	9		F			
166429	9		F			
166430	9		F	Oct.14,F		
166431	9		F			
166432	9		F			
166433	9		F			
166435	9		F			
166436	9		F			
166437	9		F			
166441	13		F	Oct.13,14,15,16 17,18,21,G		
166442	13		F	Oct.18,G		
171321	13		F	Oct.22,H		
171324	15		F			
171325	15		F			

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
171326	Oct. 15		F			
171327	15		F			
171328	15		F			
171329	15		F			
171330	16		G	Oct.29,G;Nov.1, F.		
146447	17		K	Oct.23,K		Oct.15
171334	18		F			
171336	21		G	Oct.26,G;27,29,H; 31,G; Nov.2,3,4,5, 6,7,G		
146444	21		E	Oct.23,E		Oct.13
171337	22		L	Oct.23,29,L;31,G; Nov.1,2,3,4,5,6,7, 10,11,12,13,14,17, 18,19,G;20,H.		
171338	22		A			
171339	26		E			
171343	28		H	Oct.29,G(dead)		
171345	28		C			
171347	29		L	Nov.1,4,5,7,10,11, 12,13,G;17,18,19,F; 21,G;22,L		
171348	29		L			
171351	29		G	Nov.1,2,6,7,10,11, 12,13,G		
171352	29 Nov.		G			
171353	3		K			
171360	13 Apr.		G			
171372	24		A	Apr.26,27,28,29,A.K.		

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
171373	Apr. 26		A		Apr.28	
171377	May. 1		G			
171378	1		G			
171382	1		E			
171384	2		K			
171389	3		F	May 4,F		
171390	3		F	May 4,F		
171394	3		F	May 4,F		
171395	3		F	May 4, F		
171397	4		E			
171398	4		F			
171399	4		F			
171400	4		F			
171405	5	m	F			
171412	6	f	A	May 7,A	May 8	
171413	6	m	A			
A 50557	6	f	A			
171414	7	m	C			
171418	7	f	A			
171419	7	m	A			
171420	7	f	A			
178236	7	m	A			
178239	9	f	G	May 14,G		
178240	9	f	G			
178241	9	f	G	May 13,G		
178242	9	m	G	May 13,14,15,16, 17,18,22-31,G.		

Band	Date May	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
178243	10	f	A			
178244	10	f	A	May 12,14,15,A,		
178245	11	f	G			
178247	12	f	G	May 13,14,15,G		
178248	12	m	G			
178249	12	m	H	May 13,14,15,G; 16,L;20-30,G		
178252	13	f	A			
178253	13	f	A			
178254	13	f	A			
178268	20	f	G			
178269	20	m	G			
178270	20	f	G			
178277	22	f	G			
178282	23	m	G			
178283	23	m	G			
178284	27	m	G			

Table VI

Record of Repeats. White-throated Sparrows

Band	Date	Trap	Period of Repeats in days
160090	Oct.7	A	
	9	A	
	10	A	4
160093	Oct.8	G	
	12	G	5
160096	Oct. 8	G	
	9	D	
	11	Stack	
	12	"	
	13	"	
	14	"	
	15	"	
	16	"	
	17	"	
	18	"	
	19	"	
	20	"	
	21	"	
	22	"	
	23	"	16
160100	Oct. 8	F	
	13	F	6
166426	Oct. 8	F	
	13	F	
	14	F	
	16	F	
	17	F	
	19	F	
	21	F	
	22	F	
	26	F	19
166430	Oct. 9	F	
	14	F	6
166441	Oct.13	F	
	14	G	
	15	G	
	16	G	
	17	G	
	18	G	
	21	G	8
166442	Oct.13	F	
	18	G	6
171321	Oct.13	F	
	22	G	10

Band	Date	Trap	Period of Repeats in days
160099	Oct 8	F	
	9	D	
	11	Stack	
	12	"	
	13	"	
	15	"	
	16	"	
	17	"	
	18	"	
	19	"	
	20	"	
	21	"	
	22	"	
	23	"	
	26	"	
	27	"	
	28	"	
	29	"	
	31	"	
	Nov.2	"	
	4	"	
	5	"	
	6	"	
	7	"	
	11	"	
	12	"	
	13	"	
	14	"	
	16	"	
	17	"	
	18	"	
	19	"	
	20	"	
	21	"	
	28	"	
	Dec.1	"	
	3	"	
	4	"	
	Jan.7	"	
	9	"	
	Feb19	"	135
171330	Oct.16	G	
	29	G	
	Nov. 1	F	
	3	F	
	4	F	
	5	F	
	6	F	
	7	F	23

Band	Date	Trap	Periods of Repeats in days
146447	Oct. 15	Stack	
	17	K	
	23	K	9
171336	Oct. 21	G	
	26	G	
	27	H	
	29	H	
	31	G	
	Nov. 2	G	
	3	G	
	4	G	
	6	G	
	7	G	18
146444	Oct. 13	Stack	
	21	E	
	23	E	11
171337	Oct. 22	L	
	23	L	
	29	L	
	31	G	
	Nov. 1	G	
	2	G	
	3	G	
	4	G	
	5	G	
	6	G	
	7	G	
	10	G	
	11	G	
	12	G	
	13	G	
	14	G	
	17	G	
	18	G	
	19	G	
	20	H	31
171343	Oct. 28	H	
	29	G	2
171344	Oct. 28	G	
	31	H	

Band	Date	Trap	Period of Repeats in days
171347	Oct.29	L	
	Nov. 1	G	
	4	G	
	5	G	
	7	G	
	10	G	
	11	G	
	12	G	
	13	G	
	17	F	
	18	F	
	19	F	
	21	G	
	22	L	25
171351	Oct.29	G	
	Nov. 1	G	
	2	G	
	6	G	
	7	G	
	10	G	
	11	G	
	12	G	
	13	G	16
171372	Apr.24	A	
	26	A	
	27	A	
	28	A	
	29	K	6
171373	Apr.26	A	
	28	Stack	3
171389	May 3	F	
	4	F	2
171390	May 3	F	
	4	F	2
171394	May 3	F	
	4	F	2
171395	May 3	F	
	4	F	2
171412	May 6	A	
	7	A	2
178239	May 9	G	
	14	G	6
178241	May 9	G	
	13	G	5

Band	Date	Trap	Period of Repeats in days
178242	May 9	G	
	13	G	
	14	G	
	15	G	
	16	G	
	17	G	
	18	G	
	22	G	
	23	G	
	24	G	
	26	G	
	27	G	
	28	G	
	29	G	
	31	G	23
178244	May 10	A	
	12	A	
	14	A	
	15	A	6
178247	May 12	G	
	13	G	
	14	G	
	15	G	4
178249	May 12	H	
	13	G	
	14	G	
	15	G	
	16	L	
	20	G	
	21	G	
	22	G	
	23	G	
	24	G	
	25	G	
	26	G	
	27	G	
	28	G	
	29	G	
	30	G	
	31	G	20

The numbers of white-throats were rather equally distributed between Fall and Spring migrations, 45 birds being taken in Fall, and 43 in Spring.

Of the 45 taken during the Fall, there were 19 repeated, giving a percentage of repeats of 42.2 ± 5.0%. Of the 43 taken during the Spring migration, there were 13 which repeated, or 30.2% ± 4.7%. Thus the ratio of the difference to its probable error is 1.7, which does not indicate a significant variation between Fall and Spring repeats. Such a variation is probably due to chance alone.

Of the 19 Fall repeats, 12 repe ated more than once, and 14 repeated in traps other than the one in which they were caught originally. As in the case of the juncos, it is difficult to say whether they roved in search of food, or from a feeling of restlessness during the migration period.

Eight of the birds remained in the vicinity for periods of two weeks or longer, showing no haste whatever about going south. The evidence from trap data points toward a leisurely passage south in the Fall, with probably considerable straggling by individuals or small groups.

#160099 seems to be a case of winter residence, since this bird was banded October 9, retaken on October 11, and from then on almost daily until December 4. Professor Stack then did not operate his traps regularly until Spring migration began. Nevertheless, 160099 was taken by Stack on January 7, and 9, and again on February 19. The repeat record of 160099 shows the persistence with which this bird fed in Professor Stack's traps during the Fall and Winter. The white-throats seem to be inclined to acquire the trap habit, and the trapper comes to expect to find certain birds in certain traps at every visit. #160099 was taken over a period of 135 days.

Of the 43 birds taken during Spring migration 13 repeated. Of these 13 captures, 6 repeated more than once, and 4 repeated in traps other than the original. Except in the cases of numbers 171373 and 171412 these repeats were in traps rather close to each other. In general the period of Spring stopover was short, usually only a day or two. There is little evidence of straggling during Spring migration.

Numbers 178242 and 178249 show very interesting records, since these birds were here long after the migration season for this species was past, and were in fact still in the woods when the traps were closed June first. These were both males. Were these merely stray males who for some reason lost touch with the flock and were "waiting for something to turn up", or

were they husbands with nothing to do while their mates were busy with nesting duties in the nearby woods? No female birds were taken with these males late in the season, nor were any noticed while tending the traps. Nevertheless, it seems more likely that these males were remaining with their mates to nest, than that they were left lonely strays after their companions had long ago left for the north.

No cases of return from one season to another were noted among the white-throats. Frederick C. Lincoln, in the Auk for April 1926, says that returns are almost unknown among these birds, although large numbers of them are trapped each year. This may indicate a return route entirely unlike that used for the southward journey.

Plate 2 offers some comparison between the white-throats taken at East Lansing and Jackson, Michigan. Since no individual has ever been taken at both stations, and the periods of large and small numbers do not coincide to any extent, it seems possible that the flocks stopping at the stations come from different places. Possibly the flocks stopping here have followed the Grand River valley in a general way, while those at Jackson have followed an entirely different route. The Wing Brothers, whose records have been made for the Jackson birds, think that their flocks come from the northwest in Fall.

The fact that no bird has ever been caught at both Jackson and East Lansing, although the two places are only about 40 miles distant, in nearly direct north - to-south line, shows the necessity of establishing a very large number of trapping stations throughout the state and nation if any conclusive results on general migration are to be obtained.

