

Changes in Breeding Bird Population at Hutcheson Memorial Forest Since 1958

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Abstract. The breeding bird populations at Hutcheson Memorial Forest have been studied for two decades, using various sampling techniques. In addition to visual and auditory censusing, almost 5400 birds of 91 species have been mist-netted or trapped since 1959. A review of field notes and banding data indicates that many forest species have declined, including species that were among the most numerous of the summer residents, such as the Red-eyed Vireo and Ovenbird. At least eleven of the declining species are long-distance migrants that winter in the American tropics. Only a few species have increased in recent years. Three possible factors accounting for the long-term population changes are discussed: (1) changes in the HMF plant community, (2) deterioration of wintering habitats, and (3) forest fragmentation.

Introduction

One of the major research opportunities at a permanent field site is long-term ecological research. In general, sustained investigations that span several decades are rare, although these may provide critical insights into community dynamics. At Hutcheson Memorial Forest (HMF) there is a growing tradition of long-term studies launched by botanists (M. F. Buell, H. F. Buell, and J. A. Small) in 1950. Long-term studies of the avian populations were begun in 1958 by J. Swinebroad.

Just as the vegetation has undergone change during the past decades (Davison, 1980; Davison and Forman, 1982), so have the avian populations. In the first part of this paper we review the changes that have occurred in the avian populations during the past two decades. In the second part we report preliminary results of over twenty years' sampling of these populations by mist-netting and trapping. Finally, we discuss several possible explanations for the observed population changes.

Breeding Bird Summary

An early evaluation of the breeding bird populations at HMF was published by Swinebroad (1962). Subsequent additions and discussions of breeding species were given by Leck (1971, 1975, and 1977). The following evaluations have included the observations by numerous field or-

nithologists over the two decades as well as a review of trends in the bird-banding records (Tables 1 and 2) during the period. Included in this review are all species for which nesting at HMF has been verified or is otherwise suspected.

Broad-winged Hawk*—The forest supports a breeding pair in fewer than half the years.

American Kestrel—Irregular breeder. It frequently forages over the younger fields. One killed a bird in a net located within the forest.

Ring-necked Pheasant—Fewer than ten adults frequent the area and probably breed.

Mourning Dove—The property has several pairs each year. Nesting was first confirmed in 1971.

Yellow-billed Cuckoo—Irregular breeder. Usually only one or a few pairs present.

Black-billed Cuckoo—Irregular breeder, usually uncommon.

Screech Owl—Permanent resident, although nesting has not been recorded.

Great Horned Owl—One breeding pair. Usually two young are fledged each April. Three young were fledged in 1969 (J. Kricher.)

Common Flicker—Formerly this was the most conspicuous woodpecker of the forest. Swinebroad estimated from six to ten pairs in 1962. Today, it appears to be less common, with only a few pairs.

Red-bellied Woodpecker—This southern species was recorded at HMF in the early 1950s with nesting confirmed in 1957. There is never more than one breeding pair at the forest, and in some years (e.g., 1957 through 1963) it may be absent except as a nonbreeding visitor.

Hairy Woodpecker—Uncommon resident, less numerous now than in the 1960s.

Downy Woodpecker—Permanent resident, appearing to be less common now than in the 1960s.

Great Crested Flycatcher—This forest flycatcher has dramatically declined as a summer resident. Swinebroad estimated ten or more pairs in the 1960s, but less than half

* Scientific names are given in the appendix.

that many were estimated in 1975 (Leck). Today, there are very few.

Eastern Wood Pewee—This species has declined since the 1960s when five to ten pairs were estimated.

Blue Jay—Common breeding resident.

Common Crow—Common resident, with some nesting pairs at the forest.



The Wood Thrush is one of the more frequently banded members of the breeding bird community at the forest.
(Photographed by Leck)

Chickadee sp—Both the Black-capped Chickadee and the Carolina Chickadee have been observed at the forest, but which is the more common is not clear. Swinebroad confirmed breeding by the Black-capped Chickadee in 1961, and most recent birds have been considered this species.

Tufted Titmouse—This cavity-nesting resident has apparently declined since the 1960s.

White-breasted Nuthatch—This species has also had an apparent decline. Swinebroad suggested variation in numbers (up to 5 pairs), but recent estimates are always of just a few individuals.

Brown Creeper—Summering birds were recorded in the 1960s (nesting confirmed in 1961; Murray), but now it is only a transient.

