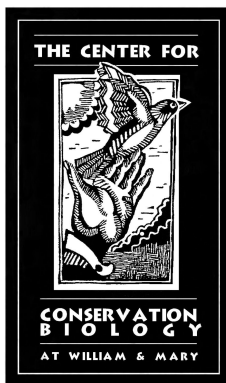

February 2006

**AVIAN SURVEY OF THE
VIRGINIA COMMONWEALTH UNIVERSITY
RICE CENTER**

**FINAL REPORT
2006**

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VCU

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**AVIAN SURVEY OF THE
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EXECUTIVE SUMMARY

The riparian forests of the Virginia Commonwealth University Rice Center help to form the ecological backbone of the James River Watershed. Protection and restoration of these forest types has been the target of many conservation initiatives aimed at improving water quality of the Chesapeake Bay or supporting wildlife. The James River Watershed sustains a prominent and diverse assemblage of bird species including many forest dwelling species of conservation concern. Much of the concern has been focused on the many neotropical migratory species that have exhibited dramatic population declines in recent decades. Many of these species require interior forest areas and so are especially vulnerable to habitat fragmentation. Growing evidence of declines in other species has extended these concerns to temperate migrants (and non-migratory species as well). The objective of this project was to gather baseline information on the status of forest bird communities at the Rice Center to better inform management and educational opportunities.

The bird community at the Rice Center was surveyed in the breeding and winter seasons using a network of 21 survey plots. The plots were located in seven different habitat types: 1) bottomland hardwood forest, 2) upland deciduous forest, 3) pine forest, 4) mixed pine-hardwood forest, 5) roadway edge, 6) early successional field, and 7) Lake Charles. The combined breeding and winter surveys resulted in detections of 1,427 individual birds of 69 species. Among these included 946 detections of 44 species in the breeding season and 470 detections of 43 species in winter. The breeding bird community was composed of 24 Neotropical migrant species, 11 temperate migrant species, and 9 resident species including several of conservation concern. Neotropical migrants were the numerically dominant group followed by resident species and then by temperate migrants. The winter bird community was composed of 36 temperate migrant species and 7 resident species.

Both species richness and bird density varied by habitat in both seasons. Likewise, the composition of species varied between habitats in a manner consistent with their individual requirements. A few species such as the Prothonotary Warbler, Kentucky Warbler, and Worm-eating Warbler had distinct distribution patterns that coincided with forest structure.

The Rice Center provides valuable breeding and wintering habitat for a number of bird species including those of conservation concern. The data collected in this project provides critical information towards the management of these species and the baseline for future avian monitoring activities.

INTRODUCTION

The Virginia Commonwealth University Rice Center is seated in one of the most historic and biologically important watersheds in the eastern United States. The position of the Rice Center on the James River, along with the riparian forests it supports, yields a significant responsibility for conservation while also providing a living laboratory for students and researchers. Over the next coming years, the Rice Center will undergo a physical transformation with the addition of new buildings and roads needed to create an educational hub for coastal science studies. Information on the biological responses to land management at the Rice Center will be critical if the transformation will be mediated by conservation-based stewardship.

Riparian forests serve as a backbone of the James River Watershed. These forests are particularly important for regulating the hydrology, nutrient flows, and pollution levels in the James River and Chesapeake Bay. Protection and restoration of riparian forests have been the leading strategies to improve water quality and support wildlife. A prominent feature of the James River is the diverse assemblage of bird species it sustains. Riparian forests are absolutely critical for species such as the Great Blue Heron, Great Egret, and Bald Eagle that depend on selecting nesting sites in close proximity to water and away from disturbance. Riparian forests value also lies in their significance to support an assemblage of forest dwelling species including many of conservation concern. Much of the concern has been focused on the many species of neotropical migrants (those species that migrate between breeding grounds in the temperate latitudes of North America and wintering grounds in Central and South America and the Caribbean) that have exhibited dramatic population declines in recent decades (*sensu* Hagan and Johnston 1992). This bird assemblage is very diverse, accounting for 65-85% of birds within the forest ecosystems of North America. Many of these species require interior forest areas and so are especially vulnerable to habitat fragmentation (e.g. Forman et al. 1976, Lynch and Whigham 1984, Blake and Karr 1987, Robbins et al. 1989). Growing evidence of declines in other species has extended these concerns to temperate migrants (those species that migrate between breeding and wintering grounds within North American latitudes) and non-migratory species (Askins 1993).

Conserving species that depend on the James River Watershed is a difficult task only made practical when the contributions of individual landowners are focused towards a common goal. Information on the biological status and response to management of riparian forests are essential tools to develop a pathway to that goal. Avian population and diversity monitoring are effective tools for evaluating environmental health, provides guidance for resource-management decisions, and provides a hands-on educational experience. The objective of this project was to gather baseline information on the status of forest bird communities at the Rice Center to better inform management and educational opportunities.

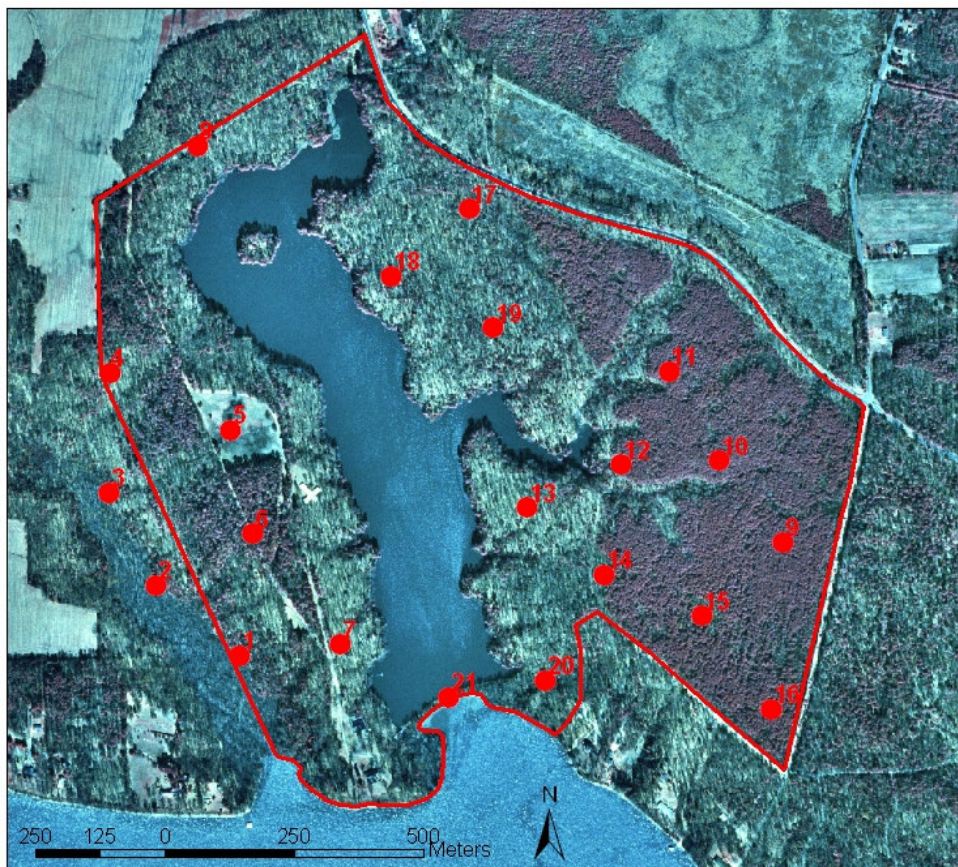
METHODS

Bird survey data was collected using a network of 21 five minute-unlimited radius point counts (plots) (Figure 1). The exact location of the plots was chosen to gather information on the different forest habitats and landcover types available. Habitat types

were selected by broadly classifying portions of the Rice Center into the following categories: 1) Bottomland hardwood forest, 2) Upland deciduous forest, 3) Mixed pine-deciduous forest, 4) Pine forest, 5) Field, and 6) Road Edge, and 7) Open water -Lake Charles. Each plot center was separated by at least 200m from one another with the exception of one plot placed on the dike separating Lake Jackson from the James River and the nearest Bottomland forest plot (#20). Surveys were conducted by one observer that stood at the center of the plot and registered the distance to each bird detected by sight or sound. Each plot was visited three times during the breeding season in 2005 (June 8, 18, and 30) and two times during the winter in 2006 (January 18 and 25). All plots were visited within a four hour period after sunrise and the order in which plots were surveyed varied between days to eliminate time-of-day effects on bird detection.

Bird data were summarized at different levels to produce community and species-level variables. Species richness (number of species) over the entire Rice Center survey was calculated from all detections. Species richness of each habitat type was calculated by stratifying detections that were within 100m from the observer with the exception of the data collected in the Field habitat where species richness was calculated only from detections within 50m of the observer. Bird density values were calculated by using only detections within a 50m radius of the observer. Each visit to a survey plot was considered as an independent sample for this statistic.

Figure 1. Map of 21 survey plots used for study. Relative position of each plot is indicated by the red circles. Plot numbers are relational to data in Appendix.



RESULTS

The combined breeding and winter surveys resulted in detections of 1,427 individual birds of 69 species. Among these included 946 detections of 44 species in the breeding season and 470 detections of 43 species in winter. Species composition varied considerably between seasons with only 14 species being detected in both seasons.

Breeding Season

The breeding bird community was composed of 24 Neotropical migrant species, 11 temperate migrant species, and 9 resident species (Table 2) (Appendices I and II). Neotropical migrants were the numerically dominant group accounting for 539 (57 %) of all detections followed by resident species (322 or 34% of all detections) and then by temperate migrants (85 or 9% of all detections). Seven of the 12 most abundant species were neotropical migrants. These seven species accounted for 47% of all detections and included the Red-eyed Vireo, Ovenbird, Blue-gray Gnatcatcher, Acadian Flycatcher, Yellow-billed Cuckoo, and Wood Thrush. The most abundant resident species were the Tufted Titmouse, Carolina Chickadee, Northern Cardinal, and Red-bellied Woodpecker which accounted for (24 %) of all detections.

The cumulative number of species detected in each habitat varied from a low of 7 species in Field habitat to a high of 28 species in Bottomland forest (Table 3). Mean values for mean species richness showed the same patterns. Bottomland and Deciduous forest types generally supported more species than other forest types, and most forest habitats supported more species than the Field. These patterns were most likely due to a combination of factors including the fact that early successional field habitats naturally support a lower diversity of species than more complex habitats. However, there is an unknown level of bias introduced into the statistic by unequal sampling of habitat area. For example, there are four plots located in Bottomland Forest but only one plot in the Field habitat. The general relationship between species and area could contribute additional variance to this measurement.