Due to differences in methods of operating traps and recording data, it was not feasible to attempt any statistical comparison of the migration records of the Wing Bros. with those of the writer.

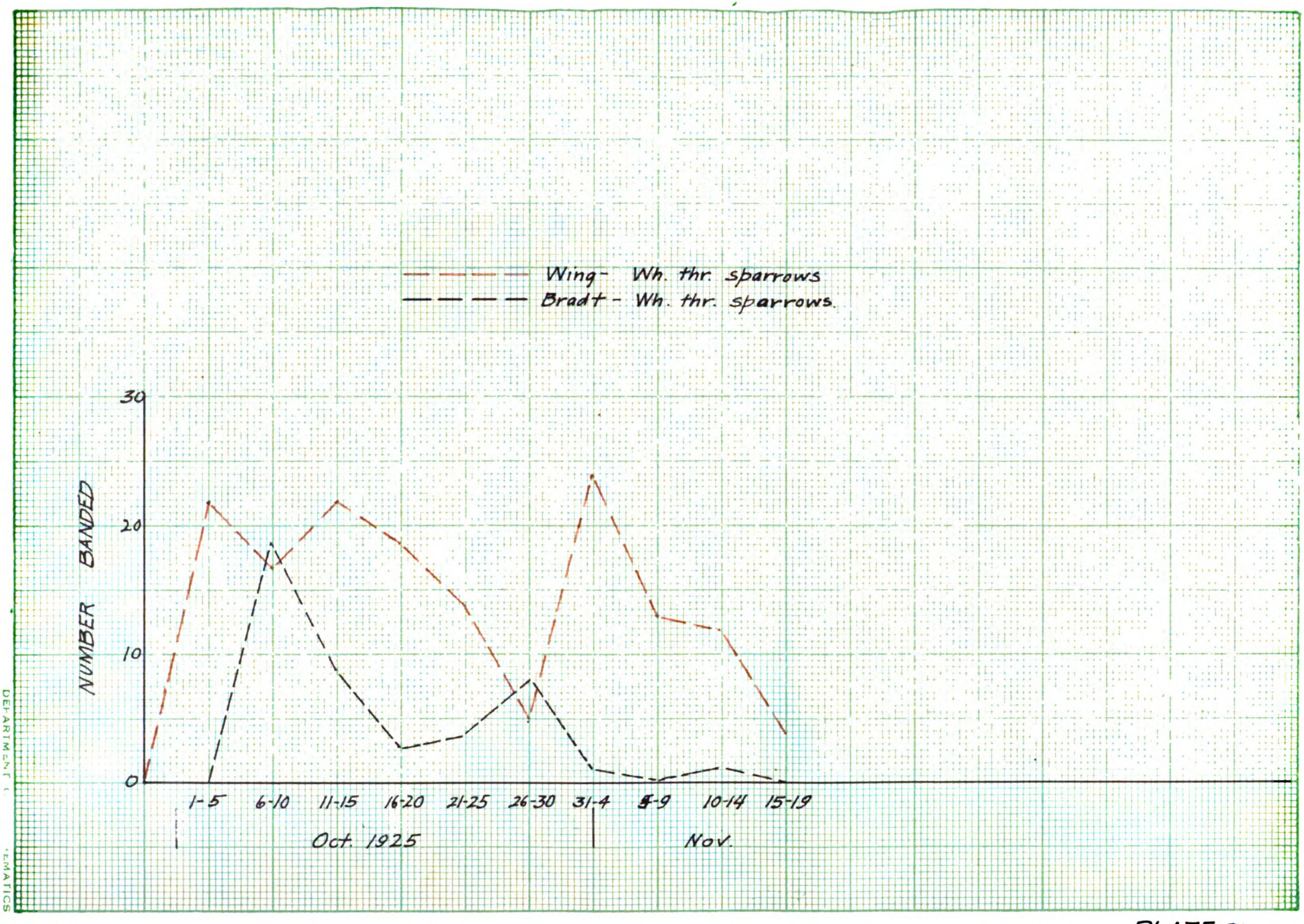


PLATE II

Table VII

Order Passeres Family Fringillidae

Zonotrichia leucophrys leucophrys White-crowned Sparrow

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
160078	Oct 7		K			
160079	7		K			
166445	13		A			
171331	15		D	Oct.21,E		
171386	May 2		E			
171388	3		E	May 5,6,7,8,C; 11,E		
171391	3		E	May 5,6,7,8,C; 9,E;11,C	May 5	
171392	3		E	May 4,6,E;12,C; 13,E		
171393	3		E	May 8,C		
171403	4		K			
171404	4		K			
171406	5		C			
171408	5		A	May 7,K		
171409	5		K			
171410	6		E			
171411	6		E			
171415	7		A			
171416	7		A			
171417	7		E	May 8,C		
178237	8		C			
178238	8		C			
178246	12		C			
178250	13		D	May 14,A		

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
	May					
178251	16		E			
178257	16		C			
178258	16		C			
178259	16		C			
178260	16		C			
178261	16		A			
178262	16		A			
178263	16		A			
178265	16		A			
178266	16		A			
178273	21		K			
178274	21		K			
178276	22		E			

Table VIII

Record of Repeats White-crowned Sparrow

Band	Date	Trap	Period of Repeats in days
171331	Oct. 15	D	
	21	E	7
171388	May 3	E	
	5	C	
	7	C	
	8	C	
	11	E	9
171391	May 3	E	
	5	C	
	7	C	
	8	C	
	9	C	
	11	C	9
171392	May 3	E	
	4	E	
	6	E	
	12	C	
	13	E	11
171393	May 3	E	
	8	C	6
171408	May 5	A	
	7	K	3
171417	May 7	E	
	8	C	2
178250	May 13	D	
	14	A	2

The number of white-crowned sparrows taken in the Fall was but 4, with 1 repeat. This gives a percentage of repeats of 25.0 ± 14.6%. Such a high percentage of probable error due to the very small numbers makes these figures of little significance. Evidence from Magee at Sault Ste. Marie, and from Wing Brothers at Jackson seems to point toward a considerable migration in September, which of course would not appear in this report.

During Spring migration 32 birds were taken, of which 7 repeated, a percentage of 22.0 ± 4.9%.

The percentage of difference between the repeats for Fall and Spring is 3.0 ±15.4%. This percentage, of course, is of no significance whatever.

The birds taken in Trap E on May 3, probably belonged to a single flock, of which at least these four birds remained in the vicinity for about ten days, as indicated by the fact that number 171392 was taken last on May 13; numbers 171388 and 171391 were taken last on May 11, and number 171393 was taken last on May 8. If the last date on which a member of the group was taken be considered the last date on which the group was here, then they must have remained from May 3 to May 13. Of course there is no proof that they <u>arrived</u> on May 3, or they they <u>left</u> on May 13.

Plates 3, 4, 5, and 6 are intended to show graphically the results from four different trapping stations with juncos, white-throated sparrows, white-crowned sparrows and song sparrows, the four species taken in greatest numbers here. Due to difference in the number of traps operated at these stations, to different feeds used, and different types of locations used for trapping, these results cannot be expected to be conclusive.

In the case of the traps of Professor Stack and myself, the most striking difference is in the relative numbers of juncos and white-throated sparrows taken. There seems to be two possible explanations. First, that the white-throats like to stick close to the river and so naturally are caught near the river. Second, that the juncos prefer the more open fields and woods away from town and campus. The results may be due to a combination of these factors.

In the case of the Wing Brothers at Jackson, the dates of migration peaks do not differ much from those here. The lack of junco migration at Jackson in the Fall is a puzzle. Evidently their station is off the regular route of the juncos for some reason. Their entire Spring migration is very light for these four species. They do catch large numbers of warblers and other species which are not caught here in any considerable numbers, however.

Another peculiarity noticed in comparing the Wing's records with ours here is that they have a heavy catch of white-crowned sparrows in the Fall and few in the Spring, while we had the exact opposite here. Does this indicate a possible difference in route in Fall and Spring?

The numbers of these four species taken at Sault Ste. Marie by Magee are hardly sufficient for drawing conclusions when compared with the numbers taken here. It is evident, however, that the junco migration there begins earlier and ends earlier than it does here. The peak of migration is the same in both places. The Spring migration of white-crowned sparrows also is evidently considerably later in the Upper Penninsula.

The graphs on the whole show very well the dates of migration of the different species, and they show that the bulk of migration takes place within rather narrow limits. The peak of migration is shown much more clearly by graphing the results of trapping operations than it is by observation alone. Although an observer can see that the migration periods of juncos and white-throats overlap, and that the juncos are somewhat later in Fall and earlier in Spring, the difference which actually exists between the peak of migration in the two cases would not be noted as it is except by analyzing

the results of trapping operations.

Statistical comparisons of the data contained in the graph will be found on a separate page preceding each graph.

Table IX

Order Passeres Family Fringillidae

Spizella monticola monticola Tree Sparrow

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
A28395	Oct. 1		B	Oct.6,C		
A283394	1		B	Oct.6,C		
A28393	1		B			
A28387	1		B			
A28380	6		C	Oct.7,C		
A28379	6		C	Oct.7,8,10, 12,14,C		
A28378	6		C	Oct.10,D;12,13, 14,17,C;22,E	Oct.22	
A28377	6		C	Oct.8,C		
160077	7		K	Oct.9,10,12,13, 14,K;16,D;19,B; 21,C;26,E		
160080	7		C	Oct.8,C;10,D;12, C;14,D;15,18,C; 21,22,E		
160081	7		C	Oct.10,12,13,D		
160088	7		C	Oct.8,C;13,D		
160089	7		C	Oct.12,C		
160092	8		C			
166427	9		B			
166438	10		C			
171322	14		C	Oct.14,C;16,D; 18,C;19,D;20,C; 21,22,E		
171340	26		G			
A50505	Apr. 19		G			
A50554	May 1		E			

The data obtained on tree sparrows tends to confirm the evidence of field observations; indicating that these birds are with us for a considerable period in October, and but for a very brief stop-off in late April and early May. The total number banded in the Fall was 18, of which number 12 repeated. The percentages of repeats was 66.6% ± 7.5%

Three of the birds, numbers A28379, 160077, 160080, repeated over a period of more than two weeks. Seven of the birds, numbers A28395, A28394, A28379, 160081, 160088, 160089, 171322, repeated over a period of from 5 to 8 days. One bird, number A28380, repeated but once, the next day after being banded, and one bird, number A28377, repeated only on the second day after being banded.