House Wren—Common breeder. It may even be increasing. Netting records suggest considerable annual variation (zero to nineteen) in numbers (greatest in 1980).

Carolina Wren—This species is noted for its population fluctuations in response to severe mortality in cold winters. At HMF the peak year was 1960 (four singing males; breeding), but none was recorded for several years thereafter. Only a few have been seen in the late 1970s, and there are no recent nesting records.

Mockingbird—At least since 1960 two to three pairs have bred in shrubbery of the old-field/forest edge. There appears to have been no increase in the past two decades, although the species is still expanding its range northward.

Gray Catbird—Common summer resident.

Brown Thrasher—Uncommon breeder.

American Robin—Common breeder, and very common migrant.

Wood Thrush—The most common breeding species at HMF. It is less numerous now than in the 1960s.

Veery—Uncommon breeder in the 1960s. Now, it is rarely recorded in the summer months.

Eastern Bluebird—Nesting at HMF until 1958.

Blue-gray Gnatcatcher—Formerly, an uncommon breeder. Now, it is a rare summer resident.

Starling—This breeding resident nests in holes in trees, snags, and man-made structures about HMF.

White-eyed Vireo—Only one or two pairs of this species are present each summer, nesting in brambles in the old fields.

Yellow-throated Vireo—Lost as a breeding bird at the forest. Swinebroad (1962) estimated five to seven pairs annually, but there has been none recently.

Red-eyed Vireo—This canopy species declined drastically from thirty-two to forty breeding pairs per year in the early 1960s to none by the early 1970s. Two pairs were present in 1980.

Black-and-white Warbler—Marked reduction in the breeding population since 1962. Now, it is a rare summer resident.

Worm-eating Warbler—Netted irregularly in the 1960s, with a report of possible nesting in 1961. None were banded in the 1970s, but singing individuals recorded in several years until 1980 (Murray).

Blue-winged Warbler—In the early 1960s several pairs used the open areas of the woods (Swinebroad), areas that remained from hurricane damage in the 1950s. Today, it is strictly a forest-edge and old-field species at HMF, with two to three pairs each summer.

Yellow Warbler—Transient and possible summer resident (e.g., Leck suspected nesting of this species along Spooky Brook in 1980).

Chestnut-sided Warbler—Formerly, an uncommon breeding bird in blow-down areas. There have been no nestings in recent years.

Ovenbird—Formerly, the most common breeding bird at HMF with an estimated thirty-five to forty-five pairs. It declined dramatically during the 1960s. From 1977 to 1980 no more than *one* was netted per season! Today, few, if any, breed at HMF.

Kentucky Warbler—Singing males irregularly recorded

in early summer, but nesting has not been confirmed.

Yellow-breasted Chat—One or more pairs regularly nest in brushy fields adjacent to the forest.

Yellowthroat—This species has increased in the decade of the 1970s, and today it is one of the more common birds of the forest. (This upland habitat is unusually dry for the species.)

American Redstart—Probably a breeding bird in the 1960s. None has been netted since 1973, and it is a scarce visitor today.

Eastern Meadowlark—Lost as a breeding bird in the old fields since the 1960s.

Northern Oriole—Uncommon breeder but conspicuous, as it often nests in the sycamores near the caretaker's house.

Orchard Oriole—In most summers since 1969 this species has been present in the sycamore near the HMF entrance and along Spooky Brook. Nesting was confirmed in 1980.

Common Grackle—Common summer visitor, probably from other nesting areas.

Brown-headed Cowbird—An uncommon (?) breeding bird. Host species at HMF include the common Wood Thrush.

Scarlet Tanager—Formerly, a common summer resident. It has declined drastically and is now scarce.

Cardinal—Common resident.

Rose-breasted Grosbeak—Formerly, only a transient. It began breeding at HMF as early as 1971, and today it is a common breeding bird. It has expanded its breeding range southward from northern New Jersey.

House Finch—Although this western species has been expanding its range in the New York City region since the late 1950s, it was not recorded at HMF until 1972. Nesting was confirmed in 1979. A maximum of 100 House Finches was estimated in August 1979. A remarkably early clutch was found on 10 April 1980 in a red cedar.

Indigo Bunting—Formerly, it bred at the forest edge and in blow-down areas in the forest. Today, the few breeding pairs are restricted to the forest edge.

Rufous-sided Towhee—Summer resident, apparently declining in recent years but still well represented.

