

**INVENTORYING AND MONITORING
PROTOCOLS OF BIRDS IN
NATIONAL PARKS OF THE
EASTERN UNITED STATES**

Technical Report NPS/PHSO/NRTR-98/074

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Executive Summary

We conducted a long-term project (1992-1996) designed to provide a comprehensive review of vertebrates (amphibians, reptiles, birds, and mammals) in four national parks in the eastern United States. We field tested select protocols at Gettysburg National Military Park (GETT), Eisenhower National Historic Site (EISE), Hopewell Furnace National Historic Site (HOFU), and Valley Forge National Historical Park (VAFO) to (1) determine the effectiveness of protocols for inventorying and monitoring terrestrial vertebrates in terms of time, labor, cost, and types of data obtained and (2) predict and document the number of terrestrial vertebrate species within the parks. The focus of this report is birds.

We had predicted that 232 avian species potentially occurred at GETT-EISE and HOFU and 247 species potentially occurred at VAFO. Of these predicted species, 98 (42%) species at GETT-EISE, 164 (71%) species at HOFU, and 211 (85%) species at VAFO were documented previous to our project by observers (e.g., park personnel) and noted on National Park Service Wildlife Observation Cards.

We tested four protocols for inventorying and monitoring birds from 1 July 1992 to 30 June 1996: transects (fixed-width and variable-width), point counts (fixed-radius and unlimited-radius), vehicular-road surveys (non-stop and BBS), and nocturnal-owl surveys. Three protocols (transects, point counts, and vehicular-road surveys) were tested at GETT-EISE, all four protocols were tested at HOFU, and two protocols (vehicular-road surveys and nocturnal-owl surveys) were tested at VAFO. Based on the test of these protocols, we recorded 113 (49% of predicted), 98 (42% of predicted), and 69 (28% of predicted) bird species at GETT-EISE, HOFU, and VAFO, respectively. In addition to avian species observed through protocol testing, 16 species at GETT-EISE, 21 species at HOFU, and 10 species at VAFO were observed by project researchers. Based on the total number of species recorded by protocol testing and project researchers from 1 July 1992 to 30 June 1996, 58 (37%) of 156 species at GETT-EISE, 14 (8%) of 178 species at HOFU, and two (1%) of 213 species at VAFO had not been documented officially in the parks prior to our project.

Based on our field testing of protocols at GETT-EISE, HOFU, and VAFO, we recommend use of point-count and vehicular-road survey protocols for waterfowl, the point-count protocol for shorebirds, the nocturnal-owl survey protocol for owls, and transect and point-count protocols for woodpeckers and passerines. Additional study will be necessary to increase the number of species documented of certain groups, such as waders, shorebirds, and raptors.

Introduction

We conducted a long-term project (1992-1996) designed to provide a comprehensive review of vertebrates (amphibians, reptiles, birds, and mammals, excluding white-tailed deer [*Odocoileus virginianus*] and black bear [*Ursus americanus*]) in four national parks in the eastern United States: Gettysburg National Military Park (GETT), Eisenhower National Historic Site (EISE), Hopewell Furnace National Historic Site (HOFU), and Valley Forge National Historical Park (VAFO). Deer were not included in this study because they were the subject of another study (Storm et al. 1989), and bear were excluded because they principally are a more northerly species. Information on presence, relative abundance, and distribution of vertebrates on these public lands is important to National Park Service (NPS) personnel (hereafter referred to as resource management specialists) who are mandated to manage natural resources. As large tracts of public lands, such as national parks, become more insular with increased habitat fragmentation because of agriculture, urbanization, or other land use, these lands will be increasingly valuable for the long-term maintenance of faunal diversity and the functional integrity of landscapes and ecosystems in the eastern United States (Ambrose and Bratton 1990, Yahner et al. 1995). The focus of this report is birds.

In years 1 and 2 of this long-term project, we surveyed the literature for protocols used in studies designed to inventory and monitor birds. We also were interested in assessing cost-, labor-, and time-constraints associated with each protocol. Protocols were organized in a hierarchical fashion, depending on specific goals and types of data needed at a given park. We also intended that these protocols would be tested and applied in other areas of the eastern United States so that trends in avian populations could be monitored on a regional basis. A summary of these protocols is given in Technical Report NPS/MAR/NRTR-94/057 (Yahner et al. 1994a).

Also in years 1 and 2, we conducted an extensive search of available databases on birds (e.g., published and unpublished species lists and range maps) that were predicted to occur or were documented in the four national parks. We also combined land-use data for each park with known habitat requirements and ranges of avian species in the eastern deciduous forest to augment the list of species predicted to occur at the four parks. Furthermore, we determined primary and secondary habitat, occurrence status, residency status, legal population status, and types of inventory and monitoring protocols applicable to each predicted and documented avian species. A summary of birds and other vertebrate fauna associated with the four parks is presented in Technical Report NPS/MAR/NRTR-94/058 (Yahner et al. 1994b, 1994c).

We selected a subset of inventorying and monitoring protocols identified in Technical Report NPS/MAR/NRTR-94/057 to test at GETT-EISE during years 2 and 3, at HOFU during years 3 and 4, and at VAFO during year 4 of our study (Yahner et al. 1994a). Protocols selected for testing in the field were principally those conducted on taxa that were not well represented in the list of documented species (e.g., spring and fall migratory species) (Yahner et al. 1994b). By testing these protocols at each of the four parks, we obtained information on the feasibility of

each protocol (i.e., amount of time, labor, and money required to conduct the protocol), avian species documented by the protocol, and habitat use by avian species in the parks. This information is important to resource management specialists who are mandated to manage native and nonnative species. Information obtained from testing of protocols will allow resource management specialists to develop time-, labor-, and cost-efficient management plans that satisfy specific objectives for a given avian species that may be documented or predicted to occur in a park.

This report can be used with Technical Report NPS/MAR/NRTR-94/057, which is entitled "Inventorying and Monitoring Protocols of Vertebrates in National Park Areas of the Eastern United States: The Bibliographic Report" (Yahner et al. 1994a), and Technical Report NPS/MAR/NRTR-94/058, which is entitled "Inventorying and Monitoring Protocols of Vertebrates in National Park Areas of the Eastern United States: The Faunal Report" (Yahner et al. 1994b, 1994c). When used together, these reports synthesize comprehensive information on inventorying and monitoring protocols, and ecological, biological, and legal data for birds and other vertebrate fauna in the eastern deciduous forest.

In this final report, we present information on our efforts to:

1. field test selected protocols to document terrestrial avian species and habitats used by these species in Gettysburg National Military Park and Eisenhower National Historic Site, Hopewell Furnace National Historic Site, and Valley Forge National Historical Park;
2. determine the effectiveness of selected protocols for birds in terms of time, labor, cost, and types of data obtained; and
3. update the Faunal Databases for each of the parks.

Study Areas

Gettysburg National Military Park and Eisenhower National Historic Site

Gettysburg National Military Park and Eisenhower National Historic Site are located in Adams County, south central Pennsylvania, and comprise 1,511 ha and 279 ha, respectively. The town of Gettysburg (population = 7,025) is surrounded by GETT (Rand McNally 1993); EISE is southwest and contiguous with GETT. The parks are located within the Triassic Lowland Section of the Piedmont Province, which corresponds to the Carolinian Life Zone (Rhoads 1903, Genoways and Brenner 1985).

The topography of the parks is gentle, consisting mainly of rolling hills. There are two principal landforms that traverse GETT: Cemetery Ridge and Seminary Ridge. These two parallel ridges are 1.6 km apart and are oriented north-south. The mean elevation in the parks is 168 m, and the highest point is Big Round Top (240 m) (Yahner et al. 1991). There are 10 ponds, numerous small wetlands, and three predominant drainages: Rock Creek in the east, Plum Run in the center, and Willoughby Run in the west of the parks.

Fifty percent (756 ha) of GETT is agricultural land (cropland and pasture), and 36% (547 ha) is forestland. The remaining 14% is comprised of maintained areas, residential areas, or other types of human-dominated developed land (Yahner et al. 1991). Eighty-three percent (232 ha) of EISE is agricultural land, 3% is forestland, and 14% maintained areas, residential areas, and other developed land (Yahner et al. 1991). Crop species at the parks include barley, corn, hay (timothy, clover, alfalfa, and fescue), sorghum, oats, rye, soybeans, and winter wheat (Yahner et al. 1991). Forestland contains mature tree species that typify Appalachian forest types and are principally oak (*Quercus* spp.), hickory (*Carya* spp.), and tulip poplar (*Liriodendron tulipifera*) (Kuchler 1964, Yahner et al. 1991).

Hopewell Furnace National Historic Site

Hopewell Furnace National Historic Site is located in Berks and Chester Counties, southeastern Pennsylvania. The 350-ha park is situated in a rural setting, approximately 10 km southwest of Pottstown (population = 21,831), and is contiguous on all but the southeast side with French Creek State Park (Rand McNally 1993). HOFU is contained within the Piedmont Upland Section and the Conestoga Valley Section of the Piedmont Province, which are within the Carolinian Life Zone (Rhoads 1903, Genoways and Brenner 1985).

The southern two-thirds of HOFU is dominated by relatively moderate topography with little relief, with the exception of one forested hill (elevation = 220 m) near the southern border of the

park. The northern one-third of the park is dominated by a forested south-facing slope with a maximum elevation of 280 m and a mean slope of 10%. The minimum elevation near the headwaters of French Creek is 146 m (Russell 1987).

Forest occurs on 262 ha (75%) of HOFU. The principal overstory trees are oak, tulip poplar, red maple (*Acer rubrum*), sycamore (*Platanus occidentalis*), red cedar (*Juniperus virginiana*), ash (*Fraxinus* spp.), elm (*Ulmus* spp.), and black walnut (*Juglans nigra*). Red cedar is only found in early successional stands. The remaining 88 ha (25%) are either developed, historic, or agricultural areas. Agricultural areas consist of 13 fields totaling 60 ha and are maintained in pastures, hay fields, and row crops (Russell 1987).

Valley Forge National Historical Park

Valley Forge National Historical Park is located in Montgomery and Chester Counties, southeastern Pennsylvania. The area of VAFO is 1,192 ha. The park is surrounded by urban-suburban land-use types and is approximately 20 km northwest of Philadelphia (population = 1,585,577) (Rand McNally 1993). VAFO is located within the Triassic Lowland Section of the Piedmont Province in the Carolinian Life Zone (Rhoads 1903, Genoways and Brenner 1985).

The topography of VAFO is relatively gentle, consisting of rolling uplands and low hills, with elevations ranging from 10 to 150 m. Fifty-seven percent (679 ha) of the park is composed of old-fields, fields mowed annually, and fields mowed biweekly; 38% (453 ha) is woodlands. The remaining 5% (60 ha) of VAFO includes developed areas (e.g., buildings), barren areas (e.g., dirt parking lots), and wetlands (e.g., small ponds) (Cypher 1986).

Woodlands consist of mature forests, early successional-stage forests, floodplain forests, and conifer plantations. The dominant understory and overstory species in woodlands include flowering dogwood (*Cornus florida*), red maple, boxelder (*Acer negundo*), tulip poplar, black gum (*Nyssa sylvatica*), chestnut oak (*Quercus prinus*), northern red oak (*Quercus rubra*), ash, sassafras (*Sassafras albidum*), and white pine (*Pinus strobus*) (Cypher 1986).

Study Sites Used for Protocol Testing

At each of the parks, we divided habitats for avian sampling into three types: grassland, old-field, and forest. Forest habitat was subdivided into upland sites and lowland sites associated with water. Ten study sites were selected randomly at GETT-EISE, eight sites at HOFU, and six sites at VAFO (Tables 1-3). Within each of these sites, a transect was established in a random direction for the field testing of specific protocols. Transect lengths at each site at GETT-EISE depended upon the amount of habitat available. For example, because of the limited amount of

old-field habitat at Devil's Den, the DOF transect was only 300 m; the DDL transect, however, was 600 m because of the abundance of lowland-forest habitat at Devil's Den (Table 1). Transects at HOFU and VAFO were each 600 m in length. The starting point along each transect was placed 50 m into the habitat edge, and sampling points were established thereafter at 150-m intervals. At the DOF transect at GETT-EISE, no sampling point was established at the end of the transect because of its close proximity to the DDL transect. At steep sites (e.g., MJU) or those associated with water (e.g., LFL), transects followed the contour of the landscape.

Gettysburg National Military Park and Eisenhower National Historic Site

Ten study sites were selected for avian sampling at GETT-EISE (Table 1, Fig. 1). Two of these sites were in grassland habitat (Pennsylvania Monument Grassland [PMG] and Valley of Death Grassland [VDG]), four in old-field habitat (Picnic Area Old-Field [POF], Devil's Den Old-Field [DOF], McMillan Old-Field [MOF], and Warfield Ridge Old-Field [WOF]), two in lowland-forest habitat (Devil's Den Lowland [DDL] and Landfill Lowland [LFL]), and two in upland-forest habitat (Little Round Top upland [LRU] and Big Round Top upland [BRU]).

Hopewell Furnace National Historic Site

Eight study sites were selected for avian sampling at HOFU (Table 2, Fig. 2). Two sites were in old-field habitat (Powerline Lowland old-field [PLO] and Powerline Upland old-field [PUO]), four in lowland-forest habitat (Powerline lowland [PLL], French Creek lowland [FCL], Hopewell Road Lowland [HOL], and French Creek Riparian [FCR]), and two in upland-forest habitat (Powerline upland [PLU] and Route 345 S-curve upland [SCU]).

Valley Forge National Historical Park

Six study sites were selected for avian sampling at VAFO (Table 3, Fig. 3). One of these study sites was in grassland habitat (General Wayne's Grassland/Field 57 [GWG]), one in old-field habitat (Valley Forge Old-Field/Field 77 [VOF]), two in lowland-forest habitat (Railroad Lowland [RRL] and James White Lowland [JWL]), and two in upland-forest habitat (Mount Misery Upland [MMU] and Mount Joy Upland [MJU]).

Table 1. Study sites, study site codes, habitat types, transect lengths (m), and number of sampling points for protocol testing at Gettysburg National Military Park and Eisenhower National Historic Site.

STUDY SITE	CODE	HABITAT TYPE	TRANSECT LENGTH	NUMBER POINTS
Pennsylvania Monument Grassland	PMG	Grassland	800	6
Valley of Death Grassland	VDG	Grassland (with marsh)	600	5
Warfield Ridge Old-Field	WOF	Old- Field	450	4
Picnic Old-Field	POF	Old- Field	150	2
McMillan Old-Field	MOF	Old- Field	300	3
Devil's Den Old-Field	DOF	Old- Field	300	2
Devil's Den Lowland	DDL	Lowland-Forest	600	5
Landfill Lowland	LFL	Lowland-Forest	600	5
Little Round Top Upland	LRU	Upland-Forest	450	4
Big Round Top Upland	BRU	Upland-Forest	750	6
TOTAL			5000	42

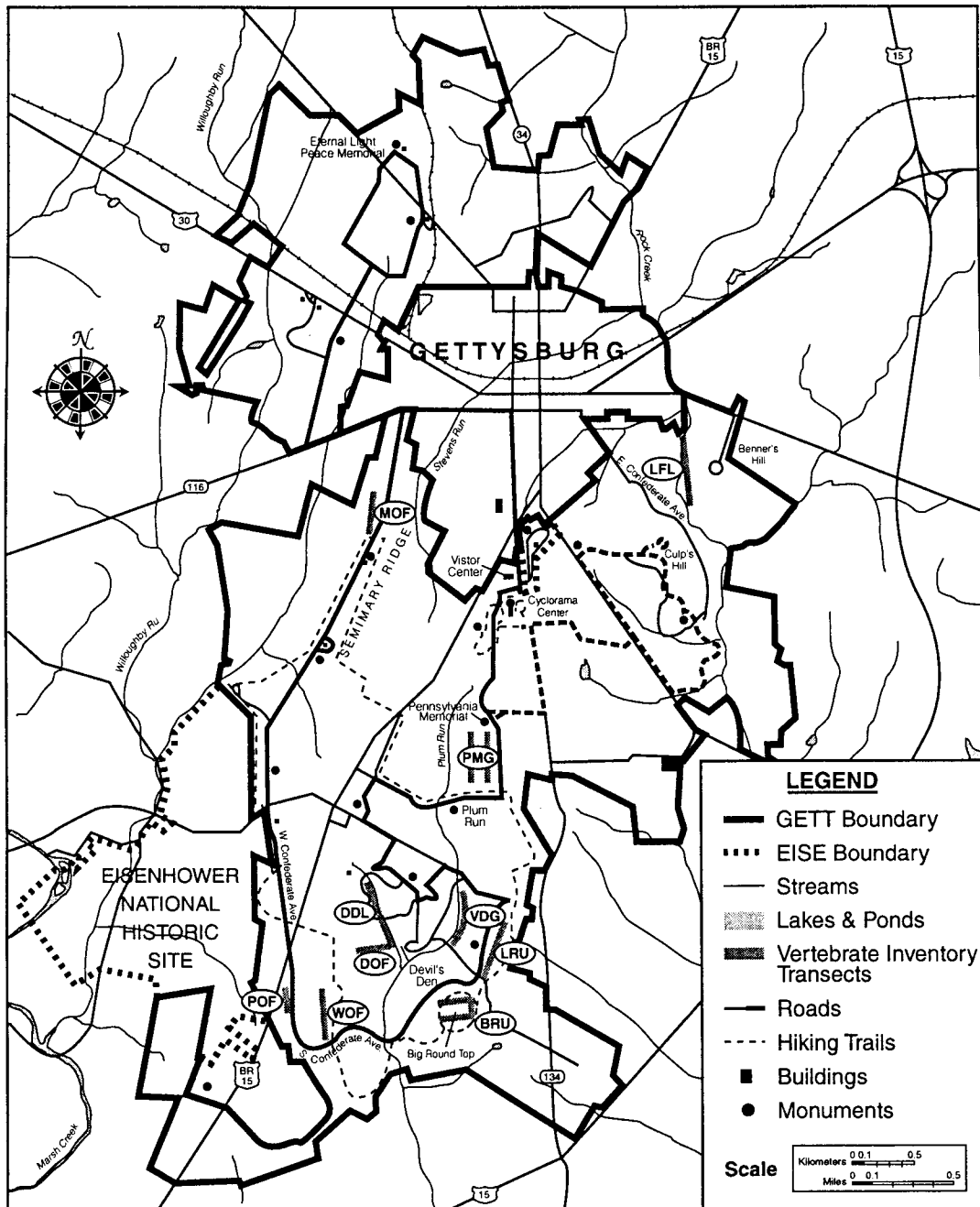


Figure 1. Locations of two grassland (PMG and VDG), four old-field (WOF, POF, MOF, and DOF), two lowland-forest (DDL and LFL), and two upland-forest (LRU and BRU) transects used for protocol testing at Gettysburg National Military Park and Eisenhower National Historic Site.

Table 2. Study sites, study site codes, habitat types, transect lengths (m), and number of sampling points for protocol testing at Hopewell Furnace National Historic Site.

STUDY SITE	CODE	HABITAT TYPE	TRANSECT LENGTH	NUMBER POINTS
Powerline Lowland Old-Field	PLO	Old- Field	600	5
Powerline Upland Old-Field	PUO	Old- Field	600	5
Powerline Lowland	PLL	Lowland-Forest	600	5
Hopewell Road Lowland	HOL	Lowland-Forest	600	5
French Creek Riparian	FCR	Lowland-Forest	600	5
French Creek Lowland	FCL	Lowland-Forest	600	5
Powerline Upland	PLU	Upland-Forest	600	5
Route 345 S-Curve Upland	SCU	Upland-Forest	600	5
TOTAL			4800	40

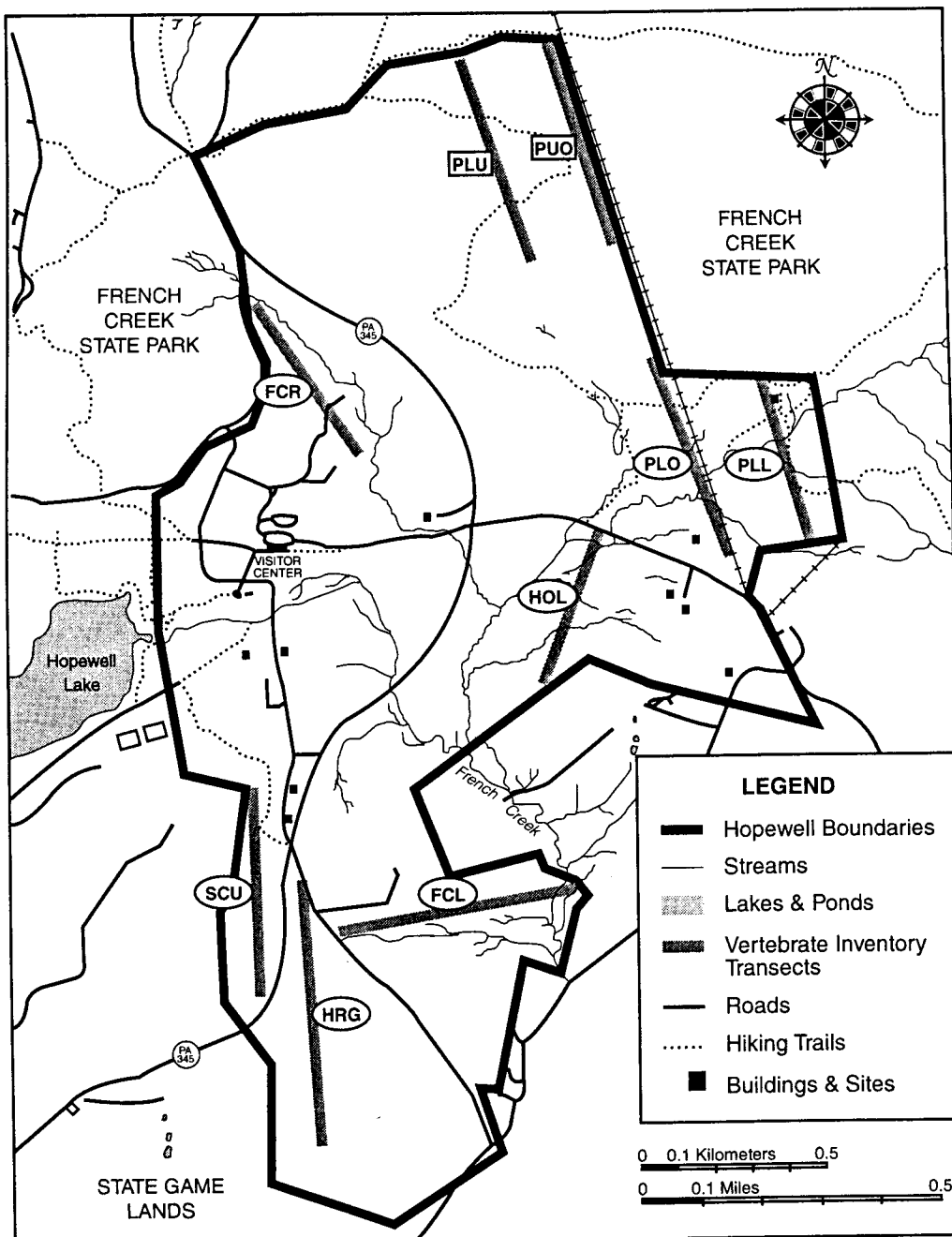


Figure 2. Locations of the grassland (HRG), two old-field (PLO and PUO), four lowland-forest (PLL, HOL, FCR, and FCL), and two upland-forest (PLU and SCU) transects used for protocol testing at Hopewell Furnace National Historic Site.

Table 3. Study sites, study site codes, habitat types, transect lengths (m), and number of sampling points for protocol testing at Valley Forge National Historical Park.

STUDY SITE	CODE	HABITAT TYPE	TRANSECT LENGTH	NUMBER POINTS
General Wayne's Grassland (Field 57)	GWG	Grassland	600	5
Valley Forge Old-Field (Field 77)	VOF	Old-Field	600	5
Railroad Lowland	RRL	Lowland-Forest	600	5
James White Lowland	JWL	Lowland-Forest	600	5
Mount Misery Upland	MMU	Upland-Forest	600	5
Mount Joy Upland	MJU	Upland-Forest	600	5
TOTAL			3600	30

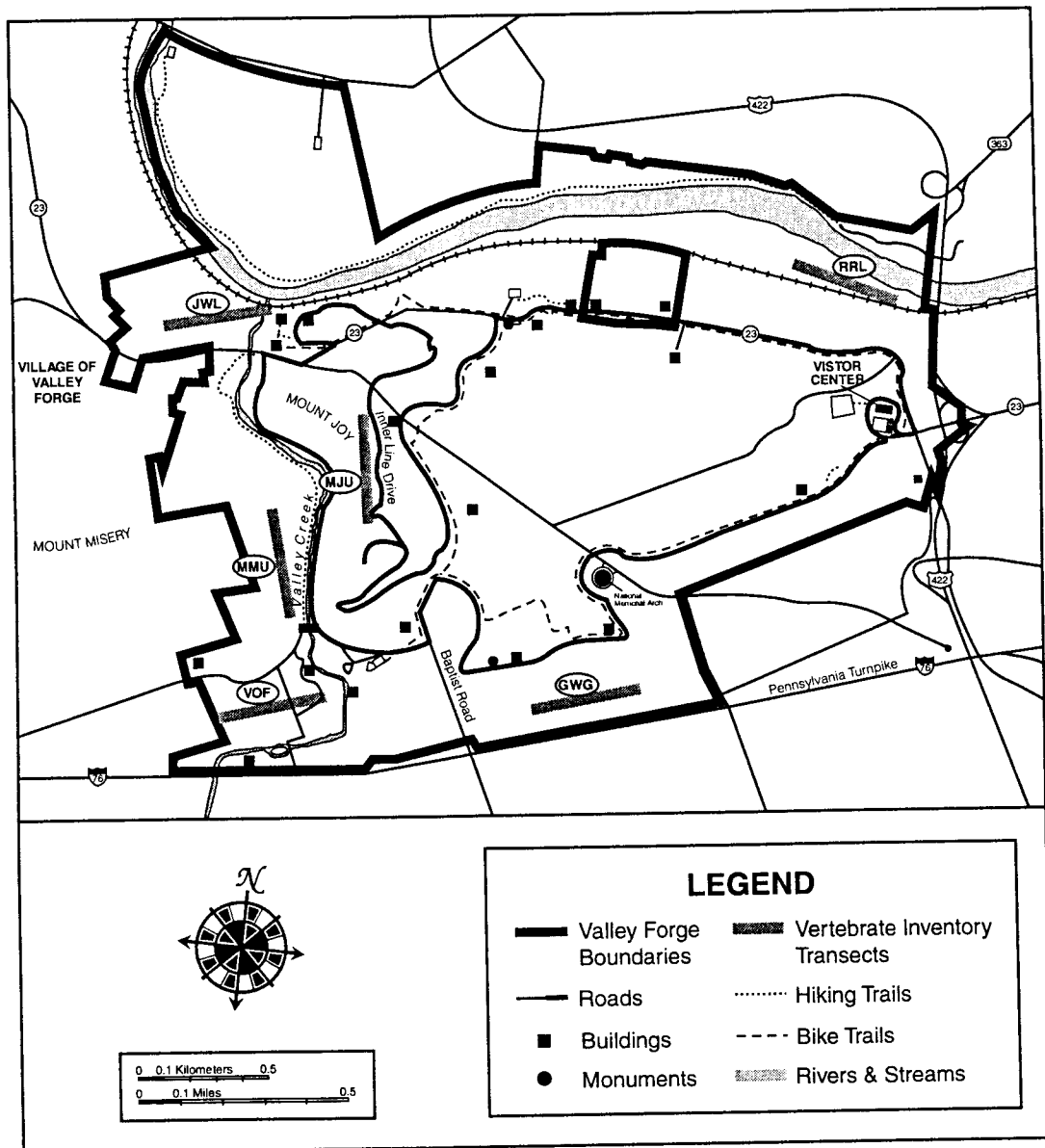


Figure 3. Locations of the one grassland (GWG), one old-field (VOF), two lowland-forest (RRL and JWL), and two upland-forest (MMU and MJU) transects used for protocol testing at Valley Forge National Historical Park.

