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THE 1977 BREEDING BIRD CENSUSES AND VEGETATION SURVEYS IN TWO SUCCESSIONAL STAGES OF OAK-PINE FOREST

Gilbert S. Raynor, John J. Ruscica, James H. Clinton,
and David L. Larsen

December 1977

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ABSTRACT

As part of a program to characterize the plant and animal life of the Laboratory site and surrounding areas, two breeding bird census plots were established in 1977 to document the occurrence and abundance of breeding species in two extreme successional stages of Long Island oak-pine forest. A 9.3-hectare plot located near the northeastern corner of the Laboratory site is composed of second growth oak-pine forest in a late successional stage. The second plot measures 9.7 hectares and is located in the scrub oak-pitch pine barrens at Westhampton.

Each plot was surveyed with a transit and steel tape and marked with wooden stakes at 100-foot intervals. Quantitative vegetational surveys were made in each plot and all plant species identified. Tree composition was measured as a function of species and size. Shrub density, percent of ground cover and percent of canopy were also measured. The Laboratory plot contained 2100 trees of five species per hectare, 72% ground cover and 84% canopy coverage. The Westhampton plot contained only one tree species, Pitch Pine, at 366 trees per hectare, 92% ground cover and no canopy.

Twelve census trips, mostly of two to three hour duration, were made in each plot. Each bird observed was located on a scale map of the plot. At the end of the season, the number of territories was determined from the distribution of sightings. Eighteen territorial bird species were found in the Laboratory plot with between 479 and 629 territorial males per km². In Westhampton, only five breeding species were present. Density was between 312 and 374 males per km². The Rufous-sided Towhee was the most common species in both plots. Future studies will document changes in both bird and plant species composition and abundance.

INTRODUCTION

Two breeding bird census plots were established in 1977 to quantify the occurrence and abundance of breeding species in representative Long Island habitats. One plot on Brookhaven National Laboratory property and another at Westhampton were chosen to represent extreme stages of plant succession in oak-pine woodlands.

The plots were surveyed and marked by stakes prior to the breeding season. Censuses were conducted by repetitive trips during the breeding season. Occurrence, size, density, dominance and frequency of plant species were measured by plant surveys conducted during and after the breeding season. Methods followed were those suggested for the breeding bird censuses sponsored by the National Audubon Society (Hall, 1946; Van Velzen, 1972). These censuses have been taken nationwide for 40 years and are published annually in American Birds, formerly Audubon Field Notes.

DESCRIPTION OF BROOKHAVEN NATIONAL LABORATORY PLOT

The BNL census plot is located in the northeastern corner of the Laboratory property and is centered 700 feet south of the original north boundary and 2500 feet west of the original east boundary in a 1500 x 1700 foot tract of woods bordered on the east and west by firelanes, on the north by the boundary road and on the south by the north fence line of the radiation forest. The plot is about 6000 feet south of State Road 25, Middle Country Road or Jericho Turnpike, in Ridge. The center is about at 40° 53' 16" north latitude and 72° 51' 53" west longitude.

The plot is located in a second growth oak-pine forest (Figure 1) in a late stage of succession from scrub oak-pitch pine forest to climax oak forest. Previous history of the plot is unknown but it was probably cut from 50 to 70 years ago. Many of the oaks are arranged in tight groups indicating sprout growth from old stumps (Figure 2). No evidence of recent fire was noted. The forest is composed exclusively of White Oak (Quercus alba), Scarlet Oak (Q. coccinia), Black Oak (Q. velutina), and Pitch Pine (Pinus rigida) (Figure 3). Scientific names of plants are from Britton and Brown (1947).

Figure 1. Western edge of forest containing
BNL census plot.

Figure 2. Sprout growth of Scarlet Oak in BNL plot.

Figure 3. Interior of BNL plot.