Table 2. List of species and number detected in order of decreasing abundance during the breeding season. Totals indicate observations from all survey plots and survey rounds.

Species	Total # Detected	Species	Total # Detected
Red-eyed Vireo	122	Barn Swallow	8
Ovenbird	86	Scarlet Tanager	7
Blue-gray Gnatcatcher	68	Indigo Bunting	7
Tufted Titmouse	66	Yellow-throated Vireo	7
Carolina Wren	64	Prothonotary Warbler	6
Acadian Flycatcher	60	Common Flicker	6
Carolina Chickadee	52	American Goldfinch	6
Yellow-billed Cuckoo	49	Kentucky Warbler	5

Table 2 continued

Northern Cardinal	49	Cedar Waxwing	5
Red-bellied Woodpecker	42	Common Grackle	4
Summer Tanager	30	Hairy Woodpecker	4
Wood Thrush	27	Red-tailed Hawk	4
Great-crested Flycatcher	22	Ruby-throated Hummingbird	3
Downy Woodpecker	21	Pine Warbler	3
Eastern Wood-PeeWee	17	Hooded Warbler	3
American Crow	15	Eastern Phoebe	3
White-breasted Nuthatch	14	Northern Parula	2
Brown-headed Cowbird	13	Louisiana Waterthrush	2
Yellow-throated Warbler	11	Eastern Bluebird	2
Pileated Woodpecker	11	Worm-eating Warbler	2
Red-shouldered Hawk	8	Green Heron	1
Blue Jay	8	Blue Grosbeak	1

Table 3. Species richness values for each habitat sampled. Total species richness is the cumulative number detected over three survey visits. Mean species richness is calculated using each visit to a point as individual replicate. Sample size (N) of each habitat indicates the number of points multiplied by three survey visits.

Habitat	N	Total Species Richness	Mean Species Richness (+ SD)
Bottomland	12	27	12.4 ± 3.72
Deciduous	18	27	12.3 ± 5.14
Mixed forest	12	21	10.2 ± 3.97
Pine forest	12	19	10.1 ± 3.17
Road edge	6	11	11.7 ± 4.76
Field	3	7	4.0 ± 1.73

Bird density patterns were generally consistent with that observed for values of species richness. Total bird density was greater in Bottomland, Deciduous, and Mixed Forest compared to Pine, Roadway Edge, and Field (Figure 2).

The composition of species varied by habitat (Table 4). The distribution of most species was consistent with their individual habitat requirements. Forest habitat generalists such as the Red-bellied Woodpecker, Acadian Flycatcher, Red-eyed Vireo, Blue-gray Gnatcatcher, Carolina Wren, Tufted Titmouse, Carolina Chickadee, Ovenbird, and Northern Cardinal were detected frequently in all forested habitats. Other species such as the Prothonotary Warbler, Northern Parula, and Louisiana Waterthrush were only detected in Bottomland forest. The Worm-eating Warbler, Kentucky Warbler, and Hooded Warbler were only detected in upland Deciduous forest. Eastern Phoebes were only detected on the shoreline of Lake Charles, presumably as a breeding pair. Finally, detections of the Indigo Bunting, Blue Grosbeak, and American Goldfinch were restricted to the field habitat.

Figure 3. Breeding density of birds by habitat type. Mean values are calculated from all birds detected within 50m of the observer over three survey visits to each plot. Whisker bars indicate standard deviation.

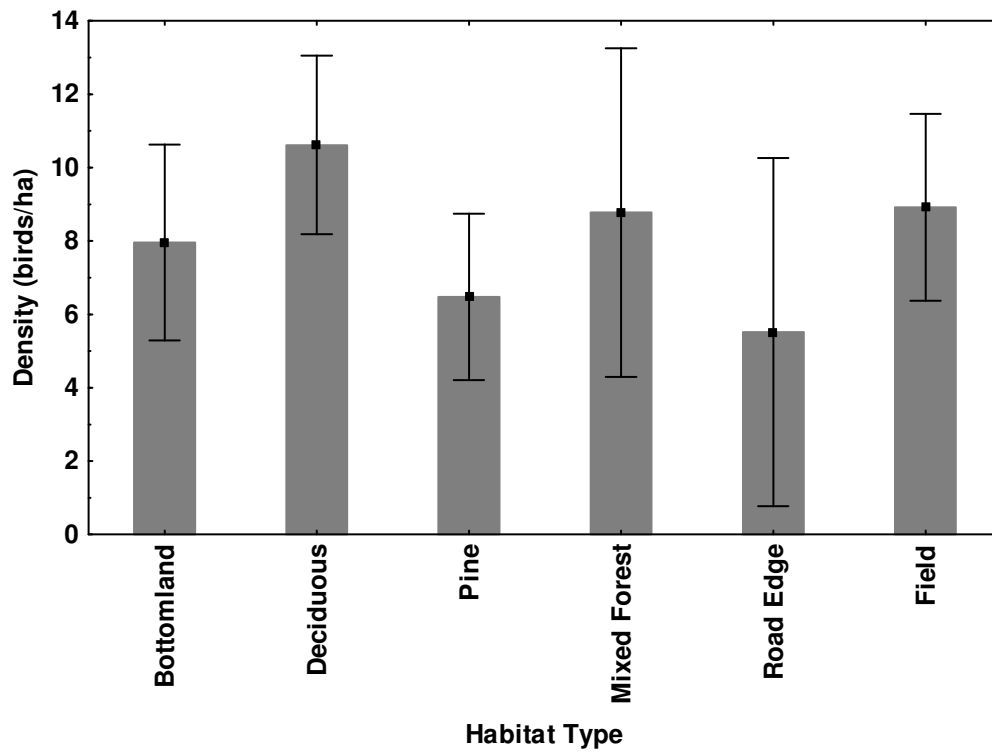


Table 4. Mean density (\pm SD) of species detected within 50m of the observer by habitat type. Values are calculated using individual survey plots and visits as individual replicates. Missing values indicate the species was not detected within the 50m radius of that habitat type.

Species	Bottomland forest	Deciduous forest	Pine Forest	Mixed Pine- Deciduous Forest	Roadway Edge	Field
Red-tailed Hawk		0.1 \pm 0.17				
Red-shouldered Hawk	0.1 \pm 0.21					
Yellow-billed Cuckoo	0.1 \pm 0.21	0.3 \pm 0.35	0.1 \pm 0.21	0.4 \pm 0.42	0.2 \pm 0.30	
Ruby-throated Hummingbird	0.1 \pm 0.21	0.1 \pm 0.17		0.1 \pm 0.25		
Pileated Woodpecker		0.1 \pm 0.22	0.2 \pm 0.25	0.1 \pm 0.25		
Red-bellied Woodpecker	0.2 \pm 0.25	0.6 \pm 0.59	0.2 \pm 0.42	0.3 \pm 0.25		
Downy Woodpecker		0.6 \pm 0.32			0.2 \pm 0.30	
Hairy Woodpecker		0.1 \pm 0.17	0.3 \pm 0.41			
Common Flicker	0.1 \pm 0.21	0.1 \pm 0.17				
Great-crested Flycatcher	0.2 \pm 0.42	0.3 \pm 0.44			0.2 \pm 0.30	
Eastern Wood-pewee		0.1 \pm 0.22			0.2 \pm 0.30	
Acadian Flycatcher	1.2 \pm 0.40	0.6 \pm 0.69	0.1 \pm 0.21	0.8 \pm 0.73	0.6 \pm 0.30	
Red-eyed Vireo	1.2 \pm 0.21	0.9 \pm 0.22	1.2 \pm 0.53	1.4 \pm 0.24	0.8 \pm 0.00	
Yellow-throated Vireo		0.1 \pm 0.17		0.1 \pm 0.25		
American Crow			0.1 \pm 0.21			
Blue Jay			0.1 \pm 0.21			
Carolina Chickadee	0.3 \pm 0.41	0.6 \pm 0.69	0.5 \pm 0.53	0.4 \pm 0.73	0.6 \pm 0.30	
Tufted Titmouse	0.2 \pm 0.24	0.8 \pm 0.73	1.3 \pm 0.49	0.6 \pm 0.65	0.4 \pm 0.60	
White-breasted Nuthatch	0.3 \pm 0.41	0.2 \pm 0.52		0.1 \pm 0.25		
Carolina Wren	0.6 \pm 0.74	0.9 \pm 0.56		0.7 \pm 1.22	0.6 \pm 0.30	0.8 \pm 1.47
Blue-gray Gnatcatcher	1.6 \pm 1.11	1.8 \pm 0.17	0.5 \pm 0.64	1.3 \pm 1.27	0.8 \pm 0.01	
Eastern Bluebird						0.4 \pm 0.74

Table 4 continued

Species	Bottomland forest	Deciduous forest	Pine Forest	Mixed Pine- Deciduous Forest	Roadway Edge	Field
Wood Thrush		0.1 ± 0.22		0.1 ± 0.25		
Northern Parula	0.2 ± 0.42					
Yellow-throated Warbler	0.1 ± 0.21				0.2 ± 0.30	
Pine Warbler			0.2 ± 0.42			
Prothonotary Warbler	0.4 ± 0.49					
Worm-eating Warbler						
Hooded Warbler		0.1 ± 0.17				
Kentucky Warbler		0.1 ± 0.35				
Louisiana Waterthrush	0.2 ± 0.42					
Ovenbird	0.3 ± 0.41	0.6 ± 0.44	0.7 ± 0.21	0.9 ± 0.24		
Summer Tanager		0.4 ± 0.54	0.3 ± 0.41		0.4 ± 0.60	
Northern Cardinal	0.1 ± 0.21	0.9 ± 0.64	0.3 ± 0.41	0.4 ± 0.42		1.2 ± 1.27
Blue Grosbeak						0.4 ± 0.74
Indigo Bunting						2.5 ± 0.00
American Goldfinch						2.5 ± 0.00
Common Grackle	0.2 ± 0.42					
Brown-headed Cowbird		0.1 ± 0.17	0.2 ± 0.42	0.7 ± 0.65		0.8 ± 1.47

Winter Season

The winter bird community was composed of 36 temperate migrant species and 7 resident species (Table 5) (Appendices III and IV). The 12 most abundant species accounted for 348 (79 %) of all detections. Three of these species, the Mallard, Cedar Waxwing, and White-throated Sparrow were detected only in large flocks and as such were some of the most numerically dominant. The remaining species were distributed more evenly among the survey plots.