Vehicular-Road Survey Route

We also established a vehicular route through each of the parks for use with the vehicular-road survey protocol. We selected secondary roads that encompassed a variety of representative habitats. The length of the route varied among parks, depending upon park size and number of low-use secondary roads. The route was 20.8 km (13 miles) in length at GETT-EISE, 8.0 km (5 miles) at HOFU, and 11.3 km (7 miles) at VAFO (Figs. 4-6, respectively).

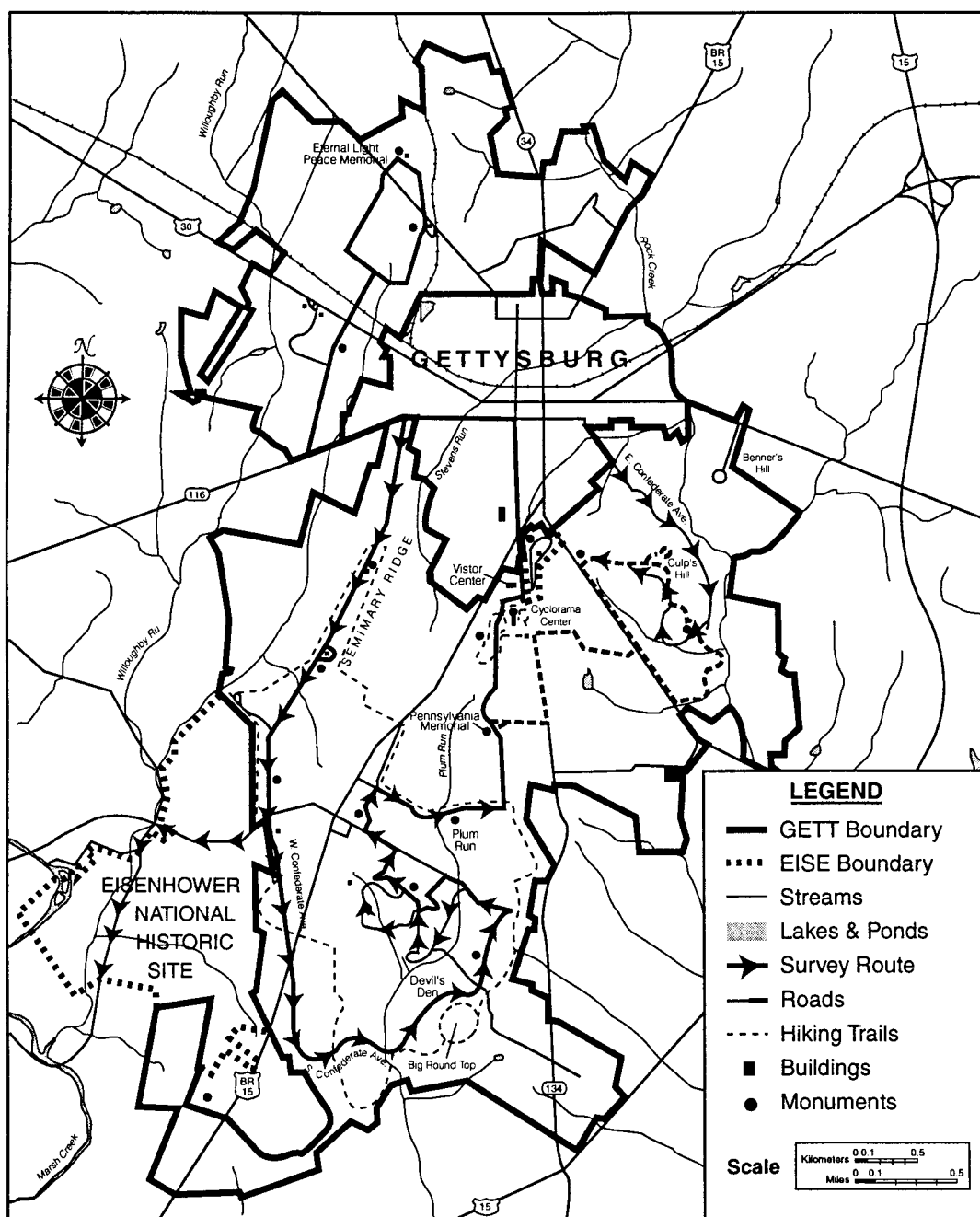


Figure 4. Location of the 20.8-km vehicular-road survey route at Gettysburg National Military Park and Eisenhower National Historic Site.

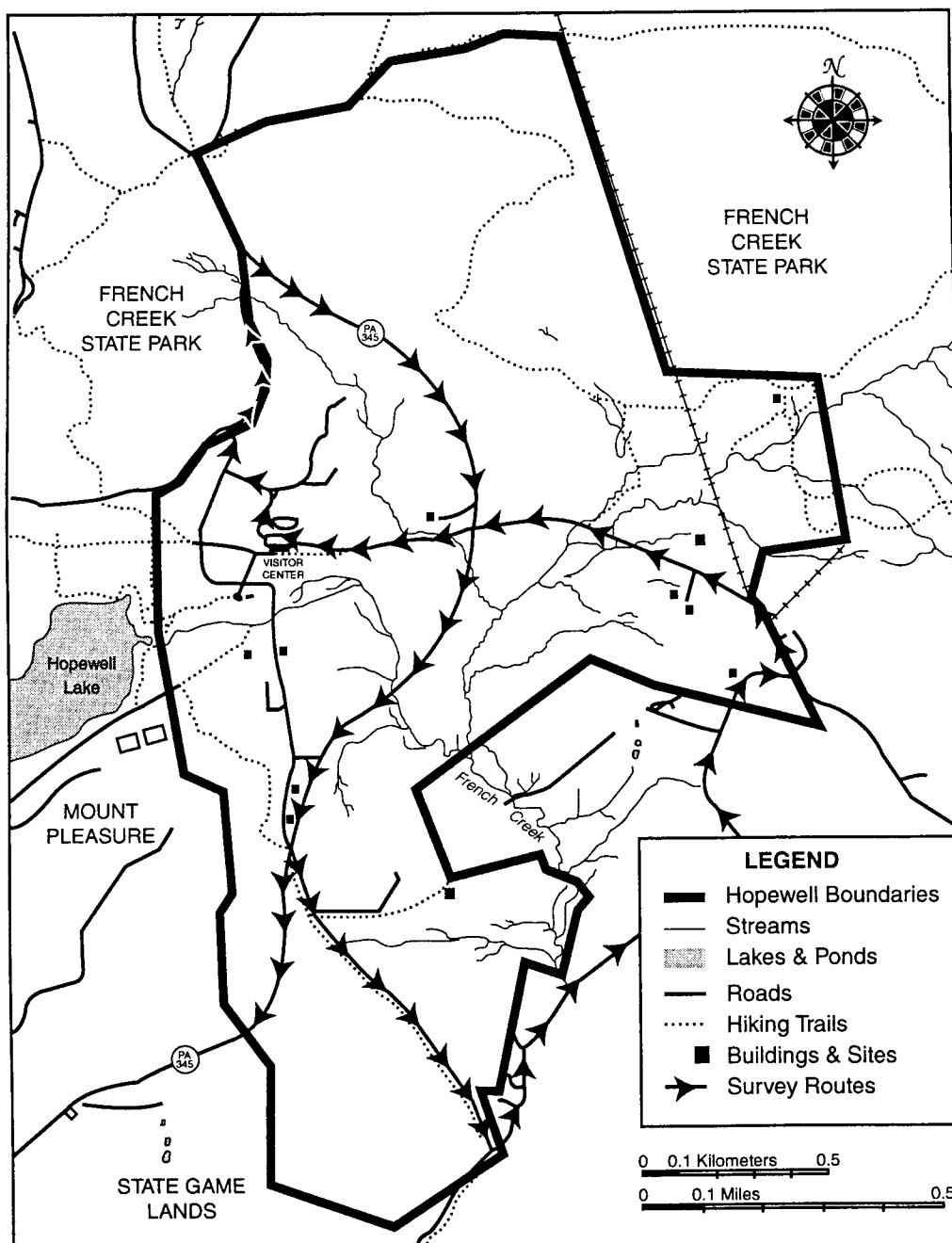


Figure 5. Location of the 8.0-km vehicular-road survey route at Hopewell Furnace National Historic Site.

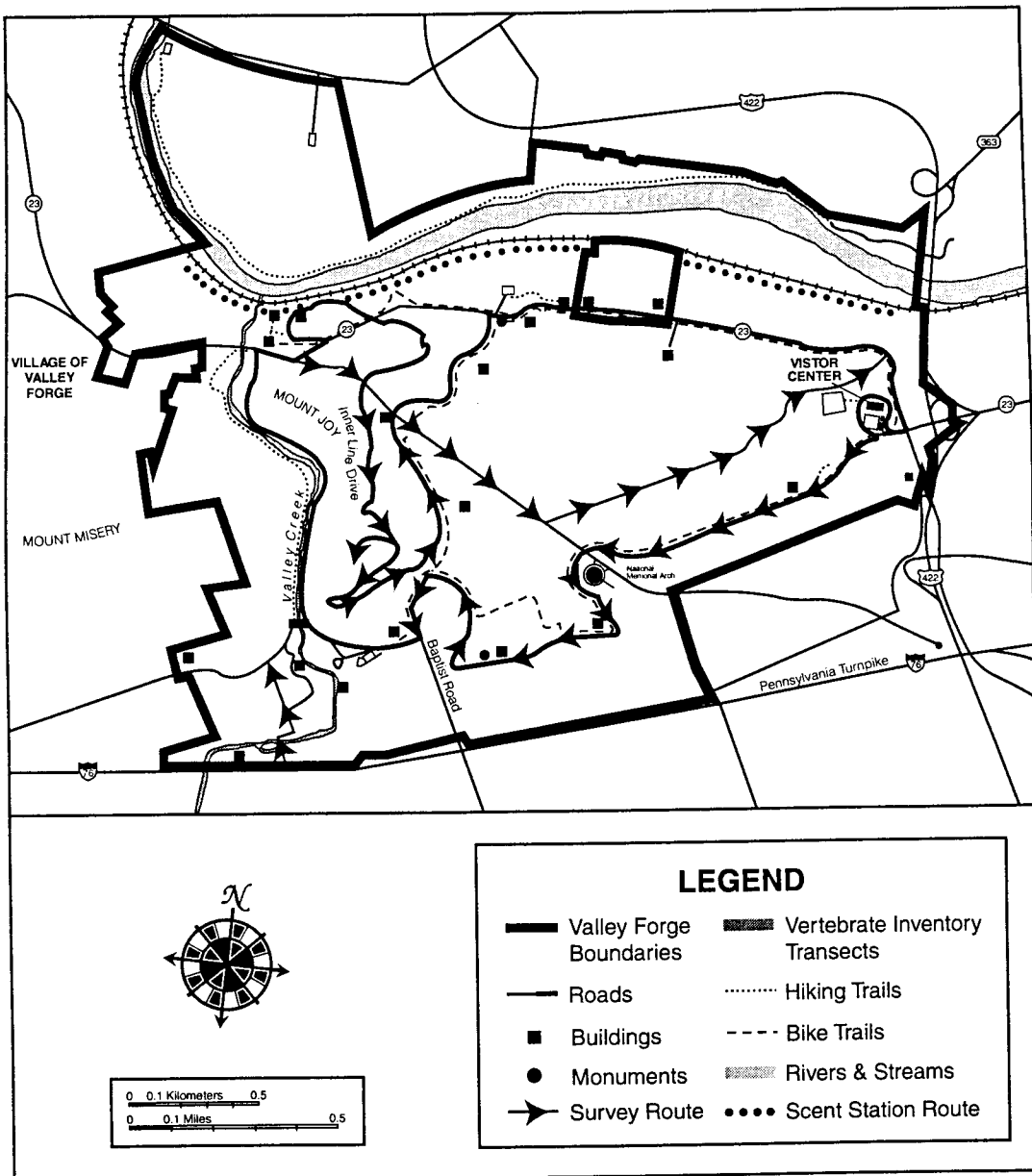


Figure 6. Location of the 11.3-km vehicular-road survey route at Valley Forge National Historical Park.

Methods

Transect Protocol

We surveyed birds using the transect protocol (Emlen 1971, Conner and Dickson 1980, Franzreb 1981, Hutto and Mosconi 1981) at GETT-EISE and HOFU. At GETT-EISE, transects were conducted during the breeding (20 May-15 July 1993 and 1994), fall migration (1 September-10 October 1993), winter (1 November 1993-15 March 1994), and spring migration (15 April-20 May 1994) seasons. At HOFU, transects were conducted during the spring migration (15 April-20 May 1994), breeding (20 May-15 July 1994), fall migration (1 September-10 October 1994) and winter (1 November 1994-15 March 1995) seasons. During breeding and fall migration seasons in 1993, the transect protocol was used only at LRU, LFL, MOF, POF, and PMG at GETT-EISE. However, the transect protocol was used at all sites during other seasons. At GETT-EISE, birds were surveyed along transects three times each season, except during the 1994 breeding season when transects were conducted twice. At HOFU, birds were surveyed along transects three times during the 1994 spring migration season, twice during the 1994 breeding and 1994-95 winter seasons, and once during the 1994 fall migration season.

Following a 1-minute equilibrium period at the beginning of the transect, birds were surveyed along each transect by walking at a moderate pace (approximately 2-3 km/hr). Frequent stops were made to identify and record the species of each bird heard or seen. In addition, starting time and ending time, temperature ($^{\circ}\text{C}$), wind velocity (kph), percent cloud cover, precipitation, and amount of snow cover (cm) were noted on a standardized data form. For each bird observed, its location along the transect and distance (m) perpendicular to the transect were recorded. Birds were surveyed in the morning (30 minutes after sunrise to noon) during spring migration and breeding seasons and throughout the day (30 minutes after sunrise to 30 minutes before sunset) during fall migration and winter seasons.

We modified the transect protocol described for GETT-EISE at HOFU because we observed a higher number of bird species using point counts than transects at GETT-EISE (Yahner et al. 1995). We stopped at 50-m intervals (including starting and ending points) for 30 seconds and listened and watched for birds before continuing the transect survey. In addition, we stopped between these intervals when necessary to identify and record birds.

Data were analyzed in relation to three lateral distances from transects: 30 m (TRAN-30), 50 m (TRAN-50), and unlimited distances (TRAN-UL). When using the TRAN-30 and TRAN-50 methods, bird observations were used only if they were ≤ 30 or ≤ 50 m laterally from the transect, respectively. These methods of analysis affected numbers of observations and density estimates for each species by altering the area of the transect (i.e., 60-m wide for TRAN-30 versus 100-m wide for TRAN-50). Because birds detected within 30 m of the transect also were detected within 50 m and unlimited distance, birds observed with the TRAN-30 method were

included in the observations obtained with TRAN-50 and TRAN-UL. Likewise, birds noted with the TRAN-50 method were included with the data obtained by the TRAN-UL method. For example, if an indigo bunting (scientific names are given in Appendices 1-3) were observed 20 m from the transect, it was included in the analysis for all three transect methods.

Species composition, species richness, species diversity (Shannon-Weiner Index), and density were calculated based on each of these three lateral distances from transects (Brower and Zar 1984). The Shannon-Weiner Index was calculated as

$$H' = - \sum p_i \log p_i,$$

where p_i is the proportion of the total number of individuals of species i . The TRAN-UL method used the maximum distance from the transect at which a species was observed to calculate the density for that species.

Point-Count Protocol

We surveyed birds using the point-count protocol at each sampling point along transects (International Bird Census Committee 1977, Fuller and Langslow 1984, Hutto et al. 1986, Verner and Ritter 1986). At GETT-EISE, point counts were used during the breeding (20 May-15 July 1993 and 1994), fall migration (1 September-10 October 1993), winter (1 November 1993-15 March 1994), and spring migration (15 April-20 May 1994) seasons. At HOFU, point counts were conducted during the spring migration (15 April-20 May 1994), breeding (20 May-15 July 1994), fall migration (1 September-10 October 1994) and winter (1 November 1994-15 March 1995) seasons. Point counts were conducted in the morning (30 minutes after sunrise to noon) during spring migration and breeding seasons and throughout the day (30 minutes after sunrise to 30 minutes before sunset) during fall migration and winter seasons. Point counts were conducted at BRU, DDL, DOF, and WOF sites during breeding and fall migration seasons in 1993 and at all sites during winter, spring migration, and breeding seasons in 1994. At GETT-EISE, each point was visited three times each season, except during the 1994 breeding season when points were visited twice. At HOFU, each point was visited three times during the 1994 spring migration season, twice during the 1994 breeding and 1994-95 winter seasons, and once during the 1994 fall migration season. Prior to all surveys, starting time, temperature ($^{\circ}\text{C}$), wind velocity (kph), percent cloud cover, precipitation, and amount (cm) of snow cover (winter season) were recorded.

When conducting a point-count survey, the investigator stopped at a sampling point for a 1-minute equilibrium period. Number and species of all birds seen or heard were then recorded for 5 minutes. Birds detected were divided into two groups for comparisons: those detected within a 30-m radius (PNTC-30) or an unlimited radius (PNTC-UL). As with the transect protocol, all species detected with the PNTC-30 method also were included within the data obtained by the

PNTC-UL method. Species richness and diversity were calculated for the PNTC-30 and PNTC-UL methods.

In addition, the call of an eastern screech-owl was used at point counts during fall migration and winter seasons to determine if it affected the number of species or individuals detected. Following the 1-minute equilibrium period, the call was played for 15 seconds in each of the cardinal directions (total = 1 minute of playing time) at odd-numbered points the first visit and at the even-numbered points second visit along each transect. Bird observations were recorded for a 5-minute period following the owl call. Because the call was used at half of the points each visit, we determined the effectiveness of the owl call by comparing species richness and species composition of birds at each site with the call versus without the call.

In order to compare species richness and composition among transect and point-count methods (TRAN-30, TRAN-50, TRAN-UL, PNTC-30, and PNTC-UL), we calculated a coefficient of community similarity (CC) for each pairwise combination of methods using the equation,

$$CC = 2c / s1 + s2 ,$$

where *c* is the number of species shared between two methods, and *s1* and *s2* are the numbers of species detected with each of the two methods independently (Brower and Zar 1984). CC varied between 0 and 1; the higher the CC value, the greater the similarity of the two methods in terms of bird species richness and species composition.

Vehicular-Road Survey Protocol

Birds were surveyed using the vehicular-road survey protocol (Petraborg et al. 1953, Diem and Lu 1960, Hewitt 1967, Saunderson et al. 1971) at GETT-EISE, HOFU, and VAFO. The vehicular-road survey protocol was conducted using two different methods: non-stop and Breeding Bird Survey (BBS). Using the non-stop method, one observer drove the survey route at a slow speed (15-25 km/hr) with the windows down and while another observer recorded the number and species of all birds seen or heard. Using the BBS method, we stopped and exited the vehicle at the starting point and at 0.8-km (0.5-mile) intervals along the survey route (Robbins et al. 1986). Following a 1-minute equilibrium period, the investigators recorded numbers and species of all birds seen or heard for 3 minutes at each survey point. Prior to each survey, starting time, temperature (°C), wind velocity (kph), percent cloud cover, precipitation, and amount (cm) of snow cover (winter season) were recorded. The number of observations of each bird species for each survey was standardized (no./km) for comparative purposes.

We conducted three vehicular-road surveys using the non-stop method during the 1994 winter season (March) and one during the 1994 spring migration season (May) at GETT-EISE. We conducted the vehicular-road survey twice using the non-stop and twice using the BBS methods

during the 1995 breeding season at HOFU and during the 1995-96 winter and 1996 spring migration seasons at HOFU and VAFO.

Nocturnal-Owl Survey Protocol

Owls were surveyed using the nocturnal-owl survey protocol (Foster 1965, Lynch and Smith 1984, Morrell 1993) during late winter (early March) 1996 at HOFU and VAFO. We conducted two surveys at HOFU at the starting point and at 1.6-km (1-mile) intervals along the road survey route (n = 4 sampling points) and at the middle points of the two upland-forest and two lowland-forest transects at VAFO. At each survey point, we played the calls of four owl species in the following order: saw-whet, eastern-screech, barred, and great horned owls. Following a 1-minute equilibrium period, we played an owl call for a 15-second calling period. After 45 seconds of silence (one bout), a calling period was repeated for a total of four bouts for each species. We conducted this sequence for each owl species consecutively at each point. We recorded the number and species of owls that responded vocally during the equilibrium (unsolicited), calling, and silent periods. In addition to owl observations, we recorded starting and ending times, temperature (°C), wind velocity (kph), percent cloud cover, precipitation, and amount (cm) of snow cover.

Description and Update of the Faunal Database

The comprehensive Faunal Database for each of the parks (GETT-EISE, HOFU, and VAFO) was presented in Technical Report NPS/MAR/NRTR-94/058 (Yahner et al. 1994b, 1994c). The database, which is maintained on the computer program *dBase III Plus* under the filenames GETT.DBF for GETT-EISE, HOFU.DBF for HOFU, and VAFO.DBF for VAFO, includes information on taxonomy, habitat use, residency status, legal status, and inventorying and monitoring protocols for all terrestrial vertebrate species (amphibians, reptiles, birds, and mammals) that were predicted or documented to occur in the parks. Scientific names for all vertebrate species mentioned in this report are given in the Faunal Database.

The database has been modified from that described in Yahner et al. (1994b, 1994c) to include avian species observed from 1 July 1992 through 30 June 1996 by project researchers at GETT-EISE, HOFU, and VAFO. Twelve variables are in the Faunal Database, including the original 11 variables plus a new variable (Field-tested Protocol, variable 12) that described the protocol(s) field tested by us to document a given species at the parks. We also added a new code (PTC) to Occurrence Status (variable 8) to note a species that was documented while field-testing one or more of the protocols during our project.

The avian section of the current Faunal Database is presented in Appendix 1 for GETT-EISE, Appendix 2 for HOFU, and Appendix 3 for VAFO; these appendices give information on variables 1, 2, 5, and 8-12. Appendices 4-7 include the codes for variables 5 and 8-10 in the Faunal Database. Appendix 8 includes codes for variables 11 and 12. Below is an example of an avian species, the rose-breasted grosbeak, entered in the database for GETT-EISE:

- (1) Common Name (Rose-breasted Grosbeak)
- (2) Scientific Name (*Pheucticus ludovicianus*)
- (3) Family Name (Emberizidae)
- (4) Order (Passeriformes)
- (5) *Pro-Cite* Group Name (Passerine)
- (6) Primary Habitat (41, 43 [Deciduous Forest, Mixed Forest])
- (7) Secondary Habitat (61 [Palustrine Wetland])
- (8) Occurrence Status (PTC, PO, BBA)
- (9) Residency Status (Summer Resident)
- (10) Legal Population Status (Protected)
- (11) Protocol (SMA [Spot-mapping], PCO [Point Count])
- (12) Field-Tested Protocol (i.e., VTRS [Variable-width Transect])

The Faunal Database can be modified continually by adding recently documented species. For instance, the occurrence status (variable 8) of a vertebrate species can be updated when it was designated as "predicted" but is later documented within a park. Changes in taxonomic classification (variables 1-4) and legal status (variable 10) of each species can be updated if needed. In addition, variable 11 (Protocol) and variable 12 (Field-Tested Protocol) in the Faunal Database can be modified as protocols are field tested or as new protocols are published for surveying birds in the eastern United States.

The Faunal Database is available in diskette or hard copy form from the National Park Service, Chief Scientist, Philadelphia Support Office, U.S. Custom House, 200 Chestnut Street, Philadelphia, PA 19106 (Appendix 9).

Results

Gettysburg National Military Park and Eisenhower National Historic Site

We predicted that 232 avian species potentially occurred at GETT-EISE (Yahner et al. 1994b, 1994c) (Table 4). Of these species, 98 (42%) species had been documented previously within the parks by various personnel and noted on National Park Service Wildlife Observation Cards prior to our project. Based on field tests of protocols in our study, we found 113 (49%) bird species predicted or previously documented to occur at GETT-EISE. We also noted 16 species by personal observations not found by protocol tests. Based on the total number of species recorded by protocol testing and project researchers from 1 July 1992 to 30 June 1996 at GETT-EISE, we increased the number of documented birds to 156 species. The highest percentages of predicted species that were documented were upland groundbirds (100%) and woodpeckers (100%).

Hopewell Furnace National Historic Site

We predicted that 232 avian species could probably be found at HOFU (Yahner et al. 1994b, 1994c) (Table 5). Of these species, 164 (71%) species had been documented previously within the park by various personnel and noted on National Park Service Wildlife Observation Cards prior to our project. Based on field tests of protocols in our study, we found 98 (42%) avian species predicted or previously documented to occur at HOFU. We also found 21 species by personal observations not found by protocol testing.

Based on the total number of species recorded by protocol testing and project researchers from 1 July 1992 to 30 June 1996 at HOFU, we increased the number of documented birds to 178 (77%) species. All (100%) of the predicted woodpeckers were documented at the park, and 90% of the predicted waterfowl were documented, mostly through wildlife observation cards. We found 10 passerines and two owl species that had not been documented in the park.

Valley Forge National Historical Park

We predicted that 247 avian species potentially occurred at VAFO (Yahner et al. 1994b, 1994c) (Table 6). Of these species, 211 (86%) species had been documented previously within the park by observers and noted on National Park Service Wildlife Observation Cards prior to our project. This substantial number of bird species documented is due in large part to the emphasis placed on this taxon by knowledgeable resource management specialists who have compiled these data for the past 10 years. Based on field tests of protocols, we detected 69 (28%) species that were

Table 4. Number of avian species predicted, number of species documented by WOC^a and during 1 July 1992 to 30 June 1996 by PO^b and PTC^c, total species documented, and percent of predicted species documented at Gettysburg National Military Park and Eisenhower National Historic Site.

	No. Pred.	Number Documented				% Pred.
		WOC	PO	PTC	Total	
Aves	232	98	85	113	156	(67%)
Waterfowl	29	13	3	4	13	(45%)
Wader	16	4	3	1	5	(31%)
Raptor	15	11	9	8	13	(87%)
Upland Groundbird	6	5	3	2	6	(100%)
Shorebird	9	3	4	3	5	(56%)
Owl	7	5	1	2	5	(71%)
Woodpecker	7	6	5	7	7	(100%)
Passerine	143	51	57	86	102	(71%)

^a WOC = National Park Service Wildlife Observation Cards.

^b PO = Personal observations by project researchers.

^c PTC = Field testing of protocols by project researchers.

Table 5. Number of avian species predicted, number of species documented by WOC^a and during 1 July 1992 to 30 June 1996 by PO^b and PTC^c, total species documented, and percent of predicted species documented at Hopewell Furnace National Historic Site.

Class:		Number Documented				
<i>Pro-Cite</i> Group	No. Pred.	WOC	PO	PTC	Total	% Pred.
Aves	232	164	102	98	178	(77%)
Waterfowl	29	26	2	3	26	(90%)
Wader	16	5	1	0	5	(31%)
Raptor	15	10	6	6	11	(73%)
Upland Groundbird	6	5	3	2	5	(83%)
Shorebird	9	3	0	2	4	(44%)
Owl	7	2	3	3	4	(57%)
Woodpecker	7	7	4	6	7	(100%)
Passerine	143	106	83	76	116	(81%)

^a WOC = National Park Service Wildlife Observation Cards.