The plot lies between the Harbor Hill and Ronkonkoma moraines. The terrain is slightly rolling with one shallow valley through part of the plot. Elevation is about 80 feet above sea level. The soil is sandy and well drained and composed of Plymouth loamy sand, Riverhead sandy loam and Carver and Plymouth sands. No roads or trails penetrate the sampling grid which is bordered by at least 200 feet of similar vegetation on all sides. Soil types are from Warner et al. (1975).

The plot measures 1000 x 1000 feet (304.9 x 304.9 m). It contains 22.96 acres or 9.29 hectares or 0.0929 Km². The plot was laid out with transit and steel tape and numbered wooden stakes placed at 100 foot-intervals.

A plant survey was conducted following methods described by James and Shugart (1970). Tree species size and composition were measured on ten randomly selected one-tenth acre plant survey plots. Composition in trees/acre is given in Table 1. Since over half of the trees were under 3.0 inches in diameter at 4.5 feet and 19% of the trees were dead, the data are presented in four sub-tables. Trees of all sizes, living and dead, total 850/acre or 2100/hectare. Living trees above 3.0 inches total 374/acre or 924/hectare. White Oak is the most numerous species followed by Scarlet Oak, Pitch Pine and Black Oak. Average tree height is about 33 feet (10m). Maximum oak height is 61 feet (19m) and maximum pine height about 49 feet (15m).

Basal area by species in ft²/acre and percent of total basal area is given in Table 2 for both plots and illustrated in Figure 4. Basal area in the BNL plot covers 0.127% of the land area. The percentage frequency of basal area by size class is given in Table 3. At BNL, small trees contribute most to total number and medium size trees most to total basal area (Figures 5 and 6).

Other measures of forest composition are given in Table 4. Relative density is the percentage of each species present. Relative dominance is the percentage of the total basal area contributed by each species. Frequency is the percentage of plant survey plots in which each species was found and is a measure of the evenness of distribution of each species.

The shrub layer (Figure 7) was sampled by two transects across each of the ten plant survey plots. It is composed largely of saplings of the four tree species plus a minor amount of scrub or Bear Oak (O. ilicifolia). Shrubs reaching 4.5 feet totaled 290/acre or 717/hectare. If the trees under 3.0 inches are considered shrubs, the total is 717/acre or 1772/hectare.

TABLE 1.

Tree Composition of BNL Plot
(Trees/ acre)

1a. Total Trees

Species	0-2.9	3-5.9	6-8.9	9-14.9	Total	%
Pitch Pine	51	51	29	2	133	15.65
White Oak	123	161	6		290	34.12
Scarlet Oak	134	78	31	12	255	30.00
Black Oak	4	1	3		8	0.94
Dead	115	49			164	19.29
Total	427	340	69	14	850	
%	50.24	40.00	8.12	1.65		

1b. Trees ≥ 3.0 in.

Species	3-5.9	6-8.9	9-14.9	Total	%
Pitch Pine	51	29	2	82	19.39
White Oak	161	6		167	39.48
Scarlet Oak	78	31	12	121	28.61
Black Oak	1	3		4	0.95
Dead	49			49	11.58
Total	340	69	14	423	
%	80.38	16.31	3.31		

1c. Total Living Trees

Species	0-2.9	3-5.9	6-8.9	9-14.9	Total	%
Pitch Pine	51	51	29	2	133	19.39
White Oak	123	161	6		290	42.27
Scarlet Oak	134	78	31	12	255	37.17
Black Oak	4	1	3		8	1.17
Total	312	291	69	14	686	
%	45.48	42.42	10.06	2.04		

1d. Living Trees ≥ 3.0 in.