The two birds banded in the Spring did not repeat. Field observations made while tending the traps indicate that the tree sparrows are passing through the region in considerable numbers in late April and early May, but that a flock which arrives one day is not to be seen or heard on the following day. Thus it seems possible that the birds in Spring do not remain in any one locality long enough to become familiar with the Trap lunch tables.

Table X

Order Passeres **Family Fringillidae**

Spizella pusilla pusilla Field Sparrow

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
A 46499	Oct. 16		C			
A 50535	Apr. 26		E			
A 50540	28		E			
A 50541	28		E			
A 50542	28		E		Apr.28	
A 50556	May 4		E			
A 50559	11		D	May 12,D		
A 50560	11		D	May 12,13,14,D		
A 62401	11		D	May 12,13,D		
A 62403	11		D			

The Field sparrow is a common bird of the open fields and woods borders, although it passes unnoticed often because of its inconspicuous coat and unpretentious habits.

The records are insufficient to do more than offer a check on migration records by observation alone.

Table XI

Order Passeres — Family Fringillidae

Passerella iliaca iliaca — Fox Sparrow

Band	Date	Sex	Trap	Repeats
346281	Oct. 10		C	

Poectes gramineus gramineus — Vesper Sparrow

171342	Oct. 27		E	
171370	Apr. 19		E	
171371	19		E	
171402	May 4		E	
178255	13		K	

Spizella passerina passerina — Chipping Sparrow

A50555	May 1		K	

Melospiza lincolni lincolni — Lincoln's Sparrow

178272	May 20		A	

The Fox Sparrow is purely a migrant, and its capture is merely corroborative of the date of migration.

The Vesper sparrow is a migrant and a resident, but seems suspicious of traps, and it is not caught as often as might reasonably be expected from its numbers and habits, as observed in the field.

The Chipping sparrow is very common, but obviously does not enter the traps to any extent. Since

it is a seed eater, it seems strange that so few are taken in open field traps.

Lincoln's sparrow is probably not rare here, although it is not often recorded, due perhaps to its superficial resemblance to the Song Sparrow. It has been taken at several Michigan trapping stations.

Table XII

Order Passeres Family Fringillidae

Pipilo erythropthalmus erythropthalmus -Chewink, Towhee

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
	Oct.					
346258	9	m	F			
346259	10	f	D			
166440	13	f	G			
166443	13	f	D	Oct.14,G		
171335	18	m	C			
	Nov.					
171354	10	m	G	Nov.12,G		
	May					
391628	4	f	F			
391629	7	f	C			
346272	10	f	A			
391636	20	f	D			
391635	20	f	L			

As the records of the Chewinks do not show repeats or returns over any period longer than two days, they are of little value as migration data. Even the dates on which the birds were taken are well inside the periods when they are known to be here, so no deductions can be drawn.

Whereas in the case of the cardinals the males are taken more often than the females, the opposite seems to be true of the chewinks. Possibly the females taken in May were busy with nesting details, and siezed the opportunity to snatch a quick meal at an already prepared table.

Table XIII

Order Passeres Family Paridae

Penthestes atricapillus atricapillus - Black-capped Chickadee

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
A46509	Nov. 4		F			
A46517	12		F			
A46518	12		F			
A46531	25		H	Dec.2,G;8,10,12, L;15,G;18,F;Jam.7,F; Jan,8,L;19,G;26,L		
A46532	25		H			
A46533	25		H	Dec.2,G(dead)		
A46534	25		H	Dec.2,G;8,10,L; 14,F;15,18,G; Jan.8,L;17,G		
A46535	Dec. 2		G	Dec.8,10,12,L		
A50465	Mar. 23		L	Mar.25,F		
A50467	23		L	Apr.13,H;14,F; 18,G;28,H;29,F;30,L; May 1,H;3,G;(dead)		
A50468	25		H			
A50485	Apr. 14		G			
A50487	14		F			

Table XIV

Order Passeres Family Paridae

Baeolophus bicolor Tufted Titmouse

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
A50466	Mar. 23		L	Apr.8,G;14,F		
A50486	Apr. 14		F	Apr.17,19,28,H; 29,G;May 3,G		
A50487	15		F			
171374	28		H			

The chickadees, like the nuthatches, were irregular trap visitors. They evidently did not feed in the traps unless they had failed to find food readily elsewhere. These records raise the question as to what the chickadees did when they ceased to visit the traps after having been caught somewhat frequently over a considerable period.

NumberA46531 was taken now and then throughout December and January, and not at all after January 26. Did it simply find food plentiful without again visiting the trap; did it change its range either locally or widely; or did it perish through accident?

The same question arises in the case of numbersA46534 andA46535. Such questions as these can not be answered until there are a larger number of cooperators both locally and throughout the land.

The tufted titmice records merely show the presence of these birds during the spring. The titmice are interesting little fellows, owing to their remarkable pugnacity. Not only do they squeal and fight furiously while being handled, but the mate of the bird in the hand will actually attack the person thought to be mistreating the captured one. On three occasions the free bird actually pecked and buffeted the writer's cap in its efforts to aid its mate.

Observations while trapping during the spring and early summer indicate that the titmice are more common here than is generally supposed, and that at least one pair are now nesting in the College woods, near Trap C.

Order Passeres Family Sittidae

Sitta carolinensis White-breasted Nuthatch

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
	Oct.					
A46447	16	f	G			
A24186	18	f	F			Oct.1
	Nov.					
A24246	11	f	A			Oct.26
171359	12	f	F	Nov.24,L; Dec.2,F		
171361	17	m	F	Nov.22,F		
	Dec.					
171362	2	f	H	Dec.15,G;16,H; Jan.19,26,H; Mar.24,H;Apr.10,H		
171363	2	f	H	Mar.12,L		
	Jan.					
171364	7	m	F	Jan.17,G;Mar.25,L		
A24213	8	f	F	Jan.20,F;Mar.12,L		Oct.9
171367	17	f	G	Jan.19,G;20,G		
171366	17	m	G	Jan.20,G		
171368	19	m	G	Jan.20,27,G; Feb.3,G		
	Feb.					
A50463	3	m	G	Apr.9,14,24,G; May 7,G		
	Mar.					
A50469	25	m	F	Apr.8,G;16,H		
	Apr.					
A50477	9	m	G			
A50478	10	m	H	Apr.16,24,26,28,30, H; May 3,7,H.		

The records of the nuthatches are interesting as showing their persistence during the winter, and their irregularity as repeaters. The explanation of their irregular appearance in the traps is no doubt the fact that they resorted to trap feeding only when,for some reason, their customary food supply became temporarily inadequate. The Nuthatches seldom seem to acquire the 'trap habit' as some of the Fringillidae do.

Table XVI

Order Passeres — **Family Fringillidae**

Spinus pinus — **Pine Finch**

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
	Oct.					
A46495	31	m	B			
A46496	31	f	B			
A46497	31	f	B			
	Nov.					
A46511	9	m	B			

Loxia leucoptera — White-winged Crossbill

	Nov.					
171354	9	f	B			

Loxia curvirostra minor — Red or American Crossbill

	Nov.					
171357	10		B			
171358	10		B			

Zamelodia ludoviciana — Rose-breasted Grosbeak

	May					
410159	11		F			May 10

Cardinalis cardinalis cardinalis — Cardinal

	Nov.					
346265	21	m	F	Jan.26,F;Apr.26, L; May 15,F	Nov.30; Dec. 1 Jan.9	
	Dec.					
346266	3	m	L	Dec.8,L;Jan.19, 20,26,L		
	Apr.					
171369	18	m	A			
346269	26	m	A			
346270	26	f	A			
	May					
391634	15	m	F			
391641	23	f	G			

Order Passeres — Family Mniotiltidae

Dendroica coronata — Myrtle Warbler

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
A28373	Oct. 7		E			

Order Passeres — Family Mimidae

Dumetella carolinensis — Catbird

391631	May 11		L			
391637	20		A	May 24,A		
391642	24		A			
391643	24		A	May 27,K		

Taxostoma rufum — Brown Thrasher

391630	May 8		F			
391633	15		G			

Order Passeres — Family Corvidae

Cyanocitta cristata cristata — Blue Jay

346261	Oct. 15		K			
69944	Nov. 2		A			Mar,6,'25
346262	2		H	Nov.6,G		
346263	6		H			
108815	21		H			Mar.9,'25
346256	Oct. 7		E		Jan.8,'26	
346257	7		E	Oct.13,K;27,A; Apr.13,A		

The records of the preceding two pages afford little basis from which to draw conclusions. The Pine Finch records, like those of the White-winged and American Crossbills, are decidedly unusual for this locality, and show that these small migrants do make feeding stop-offs here, and may be caught in traps. Their small size, and habit of keeping largely to open fields probably permits their passage to be almost unnoticed in most cases.

The Myrtle Warbler captured is also very unusual, since the warblers, although common enough, are rarely attracted by anything in a trap of this type.

The Brown Thrasher and Catbird are both rather abundant here during the summer, and probably could be taken in considerable numbers after a little experimentation with baits. Both seem to feed principally on insects and fruits, with seeds forming a decidedly minor portion of their diet. Hence one would not expect to capture them with a purely seed bait.

Although Blue Jays are one of the most conspicuous and abundant birds on the College Campus, they are by no means so numerous out in the nearby woods and fields. They seem to have a strong preference for the haunts of man.

Whether the blue jays which summer here remain all winter, or are replaced by birds from farther north cannot

be answered from these records. The record of number 346256, however, seems to indicate that this bird did remain at least for part of the winter, since he was banded October 7, and was still here on January 8. Some of the other jays were taken in the autumn, and retaken in the spring, but this proves nothing. They might have gone farther south for the winter, or merely have shifted their local habitat for a time. The Bureau at Washington is particularly interested in the blue jay records, and probably will have some authoritative information in the near future.