^b PO = Personal observations by project researchers.

^c PTC = Field testing of protocols by project researchers.

Table 6. Number of avian species predicted, number of species documented by WOC^a and during 1 July 1992 to 30 June 1996 by PO^b and PTC^c, total species documented, and percent of predicted species documented at Valley Forge National Historical Park.

	No. Pred.	Number Documented				% Pred.
		WOC	PO	PTC	Total	
Aves	247	211	38	69	213	(86%)
Waterfowl	33	29	3	3	30	(91%)
Wader	17	11	0	0	11	(65%)
Raptor	16	14	5	2	14	(88%)
Upland Groundbird	6	5	2	2	5	(83%)
Shorebird	18	14	1	1	15	(83%)
Owl	7	4	0	2	4	(57%)
Woodpecker	7	7	3	3	7	(100%)
Passerine	143	127	38	56	127	(89%)

^a WOC = National Park Service Wildlife Observation Cards.

^b PO = Personal Observations by project researchers.

^c PTC = Field testing of protocols by project researchers.

predicted or previously documented to occur at VAFO. We also found 10 species through personal observations not found by protocol tests. Based on the total number of species recorded by protocol testing and project researchers from 1 July 1992 to 30 June 1996 at VAFO, we increased the number of documented birds to 213. As at HOFU, the highest percentages of predicted bird species documented were woodpeckers (100%) and waterfowl (91%).

Time Required to Establish Transects and Sampling Points

It required 1.75 person-hours and 1.4 person-hours to establish each 600-m transect (five sampling points) at HOFU and VAFO, respectively. This included time to establish the starting point and direction of the transect, traverse the transect, and mark each 50-m interval with surveyor's flagging. We did not calculate the time required to establish a transect at GETT-EISE. The greater time necessary to establish a transect at HOFU versus VAFO was attributed to more rugged terrain at HOFU.

Transect Protocol and Point-Count Protocol

Gettysburg National Military Park and Eisenhower National Historic Site

1993 Breeding Season:

Grassland Habitat: Eleven species and 33 individuals of breeding birds were observed at the PMG site during the 1993 breeding season (Appendix 10), yielding a bird diversity of 0.82. The five most abundant species, averaged for all three transect methods, were the grasshopper sparrow (2.6/ha), eastern meadowlark (1.1/ha), European starling (0.6/ha), mourning dove (0.5/ha), and northern mockingbird (0.2/ha). The indigo bunting was the only species documented by TRAN-50 and TRAN-UL methods but not by the TRAN-30 methods. The coefficient of community similarity (CC) value was 1.00 between TRAN-50 and TRAN-UL, and 0.95 between TRAN-30 and TRAN-50 and between TRAN-30 and TRAN-UL (Table 7).

Old-Field Habitat: Thirty-five species and 185 individuals were observed at all four old-field sites (WOF, POF, MOF, and DOF) combined during the 1993 breeding season (Appendix 10). The gray catbird, northern cardinal, and eastern towhee were observed at all four sites, whereas the red-bellied woodpecker, house wren, and house finch were observed at three of the four sites. The five most abundant species, averaged across methods and sites, included the house wren

Table 7. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), and unlimited-distance transects (TRAN-UL) conducted at grassland habitat during the 1993 breeding season at Gettysburg National Military Park and Eisenhower National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 10 spp.	TRAN-50 11 spp.	TRAN-UL 11 spp.
TRAN-30 10 spp.	--	--	--
TRAN-50 11 spp.	0.95	--	--
TRAN-UL 11 spp.	0.95	1.00	--

(7.9/ha), gray catbird (7.3/ha), northern cardinal (5.3/ha), American goldfinch (5.1/ha), and field sparrow (4.9/ha).

We observed 18 (51%) of the 35 species and 67 of the 185 individuals using the TRAN-30 method at the POF and MOF sites during the 1993 breeding season (Appendix 10), which gave a diversity of 1.16. Thirty (86%) species and 118 individuals were recorded with the PNTC-30 method, resulting in a bird diversity of 1.29. All three transect methods documented the same species, except TRAN-30 did not document the downy woodpecker; the CC value was 0.97 between TRAN-30 and TRAN-50 and between TRAN-30 and TRAN-UL (Table 8). We calculated a CC value of 0.95 between PNTC-30 and PNTC-UL at the WOF and DOF sites because three additional species were found with the PNTC-UL sampling method (Appendix 10). PNTC-UL documented 13 species more than TRAN-UL, and we found 17 species in common with both methods. The CC value between TRAN-UL and PNTC-UL was 0.64 (Table 8).

Forest Habitat: Twenty-nine species of breeding birds totaling 254 individuals were observed at the forest sites (DDL, LFL, LRU, BRU) during 1993 (Appendix 10); nine species were noted at all four sites. These included the red-bellied woodpecker, northern flicker, eastern wood-pewee, black-capped chickadee, tufted titmouse, house wren, wood thrush, scarlet tanager, and northern cardinal. The five most abundant species, averaged across methods and sites, were the blue jay (6.9/ha), wood thrush (5.1/ha), gray catbird (4.2/ha), tufted titmouse (3.3/ha), and American crow (3.2/ha).

We recorded 23 (79%) of the 29 species and 135 of the 254 individuals using the TRAN-30 method at the LFL and LRU forest sites during the 1993 breeding season (Appendix 10), resulting in a bird diversity of 1.21. We found 24 (83%) species and 209 individuals with the PNTC-30 method at the DDL and BRU sites; bird diversity was 1.15. We noted two species with TRAN-50 and TRAN-UL not detected with TRAN-30 and three species with PNTC-UL not detected with PNTC-30. These differences resulted in CC values of 0.96 between all combinations of the three transect methods and 0.94 between the two point count methods (Table 9). We detected 25 species with TRAN-UL and 27 species with PNTC-UL; however, only 19 species were common to both of these methods, resulting in a CC value of 0.73.

1993 Fall Migration:

Grassland Habitat: We observed four species and seven individuals with the three transect methods during fall migration at the PMG site (Appendix 10). These species were the northern mockingbird, grasshopper sparrow, eastern meadowlark, and American goldfinch. The CC value for all comparisons of methods was 1.0 (Table 10).

Table 8. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited-distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at old-field habitat during the 1993 breeding season at Gettysburg National Military Park and Eisenhower National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 19 spp.	TRAN-50 20 spp.	TRAN-UL 20 spp.	PNTC-30 30 spp.	PNTC-UL 33 spp.
TRAN-30 19 spp.	--	--	--	--	--
TRAN-50 20 spp.	0.97	--	--	--	--
TRAN-UL 20 spp.	0.97	1.00	--	--	--
PNTC-30 30 spp.	0.65	0.64	0.64	--	--
PNTC-UL 33 spp.	0.65	0.64	0.64	0.95	--

Table 9. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited-distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at forest habitat during the 1993 breeding season at Gettysburg National Military Park and Eisenhower National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 23 spp.	TRAN-50 25 spp.	TRAN-UL 25 spp.	PNTC-30 24 spp.	PNTC-UL 27 spp.
TRAN-30 23 spp.	--	--	--	--	--
TRAN-50 25 spp.	0.96	--	--	--	--
TRAN-UL 25 spp.	0.96	1.00	--	--	--
PNTC-30 24 spp.	0.72	0.73	0.73	--	--
PNTC-UL 27 spp.	0.72	0.73	0.73	0.94	--

Table 10. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), and unlimited-distance transects (TRAN-UL) conducted at grassland habitat during 1993 fall migration at Gettysburg National Military Park and Eisenhower National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 4 spp.	TRAN-UL 4 spp.	TRAN-50 4 spp.
TRAN-30 4 spp.	--	--	--
TRAN-50 4 spp.	1.00	--	--
TRAN-UL 4 spp.	1.00	--	1.00

Old-Field Habitat: We noted 38 species and 480 individuals during fall migration at four old-field sites (Appendix 10). The black-capped chickadee, tufted titmouse, and chipping sparrow were observed on all four sites, whereas the red-bellied woodpecker, northern flicker, blue jay, house wren, American robin, and northern cardinal occurred on three of four sites. The five most abundant species averaged across methods and sites were the common grackle (26.1/ha), blue jay (25.6/ha), cedar waxwing (18.6/ha), gray catbird (18.1/ha), and field sparrow (14.9/ha).

We noted 20 (53%) of the 38 species and 181 of the 480 individuals using the TRAN-30 method at the MOF and POF sites (Appendix 10), yielding diversity of 0.66. We detected 35 (92%) species and 343 individuals with the PNTC-30 method at the WOF and DOF sites, resulting in a diversity of 1.21. We detected the same species using TRAN-30, TRAN-50, and TRAN-UL, giving CC values of 1.0 in pairwise comparisons (Table 11). The CC value also was 1.0 between PNTC-30 and PNTC-UL. Seventeen species were common to both point counts and transects, but 13 more bird species were detected with point counts than with transects. All CC values between transects and point counts, however, were 0.62.

Forest Habitat: We observed 42 species and 286 individuals at the four forest sites during 1993 fall migration (Appendix 10). The red-bellied woodpecker, tufted titmouse, and northern cardinal were observed on all four sites, whereas the downy woodpecker, northern flicker, blue jay, black-capped chickadee, white-breasted nuthatch, wood thrush, American robin, and magnolia warbler were observed at three of four sites. The five most abundant species averaged across methods and sites were the blue jay (10.2/ha), black-capped chickadee (7.5/ha), tufted titmouse (5.6/ha), red-bellied woodpecker (4.9/ha), and wood thrush (5.9/ha). Because the eastern screech-owl call did not increase the number of species or the number of individuals detected in fall, we combined the point counts with and without the owl call for all analyses.

Twenty-five (60%) of 42 species were detected with TRAN-30 at the LFL and LRU forest sites during fall 1993 (Table 12), resulting in a bird diversity of 1.30. The Canada goose and American crow, which were found with TRAN-50 and TRAN-UL, were not detected with TRAN-30. We found 34 (82%) of 42 species using the PNTC-30 method and the PNTC-UL method at the DDL and BRU sites, resulting in a bird diversity of 1.22. PNTC-30 and PNTC-UL each had 21 species in common with each of TRAN-50 and TRAN-UL and a coefficient of community similarity of 0.69. Point counts detected nine more species than TRAN-30 and seven more than each of TRAN-50 and TRAN-UL.

1993-94 Winter Season:

Old-Field Habitat: We observed 37 species of birds at the four old-field sites during the 1993-94 winter season (Appendix 10). Species occurring at all four sites included red-bellied woodpecker, blue jay, black-capped chickadee, tufted titmouse, northern mockingbird, northern

Table 11. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited-distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at old-field habitat during 1993 fall migration, at Gettysburg National Military Park and Eisenhower National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 21 spp.	TRAN-50 21 spp.	TRAN-UL 21 spp.	PNTC-30 34 spp.	PNTC-UL 34 spp.
TRAN-30 21 spp.	--	--	--	--	--
TRAN-50 21 spp.	1.00	--	--	--	--
TRAN-UL 21 spp.	1.00	1.00	--	--	--
PNTC-30 34 spp.	0.62	0.62	0.62	--	--
PNTC-UL 34 spp.	0.62	0.62	0.62	1.00	--

Table 12. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited-distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at forest habitat during 1993 fall migration, at Gettysburg National Military Park and Eisenhower National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 25 spp.	TRAN-50 27 spp.	TRAN-UL 27 spp.	PNTC-30 34 spp.	PNTC-UL 34 spp.
TRAN-30 25 spp.	--	--	--	--	--
TRAN-50 27 spp.	0.96	--	--	--	--
TRAN-UL 27 spp.	0.96	1.00	--	--	--
PNTC-30 34 spp.	0.65	0.69	0.69	--	--
PNTC-UL 34 spp.	0.65	0.69	0.69	1.00	--

cardinal, and dark-eyed junco. The five species exhibiting the highest densities, averaged across methods and sites, were the dark-eyed junco (9.0/ha), black-capped chickadee (2.5/ha), northern cardinal (2.4/ha), northern mockingbird (2.1/ha), and blue jay (2.1/ha).

Using the TRAN-30 method at all four old-field sites, we noted 28 (76%) of the 37 species and 160 of the 380 individuals (Appendix 10); bird diversity was 1.14. The turkey vulture, killdeer, mourning dove, Carolina chickadee, Carolina wren, golden-crowned kinglet, eastern bluebird, brown-headed cowbird, and American goldfinch were not detected by the TRAN-30 method. Identical species were detected using TRAN-30, TRAN-50, and TRAN-UL (CC = 1.0 for all pair-wise comparisons) (Table 13).

Based on the PNTC-30 method at all four sites, we noted 31 (84%) of the 37 species and 220 of the 380 individuals (Appendix 10); bird diversity was 1.25. The barred owl, fish crow, brown creeper, cedar waxwing, eastern towhee, and American tree sparrow were not detected by the PNTC-30 method. PNTC-UL yielded the same species as PNTC-30 (Table 13). The coefficient of community similarity was 0.75 between pair-wise comparisons of transect and point-count protocols. Because the eastern screech-owl call did not enhance the number of species or the number of individuals detected in the winter, we combined the point counts with and without the owl call for all analyses.

Forest Habitat: The four forest sites contained 36 species during the 1993-94 winter season (Appendix 10). Only five species were observed at all four sites: red-bellied woodpecker, downy woodpecker, American crow, tufted titmouse, and white-breasted nuthatch. The species with the highest density, averaged across methods and sites, were the dark-eyed junco (5.1/ha), black-capped chickadee (2.2/ha), song sparrow (1.2/ha), American crow (1.1/ha), and red-headed woodpecker (0.9/ha).

We found 25 (69%) of the 36 species and 275 of the 473 individuals at the four forest sites using the TRAN-30 method (Appendix 10). Bird diversity was 1.01 in forest habitats during winter 1993-94, using the TRAN-30 method. Using TRAN-50 and TRAN-UL, we detected the pileated woodpecker and blue jay, which were not found with TRAN-30 (Table 14).

We detected 29 (81%) of the 36 species and 198 of the 473 individuals using the PNTC-30 method at the four forest sites (Appendix 10), yielding a bird diversity of 1.24. Species not detected by PNTC-30 included the sharp-shinned hawk, belted kingfisher, Carolina wren, winter wren, cedar waxwing, common grackle, and white-throated sparrow. All species found with PNTC-30 were also found with PNTC-UL (CC = 1.0) (Table 14). We found two more species with each point count method than with either TRAN-50 and TRAN-UL. Coefficients of community similarity between each point count method and each of TRAN-50 and TRAN-UL were 0.71, with 20 species in common.

Table 13. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited-distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at old-field habitat during the 1993-94 winter season at Gettysburg National Military Park and Eisenhower National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 28 spp.	TRAN-50 28 spp.	TRAN-UL 28 spp.	PNTC-30 31 spp.	PNTC-UL 31 spp.
TRAN-30 28 spp.	--	--	--	--	--
TRAN-50 28 spp.	1.00	--	--	--	--
TRAN-UL 28 spp.	1.00	1.00	--	--	--
PNTC-30 31 spp.	0.75	0.75	0.75	--	--
PNTC-UL 31 spp.	0.75	0.75	0.75	1.00	--

Table 14. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited-distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at forest habitat during the 1993-94 winter season at Gettysburg National Military Park and Eisenhower National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 25 spp.	TRAN-50 27 spp.	TRAN-UL 27 spp.	PNTC-30 29 spp.	PNTC-UL 29 spp.
TRAN-30 25 spp.	--	--	--	--	--
TRAN-50 27 spp.	0.96	--	--	--	--
TRAN-UL 27 spp.	0.96	1.00	--	--	--
PNTC-30 29 spp.	0.70	0.71	0.71	--	--
PNTC-UL 29 spp.	0.70	0.71	0.71	1.00	--

1994 Spring Migration:

Grassland Habitat: We noted six species and 15 individuals using the TRAN-30 at the grassland site during 1994 spring migration (Appendix 10). We detected the same six species with each transect method. CC values for all comparisons were 1.0.

Old-Field Habitat: The four old-field sites contained 53 species during the 1994 spring migration (Appendix 10). The blue jay, tufted titmouse, house wren, gray catbird, northern cardinal, eastern towhee, field sparrow, white-throated sparrow, common grackle, and house finch occurred at all four sites. The five most abundant species, averaged across methods and sites, were the eastern towhee (2.5/ha), American robin (2.4/ha), field sparrow (2.1/ha), common grackle (2.1/ha), and mourning dove (1.9/ha).

Thirty-nine (74%) of the 53 species and 208 of the 422 individuals (Appendix 10) were detected with TRAN-30 at the four old-field sites; bird diversity was 1.48. Species not detected by the TRAN-30 protocol included the double-crested cormorant, red-tailed hawk, killdeer, barred owl, chimney swift, acadian flycatcher, American tree swallow, cedar waxwing, white-eyed vireo, chestnut-sided warbler, black-throated blue warbler, black-and-white warbler, and eastern meadowlark.

Using the PNTC-30 method at the four old-field sites, we noted 36 (68%) of the 53 species and 214 of the 422 individuals (Appendix 10), giving a bird diversity of 1.50. Species not detected by the PNTC-30 method included the Canada goose, yellow-billed cuckoo, red-headed woodpecker, downy woodpecker, great crested flycatcher, ruby-crowned kinglet, yellow-rumped warbler, prairie warbler, dark-eyed junco, and red-winged blackbird.

We found 42 species with each of TRAN-50 and TRAN-UL for a CC value of 0.96 when each was compared to TRAN-30 (Table 15). We found eight more species with PNTC-UL than with PNTC-30; this difference resulted in a CC value of 0.90. TRAN-UL and PNTC-UL documented 33 of the same species, although we found two additional species with PNTC-UL. The CC value between TRAN-UL and PNTC-UL was 0.77.

Forest Habitat: Seventy-two species were recorded at the four forest sites (DDL, LFL, LRU, and BRU) during spring migration surveys conducted in 1994 (Appendix 10). The downy woodpecker, great crested flycatcher, blue jay, tufted titmouse, white-breasted nuthatch, wood thrush, northern cardinal, and common grackle were observed at all four sites. The five most abundant species, averaged across methods and sites, included the house wren (3.1/ha), northern cardinal (1.9/ha), wood thrush (1.9/ha), blue-gray gnatcatcher (1.5/ha), and tufted titmouse (1.4/ha).

Table 15. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited-distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at old-field habitat during 1994 spring migration at Gettysburg National Military Park and Eisenhower National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 39 spp.	TRAN-50 42 spp.	TRAN-UL 42 spp.	PNTC-30 36 spp.	PNTC-UL 44 spp.
TRAN-30 39 spp.	--	--	--	--	--
TRAN-50 42 spp.	0.96	--	--	--	--
TRAN-UL 42 spp.	0.96	1.00	--	--	--
PNTC-30 36 spp.	0.75	0.74	0.74	--	--
PNTC-UL 44 spp.	0.75	0.77	0.77	0.90	--

We detected 49 (68%) of the 72 species and 213 of the 452 individuals using the TRAN-30 method at the four forest sites (Appendix 10). This resulted in a bird diversity of 1.51. Using the PNTC-30 method, we detected 44 (61%) of the 72 species and 239 of the 452 individuals, with a bird diversity of 1.41. We detected nine species more with TRAN-UL than with TRAN-30 (CC = 0.92) (Table 16). We found 54 species with PNTC-UL, 10 species more than with PNTC-30 (CC = 0.90). TRAN-UL and PNTC-UL detected 42 of the same species, and TRAN-UL yielded four species more than PNTC-UL. The CC value between TRAN-UL and PNTC-UL was 0.75.

1994 Breeding Season:

Old-Field Habitat: Forty-six bird species were observed at the four old-field sites during the 1994 breeding season (Appendix 10). Species noted at all four sites were the blue jay, black-capped chickadee, tufted titmouse, house wren, wood thrush, gray catbird, northern cardinal, eastern towhee, and brown-headed cowbird. The five most abundant species, averaged across methods and sites, were the cedar waxwing (2.5/ha), American goldfinch (2.0/ha), field sparrow (1.9/ha), gray catbird (1.6/ha), and eastern towhee (1.4/ha).

Using the TRAN-30 method at the four old-field sites, we recorded 31 (67%) of the 46 species and 86 of the 177 individuals, yielding a bird species diversity of 1.36 (Appendix 10). Using the PNTC-30 method, we observed 28 (61%) of the 46 species and 91 of the 177 individuals (Appendix 10). This resulted in a diversity of 1.28.

TRAN-50 and TRAN-UL detected the same 35 species (CC = 1.0) and each method detected four species more than TRAN-30 (CC = 0.94) (Table 17). We found nine more species with PNTC-UL than with PNTC-30, which resulted in a CC value of 0.86. We found 26 of the same species with TRAN-UL and PNTC-UL and two additional species with PNTC-UL (CC = 0.72).

Forest Habitat: We observed 50 bird species at the four forest sites during the 1994 breeding season (Appendix 10). The downy woodpecker, northern flicker, eastern wood-pewee, great crested flycatcher, blue jay, wood thrush, scarlet tanager, and northern cardinal were observed at all four sites. Averaged across methods and sites, the five most abundant species were the cedar waxwing (1.8/ha), house wren (1.7/ha), great crested flycatcher (1.5/ha), wood thrush (1.4/ha), and white-breasted nuthatch (1.2/ha).

We noted 36 (72%) of the 50 species and 153 of the 305 individuals using the TRAN-30 method during the 1994 breeding season (Appendix 10); diversity was 1.40. Species not detected by TRAN-30 included the turkey vulture, mourning dove, barred owl, belted kingfisher, red-headed woodpecker, red-bellied woodpecker, northern flicker, pileated woodpecker, American crow, cedar waxwing, magnolia warbler, black-throated green warbler, indigo bunting, and song sparrow. Thirty-five (70%) of the 50 species and 152 of the 305 individuals were recorded using

Table 16. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited-distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at forest habitat during 1994 spring migration at Gettysburg National Military Park and Eisenhower National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 49 spp.	TRAN-50 57 spp.	TRAN-UL 58 spp.	PNTC-30 44 spp.	PNTC-UL 54 spp.
TRAN-30 49 spp.	--	--	--	--	--
TRAN-50 57 spp.	0.92	--	--	--	--
TRAN-UL 58 spp.	0.92	0.99	--	--	--
PNTC-30 44 spp.	0.73	0.69	0.69	--	--
PNTC-UL 54 spp.	0.74	0.74	0.75	0.90	--

Table 17. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited-distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at old-field habitat during 1994 breeding season at Gettysburg National Military Park and Eisenhower National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 31 spp.	TRAN-50 35 spp.	TRAN-UL 35 spp.	PNTC-30 28 spp.	PNTC-UL 37 spp.
TRAN-30 31 spp.	--	--	--	--	--
TRAN-50 35 spp.	0.94	--	--	--	--
TRAN-UL 35 spp.	0.94	1.00	--	--	--
PNTC-30 28 spp.	0.61	0.70	0.70	--	--
PNTC-UL 37 spp.	0.65	0.72	0.72	0.86	--

the PNTC-30 method (Appendix 10), resulting in a bird diversity of 1.40. The Canada goose, mourning dove, pileated woodpecker, acadian flycatcher, American crow, red-breasted nuthatch, eastern bluebird, wood thrush, veery, yellow warbler, magnolia warbler, Cape May warbler, American redstart, song sparrow, and blue-winged warbler were not detected by PNTC-30.

We detected four fewer species with TRAN-30 than with either TRAN-50 or TRAN-UL (CC = 0.95) and seven species less with PNTC-30 than with PNTC-UL (CC = 0.90) (Table 18). Although we detected 40 species with each of TRAN-UL and PNTC-UL, we found 30 of the same species with both methods. This resulted in a CC value of 0.75.

Time Required to Conduct the Transect Protocol and the Point-Count Protocol:

We calculated the amount of time required to conduct the transect and point-count protocols for grassland, old-field, and forest habitats separately for each season (Table 19). Because transect length varied among study sites, we standardized length of transects (600 m) and number of points ($n = 5$) for comparisons among habitats and between protocols.

For all seasons and habitats combined, a 600-m transect required an average of 26.8 minutes to survey, whereas five point counts required an average of 40.6 minutes to conduct, including the equilibrium period (1 minute/point), survey period (5 minutes/point), and travel time between points. For old-field sites, surveying birds with a 600-m transect required an average of 10.2 minutes less than surveying with five point counts. The difference between transects and point counts was greatest at forest areas. Five point counts required an average of 17.4 minutes more to conduct compared to a 600-m transect.

Hopewell Furnace National Historic Site

1994 Spring Migration:

Old-Field Habitat: We recorded 197 individuals of 39 species at the two old-field sites during spring migration surveys conducted in 1994 (Appendix 11). We detected 26 (67%) of the 39 species and 58 of the 197 individuals using the TRAN-30 protocol. This resulted in a bird diversity of 1.32. Thirteen species found by other methods at the old-field sites were not found by TRAN-30. The five most abundant species using TRAN-30 were the white-throated sparrow (1.94/ha), ruby-crowned kinglet (1.39/ha), ovenbird (1.39/ha), eastern towhee (1.11/ha), and common yellowthroat (1.11/ha).

Table 18. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited-distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at forest habitats during the 1994 breeding season at Gettysburg National Military Park and Eisenhower National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 36 spp.	TRAN-50 40 spp.	TRAN-UL 40 spp.	PNTC-30 33 spp.	PNTC-UL 40 spp.
TRAN-30 36 spp.	--	--	--	--	--
TRAN-50 40 spp.	0.95	--	--	--	--
TRAN-UL 40 spp.	0.95	1.00	--	--	--
PNTC-30 33 spp.	0.78	0.71	0.71	--	--
PNTC-UL 40 spp.	0.68	0.75	0.75	0.90	--

Table 19. Average time (minutes) required to conduct a 600-m transect and five point counts for birds at grassland, old-field, and forest habitats during five seasons at Gettysburg National Military Park and Eisenhower National Historic Site. Averages for each season and overall average include only old-field and forest habitats. Point counts were not conducted at grassland sites (N.A.).

	600-m Transect	Five Point Counts
1993 Breeding Season Average:	31.0 minutes	40.9 minutes
Grassland:	18.8 minutes	N.A.
Old-Field:	37.5 minutes	38.5 minutes
Forest:	24.5 minutes	43.3 minutes
1993 Fall Migration Average:	35.7 minutes	48.9 minutes
Grassland:	11.3 minutes	N.A.
Old-Field:	37.0 minutes	49.8 minutes
Forest:	34.4 minutes	48.0 minutes
1993-94 Winter Season:	25.6 minutes	39.5 minutes
Old-Field:	28.2 minutes	35.6 minutes
Forest:	22.9 minutes	43.3 minutes
1994 Spring Migration:	20.8 minutes	34.5 minutes
Old-Field:	21.2 minutes	34.5 minutes
Forest:	20.4 minutes	34.5 minutes
1994 Breeding Season:	20.8 minutes	39.0 minutes
Old-Field:	21.6 minutes	38.0 minutes
Forest:	20.0 minutes	40.0 minutes
Grassland Average:	15.1 minutes	N.A.
Old-field Average:	29.1 minutes	39.3 minutes
Forest Average:	24.4 minutes	41.8 minutes
Overall Average:	26.8 minutes	40.6 minutes

Using the PNTC-30 protocol, we detected 28 (72%) of 39 species and 71 individuals (Appendix 11), resulting in a bird diversity of 1.34. Eleven species found with other methods at the old-field sites were not detected by PNTC-30. The five most abundant species using PNTC-30 were the yellow-rumped warbler (5.66/ha), blue jay (4.24/ha), American crow (3.54/ha), black-throated blue warbler (3.54/ha), and scarlet tanager (2.83/ha).