Species	3-5.9	6-8.9	9-14.9	Total	%
Pitch Pine	51	29	2	82	21.93
White Oak	161	6		167	44.65
Scarlet Oak	78	31	12	121	32.35
Black Oak	1	3		4	1.07
Total	291	69	14	374	
%	77.81	18.45	3.74		

TABLE 2
Basal Area/Acre by Species

BNL

<u>Species</u>	<u>Area (Ft.²)</u>	<u>%</u>
White Oak	18.81	34.07
Scarlet Oak	16.61	30.08
Pitch Pine	10.12	18.32
Dead	9.02	16.33
Black Oak	0.66	1.19

WESTHAMPTON

<u>Species</u>	<u>Area (Ft.²)</u>	<u>%</u>
Pitch Pine	3.93	100.00

TABLE 3
Frequency of Percent Occurrence and Basal Area by Tree Diameter

<u>Dia. (in.)</u>	BNL		WESTHAMPTON	
	<u>% by size</u>	<u>% by basal area</u>	<u>% by size</u>	<u>% by basal area</u>
0.5	14.1	2.3	8.3	2.2
1.0	5.6	1.8	25.0	13.3
1.5	6.6	3.3	17.7	14.2
2.0	11.3	7.4	17.7	18.9
2.5	12.7	10.5	11.5	15.3
3.0	8.5	8.5	10.4	16.7
3.5	11.0	12.8	4.2	7.8
4.0	7.1	9.4	4.2	8.8
4.5	6.8	9.9		
5.0	3.1	5.1	1.0	2.8
5.5	2.5	4.5		
6.0	2.4	4.7		
6.5	1.3	2.8		
7.0	1.9	4.7		
7.5	2.1	3.0		
8.0	0.5	1.3		
8.5	1.0	2.7		
9.0	0.5	6.3		
9.5	0.2	7.5		
10.0	0.1	3.9		
10.5	0.4	1.2		
11.0	0.2	0.9		
11.5	0.1	0.5		
12.0	0.1	0.9

Figure 4. Percent of basal area of trees in BNL plot by trunk diameter for three species.

Figure 5. Frequency distribution of all trees in BNL and Westhampton plots by trunk diameter.

Figure 6. Frequency distribution of all trees in BNL and West Hampton plots by basal area.

Figure 7. Shrub layer and undergrowth in BNL plot.

Figure 8. Lower shrub layer in BNL plot.

A lower shrub layer (Figure 8) is included in ground cover and is composed of Black Huckleberry (Gaylussacia baccata), Late Blueberry (Vaccinium vacillans), Scrub Chestnut Oak (Q. prinoides), Low Blueberry (V. pennsylvanicum), and smaller amounts of Sweet Fern (Myrica asplenifolia), Bayberry (M. caroliniensis) Stagger Bush (Lyonia mariana). Most are from one to three feet tall. One or two vines of Greenbrier (Smilax sp.) were noted.

Herbaceous plants were scattered throughout in the more open areas and include Bracken Fern (Pteridium aquilinum), (Figure 9), Goat's Rue (Tephrosia virginiana), Wild Indigo (Baptisia tinctoria), Spreading Dogbane (Apocynum androsaemifolium), Cow Wheat (Melampyrum lineare), Wintergreen (Gaultheria procumbens), Panic Grass (Panicum sp.) and Pennsylvania Sedge (Carex pennsylvanica). The Bracken, Wintergreen and Sedge were the only species reasonably common and generally distributed.

Based on twenty-four equally spaced measurements along the transects across each plant survey plot, ground cover was found in 72.1% of the area.

Based on similar measurements, canopy is present above 83.8% of the area (Figure 10).

The plot is surrounded by similar habitat on all sides so no edge effect occurs.

DESCRIPTION OF WESTHAMPTON PLOT

The Westhampton census plot is located in the northern portion of Westhampton about 0.6 miles south of New York State Route 27 (Sunrise Highway) and about 0.9 miles west of County Road 31 (Old Riverhead Road) and about opposite the northern portion of Suffolk County Airfield (formerly Suffolk County Air Force Base). The center is near 40° 51' 23" north latitude and 72° 39' 46" west longitude.