Grasshopper Sparrow—Lost as a breeding bird in the old fields since the 1960s.

Vesper Sparrow—Lost as a breeding bird in the old fields since the 1960s.

Field Sparrow—Uncommon breeder in the old fields.

Song Sparrow—Common resident, nesting in brushy old-fields and along the forest edge.

Bird Banding Summary

We have compiled a list of the birds mist-netted at HMF since 1959 during the months of June, July, and August. Although the populations were sampled in each year, we report the number of new birds captured and the number of returns to HMF of birds banded in previous years only for those years in which nets were set on at least five days (Tables 1 and 2). The list includes late

spring and early fall migrants. The number of birds captured in any year is the sum of new birds banded and returns. In many years 12-meter mist-nets were set about 100 m apart in a grid pattern, allowing certain kinds of statistical analysis (Swinebroad, 1964), but the number of days of mist-netting varied considerably between years (Tables 1 and 2), which precludes direct comparison of one year with another. The most comparable years with regard to net placement and number of days netting are 1961 through 1967 and 1975-1976-1980. These data show that the avian populations have undergone considerable changes during the past twenty years, changes that are so drastic that they were detectable by simple observation.

Discussion

Forest Species

The most pronounced changes in the populations of HMF breeding birds are declines of the long-distance migrants, that is, species that migrate to the American tropics, particularly the Red-eyed Vireo and Oven-bird, both once among the commonest species at HMF, Great Crested Flycatcher, Eastern Wood Pewee, Veery, Northern Oriole, Scarlet Tanager, and Indigo Bunting. Smaller populations of long-distance migrants have also disappeared, such as the Yellow-throated Vireo, Black-and-white Warbler, and Chestnut-sided Warbler. Many species have undergone apparent fluctuations, the only sustained increase being that of the Common Yellowthroat, a middle-distance migrant, and the Rose-breasted Grosbeak, a long-distance migrant.

There are three factors that may account for these changes.

(1) The plant community itself has undergone long-term changes. The most evident changes in recent years are the opening of the forest canopy, with at least a ten-fold increase in summer light penetration from 1969 to 1979, and a 42% decrease in understory (*Cornus florida*) tree cover since 1969 (Davison, 1980). The high mortality of larger and older oaks has been related to severe drought in the summer of 1957 (Small, 1961), insect damage by gypsy moths and cankerworms between 1972 and 1976 (Moulding, 1977), hurricane damage (but none since 1955), and windstorms (Reiners and Reiners, 1965). Fire has not occurred at the forest since 1711 (Buell et al., 1954).

(2) Briggs and Criswell (1979) have suggested that similar declines in the populations of long-distance migrants as breeding birds in several locations near Washington, D.C., are related to habitat deterioration on the *wintering* range, such as simple habitat destruction and the widespread, heavy use of pesticides. Morton (1979) has also warned of the problems faced by North American migrants wintering in the tropics.

(3) Robbins (1980), studying populations in Maryland, has emphasized that forest fragmentation on the breeding grounds is probably the most important factor accounting for the decline of long-distance migrant species. His data clearly show forest size dependence for many species of the eastern woodlands, much as described in earlier

studies in New Jersey (Galli et al., 1976). Robbins also suspects that parasitism by Brown-headed Cowbirds and predation by Blue Jays and Common Grackles are higher in the smaller forests, which tend to be more open and ecotonal.

There is probably no one explanation for the declines of avian populations in the northeast. Because the isolation of HMF has not been altered significantly over many decades, forest fragmentation seems an unlikely cause of the recent declines there. Although the opening of the forest could result in population decline, we think it could hardly result in the local extinction of several common species (e.g., Red-eyed Vireo and Ovenbird). Finally, the possibility that conditions on the winter range are the causes of population decline of eastern woodlands seems inconsistent with the observation that in several large tracts of forest in Maryland, these species have not suffered a similar decline (Robbins, 1980). Finding the cause(s) of the population declines of breeding birds at HMF will require further research.

Field Birds

Several species of the fields surrounding HMF have also undergone population changes. The Grasshopper and Vesper sparrows have declined, the result of successional change, even though both have generally declined throughout the northeastern United States. The loss of the Eastern Bluebird was coincident with its general decline in the eastern United States. The House Finch, however, has enjoyed an extraordinary population increase during the past few decades. The history of these changes in field species for northern New Jersey has been reviewed by Bull (1964).