We detected four species more with each of TRAN-UL and TRAN-50 than with TRAN-30 (Table 20). We found 33 species with PNTC-UL, five additional species than with PNTC-30 ($CC = 0.90$). TRAN-UL and PNTC-UL detected 23 of the same species, and PNTC-UL yielded three species more than TRAN-UL. The CC value between TRAN-UL and PNTC-UL was 0.73.

Lowland-Forest Habitat

We found 50 species and 426 individuals at the four lowland-forest sites during spring migration surveys conducted in 1994 (Appendix 11). Thirty-five (70%) of the 50 species and 151 individuals were noted using the TRAN-30 protocol; bird diversity was 1.49. Fifteen species found by other methods at the lowland-forest sites were not found by TRAN-30. The six most abundant species using TRAN-30 were the common yellowthroat (4.44/ha), white-throated sparrow (3.89/ha), blue jay (3.06/ha), ovenbird (2.78/ha), gray catbird (2.50/ha), and American robin (2.22/ha).

Using the PNTC-30 protocol, we detected 40 (80%) of 50 species and 133 of the 426 individuals (Appendix 11), resulting in a bird diversity of 1.50. Ten species found with other methods at the lowland-forest sites were not detected by PNTC-30. The six most abundant species using PNTC-30 were the ovenbird (8.48/ha), common yellowthroat (6.36/ha), American goldfinch (5.66/ha), tufted titmouse (4.24/ha), gray catbird (4.24/ha), and blue jay (3.54/ha).

We detected three species more with TRAN-UL than with TRAN-30 ($CC = 0.96$) (Table 21). We found 46 species with PNTC-UL, six additional species than with PNTC-30 ($CC = 0.93$) and eight additional species than with TRAN-UL ($CC = 0.81$). TRAN-UL and PNTC-UL detected 34 of the same species.

Upland-Forest Habitat

We observed 156 individuals of 34 species at the two upland-forest sites during spring migration surveys conducted in 1994 (Appendix 11). We detected 19 (56%) of the 34 species and 32 individuals using the TRAN-30 protocol. This resulted in a bird diversity of 1.19. Fifteen species found by other methods at the upland-forest sites were not found by TRAN-30. The seven most abundant species using TRAN-30 were the blue jay (1.39/ha), ovenbird (1.11/ha),

Table 20. Coefficients of community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at old-field sites during 1994 spring migration at Hopewell Furnace National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 26 spp.	TRAN-50 30 spp.	TRAN-UL 30 spp.	PNTC-30 28 spp.	PNTC-UL 33 spp.
TRAN-30 26 spp.	--	--	--	--	--
TRAN-50 30 spp.	0.93	--	--	--	--
TRAN-UL 30 spp.	0.93	1.00	--	--	--
PNTC-30 28 spp.	0.78	0.79	0.79	--	--
PNTC-UL 33 spp.	0.74	0.73	0.73	0.92	--

Table 21. Coefficients of community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at lowland-forest sites during 1994 spring migration at Hopewell Furnace National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 35 spp.	TRAN-50 36 spp.	TRAN-UL 38 spp.	PNTC-30 40 spp.	PNTC-UL 46 spp.
TRAN-30 35 spp.	--	--	--	--	--
TRAN-50 36 spp.	0.99	--	--	--	--
TRAN-UL 38 spp.	0.96	0.97	--	--	--
PNTC-30 40 spp.	0.80	0.79	0.77	--	--
PNTC-UL 46 spp.	0.79	0.78	0.81	0.93	--

wood thrush (0.83/ha), and red-bellied woodpecker (0.56/ha), turkey vulture (0.56/ha), black-and-white warbler (0.56/ha), and brown-headed cowbird (0.56/ha).

Using the PNTC-30 protocol, 17 (50%) of 34 species and 47 of the 156 individuals (Appendix 11) were detected, resulting in a bird diversity of 1.14. Seventeen species found with other methods at the upland-forest sites were not detected by PNTC-30. The five most abundant species using PNTC-30 were the blue jay (4.95/ha), downy woodpecker (3.54/ha), ovenbird (3.54/ha), white-breasted nuthatch (2.83/ha), and yellow-rumped warbler (2.83/ha).

We detected three more species with each of TRAN-UL and TRAN-50 than with TRAN-30 (Table 22). We found 28 species with PNTC-UL, which was 11 more species than with PNTC-30 (CC = 0.90). TRAN-UL and PNTC-UL detected 16 of the same species, and PNTC-UL yielded six species more than TRAN-UL. The CC value between TRAN-UL and PNTC-UL was 0.75. PNTC-UL yielded 99 individual observations, which was nearly twice as many detected than with any one of the other methods.

1994 Breeding Season

Old-Field Habitat

One-hundred eighty-nine individuals of 29 species were recorded at the two old-field sites during breeding season surveys conducted in 1994 at HOFU (Appendix 11). We detected 19 (66%) of the 29 species and 46 individuals using the TRAN-30 protocol; this resulted in a bird diversity of 1.17. Ten species found by other methods at the old-field sites were not found by TRAN-30. The four most abundant species using TRAN-30 were the indigo bunting (1.67/ha), eastern towhee (1.67/ha), ovenbird (1.67/ha), and common yellowthroat (1.11/ha).

Using the PNTC-30 protocol, we found 17 (59%) of the 29 species and 54 of the 189 individuals (Appendix 11), resulting in a diversity of 1.02. Twelve species found with other methods at the old-field sites were not detected by PNTC-30. The four most abundant species using PNTC-30 were the common grackle (9.19/ha), cedar waxwing (8.48/ha), ovenbird (2.12/ha), and scarlet tanager (1.41/ha).

We detected four species more with each of TRAN-UL and TRAN-50 than with TRAN-30 (CC = 0.90) (Table 23). We found 23 species with PNTC-UL, six additional species than with PNTC-30 (CC = 0.90). TRAN-UL, TRAN-50, and PNTC-UL each detected 23 species, including 17 of the same species. This yielded a CC value of 0.74 for each of TRAN-UL and TRAN-50 compared to PNTC-UL.

Table 22. Coefficients of community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at upland-forest sites during 1994 spring migration at Hopewell Furnace National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 19 spp.	TRAN-50 22 spp.	TRAN-UL 22 spp.	PNTC-30 17 spp.	PNTC-UL 28 spp.
TRAN-30 19 spp.	--	--	--	--	--
TRAN-50 22 spp.	0.93	--	--	--	--
TRAN-UL 22 spp.	0.93	1.00	--	--	--
PNTC-30 17 spp.	0.56	0.56	0.56	--	--
PNTC-UL 28 spp.	0.60	0.64	0.64	0.92	--

Table 23. Coefficients of community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at old-field sites during the 1994 breeding season at Hopewell Furnace National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 19 spp.	TRAN-50 23 spp.	TRAN-UL 23 spp.	PNTC-30 17 spp.	PNTC-UL 23 spp.
TRAN-30 19 spp.	--	--	--	--	--
TRAN-50 23 spp.	0.90	--	--	--	--
TRAN-UL 23 spp.	0.90	1.00	--	--	--
PNTC-30 17 spp.	0.63	0.65	0.65	--	--
PNTC-UL 23 spp.	0.67	0.74	0.74	0.85	--

Lowland-Forest Habitat

Three-hundred fifty-two individuals of 37 species were recorded at the four lowland-forest sites using transects and point counts during the 1994 breeding season (Appendix 11). We detected 24 (65%) of the 37 species and 72 individuals using the TRAN-30 protocol. This resulted in a bird diversity of 1.16. Thirteen species found by other methods at the lowland-forest sites were not found by TRAN-30. The five most abundant species using TRAN-30 were the red-eyed vireo (2.50/ha), common yellowthroat (2.50/ha), ovenbird (1.94/ha), American goldfinch (1.67/ha), and scarlet tanager (1.39/ha).

Twenty-two (59%) of 37 species and 111 of the 352 individuals (Appendix 11) were noted using PNTC-30, resulting in a bird diversity of 0.91. Fifteen species found with other methods at the lowland-forest sites were not detected by PNTC-30. The six most abundant species using PNTC-30 were the cedar waxwing (38.89/ha), common grackle (7.07/ha), scarlet tanager (4.24/ha), ovenbird (3.54/ha), red-eyed vireo (2.83/ha), and common yellowthroat (2.12/ha).

We found the most species (33) with PNTC-UL, 11 additional species than with PNTC-30 ($CC = 0.80$) and two additional species than with TRAN-UL ($CC = 0.84$) (Table 24). We detected seven species more with TRAN-UL than with TRAN-30 ($CC = 0.87$). TRAN-UL and PNTC-UL detected 27 of the same species.

Upland-Forest Habitat

We recorded 111 individuals of 21 species at the two upland-forest sites during breeding season surveys conducted in 1994 (Appendix 11). We found only eight (38%) of the 21 species and 16 individuals using the TRAN-30 protocol. This resulted in a bird diversity of 0.85. Thirteen species found with other methods at the upland-forest sites were not found by TRAN-30. The four most abundant species using TRAN-30 were the ovenbird (1.11/ha), wood thrush (0.83/ha), red-eyed vireo (0.83/ha), and red-bellied woodpecker (0.56/ha).

Using the PNTC-30 protocol, we observed 11 (52%) of 21 species and 19 of the 111 individuals (Appendix 11); bird diversity was 1.00. The five most abundant species using PNTC-30 were the downy woodpecker (2.12/ha), wood thrush (2.12/ha), common grackle (2.12/ha), worm-eating warbler (1.41/ha), and Baltimore oriole (1.41/ha).

We detected 13 species with TRAN-UL, which was three species more than with TRAN-30 ($CC = 0.87$) and five species more than with TRAN-30 ($CC = 0.76$) (Table 25). We found 20 species with PNTC-UL, more than with any other method. The coefficient of community similarity between PNTC-UL and PNTC-30 was 0.71. All but one species, the Carolina chickadee, found

Table 24. Coefficients of community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at lowland-forest sites during the 1994 breeding season at Hopewell Furnace National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 24 spp.	TRAN-50 27 spp.	TRAN-UL 31 spp.	PNTC-30 22 spp.	PNTC-UL 33 spp.
TRAN-30 24 spp.	--	--	--	--	--
TRAN-50 27 spp.	0.94	--	--	--	--
TRAN-UL 31 spp.	0.87	0.93	--	--	--
PNTC-30 22 spp.	0.74	0.73	0.72	--	--
PNTC-UL 33 spp.	0.77	0.80	0.84	0.80	--

Table 25. Coefficients of community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at upland-forest sites during the 1994 breeding season at Hopewell Furnace National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 8 spp.	TRAN-50 10 spp.	TRAN-UL 13 spp.	PNTC-30 11 spp.	PNTC-UL 20 spp.
TRAN-30 8 spp.	--	--	--	--	--
TRAN-50 10 spp.	0.89	--	--	--	--
TRAN-UL 13 spp.	0.76	0.87	--	--	--
PNTC-30 11 spp.	0.53	0.67	0.69	--	--
PNTC-UL 20 spp.	0.50	0.60	0.73	0.71	--

with TRAN-UL was also found with PNTC-UL ($CC = 0.73$). PNTC-UL yielded 62 individual observations.

1994 Fall Migration

Old-Field Habitat

We recorded 71 individuals of 19 species at the two old-field sites during fall migration surveys conducted in 1994 (Appendix 11). We found nine (47%) of the 19 species and 20 individuals using the TRAN-30 protocol. This resulted in a bird diversity of 0.84. Ten species found with other methods at the old-field sites were not found by TRAN-30. The two most abundant species using TRAN-30 were the white-throated sparrow (1.94/ha) and white-breasted nuthatch (0.83/ha).

We noted 11 (58%) of 19 species and 32 of the 71 individuals (Appendix 11) using PNTC-30, resulting in a bird diversity of 0.60. The three most abundant species using PNTC-30 were the white-throated sparrow (7.78/ha), Carolina chickadee (5.66/ha), and magnolia warbler (2.12/ha).

We detected 10 species with each of TRAN-UL and TRAN-50 ($CC = 1.00$), which was one species more than with TRAN-30 ($CC = 0.95$) (Table 26). We found 17 species with PNTC-UL, more than with any other method. The coefficient of community similarity between PNTC-UL and PNTC-30 was 0.79. Only the yellow-rumped warbler and dark-eyed junco were found with TRAN-UL but not with PNTC-UL ($CC = 0.52$), whereas eight species were found with PNTC-UL but not TRAN-UL.

Lowland-Forest Habitat

One-hundred ninety-two individuals of 28 species were recorded at the four lowland-forest sites using transects and point counts during 1994 fall migration at HOFU (Appendix 11). We detected 20 (71%) of the 28 species and 86 individuals using the TRAN-30 protocol. This resulted in a bird diversity of 0.77. Eight species found by other methods at the lowland-forest sites were not found by TRAN-30. The seven most abundant species using TRAN-30 were the American robin (14.17/ha), white-throated sparrow (1.39/ha), Carolina chickadee (1.11/ha), red-bellied woodpecker (0.83/ha), downy woodpecker (0.83/ha), yellow-rumped warbler (0.83/ha), and black-throated green warbler (0.83/ha).

Using the PNTC-30 protocol, we found only nine (32%) of 28 species and 19 of the 192 individuals (Appendix 11), resulting in a bird diversity of 0.85. Nineteen species found with

Table 26. Coefficients of community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at old-field sites during 1994 fall migration at Hopewell Furnace National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 9 spp.	TRAN-50 10 spp.	TRAN-UL 10 spp.	PNTC-30 11 spp.	PNTC-UL 17 spp.
TRAN-30 9 spp.	--	--	--	--	--
TRAN-50 10 spp.	0.95	--	--	--	--
TRAN-UL 10 spp.	0.95	1.00	--	--	--
PNTC-30 11 spp.	0.40	0.48	0.48	--	--
PNTC-UL 17 spp.	0.54	0.52	0.52	0.79	--

other methods at the lowland-forest sites were not detected by PNTC-30. The three most abundant species using PNTC-30 were the tree swallow (4.24/ha), turkey vulture (2.12/ha), and cedar waxwing (2.12/ha).

We found the most species with TRAN-UL (24 spp.), two and four additional species than with TRAN-30 (CC = 0.91) and TRAN-50 (CC = 0.96), respectively, and seven additional species than with PNTC-UL (CC = 0.63) (Table 27). We detected eight species more with PNTC-UL than with PNTC-30 (CC = 0.69). TRAN-UL and PNTC-UL detected 13 of the same species.

Upland-Forest Habitat

We observed 33 individuals of 15 species at the two upland-forest sites during fall migration surveys conducted in 1994 (Appendix 11). We noted only two (13%) of the 15 species and seven individuals using the TRAN-30 protocol. This resulted in a bird diversity of 0.26. Thirteen species found by other methods at the upland-forest sites were not found by TRAN-30. The two species detected using TRAN-30 were the Canada goose (1.39/ha) and tufted titmouse (0.56/ha).

We observed seven (50%) of 15 species and nine of the 33 individuals (Appendix 11) using PNTC-30; bird diversity was 0.82. Eight species found with other methods at the upland-forest sites were not detected by PNTC-30. The two most abundant species using PNTC-30 were the turkey vulture (1.41/ha) and white-breasted nuthatch (1.41/ha).

With TRAN-UL, we detected two and four more species than with TRAN-50 (CC = 0.80) and TRAN-30 (CC = 0.50), respectively (Table 28). We found 11 species with PNTC-UL, which was four more species than with PNTC-30 (CC = 0.78). TRAN-UL and PNTC-UL detected only two of the same species (red-bellied woodpecker and yellow-bellied sapsucker) and PNTC-UL yielded five species more than TRAN-UL. The CC value for TRAN-UL and PNTC-UL was 0.24.

1994-95 Winter Season

Old-Field Habitat

We recorded 57 individuals of 17 species at the two old-field sites during winter season surveys conducted in 1994-95 (Appendix 11). We detected five (29%) of the 17 species and six individuals using the TRAN-30 protocol. This resulted in a bird diversity of 0.68. Twelve species found by other methods at the old-field sites were not found by TRAN-30. The most abundant species using TRAN-30 was the American robin (0.56/ha). We found one individual

Table 27. Coefficients of community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at lowland-forest sites during 1994 fall migration at Hopewell Furnace National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 20 spp.	TRAN-50 22 spp.	TRAN-UL 24 spp.	PNTC-30 9 spp.	PNTC-UL 17 spp.
TRAN-30 20 spp.	--	--	--	--	--
TRAN-50 22 spp.	0.95	--	--	--	--
TRAN-UL 24 spp.	0.91	0.96	--	--	--
PNTC-30 9 spp.	0.21	0.34	0.30	--	--
PNTC-UL 17 spp.	0.54	0.62	0.63	0.69	--

Table 28. Coefficients of community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at upland-forest sites during 1994 fall migration at Hopewell Furnace National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 2 spp.	TRAN-50 4 spp.	TRAN-UL 6 spp.	PNTC-30 7 spp.	PNTC-UL 11 spp.
TRAN-30 2 spp.	--	--	--	--	--
TRAN-50 4 spp.	0.67	--	--	--	--
TRAN-UL 6 spp.	0.50	0.80	--	--	--
PNTC-30 7 spp.	0.00	0.00	0.15	--	--
PNTC-UL 11 spp.	0.00	0.13	0.24	0.78	--

(0.58/ha) each of the four other species documented with TRAN-30: the turkey vulture, American crow, black-capped chickadee, and Carolina chickadee.

Only seven (41%) of the 17 species and 12 of the 57 individuals (Appendix 11) were observed using PNTC-30, resulting in a bird diversity of 0.80. Ten species found with other methods at the old-field sites were not detected by PNTC-30. The three most abundant species using PNTC-30 were the cedar waxwing (2.12/ha), dark-eyed junco (2.12/ha), and Carolina chickadee (1.41/ha).

We detected three species more with TRAN-50 ($CC = 0.77$) and five more with TRAN-UL ($CC = 0.67$) than with TRAN-30 (Table 29). We found the most species (14) with PNTC-UL, twice as many species as with PNTC-30 ($CC = 0.67$). TRAN-UL and PNTC-UL detected seven of the same species, and PNTC-UL yielded four species more than TRAN-UL. The CC value between TRAN-UL and PNTC-UL was 0.58.

Lowland-Forest Habitat

We found 26 species and 244 individuals at the four lowland-forest sites during winter season surveys conducted in 1994 (Appendix 11). Seventeen (65%) of the 26 species and 59 individuals were noted using the TRAN-30 protocol. This resulted in a bird diversity of 1.03. Nine species found by other methods at the lowland-forest sites were not found by TRAN-30. The four most abundant species using TRAN-30 were the dark-eyed junco (5.83/ha), red-bellied woodpecker (1.39/ha), tufted titmouse (1.11/ha), and American goldfinch (1.11/ha).

Using the PNTC-30 protocol, we observed 14 (54%) of 26 species and 84 of the 244 individuals (Appendix 11), resulting in a bird diversity of 0.99. Twelve species found with other methods at the lowland-forest sites were not detected by PNTC-30. The seven most abundant species using PNTC-30 were the dark-eyed junco (12.72/ha), turkey vulture (7.07/ha), American robin (7.07/ha), tufted titmouse (6.36/ha), American crow (5.66/ha), black-capped chickadee (4.95/ha), and Carolina chickadee (4.95/ha).

We detected one species (American robin) more with TRAN-50 ($CC = 0.97$) and four more with TRAN-UL ($CC = 0.89$) than with TRAN-30 (Table 30). We found the most species (22) with PNTC-UL, eight additional species than with PNTC-30 ($CC = 0.78$) and one additional species than with TRAN-UL ($CC = 0.79$). TRAN-UL and PNTC-UL detected 17 of the same species.

Table 29. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited-distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at old-field sites (PLO and PUO) during the 1994-95 winter season at Hopewell Furnace National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 5 spp.	TRAN-50 8 spp.	TRAN-UL 10 spp.	PNTC-30 7 spp.	PNTC-UL 14 spp.
TRAN-30 5 spp.	--	--	--	--	--
TRAN-50 8 spp.	0.77	--	--	--	--
TRAN-UL 10 spp.	0.67	0.89	--	--	--
PNTC-30 7 spp.	0.17	0.27	0.12	--	--
PNTC-UL 14 spp.	0.32	0.55	0.58	0.67	--

Table 30. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited-distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at lowland-forest sites (FCR, FCL, HOL, and PLL) during the 1994-95 winter season at Hopewell Furnace National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 17 spp.	TRAN-50 18 spp.	TRAN-UL 21 spp.	PNTC-30 14 spp.	PNTC-UL 22 spp.
TRAN-30 17 spp.	--	--	--	--	--
TRAN-50 18 spp.	0.97	--	--	--	--
TRAN-UL 21 spp.	0.89	0.92	--	--	--
PNTC-30 14 spp.	0.65	0.69	0.63	--	--
PNTC-UL 22 spp.	0.72	0.75	0.79	0.78	--

Upland-Forest Habitat

We recorded 67 individuals of 15 species at the two upland-forest sites during winter season surveys conducted in 1994-95 (Appendix 11). We found only two (13%) of the 15 species and four individuals using the TRAN-30 protocol. This resulted in a diversity of 0.24. Twelve species found with other methods at the upland-forest sites were not found by TRAN-30. The downy woodpecker (0.83/ha) was the most abundant species using TRAN-30, followed by the brown creeper (0.28/ha).

Only three (20%) of the 15 species and 32 of the 67 individuals (Appendix 11) were noted using PNTC-30, resulting in a diversity of 0.32. The common grackle was the most abundant species (14.85/ha), followed by the ring-billed gull (7.07/ha) and the house finch (0.71/ha).

We detected 12 species with TRAN-UL, which was five species more than with TRAN-50 (CC = 87) and 10 species more than with TRAN-30 (CC = 0.76) (Table 31). We found 13 species with PNTC-UL, which was more than with any other method. The coefficient of community similarity between PNTC-UL and PNTC-30 was 0.38. All but three species, the ring-billed gull, red-bellied woodpecker, and American robin, found with PNTC-UL were also found with TRAN-UL. All but two species, the brown creeper and northern cardinal, found with TRAN-UL were also found with PNTC-UL (CC = 0.80). PNTC-UL yielded 56 individual observations.

Time Required for Transect Protocol and Point-Count Protocol

We calculated the amount of time required to conduct the transect and point-count protocols for old-field, lowland-forest, and upland-forest habitats separately for each season in 1994 and 1995 (Table 32). For all seasons and habitats combined, a 600-m transect required an average of 19.9 minutes to survey, including the equilibrium period (1 minute), survey period, and periodic stops (30 seconds every 50 m). Five point counts required an average of 35.8 minutes to conduct, including the equilibrium period (1 minute/point), survey period (5 minutes/point), and travel time between points within a transect. For all habitats and seasons combined, surveying birds with a 600-m transect required an average of 15.9 minutes less than surveying with five point counts. Transects at upland-forest sites required the least amount of time to conduct (18.7 minutes), whereas point counts at lowland-forest sites required the greatest amount of time (36.7 minutes). The largest average time difference between transects and point counts was at upland-forest sites (17.6 minutes more for point counts). The average amount of time required to conduct transects decreased each season due to increased familiarity with the transect route.

Table 31. Coefficients of bird community similarity for 30-m fixed-width transects (TRAN-30), 50-m fixed-width transects (TRAN-50), unlimited-distance transects (TRAN-UL), 30-m fixed-radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) conducted at upland-forest sites (PLU and SCU) during the 1994-95 winter season at Hopewell Furnace National Historic Site. The total number of species detected for each method also is given.

	TRAN-30 2 spp.	TRAN-50 7 spp.	TRAN-UL 12 spp.	PNTC-30 3 spp.	PNTC-UL 13 spp.
TRAN-30 2 spp.	--	--	--	--	--
TRAN-50 7 spp.	0.44	--	--	--	--
TRAN-UL 12 spp.	0.29	0.74	--	--	--
PNTC-30 3 spp.	0.00	0.20	0.27	--	--
PNTC-UL 13 spp.	0.13	0.60	0.80	0.38	--

Table 32. Average time (minutes) required to conduct a 600-m transect and five point counts for birds at old-field, lowland-forest, and upland-forest habitats during four seasons at Hopewell Furnace National Historic Site.

	600-M TRANSECT	FIVE POINT COUNTS
1994 Spring Migration Average:	22.6 minutes	33.9 minutes
Old-Field:	25.0 minutes	32.7 minutes
Lowland-Forest:	20.5 minutes	33.7 minutes
Upland-Forest:	22.4 minutes	35.2 minutes
1994 Breeding Season Average:	19.8 minutes	34.7 minutes
Old-Field:	23.5 minutes	33.5 minutes
Lowland-Forest:	18.5 minutes	34.6 minutes
Upland-Forest:	17.3 minutes	36.0 minutes
1994 Fall Migration Average:	19.2 minutes	39.2 minutes
Old-Field:	17.5 minutes	35.0 minutes
Lowland-Forest:	22.5 minutes	45.0 minutes
Upland-Forest:	17.5 minutes	37.5 minutes
1994-95 Winter Season Average:	18.1 minutes	35.4 minutes
Old-Field:	17.5 minutes	36.3 minutes
Lowland-Forest:	19.4 minutes	33.5 minutes
Upland-Forest:	17.5 minutes	36.3 minutes
Old-Field Average:	20.9 minutes	34.4 minutes
Lowland-Forest Average:	20.2 minutes	36.7 minutes
Upland-Forest Average:	18.7 minutes	36.3 minutes
Overall Average:	19.9 minutes	35.8 minutes

Vehicular-Road Survey Protocol

Gettysburg National Military Park and Eisenhower National Historic Site

1993-94 Winter Season: We observed 24 bird species and 181 individuals during two road surveys conducted in March 1994 using the non-stop method (Appendix 12). The average number of Canada geese, European starlings, American crows, American robins, and ring-billed gulls per survey (20.8 km length) was 34.5, 14.0, 7.0, 6.0, and 3.5, respectively, and the average number observed per km was 1.67, 0.67, 0.34, 0.29, and 0.17, respectively. Other common species included the turkey vulture, black-capped chickadee, tufted titmouse, eastern bluebird, song sparrow, and dark-eyed junco. The survey route (20.8 km length) required 2.5 hours to establish (i.e., map and test-run). We required an average of 60 minutes to conduct each road survey at GETT-EISE during winter 1993-94.

1994 Spring Migration: We noted 37 bird species and 132 individuals during a non-stop road survey conducted in May 1994. The most common species included 16 Canada geese (0.77/km), 10 European starlings (0.48/km), 10 cedar waxwings (0.48/km), nine American robins (0.43/km), and eight eastern wood-pewees (0.38/km). Other common species included the northern cardinal, white-breasted nuthatch, great crested flycatcher, house wren, and wood thrush. We required 65 minutes to conduct the spring survey.

Hopewell Furnace National Historic Site

1995 Breeding Season: We found 43 bird species and 409 individuals using the non-stop and BBS methods of the vehicular-road survey protocol during 1995 breeding season at HOFU (Appendix 13). Of the 43 species observed with both methods combined, 24 (56%) were documented with both methods and 19 (44%) were documented with only one method.

During two surveys using the non-stop method, we noted 30 (70%) of the 43 total species and 140 individuals. The average number of red-eyed vireos, wood thrushes, chipping sparrows, American robins, and eastern towhees per survey (8.0 km length for each survey) with the non-stop method was 9.0, 7.0, 6.5, 4.0, and 4.0, respectively, and the average number observed per km was 1.1, 0.9, 0.8, 0.5, and 0.5, respectively. Other common species noted with the non-stop method included the house wren, eastern bluebird, gray catbird, European starling, ovenbird, and scarlet tanager.