The Rose-breasted Grosbeak is not uncommon here during the migration season, and Professor Stack has taken a number. They seem to prefer the Campus to the open woods and fields, and so are not often captured in the latter.

The Cardinal has become one of our common birds of late years, and is a winter resident in many cases. The records of numbers 346265 and 346266 show that these birds remained with us during at least part of the winter, although the evidence is not positive that they were here during the autumn and summer. However, it seems likely that the cardinal which was here from November 21 to May 15, probably does stay with us the rest of the year as well.

The male cardinals seem to be either more hungry, more bold, or more gullible, as the case may be, since five males were captured as against but two females. In such small numbers of individuals, of course, this means little.

Table XVII

Order Passeres **Family Turdidae**

Planesticus migratorius migratorius Robin

Band	Date	Sex	Trap	Repeats
	Apr.			
346271	27		**A**	

Hylocichla guttata pallasi Hermit Thrush

	Oct.			
160083	7		H	
160084	7		H	
160085	7		H	
160086	7		H	
160097	8		H	
166439	13		H	
346260	13		H	
171323	14		H	
171332	17		H	
171333	17		H	
171349	29		H	
171350	29		H	

Hylocichla ustulata swainsoni Olive-backed Thrush

	Oct.			
160098	8		H	
	May			
178279	22		H	
178280	22		H	

Just why Trap H caught all the thrushes is a mystery. Its location was <u>apparently</u> not much different from the other College Woods traps. Since none of the thrushes repeated or returned, and both varieties are summer residents, the data seems to be of little value as yet.

Table XVIII

Order Passeres — Family Icteridae

Molothrus ater ater — Cowbird

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
171375	Apr. 28	f	H			
171376	29	f	F			
410154	May 1	f	K			Apr.24
328165	1	m	K	May 19,K		Apr.18
391626	1	m	K			
391627	1	f	K		May 2	
265517	25	m	K			Apr.1,'25

Quiscalus quiscula aeneus — Bronzed Grackle

346273	May 24	f	D			
361152	27	m	A			Apr.26
346274	27	f	C			
346275	27	f	D	May 28,E		
346276	27	m	E			
346277	28	m	K			
346278	29	m	E			

Since Professor Stack has secured considerable, as yet unpublished, data on the movements of Grackles and Cowbirds, no attempt will be made to draw any conclusions from these meager records here.

Table XIX

Order Pici — Family Picidae

Dryobates pubescens medianus — Downy Woodpecker

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
240957	Nov. 7	f	F	Nov.11,F; Dec. 12,L.	Mar.1925 Apr.1926	Oct. 21, 1924
50461	Jan. 27	f	H			

Dryobates villosus villosus — Hairy Woodpecker

171365	Jan. 8	f	F	Jan.20,G		

Colaptes auratus luteus — Flicker

413299	Apr. 29		H			

Melanerpes erythrocephalus — Red-headed Woodpecker

391638	May 22	f?	E			
391639	23	f	E			
391640	23	f	E	May 25,E;28,D; 29,30,E		

Both the Flicker and Red-headed Woodpecker are very rarely taken in bird traps according to the records for Michigan. It would be interesting to know just why they entered the traps, as the traps in which they were taken were baited with seeds only at the time of capture in each case. The Downey Woodpecker number 240957 is an interesting record, as it has been taken once during the autumn of 1924, once during the spring of 1925, twice during late fall and early winter of 1925, and once during the spring of 1926. Do these captures represent transitory stops during migration?

Table XX

Order Columbae — Family Columbidae

Zenaidura macroura carolinensis — Mourning Dove

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
346268	Apr. 24		K			
413301	May 18		K			
413303	25		K			
285365	27		E	May 28,A		May 26, 1925

These records show little other than the simple fact that Mourning Doves may sometimes be taken in bird traps. Professor Stack's records show that they are more likely to be captured in summer than at any other time of year.

Table XXI

Order Gallinae — Family Odontophoridae

Colinus virginianus virginianus — Bob-white, Quail

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
284751	Oct. 14	m	C			
284752	17	imm.	E	May 14,20,1926,E		
284753	17	imm.	E			
284754	23	imm	H			
284755	23	imm	H			
284756	23	imm.	H			
284757	23	imm.	H			
284758	23	imm.	H			
206659	27	f	E		Nov.29,'24 repeats Jan.9, 16,30, May 19, 1926	
284759	27	m	E			
284760	27	imm.	E			
284761	27	imm.	E			
284762	27	imm.	E	Nov.21,E		
284763	27	imm.	E			
284764	27	imm.	E			
284765	27	imm.	E	Nov.4,C		
284766	27	imm.	E			
284767	27	imm.	E	Nov.21,E		
284768	27	imm.	E	Nov.21,E		
284769	27	imm.	E	Nov.21,E		
284770	Nov. 21	imm.	E			
284772	21	imm.	E	May 14,E		
284773	21	imm.	E			
284774	21	imm.	E			

Band	Date	Sex	Trap	Repeats	Recoveries by Stack	Banded by Stack
	Jan.					
284775	8	m	G			
413296	8	m	G			
	Apr.					
413297	27	m	E			
413298	29	m	E	May 15,C		
	May					
413300	17	m	C			
413302	20	m	E			
413304	25	f	K			

Although at the outset of the bird banding work it was expected that considerable data would be obtained on local quail migration, this expedtation was not realized. The number of quail taken during the year was too small, and the repeats too few, to justify any conclusions regarding local migrations, except to indicate that the flocks in this immediate vicinity apparently did not remain in their autumnal haunts during the winter. If they had remained in the vicinity of the traps during the winter they would almost certainly have been taken during stormy periods when snow covered the ground. This has proven true in the case of Professor Stack's traps during previous years.

An interesting case is that of the female, number 206659, banded by Professor Stack in November, 1924, which repeated at his traps during the winter and spring of 1925, and was trapped with an adult male and ten immature young on October 27,1925. Probably this capture represented the female with her mate and young of the summer of 1925.

Comparative Numbers of Birds Banded on Clear and Stormy Days

From October first to November twenty-fifth, 1925, there were twenty clear days and twenty stormy days on which birds were banded. The classification of clear and stormy days is rough: Days on which the weather was clear most of the time being classed as clear, and days on which there was any considerable amount of rain or snow classed as stormy.

While this classification leaves much to be desired, it is probably as satisfactory for this purpose as any other, since it indicates in a general way weather conditions locally which would be most likely to influence the actions of birds. Since the temperature tends to grow progressively colder as autumn advances it would be difficult to base any comparison on the comparative degrees of temperature on a series of days. So many other factors enter into any calculations of this sort that it seems best to avoid any attempt to correlate temperatures with numbers of birds.

Twenty stormy days		Twenty clear days	
11	individuals banded	3	individuals banded
6		22	
17		12	
5		3	
11		4	
14		11	
2		5	
6		18	
5		7	
2		11	
19		7	
12		15	
1		1	
1		1	
2		2	
1		4	
2		4	
2		6	
1		5	
6		12	
126		153	

Total banded on stormy days was 126. Mean per day 6.3 ± .65. Total banded on clear days was 153 Mean per day 7.6 ± .86. Probable Error of the two means ± 1.07. Difference of the two means 7.65 - 6.30 = 1.35 ± 1.07 . The difference is only 1.26 times the probable error. With so small a difference we may expect that about two times out of five, due to chance alone, the results would be reversed. Therefore, we cannot say that there is any significant difference in the number of birds caught on stormy and on clear days.

Table to show Correlation between Numbers of Individuals and number of Species Trapped, for October and November.

Oct.	Birds	Species	Nov.	Birds	Species
1	14	3	1	13	1
2			2	3	2
3			3	1	1
4			4	1	1
5			5	2	1
6	5	2	6	1	1
7	23	7	7	1	1
8	12	5	8		
9	17	4	9	2	2
10	3	3	10	4	2
11			11	5	2
12	4	1	12	6	3
13	11	7	13	1	1
14	5	4	14		
15	11	4	15		
16	5	5	16		
17	14	5	17	5	2
18	18	5	18	2	1
19	2	1	19	1	1
20	6	2	20		
21			21	12	4
22	8	2	22		
23	5	1	23		
24			24		
25			25	4	1
26	2	2	26		
27	19	4	27		
28	11	3	28		
29	12	3	29		
30	1	1	30		
31	7	2			

The coefficient of correlation for number of species and number of individuals caught during October and November is + .80

This shows that over a period of two months there is a high degree of correlation between numbers of birds and numbers of species, even though the larger percentage of birds caught belong to three or four species only.

Table to show correlation between numbers of individuals and number of species trapped for April and May.

April	Birds	Species	May	Birds	Species
1			1	15	5
2			2	2	2
3			3	8	2
4			4	11	5
5			5	5	3
6			6	7	3
7			7	9	3
8	1	1	8	3	2
9	7	3	9	4	1
10	1	1	10	3	2
11			11	6	4
12	1	1	12	5	3
13	5	2	13	7	4
14	3	3	14	1	1
15	3	2	15	2	2
16	4	1	16	9	1
17	4	2	17	1	1
18	6	3	18	2	2
19	7	4	19		
20	6	2	20	9	7
21	3	1	21	3	2
22	3	1	22	6	5
23	10	2	23	6	4
24	6	4	24	3	2
25	2	2	25	3	3
26	6	4	26		
27	6	4	27	6	3
28	7	4	28	1	1
29	7	4	29	1	1
30	6	2	30	1	1
			31		

The coefficient of correlation for number of species and number of individuals caught during April and May is + .67. While this is not as high a degree of correlation as that for October and November, still it shows a relatively high correlation for the spring migration season.

Plate 7 shows this correlation graphically.

Plates III and IV seem to indicate that the peak of migration for the juncos comes later in the Fall than do the peaks for the white-throats, white-crowns, and song sparrows. The three latter species seem to reach their peaks of migration in the Fall at about the same time.

In Spring the juncos and song sparrows reach their peaks of migration at approximately the same time, which is earlier than the peaks for white-throats and white-crowns.

Since these graphs were constructed on the basis of a 15 day interval, which brings out the peaks strongly, but is not very accurate, the data were subjected to analysis by statistical methods in an effort to determine whether the difference between peaks is really significant, or is likely to be due to chance.