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Table 1. The numbers of new birds (N) and returns of birds banded in previous years (R) captured at Hutcheson Memorial Forest, 1960-1968.

Banding Days (June/July/August)	1960		1961		1962		1963		1964		1965		1966		1967		1968		
	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R	
Broad-winged Hawk	1																		
American Kestrel									1										
American Woodcock																			
Mourning Dove																			
Yellow-billed Cuckoo			1				1		2		1		2		2				
Black-billed Cuckoo			2						2								5		
Common Flicker	5		14	2	6	2	7		20	2	17	4	6		5	2	12	5	
Red-bellied Woodpecker									1				1		1				

Table 1. *Continued.*

	1960		1961		1962		1963		1964		1965		1966		1967		1968	
	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R
Hairy Woodpecker	5		5	1	2	2	0	1	3	2	5	3	1	2	1		1	2
Downy Woodpecker	15		14	2	8	5	8	3	7	3	17	2	2	6	2	2	7	1
Eastern Kingbird													1					
Great Crested Flycatcher	2		5		1		5		1		7		2		7		2	
Eastern Phoebe					1				1		4		2					
<i>Empidonax</i> sp.					1													
Eastern Wood Pewee	3		2	1	4		5		5	2	4	1	1		2		1	
Blue Jay	4		18		17		8	3	22		21	4	13	3	7	4	26	2
Black-capped Chickadee			1				4		2	1	7		1		3			
Carolina Chickadee															2			
Tufted Titmouse	17		17	2	14	1	4	2	12	3	14	2	4	3	8	1	4	2
White-breasted Nuthatch	7		7	2	2		4		11	2	3	3	1	1			7	1
Brown Creeper																		1
House Wren	1		2		9		0	1			1		3		1			
Carolina Wren	1																	
Mockingbird					3		1								4			
Gray Catbird	23		55	2	82	11	29	13	28	14	30	4	15	5	32	6	16	4
Brown Thrasher			6		4		8		6	1	7		5		12		9	
American Robin			47		32	3	21	2	21	2	20	3	40	9	34	3	14	7
Wood Thrush	51	1	82	20	69	32	47	34	100	30	40	33	16	19	37	18	33	19
Veery	2		8		3	3	1	2	7	1	0	2	1	1			1	
Blue-gray Gnatcatcher			1															
Cedar Waxwing													3					
Starling													1		1		3	
White-eyed Vireo					1		0	1					1					
Yellow-throated Vireo			2															
Red-eyed Vireo	21		11	5	16	2	3	7	6	5	4	4	2	5	1			
Black-and-white Warbler	9		8		2		1				2		1		1			
Worm-eating Warbler			3		2				1									
Blue-winged Warbler	2		5		2		1		3		15		1	1			1	
Yellow Warbler																		
Chestnut-sided Warbler			1															
Blackpoll Warbler											1		1		3			
Ovenbird	32		34	11	47	17	15	21	24	14	23	8	6	13	8	10	4	6
Northern Waterthrush											1							
Louisiana Waterthrush					1						1							
Kentucky Warbler									1									
Common Yellowthroat			3		2								1		1			
Hooded Warbler			1		1													
Canada Warbler					1						2		1					
American Redstart	2		1								1		1					
House Sparrow									1									
Eastern Meadowlark									3									
Red-winged Blackbird			9		23		8		4		7		1	1	5		2	
Orchard Oriole																		

Table 1. Continued.

	1960		1961		1962		1963		1964		1965		1966		1967		1968	
	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R
Northern Oriole			1		0	1	5		3	2	19		3		21		4	
Common Grackle			79		56		69	2	31		109	3	1*	3			1	
Brown-headed Cowbird	2				6		2		4		4		3	3	1	1		
Scarlet Tanager	4		5		1	1	7	1	16	3	12	6	7	3	8		2	1
Cardinal	15		10	5	11	2	2	2	3	1	9	1	5	1	2	3	5	3
Rose-breasted Grosbeak			3		6		3		1		9		2		7		11	
Indigo Bunting	4		11	1	5		5	1	0	1	2		3		1		2	
American Goldfinch					2				1									
Rufous-sided Towhee	7		24	1	25	6	19	6	25	5	21	6	10	6	14	2	12	2
Savannah Sparrow																		
Grasshopper Sparrow					1													
Vesper Sparrow					4						4							
Chipping Sparrow					1		1											
Field Sparrow			3		2		1		2		4	1	1		1	1	2	1
Song Sparrow	4		8		15	2	6	1	2		3	1	1		2	1	1	

* From 1965 to 1968 not all of the captured Common Grackles were banded.