The plot is located in a representative section of the Dwarf Pine Plains or Pitch Pine-Scrub Oak barrens which cover a large area in this region (Figure 11). This habitat is characterized by scattered dwarfed Pitch Pines and scattered to dense thickets of Scrub Oak. In contrast to other pine barrens on Long Island which eventually revert to climax oak forest if protected from fire and cutting, larger oaks such as White and Scarlet, are absent. Thus, this plant community apparently constitutes a climax type maintained primarily by poor soil and severe local climatic conditions and secondarily by fire. However, the study plot has not been burned for many years and the pine plains have reportedly existed with little change since colonial days.

TABLE 4

Measures of Forest Composition

<u>Species</u>	<u>Trees/acre</u>	<u>Relative Density</u>	<u>Relative Dominance</u>	<u>Frequency</u>
BNL				
Pitch Pine	133	15.7	18.3	100
White Oak	290	34.1	34.1	100
Scarlet Oak	255	30.0	30.1	100
Black Oak	8	0.9	1.2	60
Dead	164	19.3	16.3	100
WESTHAMPTON				
Pitch Pine	148	100.0	100.0	100

TABLE 5

Size Composition of Pitch Pines on Westhampton Plot
(Trees/acre)

<u>Dia. at 4.5 ft. (in.)</u>	<u>0-2.9</u>	<u>3.0-5.9</u>	<u><4.5 ft.</u>	<u>Total</u>
Count	80	20	48	148
%	54.1	13.5	32.4	
% $\geq$ 4.5 ft.	80.0	20.0

Figure 9. Bracken fern and undergrowth in BNL plot.

Figure 10. Deciduous canopy in BNL plot.

Figure 11. Westhampton pitch pine-scrub oak barrens.

Figure 12. Pitch pine and grid stake in Westhampton plot.

The plot is in the upper portion of the glacial outwash plain south of the Ronkonkoma moraine. Elevation is about 80 feet above sea level and the terrain is somewhat rolling. The extremely sandy and well-drained soil is composed of Carver and Plymouth sands and Plymouth loamy sand. A seldom-used dirt and cinder road provides access to the vicinity of the plot but no roads or trails penetrate the sampling area.

The plot measures 800 x 1300 feet (244 x 396 m) with the long axis approximately NNE-SSW. It contains 23.8 acres or 9.67 hectares or 0.0967 Km². The plot was laid out with transit and steel tape and numbered wooden stakes placed at 100-foot intervals.

As in the surrounding region, the vegetation is dominated by Pitch Pine and Scrub Oak. The pine (Figure 12) is the only tree species and is rather scattered except in the northwestern sector of the plot where a rather dense stand occurs. Extrapolated from counts on ten randomly chosen one-tenth acre plant survey plots, there are 148 Pitch Pines/acre (366/hectare) of which 100/acre (247/hectare) are over 4.5 feet tall. The size distribution is given in Table 5 which shows that 80% are less than 3 inches in diameter at 4.5 feet and all are less than 6 inches in diameter. Most frequent tree height is 6-8 feet (1.8-2.4m) and maximum 20 feet (6.1m).

Basal area covers only 0.009% of the land area (Table 2). A percentage frequency by size and basal area is given in Table 3 and illustrated in Figures 5 and 6. As at BNL, small sizes dominate the number frequency and somewhat larger trees the basal area frequency. Values of relative density, relative dominance and frequency are all 100% for the Pitch Pine (Table 4).

Scrub Oak is the sole species in the dominant shrub layer (Figure 13) and the number of stems/acre was estimated from counts along two transects across each of the ten plant survey plots. Density is 10,100 stems/acre or 24,975 stems/hectare. Most Scrub Oaks are from three to four feet tall with some to five feet and others lower.

A lower shrub layer (Figure 14) from one to two feet tall is included in the ground cover and is composed largely of Black Huckleberry and Late Blueberry with smaller numbers of Low Blueberry. The Huckleberry is most numerous. A few plants of Stagger Bush and Sweet Fern are also present.

True ground cover is predominantly Bear Berry (Arctostaphylos Uva-ursi) (Figure 15) which covers nearly all areas not too shaded by trees and shrubs.