A comparison of migration of juncos and white-throats for the Fall period from Oct. 1 on as shown by Bradt's records follows:- The mean day of migration for the juncos, which corresponds approximately to the peak of migration on the graph, was reached on Oct. 26, or 26.6 days ±.94 days after the start of operations, on Oct. 1.

In the case of the white-throats the mean was reached on Oct. 15, or 15.7 days ± 1.8 days after Oct. 1.

The difference between the means for these two species is 10.9 days ± 2.0 days. From these figures it seems that there may be a real difference between the mean migration dates of juncos and white-throats. This difference would probably be even greater had the records been kept for the month of September, since the white-throats were in migration before these records began on October 1.

A comparison of migration of juncos and white-throats for the Spring period. Bradt's records.

The mean day of migration for the juncos was reached on Apr.25,or 25.9 days after April 1,with a probable error of ±.89 .

The mean for white-throats came on May 6,or 36.2 days after Apr.1,with a probable error of .94 .

The difference between the means for these two species is 12.3 days ±1.15 . In this case,as in the Fall period, the difference between the mean dates of migration is,then, probably not due to chance.

Hence we may conclude that there is a real lag of the juncos behind the white-throats in Fall of about 11 days, and a lag of the white-throats behind the juncos in Spring of about 12 days. Too much importance should not be attached to these figures,which represent the data for but a single year. It would be of interest to continue these records for several years,to see whether the lag remains more or less constant over an extended period.

No attempt was made to analyze the data for song sparrows and white-crowned sparrows for the Fall period, since not only were the numbers small,but in the case of the song sparrows the migration period was far advanced before these records were begun,as shown by the records from other Michigan stations. The Spring records of these two species are treated on a later page.

A comparison of migration of juncos and white-throats for the Fall migration after Oct. 1. Stack's records.

The mean day of migration for juncos was reached on Oct.27,or 27.0 days after Oct.1,with a probable error of ± 1.1 days.

The mean day of migration for the white-throats was reached on Oct.12,or 12.4 days after Oct.1,with a probable error of ± 2.2 days.

The difference between the means for these two species was 14.6 days ± 2.46 days,which may be considered as a significant difference,since the mean is six times its probable error.

In Spring the mean day of migration was reached on Apr.29,or 29.8 days after Apr.1,with a probable error of ± 1.5 days,in the case of the juncos.

The mean day of migration for white-throats was reached on May 8,or 38.2 days after April 1,with a probable error of ± 1.1 days.

The difference between the means for these two species in Spring was 17.4 days, ± 1.9 days,a ratio which indicates that this difference is significant,and not due to chance alone. This corroborates the conclusions reached from the study of Bradt's records.

A comparison of means from the records of Bradt and Stack.

Bradt- mean of migration for juncos, Fall -26.6

Stack- " " " " " " -27.0

Difference - 0.4

A difference of .4 days is obviously unimportant.

Bradt-mean of migration for juncos, Spring -23.9

Stack- " " " " " " -29.0

Difference - 5.1

The probable error of this difference is ± 1.7, which indicates that the difference is probably due to chance.

Bradt-mean of migration for white-throats, Fall -15.7

Stack- " " " " " " " -12.3

Difference - 3.4

The probable error of this difference is ± 2.0, which again indicates that the difference is probably due to chance.

Bradt-mean of migration for white-throats, Spring -36.2

Stack- " " " " " " " -38.2

Difference - 2.0

The probable error of this difference is ± 1.44, which indicates that this difference is also due to chance.

Hence we may conclude that the records of Bradt and Stack do not differ significantly in the case of these two species.

A comparison of migration of white-crowns and song sparrows with the migration of white-throated sparrows and juncos.

The mean for migration for white-crowns in Spring was 37.6 days, while that for white-throats was 36.2 days, a difference of 1.4 days. The probable error of the difference is ± 1.7, an error greater than the difference itself. Hence we may conclude that the difference is not significant, and that the migrations of white-throats and white-crowns are approximately synchronous. Stack's records tend to corroborate this conclusion.

The mean day of migration for song sparrows came on April 27, or 27.0 days after April 1. The mean for white-throats was 36.5 days. The difference between these two means was 9.5 days, with a probable error of ± 5.1 days. In spite of the apparently large difference between these means, the ratio of the difference to its probable error indicates that such a difference might well have been due to chance alone.

The mean day of migration for juncos in Spring was 25.9 days. The difference between the means for juncos and song sparrows was 3.1 days, ± 5.1 days. This difference was probably due to chance.

From these data it appears that there was probably no significant difference in the migrations of song sparrows and white-throats, or of song sparrows and juncos. Migration seems to be synchronous in these species.

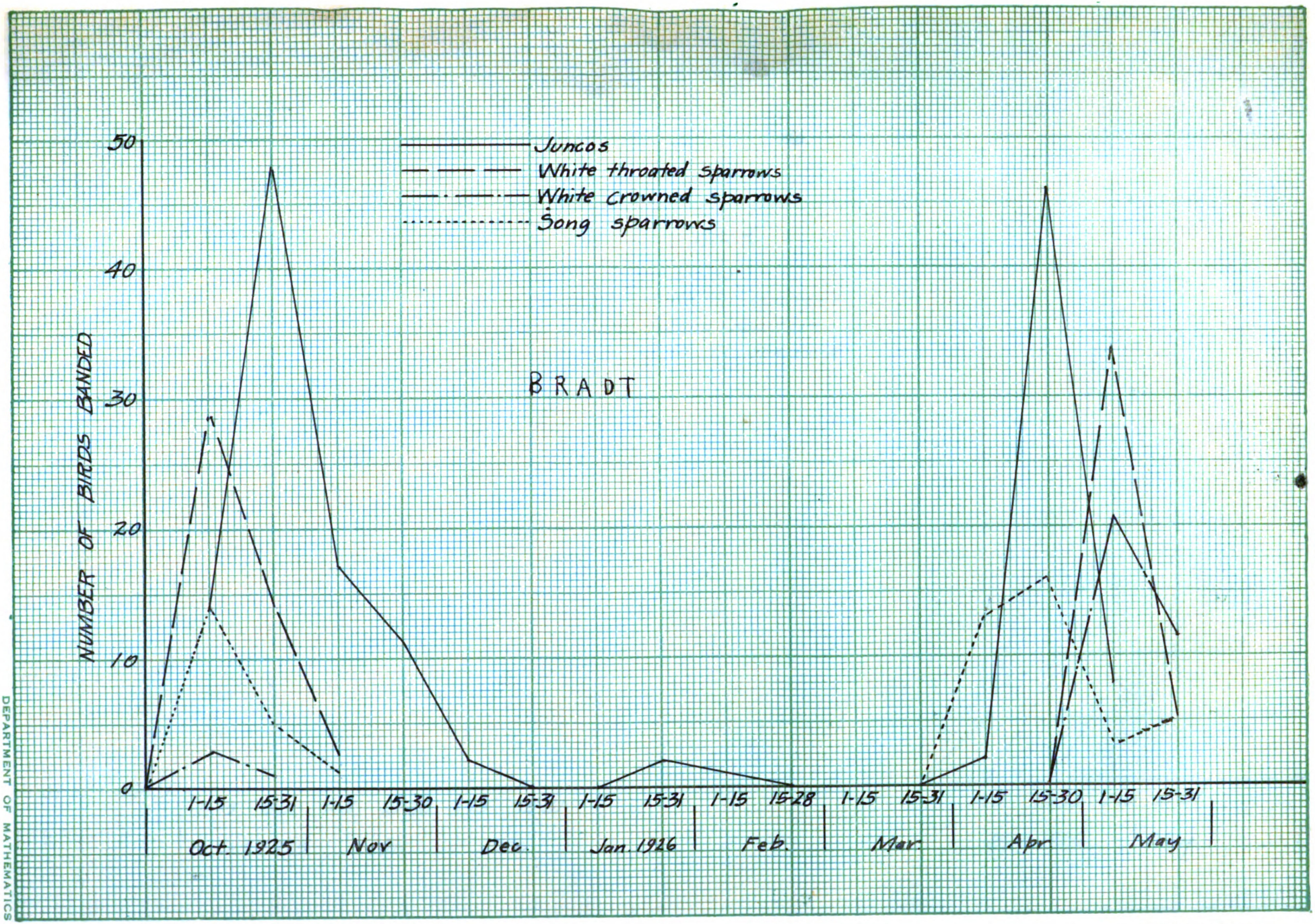
Table of Daily Captures of Four Principal Species.
Bradt's records.

Date Oct.	W.T. Sp.	W.C. Sp.	Sng. Sp.	Jnco. 1
1			9	
2				
3				
4				
5				
6	1			
7	3	2		3
8	7			3
9	10			3
10				
11				
12			1	3
13	2	1	2	2
14			1	
15	6		1	3
16	1	1	1	
17			1	3
18	1			1
19				1
20				
21	1			3
22	2			6
23				
24				
25			1	
26	1			5
27			1	
28	3			7
29	4			6
30				1
31				3
Nov.				
1				9
2				1
3	1			
4				
5				1
6				
7				
8			1	
9				
10				
11				3
12				2
13	1			1
14				
15				
16				
17				4
18				2
19				1
20				
21				5
22				

Date Apr.	W.T. Sp.	W.C. Sp.	Sng. Sp.	Jnco.
8			1	
9			4	1
10				
11				
12			1	
13			4	1
14			1	
15			1	
16				4
17			2	2
18			2	3
19				3
20			1	4
21				2
22				3
23			4	6
24	1		2	2
25			1	1
26	1			2
27			2	2
28				2
29				4
30				5
May				
1	3			6
2	1	1		
3	5	4		
4	4	2	2	
5	1	3		1
6	3	2		1
7	5	3		
8		2		
9	4			
10	2			
11	1			
12	3	1		
13	3	2		
14			2	
15				
16		9		
17				
18			1	
19				
20	3		1	
21		2	1	
22	1	1	1	
23	2		1	
24				
25				
26				
27	1			
28				
29				
30			1	
31				

Table of Daily Captures of the Four Leading Species.
Stack's records.