Table 5. List of species and number detected in order of decreasing abundance during the winter season. Values indicate total detections from all survey plots and visits.

Species	Total Detected	Species	Total Detected
Mallard	56	Pileated Woodpecker	5
Tufted Titmouse	43	Canada Goose	5
Cedar Waxwing	42	Brown Creeper	4
Carolina Chickadee	36	Hermit Thrush	4
White-throated Sparrow	35	Double-crested Cormorant	4
American Goldfinch	30	Great Blue Heron	4
Carolina Wren	27	Northern Cardinal	3
Red-bellied Woodpecker	22	Red-shouldered Hawk	3
American Robin	18	Eastern Phoebe	3
Dark-eyed Junco	16	Ruby-crowned Kinglet	3
White-breasted Nuthatch	12	Laughing Gull	3
American Crow	11	Bald Eagle	2
Winter Wren	9	Pine Warbler	1
Song Sparrow	9	Herring Gull	1
Yellow-rumped Warbler	9	Red-breasted Nuthatch	1
Downy Woodpecker	9	Hooded Merganser	1
Common Flicker	9	Bufflehead	1
Blue Jay	8	Yellow-bellied Sapsucker	1
Hairy Woodpecker	8	Mourning Dove	1
Golden-crowned Kinglet	6	Belted Kingfisher	1
Common Grackle	5		

Cumulative species richness varied from a low of 3 species in Field habitat to a high of 18 species in Bottomland forest (Table 6). Values for mean species richness followed a similar pattern as the cumulative value with the Bottomland forest, Deciduous forest, Mixed forest, and Roadway edge shown to support greater numbers of species than Pine forest and Field habitat.

Table 6. Accumulated and mean species richness by habitat type. Mean richness values are calculated using each plot visit as an individual replicate. Sample size (N) indicates the number of plots multiplied by 2 visits for each category.

Habitat	N	Total Species Richness	Mean Species Richness (\pm SD)
Bottomland	8	18	4.4 \pm 1.77
Deciduous	12	15	3.6 \pm 1.67
Pine	8	9	1.4 \pm 1.68
Mixed	6	14	3.0 \pm 2.82
Roadway Edge	4	15	5.0 \pm 3.91
Field	2	3	2.0 \pm 1.41

Bird density values varied greatly between habitat types (Figure 4). The greatest density value was recorded in the Field, however this result was due to one large flock of White-throated Sparrows detected during one survey. Aside from this, the most general patterns were for greater and more consistent (less variation between surveys) density values in Bottomland forest and Deciduous forest plots compared to other habitats.

Species composition varied by habitat (Table 7). The distribution of most species was consistent with their known individual habitat requirements. Habitat generalists such as the Red-bellied Woodpecker, Hairy Woodpecker, Carolina Wren, Tufted Titmouse, Carolina Chickadee, and Northern Cardinal were detected frequently in most forested habitats. There were no clear patterns among the remaining species. Most species, including those only detected in Field habitat, are known to use forest and forest edge habitats in winter. Overall distribution and abundance patterns were most likely due to the clumping of birds in flocks, large range of movement by most species, and small sampling effort of the winter bird community.

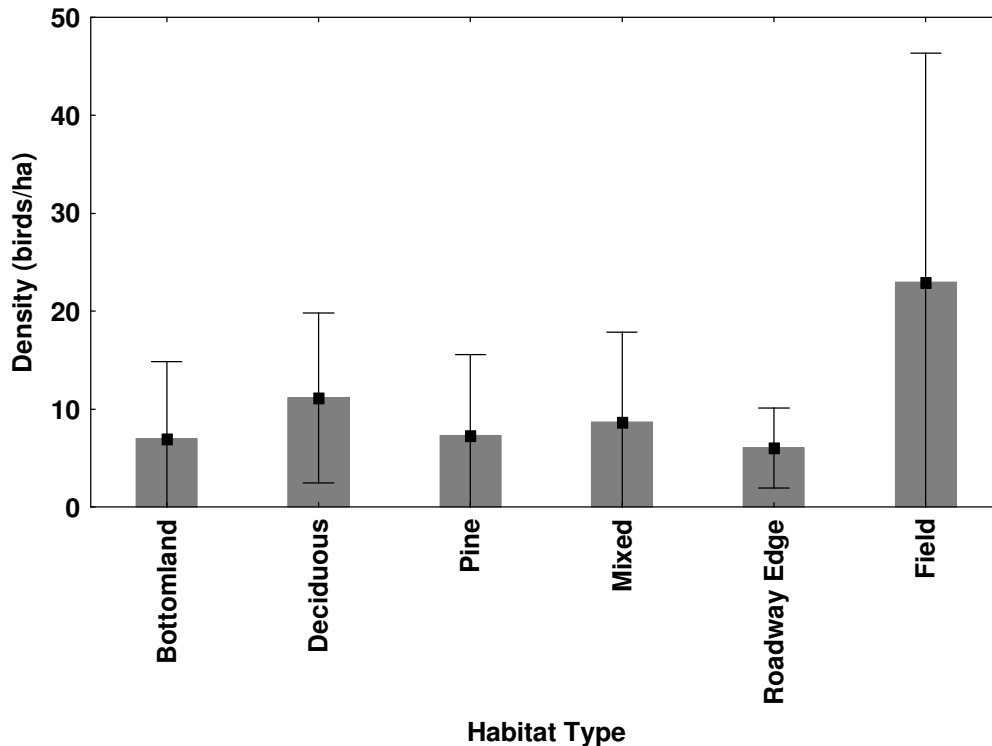
Lake Charles

Several species were only detected on Lake Charles or its shoreline (see survey plot #21, Appendices I-IV). During the breeding season, the lake shoreline appeared to support the only breeding pair of Eastern Phoebes. Two Cedar Waxwings were also observed in summer suggesting that this also was a breeding pair. Waterbirds were only detected in winter. This includes a small list of species including Double-crested Cormorant, Hooded Merganser, Mallard, Bufflehead, Great-blue Heron, and the Belted Kingfisher.

DISCUSSION

The patterns of species richness, bird abundance, and the species observed at the Rice Center are typical of those found in the Mid-Atlantic Region. Early successional and forest parcels had recognizable differences in species composition. The composition of

Figure 4. Density of winter birds by habitat type. Mean values are calculated from all birds detected within 50m of the observer over three survey visits to each plot. Whisker bars indicate standard deviation.



forest habitats were dominated by forest generalists such as the Acadian Flycatcher, Red-bellied Woodpecker, Blue-gray Gnatcatcher, Carolina Wren, Tufted Titmouse, Carolina Chickadee, and Ovenbird. Breeding forest species such as the Prothonotary Warbler, Northern Parula, Kentucky Warbler, and Worm-eating Warbler are more specialized and not detected with great frequency. However, each of these species showed distinct distribution patterns that coincided with changes in forest structure. Prothonotary Warblers and Northern Parulas were only detected in Bottomland hardwood areas. Kentucky Warblers and Worm-eating Warbler were only found in deciduous forest parcels with dense understory vegetation. Both species are also of moderate to high conservation concern within the region (Watts 1999). These two species also respond negatively to forest fragmentation (Robbins et. al. 1989) and are effective indicators of forest health. Maintaining these species at the Rice Center requires that their basic requirements are satisfied. Specific management actions for these species would include protecting areas where they occur and increasing the amount of understory vegetation in other areas. The best habitat for these species is found on the northeast quarter of the Rice Center, just east of Lake Charles, and near Route 5.

Results from surveys suggest that pine stands support relatively lower bird densities and numbers of species. These stands are characterized by dense stocking

levels of pine that closes the canopy, shades the forest floor, and provides little or no understory vegetation. Understory vegetation is directly related to bird species diversity. Opening the canopy through selective thinning will allow for regrowth of understory vegetation. This will stimulate a positive response in the bird community (Thompson et al. 1995, Wilson and Watts 1999) by permitting more species to utilize the forest understory.

Species that were detected in the Field are those typically found in early successional habitats. Indigo Buntings, Blue Grosbeaks, and the American Goldfinches generally require habitats with 30% or more shrubby cover and a groundcover of grasses and forbs. The influence of vegetation structure is clearly evident in this avian community. Early successional habitats change from patches of bare ground to patches of dense, woody vegetation in a relatively short period of time. Most early successional species are restricted to using habitats within in a relatively narrow window of field age. The management of early successional habitats for birds requires a balance between allowing enough woody vegetation to permit species use and controlling vegetation to halt further succession. Complete removal of shrubs and small trees will prevent use by the early successional species detected as well as others (e.g., Common Yellowthroat, Yellow-breasted Chat, and Orchard Oriole) until the vegetation has had adequate time for regrowth. Staggering the management cycle between two or more zones of the Field will help maintain adequate shrub cover for these species while controlling vegetation growth.

The species detected on Lake Charles during surveys are probably only a small subset of those that actually use the Lake during the breeding or wintering seasons. Many additional species were seen flying to or away from the vicinity of the lake during times when it was not being surveyed. This was particularly evident in winter when the region is inundated by scores of waterbirds that breed further north. Among these include several species of ducks, geese, herons, egrets, and gulls as well as Double-crested Cormorants and Bald Eagles. These species are likely using Lake Charles to supplement foraging and resting areas along the James River and other nearby tributaries. The relative importance of the Lake to these species remains unknown. Determining the relative use of Lake Charles to other nearby water bodies would require a more concentrated effort.

In conclusion, the Rice Center provides valuable breeding and wintering habitat for a number of bird species. Included among these are several of conservation concern. The data collected in this project provides critical information on the management for some of these species and the baseline for future avian monitoring activities.

Table7. Mean density (\pm SD) (birds/ha) of species detected within 50m of the observer during winter by habitat type. Mean values are calculated using each survey plot and visit as individual replicates. Missing values indicate a species was not detected within 50m for the respective habitat type.