Figure 13. Scrub oak thicket in Westhampton plot.

Figure 14. Lower shrub layer and ground cover
in Westhampton plot.

TABLE 6
Description of Census Trips

BNL

Date	Time (EST)	Wind		Temp. (°F)	Weather
		Speed	Dir.		
May 24	0600-0800	2	SW	64	Scattered Cirrus, Haze
May 26	0600-0900	2	N	64	Clear
June 1	0600-0800	3	SSE	58	Overcast Altostratus & Stratus
June 8	0600-0830	6	W	52	Scattered Cirrus
June 14	0515-0810	1	Var.	58	Broken Cirrus
June 16	0600-0900	2	NE	64	Broken Cirrus
June 26	1330-1630	3	N	78	Scattered-Broken Cumulus
June 28	0400-0700	2	SW	65	Not recorded
July 2	1320-1540	8	NW	80	Broken Altocumulus
July 7	2100-2115	2	ESE	70	Overcast Stratocumulus
July 11	0600-0800	1	SE	65	Broken-Scattered Stratocumulus
July 27	0600-0800	2	NE	66	Clear

WESTHAMPTON

Date	Time (EST)	Wind		Temp. (°F)	Weather
		Speed	Dir.		
May 22	0635-0845	2	SW	66	Scattered Cumulus
May 24	0435-0735	2	SW	64	Fog-Broken Cirrus
June 1	0425-0735	3	SSE	58	Overcast Altostratus & Strato-cumulus
June 5	0600-1000	1	W	62	Overcast Altostratus
June 12	0600-0830	3	NW	68	Broken Stratocumulus
June 17	0400-0700	2	S	63	Clear-Overcast Stratus & Fog
June 23	0400-0710	1	N	64	Clear
June 26	1200-1300	5	N	78	Overcast Cumulus-Rainshower
July 2	0600-0900	2	W	76	Broken Altocumulus & Stratocumulus
July 10	0715-1030	2	NE	75	Clear
July 14	0355-0615	2	NW	67	Clear
July 16	0700-0845	3	WSW	85	Scattered Cirrus

A moderate amount of Heath-like Hudsonia (Hudsonia ericoides) and a few plants of Woolly Hudsonia (H. tomentosa) are also present.

Herbaceous plants are scattered thinly throughout in the more open areas and include Goat's Rue, Wild Indigo, Downy Goldenrod (Solidago puberula), Toothed White-topped Aster (Seriocarpus asteroides), Low Showy Aster (Aster spectabilis), Poverty Grass (Aristida dichotoma) and Panic Grass.

Based on twenty-four equally spaced spot measurements along two transects across each plant survey plot, ground cover is present in 96.7% of the census tract. No true canopy is present.

The plot is surrounded by similar habitat on all sides although the pines are taller and denser west of the plot than on the other three sides. Thus, no edge effect is present.

CENSUS COVERAGE

Coverage of the two plots is detailed in Table 6 which also lists weather conditions. Weather data were taken from BNL records modified by observations at Westhampton during the census visits. Wind speed and direction are from the 37 foot level on Ace Tower. Temperature is the average for the census period and is taken at the instrument shelter near the Meteorology Building.

Most trips were made in early morning when song was at its peak. One evening trip was made at BNL to census nocturnal species. During most census trips, the observer travelled along alternate rows but deviated from this track when necessary to locate specific birds. The location of all birds seen or heard was plotted on a gridded map of the plot with appropriate notations for sex, song, territorial conflict or other pertinent observations. A separate map was used for each trip. In general, on alternate trips, traverses across the plot were made at right angles to the direction used on the previous trip to equalize temporal coverage of all sections. Visitors, species not breeding in the plot, and species flying over the plot were also noted.

ANALYSIS

At the end of the season, a master map was prepared for each species showing the location of all sight or sound encounters with accompanying information. From these maps, the number of territorial males was estimated by the clustering of encounters, by locations of two or more males observed simultaneously and by the location of territorial conflicts. For some species, it was not possible to separate the data into an exact number of territories.