Date Oct.	W.T. Sp.	Sng. Sp.	Junco.	Date Apr.	W.T. Sp.	W.C. Sp.	Sng. Sp.	Junco.
1		1	3	11			1	
2				12			1	
3				13			2	2
4				14			2	1
5	7		5	15			1	2
6	7		3	16			1	1
7	1	2	3	17			1	
8	1		3	18			1	
9	1	1	2	19			3	3
10	2		2	20				
11	0		1	21				
12	1		1	22	1			5
13	2		1	23				5
14	2		4	24				
15	1	1	1	25	3		1	
16	1		2	26	2			
17				27				2
18	1		1	28	1		1	
19			2	29				1
20	2		3	30				
21				May				
22		1		1	2			1
23				2				
24				3	3		1	
25				4	3			
26	2		4	5	1	2	1	
27			2	6	3	1		
28			3	7	5			
29			3	8	6			
30	1		2	9	3	1		
31			1	10	5	1		
Nov.				11	2	1		
1				12	3			
2			2	13				
3			1	14		1	1	
4				15	4			
5			2	16				
6				17	2	1		
7				18				
8				19	3	2		
9			7	20	3	1		
10			7	21				
11								
12								
13			3					
14								
15								
16			1					
17	1		3					
18			4					
19			1					
20								
21								
22								
23								
24			2					
25			2					
30								

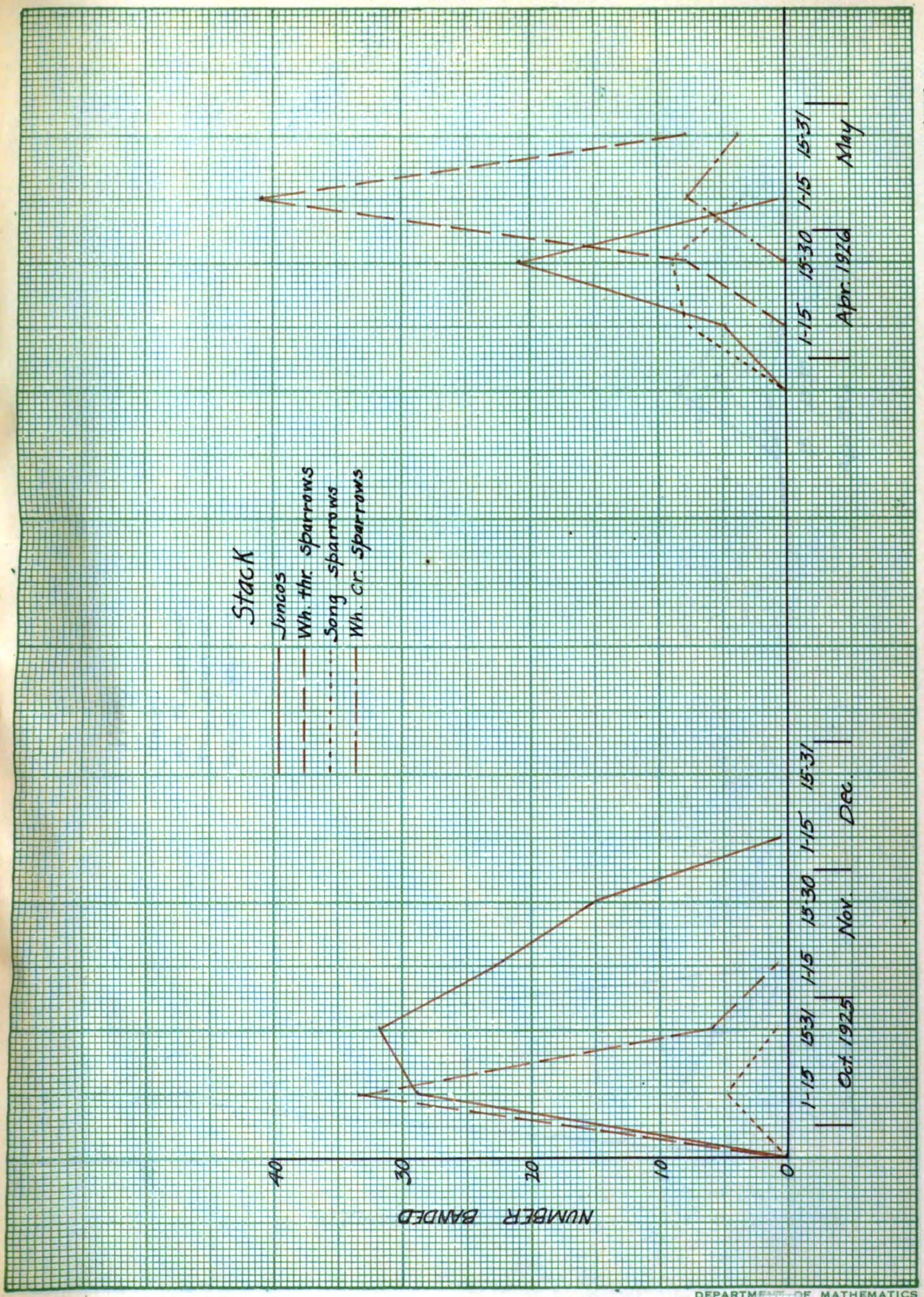


MICHIGAN AGRICULTURAL COLLEGE

DEPARTMENT OF MATHEMATICS

PLATE III

PLATE IV.


Stack
Juncos
Wh. thr. sparrows
Song sparrows
Wh. cr. sparrows
NUMBER BANDED
40
30
20
10
0
1-15
15-31
1-15
15-30
1-15
15-31
Oct. 1925
Nov.
Dec.
1-15
15-31
1-15
15-30
1-15
15-31
Apr. 1926
May