Species	Bottomland forest	Deciduous forest	Pine Forest	Mixed Forest	Roadway Edge	Field
Mourning Dove				0.3 \pm 0.45		
Pileated Woodpecker			0.1 \pm 0.25	0.3 \pm 0.45	0.3 \pm 0.45	
Red-bellied Woodpecker	0.5 \pm 0.61	0.5 \pm 0.48		0.3 \pm 0.45	0.6 \pm 0.90	
Downy Woodpecker		0.3 \pm 0.53	0.1 \pm 0.12		0.9 \pm 0.45	
Hairy Woodpecker	0.2 \pm 0.32	0.2 \pm 0.52	0.1 \pm 0.12	0.6 \pm 0.90		
Yellow-bellied Sapsucker		0.1 \pm 0.26				
Eastern Phoebe	0.2 \pm 0.32				0.3 \pm 0.45	
American Crow				0.6 \pm 0.90		
Carolina Chickadee	0.5 \pm 0.96	0.5 \pm 1.30	0.2 \pm 0.38	1.3 \pm 1.80	1.6 \pm 0.45	
Tufted Titmouse	0.8 \pm 1.59	1.7 \pm 1.49		1.6 \pm 0.45		
White-breasted Nuthatch	0.2 \pm 0.32	0.2 \pm 0.33				
Carolina Wren	0.6 \pm 0.90	0.9 \pm 0.53	0.1 \pm 0.24		0.3 \pm 0.45	
Winter Wren	0.5 \pm 0.32	0.3 \pm 0.35		0.3 \pm 0.45		1.3 \pm 1.80
Brown Creeper	0.3 \pm 0.37			0.3 \pm 0.45	0.3 \pm 0.45	
Ruby-crowned Kinglet	0.2 \pm 0.32	0.2 \pm 0.52				
Golden-crowned Kinglet				0.9 \pm 1.35	0.6 \pm 0.90	
Cedar Waxwing				1.6 \pm 2.25		
Hermit Thrush	0.5 \pm 0.61	0.1 \pm 0.26				
Yellow-rumped Warbler					0.9 \pm 1.35	
Pine Warbler					0.3 \pm 0.45	
Northern Cardinal	0.3 \pm 0.63				0.3 \pm 0.45	
Dark-eyed Junco					2.5 \pm 3.60	
White-throated Sparrow						14.6 \pm 20.7
Song Sparrow						5.7 \pm 2.7
American Goldfinch	2.4 \pm 4.78					

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LITERATURE CITED

- Askins, R. A. 1993. Population trends in grassland, shrubland and forest birds in eastern North America. *Current Ornithology* 11:1-34.
- Blake, J. G., and J. R. Karr. 1987. Breeding birds of isolated woodlots: Area and habitat relationships. *Ecology* 68:1724-1734.
- Forman, R. T. T., A. E. Galli, and C. F. Leck. 1976. Forest size and avian diversity in New Jersey woodlots with some land use implications. *Oecologia* 26:1-8.
- Hagan, J. M. and D. W. Johnston [Ed.] 1992. Ecology and conservation of neotropical migrant landbirds. Smithsonian Institution Press, Washington, D.C.
- Lynch, J. F., and D. F. Whigham. 1984. Effects of forest fragmentation on breeding bird communities in Maryland, USA. *Biological Conservation* 28:287-324.
- Thompson, F. R. III, J. R. Probst, and M. G. Raphael. 1995. Impacts of silviculture: Overview and management recommendations. Pp 202-219 in T. E. Martin and D. M. Finch (eds.) *Ecology and Management of Neotropical Migratory Birds: A Synthesis and Review of Critical Issues*. Oxford University Press, New York.
- Wilson, M. D. and B. D. Watts. 1999. Breeding Bird Communities of Pine Plantations on the Coastal Plain of North Carolina. *The Chat* 64:1-8.
- Watts, B. D. 1999. Mid-Atlantic Coastal Plain Bird Conservation Plan. Version 1.0. 75 pp.

Appendix I. Number of individuals detected within 50m of the observer by survey plot and round.

		Survey Plot 1			Survey Plot 2			Survey Plot 3			Survey Plot 4			Survey Plot 5			Survey Plot 6		
		Survey Round			Survey Round			Survey Round			Survey Round			Survey Round			Survey Round		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Species Common Name	Scientific Name																		
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	0	1	0	0	0	2	0	0	0	2	0	1	0	1	0	0	0	0
Downy Woodpecker	<i>Picoides pubescens</i>	0	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0
Hairy Woodpecker	<i>Picoides villosus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Flicker	<i>Colaptes auratus</i>	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eastern Wood-Pewee	<i>Contopus virens</i>	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Acadian Flycatcher	<i>Empidonax vireescens</i>	3	4	3	1	2	2	2	0	2	0	0	0	0	0	0	1	0	0
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	0	0	0	2	3	2	0	0	0	1	2	2	2	0	0	2	1	2
Yellow-throated Vireo	<i>Vireo flavifrons</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-eyed Vireo	<i>Vireo olivaceus</i>	2	2	2	2	2	3	2	3	0	3	0	0	0	0	0	2	2	2
Blue Jay	<i>Cyanocitta cristata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Crow	<i>Corvus brachyrhynchos</i>	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barn Swallow	<i>Hirundo rustica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carolina Chickadee	<i>Poecile carolinensis</i>	0	0	2	0	0	2	0	2	0	0	0	1	0	0	2	3	0	0
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	0	0	1	2	0	0	1	2	0	2	0	0	0	0	1	2	0	0
White-breasted Nuthatch	<i>Sitta carolinensis</i>	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Carolina Wren	<i>Thryothorus ludovicianus</i>	3	3	3	3	1	2	1	0	2	1	0	0	0	0	2	1	1	1
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	2	2	2	0	0	0	3	2	2	2	3	1	0	0	0	1	1	0
Eastern Bluebird	<i>Sialia sialis</i>	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
Wood Thrush	<i>Hylocichla mustelina</i>	0	0	0	0	0	0	1	0	2	0	0	1	3	2	0	0	0	0
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Parula	<i>Parula americana</i>	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Yellow-throated Warbler	<i>Dendroica dominica</i>	0	0	0	0	0	0	1	1	0	0	1	0	0	1	0	2	0	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prothonotary Warbler	<i>Protonotaria citrea</i>	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Ovenbird	<i>Seiurus aurocapilla</i>	0	1	0	1	2	0	2	3	0	1	3	1	2	1	1	1	1	1
Louisiana Waterthrush	<i>Seiurus motacilla</i>	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Kentucky Warbler	<i>Oporornis formosus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hooded Warbler	<i>Wilsonia citrina</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Summer Tanager	<i>Piranga rubra</i>	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	1	1	0
Scarlet Tanager	<i>Piranga olivacea</i>	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Cardinal	<i>Cardinalis cardinalis</i>	1	0	1	1	0	0	0	0	0	1	1	2	1	2	0	2	1	2
Blue Grosbeak	<i>Passerina caerulea</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Indigo Bunting	<i>Passerina cyanea</i>	0	0	0	0	0	0	0	0	0	0	0	0	2	3	2	0	0	0
Common Grackle	<i>Quiscalus quiscula</i>	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Brown-headed Cowbird	<i>Molothrus ater</i>	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
American Goldfinch	<i>Carduelis tristis</i>	0	0	0	0	0	0	0	0	0	0	0	0	2	3	1	0	0	0
Green Heron	<i>Butorides virescens</i>	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-shouldered Hawk	<i>Buteo lineatus</i>	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	1	0	0
Red-tailed Hawk	<i>Buteo jamaicensis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	2	2	2	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals		21	17	23	18	11	14	16	14	12	17	14	12	19	16	10	19	8	8

Appendix I – continued

		Survey Plot 7			Survey Plot 8			Survey Plot 9			Survey Plot 10			Survey Plot 11			Survey Plot 12		
		Survey Round			Survey Round			Survey Round			Survey Round			Survey Round			Survey Round		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Species Common Name	Scientific Name																		
Green Heron	<i>Butorides virescens</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-shouldered Hawk	<i>Buteo lineatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Red-tailed Hawk	<i>Buteo jamaicensis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	2	1	1	0	0	1	0	1	0	1	1	3	0	0	0	0	0	0
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	0	2	2	0	2	1	0	2	0	0	1	0	2	0	0	2	2	1
Downy Woodpecker	<i>Picoides pubescens</i>	0	1	0	0	0	0	0	0	1	0	2	0	0	1	0	1	0	1
Hairy Woodpecker	<i>Picoides villosus</i>	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Flicker	<i>Colaptes auratus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0	0	0	0	0	0	2	0	0	2	0	2	0	0	0	1	0	1
Eastern Wood-Pewee	<i>Contopus virens</i>	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acadian Flycatcher	<i>Empidonax virescens</i>	2	2	2	2	1	1	0	0	0	0	0	0	1	2	0	2	1	1
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0
Yellow-throated Vireo	<i>Vireo flavifrons</i>	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-eyed Vireo	<i>Vireo olivaceus</i>	2	2	2	3	3	3	2	3	2	4	2	3	3	2	3	2	3	3
Blue Jay	<i>Cyanocitta cristata</i>	0	1	0	0	0	1	0	1	1	0	0	0	0	0	3	0	0	0
American Crow	<i>Corvus brachyrhynchos</i>	1	2	0	0	0	0	0	2	0	0	0	1	0	0	2	0	0	0
Barn Swallow	<i>Hirundo rustica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carolina Chickadee	<i>Poecile carolinensis</i>	0	2	2	0	0	2	2	2	3	1	2	0	2	0	2	1	2	1

Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	3	0	2	0	0	3	2	0	2	0	0	3	2	1	2	0	2	1
White-breasted Nuthatch	<i>Sitta carolinensis</i>	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carolina Wren	<i>Thryothorus ludovicianus</i>	3	0	1	1	2	0	0	1	1	0	1	0	0	0	0	0	0	0
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	2	0	0	1	2	1	0	0	0	3	0	1	0	2	0	2	1	1
Eastern Bluebird	<i>Sialia sialis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wood Thrush	<i>Hylocichla mustelina</i>	0	1	0	0	0	0	2	1	3	0	0	0	0	0	0	0	0	0
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Parula	<i>Parula americana</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-throated Warbler	<i>Dendroica dominica</i>	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0
Prothonotary Warbler	<i>Protonotaria citrea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ovenbird	<i>Seiurus aurocapilla</i>	0	0	0	2	2	2	2	2	3	1	2	1	2	2	1	2	2	2
Louisiana Waterthrush	<i>Seiurus motacilla</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kentucky Warbler	<i>Oporornis formosus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hooded Warbler	<i>Wilsonia citrina</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Summer Tanager	<i>Piranga rubra</i>	2	2	1	2	1	1	0	0	1	0	0	0	1	2	2	0	0	0
Scarlet Tanager	<i>Piranga olivacea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Cardinal	<i>Cardinalis cardinalis</i>	1	0	2	2	2	0	0	2	2	0	1	0	0	0	0	0	0	0
Blue Grosbeak	<i>Passerina caerulea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indigo Bunting	<i>Passerina cyanea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Common Grackle	<i>Quiscalus quiscula</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown-headed Cowbird	<i>Molothrus ater</i>	1	0	1	1	0	0	0	0	0	0	0	1	0	1	2	0	1	1
American Goldfinch	<i>Carduelis tristis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals		22	18	16	18	17	18	13	17	21	12	12	14	15	12	16	15	13	14