TABLE 7

Species Composition and Density of Territorial Males on BNL Plot

<u>Species</u>	<u>Territorial males</u>	<u>No./Km²</u>	<u>No./100 Acres</u>
Rufous-sided Towhee	15.5-17.5	167-188	68-77
Ovenbird	7-9	75-97	31-40
Blue Jay	3-7	32-75	13-31
Black & White Warbler	3	32	13
Baltimore Oriole	3	32	13
Crested Flycatcher	2-4	22-43	9-18
Wood Thrush	2	22	9
Whip-poor-will	1-3	11-32	4-13
Yellowthroat	1-2	11-22	4-9
Scarlet Tanager	1-2	11-22	4-9
Downy Woodpecker	1	4	11
Black-capped Chickadee	1	4	11
White-breasted Nuthatch	1	4	11
Brown Thrasher	1	4	11
Hermit Thrush	1	4	11
Pine Warbler	1	4	11
Yellow-shafted Flicker	1	-	-
Tufted Titmouse	1	-	-
Total	82-96	479-629	196-257

TABLE 8

Species Composition and Density of Territorial Males on Westhampton Plot

<u>Species</u>	<u>Territorial Males</u>	<u>No./Km²</u>	<u>No./100 Acres</u>
Rufous-sided Towhee	13.5-16.5	138-169	57-69
Prairie Warbler	10	102	42
Field Sparrow	3.5	40	15
Yellowthroat	2-4	21-41	8-17
Brown Thrasher	1.5-2.5	15-26	6-11
Total	30-38	312-374	128-153

Figure 15. Mats of bear berry in open area of Westhampton plot.

In these cases, a range of probable values was assigned.

BNL CENSUS

A list of the 18 territorial species on the BNL plot with number of territorial males, number/Km² and number/100 acres is given in Table 7. Scientific names of species mentioned in this report are given in the appendix. Rufous-sided Towhees were the dominant species and Ovenbirds the second most abundant. Eight species were represented by only one or a partial territory. The Towhee, Brown Thrasher, Hermit Thrush and Yellowthroat are species found in earlier stages of oak-pine forest succession. Most of the other species are more typical of more mature forest. Two species found at Westhampton, Prairie Warbler and Field Sparrow, are no longer found in the BNL plot. On the other hand, the stand has apparently not matured enough to attract one of our most common breeding species in mature forests, the Red-eyed Vireo.

Visiting species observed on the BNL plot include Yellow-billed Cuckoo, Hairy Woodpecker, Mockingbird, Robin, Red-eyed Vireo, Blue-winged Warbler, Common Grackle and Brown-headed Cowbird. Species observed flying over were Mourning Dove, Common Crow, Fish Crow and American Goldfinch. All species observed nest at BNL or in nearby areas.

WESTHAMPTON CENSUS

A list of the five territorial species found at Westhampton is given in Table 8 with number of territorial males, number/ Km² and number/100 acres. Here also, the Towhee is dominant but number per unit area is smaller than at BNL probably reflecting the more impoverished habitat and sparser vegetation. The Prairie Warbler is confined to the earlier stages of oak-pine forests and finds ideal habitat here.

Visitors to the plot include Marsh Hawk, Mourning Dove, Yellow-billed Cuckoo, Black-billed Cuckoo, Great Horned Owl, Chimney Swift, Eastern Kingbird, Wood Pewee, Tree Swallow, Barn Swallow, Purple Martin, Blue Jay, Black-capped Chickadee, Mockingbird, Robin, Blue-winged Warbler, Redwinged Blackbird, Common Grackle, Brown-headed Cowbird, American Goldfinch and Vesper Sparrow. All probably nested nearby except the Swift and the Swallows which were seen feeding over the plot and may have nested some distance away. The Vesper Sparrow held a territory just east of the plot. Probable nearby nesters

observed flying over the plot were Common and Fish Crow. Species not nesting locally but seen flying over were Common Loon, Osprey and Herring Gull.