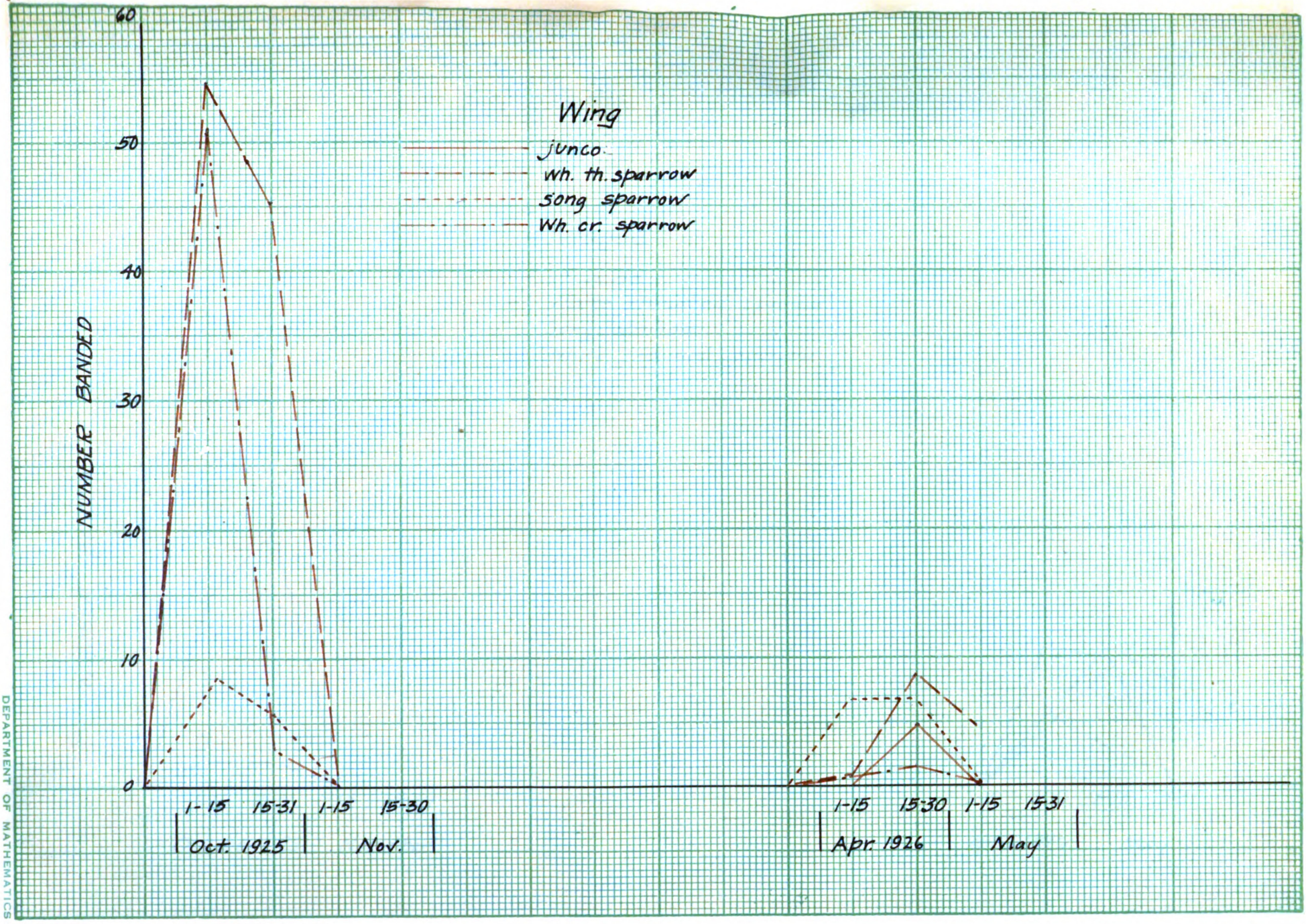


PLATE V

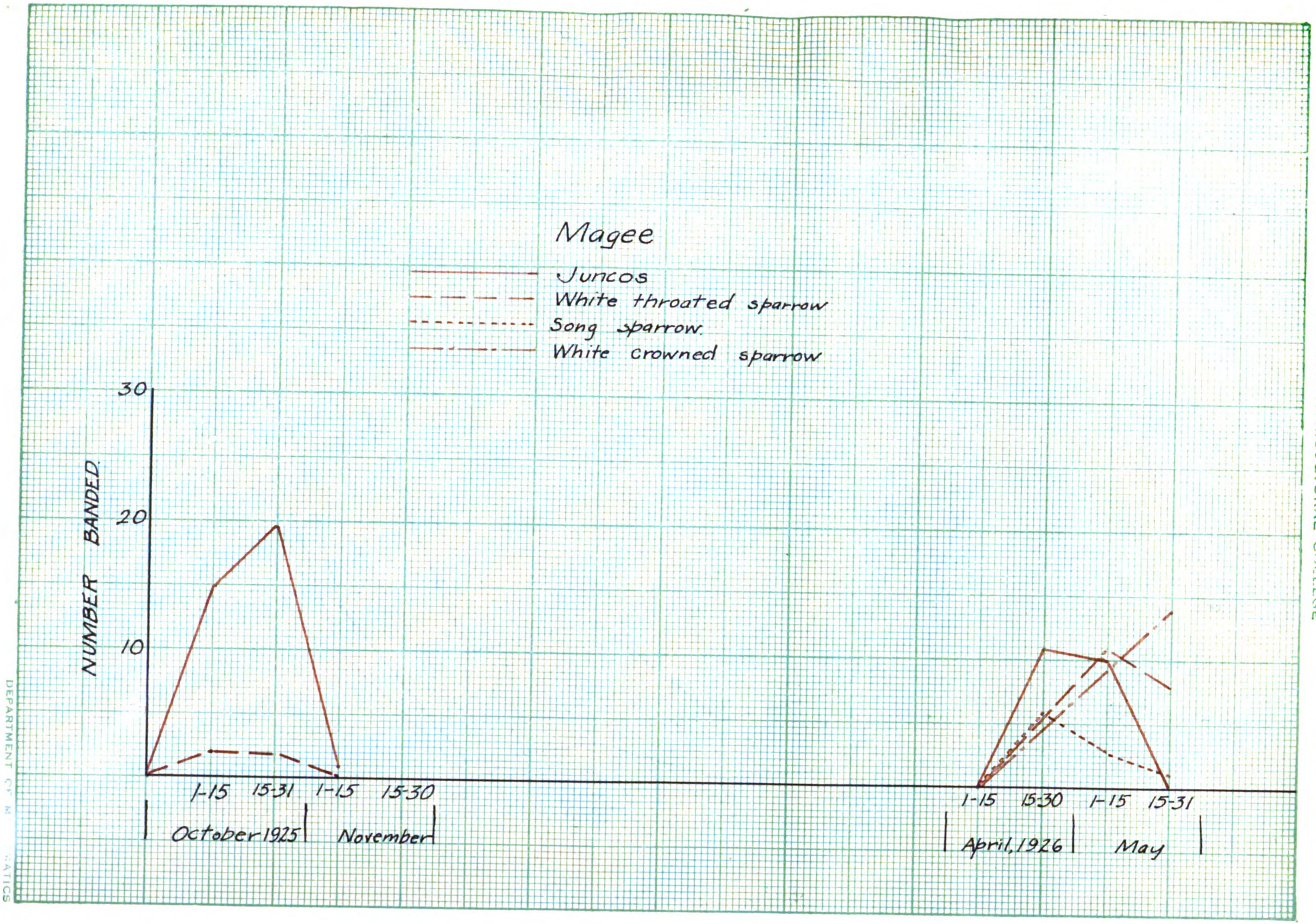


PLATE VI

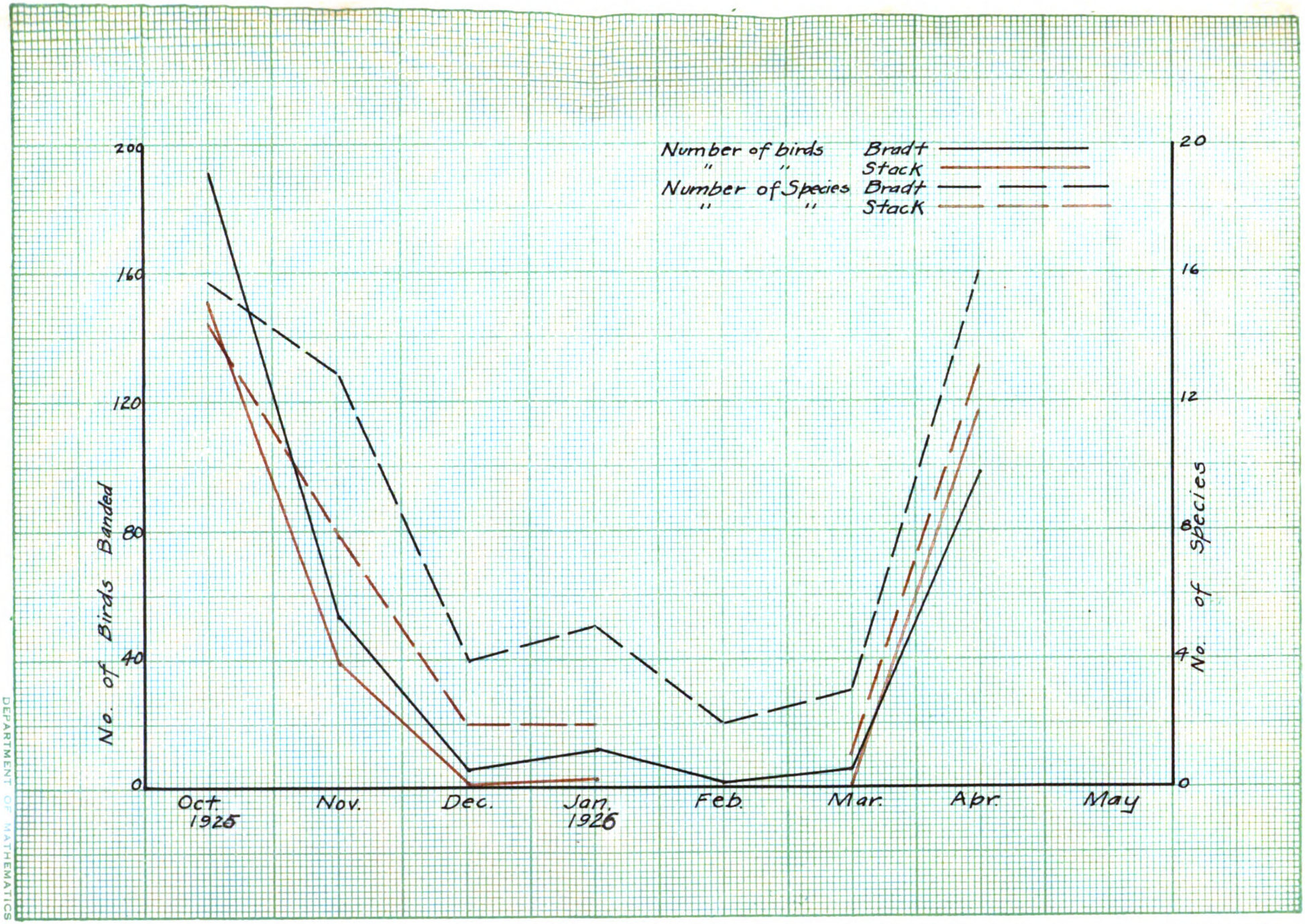


PLATE VII

A comparison of the tendency to form the "trap habit" among the four principal species caught.

(In this comparison any bird is considered to have formed a "trap habit" which repeats three or more times in the same trap without having been caught meanwhile in another trap).

Juncos.

Total taken	-174
Repeated three or more times in one trap	- 10
Percentage forming trap habit	- 5.5% ± 1.1%

Song sparrows

Total taken	- 5o
Repeated three or more times in one trap	- 1[illegible]
Percentage forming trap habit	- 17.[illegible]% ± 3.5%

White-throated sparrows

Total taken	-[illegible]8
Repeated three or more times in one trap	-15
Percentage forming trap habit	-17.[illegible]% ± 2.[illegible]%

White-crowned sparrows

Total taken	-56
Repeated three or more times in one trap	- 3
Percentage forming trap habit	- 5.3% ± 2.9%

Juncos and song sparrows.

The difference between the percentage of juncos and of song sparrows forming the trap habit was 12.5% ± 5.64%. These figures indicate a real difference, not due to chance alone. Possibly the difference is due to the fact that the song sparrows are residents here to a considerable extent, while the juncos are migrants. The song sparrows may have established nests in the vicinity of the trap visited, and thus naturally have stayed close to the trap, whereas the juncos were not definitely attached to any particular spot.

Juncos and white-throats.

The difference between the percentage of juncos and of white-throats forming the trap habit was 11.7% ± 2.9%. This indicates a real difference in the formation of the trap habit, which may possibly be explained on the supposition that the white-throats are less frightened by being enticed in the traps, or else that they form definite habits of feeding more readily than do the juncos. A wider feeding range among the juncos might also be a factor in this case.

Juncos and white-crowns.

The difference between the percentage of juncos and of white-crowns forming the trap habit was 3.3% ±3.2%. This difference is probably due to chance.

song sparrows and white-throats.

The difference between the percentage of song sparrows and of white-throats forming the trap habit was 0.0% ± 4.4%. This difference is probably due to chance.

Song sparrows and white-crowns.

The difference between the percentage of song sparrows and of white-crowns forming the trap habit was 14.4% ± 4.2%. This difference may be due to the very small number of white-crowns caught, or it may be due, as in the case of the juncos and song sparrows, to the resident habit of the song sparrows as compared to the migrant habit of the White-crowns.

White-crowns and White-throats.

The difference between the percentage of white-crowns and of white-throats forming the trap habit was 5.4% ± 4.0%. This difference is probably due to chance.

Summary.

The total number of birds banded was 507, to which may be added 45 recoveries, making a total of 552 individuals handled at the traps. The distribution of the birds among the different traps is shown in the following table.

Trap	Period of Operation	Number of Birds
A	Oct. 1 to Dec. 1 Apr. 5 to June 1	110
B	Oct. 1 to Dec. 1	17
C	Oct. 1 to Dec. 1 Apr. 5 to June 1	47
D	Oct. 1 to Dec. 1 Apr. 5 to June 1	30
E	Oct. 1 to Dec. 1 Apr. 5 to June 1	79
F	Oct. 1 to June 1	83
G	Oct. 1 to June 1	52
H	Oct. 1 to June 1	45
K	Oct. 1 to Dec. 1 Apr. 5 to June 1	67
L	Oct. 1 to June 1	22
	Total -	552

There were 172 repeats giving a percentage of repeats of 31%. Thus approximately one out of every three birds taken in the traps was retaken at least once. Of these 172 repeats 71 birds, or 54.6% repeated more than once. Thus slightly more than one-half of all birds which were retaken at all were retaken more than once. These figures certainly show that the birds are not seriously frightened or disturbed by the experience of banding and handling.