Using the BBS method, we found 37 (86%) of the 43 total species and 269 individuals during two surveys. The average number of chipping sparrows, barn swallows, Canada geese, red-eyed

vireos, and wood thrushes observed per survey (nine stopping points per survey) with the BBS method was 13.5, 12.5, 10.0, 8.0, and 8.0, respectively, and the average number observed per km was 1.7, 1.6, 1.3, 1.0, and 1.0, respectively. Other common species found with the BBS method included the blue jay, tufted titmouse, house wren, European starling, scarlet tanager, and American goldfinch. We required an average of 30.0 minutes to conduct each non-stop road survey and 52.5 minutes to conduct each BBS road survey at HOFU during the 1995 breeding season.

1995-96 Winter Season: We noted 18 bird species and 278 individuals using the non-stop and BBS methods of the vehicular-road survey protocol during 1995-96 winter season at HOFU (Appendix 13). Twelve (67%) of the 18 species were found with both the non-stop method and BBS method, and six (33%) species were found with only one method.

Using the non-stop method, we observed 13 (72%) of the 18 species detected with both methods and 176 individuals during two surveys (8.0 km length per survey). The most common species included the European starling (51.5/survey, 6.4/km), American robin (13.5/survey, 1.7/km), American crow (6.5/survey, 0.8/km), house sparrow (4.5/survey, 0.6/km), and blue jay (4.0/survey, 0.5/km). Other common species included the tufted titmouse and eastern bluebird.

Using the BBS method, we found 17 species and 102 individuals during two surveys. The average number of European starlings, American crows, American robins, house sparrows, and white-breasted nuthatches noted per survey (nine stopping points) was 17.0 (2.1/km), 9.0 (1.1/km), 5.0 (0.6/km), 4.0 (0.5/km), and 2.5 (0.3/km), respectively. Other common species included the turkey vulture, red-bellied woodpecker, blue jay, and eastern bluebird. We required an average of 29.0 and 47.5 minutes to conduct each survey using the non-stop method and BBS method, respectively.

1996 Spring Migration: We found 58 bird species and 386 individuals using the non-stop and BBS methods of the vehicular-road survey protocol during 1996 spring migration at HOFU (Appendix 13). Of the 58 species observed with both methods combined, 48 (83%) were documented with both methods and 10 (17%) were documented with only one method.

During two surveys using the non-stop method, we noted 54 (93%) of the 58 species detected with both methods and 216 individuals. The average number of red-eyed vireos, ovenbirds, scarlet tanagers, wood thrushes, and common yellowthroats per survey (8.0 km length for each survey) with the non-stop method was 10.0, 7.0, 5.0, 4.5, and 4.5, respectively, and the average number observed per km was 1.3, 0.9, 0.6, 0.6, and 0.6, respectively. Other common species noted with the non-stop method included the blue jay, tufted titmouse, indigo bunting, chipping sparrow, white-throated sparrow, brown-headed cowbird, and Baltimore oriole.

We detected 52 (90%) of the 58 species observed with both methods and 170 individuals using the BBS method during two surveys. The average number of blue jays, Canada geese, red-eyed vireos, American crows, and chipping sparrows observed per survey (nine stopping points per survey) with the BBS method was 6.0, 5.5, 5.5, 4.0, and 4.0, respectively, and the average number observed per km was 0.8, 0.7, 0.7, 0.5, and 0.5, respectively. Other common species found with the BBS method included the barn swallow, tufted titmouse, wood thrush, scarlet tanager, and brown-headed cowbird. We required an average of 31.5 minutes to conduct each non-stop road survey and 50.0 minutes to conduct each BBS road survey at HOFU during 1996 spring migration.

Valley Forge National Historical Park

1995-96 Winter Season: We found 21 bird species and 189 individuals using the non-stop and BBS methods of the vehicular-road survey protocol during 1995-96 winter season at VAFO (Appendix 14). Of the 21 species observed with both methods combined, 11 (52%) were documented with both methods and 10 (48%) were documented with only one method.

During two surveys using the non-stop method, we noted 14 (67%) of the 21 species observed with both methods and 98 individuals. The average number of European starlings, Canada geese, mallards, and American crows per survey (11.3 km length for each survey) with the non-stop method was 19.5, 9.0, 6.0, and 4.0, respectively, and the average number observed per km was 1.7, 0.8, 0.5, and 0.4, respectively. Other common species noted with the non-stop method included the red-tailed hawk and downy woodpecker.

Although we conducted the BBS method only once during winter 1995-96, we detected more species with this method compared to the non-stop method. We found 18 (86%) of the 21 species noted with both methods combined and 91 individuals during one survey at VAFO. The number of European starlings, mallards, red-tailed hawks, mourning doves, American crows, and Carolina chickadees observed (eight stopping points) with the BBS method was 52.0, 12.0, 3.0, 3.0, 3.0, and 3.0, respectively, and the number observed per km was 4.6, 1.0, 0.2, 0.2, 0.2, and 0.2, respectively. We required an average of 35.5 minutes to conduct each non-stop road survey and 55.0 minutes to conduct the one BBS road survey at VAFO during 1995-96 winter season.

1996 Spring Migration: We noted 63 bird species and 454 individuals using the non-stop and BBS methods of the vehicular-road survey protocol during 1996 spring migration at HOFU (Appendix 14). Forty-nine (78%) of the 63 total species were found with both the non-stop method and BBS method, and 14 (22%) species were found with only one method.

Using the non-stop method, we observed 57 (90%) of the 63 species observed with both methods combined and 273 individuals during two surveys (11.3 km length per survey). The most

common species included the European starling (19.5/survey, 1.7/km), American robin (14/survey, 1.2/km), red-eyed vireo (7.0/survey, 0.6/km), wood thrush (5.0/survey, 0.4/km), and ovenbird (5.0/survey, 0.4/km). Other common species noted with the non-stop method were the blue jay, gray catbird, eastern towhee, eastern meadowlark, and Baltimore oriole.

Using the BBS method, we found 55 (87%) of 63 total species and 181 individuals during two surveys. The average number of European starlings, American robins, red-eyed vireos, wood thrushes, blue jays, and gray catbirds noted per survey (nine stopping points) was 10.0 (0.9/km), 6.0 (0.5/km), 6.0 (0.5/km), 4.5 (0.4/km), 3.5 (0.3/km), and 3.5 (0.3/km), respectively. Other common species included the eastern wood-pewee, Carolina chickadee, ovenbird, common yellowthroat, eastern meadowlark, and Baltimore oriole. We required an average of 37.5 and 54.0 minutes to conduct each survey using the non-stop method and BBS method, respectively.

Nocturnal-Owl Survey Protocol

Hopewell Furnace National Historic Site

We found one saw-whet owl, 18 eastern screech-owls, and four great horned owls while conducting two nocturnal-owl surveys at HOFU during winter 1995-96 (Table 33). The saw-whet owl, 15 (83%) of the screech-owls, and two (50%) of the great horned owls were observed during their respective calling periods (e.g., great horned owl responding to the great horned owl call). One screech-owl and one great horned owl were noted during the unsolicited period prior to the start of the calling periods. A survey required an average of 1 hour and 32.5 minutes to conduct, including the equilibrium period, the survey period for each owl species, and travel time between the four sampling points.

Valley Forge National Historical Park

We recorded five eastern screech-owls and one great horned owl while conducting two nocturnal-owl surveys during winter 1995-96 at VAFO (Table 34). Unlike HOFU, only two (33%) of the owls were recorded during their respective calling periods. One screech-owl was found during the unsolicited period, and two screech-owls were found during the great horned owl calling period. The great horned owl was observed during the barred owl calling period. We required an average of 2 hours and 7 minutes to complete the nocturnal-owl survey protocol at VAFO, including the equilibrium period, the survey period for each owl species (four survey periods), and travel time between the four sampling points. The greater amount of time (34.5 minutes) to conduct the survey at VAFO compared to HOFU is due to greater distance between sampling points at VAFO.

Table 33. Number of individuals of four owl species observed during unsolicited period and during or following each owl call at four sampling points during winter 1995-96 (two surveys) at Hopewell Furnace National Historic Site.

	Unsolicited Period	Saw-whet Owl Call	Eastern Screech Owl Call	Barred Owl Call	Great Horned Owl Call	Total
Saw-whet Owl	0	1	0	0	0	1
Eastern Screech Owl	1	1	15	1	0	18
Barred Owl	0	0	0	0	0	0
Great Horned Owl	1	1	0	0	2	4
Total	2	3	15	1	2	23

Table 34. Number of individuals of four owl species observed during unsolicited period and during or following each owl call at four sampling points during winter 1995-96 (two surveys) at Valley Forge National Historical Park.

	Unsolicited Period	Saw-whet Owl Call	Eastern Screech Owl Call	Barred Owl Call	Great Horned Owl Call	Total
Saw-whet Owl	0	0	0	0	0	0
Eastern Screech Owl	1	0	2	0	2	5
Barred Owl	0	0	0	0	0	0
Great Horned Owl	0	0	0	1	0	1
Total	1	0	2	1	2	6

Discussion

Gettysburg National Military Park and Eisenhower National Historic Site

Our test of field protocols for Gettysburg National Military Park and Eisenhower National Historic Site using transects, point counts, and non-stop vehicular-road surveys indicated that data obtained per survey type and time required to conduct a given survey are important considerations. For instance, surveys of birds with transects versus point counts differed in species richness and time required to conduct the survey. At old-field sites, more species were detected with 30-m radius point counts (PNTC-30; average = 31.8 species) and unlimited-radius point counts (PNTC-UL; average = 35.8 species) than with the three transect methods (30-m, 50-m, and unlimited-distance; average = 27.6-29.2 species) for all seasons combined. Although point counts resulted in higher species richness, they required an average of 10.2 minutes longer to complete than transects over a standard length. However, the higher species richness obtained with PNTC-UL compared to all other methods may compensate for this time difference. Therefore, the method selected for surveying birds at old-field sites will depend on specific goals and available personnel at a given park. If the required labor and expertise are available to a resource management specialist whose goal is to document the highest number of bird species at old-fields, unlimited-radius point counts (PNTC-UL) should be selected as the appropriate survey method regardless of the season.

At forest sites, PNTC-UL also resulted in the highest species richness (36.8) when averaged for all seasons compared to TRAN-30 (31.8 species), PNTC-30 (32.8 species), TRAN-50 (35.2 species), and TRAN-UL (35.4 species). However, this trend was not found every season; more bird species were detected using TRAN-50 and TRAN-UL (58 species) compared to PNTC-UL (54 species) during spring migration. In addition, the difference in time required to survey birds with point counts and transects at forest sites was greater than at old-field sites; point counts required an average of 17.4 minutes more to survey a site for the standard length (5 point counts and 600 m). Therefore, because average differences in species detected among TRAN-50, TRAN-UL, and PNTC-UL were relatively small (maximum difference = 1.6 species), TRAN-50 and TRAN-UL often detected as many or more species than PNTC-UL, and point counts required considerably more time to conduct, TRAN-50 and TRAN-UL were more time- and labor-efficient methods for surveying birds at forest sites.

Although we detected more species at old-field and forest sites with the PNTC-UL method when averaged for all seasons, a combination of transect and point-count methods may be better than PNTC-UL only. For example, although we documented 40 species each with TRAN-UL and PNTC-UL during the 1994 breeding season at forest sites, only 30 species were common between the two methods ($CC = 0.75$). Use of a single method at forest sites would have resulted in the omission of 10 species. Because the maximum coefficient of community similarity value between PNTC-UL and TRAN-UL was 0.77 for both old-field and forest sites, a significant

number of species would not be observed using a only one protocol. Therefore, surveying birds with both TRAN-UL and PNTC-UL is the approach recommended to identify a representative species richness.

Our use of an owl call during point counts did not increase species richness or abundance. Thus, this protocol is not necessary when surveying birds during fall migration and winter seasons. Moreover, birds may be drawn off of nests using this protocol during both spring migration and breeding seasons, precluding the use of this protocol.

The vehicular-road survey allowed us to survey much of the park and several habitats but required little time to set up and to conduct. Furthermore, of the 24 species observed during winter surveys and 37 species during the spring migration survey, the rock dove, eastern kingbird, northern rough-winged swallow, purple martin, and house sparrow were not documented with another protocol. This protocol may be an efficient alternative when little time is available to survey birds with transects or point counts or an efficient supplement to increase species detected in a variety of habitats.

Hopewell Furnace National Historic Site

We surveyed birds at Hopewell Furnace National Historic Site using a modified version of fixed-width (TRAN-30 and TRAN-50) and variable-width transects (TRAN-UL), fixed-radius (PNTC-30) and unlimited-radius point counts (PNTC-UL), non-stop and Breeding Bird Survey (BBS) vehicular-road surveys, and nocturnal-owl surveys. As at GETT-EISE, more species were consistently detected with PNTC-UL compared to PNTC-30, TRAN-50, and TRAN-UL at old-field sites although we modified the transect protocol to increase species richness by increasing sampling time at HOFU. This same trend also was found at upland-forest sites. However, at lowland-forest sites during fall migration, we found more species using TRAN-50 (22 species) and TRAN-UL (24 species) compared to PNTC-UL (17 species), and we found nearly as many species using TRAN-UL (21 species) as PNTC-UL (22 species) during the winter season. Additionally, point counts continued to require almost twice as much time to conduct compared to transects. This exception during fall migration may be because we visited each site only once, whereas during other seasons, we visited each site at least twice. One visit likely does not adequately sample the avifauna at a site.

In all habitats, point counts required a greater amount of time to conduct (13.5 minutes at old-field sites, 16.5 minutes at lowland-forest sites, and 17.6 minutes at upland-forest sites). This time difference may be offset by the considerable difference in species richness between PNTC-UL and all other methods in old-field and upland-forest habitats. However, this is not true at lowland-forest sites during the breeding, fall migration, and winter seasons.

As with GETT-EISE, the choice between transects and point counts for some seasons and habitats (e.g., spring migration at lowland-forest sites) will depend on specific goals and available personnel at a park. If the required labor and expertise are available to a resource management specialist whose goal is to document the highest number of bird species at upland-forest habitat during the breeding season, then the unlimited-radius point counts (PNTC-UL) should be selected as the appropriate survey method. Conversely, if the additional labor and expertise to conduct PNTC-UL are not available to a resource management specialist, TRAN-UL should be selected to survey birds. As with GETT-EISE, however, a combination of transect and point-count methods may be better than using either the PNTC-UL or TRAN-UL methods alone. Because the average coefficient of community similarity value between PNTC-UL and TRAN-UL was 0.67 for all seasons and habitats, a significant number of species would not be observed using only one protocol. Therefore, surveying birds with both TRAN-UL and PNTC-UL is the approach recommended to identify a representative number of species. In addition, although considerably more species were detected using PNTC-UL compared to PNTC-30, particularly at lowland-forest and upland-forest sites, a combination of methods would provide additional benefits. Surveying birds within a given radius or width allows calculation of relative abundance or density estimates. Therefore, use of 50-m fixed-width transects along with unlimited-radius transects or 30-m radius point counts along with unlimited-radius point counts provides additional information without additional investment of time or labor.

The 67 species documented using the vehicular-road survey protocol during three seasons at HOFU included 14 species not found with any other protocol and one species, the golden-winged warbler, that had not been formally documented in the park. We required less than one hour (per survey) to survey all habitats within the park, significantly less time than using either point counts or transects. Even though we found more species during spring migration using the non-stop method and the BBS method takes more time to conduct, we recommend the use of the BBS method or a combination of both methods for the following reasons. First, the time difference between the non-stop and BBS methods is small compared to the difference between the vehicular-road survey protocol and other protocols (transects and point counts). Second, only 56%, 67%, and 83% of the total number of species documented were documented with both methods during the breeding season, winter season, and spring migration, respectively. Use of both methods would add a substantial number of species, particularly during the breeding and winter seasons. Third, the non-stop survey requires much greater ability to identify birds by song and call very quickly. Because there is no time visually and little time aurally to identify the majority of individuals, the non-stop method should be used only by observers adept at rapid song and call identification.

The nocturnal-owl survey protocol was a time-efficient method of surveying owls. Although we detected only three species (eastern-screech owl, great horned owl, and saw-whet owl), this protocol may be effective to survey other owl species potentially occurring in the park (e.g., barred, long-eared, and barn owls).

Valley Forge National Historical Park

The substantial number of bird species previously documented at VAFO is due in large part to the emphasis placed on this taxon by the resource management specialists. Data have been compiled at the park for the past 10 years by park personnel with ornithological experience. These data also include observations collected from Christmas Bird Counts conducted in the park and sightings by knowledgeable organizations (i.e., local bird clubs).

Because of the high percentage of predicted bird species documented previously in the park (85%) and because of the amount of protocol testing concentrating on birds at GETT-EISE and HOFU, we did not test point counts and transects at VAFO. Instead, we tested two protocols (vehicular-road survey and nocturnal-owl survey) at VAFO that were not used extensively at GETT-EISE.

Using the vehicular-road survey protocol, we detected 67 species during two seasons. As with HOFU, we surveyed the entire park and all representative habitats in less than one hour. The BBS method was much more effective in surveying winter birds than the non-stop method. In contrast, we found two species more using two non-stop surveys compared to two BBS surveys during the spring. As with HOFU, a low percentage (52% during the winter season and 78% during spring migration) of the total number of bird species found with the vehicular-road survey protocol were documented by each method. A more effective approach may be to use both methods to survey spring migratory and winter birds (see discussion for HOFU above).

With the nocturnal-owl survey protocol, we documented the eastern screech-owl and great horned owl at VAFO. Each survey required 2 hours 7 minutes to conduct, which is slightly more time than at HOFU. Sampling at the center point of each transect at VAFO took more time than sampling along the vehicular-road survey route at HOFU. However, because of high traffic levels, conducting the nocturnal-owl survey protocol along the vehicular-road survey route at VAFO would not have been effective.

Suggested Inventory and Monitoring Program for Birds

Introductory Considerations

Three-hundred seventy-two extant species of birds occur in Pennsylvania, compared to 75 species of amphibians and reptiles and 63 species of mammals (Yahner 1997). In our study of four national parks in Pennsylvania from 1992-96, we predicted that 232 avian species potentially could be found at both GETT-EISE and HOFU and 247 species could potentially be found at VAFO (Tables 6-8); 232 and 247 species represent 62% and 66%, respectively, of the extant avian species in the state. These predictions were based on various types of information, e.g., published field guides of the geographic distribution of mammals in the state.

Only 67-77% of the 232 avian species predicted to occur in GETT-EISE and HOFU were documented in our study; 86% of the 247 avian species predicted to occur in VAFO were documented. At least three reasons may explain this low number of documented species. First, numbers of certain species in a given park may be too low to be easily detected within the scope of our project. Second, some species require specific inventory protocols that were not tested in our study. For example, the nocturnal-calling survey for rails is an excellent way to monitor breeding populations, but it was not tested in our study. Third, geographic distributions given for some species in popular field guides are often very broad. Hence, a park may be within the potential geographic range of a particular species, but that species may not be found in the park because the park is relatively small or may not contain all the necessary ecological requirements of the species. Thus, because of ecological and logistical constraints, a natural resource manager using typical inventory and monitoring procedures and efforts should probably expect to document only about 65-85% of the total avian species predicted to occur in a given park, which includes between 150 and 200 of the extant species in Pennsylvania.

Natural resource managers should develop a comprehensive inventory and monitoring program for birds that has reasonable objectives, given the ecological and logistical constraints of a particular park. We recommend that each park achieve at least two specific objectives:

- (1) To inventory and monitor approximately 65-85% of the predicted species richness (list of species) of birds in the park.
- (2) To inventory and monitor the relative abundance of key subsets of the avifauna in the park.

However, before these objectives can be achieved, at least two interrelated and specific questions should be addressed by natural resource managers: (1) What types of information are needed about avian abundance and distribution in a park? (2) What are potential ecological and logistical constraints that may influence the success of the program?

Types of Information Needed

Natural resource managers interested in an inventory and monitoring program for birds initially begin by simply deriving a list of species documented in a park; this simple measure of avian diversity is termed species richness. A list of species can often be readily obtained from existing data sources, such as previous studies conducted in the park, Christmas Bird Counts or Breeding Bird Surveys, museum voucher specimens, or NPS wildlife observation cards (WOC). The use of WOC is particularly useful because often these records are ongoing and can be maintained over an extended time period by park personnel with little effort; WOC often provide information on relatively uncommon species in a park, such as "irruptive" species (e.g., evening grosbeaks, common redpolls).

A measure of species richness of birds in a given park has considerable value because it may be determined with relatively low cost and labor and may be used in the long-term for monitoring of avian biodiversity within the park and contiguous areas. This measure, however, has two disadvantages. First, a complete list of all birds in a park may be difficult to obtain because of the secretive nature of some birds and because some species may require considerable time, monies, and expertise to inventory and monitor (e.g., rails). Second, a simple list of species gives no information on the abundance and distribution of birds in the park.

Natural resource managers may wish to increase their understanding of avifauna in a park by stating additional objectives that determine some measure of the relative abundance of a given subset(s) of birds. Neotropical-migratory songbirds (i.e., warblers, tanagers, and vireos) are an excellent subset of species to include in an inventory and monitoring program because they are sensitive to habitat fragmentation (Yahner 1995) and, hence, are excellent barometers of environmental change or degradation. Furthermore, they typically consist of a variety of species, may have relatively high population numbers, and are important members of the avian community during spring, summer, and fall. For example, in our study, we documented between 73-93% of the predicted species of Neotropical migrants in each of the four parks. Surveys by experts familiar with song and sight identification of the avifauna of the region, however, is advised because of the similarity in appearance by many wood-warblers (Family Emberizidae, Subfamily Parulinae), particularly during fall migration.

Duration and Scope of Project

If an objective of natural resource managers is simply to obtain some information of the presence/absence of birds in a given park, then a conservative list of predicted and documented list of species can be obtained within a relatively short time period (e.g., few months). This can be achieved by collating a list of avian species recorded in the park from previous natural resource studies, museum voucher specimens, wildlife observation cards, or other sources of

information. However, a comprehensive measure of species richness may take a much longer time period, including surveying birds during all seasons and in all representative habitats.

In addition to species richness, we recommend that the relative abundance of a given subset(s) of avian species be determined for a minimum of 2-3 years because some environmental perturbation may affect the likelihood of observing certain species. If a project were limited to a single field season, an inaccurate picture of avian abundance may be obtained as a result of natural year-to-year fluctuations in avian population numbers.

The scope of an inventory and monitoring program should include a major portion of a given park rather than a small subsection of the park. Some bird populations may be widely distributed but relatively uncommon throughout the park. Thus, establishing several areas as survey sites is advantageous. In addition, the scope of an inventory and monitoring program should not be restricted to a single habitat type, e.g., deciduous forest, unless logistical constraints restrict the scope of the program or because that particular habitat/cover type comprises the vast majority of the park acreage. Most parks, however, contain more than one habitat/cover type (i.e., deciduous forest, coniferous forest, old-field, grassland, wetland) of appreciable size. If possible, each habitat/cover type within the park that comprises at least 10 ha should be sampled for birds. However, critical or sensitive habitat/cover types, such as wetlands or rock outcrops, that are less than 10 ha may be included in the sampling design because these may contain avian species (e.g., Louisiana waterthrush) with very specific habitat requirements not found elsewhere in the park. Habitat/cover types that are dynamic and highly disturbed for much of the year, e.g., cropland, should be avoided in the sampling design. As a general rule, the amount of effort devoted to inventorying or monitoring birds in a given habitat/cover type should be approximately proportionate to the availability of that type in order to ensure similar sampling effort across per unit area of habitat/cover type.

Ecological and Logistical Constraints

Information on predicted species of birds in a park is helpful because it gives natural resource managers some indication of the probability of finding a particular species in a given park. However, although the geographic range of an avian species may overlap the boundaries of a park based on inspection of range maps given in field guides, a given species may not occur in the park. The absence of a given species may be attributed to the fact that its abundance is low not only in the park but in the region contiguous to the park or that its ecological requirements are not met in the park. Thus, objectives designed to inventory and monitoring certain species may not be realistic for ecological reasons. Natural resource managers may wish to consult with experts familiar with the ecological requirements of birds in question before conducting an in-depth and comprehensive survey of certain species, particularly if logistical considerations are important.

Some inventory and monitoring objectives may not be reasonable because of logistical constraints. For instance, a nocturnal-owl survey should include use of a Johnnycaller with amplifier, significant field time, and expertise in identification of owl calls; thus, this inventory and monitoring protocol involves an investment of time and labor. Road surveys will be best suited for parks with extensive infrastructure throughout the park.

Suggested Sampling Protocols

Based on our evaluation of protocols at GETT-EISE, HOFU, and VAFO, we suggest three sampling protocols for inventorying and monitoring birds: transect and point counts, BBS-type vehicular-road survey, and nocturnal-owl survey. Additional details for each protocol (e.g., types of data collected, cost of equipment) are given in the next section of this report. Furthermore, we recommend the continued use of wildlife observation cards and offer some additional considerations for an inventory and monitoring program.

For each protocol, data should be carefully and accurately collected. If possible and depending on the protocol, data collected may include the species, sex, age, location, habitat/cover type, date, and time of each observation. Data should be kept on standardized data field sheets. If a computerized faunal database is available for a park, data collected should be added to the database.

1. **Transects and Point Counts:** Use of both the transect protocol and point-count protocol (see sections entitled “Transect Protocol” and “Point-Count Protocol,” respectively) is recommended to survey bird species in all habitats except grasslands, where only transects should be used. The most common habitat/cover types in terms of total acreage in the park should be sampled; these should include types that comprise at least 10 ha (25 acres) and exclude cropland. Special attention may also be given to critical or sensitive types, such as wetlands and rock outcrops.

At least two 600-m permanent transects (per 10 ha) should be established in each habitat/cover type (old-field, lowland- and upland-forest, and coniferous forest). These transects may be placed along existing trails. Sampling points (at least 10 points) should be spaced at 150-m intervals along the transects at each sampling area. Birds should be surveyed using a combination of transects and point counts along the permanent transects. Transects should be conducted at a slow pace (2-3 km/hour), with the observer stopping for 5 minutes at each sampling point. All birds observed within 50 m of the transect and sampling points should be recorded for density estimates. In addition, all species observed outside of 50 m should be recorded for species richness estimates. Bird surveys should be conducted three times per transect during each season (breeding season, fall and spring migration, and winter season) between sunrise and four hours after sunrise. If time and monies allow, birds should be surveyed 4-5 times during the migratory seasons to ensure adequate coverage. For a sufficient inventory, surveys should be conducted for a minimum of 2 consecutive years. If long-term monitoring is

an objective, surveys should be conducted for two consecutive years at 5-year intervals. This sampling protocol will provide a suitable measure of species richness and relative abundance (expressed as number of individuals observed/ha for each species and habitat type) in a given park.

2. Vehicular-road survey: At least one permanent vehicular-road survey route should be established in a park. The survey route should traverse representative habitat/cover types and avoid heavily traveled roads, if possible. We recommend that the length of the route be at least 8 km (5 miles). Road surveys can be valuable in documenting species richness and relative abundance (expressed as number of individuals of each species observed per km) of a variety of species. We recommend at least three BBS-type road surveys be conducted during the breeding season, winter season, and spring migration. If time and monies exist, a combination of at least two surveys each of BBS-type and non-stop methods should be used. Most bird species, particularly songbirds, will not be adequately surveyed with vehicular-road surveys during fall migration because they are inconspicuous and difficult to identify. Vehicular-road surveys should be conducted for at least 2 consecutive years to inventory birds, and thereafter at 2- to 3-year intervals to monitor these species.

3. Nocturnal-owl survey: We recommend the use of the nocturnal-owl survey protocol to survey saw-whet, eastern screech, barred, and great horned owls. Surveys should be conducted at sampling points along an established vehicular-road survey route if the route has little vehicular traffic at night. Otherwise, owls may be surveyed along existing trails or along established transects; however, this will increase the survey time. Sampling points should be separated by 500 m and should be located in deciduous forest, coniferous forest, or at a forest-field interface.