Table 2. The numbers of new birds (N) and returns of birds banded in previous years (R) captured at Hutcheson Memorial Forest, 1971-1980.

	1971		1972		1973		1975		1976		1978		1980		
	N	R	N	R	N	R	N	R	N	R	N	R	N	R	
Broad-winged Hawk															
American Kestrel							1								
American Woodcock	1													1	
Mourning Dove														1	
Yellow-billed Cuckoo			1				1							1	
Black-billed Cuckoo							1				1				
Common Flicker	2		5				2		5		2	2		1	
Red-bellied Woodpecker			1				1								
Hairy Woodpecker	1						2	2	1					4	
Downy Woodpecker	1	1	4	1	1		7		9	2	2	3		7	2
Eastern Kingbird					1										
Great Crested Flycatcher			1				1		1		1				
Eastern Phoebe														1	
<u>Empidonax</u> sp.															
Eastern Wood Pewee														4	
Blue Jay	4		6		5	1	15	2	13	1	1			3	2
Black-capped Chickadee			4						7		0	1		1	
Carolina Chickadee														2	
Tufted Titmouse	6	1	5		2		3		15	2	1			4	
White-breasted Nuthatch			1						1					1	

Table 2. *Continued.*

	1971		1972		1973		1975		1976		1978		1980	
	N	R	N	R	N	R	N	R	N	R	N	R	N	R
Brown Creeper														
House Wren	1				11				2	1	2		19	1
Carolina Wren							1		2					
Mockingbird														
Gray Catbird	2		21	1	9		27		45	8	30	3	34	6
Brown Thrasher	2		2		5	1	3		7		2	1	3	
American Robin	4		27		13		24	3	65	2	23	3	25	2
Wood Thrush	39	6	36	3	8		81	6	60	21	17	4	29	9
Veery														1
Blue-gray Gnatcatcher														
Cedar Waxwing														
Starling	1								6					
White-eyed Vireo													2	
Yellow-throated Vireo														
Red-eyed Vireo													4	
Black-and-white Warbler														
Worm-eating Warbler														
Blue-winged Warbler	1						1	1	8	2	2		5	
Yellow Warbler					2						1		1	
Chestnut-sided Warbler														
Blackpoll Warbler														
Ovenbird	4	1	1				4		1		1		1	
Northern Waterthrush														
Louisiana Waterthrush														
Kentucky Warbler														
Common Yellowthroat					1		7	1	21	1	7		11	1
Hooded Warbler														
Canada Warbler														
American Redstart														
House Sparrow														
Eastern Meadowlark														
Red-winged Blackbird														
Orchard Oriole					1									
Northern Oriole	1								3		1			
Common Grackle	1		4		5		36		27	4	22	1	27	2
Brown-headed Cowbird			0	1			2		1				1	
Scarlet Tanager	4	1			1						1		0	1
Cardinal	4		1		2		7	1	6	2	3	1	7	1
Rose-breasted Grosbeak			3	1	2		4		5	2	5	1	17	2
Indigo Bunting	3		2		3				3		1			
American Goldfinch					3								1	
Rufous-sided Towhee	4		6	1	2		2		9	3	5	2	5	1
Savannah Sparrow														
Grasshopper Sparrow														
Vesper Sparrow														
Chipping Sparrow					1									
Field Sparrow	1				12		3		4		1			
Song Sparrow	1	1	6	3	14		4		9		1			

Appendix. Scientific Names.