DISCUSSION

Only a few breeding bird censuses have previously been taken on Long Island and none in upland habitats. However, similar oak-pine woods have been censused in New Jersey and Massachusetts and are available for comparison.

In 1972, for instance, census 43 in the New Jersey pine barrens reported ten species with 356 pairs/Km². The Towhee was most numerous and other species occurred only in small numbers (Van Velzen, 1973).

In 1976, a recently burned pine-oak forest of 22.5 hectares in eastern Massachusetts, census 55, yielded 220 pairs/Km² with 20 species. Ovenbird and Towhee were most numerous. A nearby Scrub Oak-Pitch Pine forest of 7.5 hectares, census 58, found 500 pairs/Km² of 22 species with Towhee and Prairie Warbler dominant. Thus our results are similar to those found elsewhere in comparable habitat but obviously reflect specific local conditions.

FUTURE PLANS

The two plots will be censused again in 1978. If additional help is obtained, one or more new plots may be added. A long term goal is to document the breeding bird distribution and density of all remaining native habitats on Long Island and to monitor their changes with time.

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APPENDIX

Scientific Names of Birds Recorded

<u>Common Name</u>	<u>Scientific Name</u>
Common Loon	<i>Gavia immer</i>
Marsh Hawk	<i>Circus cyaneus</i>
Osprey	<i>Pandion haliaetus</i>
Herring Gull	<i>Larus argentatus</i>
Mourning Dove	<i>Zenaidura macroura</i>
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>
Great Horned Owl	<i>Bubo virginianus</i>
Whip-poor-will	<i>Caprimulgus vociferus</i>
Chimney Swift	<i>Chaetura pelagica</i>
Hairy Woodpecker	<i>Dendrocopus villosus</i>
Downy Woodpecker	<i>Dendrocopus pubescens</i>
Eastern Kingbird	<i>Tyrannus tyrannus</i>
Great Crested Flycatcher	<i>Myiarchus crinitus</i>
Eastern Wood Pewee	<i>Contopus virens</i>
Tree Swallow	<i>Iridoprocne bicolor</i>
Barn Swallow	<i>Hirundo rustica</i>
Purple Martin	<i>Progne subis</i>
Blue Jay	<i>Cyanocitta cristata</i>
Common Crow	<i>Corvus brachyrhynchus</i>
Fish Crow	<i>Corvus ossifragus</i>
Black-capped Chickadee	<i>Parus atricapillus</i>
Tufted Titmouse	<i>Parus bicolor</i>
White-breasted Nuthatch	<i>Sitta carolinensis</i>
Mockingbird	<i>Mimus polyglottos</i>
Brown Thrasher	<i>Toxostoma rufum</i>
Robin	<i>Turdus migratorius</i>
Wood Thrush	<i>Hylocichla mustelina</i>
Hermit Thrush	<i>Hylocichla guttata</i>
Red-eyed Vireo	<i>Vireo olivaceus</i>
Black and White Warbler	<i>Mniotilta varia</i>
Blue-winged Warbler	<i>Vermivora pinus</i>
Pine Warbler	<i>Dendroica pinus</i>
Prairie Warbler	<i>Dendroica discolor</i>
Ovenbird	<i>Seiurus aurocapillus</i>
Yellowthroat	<i>Geothlypis trichis</i>
Redwinged Blackbird	<i>Agelaius phoeniceus</i>
Common Grackle	<i>Quiscalus quiscula</i>
Brown-headed Cowbird	<i>Molothrus ater</i>
Scarlet Tanager	<i>Piranga olivacea</i>
American Goldfinch	<i>Spinus tristis</i>
Rufous-sided Towhee	<i>Pipilo erythrophthalmus</i>
Vesper Sparrow	<i>Poocetes gramineus</i>
Field Sparrow	<i>Spizella pusilla</i>