Table showing Seasonal Distribution of Species Banded.

Species	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Total	% of Total
Tree sparrow	18						1	1	20	3.9
Song sparrow	19	1					25	8	53	10.4
Junco	62	23	2	2	1		50	8	152	30.1
W.C.Sparrow	4							32	36	7.0
W.T.Sparrow	43	2					2	41	88	17.3
Hermit thrush	12								12	2.3
Olive-back.thrush	1							2	3	
Chewink	5	1						5	11	2.1
Fox sparrow	1								1	
Quail	29	5		2			2	3	32	6.3
W.brst.nuthatch	2	3	2	5	1	1	3		17	3.3
Field sparrow	1						4	5	10	1.9
Vesper sparrow	1						2	2	5	
Pine finch	3	1							4	
B.cap.chickadee		7	1			3	1		12	2.3
Downy w'dpecker		1		1					2	
Hairy w'dpecker				1					1	
Flicker							1		1	
Red-head.w'dpecker								3	3	
W.wing.crossbill		1							1	
Amer.crossbill		2							2	
Tufted titmouse						1	3		4	
Mourning dove							1	3	4	
Robin							1		1	
Cowbird							1	4	5	
Chip.sparrow							1		1	
Bronzed grackle								6	6	
Lincoln sparrow								1	1	
Cardinal		1	1				3	2	7	
Blue jay	3	4							7	
Myrtle warbler	1								1	
Catbird								4	4	
Brown thrasher								2	2	
Totals -	156	57	6	11	2	4	101	133	507	

The total number of birds banded was 507, and the total number of species banded was 33. The total number of birds handled at the traps, which includes repeats and recoveries, was 1142.

List of Animals caught but not banded.

Name	Number	Disposition
English sparrows	20	Killed
Red squirrels	30	Killed
Fox squirrels	9	Released
Chipmunk	1	Killed
Moochers	2	Killed
Weasels	2	Killed
Skunks	4	Released
House cat	1	Killed

The table on the preceding page shows the general seasonal distribution of the birds trapped, with the percentages of the total number formed by each species of which ten or more individuals were taken. The five leading species in point of numbers were the juncos, white-throated sparrows, song sparrows, white-crowned sparrows, and quail. These five species formed 71.1% of the total number caught. The remaining 25 species thus formed but 28.9% of the total.

The following table shows the percentage of the total formed by each of the five leading species during the principal migration months.

	Oct.	Nov.	Apr.	May
Song sparrow	8.7%	1.7%	24.7%	6.6%
Junco	51.6	43.1	41.5	6.3
W.T.sparrow	21.9	3.5	1.9	38.9
W.C.sparrow	2.3	0	0	24.3
Quail	10.2	0.7	1.2	2.2
Totals -	74.4%	79.3%	73.3%	81.3%

The question arises as to whether these percentages may be considered as indicative of the relative proportions of each species actually present in the vicinity at a specified period. Several reasons can be advanced to show that such a supposition is not warranted.

1.

Two species may be present in an area in equal numbers, but one species may be so much more trap-shy than the other that the number caught will be an indication of relative shyness rather than of relative numbers. For example, observation indicates that both Vesper sparrows and Chipping sparrows are actually present in far greater numbers than would be inferred from the trap records. Observation actually indicates that these species are nearly as numerous as were the white-throats and white-crowns, which were caught in such numbers.

2.

The food used as bait in the traps may attract certain species to a greater extent than others. While a mixture of seeds was used in each trap, it still seems probable that this mixture did not attract all species of seed-eaters to an equal extent, and certainly did not attract many birds which are not primarily seed-eaters. The paucity of Vesper sparrows and Chipping sparrows trapped may possibly be partially due to this factor of bait attractiveness. There is not as yet sufficient data regarding the food preferences of birds to justify conclusions as to relative numbers attracted by particular food combinations.

3.

Some observations made while visiting the traps seem to indicate that even within a species there may be a considerable difference in degree of trap shyness. Certain flocks of juncos and white-throats were seen about the traps day after day with few captures, while other flocks were caught freely from the time of arrival to that of departure. These field observations were of course limited in scope, and future workers would do well to make a series of systematic observations along this line.

4.

It seems probable that local variations in food supplies play an important part in the numbers and length of stay of birds in an area. This matter should be investigated by as many observers as possible in an attempt to correlate local food variations with numbers of birds and length of stop-over periods during migration.

This experiment in bird banding was necessarily carried on to a considerable extent as pioneer work, since there is no large amount of literature available along this line. Therefore it was necessary to place traps and record data according to personal ideas of efficiency, and endeavor to improve these as the work progressed. Undoubtedly many of the methods used could be much improved upon in future work. Probably the suggestions and criticisms arising from the work of this year will prove to be of more value than any actual conclusions which can be drawn.

After conversation with the Wing Bros. of Jackson, Mich., and observation of their trapping station and records, it seems probable that traps should have been placed under trees and in thick brush in this experiment, in addition to those in the more open spaces. Altho the consensus of opinion among bird banders has been that traps should never be placed along thick brush or under trees, the Wing Bros. set their traps in such dense thickets that they were obliged to crawl in on hands and knees to band their birds. Their results seem to show that under such conditions a large number of birds may be caught, including species which are rarely taken under the customary conditions. They have made an excellent and unusual record in banding the warbler group and the Lincoln's sparrows, which are seldom taken. They have also set traps in open spaces near their brush traps, and claim to have had better success in the brush. It is of course possible that the Wing's results have been due more to the peculiarities of their local terrain than to the placing of the traps. A group of traps baited alike, and as close together as possible, but divided into an open ground and a thicket series, would help to settle this question

Although the results here do not seem to indicate that any considerable increase in numbers of species or in relative numbers of individuals would be secured by the operation of more traps in similar situations, it is nevertheless true that such an increase would mean more birds handled, and might add considerably to the statistical value of the records. Such an increase in number of traps, unless the additional traps were located at some distance from other traps in a similar environment would result in a great increase in numbers of repeats, since many birds soon acquire the 'trap habit', and travel from trap to trap to eat rather than to forage in the open. A large number of traps would require a great amount of time for attention, and might easily exceed the time possible for proper attention by a single person. There should never be so many traps that they cannot all be visited and the birds released just before dark. Some banders have reported the visiting of traps after dark with a flashlight, but this would seem to be too great a disturbance of the natural habits of the birds.

The problem of baiting the traps is one which offers great possibilities for future investigation. This problem will probably have to be attacked by itself, separated from general bird banding work such as was carried on this year. Field observations should be of great value in connection with this problem. It seems that the baiting problem is one which could be handled as a part of class work in ornithology. The following is a tentative suggestion as to a method of carrying on this work.

Establish the desired number of traps in suitable locations, using as many traps in a place as there are bait combinations to be tried. Have each student attend to one or more of

these groups. In addition to tending care of traps, each student could carry on observations to discover what certain birds are eating at a definite time and place. The results of such data from many observers, corroborated by data from the trap baiting experiments, should prove of value in many ways.

In connection with this suggestion for class work it might also be suggested that bird census work through field observations could well be undertaken as a check on the records from the trapping operations. The combined results of field census and trapping records should indicate to a considerable degree the actual and relative numbers of birds present in an area at a certain date.

Since most of the bird banding work of the country is carried on by persons who are interested in birds, but who operate traps as a recreation or a hobby, it cannot be expected that the records from these stations will be kept as regularly or in such detail as is required in a scientific experiment. The record cards which each bander sends to the Bureau of Biological Survey at Washington are of course uniform, but often these are not kept in duplicate, and accurate information is not available to a private investigator who may need data from other stations. It would be advisable for station operators to adopt some system of records which would embody the data for each species as is listed in this report, together with such other data as seems to the operator to be of possible importance. Particularly is it important to record the dates on which the traps were not in operation. Some data collected from other stations for this report was of no statistical value

due to lack of this information. Much of the value of future bird banding work will come through statistical treatment of the data collected, and this data cannot be reliable unless it is carefully and accurately recorded by each individual operator.

Altho this thesis must be considered rather as a progress report than as a statement of definite results, yet there are a few conclusions which may be drawn from the data obtained. Such conclusions are included in the body of the report, but a brief resume may be permitted here.

1. In the case of many species at least, birds are not seriously frightened or disturbed by the handling necessary in banding and releasing at the traps.

2. Local weather seems to have little or no effect on the numbers of birds entering the traps.

3. Many individual birds form a habit of feeding regularly at a particular trap, and repeat persistently at this trap as long as they remain in the locality.

4. The data point to the conclusion that juncos, white-throated sparrows, and white-crowned sparrows migrate in a leisurely manner southward in Fall, remaining for days or weeks in one locality, whereas in Spring they hurry northward, remaining in a locality but a few days at most.

5. There seems to be a definite difference in the migration periods of juncos and white-throated sparrows both in Fall and Spring. The juncos lagged behind the white-throats in Fall about 11 days, and preceded the white-throats in Spring by about 12 days. While a single year's results are hardly

to be accepted as conclusive, yet the observed regularity of bird migration, especially in Spring, tends to indicate that dates of migration obtained one year would quite possibly be closely approximated in following years.

6.
Juncos and song sparrows seem to arrive at approximately the same time in Spring, altho the song sparrows migrate much earlier in the Fall.

7.
* Trap records show that some white-throated sparrows were still in the College Woods during the last week of May, and may have remained to nest there, altho Barrows was unable to obtain any records of nesting in Ingham county, and the migration as a whole is finished about the middle of May.

* Michigan Bird Life

Barrows

Mich. Agr. College Bull.
1912

Acknowledgments

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Appreciation is also expressed to King Brothers of Jackson, Michigan, and to H.J.Magee of Sault Ste. Marie, Michigan, for permission to use their bird banding records; and to C.V.Green of the Department of Zoology of Michigan State College for assistance with the statistical tables.

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