Broad-winged Hawk (*Buteo platypterus*), American Kestrel (*Falco sparverius*), Ring-necked Pheasant (*Phasianus colchicus*), American Woodcock (*Philohela minor*), Mourning Dove (*Zenaidura macroura*), Yellow-billed Cuckoo (*Coccyzus americanus*), Black-billed Cuckoo (*Coccyzus erythrophthalmus*), Screech Owl (*Otus asio*), Great Horned Owl (*Bubo virginianus*), Common Flicker (*Colaptes auratus*), Red-bellied Woodpecker (*Melanerpes carolinus*), Hairy Woodpecker (*Picoides villosus*), Downy Woodpecker (*Picoides pubescens*), Eastern Kingbird (*Tyrannus tyrannus*), Great Crested Flycatcher (*Myiarchus crinitus*), Eastern Phoebe (*Sayornis phoebe*), Yellow-bellied Flycatcher (*Empidonax flaviventris*), Traill's Flycatcher (*Empidonax traillii*), Eastern Wood Pewee (*Contopus virens*), Blue Jay (*Cyanocitta cristata*), Common Crow (*Corvus brachyrhynchos*), Black-capped Chickadee (*Parus atricapillus*), Carolina Chickadee (*Parus carolinensis*), Tufted Titmouse (*Parus bicolor*), White-breasted Nuthatch (*Sitta carolinensis*), Brown Creeper (*Certhia familiaris*), House Wren (*Troglodytes aedon*), Carolina Wren (*Thryothorus ludovicianus*), Mockingbird (*Mimus polyglottos*), Gray Catbird (*Dumetella carolinensis*), Brown Thrasher (*Toxostoma rufum*), American Robin (*Turdus migratorius*), Wood Thrush (*Hyocichla mustelina*), Hermit Thrush (*Catharus guttatus*), Swainson's Thrush (*Catharus ustulata*), Gray-cheeked Thrush (*Catharus minimus*), Veery (*Catharus fuscescens*), Blue-gray Gnatcatcher (*Polioptila caerulea*), Golden-crowned Kinglet (*Regulus satrapa*), Ruby-crowned Kinglet (*Regulus calendula*), Cedar Waxwing (*Bombicilla cedrorum*), Starling (*Sturnus vulgaris*), White-eyed Vireo (*Vireo griseus*), Yellow-throated Vireo (*Vireo flavifrons*), Red-eyed Vireo (*Vireo olivaceus*), Black-and-white Warbler (*Mniotilta varia*), Worm-eating Warbler (*Helmitheros vermivorus*), Blue-winged Warbler (*Vermivora pinus*), Tennessee Warbler (*Vermivora peregrina*),

Nashville Warbler (*Vermivora ruficapilla*), Yellow Warbler (*Dendroica petechia*), Magnolia Warbler (*Dendroica magnolia*), Black-throated Blue Warbler (*Dendroica caerulescens*), Myrtle Warbler (*Dendroica coronata*), Blackburnian Warbler (*Dendroica fusca*), Chestnut-sided Warbler (*Dendroica pensylvanica*), Blackpoll Warbler (*Dendroica striata*), Palm Warbler (*Dendroica palmarum*), Ovenbird (*Seiurus aurocapillus*), Northern Waterthrush (*Seiurus noveboracensis*), Louisiana Waterthrush (*Seiurus motacilla*), Kentucky Warbler (*Oporornis formosus*), Mourning Warbler (*Oporornis philadelphia*), Common Yellowthroat (*Geothlypis trichas*), Yellow-breasted chat (*Icteria virens*), Hooded Warbler (*Wilsonia citrina*), Canada Warbler (*Wilsonia canadensis*), American Redstart (*Setophaga ruticilla*), House Sparrow (*Passer domesticus*), Eastern Meadowlark (*Sturnella magna*), Red-winged Blackbird (*Agelaius phoeniceus*), Orchard Oriole (*Icterus spurius*), Northern Oriole (*Icterus galbula*), Rusty Blackbird (*Euphagus carolinus*), Common Grackle (*Quiscalus quiscula*), Brown-headed Cowbird (*Molothrus ater*), Scarlet Tanager (*Piranga olivacea*), Cardinal (*Cardinalis cardinalis*), Rose-breasted Grosbeak (*Pheucticus ludovicianus*), Indigo Bunting (*Passerina cyanea*), House Finch (*Carpodacus mexicanus*), American Goldfinch (*Carduelis tristis*), Rufous-sided Towhee (*Pipilo erythrophthalmus*), Savannah Sparrow (*Passerculus sandwichensis*), Grasshopper Sparrow (*Ammodramus savannarum*), Vesper Sparrow (*Pooecetes gramineus*), Dark-eyed Junco (*Junco hyemalis*), Tree Sparrow (*Spizella arborea*), Chipping Sparrow (*Spizella passerina*), Field Sparrow (*Spizella pusilla*), White-crowned Sparrow (*Zonotrichia leucophrys*), White-throated Sparrow (*Zonotrichia albicollis*), Fox Sparrow (*Passerella iliaca*), Lincoln's Sparrow (*Melospiza lincolni*), Swamp Sparrow (*Melospiza georgiana*), Song Sparrow (*Melospiza melodia*).