Nocturnal-owl surveys should be conducted in February or early March during the courtship period and before egg-laying dates (Brauning 1992). Surveys should be conducted three times each year. These surveys should be conducted for at least 2 consecutive years to inventory owls, and thereafter at 2- to 3-year intervals to monitor these species.

4. Wildlife observation cards: Each park should maintain a catalog of wildlife sightings on wildlife observation cards. These cards provide valuable long-term data on wildlife in the park. Natural resource managers and other personnel should continue to document incidental sightings of wildlife, road-kill information, and other interesting facts noted about wildlife while conducting day-to-day duties at the park.

5. Additional considerations: If resources, such as personnel, time, and monies, are available, the scope of an inventory and monitoring program for birds can be expanded. For example, surveys of rails may require nocturnal-calling surveys as well as use of specific equipment, e.g., Johnnycaller and amplifier. If appropriate habitat is available (e.g., marsh, wetlands), these surveys should be conducted during the breeding season.

In conclusion, the types of protocols and the extent to which each is used to inventory and monitor birds in a given park will depend on resource management objectives of the parks. Natural resource managers should determine what types of data are needed and what are the ecological constraints within the park.

Taxonomic-Specific Recommendations for Avian Inventorying and Monitoring

A major objective of our study was to select a set of protocols to field test that were specific to the major vertebrate groups at each of the parks. The effectiveness of these protocols was then based on their ability to detect various species that were predicted to occur at the parks in terms of labor, time, and cost required to conduct the protocols. A protocol was particularly effective if it documented species with relatively little time and labor and low cost.

We concentrated our effort surveying abundant taxa (e.g., woodpeckers and passerines) and placed less emphasis on taxa for which relatively few survey protocols have been developed (e.g., shorebirds and wading birds). Although our field testing for birds is complete, we recommend that future work focus on less abundant taxa and on taxa that were not effectively documented by our subset of protocols.

Below are our recommendations for inventorying and monitoring specific taxonomic groups, based on our field test of protocols at GETT-EISE, HOFU, and VAFO. We will note the most effective protocol for inventorying a given taxon and, if appropriate, alternative protocols if labor or monies are limited. Numbers of species detected are given based on the most robust method for each protocol (PNTC-UL for point counts and TRAN-UL for transects). Both the non-stop (NRCE) and BBS-type (BRCE) methods are provided for the vehicular-road survey protocol.

Waterfowl (Orders Gaviiformes, Podicipediformes, Pelecaniformes, and Anseriformes)

The unlimited-radius point-count protocol (PNTC-UL) was the most effective protocol to survey waterfowl at both GETT-EISE and HOFU, followed by the unlimited-distance transect (TRAN-UL) and vehicular-road survey protocols (Tables 35-37, respectively). However, we did not survey habitats that are primary and secondary habitats for waterfowl (e.g., lacustrine wetlands) (Yahner et al. 1994b, 1994c). Because of the few number of these habitats throughout the parks, our results may not be appropriate at a park with abundant wetland habitat.

Waders (Order Ciconiiformes and Gruiformes)

Wading birds were not adequately sampled at any of the parks. We found only the great blue heron using the transect protocol (TRAN-UL) at GETT-EISE (Table 38), although two other species, the green-backed heron (GETT-EISE) and great egret (GETT-EISE and HOFU), were personally observed. We detected no wading birds at VAFO.

Table 35. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the transect protocol for waterfowl (Orders Gaviiformes, Podicipediformes, Pelecaniformes, and Anseriformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural
Seasons:	spring ^b , summer ^b , fall ^b , winter ^b
Type of data: Presence Relative Abundance Density	yes yes yes
Number of species detected at: GETT-EISE HOFU VAFO	3 2 NA ^c
Survey Specifications:	at least two 600-m transects per habitat type; three visits per season
Time:	26.8 minutes (0.45 person-hours)/600-m transect at GETT-EISE; 19.9 minutes (0.33 person-hours)/600-m transect at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	rough terrain may increase the amount of time to conduct a survey and decrease the number of species detected; requires ability to identify birds by sight and especially song and call
Citations:	Conner and Dickson 1980 (#1940); Emlen 1971 (#2660); Franzreb 1981 (#3110); Hutto and Mosconi 1981 (#4190)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 36. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the point count protocol for waterfowl (Orders Gaviiformes, Podicipediformes, Pelecaniformes, and Anseriformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland, agricultural
Seasons:	spring ^b , summer ^b , fall ^b , winter ^b
Type of data: Presence Relative Abundance Density	 yes yes yes
Number of species detected at: GETT-EISE HOFU VAFO	 4 3 NA ^c
Survey Specifications:	at least 10 points per habitat type; three visits per season
Time:	40.6 minutes (0.68 person-hours)/5 points at GETT-EISE; 35.8 minutes (0.60 person-hours)/5 points at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	requires ability to identify birds by sight and especially song and call
Citations:	Fuller and Langslow 1984 (#3240); Hutto et al. 1986 (#4200); International Bird Census Committee 1977 (#7030); Verner and Ritter 1986 (#8480)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 37. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the non-stop (NRCE) and BBS-type (BRCE) vehicular-road survey protocol for waterfowl (Orders Gaviiformes, Podicipediformes, Pelecaniformes, and Anseriformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural ^a
Seasons:	spring ^b , summer ^b , fall, winter ^b
Type of data: Presence Relative Abundance Density	Yes Yes Yes
Number of species detected at: GETT-EISE HOFU VAFO	2 Total 0 NRCE, 1 BRCE, 1 Total 2 NRCE, 2 BRCE, 3 Total
Survey Specifications:	at least 8.0 km survey route; three surveys per season
Time:	2.5 hours to map and test-run and 62.5 minutes
Labor:	2 personnel (one driver/observer and one additional observer)
Materials:	vehicle, map
Cost:	cost of gasoline
Limitations:	difficult to conduct in a high-use park or on busy roads; best conducted on park roads with little traffic; non-stop method requires greater ability to recognize songs and calls in a short amount of time
Citations:	Diem and Lu 1960 (#2370); Hewitt 1967 (#4010); Petraborg et al. 1953 (#6380); Saunder et al. 1971 (#7170)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

Table 38. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the transect protocol for waders (Orders Ciconiiformes and Gruiformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural
Seasons:	spring, summer ^b , fall, winter
Type of data: Presence Relative Abundance Density	 yes yes yes
Number of species detected at: GETT-EISE HOFU VAFO	 1 0 NA ^c
Survey Specifications:	at least two 600-m transects per habitat type; two to three visits per season
Time:	26.8 minutes (0.45 person-hours)/600-m transect at GETT-EISE; 19.9 minutes (0.33 person-hours)/600-m transect at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	rough terrain may increase the amount of time to conduct a survey and decrease the number of species detected; requires ability to identify birds by sight and especially song and call
Citations:	Conner and Dickson 1980 (#1940); Emlen 1971 (#2660); Franzreb 1981 (#3110); Hutto and Mosconi 1981 (#4190)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Raptors (Order Falconiformes)

We observed eight raptor species at GETT-EISE, six at HOFU, and two at VAFO by testing protocols. At GETT-EISE, we found the most species (7) using transects (Table 39), whereas the most species at HOFU (4) were detected with point counts (Table 40) and vehicular-road surveys (Table 41). Based on our work at GETT-EISE, transects provided the greatest number of detected species, whereas they provided the least number of species at HOFU. A combination of protocols may be appropriate, depending upon the personnel available at a given park. If time or personnel are limited, use of the vehicular-road survey protocol is a time-efficient alternative.

Upland Groundbirds (Orders Galliformes and Columbiformes)

We detected mourning doves and rock doves using transects at GETT-EISE and HOFU (Table 42), respectively, and mourning doves using point counts at both parks (Table 43). In contrast, we found both species with the vehicular-road survey protocol at GETT-EISE and VAFO (Table 44). In particular, the non-stop method detected both species at VAFO, whereas the BBS method detected only the mourning dove. This difference is most likely due to the greater variety of habitats surveyed using the non-stop method (i.e., suburban habitat). Because the vehicular-road survey protocol is time- and cost-efficient and was developed in part to survey dove species (Brown and Smith 1976), we recommend this protocol. Although we did not find other upland groundbird species while conducting this protocol, ring-necked pheasant, ruffed grouse, northern bobwhite, and wild turkey are all readily observed adjacent to roads and may be detected using this protocol.

Shorebirds (Order Charadriiformes)

Point counts provided the greatest number of shorebird species at both GETT-EISE (three species) and HOFU (two species) (Table 45), compared to transect (one species each at GETT-EISE and HOFU) (Table 46) and vehicular-road surveys (two species at GETT-EISE, no species at HOFU, and one species at VAFO) (Table 47). As with surveying waterfowl, surveys of shorebirds are reliant upon appropriate habitat (e.g., riverine tidal, beaches) (Yahner et al. 1994b, 1994c) which was not abundant and not surveyed at the parks. Therefore, although we recommend point counts to detect shorebirds at GETT-EISE, HOFU, and VAFO, another protocol (transect protocol or vehicular-road survey protocol) may be more effective at parks where primary habitat for shorebirds is abundant.

Table 39. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the transect protocol for raptors (Order Falconiformes)

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural
Seasons:	spring ^b , summer ^b , fall ^b , winter ^b
Type of data: Presence Relative Abundance Density	yes yes yes
Number of species detected at: GETT-EISE HOFU VAFO	7 2 NA ^c
Survey Specifications:	at least two 600-m transects per habitat type; two to three visits per season
Time:	26.8 minutes (0.45 person-hours)/600-m transect at GETT-EISE; 19.9 minutes (0.33 person-hours)/600-m transect at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	rough terrain may increase the amount of time to conduct a survey and decrease the number of species detected; requires ability to identify birds by sight and especially song and call
Citations:	Conner and Dickson 1980 (#1940); Emlen 1971 (#2660); Franzreb 1981 (#3110); Hutto and Mosconi 1981 (#4190)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 40. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the point-count protocol for raptors (Order Falconiformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland, agricultural
Seasons:	spring ^b , summer ^b , fall ^b , winter ^b
Type of data: Presence Relative Abundance Density	 yes yes yes
Number of species detected at: GETT-EISE HOFU VAFO	 4 4 NA ^c
Survey Specifications:	at least 10 points per habitat type; three visits per season
Time:	40.6 minutes (0.68 person-hours)/5 points at GETT-EISE; 35.8 minutes (0.60 person-hours)/5 points at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	requires ability to identify birds by sight and especially song and call
Citations:	Fuller and Langslow 1984 (#3240); Hutto et al. 1986 (#4200); International Bird Census Committee 1977 (#7030); Verner and Ritter 1986 (#8480)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 41. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the non-stop (NRCE) and BBS-type (BRCE) vehicular-road survey protocol for raptors (Order Falconiformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural ^a
Seasons:	spring ^b , summer ^b , fall, winter ^b
Type of data:	
Presence	Yes
Relative Abundance	Yes
Density	Yes
Number of species detected at:	
GETT-EISE	3 Total
HOFU	2 NRCE, 3 BRCE, 4 Total
VAFO	2 NRCE, 2 BRCE, 2 Total
Survey Specifications:	at least 8.0 km survey route; three surveys per season
Time:	2.5 hours to map and test-run and 62.5 minutes
Labor:	2 personnel (one driver/observer and one additional observer)
Materials:	vehicle, map
Cost:	cost of gasoline
Limitations:	difficult to conduct in a high-use park or on busy roads; best conducted on park roads with little traffic; non-stop method requires greater ability to recognize songs and calls in a short amount of time
Citations:	Diem and Lu 1960 (#2370); Hewitt 1967 (#4010); Petraborg et al. 1953 (#6380); Saunder et al. 1971 (#7170)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

Table 42. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the transect protocol for upland groundbirds (Orders Galliformes and Columbiformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural
Seasons:	spring ^b , summer ^b , fall ^b , winter ^b
Type of data: Presence Relative Abundance Density	 yes yes yes
Number of species detected at: GETT-EISE HOFU VAFO	 1 1 NA ^c
Survey Specifications:	at least two 600-m transects per habitat type; three visits per season
Time:	26.8 minutes (0.45 person-hours)/600-m transect at GETT-EISE; 19.9 minutes (0.33 person-hours)/600-m transect at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	rough terrain may increase the amount of time to conduct a survey and decrease the number of species detected; requires ability to identify birds by sight and especially song and call
Citations:	Conner and Dickson 1980 (#1940); Emlen 1971 (#2660); Franzreb 1981 (#3110); Hutto and Mosconi 1981 (#4190)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 43. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the point-count protocol for upland groundbirds (Orders Galliformes and Columbiformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland, agricultural
Seasons:	spring ^b , summer ^b , fall ^b , winter ^b
Type of data: Presence Relative Abundance Density	 yes yes yes
Number of species detected at: GETT-EISE HOFU VAFO	 1 1 NA ^c
Survey Specifications:	at least 10 points per habitat type; three visits per season
Time:	40.6 minutes (0.68 person-hours)/5 points at GETT-EISE; 35.8 minutes (0.60 person-hours)/5 points at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	requires ability to identify birds by sight and especially song and call
Citations:	Fuller and Langslow 1984 (#3240); Hutto et al. 1986 (#4200); International Bird Census Committee 1977 (#7030); Verner and Ritter 1986 (#8480)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 44. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the non-stop (NRCE) and BBS-type (BRCE) vehicular-road survey protocol for upland groundbirds (Orders Galliformes and Columbiformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural ^a
Seasons:	spring ^b , summer ^b , fall, winter ^b
Type of data: Presence Relative Abundance Density	 Yes Yes Yes
Number of species detected at: GETT-EISE HOFU VAFO	 2 Total 0 NRCE, 0 BRCE, 0 Total 2 NRCE, 1 BRCE, 2 Total
Survey Specifications:	at least 8.0 km survey route; three surveys per season
Time:	2.5 hours to map and test-run and 62.5 minutes
Labor:	2 personnel (one driver/observer and one additional observer)
Materials:	vehicle, map
Cost:	cost of gasoline
Limitations:	difficult to conduct in a high-use park or on busy roads; best conducted on park roads with little traffic; non-stop method requires greater ability to recognize songs and calls in a short amount of time
Citations:	Diem and Lu 1960 (#2370); Hewitt 1967 (#4010); Petraborg et al. 1953 (#6380); Saunder et al. 1971 (#7170)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

Table 45. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the point-count protocol for shorebirds (Order Charadriiformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland, agricultural
Seasons:	spring ^b , summer ^b , fall ^b , winter ^b
Type of data: Presence Relative Abundance Density	 yes yes yes
Number of species detected at: GETT-EISE HOFU VAFO	 3 2 NA ^c
Survey Specifications:	at least 10 points per habitat type; three visits per season
Time:	40.6 minutes (0.68 person-hours)/5 points at GETT-EISE; 35.8 minutes (0.60 person-hours)/5 points at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	requires ability to identify birds by sight and especially song and call
Citations:	Fuller and Langslow 1984 (#3240); Hutto et al. 1986 (#4200); International Bird Census Committee 1977 (#7030); Verner and Ritter 1986 (#8480)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 46. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the transect protocol for shorebirds (Order Charadriiformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural
Seasons:	spring ^b , summer ^b , fall ^b , winter ^b
Type of data: Presence Relative Abundance Density	 yes yes yes
Number of species detected at: GETT-EISE HOFU VAFO	 1 1 NA ^c
Survey Specifications:	at least two 600-m transects per habitat type; three visits per season
Time:	26.8 minutes (0.45 person-hours)/600-m transect at GETT-EISE; 19.9 minutes (0.33 person-hours)/600-m transect at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	rough terrain may increase the amount of time to conduct a survey and decrease the number of species detected; requires ability to identify birds by sight and especially song and call
Citations:	Conner and Dickson 1980 (#1940); Emlen 1971 (#2660); Franzreb 1981 (#3110); Hutto and Mosconi 1981 (#4190)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 47. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the non-stop (NRCE) and BBS-type (BRCE) vehicular-road survey protocol for shorebirds (Order Charadriiformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural ^a
Seasons:	spring ^b , summer ^b , fall, winter ^b
Type of data: Presence Relative Abundance Density	Yes Yes Yes
Number of species detected at: GETT-EISE HOFU VAFO	2 Total 0 NRCE, 0 BRCE, 0 Total 1 NRCE, 0 BRCE, 1 Total
Survey Specifications:	at least 8.0 km survey route; three surveys per season
Time:	2.5 hours to map and test-run and 62.5 minutes
Labor:	2 personnel (one driver/observer and one additional observer)
Materials:	vehicle, map
Cost:	cost of gasoline
Limitations:	difficult to conduct in a high-use park or on busy roads; best conducted on park roads with little traffic; non-stop method requires greater ability to recognize songs and calls in a short amount of time
Citations:	Diem and Lu 1960 (#2370); Hewitt 1967 (#4010); Petraborg et al. 1953 (#6380); Saunder et al. 1971 (#7170)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

Owls (Order Strigiformes)

The nocturnal-owl survey protocol was the most reliable, time-efficient, and effective method of surveying owls (Table 48). Although we documented the barred owl at GETT-EISE using transects and point counts (Tables 49 and 50, respectively) and did not detect this species using the nocturnal-owl survey protocol at HOFU and VAFO, we do not recommend transects and point counts for surveying owls. These methods do not provide reliable observations of owls, and only the barred owl is likely to be seen or heard during the day when these protocols are conducted. The nocturnal-owl survey should be conducted at least twice each winter prior to the egg date of the species of interest within the park (see Brauning 1992 for approximate dates). This will avoid drawing parents off of active nests. We recommend use of a Johnnycaller to broadcast conspecific calls; although not as effective, a hand-held recorder or vocal imitation may be substituted if cost prohibits the use of a Johnnycaller.

Woodpeckers (Order Piciformes)

We documented seven and six species of woodpeckers at GETT-EISE and HOFU, respectively, using both transects (Table 51) and point counts (Table 52). Although differences may exist for individual sites and seasons at both parks, there is no difference between species detected with transects and point counts for all seasons and habitats combined. In contrast, we found two fewer woodpecker species using the vehicular-road survey protocol at HOFU, and only three woodpecker species at VAFO (Table 53). Therefore, unless personnel are limited, transects, point counts, or a combination of both protocols are recommended to survey woodpeckers.

Passerines (Orders Cuculiformes, Caprimulgiformes, Apodiiformes, Coraciiformes, and Passeriformes)

For all seasons and habitats combined, we observed more passerine species at GETT-EISE using transects (Table 54), whereas we observed more passerines at HOFU using point counts (Table 55). For almost every season and habitat at both of these parks, point counts consistently provided greater species detected than transects. However, as discussed for the parks individually, a relatively large percentage of species is not detected when only one protocol is used. Therefore, we suggest a combination of point counts and transects to survey the songbird community.

If time and personnel are not available to conduct a full complement of transects or point counts, we recommend use of the vehicular-road survey protocol (Table 56). Using this low-cost alternative, we found four and 13 passerine species at GETT-EISE and HOFU, respectively, that

Table 48. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the nocturnal-owl survey protocol for owls (Order Strigiformes).

	Comments
Habitats:	wetland, riparian ^a , forest ^a , old-field, grassland, agricultural
Seasons:	winter ^b and spring
Type of data: Presence Relative Abundance Density	Yes Yes No
Number of species detected at: GETT-EISE HOFU VAFO	NA ^c 3 2
Survey Specifications:	at least two points per forest type (lowland, upland, and coniferous) and at least four total points; three surveys per season
Time:	1 hour 32.5 minutes/survey to conduct at HOFU; 2 hours 7 minutes/survey at VAFO.
Labor:	2-3 personnel
Materials:	Johnnycaller tape player and amplifier, tape of each owl species
Cost:	\$230 for the Johnnycaller tape player and amplifier
Limitations:	for use only during the breeding season
Citations:	Foster 1965 (#3030); Lynch and Smith 1984 (#5370); Morrell 1993 (#9220); Nowicki 1974 (#6040); Rohner and Doyle 1992 (#7030); Swengel and Swengel 1986 (#8010)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 49. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the transect protocol for owls (Order Strigiformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural
Seasons:	spring ^b , summer ^b , fall ^b , winter ^b
Type of data: Presence Relative Abundance Density	 yes yes yes
Number of species detected at: GETT-EISE HOFU VAFO	 1 0 NA ^c
Survey Specifications:	at least two 600-m transects per habitat type; three visits per season
Time:	26.8 minutes (0.45 person-hours)/600-m transect at GETT-EISE; 19.9 minutes (0.33 person-hours)/600-m transect at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	rough terrain may increase the amount of time to conduct a survey and decrease the number of species detected; requires ability to identify birds by sight and especially song and call
Citations:	Conner and Dickson 1980 (#1940); Emlen 1971 (#2660); Franzreb 1981 (#3110); Hutto and Mosconi 1981 (#4190)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 50. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the point-count protocol for owls (Order Strigiformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland, agricultural
Seasons:	spring ^b , summer ^b , fall ^b , winter ^b
Type of data:	
Presence	yes
Relative Abundance	yes
Density	yes
Number of species detected at:	
GETT-EISE	1
HOFU	0
VAFO	NA ^c
Survey Specifications:	at least 10 points per habitat type; three visits per season
Time:	40.6 minutes (0.68 person-hours)/5 points at GETT-EISE; 35.8 minutes (0.60 person-hours)/5 points at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	requires ability to identify birds by sight and especially song and call
Citations:	Fuller and Langslow 1984 (#3240); Hutto et al. 1986 (#4200); International Bird Census Committee 1977 (#7030); Verner and Ritter 1986 (#8480)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 51. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the transect protocol for woodpeckers (Order Piciformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural
Seasons:	spring ^b , summer ^b , fall ^b , winter ^b
Type of data: Presence Relative Abundance Density	 yes yes yes
Number of species detected at: GETT-EISE HOFU VAFO	 7 6 NA ^c
Survey Specifications:	at least two 600-m transects per habitat type; three visits per season
Time:	26.8 minutes (0.45 person-hours)/600-m transect at GETT-EISE; 19.9 minutes (0.33 person-hours)/600-m transect at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	rough terrain may increase the amount of time to conduct a survey and decrease the number of species detected; requires ability to identify birds by sight and especially song and call
Citations:	Conner and Dickson 1980 (#1940); Emlen 1971 (#2660); Franzreb 1981 (#3110); Hutto and Mosconi 1981 (#4190)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 52. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the point-count protocol for woodpeckers (Order Piciformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland, agricultural
Seasons	spring ^b , summer ^b , fall ^b , winter ^b
Type of data: Presence Relative Abundance Density	yes yes yes
Number of species detected at: GETT-EISE HOFU VAFO	7 6 NA ^c
Survey Specifications:	at least 10 points per habitat type; three visits per season
Time:	40.6 minutes (0.68 person-hours)/5 points at GETT-EISE; 35.8 minutes (0.60 person-hours)/5 points at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	requires ability to identify birds by sight and especially song and call
Citations:	Fuller and Langslow 1984 (#3240); Hutto et al. 1986 (#4200); International Bird Census Committee 1977 (#7030); Verner and Ritter 1986 (#8480)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 53. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the non-stop (NRCE) and BBS-type (BRCE) vehicular-road survey protocol for woodpeckers (Order Piciformes).

	Comments
Habitat:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural ^a
Seasons:	spring ^b , summer ^b , fall, winter ^b
Type of data: Presence Relative Abundance Density	 Yes Yes Yes
Number of species detected at: GETT-EISE HOFU VAFO	 2 Total 4 NRCE, 4 BRCE, 4 Total 3 NRCE, 3 BRCE, 3 Total
Survey Specifications:	at least 8.0 km survey route; three surveys per season
Time:	2.5 hours to map and test-run and 62.5 minutes
Labor:	2 personnel (one driver/observer and one additional observer)
Materials:	vehicle, map
Cost:	cost of gasoline
Limitations:	difficult to conduct in a high-use park or on busy roads; best conducted on park roads with little traffic; non-stop method requires greater ability to recognize songs and calls in a short amount of time
Citations:	Diem and Lu 1960 (#2370); Hewitt 1967 (#4010); Petraborg et al. 1953 (#6380); Saunder et al. 1971 (#7170)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

Table 54. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the transect protocol for passerines (Orders Cuculiformes, Caprimulgiformes, Apodiformes, Coraciiformes, and Passeriformes).

	Comments
Habitats:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural
Seasons:	spring ^b , summer ^b , fall ^b , winter ^b
Type of data: Presence Relative Abundance Density	 yes yes yes
Number of species detected at: GETT-EISE HOFU VAFO	 72 53 NA ^c
Survey Specifications:	at least two 600-m transects per habitat type; three visits per season
Time:	26.8 minutes (0.45 person-hours)/600-m transect at GETT-EISE; 19.9 minutes (0.33 person-hours)/600-m transect at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	rough terrain may increase the amount of time to conduct a survey and decrease the number of species detected; requires ability to identify birds by sight and especially song and call
Citations:	Conner and Dickson 1980 (#1940); Emlen 1971 (#2660); Franzreb 1981 (#3110); Hutto and Mosconi 1981 (#4190)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 55. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the point-count protocol for passerines (Orders Cuculiformes, Caprimulgiformes, Apodiformes, Coraciiformes, and Passeriformes).

	Comments
Habitat:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland, agricultural
Seasons:	spring ^b , summer ^b , fall ^b , winter ^b
Type of data: Presence Relative Abundance Density	 Yes Yes Yes
Number of species detected at: GETT-EISE HOFU VAFO	 70 57 NA ^c
Survey Specifications:	at least 10 points per habitat type; three visits per season
Time:	40.6 minutes (0.68 person-hours)/5 points at GETT-EISE; 35.8 minutes (0.60 person-hours)/5 points at HOFU.
Labor:	1 person
Materials:	binoculars
Cost:	none
Limitations:	requires ability to identify birds by sight and especially song and call
Citations:	Fuller and Langslow 1984 (#3240); Hutto et al. 1986 (#4200); International Bird Census Committee 1977 (#7030); Verner and Ritter 1986 (#8480)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

^c Protocol not tested at park.

Table 56. Habitats, seasons, type of data obtained, survey specifications, time, labor, materials, cost, limitations, and Pro-Cite citations for the non-stop (NRCE) and BBS-type (BRCE) vehicular-road survey protocol for passerines (Orders Cuculiformes, Caprimulgiformes, Apodiformes, Coraciiformes, and Passeriformes).

	Comments
Habitat:	wetland ^a , riparian ^a , forest ^a , old-field ^a , grassland ^a , agricultural ^a
Seasons:	spring ^b , summer ^b , fall, winter ^b
Type of data: Presence Relative Abundance Density	 Yes Yes Yes
Number of species detected at: GETT-EISE HOFU VAFO	 36 Total 53 NRCE, 51 BRCE, 58 Total 51 NRCE, 50 BRCE, 56 Total
Survey Specifications:	at least 8.0 km survey route; three surveys per season
Time:	2.5 hours to map and test-run and 62.5 minutes
Labor:	2 personnel (one driver/observer and one additional observer)
Materials:	vehicle, map
Cost:	cost of gasoline
Limitations:	difficult to conduct in a high-use park or on busy roads; best conducted on park roads with little traffic; non-stop method requires greater ability to recognize songs and calls in a short amount of time
Citations:	Diem and Lu 1960 (#2370); Hewitt 1967 (#4010); Petraborg et al. 1953 (#6380); Saunder et al. 1971 (#7170)

^a Habitats tested for this project; others obtained from the literature.