Appendix I – continued

		Survey Plot 13			Survey Plot 14			Survey Plot 15			Survey Plot 16			Survey Plot 17			Survey Plot 18		
		Survey Round			Survey Round			Survey Round			Survey Round			Survey Round			Survey Round		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Species Common Name	Scientific Name																		
Green Heron	<i>Butorides virescens</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-shouldered Hawk	<i>Buteo lineatus</i>	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-tailed Hawk	<i>Buteo jamaicensis</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	2	0	2	2	1	1	0	0	1	1	0	2	1	2	1	2	1	1
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	1	0	0	0	2	0	0	0	0	0	2	1	2	2	2	0	0	0
Downy Woodpecker	<i>Picoides pubescens</i>	0	0	0	0	2	0	0	0	0	0	1	0	1	0	1	0	1	1
Hairy Woodpecker	<i>Picoides villosus</i>	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Flicker	<i>Colaptes auratus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Eastern Wood-Pewee	<i>Contopus virens</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	1
Acadian Flycatcher	<i>Empidonax virescens</i>	2	0	2	0	0	0	0	1	0	0	1	0	1	1	0	3	2	3
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-throated Vireo	<i>Vireo flavifrons</i>	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-eyed Vireo	<i>Vireo olivaceus</i>	2	3	3	3	2	3	2	1	2	1	1	2	0	2	2	2	2	1
Blue Jay	<i>Cyanocitta cristata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Crow	<i>Corvus brachyrhynchos</i>	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	1
Barn Swallow	<i>Hirundo rustica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carolina Chickadee	<i>Poecile carolinensis</i>	0	1	0	2	0	0	2	0	1	2	0	0	0	0	0	0	0	0
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	3	1	2	0	0	1	2	1	1	0	2	2	2	0	2	2	2	3
White-breasted Nuthatch	<i>Sitta carolinensis</i>	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	1	1	1
Carolina Wren	<i>Thryothorus ludovicianus</i>	2	2	2	1	2	0	1	0	2	0	0	2	1	2	1	2	1	2

Blue-gray Gnatcatcher	<i>Poliioptila caerulea</i>	2	2	2	2	1	2	0	0	0	0	0	0	2	1	1	3	2	2
Eastern Bluebird	<i>Sialia sialis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wood Thrush	<i>Hylocichla mustelina</i>	1	0	1	0	0	0	2	0	1	0	0	1	0	0	0	1	0	3
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Parula	<i>Parula americana</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-throated Warbler	<i>Dendroica dominica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prothonotary Warbler	<i>Protonotaria citrea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ovenbird	<i>Seiurus aurocapilla</i>	2	3	1	0	2	0	2	1	2	1	2	3	1	3	1	0	0	0
Louisiana Waterthrush	<i>Seiurus motacilla</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kentucky Warbler	<i>Oporornis formosus</i>	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Hooded Warbler	<i>Wilsonia citrina</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Summer Tanager	<i>Piranga rubra</i>	0	0	0	2	1	3	0	0	1	0	1	1	0	0	0	0	0	0
Scarlet Tanager	<i>Piranga olivacea</i>	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Northern Cardinal	<i>Cardinalis cardinalis</i>	1	0	2	0	2	2	1	1	1	0	0	1	2	0	2	0	1	0
Blue Grosbeak	<i>Passerina caerulea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indigo Bunting	<i>Passerina cyanea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Common Grackle	<i>Quiscalus quiscula</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown-headed Cowbird	<i>Molothrus ater</i>	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Goldfinch	<i>Carduelis tristis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals		23	16	23	14	16	15	12	6	13	6	10	15	15	14	15	18	18	20

Appendix I – continued

		Survey Plot 19			Survey Plot 20			Survey Plot 21		
		Survey Round			Survey Round			Survey Round		
		1	2	3	1	2	3	1	2	3
Species Common Name	Scientific Name									
Green Heron	<i>Butorides virescens</i>	0	0	0	0	0	0	0	0	0
Red-shouldered Hawk	<i>Buteo lineatus</i>	0	0	0	0	0	0	0	0	0
Red-tailed Hawk	<i>Buteo jamaicensis</i>	0	1	1	0	0	0	0	0	0
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	2	1	2	1	0	0	0	0	0
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	0	0	0	0	0	0	0	0	0
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	2	1	0	1	1	1	0	0	0
Downy Woodpecker	<i>Picoides pubescens</i>	0	0	1	0	0	0	0	0	0
Hairy Woodpecker	<i>Picoides villosus</i>	0	0	1	0	0	0	0	0	0
Northern Flicker	<i>Colaptes auratus</i>	0	1	0	1	1	1	0	0	0
Pileated Woodpecker	<i>Dryocopus pileatus</i>	1	0	1	0	0	0	0	0	0
Eastern Wood-Pewee	<i>Contopus virens</i>	1	0	1	1	1	0	0	0	0
Acadian Flycatcher	<i>Empidonax virescens</i>	0	1	1	2	2	1	0	0	0
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	0	0	2	1	0
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	0	0	0	0	0	0	0	0	0
Yellow-throated Vireo	<i>Vireo flavifrons</i>	0	0	1	0	0	0	0	0	0
Red-eyed Vireo	<i>Vireo olivaceus</i>	3	2	2	3	2	2	0	0	0
Blue Jay	<i>Cyanocitta cristata</i>	0	0	0	1	0	0	0	0	0
American Crow	<i>Corvus brachyrhynchos</i>	0	0	0	0	0	0	0	0	0
Barn Swallow	<i>Hirundo rustica</i>	0	0	0	0	0	0	0	8	0
Carolina Chickadee	<i>Poecile carolinensis</i>	2	0	2	0	2	2	0	0	0
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	0	3	0	2	1	0	0	0	0
White-breasted Nuthatch	<i>Sitta carolinensis</i>	0	0	1	1	0	0	0	0	0
Carolina Wren	<i>Thryothorus ludovicianus</i>	2	2	0	1	1	1	0	0	0

Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	1	1	2	3	1	1	0	0	0
Eastern Bluebird	<i>Sialia sialis</i>	0	0	0	0	0	0	0	0	0
Wood Thrush	<i>Hylocichla mustelina</i>	0	0	0	1	0	0	0	0	0
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	1	0	2	2	0
Northern Parula	<i>Parula americana</i>	0	0	0	0	0	0	0	0	0
Yellow-throated Warbler	<i>Dendroica dominica</i>	0	0	0	1	1	0	0	0	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	0	0	0
Prothonotary Warbler	<i>Protonotaria citrea</i>	0	0	0	1	1	1	0	0	0
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	0	0	0	0	0	0	0	0	0
Ovenbird	<i>Seiurus aurocapilla</i>	2	2	4	1	2	2	0	0	0
Louisiana Waterthrush	<i>Seiurus motacilla</i>	0	0	0	0	0	0	0	0	0
Kentucky Warbler	<i>Oporornis formosus</i>	0	0	0	0	0	0	0	0	0
Hooded Warbler	<i>Wilsonia citrina</i>	1	1	1	0	0	0	0	0	0
Summer Tanager	<i>Piranga rubra</i>	0	0	0	0	0	0	0	0	0
Scarlet Tanager	<i>Piranga olivacea</i>	0	0	0	0	0	0	0	0	0
Northern Cardinal	<i>Cardinalis cardinalis</i>	2	0	2	2	0	0	0	0	0
Blue Grosbeak	<i>Passerina caerulea</i>	0	0	0	0	0	0	0	0	0
Indigo Bunting	<i>Passerina cyanea</i>	0	0	0	0	0	0	0	0	0
Common Grackle	<i>Quiscalus quiscula</i>	0	0	0	0	0	0	0	0	0
Brown-headed Cowbird	<i>Molothrus ater</i>	0	0	0	0	0	0	0	0	0
American Goldfinch	<i>Carduelis tristis</i>	0	0	0	0	0	0	0	0	0
Totals		19	16	23	23	17	12	4	11	0

Appendix II. Summary of all detections made during breeding season surveys for each survey plot and round.

		Survey Plot 1			Survey Plot 2			Survey Plot 3			Survey Plot 4			Survey Plot 5			Survey Plot 6		
		Survey Round			Survey Round			Survey Round			Survey Round			Survey Round			Survey Round		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Species Common Name	Scientific Name																		
Green Heron	<i>Butorides virescens</i>	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-shouldered Hawk	<i>Buteo lineatus</i>	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	1	0	0
Red-tailed Hawk	<i>Buteo jamaicensis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	2	2	2	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	0	1	0	0	0	2	0	0	0	2	0	1	0	1	0	0	0	0
Downy Woodpecker	<i>Picoides pubescens</i>	0	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0
Hairy Woodpecker	<i>Picoides villosus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Flicker	<i>Colaptes auratus</i>	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eastern Wood-Pewee	<i>Contopus virens</i>	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Acadian Flycatcher	<i>Empidonax virescens</i>	3	4	3	1	2	2	2	0	2	0	0	0	0	0	0	1	0	0
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	0	0	0	2	3	2	0	0	0	1	2	2	2	0	0	2	1	2
Yellow-throated Vireo	<i>Vireo flavifrons</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-eyed Vireo	<i>Vireo olivaceus</i>	2	2	2	2	2	3	2	3	0	3	0	0	0	0	0	2	2	2
Blue Jay	<i>Cyanocitta cristata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Crow	<i>Corvus brachyrhynchos</i>	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barn Swallow	<i>Hirundo rustica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carolina Chickadee	<i>Poecile carolinensis</i>	0	0	2	0	0	2	0	2	0	0	0	1	0	0	2	3	0	0
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	0	0	1	2	0	0	1	2	0	2	0	0	0	0	1	2	0	0
White-breasted Nuthatch	<i>Sitta carolinensis</i>	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Carolina Wren	<i>Thryothorus ludovicianus</i>	3	3	3	3	1	2	1	0	2	1	0	0	0	0	2	1	1	1

Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	2	2	2	0	0	0	3	2	2	2	3	1	0	0	0	1	1	0
Eastern Bluebird	<i>Sialia sialis</i>	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
Wood Thrush	<i>Hylocichla mustelina</i>	0	0	0	0	0	0	1	0	2	0	0	1	3	2	0	0	0	0
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Parula	<i>Parula americana</i>	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-throated Warbler	<i>Dendroica dominica</i>	0	0	0	0	0	0	1	1	0	0	1	0	0	1	0	2	0	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prothonotary Warbler	<i>Protonotaria citrea</i>	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Ovenbird	<i>Seiurus aurocapilla</i>	0	1	0	1	2	0	2	3	0	1	3	1	2	1	1	1	1	1
Louisiana Waterthrush	<i>Seiurus motacilla</i>	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Kentucky Warbler	<i>Oporornis formosus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hooded Warbler	<i>Wilsonia citrina</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Summer Tanager	<i>Piranga rubra</i>	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	1	1	0
Scarlet Tanager	<i>Piranga olivacea</i>	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Cardinal	<i>Cardinalis cardinalis</i>	1	0	1	1	0	0	0	0	0	1	1	2	1	2	0	2	1	2
Blue Grosbeak	<i>Passerina caerulea</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Indigo Bunting	<i>Passerina cyanea</i>	0	0	0	0	0	0	0	0	0	0	0	0	2	3	2	0	0	0
Common Grackle	<i>Quiscalus quiscula</i>	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Brown-headed Cowbird	<i>Molothrus ater</i>	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
American Goldfinch	<i>Carduelis tristis</i>	0	0	0	0	0	0	0	0	0	0	0	0	2	3	1	0	0	0
Totals		21	17	23	18	11	14	16	14	12	17	14	12	19	16	10	19	8	8

Appendix II – continued

		Survey Plot 7			Survey Plot 8			Survey Plot 9			Survey Plot 10			Survey Plot 11			Survey Plot 12		
		Survey Round			Survey Round			Survey Round			Survey Round			Survey Round			Survey Round		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Species Common Name	Scientific Name																		
Green Heron	<i>Butorides virescens</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-shouldered Hawk	<i>Buteo lineatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Red-tailed Hawk	<i>Buteo jamaicensis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	2	1	1	0	0	1	0	1	0	1	1	3	0	0	0	0	0	0
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	0	2	2	0	2	1	0	2	0	0	1	0	2	0	0	2	2	1
Downy Woodpecker	<i>Picoides pubescens</i>	0	1	0	0	0	0	0	0	1	0	2	0	0	1	0	1	0	1
Hairy Woodpecker	<i>Picoides villosus</i>	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Flicker	<i>Colaptes auratus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0	0	0	0	0	0	2	0	0	2	0	2	0	0	0	1	0	1
Eastern Wood-Pewee	<i>Contopus virens</i>	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acadian Flycatcher	<i>Empidonax virescens</i>	2	2	2	2	1	1	0	0	0	0	0	0	1	2	0	2	1	1
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0
Yellow-throated Vireo	<i>Vireo flavifrons</i>	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-eyed Vireo	<i>Vireo olivaceus</i>	2	2	2	3	3	3	2	3	2	4	2	3	3	2	3	2	3	3
Blue Jay	<i>Cyanocitta cristata</i>	0	1	0	0	0	1	0	1	1	0	0	0	0	0	3	0	0	0
American Crow	<i>Corvus brachyrhynchos</i>	1	2	0	0	0	0	0	2	0	0	0	1	0	0	2	0	0	0
Barn Swallow	<i>Hirundo rustica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carolina Chickadee	<i>Poecile carolinensis</i>	0	2	2	0	0	2	2	2	3	1	2	0	2	0	2	1	2	1
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	3	0	2	0	0	3	2	0	2	0	0	3	2	1	2	0	2	1
White-breasted Nuthatch	<i>Sitta carolinensis</i>	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carolina Wren	<i>Thryothorus ludovicianus</i>	3	0	1	1	2	0	0	1	1	0	1	0	0	0	0	0	0	0

Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	2	0	0	1	2	1	0	0	0	3	0	1	0	2	0	2	1	1
Eastern Bluebird	<i>Sialia sialis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wood Thrush	<i>Hylocichla mustelina</i>	0	1	0	0	0	0	2	1	3	0	0	0	0	0	0	0	0	0
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Parula	<i>Parula americana</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-throated Warbler	<i>Dendroica dominica</i>	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0
Prothonotary Warbler	<i>Protonotaria citrea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ovenbird	<i>Seiurus aurocapilla</i>	0	0	0	2	2	2	2	2	3	1	2	1	2	2	1	2	2	2
Louisiana Waterthrush	<i>Seiurus motacilla</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kentucky Warbler	<i>Oporornis formosus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hooded Warbler	<i>Wilsonia citrina</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Summer Tanager	<i>Piranga rubra</i>	2	2	1	2	1	1	0	0	1	0	0	0	1	2	2	0	0	0
Scarlet Tanager	<i>Piranga olivacea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Cardinal	<i>Cardinalis cardinalis</i>	1	0	2	2	2	0	0	2	2	0	1	0	0	0	0	0	0	0
Blue Grosbeak	<i>Passerina caerulea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indigo Bunting	<i>Passerina cyanea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Common Grackle	<i>Quiscalus quiscula</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown-headed Cowbird	<i>Molothrus ater</i>	1	0	1	1	0	0	0	0	0	0	0	0	1	0	1	2	0	1
American Goldfinch	<i>Carduelis tristis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals		22	18	16	18	17	18	13	17	21	12	12	14	15	12	16	15	13	14

Appendix II - continued

		Survey Plot 13			Survey Plot 14			Survey Plot 15			Survey Plot 16			Survey Plot 17			Survey Plot 18		
		Survey Round			Survey Round			Survey Round			Survey Round			Survey Round			Survey Round		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Species Common Name	Scientific Name																		
Green Heron	<i>Butorides virescens</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-shouldered Hawk	<i>Buteo lineatus</i>	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-tailed Hawk	<i>Buteo jamaicensis</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	2	0	2	2	1	1	0	0	1	1	0	2	1	2	1	2	1	1
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	1	0	0	0	2	0	0	0	0	0	2	1	2	2	2	0	0	0
Downy Woodpecker	<i>Picoides pubescens</i>	0	0	0	0	2	0	0	0	0	0	1	0	1	0	1	0	1	1
Hairy Woodpecker	<i>Picoides villosus</i>	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Flicker	<i>Colaptes auratus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Eastern Wood-Pewee	<i>Contopus virens</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	1
Acadian Flycatcher	<i>Empidonax virescens</i>	2	0	2	0	0	0	0	1	0	0	1	0	1	1	0	3	2	3
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-throated Vireo	<i>Vireo flavifrons</i>	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-eyed Vireo	<i>Vireo olivaceus</i>	2	3	3	3	2	3	2	1	2	1	1	2	0	2	2	2	2	1
Blue Jay	<i>Cyanocitta cristata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Crow	<i>Corvus brachyrhynchos</i>	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	1
Barn Swallow	<i>Hirundo rustica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carolina Chickadee	<i>Poecile carolinensis</i>	0	1	0	2	0	0	2	0	1	2	0	0	0	0	0	0	0	0
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	3	1	2	0	0	1	2	1	1	0	2	2	2	0	2	2	2	3
White-breasted Nuthatch	<i>Sitta carolinensis</i>	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	1	1	1
Carolina Wren	<i>Thryothorus ludovicianus</i>	2	2	2	1	2	0	1	0	2	0	0	2	1	2	1	2	1	2

Blue-gray Gnatcatcher	<i>Poliotilta caerulea</i>	2	2	2	2	1	2	0	0	0	0	0	0	2	1	1	3	2	2
Eastern Bluebird	<i>Sialia sialis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wood Thrush	<i>Hylocichla mustelina</i>	1	0	1	0	0	0	2	0	1	0	0	1	0	0	0	1	0	3
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Parula	<i>Parula americana</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow-throated Warbler	<i>Dendroica dominica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prothonotary Warbler	<i>Protonotaria citrea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ovenbird	<i>Seiurus aurocapilla</i>	2	3	1	0	2	0	2	1	2	1	2	3	1	3	1	0	0	0
Louisiana Waterthrush	<i>Seiurus motacilla</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kentucky Warbler	<i>Oporornis formosus</i>	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Hooded Warbler	<i>Wilsonia citrina</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Summer Tanager	<i>Piranga rubra</i>	0	0	0	2	1	3	0	0	1	0	1	1	0	0	0	0	0	0
Scarlet Tanager	<i>Piranga olivacea</i>	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Northern Cardinal	<i>Cardinalis cardinalis</i>	1	0	2	0	2	2	1	1	1	0	0	1	2	0	2	0	1	0
Blue Grosbeak	<i>Passerina caerulea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indigo Bunting	<i>Passerina cyanea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Common Grackle	<i>Quiscalus quiscula</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown-headed Cowbird	<i>Molothrus ater</i>	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Goldfinch	<i>Carduelis tristis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals		23	16	23	14	16	15	12	6	13	6	10	15	15	14	15	18	18	20

Appendix II – continued

		Survey Plot 19			Survey Plot 20			Survey Plot 21		
		Survey Round			Survey Round			Survey Round		
		1	2	3	1	2	3	1	2	3
Species Common Name	Scientific Name									
Green Heron	<i>Butorides virescens</i>	0	0	0	0	0	0	0	0	0
Red-shouldered Hawk	<i>Buteo lineatus</i>	0	0	0	0	0	0	0	0	0
Red-tailed Hawk	<i>Buteo jamaicensis</i>	0	1	1	0	0	0	0	0	0
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	2	1	2	1	0	0	0	0	0
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	0	0	0	0	0	0	0	0	0
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	2	1	0	1	1	1	0	0	0
Downy Woodpecker	<i>Picoides pubescens</i>	0	0	1	0	0	0	0	0	0
Hairy Woodpecker	<i>Picoides villosus</i>	0	0	1	0	0	0	0	0	0
Northern Flicker	<i>Colaptes auratus</i>	0	1	0	1	1	1	0	0	0
Pileated Woodpecker	<i>Dryocopus pileatus</i>	1	0	1	0	0	0	0	0	0
Eastern Wood-Pewee	<i>Contopus virens</i>	1	0	1	1	1	0	0	0	0
Acadian Flycatcher	<i>Empidonax virescens</i>	0	1	1	2	2	1	0	0	0
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	0	0	2	1	0
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	0	0	0	0	0	0	0	0	0
Yellow-throated Vireo	<i>Vireo flavifrons</i>	0	0	1	0	0	0	0	0	0
Red-eyed Vireo	<i>Vireo olivaceus</i>	3	2	2	3	2	2	0	0	0
Blue Jay	<i>Cyanocitta cristata</i>	0	0	0	1	0	0	0	0	0
American Crow	<i>Corvus brachyrhynchos</i>	0	0	0	0	0	0	0	0	0
Barn Swallow	<i>Hirundo rustica</i>	0	0	0	0	0	0	0	8	0
Carolina Chickadee	<i>Poecile carolinensis</i>	2	0	2	0	2	2	0	0	0
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	0	3	0	2	1	0	0	0	0
White-breasted Nuthatch	<i>Sitta carolinensis</i>	0	0	1	1	0	0	0	0	0
Carolina Wren	<i>Thryothorus ludovicianus</i>	2	2	0	1	1	1	0	0	0

Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	1	1	2	3	1	1	0	0	0
Eastern Bluebird	<i>Sialia sialis</i>	0	0	0	0	0	0	0	0	0
Wood Thrush	<i>Hylocichla mustelina</i>	0	0	0	1	0	0	0	0	0
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	1	0	2	2	0
Northern Parula	<i>Parula americana</i>	0	0	0	0	0	0	0	0	0
Yellow-throated Warbler	<i>Dendroica dominica</i>	0	0	0	1	1	0	0	0	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	0	0	0
Prothonotary Warbler	<i>Protonotaria citrea</i>	0	0	0	1	1	1	0	0	0
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	0	0	0	0	0	0	0	0	0
Ovenbird	<i>Seiurus aurocapilla</i>	2	2	4	1	2	2	0	0	0
Louisiana Waterthrush	<i>Seiurus motacilla</i>	0	0	0	0	0	0	0	0	0
Kentucky Warbler	<i>Oporornis formosus</i>	0	0	0	0	0	0	0	0	0
Hooded Warbler	<i>Wilsonia citrina</i>	1	1	1	0	0	0	0	0	0
Summer Tanager	<i>Piranga rubra</i>	0	0	0	0	0	0	0	0	0
Scarlet Tanager	<i>Piranga olivacea</i>	0	0	0	0	0	0	0	0	0
Northern Cardinal	<i>Cardinalis cardinalis</i>	2	0	2	2	0	0	0	0	0
Blue Grosbeak	<i>Passerina caerulea</i>	0	0	0	0	0	0	0	0	0
Indigo Bunting	<i>Passerina cyanea</i>	0	0	0	0	0	0	0	0	0
Common Grackle	<i>Quiscalus quiscula</i>	0	0	0	0	0	0	0	0	0
Brown-headed Cowbird	<i>Molothrus ater</i>	0	0	0	0	0	0	0	0	0
American Goldfinch	<i>Carduelis tristis</i>	0	0	0	0	0	0	0	0	0
Totals		19	16	23	23	17	12	4	11	0

Appendix III. Summary of detections within 50m of the observer during the winter season for each survey plot and round.

		Survey Plot 1		Survey Plot 2		Survey Plot 3		Survey Plot 4		Survey Plot 5		Survey Plot 6		Survey Plot 7		Survey Plot 8	
		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Species common name	Scientific Name																
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Blue Heron	<i>Ardea herodias</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mallard	<i>Anas platyrhynchos</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bufflehead	<i>Bucephala albeola</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hooded Merganser	<i>Lophodytes cucullatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mourning Dove	<i>Zenaida macroura</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	0	0	0	2	1	0	1	0	0	0	0	0	2	0	1	0
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Downy Woodpecker	<i>Picoides pubescens</i>	0	0	0	0	0	0	1	1	0	0	2	0	0	1	0	1
Hairy Woodpecker	<i>Picoides villosus</i>	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
American Crow	<i>Corvus brachyrhynchos</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carolina Chickadee	<i>Poecile carolinensis</i>	0	0	0	0	0	0	0	0	0	0	3	0	2	0	0	0
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	0
White-breasted Nuthatch	<i>Sitta carolinensis</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown Creeper	<i>Certhia americana</i>	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0
Carolina Wren	<i>Thryothorus ludovicianus</i>	0	0	3	0	0	1	0	0	0	0	1	0	0	0	2	0
Winter Wren	<i>Troglodytes troglodytes</i>	0	0	0	1	0	1	0	0	0	2	0	0	0	0	0	1
Golden-crowned Kinglet	<i>Regulus satrapa</i>	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Ruby-crowned Kinglet	<i>Regulus calendula</i>	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Hermit Thrush	<i>Catharus guttatus</i>	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myrtle Warbler	<i>Dendroica coronata</i>	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Song Sparrow	<i>Melospiza melodia</i>	0	0	0	0	0	0	0	0	3	6	0	0	0	0	0	0

White-throated Sparrow	<i>Zonotrichia albicollis</i>	0	0	0	0	0	0	0	0	0	23	0	0	0	0	0	0
Slate-colored Junco	<i>Junco hyemalis</i>	0	0	0	0	0	0	0	0	0	0	0	0	5	3	0	0
Northern Cardinal	<i>Cardinalis cardinalis</i>	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0
American Goldfinch	<i>Carduelis tristis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals		1	2	4	4	4	5	3	6	3	31	14	0	9	6	6	2

Appendix III – continued

		Survey Plot 9		Survey Plot 10		Survey Plot 11		Survey Plot 12		Survey Plot 13		Survey Plot 14		Survey Plot 15		Survey Plot 16	
		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Species common name	Scientific Name																
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Blue Heron	<i>Ardea herodias</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mallard	<i>Anas platyrhynchos</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bufflehead	<i>Bucephala albeola</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hooded Merganser	<i>Lophodytes cucullatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mourning Dove	<i>Zenaida macroura</i>	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Downy Woodpecker	<i>Picoides pubescens</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Hairy Woodpecker	<i>Picoides villosus</i>	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0
Pileated Woodpecker	<i>Dryocopus pileatus</i>	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Crow	<i>Corvus brachyrhynchos</i>	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Carolina Chickadee	<i>Poecile carolinensis</i>	0	0	0	0	0	0	0	0	4	0	2	3	3	0	0	0
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	0	0	0	0	0	0	2	0	3	0	3	3	0	0	0	0
White-breasted Nuthatch	<i>Sitta carolinensis</i>	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Brown Creeper	<i>Certhia americana</i>	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Carolina Wren	<i>Thryothorus ludovicianus</i>	0	0	0	0	2	0	0	0	0	0	0	2	0	0	2	0
Winter Wren	<i>Troglodytes troglodytes</i>	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0

Golden-crowned Kinglet	<i>Regulus satrapa</i>	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Ruby-crowned Kinglet	<i>Regulus calendula</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Hermit Thrush	<i>Catharus guttatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
Myrtle Warbler	<i>Dendroica coronata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Song Sparrow	<i>Melospiza melodia</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White-throated Sparrow	<i>Zonotrichia albicollis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slate-colored Junco	<i>Junco hyemalis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Cardinal	<i>Cardinalis cardinalis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Goldfinch	<i>Carduelis tristis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals		2	0	0	0	2	0	7	0	18	1	6	11	5	0	4	0

Appendix III – continued

		Survey Plot 17		Survey Plot 18		Survey Plot 19		Survey Plot 20		Survey Plot 21	
		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round	
		1	2	1	2	1	2	1	2	1	2
Species common name	Scientific Name										
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	0	0	0	0	0	0	0	1	0	0
Great Blue Heron	<i>Ardea herodias</i>	0	0	0	0	0	0	0	1	0	0
Mallard	<i>Anas platyrhynchos</i>	0	0	0	0	0	0	0	1	0	0
Bufflehead	<i>Bucephala albeola</i>	0	0	0	0	0	0	0	1	0	0
Hooded Merganser	<i>Lophodytes cucullatus</i>	4	4	0	0	0	0	0	1	0	0
Mourning Dove	<i>Zenaida macroura</i>	0	0	0	0	0	0	0	0	0	0
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	1	0	1	0	0	0	0	0	0	0
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	0	0	0	0	0	0	0	0	0	0
Downy Woodpecker	<i>Picoides pubescens</i>	0	0	0	0	0	0	0	0	0	0
Hairy Woodpecker	<i>Picoides villosus</i>	0	0	0	0	0	0	0	0	0	0
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0	0	0	0	0	0	0	0	0	0
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	0	0	0	0	0	0
American Crow	<i>Corvus brachyrhynchos</i>	0	0	0	0	0	0	0	0	0	0

Carolina Chickadee	<i>Poecile carolinensis</i>	2	2	0	0	0	3	0	0	0	0
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	1	0	0	0	2	3	6	0	0	0
White-breasted Nuthatch	<i>Sitta carolinensis</i>	0	0	0	0	0	0	0	0	0	0
Brown Creeper	<i>Certhia americana</i>	0	1	0	0	0	0	0	0	0	0
Carolina Wren	<i>Thryothorus ludovicianus</i>	0	1	0	2	0	0	2	0	0	0
Winter Wren	<i>Troglodytes troglodytes</i>	0	0	0	0	0	1	0	0	0	0
Golden-crowned Kinglet	<i>Regulus satrapa</i>	0	0	0	0	0	0	0	0	0	0
Ruby-crowned Kinglet	<i>Regulus calendula</i>	0	0	0	0	0	0	0	0	0	0
Hermit Thrush	<i>Catharus guttatus</i>	0	0	0	0	0	0	0	0	0	0
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	0	0	18	0	0	0
Myrtle Warbler	<i>Dendroica coronata</i>	0	0	0	0	0	0	6	0	0	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	0	0	0	0
Song Sparrow	<i>Melospiza melodia</i>	0	0	0	0	0	0	0	0	0	0
White-throated Sparrow	<i>Zonotrichia albicollis</i>	0	0	0	0	0	0	11	0	0	0
Slate-colored Junco	<i>Junco hyemalis</i>	0	0	0	0	0	0	0	0	0	0
Northern Cardinal	<i>Cardinalis cardinalis</i>	0	0	0	0	0	0	0	0	0	0
American Goldfinch	<i>Carduelis tristis</i>	0	0	0	0	15	0	12	0	0	0
Totals		2	0	1	2	17	7	55	5	0	0

Appendix IV. Summary of all detections during winter surveys for each survey point and round.