^b Seasons tested for this project; others obtained from the literature.

were not documented with point counts or transects. Although this protocol may not provide as complete a species list for a park as transects and point counts, it provides a method to sample the representative habitats in a park in a relatively short amount of time. If time and personnel are available to a resource management specialist at a park, we suggest using this protocol along with transects and point counts to survey all avian species in the park.

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Appendix 1. Avian section of the Faunal Database for Gettysburg National Military Park and Eisenhower National Historic Site, including data from 1 July 1992 to 30 June 1996.

APPENDIX 1.

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
COMMON LOON	<i>Gavia immer</i>	Waterfowl	R	B	PR	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
PIED-BILLED GREBE	<i>Podilymbus podiceps</i>	Waterfowl	R	M/S	PR - C2	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
HORNED GREBE	<i>Podiceps auritus</i>	Waterfowl	WOC CBC	M	PR	TRS PCO SMA NCO FLC NIG REC BTR AER NET BAN CRE	
DOUBLE-CRESTED CORMORANT	<i>Phalacrocorax auritus</i>	Waterfowl	PTC WOC	M	PR	TRS PCO SMA NCO FLC NIG REC BTR AER NET BAN CRE	FPCO UPCO
AMERICAN BITTERN	<i>Botaurus lentiginosus</i>	Wader	R	S	ST - T	TRS VCP SMA V&C IRE COR NIG BTR	
LEAST BITTERN	<i>Ixobrychus exilis</i>	Wader	R	S	ST - T	TRS VCP SMA V&C IRE COR NIG BTR	
GREAT BLUE HERON	<i>Ardea herodias</i>	Wader	PTC PO BBA BBS CBC	S	PR	TRS VCP SMA V&C IRE COR NIG BTR	VTRS FTRS
GREAT EGRET	<i>Casmerodius albus</i>	Wader	PO WOC	S	ST - T	TRS VCP SMA V&C IRE COR NIG BTR	
LITTLE BLUE HERON	<i>Egretta caerulea</i>	Wader	R	S	PR	TRS VCP SMA V&C IRE COR NIG BTR	
TRICOLORED HERON	<i>Egretta tricolor</i>	Wader	R	A	PR	TRS VCP SMA V&C IRE COR NIG BTR	
CATTLE EGRET	<i>Bubulcus ibis</i>	Wader	R	S	PR - C3	TRS VCP SMA V&C IRE COR NIG BTR	
GREEN-BACKED HERON	<i>Butorides striatus</i>	Wader	PO WOC BBA BBS	S	PR	TRS VCP SMA V&C IRE COR NIG BTR	
BLACK-CROWNED NIGHT-HERON	<i>Nycticorax nycticorax</i>	Wader	R	S	PR	TRS VCP SMA V&C IRE COR NIG BTR	
YELLOW-CROWNED NIGHT-HERON	<i>Nyctanassa violacea</i>	Wader	WOC	S	ST - T	TRS VCP SMA V&C IRE COR NIG BTR	
GLOSSY IBIS	<i>Plegadis falcinellus</i>	Wader	R	M	PR	TRS VCP SMA V&C IRE COR NIG BTR	
BLACK VULTURE	<i>Coragyps atratus</i>	Raptor	PTC PO WOC BBA CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	IRE FPCO UPCO VTRS FTRS RCE
TURKEY VULTURE	<i>Cathartes aura</i>	Raptor	PTC PO WOC BBA BBS CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	IRE FPCO UPCO VTRS FTRS RCE
TUNDRA SWAN	<i>Olor columbianus</i>	Waterfowl	WOC CBC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
MUTE SWAN	<i>Cygnus olor</i>	Waterfowl	WOC	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
SNOW GOOSE	<i>Chen caerulescens</i>	Waterfowl	R	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
CANADA GOOSE	<i>Branta canadensis</i>	Waterfowl	PTC PO WOC BBA BBS CBC	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	FPCO UPCO VTRS FTRS RCE
WOOD DUCK	<i>Aix sponsa</i>	Waterfowl	PTC PO WOC BBA	S	GM	TRS PCO SMA NCO FLC NIG RCR BTR AER NET BAN CRE NBT ROC	FPCO UPCO VTRS FTRS
GREEN-WINGED TEAL	<i>Anas crecca</i>	Waterfowl	CBC	S	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
AMERICAN BLACK DUCK	<i>Anas rubripes</i>	Waterfowl	WOC CBC	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
MALLARD	<i>Anas platyrhynchos</i>	Waterfowl	PTC PO WOC BBA BBS CBC	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE FSV	FPCO UPCO VTRS FTRS RCE
NORTHERN PINTAIL	<i>Anas acuta</i>	Waterfowl	CBC	M	GM - C3	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
BLUE-WINGED TEAL	<i>Anas discors</i>	Waterfowl	WOC	S	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
NORTHERN SHOVELER	<i>Anas clypeata</i>	Waterfowl	R	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
GADWALL	<i>Anas strepera</i>	Waterfowl	WOC	M	GM - C3	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
AMERICAN WIGEON	<i>Anas americana</i>	Waterfowl	WOC CBC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
CANVASBACK	<i>Aythya valisineria</i>	Waterfowl	CBC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
REDHEAD	<i>Aythya americana</i>	Waterfowl	R	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
RING-NECKED DUCK	<i>Aythya collaris</i>	Waterfowl	R	W	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
GREATER SCAUP	<i>Aythya marila</i>	Waterfowl	R	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	

APPENDIX 1. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
LESSER SCAUP	<i>Aythya affinis</i>	Waterfowl	R	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
OLDSQUAW	<i>Ciangula hyemalis</i>	Waterfowl	R	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
COMMON GOLDENEYE	<i>Bucephala clangula</i>	Waterfowl	R	W	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
BUFFLEHEAD	<i>Bucephala albeola</i>	Waterfowl	WOC	W	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
HOODED MERGANSER	<i>Lophodytes cucullatus</i>	Waterfowl	WOC CBC	S	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE NBT	
COMMON MERGANSER	<i>Mergus merganser</i>	Waterfowl	R	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
RED-BREASTED MERGANSER	<i>Mergus serrator</i>	Waterfowl	R	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
RUDDY DUCK	<i>Oxyura jamaicensis</i>	Waterfowl	CBC	M	GM - C3	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
OSPREY	<i>Pandion haliaetus</i>	Raptor	WOC	S	SE - E	BTR TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
BALD EAGLE	<i>Haliaeetus leucocephalus</i>	Raptor	WOC CBC	R	FE - E	BTR TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
NORTHERN HARRIER	<i>Circus cyaneus</i>	Raptor	PO WOC BBA CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
SHARP-SHINNED HAWK	<i>Accipiter striatus</i>	Raptor	PTC PO WOC BBA BBS CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	VTRS FTRS
COOPER'S HAWK	<i>Accipiter cooperii</i>	Raptor	PTC PO CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	FPCO UPKO VTRS FTRS
NORTHERN GOSHAWK	<i>Accipiter gentilis</i>	Raptor	R	R	PR - C2	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
RED-SHOULDERED HAWK	<i>Buteo lineatus</i>	Raptor	PTC PO WOC BBA CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	VTRS FTRS
BROAD-WINGED HAWK	<i>Buteo platyterus</i>	Raptor	PTC PO BBA	S	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	VTRS FTRS
RED-TAILED HAWK	<i>Buteo jamaicensis</i>	Raptor	PTC PO WOC BBA CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	IRE FPCO UPKO VTRS FTRS
ROUGH-LEGGED HAWK	<i>Buteo lagopus</i>	Raptor	CBC	W	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
GOLDEN EAGLE	<i>Aquila chysaetos</i>	Raptor	WOC	M	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
AMERICAN KESTREL	<i>Falco sparverius</i>	Raptor	PTC PO WOC BBA BBS CBC	R	PR	NBT TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	RCE
MERLIN	<i>Falco columbarius</i>	Raptor	WOC CBC	M	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
RING-NECKED PHEASANT	<i>Phasianus colchicus</i>	Groundbird	WOC BBA BBS CBC	R	GM	TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	
RUFFED GROUSE	<i>Bonasa umbellus</i>	Groundbird	PO WOC BBA BBS CBC	R	GM	TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	
WILD TURKEY	<i>Meleagris gallopavo</i>	Groundbird	WOC BBA CBC	R	GM	ROC TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	
NORTHERN BOBWHITE	<i>Colinus virginianus</i>	Groundbird	WOC BBA BBS CBC	R	GM - C3	TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	
KING RAIL	<i>Rallus elegans</i>	Wader	R	S	SE - E	TRS VCP SMA V&C IRE COR NIG BTR	
VIRGINIA RAIL	<i>Rallus limicola</i>	Wader	R	S	GM	TRS VCP SMA V&C IRE COR NIG BTR	
SORA	<i>Porzana carolina</i>	Wader	R	S	GM	TRS VCP SMA V&C IRE COR NIG BTR	
COMMON MOORHEN	<i>Gallinula chloropus</i>	Wader	R	S	GM	TRS VCP SMA V&C IRE COR NIG BTR	
AMERICAN COOT	<i>Fulica americana</i>	Wader	WOC	R	GM	TRS VCP SMA V&C IRE COR NIG BTR	
KILLDEER	<i>Charadrius vociferus</i>	Shorebird	PTC PO WOC BBA BBS CBC	S	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	FPCO UPKO RCE
SPOTTED SANDPIPER	<i>Actitis macularia</i>	Shorebird	PTC BBA	S	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	FPCO UPKO
UPLAND SANDPIPER	<i>Bartramia longicauda</i>	Shorebird	BBS	S	ST - T	TRS V&C NCO NIG BTR AER NET BAN CRE	
COMMON SNIFE	<i>Gallinago gallinago</i>	Shorebird	PO CBC	S	GM - T	TRS V&C NCO NIG BTR AER NET BAN CRE	

APPENDIX 1. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
AMERICAN WOODCOCK	<i>Scolopax minor</i>	Shorebird	PO WOC BBA	S	GM	TRS V&C NCO NIG BTR AER NET BAN CRE	
RING-BILLED GULL	<i>Larus delawarensis</i>	Shorebird	PTC PO WOC	R	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	FPCO UPKO VTRS FTRS RCE
HERRING GULL	<i>Larus argentatus</i>	Shorebird	R	R	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
LESSER BLACK-BACKED GULL	<i>Larus fuscus</i>	Shorebird	R	W	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
COMMON TERN	<i>Sterna hirundo</i>	Shorebird	R	S	PR - X	TRS V&C NCO NIG BTR AER NET BAN CRE	
ROCK DOVE	<i>Columba livia</i>	Groundbird	PTC PO BBA BBS CBC	R	GM	TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT FSV	RCE
MOURNING DOVE	<i>Zenaida macroura</i>	Groundbird	PTC PO WOC BBA BBS CBC	R	GM	TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT FSV	IRE FPCO UPKO VTRS FTRS RCE
BLACK-BILLED CUCKOO	<i>Coccyzus erythrophthalmus</i>	Passerine	PTC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	UPKO
YELLOW-BILLED CUCKOO	<i>Coccyzus americana</i>	Passerine	PTC WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	UPKO VTRS FTRS
COMMON BARN OWL	<i>Tyto alba</i>	Owl	WOC BBA CBC	M	PR - C1	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	
EASTERN SCREECH OWL	<i>Otus asio</i>	Owl	BBA CBC	R	PR	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	
GREAT HORNED OWL	<i>Bubo virginiana</i>	Owl	PTC WOC BBA CBC	R	PR	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	OPI
BARRED OWL	<i>Strix varia</i>	Owl	PTC PO WOC BBA CBC	R	PR	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	UPKO VTRS FTRS
LONG-EARED OWL	<i>Asio otus</i>	Owl	R	S	PR - C3	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	
SHORT-EARED OWL	<i>Asio flammeus</i>	Owl	WOC CBC	S	PR	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	
NORTHERN SAW-WHET OWL	<i>Aegolius acadicus</i>	Owl	WOC	S	PR - C3	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	
COMMON NIGHTHAWK	<i>Chordeiles minor</i>	Passerine	WOC BBA	S	PR - C3	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WHIP-POOR-WILL	<i>Caprimulgus vociferus</i>	Passerine	BBA BBS	S	PR - C3	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CHIMNEY SWIFT	<i>Chaetura pelagica</i>	Passerine	PTC PO BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
RUBY-THROATED HUMMINGBIRD	<i>Archilochus colubris</i>	Passerine	PO WOC BBA BBS	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BELTED KINGFISHER	<i>Ceryle alcyon</i>	Passerine	PTC PO BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS
RED-HEADED WOODPECKER	<i>Melanerpes erythrocephalus</i>	Woodpecker	PTC PO WOC BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	IRE FPCO UPKO VTRS FTRS
RED-BELLIED WOODPECKER	<i>Melanerpes carolinus</i>	Woodpecker	PTC PO WOC BBA BBS CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	IRE FPCO UPKO VTRS FTRS RCE
YELLOW-BELLIED SAPSUCKER	<i>Sphyrapicus varius</i>	Woodpecker	PTC WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS
DOWNY WOODPECKER	<i>Picoides pubescens</i>	Woodpecker	PTC PO WOC BBA BBS CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	IRE FPCO UPKO VTRS FTRS RCE
HAIRY WOODPECKER	<i>Picoides villosus</i>	Woodpecker	PTC WOC BBA BBS CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	IRE FPCO UPKO VTRS FTRS
NORTHERN FLICKER	<i>Colaptes auratus</i>	Woodpecker	PTC PO BBA BBS CBC	S	PR	NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	IRE FPCO UPKO VTRS FTRS
PILEATED WOODPECKER	<i>Dryocopus pileatus</i>	Woodpecker	PTC PO WOC BBA BBS CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	IRE FPCO UPKO VTRS FTRS
OLIVE-SIDED FLYCATCHER	<i>Contopus borealis</i>	Passerine	R	S	PR - X	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
EASTERN WOOD-PEEWEE	<i>Contopus virens</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS RCE
YELLOW-BELLIED FLYCATCHER	<i>Empidonax flaviventris</i>	Passerine	R	S	ST	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
ACADIAN FLYCATCHER	<i>Empidonax virescens</i>	Passerine	PTC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	VTRS FTRS
ALDER FLYCATCHER	<i>Empidonax alnorum</i>	Passerine	BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WILLOW FLYCATCHER	<i>Empidonax traillii</i>	Passerine	PO BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	

APPENDIX 1. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
LEAST FLYCATCHER	<i>Empidonax minimus</i>	Passerine	BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
EASTERN PHOEBE	<i>Sayornis phoebe</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS
GREAT CRESTED FLYCATCHER	<i>Myiarchus crinitus</i>	Passerine	PTC PO WOC BBA BBS	S	PR	NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS RCE
EASTERN KINGBIRD	<i>Tyrannus tyrannus</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	RCE
HORNED LARK	<i>Eremophila alpestris</i>	Passerine	WOC BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PURPLE MARTIN	<i>Progne subis</i>	Passerine	PTC WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	RCE
TREE SWALLOW	<i>Tachycineta bicolor</i>	Passerine	PTC BBA BBS	S	PR	NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO
NORTHERN ROUGH-WINGED SWALLOW	<i>Stelgidopteryx serripennis</i>	Passerine	PTC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	RCE
BANK SWALLOW	<i>Riparia riparia</i>	Passerine	BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CLIFF SWALLOW	<i>Hirundo pyrrhonota</i>	Passerine	BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BARN SWALLOW	<i>Hirundo rustica</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	VTRS FTRS
BLUE JAY	<i>Cyanocitta cristata</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
AMERICAN CROW	<i>Corvus brachyrhynchos</i>	Passerine	PTC PO WOC BBA BBS CBC	R	GM	FSV ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
FISH CROW	<i>Corvus ossifragus</i>	Passerine	PTC BBA BBS CBC	R	GM	ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS
COMMON RAVEN	<i>Corvus corax</i>	Passerine	PTC BBS CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	UPKO
BLACK-CAPPED CHICKADEE	<i>Poecile atricapillus</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
CAROLINA CHICKADEE	<i>Poecile carolinensis</i>	Passerine	PTC PO BBA BBS CBC	R	PR	FSV NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS
TUFTED TITMOUSE	<i>Baeolophus bicolor</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
RED-BREASTED NUTHATCH	<i>Sitta canadensis</i>	Passerine	PTC WOC CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS
WHITE-BREASTED NUTHATCH	<i>Sitta carolinensis</i>	Passerine	PTC PO BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
BROWN CREEPER	<i>Certhia americana</i>	Passerine	PTC WOC BBA CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
CAROLINA WREN	<i>Thryothorus ludovicianus</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS
BEWICK'S WREN	<i>Thryomanes bewickii</i>	Passerine	R	S	PR - X	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
HOUSE WREN	<i>Troglodytes aedon</i>	Passerine	PTC PO WOC BBA BBS	S	PR	NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
WINTER WREN	<i>Troglodytes troglodytes</i>	Passerine	PTC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS
SEDGE WREN	<i>Cistothorus platensis</i>	Passerine	R	S	ST - T	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
MARSH WREN	<i>Cistothorus palustris</i>	Passerine	PTC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	VTRS FTRS
GOLDEN-CROWNED KINGLET	<i>Regulus satrapa</i>	Passerine	PTC WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO
RUBY-CROWNED KINGLET	<i>Regulus calendula</i>	Passerine	PTC PO WOC CBC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS
BLUE-GRAY GNATCATCHER	<i>Poliophtila caerulea</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS
EASTERN BLUEBIRD	<i>Sialia sialis</i>	Passerine	PTC PO WOC BBA BBS CBC	S	PR	ROC RCE FSV NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
VEERY	<i>Catharus fuscescens</i>	Passerine	PTC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	VTRS FTRS
GRAY-CHEEKED THRUSH	<i>Catharus minimus</i>	Passerine	PTC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO PCO VTRS FTRS
SWAINSON'S THRUSH	<i>Catharus ustulatus</i>	Passerine	WOC	S	PR - G2	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	

APPENDIX 1. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
HERMIT THRUSH	<i>Catharus guttatus</i>	Passerine	PTC WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO
WOOD THRUSH	<i>Hylocichla mustelina</i>	Passerine	PTC PO BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
AMERICAN ROBIN	<i>Turdus migratorius</i>	Passerine	PTC PO WOC BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
GRAY CATBIRD	<i>Dumetella carolinensis</i>	Passerine	PTC PO BBA BBS CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
NORTHERN MOCKINGBIRD	<i>Mimus polyglottos</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
BROWN THRASHER	<i>Toxostoma rufum</i>	Passerine	PTC BBA BBS	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
AMERICAN PIPIT	<i>Anthus rubescens</i>	Passerine	R	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CEDAR WAXWING	<i>Bombycilla cedrorum</i>	Passerine	PTC WOC BBA BBS CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
NORTHERN SHRIKE	<i>Lanius excubitor</i>	Passerine	CBC	W	PR	BCT RCE TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
LOGGERHEAD SHRIKE	<i>Lanius ludovicianus</i>	Passerine	WOC CBC	M	PR - X	BCT RCE TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
EUROPEAN STARLING	<i>Sturnus vulgaris</i>	Passerine	PTC PO WOC BBA BBS CBC	R	NN	ROC FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
WHITE-EYED VIREO	<i>Vireo griseus</i>	Passerine	PTC PO BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO
BLUE-HEADED VIREO	<i>Vireo solitarius</i>	Passerine	PO	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
YELLOW-THROATED VIREO	<i>Vireo flavifrons</i>	Passerine	PO BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WARBLING VIREO	<i>Vireo gilvus</i>	Passerine	BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PHILADELPHIA VIREO	<i>Vireo philadelphicus</i>	Passerine	PTC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO
RED-EYED VIREO	<i>Vireo olivaceus</i>	Passerine	PTC PO BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
BLUE-WINGED WARBLER	<i>Vermivora pinus</i>	Passerine	PTC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS
GOLDEN-WINGED WARBLER	<i>Vermivora chrysoptera</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
TENNESSEE WARBLER	<i>Vermivora peregrina</i>	Passerine	PTC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	VTRS FTRS
ORANGE-CROWNED WARBLER	<i>Vermivora celata</i>	Passerine	R	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
NASHVILLE WARBLER	<i>Vermivora ruficapilla</i>	Passerine	PO	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
NORTHERN PARULA	<i>Parula americana</i>	Passerine	PTC BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS
YELLOW WARBLER	<i>Dendroica petechia</i>	Passerine	PTC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	VTRS FTRS RCE
CHESTNUT-SIDED WARBLER	<i>Dendroica pensylvanica</i>	Passerine	PTC PO BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS
MAGNOLIA WARBLER	<i>Dendroica magnolia</i>	Passerine	PTC PO	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS
CAPE MAY WARBLER	<i>Dendroica tigrina</i>	Passerine	PTC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	VTRS FTRS
BLACK-THROATED BLUE WARBLER	<i>Dendroica caerulescens</i>	Passerine	PTC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS
YELLOW-RUMPED WARBLER	<i>Dendroica coronata</i>	Passerine	PTC PO WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS
BLACK-THROATED GREEN WARBLER	<i>Dendroica virens</i>	Passerine	PTC BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS
BLACKBURNIAN WARBLER	<i>Dendroica fusca</i>	Passerine	PTC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	VTRS FTRS
YELLOW-THROATED WARBLER	<i>Dendroica dominica</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PINE WARBLER	<i>Dendroica pinus</i>	Passerine	PTC BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS
PRAIRIE WARBLER	<i>Dendroica discolor</i>	Passerine	PTC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS

APPENDIX 1. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
PALM WARBLER	<i>Dendroica palmarum</i>	Passerine	R	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BAY-BREASTED WARBLER	<i>Dendroica castanea</i>	Passerine	R	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BLACKPOLL	<i>Dendroica striata</i>	Passerine	PTC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO RCE
CERULEAN WARBLER	<i>Dendroica cerulea</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BLACK-AND-WHITE WARBLER	<i>Mniotilta varia</i>	Passerine	PTC PO BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS
AMERICAN REDSTART	<i>Setophaga ruticilla</i>	Passerine	PTC PO BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS
PROTHONOTARY WARBLER	<i>Protonotaria citrea</i>	Passerine	R	S	PR - C1	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WORM-EATING WARBLER	<i>Helmitheros vermivorus</i>	Passerine	PTC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO
SWAINSON'S WARBLER	<i>Limnothlypis swainsonii</i>	Passerine	R	A	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
OVENBIRD	<i>Seiurus aurocapillus</i>	Passerine	PTC PO BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS
NORTHERN WATERTHRUSH	<i>Seiurus noveboracensis</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
LOUISIANA WATERTHRUSH	<i>Seiurus motacilla</i>	Passerine	PO	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
KENTUCKY WARBLER	<i>Oporornis formosus</i>	Passerine	BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CONNECTICUT WARBLER	<i>Oporornis agilis</i>	Passerine	R	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
MOURNING WARBLER	<i>Oporornis philadelphia</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
COMMON YELLOWTHROAT	<i>Geothlypis trichas</i>	Passerine	PTC WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS
HOODED WARBLER	<i>Wilsonia citrina</i>	Passerine	PTC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS
WILSON'S WARBLER	<i>Wilsonia pusilla</i>	Passerine	PO	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CANADA WARBLER	<i>Wilsonia canadensis</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
YELLOW-BREASTED CHAT	<i>Icteria virens</i>	Passerine	BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SUMMER TANAGER	<i>Piranga rubra</i>	Passerine	BBA	S	PR - C2	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SCARLET TANAGER	<i>Piranga olivacea</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
NORTHERN CARDINAL	<i>Cardinalis cardinalis</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
ROSE-BREASTED GROSBEAK	<i>Pheucticus ludovicianus</i>	Passerine	PTC PO BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	VTRS FTRS
BLUE GROSBEAK	<i>Guiraca caerulea</i>	Passerine	R	S	PR - C2	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
INDIGO BUNTING	<i>Passerina cyanea</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO VTRS FTRS RCE
DICKCISSEL	<i>Spiza americana</i>	Passerine	R	S	PR - C3	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
EASTERN TOWHEE	<i>Pipilo erythrophthalmus</i>	Passerine	PTC WOC BBA BBS	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
AMERICAN TREE SPARROW	<i>Spizella arborea</i>	Passerine	PTC WOC CBC	W	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	VTRS FTRS
CHIPPING SPARROW	<i>Spizella passerina</i>	Passerine	PTC PO BBA BBS CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS RCE
FIELD SPARROW	<i>Spizella pusilla</i>	Passerine	PTC PO WOC BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UPKO VTRS FTRS
VESPER SPARROW	<i>Pooecetes gramineus</i>	Passerine	BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SAVANNAH SPARROW	<i>Passerculus sandwichensis</i>	Passerine	BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
GRASSHOPPER SPARROW	<i>Ammodramus savannarum</i>	Passerine	PTC PO BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	VTRS FTRS

APPENDIX 1. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
HENSLow'S SPARROW	<i>Ammodramus henslowii</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
FOX SPARROW	<i>Passerella iliaca</i>	Passerine	WOC CBC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SONG SPARROW	<i>Melospiza melodia</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UP CO VTRS FTRS RCE
LINCOLN'S SPARROW	<i>Melospiza lincolni</i>	Passerine	R	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SWAMP SPARROW	<i>Melospiza georgiana</i>	Passerine	CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WHITE-THROATED SPARROW	<i>Zonotrichia albicollis</i>	Passerine	PTC PO WOC CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UP CO VTRS FTRS
WHITE-CROWNED SPARROW	<i>Zonotrichia leucophrys</i>	Passerine	PO WOC CBC	W	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
DARK-EYED JUNCO	<i>Junco hyemalis</i>	Passerine	PTC PO WOC BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UP CO VTRS FTRS RCE
LAPLAND LONGSPUR	<i>Calcarius lapponicus</i>	Passerine	R	W	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SNOW BUNTING	<i>Plectrophenax nivalis</i>	Passerine	R	W	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BOBOLINK	<i>Dolichonyx oryzivorus</i>	Passerine	PTC PO WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	VTRS FTRS
RED-WINGED BLACKBIRD	<i>Agelaius phoeniceus</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV ROC FLC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UP CO VTRS FTRS RCE
EASTERN MEADOWLARK	<i>Stumella magna</i>	Passerine	PTC PO BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	UP CO VTRS FTRS RCE
RUSTY BLACKBIRD	<i>Euphagus carolinus</i>	Passerine	CBC	W	PR	ROC FLC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
COMMON GRACKLE	<i>Quiscalus quiscula</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UP CO VTRS FTRS
BROWN-HEADED COWBIRD	<i>Molothrus ater</i>	Passerine	PTC CBC	S	PR	FSV ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UP CO VTRS FTRS RCE
ORCHARD ORIOLE	<i>Icterus spurius</i>	Passerine	PO BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BALTIMORE ORIOLE	<i>Icterus galbula</i>	Passerine	PO WOC BBA BBS	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PINE GROSBEAK	<i>Pinicola enucleator</i>	Passerine	R	W	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PURPLE FINCH	<i>Carpodacus purpureus</i>	Passerine	PTC WOC BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UP CO VTRS FTRS
HOUSE FINCH	<i>Carpodacus mexicanus</i>	Passerine	PTC WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UP CO VTRS FTRS RCE
RED CROSSBILL	<i>Loxia curvirostra</i>	Passerine	R	W	PR - C3	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WHITE-WINGED CROSSBILL	<i>Loxia leucoptera</i>	Passerine	WOC	W	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
COMMON REDPOLL	<i>Carduelis flammea</i>	Passerine	CBC	W	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PINE SISKIN	<i>Carduelis pinus</i>	Passerine	PTC WOC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UP CO
AMERICAN GOLDFINCH	<i>Carduelis tristis</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	IRE FPCO UP CO VTRS FTRS
EVENING GROSBEAK	<i>Coccothraustes vespertina</i>	Passerine	CBC	W	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
HOUSE SPARROW	<i>Passer domesticus</i>	Passerine	PTC PO BBA BBS CBC	R	NN	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	RCE

Appendix 2. Avian section of the Faunal Database for Hopewell Furnace National Historic Site, including data from 1 July 1992 to 30 June 1996.