		Survey Plot 1		Survey Plot 2		Survey Plot 3		Survey Plot 4		Survey Plot 5		Survey Plot 6		Survey Plot 7		Survey Plot 8	
		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Species common name	Scientific Name																
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Blue Heron	<i>Ardea herodias</i>	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Mallard	<i>Anas platyrhynchos</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bufflehead	<i>Bucephala albeola</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hooded Merganser	<i>Lophodytes cucullatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bald Eagle	<i>Haliaeetus leucocephalus</i>	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Red-shouldered Hawk	<i>Buteo lineatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Laughing Gull	<i>Larus atricilla</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Herring Gull	<i>Larus argentatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mourning Dove	<i>Zenaida macroura</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Belted Kingfisher	<i>Ceryle alcyon</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	0	0	0	2	2	0	2	2	0	0	0	0	2	1	2	0
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Downy Woodpecker	<i>Picoides pubescens</i>	0	0	1	0	0	0	1	1	0	0	2	0	0	1	0	1
Hairy Woodpecker	<i>Picoides villosus</i>	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Yellow-shafted Flicker	<i>Colaptes auratus</i>	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Flicker	<i>Colaptes auratus</i>	0	0	1	1	0	1	1	0	0	0	1	0	0	0	0	0
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0
Blue Jay	<i>Cyanocitta cristata</i>	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0
American Crow	<i>Corvus brachyrhynchos</i>	0	0	0	0	0	0	0	0	0	0	2	0	0	1	1	0
Carolina Chickadee	<i>Poecile carolinensis</i>	0	0	2	0	2	2	0	0	0	2	3	0	2	2	2	0
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	0	0	0	0	3	0	2	3	0	3	0	0	0	0	3	0
Red-breasted Nuthatch	<i>Sitta canadensis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White-breasted Nuthatch	<i>Sitta carolinensis</i>	1	1	1	0	0	0	1	0	0	1	2	0	0	0	0	0
Brown Creeper	<i>Certhia americana</i>	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0

Carolina Wren	<i>Thryothorus ludovicianus</i>	0	0	3	0	2	1	0	0	0	0	2	0	0	0	2	0
Winter Wren	<i>Troglodytes troglodytes</i>	0	0	0	1	0	1	0	0	0	2	0	0	0	0	0	1
Golden-crowned Kinglet	<i>Regulus satrapa</i>	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Ruby-crowned Kinglet	<i>Regulus calendula</i>	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Canada Goose	<i>Branta canadensis</i>	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0
Hermit Thrush	<i>Catharus guttatus</i>	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0
American Robin	<i>Turdus migratorius</i>	9	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0
Myrtle Warbler	<i>Dendroica coronata</i>	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Song Sparrow	<i>Melospiza melodia</i>	0	0	0	0	0	0	0	0	3	6	0	0	0	0	0	0
White-throated Sparrow	<i>Zonotrichia albicollis</i>	0	0	0	0	0	0	0	0	0	23	0	0	0	0	0	0
Slate-colored Junco	<i>Junco hyemalis</i>	8	0	0	0	0	0	0	0	0	0	0	0	5	3	0	0
Northern Cardinal	<i>Cardinalis cardinalis</i>	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0
Common Grackle	<i>Quiscalus quiscula</i>	0	0	3	0	0	0	0	0	0	0	2	0	0	0	0	0
American Goldfinch	<i>Carduelis tristis</i>	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals		21	5	15	5	12	8	8	8	3	38	23	1	25	11	12	2

Appendix IV – continued

		Survey Plot 9		Survey Plot 10		Survey Plot 11		Survey Plot 12		Survey Plot 13		Survey Plot 14		Survey Plot 15		Survey Plot 16	
		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Species common name	Scientific Name																
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Blue Heron	<i>Ardea herodias</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mallard	<i>Anas platyrhynchos</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bufflehead	<i>Bucephala albeola</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hooded Merganser	<i>Lophodytes cucullatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bald Eagle	<i>Haliaeetus leucocephalus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-shouldered Hawk	<i>Buteo lineatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laughing Gull	<i>Larus atricilla</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Herring Gull	<i>Larus argentatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mourning Dove	<i>Zenaida macroura</i>	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Belted Kingfisher	<i>Ceryle alcyon</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	0	0	0	0	0	0	0	0	1	1	2	1	0	1	1	0
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Downy Woodpecker	<i>Picoides pubescens</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Hairy Woodpecker	<i>Picoides villosus</i>	0	0	0	0	0	1	2	0	0	0	0	0	0	0	1	0
Yellow-shafted Flicker	<i>Colaptes auratus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Flicker	<i>Colaptes auratus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blue Jay	<i>Cyanocitta cristata</i>	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0
American Crow	<i>Corvus brachyrhynchos</i>	0	0	0	0	0	0	1	0	2	0	0	2	0	0	0	0
Carolina Chickadee	<i>Poecile carolinensis</i>	0	0	0	0	0	0	0	0	4	0	4	3	0	0	3	0
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	0	0	0	0	0	0	2	0	3	0	3	3	0	0	0	0
Red-breasted Nuthatch	<i>Sitta canadensis</i>	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
White-breasted Nuthatch	<i>Sitta carolinensis</i>	0	0	0	0	0	1	0	0	0	0	1	1	0	0	1	0
Brown Creeper	<i>Certhia americana</i>	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

Carolina Wren	<i>Thryothorus ludovicianus</i>	0	0	0	0	2	0	0	0	0	0	0	2	1	2	0	0
Winter Wren	<i>Troglodytes troglodytes</i>	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Golden-crowned Kinglet	<i>Regulus satrapa</i>	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Ruby-crowned Kinglet	<i>Regulus calendula</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Canada Goose	<i>Branta canadensis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hermit Thrush	<i>Catharus guttatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Robin	<i>Turdus migratorius</i>	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
Myrtle Warbler	<i>Dendroica coronata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Song Sparrow	<i>Melospiza melodia</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White-throated Sparrow	<i>Zonotrichia albicollis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slate-colored Junco	<i>Junco hyemalis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Cardinal	<i>Cardinalis cardinalis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Common Grackle	<i>Quiscalus quiscula</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Goldfinch	<i>Carduelis tristis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals		0	2	0	0	2	5	10	0	18	5	10	13	1	3	7	4

Appendix IV – continued

		Survey Plot 17		Survey Plot 18		Survey Plot 19		Survey Plot 20		Survey Plot 21	
		Survey Round		Survey Round		Survey Round		Survey Round		Survey Round	
		1	2	1	2	1	2	1	2	1	2
Species common name	Scientific Name										
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	0	0	0	0	0	0	0	0	3	1
Great Blue Heron	<i>Ardea herodias</i>	0	0	0	0	0	0	0	0	0	1
Mallard	<i>Anas platyrhynchos</i>	0	0	0	0	0	0	0	0	55	1
Bufflehead	<i>Bucephala albeola</i>	0	0	0	0	0	0	0	0	0	1
Hooded Merganser	<i>Lophodytes cucullatus</i>	0	0	0	0	0	0	0	0	0	1
Bald Eagle	<i>Haliaeetus leucocephalus</i>	0	0	0	1	0	0	0	0	0	0
Red-shouldered Hawk	<i>Buteo lineatus</i>	0	0	0	0	0	1	0	0	0	0
Laughing Gull	<i>Larus atricilla</i>	0	0	0	0	0	0	0	0	3	0
Herring Gull	<i>Larus argentatus</i>	0	0	0	0	0	1	0	0	0	0
Mourning Dove	<i>Zenaida macroura</i>	0	0	0	0	0	0	0	0	0	0
Belted Kingfisher	<i>Ceryle alcyon</i>	0	0	0	0	0	0	0	0	1	0
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	0	0	0	0	2	0	0	0	0	0
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	0	0	1	0	0	0	0	0	0	0
Downy Woodpecker	<i>Picoides pubescens</i>	0	0	0	0	0	0	0	0	0	0
Hairy Woodpecker	<i>Picoides villosus</i>	0	0	1	0	0	0	0	0	0	0
Yellow-shafted Flicker	<i>Colaptes auratus</i>	0	0	0	0	0	0	0	0	0	0
Northern Flicker	<i>Colaptes auratus</i>	1	1	0	0	0	0	0	0	0	0
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0	0	1	0	0	0	0	0	0	0
Eastern Phoebe	<i>Sayornis phoebe</i>	0	0	0	0	0	0	0	0	0	0
Blue Jay	<i>Cyanocitta cristata</i>	0	0	0	0	0	0	0	0	0	0
American Crow	<i>Corvus brachyrhynchos</i>	2	0	0	0	0	0	0	0	0	0
Carolina Chickadee	<i>Poecile carolinensis</i>	0	0	0	0	2	0	0	3	0	0
Eastern Tufted Titmouse	<i>Baeolophus bicolor</i>	0	0	3	2	2	0	2	3	6	0
Red-breasted Nuthatch	<i>Sitta canadensis</i>	0	0	0	0	0	0	0	0	0	0
White-breasted Nuthatch	<i>Sitta carolinensis</i>	0	0	1	0	0	0	0	0	0	0
Brown Creeper	<i>Certhia americana</i>	0	0	0	0	0	0	0	0	0	0

Carolina Wren	<i>Thryothorus ludovicianus</i>	2	2	0	1	1	2	0	0	2	0
Winter Wren	<i>Troglodytes troglodytes</i>	0	0	0	1	0	0	0	1	0	0
Golden-crowned Kinglet	<i>Regulus satrapa</i>	0	0	0	0	0	0	0	0	0	0
Ruby-crowned Kinglet	<i>Regulus calendula</i>	2	0	0	0	0	0	0	0	0	0
Canada Goose	<i>Branta canadensis</i>	0	0	0	0	0	0	0	0	0	0
Hermit Thrush	<i>Catharus guttatus</i>	0	0	0	0	0	0	0	0	0	0
American Robin	<i>Turdus migratorius</i>	0	0	0	0	0	0	0	0	0	0
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0	13	0	0	0	0	0	18	0
Myrtle Warbler	<i>Dendroica coronata</i>	0	0	0	0	0	0	0	0	6	0
Pine Warbler	<i>Dendroica pinus</i>	0	0	0	0	0	0	0	0	0	0
Song Sparrow	<i>Melospiza melodia</i>	0	0	0	0	0	0	0	0	0	0
White-throated Sparrow	<i>Zonotrichia albicollis</i>	0	0	0	0	1	0	0	0	11	0
Slate-colored Junco	<i>Junco hyemalis</i>	0	0	0	0	0	0	0	0	0	0
Northern Cardinal	<i>Cardinalis cardinalis</i>	0	0	0	0	0	0	0	0	0	0
Common Grackle	<i>Quiscalus quiscula</i>	0	0	0	0	0	0	0	0	0	0
American Goldfinch	<i>Carduelis tristis</i>	0	0	0	0	0	0	15	0	12	0
Totals		7	3	20	5	8	4	17	7	117	5