APPENDIX 2.

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
COMMON LOON	<i>Gavia immer</i>	Waterfowl	WOC CBC	B	PR	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
PIED-BILLED GREBE	<i>Podilymbus podiceps</i>	Waterfowl	WOC CBC	M/S	PR - C2	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
HORNED GREBE	<i>Podiceps auritus</i>	Waterfowl	WOC CBC	M	PR	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
DOUBLE-CRESTED CORMORANT	<i>Phalacrocorax auritus</i>	Waterfowl	WOC	M	PR	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
AMERICAN BITTERN	<i>Botaurus lentiginosus</i>	Wader	R	S	ST - T	TRS VCP SMA V&C IRE COR NIG BTR	
LEAST BITTERN	<i>Ixobrychus exilis</i>	Wader	R	S	ST - T	TRS VCP SMA V&C IRE COR NIG BTR	
GREAT BLUE HERON	<i>Ardea herodias</i>	Wader	PO WOC BBA CBC	S	PR	TRS VCP SMA V&C IRE COR NIG BTR	
GREAT EGRET	<i>Casmerodius albus</i>	Wader	WOC	S	ST - T	TRS VCP SMA V&C IRE COR NIG BTR	
LITTLE BLUE HERON	<i>Egretta caerulea</i>	Wader	WOC	S	PR	TRS VCP SMA V&C IRE COR NIG BTR	
TRICOLORED HERON	<i>Egretta tricolor</i>	Wader	R	A	PR	TRS VCP SMA V&C IRE COR NIG BTR	
CATTLE EGRET	<i>Bubulcus ibis</i>	Wader	R	S	PR - C3	TRS VCP SMA V&C IRE COR NIG BTR	
GREEN-BACKED HERON	<i>Butorides striatus</i>	Wader	WOC BBA BBS	S	PR	TRS VCP SMA V&C IRE COR NIG BTR	
BLACK-CROWNED NIGHT HERON	<i>Nycticorax nycticorax</i>	Wader	WOC BBA BBS	S	PR	TRS VCP SMA V&C IRE COR NIG BTR	
YELLOW-CROWNED NIGHT HERON	<i>Nyctanassa violacea</i>	Wader	R	S	ST - T	TRS VCP SMA V&C IRE COR NIG BTR	
GLOSSY IBIS	<i>Plegadis falcinellus</i>	Wader	R	M	PR	TRS VCP SMA V&C IRE COR NIG BTR	
BLACK VULTURE	<i>Coragyps atratus</i>	Raptor	PO WOC BBA CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
TURKEY VULTURE	<i>Cathartes aura</i>	Raptor	PTC PO WOC BBA BBS CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	FTRS VTRS FPCO UPCO NRCE BRCE
TUNDRA SWAN	<i>Olor columbianus</i>	Waterfowl	WOC CBC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
MUTE SWAN	<i>Cygnus olor</i>	Waterfowl	CBC	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
SNOW GOOSE	<i>Chen caerulescens</i>	Waterfowl	CBC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
CANADA GOOSE	<i>Branta canadensis</i>	Waterfowl	PTC PO WOC BBA BBS CBC	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	FTRS VTRS UPCO BRCE
WOOD DUCK	<i>Aix sponsa</i>	Waterfowl	PTC PO WOC BBA CBC	S	GM	NBT ROC TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	FTRS VTRS FPCO UPCO
GREEN-WINGED TEAL	<i>Anas crecca</i>	Waterfowl	WOC CBC	S	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
AMERICAN BLACK DUCK	<i>Anas rubripes</i>	Waterfowl	WOC BBS CBC	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
MALLARD	<i>Anas platyrhynchos</i>	Waterfowl	PTC WOC BBA BBS CBC	R	GM	FSV TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	UPCO
NORTHERN PINTAIL	<i>Anas acuta</i>	Waterfowl	WOC CBC	M	GM - C3	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
BLUE-WINGED TEAL	<i>Anas discors</i>	Waterfowl	WOC	S	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
NORTHERN SHOVELER	<i>Anas clypeata</i>	Waterfowl	CBC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
GADWALL	<i>Anas strepera</i>	Waterfowl	WOC CBC	M	GM - C3	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
AMERICAN WIGEON	<i>Anas americana</i>	Waterfowl	WOC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
CANVASBACK	<i>Aythya valisineria</i>	Waterfowl	WOC CBC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
REDHEAD	<i>Aythya americana</i>	Waterfowl	WOC CBC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
RING-NECK DUCK	<i>Aythya collaris</i>	Waterfowl	WOC CBC	W	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
GREATER SCAUP	<i>Aythya marila</i>	Waterfowl	WOC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	

APPENDIX 2. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
LESSER SCAUP	<i>Aythya affinis</i>	Waterfowl	WOC CBC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
OLDSQUAW	<i>Clangula hyemalis</i>	Waterfowl	WOC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
COMMON GOLDENEYE	<i>Bucephala clangula</i>	Waterfowl	WOC CBC	W	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
BUFFLEHEAD	<i>Bucephala albeola</i>	Waterfowl	WOC CBC	W	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
HOODED MERGANSER	<i>Lophodytes cucullatus</i>	Waterfowl	WOC CBC	S	GM	NBT TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
COMMON MERGANSER	<i>Mergus merganser</i>	Waterfowl	WOC CBC	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
RED-BREASTED MERGANSER	<i>Mergus serrator</i>	Waterfowl	WOC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
RUDDY DUCK	<i>Oxyura jamaicensis</i>	Waterfowl	WOC CBC	M	GM - C3	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
OSPREY	<i>Pandion haliaetus</i>	Raptor	WOC BBA	S	SE - E	BTR TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
BALD EAGLE	<i>Haliaeetus leucocephalus</i>	Raptor	CBC	R	FE - E	BTR TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
NORTHERN HARRIER	<i>Circus cyaneus</i>	Raptor	WOC CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
SHARP-SHINNED HAWK	<i>Accipiter striatus</i>	Raptor	PTC WOC BBA CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	FPCO UPKO
COOPER'S HAWK	<i>Accipiter cooperii</i>	Raptor	PTC PO WOC CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	VTRS NRCE
NORTHERN GOSHAWK	<i>Accipiter gentilis</i>	Raptor	R	R	PR - C2	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
RED-SHOULDERED HAWK	<i>Buteo lineatus</i>	Raptor	PTC PO CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	UPCO
BROAD-WINGED HAWK	<i>Buteo platypterus</i>	Raptor	PTC PO WOC BBA	S	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	BRCE
RED-TAILED HAWK	<i>Buteo jamaicensis</i>	Raptor	PTC PO WOC BBA BBS CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	FPCO UPKO BRCE
ROUGH-LEGGED HAWK	<i>Buteo lagopus</i>	Raptor	WOC CBC	W	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
GOLDEN EAGLE	<i>Aquila chysaetos</i>	Raptor	R	M	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
AMERICAN KESTREL	<i>Falco sparverius</i>	Raptor	WOC BBA BBS CBC	R	PR	NBT TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
MERLIN	<i>Falco columbarius</i>	Raptor	R	M	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
RING-NECKED PHEASANT	<i>Phasianus colchicus</i>	Groundbird	PO WOC BBA BBS CBC	R	GM	TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	
RUFFED GROUSE	<i>Bonasa umbellus</i>	Groundbird	WOC BBA CBC	R	GM	TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	
WILD TURKEY	<i>Meleagris gallopavo</i>	Groundbird	PO WOC BBA CBC	R	GM	ROC TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	
NORTHERN BOBWHITE	<i>Colinus virginianus</i>	Groundbird	BBA BBS	R	GM - C3	TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	
KING RAIL	<i>Rallus elegans</i>	Wader	R	S	SE - E	TRS VCP SMA V&C IRE COR NIG BTR	
VIRGINIA RAIL	<i>Rallus limicola</i>	Wader	R	S	GM	TRS VCP SMA V&C IRE COR NIG BTR	
SORA	<i>Porzana carolina</i>	Wader	R	S	GM	TRS VCP SMA V&C IRE COR NIG BTR	
COMMON MOORHEN	<i>Gallinula chloropus</i>	Wader	R	S	GM	TRS VCP SMA V&C IRE COR NIG BTR	
AMERICAN COOT	<i>Fulica americana</i>	Wader	CBC	R	GM	TRS VCP SMA V&C IRE COR NIG BTR	
KILLDEER	<i>Charadrius vociferus</i>	Shorebird	PTC WOC BBA BBS CBC	S	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	FTRS VTRS UPKO
SPOTTED SANDPIPER	<i>Actitis macularia</i>	Shorebird	WOC BBA BBS	S	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
UPLAND SANDPIPER	<i>Bartramia longicauda</i>	Shorebird	R	S	ST - T	TRS V&C NCO NIG BTR AER NET BAN CRE	
COMMON SNIPE	<i>Gallinago gallinago</i>	Shorebird	CBC	S	GM - T	TRS V&C NCO NIG BTR AER NET BAN CRE	

APPENDIX 2. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
AMERICAN WOODCOCK	<i>Scolopax minor</i>	Shorebird	BBA	S	GM	TRS V&C NCO NIG BTR AER NET BAN CRE	
RING-BILLED GULL	<i>Larus delawarensis</i>	Shorebird	PTC CBC	R	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	FPCO UPKO
HERRING GULL	<i>Larus argentatus</i>	Shorebird	WOC CBC	R	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
LESSER BLACK-BACKED GULL	<i>Larus fuscus</i>	Shorebird	CBC	W	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
COMMON TERN	<i>Sterna hirundo</i>	Shorebird	R	S	PR - X	TRS V&C NCO NIG BTR AER NET BAN CRE	
ROCK DOVE	<i>Columba livia</i>	Groundbird	PTC WOC BBA BBS CBC	R	GM	FSV TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	FTRS VTRS
MOURNING DOVE	<i>Zenaida macroura</i>	Groundbird	PTC PO WOC BBA BBS CBC	R	GM	FSV TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	UPCO
BLACK-BILLED CUCKOO	<i>Coccyzus erythrophthalmus</i>	Passerine	PO BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
YELLOW-BILLED CUCKOO	<i>Coccyzus americana</i>	Passerine	PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
COMMON BARN OWL	<i>Tyto alba</i>	Owl	R	R	PR - C1	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	
EASTERN SCREECH OWL	<i>Otus asio</i>	Owl	PTC PO WOC BBA CBC	R	PR	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	NOS
GREAT HORNED OWL	<i>Bubo virginiana</i>	Owl	PTC PO WOC BBA CBC	R	PR	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	NOS
BARRED OWL	<i>Strix varia</i>	Owl	PO	R	PR	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	
LONG-EARED OWL	<i>Asio otus</i>	Owl	CBC	S	PR - C3	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	
SHORT-EARED OWL	<i>Asio flammeus</i>	Owl	CBC	S	PR	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	
NORTHERN SAW-WHET OWL	<i>Aegolius acadicus</i>	Owl	PTC	S	PR - C3	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	NOS
COMMON NIGHTHAWK	<i>Chordeiles minor</i>	Passerine	PO BBA	S	PR - C3	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WHIP-POOR-WILL	<i>Caprimulgus vociferus</i>	Passerine	BBA	S	PR - C3	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CHIMNEY SWIFT	<i>Chaetura pelagica</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO BRCE
RUBY-THROATED HUMMINGBIRD	<i>Archilochus colubris</i>	Passerine	PO WOC BBA	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BELTED KINGFISHER	<i>Ceryle alcyon</i>	Passerine	WOC BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
RED-HEADED WOODPECKER	<i>Melanerpes erythrocephalus</i>	Woodpecker	PO WOC BBA CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	
RED-BELLIED WOODPECKER	<i>Melanerpes carolinus</i>	Woodpecker	PTC PO WOC BBA BBS CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	FTRS VTRS FPCO UPKO NRCE BRCE
YELLOW-BELLIED SAPSUCKER	<i>Sphyrapicus varius</i>	Woodpecker	PTC WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO
DOWNY WOODPECKER	<i>Picoides pubescens</i>	Woodpecker	PTC PO WOC BBA BBS CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	FTRS VTRS FPCO UPKO NRCE BRCE
HAIRY WOODPECKER	<i>Picoides villosus</i>	Woodpecker	PTC WOC BBA BBS CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	FTRS VTRS FPCO UPKO
NORTHERN FLICKER	<i>Colaptes auratus</i>	Woodpecker	PTC PO WOC BBA BBS CBC	S	PR	NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	FTRS VTRS FPCO UPKO NRCE BRCE
PILEATED WOODPECKER	<i>Dryocopus pileatus</i>	Woodpecker	PTC PO WOC BBA CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	FTRS VTRS FPCO UPKO NRCE BRCE
OLIVE-SIDED FLYCATCHER	<i>Contopus borealis</i>	Passerine	R	S	PR - X	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
EASTERN WOOD-PEEWEE	<i>Contopus virens</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO NRCE BRCE
YELLOW-BELLIED FLYCATCHER	<i>Empidonax flaviventris</i>	Passerine	R	S	ST	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
ACADIAN FLYCATCHER	<i>Empidonax virens</i>	Passerine	PTC PO BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO NRCE BRCE
ALDER FLYCATCHER	<i>Empidonax alnorum</i>	Passerine	WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WILLOW FLYCATCHER	<i>Empidonax traillii</i>	Passerine	BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	

APPENDIX 2. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
LEAST FLYCATCHER	<i>Empidonax minimus</i>	Passerine	WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
EASTERN PHOEBE	<i>Sayornis phoebe</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPCO NRCE BRCE
GREAT CRESTED FLYCATCHER	<i>Myiarchus crinitus</i>	Passerine	PTC PO WOC BBA BBS	S	PR	NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPCO NRCE BRCE
EASTERN KINGBIRD	<i>Tyrannus tyrannus</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE
HORNED LARK	<i>Eremophila alpestris</i>	Passerine	WOC BBA CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PURPLE MARTIN	<i>Progne subis</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE
TREE SWALLOW	<i>Tachycineta bicolor</i>	Passerine	PTC PO BBA BBS	S	PR	NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPCO NRCE
NORTHERN ROUGH-WINGED SWALLOW	<i>Stelgidopteryx serripennis</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BANK SWALLOW	<i>Riparia riparia</i>	Passerine	WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CLIFF SWALLOW	<i>Hirundo pyrrhonota</i>	Passerine	PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BARN SWALLOW	<i>Hirundo rustica</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPCO NRCE BRCE
BLUE JAY	<i>Cyanocitta cristata</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPCO NRCE BRCE
AMERICAN CROW	<i>Corvus brachyrhynchos</i>	Passerine	PTC PO WOC BBA BBS CBC	R	GM	FSV ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPCO NRCE BRCE
FISH CROW	<i>Corvus ossifragus</i>	Passerine	PTC PO BBS CBC	R	GM	ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPCO
COMMON RAVEN	<i>Corvus corax</i>	Passerine	R	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BLACK-CAPPED CHICKADEE	<i>Poecile atricapillus</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPCO BRCE
CAROLINA CHICKADEE	<i>Poecile carolinensis</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPCO NRCE BRCE
TUFTED TITMOUSE	<i>Baeolophus bicolor</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPCO NRCE BRCE
RED-BREASTED NUTHATCH	<i>Sitta canadensis</i>	Passerine	PTC WOC CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPCO
WHITE-BREASTED NUTHATCH	<i>Sitta carolinensis</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPCO NRCE BRCE
BROWN CREEPER	<i>Certhia americana</i>	Passerine	PTC PO WOC BBA CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS UPCO
CAROLINA WREN	<i>Thryothorus ludovicianus</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS
BEWICK'S WREN	<i>Thryomanes bewickii</i>	Passerine	R	S	PR - X	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
HOUSE WREN	<i>Troglodytes aedon</i>	Passerine	PTC PO WOC BBA BBS	S	PR	NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPCO NRCE BRCE
WINTER WREN	<i>Troglodytes troglodytes</i>	Passerine	PO WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SEDGE WREN	<i>Cistothorus platensis</i>	Passerine	R	S	ST - T	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
MARSH WREN	<i>Cistothorus palustris</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
GOLDEN-CROWNED KINGLET	<i>Regulus satrapa</i>	Passerine	PTC PO WOC BBA CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPCO
RUBY-CROWNED KINGLET	<i>Regulus calendula</i>	Passerine	PTC PO WOC CBC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPCO
BLUE-GRAY GNATCATCHER	<i>Polioptila caerulea</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPCO NRCE BRCE
EASTERN BLUEBIRD	<i>Sialia sialis</i>	Passerine	PTC PO WOC BBA BBS CBC	S	PR	FSV NBT ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
VEERY	<i>Catharus fuscescens</i>	Passerine	PTC PO WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPCO NRCE BRCE
GRAY-CHEEKED THRUSH	<i>Catharus minimus</i>	Passerine	WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SWAINSON'S THRUSH	<i>Catharus ustulatus</i>	Passerine	PTC WOC	S	PR - C2	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS

APPENDIX 2. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
HERMIT THRUSH	<i>Catharus guttatus</i>	Passerine	PTC PO WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO
WOOD THRUSH	<i>Hylocichla mustelina</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO NRCE BRCE
AMERICAN ROBIN	<i>Turdus migratorius</i>	Passerine	PTC PO WOC BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO NRCE BRCE
GRAY CATBIRD	<i>Dumetella carolinensis</i>	Passerine	PTC PO WOC BBA BBS CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO NRCE BRCE
NORTHERN MOCKINGBIRD	<i>Mimus polyglottos</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
BROWN THRASHER	<i>Toxostoma rufum</i>	Passerine	PO WOC BBA BBS CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
AMERICAN PIPIT	<i>Anthus rubescens</i>	Passerine	WOC CBC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CEDAR WAXWING	<i>Bombycilla cedrorum</i>	Passerine	PTC PO WOC BBA CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO
NORTHERN SHRIKE	<i>Lanius excubitor</i>	Passerine	CBC	W	PR	BCT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
LOGGERHEAD SHRIKE	<i>Lanius ludovicianus</i>	Passerine	WOC CBC	M	PR - X	BCT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
EUROPEAN STARLING	<i>Sturnus vulgaris</i>	Passerine	PTC PO WOC BBA BBS CBC	R	NN	FSV ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
WHITE-EYED VIREO	<i>Vireo griseus</i>	Passerine	WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BLUE-HEADED VIREO	<i>Vireo solitarius</i>	Passerine	PTC PO WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO BRCE
YELLOW-THROATED VIREO	<i>Vireo flavifrons</i>	Passerine	PTC PO WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS UPKO
WARBLING VIREO	<i>Vireo gilvus</i>	Passerine	BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PHILADELPHIA VIREO	<i>Vireo philadelphicus</i>	Passerine	PTC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO
RED-EYED VIREO	<i>Vireo olivaceus</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO NRCE BRCE
BLUE-WINGED WARBLER	<i>Vermivora pinus</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO NRCE BRCE
GOLDEN-WINGED WARBLER	<i>Vermivora chrysoptera</i>	Passerine	PTC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE
TENNESSEE WARBLER	<i>Vermivora peregrina</i>	Passerine	PO WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
ORANGE-CROWNED WARBLER	<i>Vermivora celata</i>	Passerine	R	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
NASHVILLE WARBLER	<i>Vermivora ruficapilla</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
NORTHERN PARULA	<i>Parula americana</i>	Passerine	PTC PO WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO NRCE BRCE
YELLOW WARBLER	<i>Dendroica petechia</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO NRCE BRCE
CHESTNUT-SIDED WARBLER	<i>Dendroica pensylvanica</i>	Passerine	PTC WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO NRCE BRCE
MAGNOLIA WARBLER	<i>Dendroica magnolia</i>	Passerine	PTC PO WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO NRCE BRCE
CAPE MAY WARBLER	<i>Dendroica tigrina</i>	Passerine	PO WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BLACK-THROATED BLUE WARBLER	<i>Dendroica caerulescens</i>	Passerine	PTC PO WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO
YELLOW-RUMPED WARBLER	<i>Dendroica coronata</i>	Passerine	PTC PO WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO
BLACK-THROATED GREEN WARBLER	<i>Dendroica virens</i>	Passerine	PTC PO WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UPKO NRCE BRCE
BLACKBURNIAN WARBLER	<i>Dendroica fusca</i>	Passerine	PTC PO WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UPKO NRCE BRCE
YELLOW-THROATED WARBLER	<i>Dendroica dominica</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PINE WARBLER	<i>Dendroica pinus</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PRAIRIE WARBLER	<i>Dendroica discolor</i>	Passerine	PO BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	

APPENDIX 2. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
PALM WARBLER	<i>Dendroica palmarum</i>	Passerine	PO WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BAY-BREASTED WARBLER	<i>Dendroica castanea</i>	Passerine	WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BLACKPOLL WARBLER	<i>Dendroica striata</i>	Passerine	PTC PO WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS
CERULEAN WARBLER	<i>Dendroica cerulea</i>	Passerine	PO WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BLACK-AND-WHITE WARBLER	<i>Mniotilta varia</i>	Passerine	PTC PO WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UP CO BRCE
AMERICAN REDSTART	<i>Setophaga ruticilla</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FPCO UP CO NRCE BRCE
PROTHONOTARY WARBLER	<i>Protonotaria citrea</i>	Passerine	R	S	PR - C1	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WORM-EATING WARBLER	<i>Helmitheros vermivorus</i>	Passerine	PTC PO WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UP CO
SWAINSON'S WARBLER	<i>Limnothlypis swainsonii</i>	Passerine	R	A	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
OVENBIRD	<i>Seiurus aurocapillus</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UP CO NRCE BRCE
NORTHERN WATERTHRUSH	<i>Seiurus noveboracensis</i>	Passerine	WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
LOUISIANA WATERTHRUSH	<i>Seiurus motacilla</i>	Passerine	PTC PO WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UP CO
KENTUCKY WARBLER	<i>Oporornis formosus</i>	Passerine	PTC WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
CONNECTICUT WARBLER	<i>Oporornis agilis</i>	Passerine	R	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
MOURNING WARBLER	<i>Oporornis philadelphia</i>	Passerine	PTC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS
COMMON YELLOWTHROAT	<i>Geothlypis trichas</i>	Passerine	PTC PO WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UP CO NRCE BRCE
HOODED WARBLER	<i>Wilsonia citrina</i>	Passerine	PTC PO WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE
WILSON'S WARBLER	<i>Wilsonia pusilla</i>	Passerine	R	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CANADA WARBLER	<i>Wilsonia canadensis</i>	Passerine	PTC PO WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
YELLOW-BREASTED CHAT	<i>Icteria virens</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SUMMER TANAGER	<i>Piranga rubra</i>	Passerine	R	S	PR - C2	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SCARLET TANAGER	<i>Piranga olivacea</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UP CO NRCE BRCE
NORTHERN CARDINAL	<i>Cardinalis cardinalis</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UP CO NRCE BRCE
ROSE-BREASTED GROSBEAK	<i>Pheucticus ludovicianus</i>	Passerine	PTC PO WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE
BLUE GROSBEAK	<i>Guiraca caerulea</i>	Passerine	R	S	PR - C2	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
INDIGO BUNTING	<i>Passerina cyanea</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UP CO NRCE BRCE
DICKCISSEL	<i>Spiza americana</i>	Passerine	R	S	PR - C3	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
EASTERN TOWHEE	<i>Pipilo erythrophthalmus</i>	Passerine	PTC PO WOC BBA BBS CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FPCO UP CO NRCE BRCE
AMERICAN TREE SPARROW	<i>Spizella arborea</i>	Passerine	PTC WOC CBC	W	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE
CHIPPING SPARROW	<i>Spizella passerina</i>	Passerine	PTC PO WOC BBA BBS	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	VTRS NRCE BRCE
FIELD SPARROW	<i>Spizella pusilla</i>	Passerine	PTC PO WOC BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS
VESPER SPARROW	<i>Poocetes gramineus</i>	Passerine	WOC BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SAVANNAH SPARROW	<i>Passerculus sandwichensis</i>	Passerine	WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
GRASSHOPPER SPARROW	<i>Ammodramus savannarum</i>	Passerine	WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	

APPENDIX 2. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
HENSLOW'S SPARROW	<i>Ammodramus henslowii</i>	Passerine	WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
FOX SPARROW	<i>Passerella iliaca</i>	Passerine	WOC CBC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SONG SPARROW	<i>Melospiza melodia</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS UP CO NRCE BRCE
LINCOLN'S SPARROW	<i>Melospiza lincolni</i>	Passerine	R	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SWAMP SPARROW	<i>Melospiza georgiana</i>	Passerine	WOC BBA CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WHITE-THROATED SPARROW	<i>Zonotrichia albicollis</i>	Passerine	PTC PO WOC CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FP CO UP CO NRCE BRCE
WHITE-CROWNED SPARROW	<i>Zonotrichia leucophrys</i>	Passerine	WOC CBC	W	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
DARK-EYED JUNCO	<i>Junco hyemalis</i>	Passerine	PTC PO WOC CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FP CO UP CO NRCE BRCE
LAPLAND LONGSPUR	<i>Calcarius lapponicus</i>	Passerine	R	W	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SNOW BUNTING	<i>Plectrophenax nivalis</i>	Passerine	WOC CBC	W	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BOBOLINK	<i>Dolichonyx oryzivorus</i>	Passerine	WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
RED-WINGED BLACKBIRD	<i>Agelaius phoeniceus</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV FLC ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
EASTERN MEADOWLARK	<i>Sturnella magna</i>	Passerine	PO WOC BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
RUSTY BLACKBIRD	<i>Euphagus carolinus</i>	Passerine	WOC CBC	W	PR	ROC FLC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
COMMON GRACKLE	<i>Quiscalus quiscula</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FP CO UP CO NRCE BRCE
BROWN-HEADED COWBIRD	<i>Molothrus ater</i>	Passerine	PTC PO WOC BBA BBS CBC	S	PR	FSV ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FP CO UP CO BRCE
ORCHARD ORIOLE	<i>Icterus spurius</i>	Passerine	PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BALTIMORE ORIOLE	<i>Icterus galbula</i>	Passerine	PTC PO WOC BBA BBS	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FP CO UP CO NRCE BRCE
PINE GROSBEAK	<i>Pinicola enucleator</i>	Passerine	R	W	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PURPLE FINCH	<i>Carpodacus purpureus</i>	Passerine	PO WOC BBA CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
HOUSE FINCH	<i>Carpodacus mexicanus</i>	Passerine	PTC PO BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FP CO UP CO NRCE BRCE
RED CROSSBILL	<i>Loxia curvirostra</i>	Passerine	R	W	PR - C3	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WHITE-WINGED CROSSBILL	<i>Loxia leucoptera</i>	Passerine	R	W	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
COMMON REDPOLL	<i>Carduelis flammea</i>	Passerine	R	W	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PINE SISKIN	<i>Carduelis pinus</i>	Passerine	WOC CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
AMERICAN GOLDFINCH	<i>Carduelis tristis</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	FTRS VTRS FP CO UP CO NRCE BRCE
EVENING GROSBEAK	<i>Coccothraustes vespertinus</i>	Passerine	WOC CBC	W	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
HOUSE SPARROW	<i>Passer domesticus</i>	Passerine	PTC PO WOC BBA BBS CBC	R	NN	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE

Appendix 3. Avian section of the Faunal Database for Valley Forge National Historical Park, including data from 1 July 1992 to 30 June 1996.

APPENDIX 3.

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
COMMON LOON	<i>Gavia immer</i>	Waterfowl	WOC	R	PR	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
RED-NECKED GREBE	<i>Podiceps grisegena</i>	Waterfowl	WOC	W	PR	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
PIED-BILLED GREBE	<i>Podilymbus podiceps</i>	Waterfowl	WOC BBA CBC	S	PR - C2	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
HORNED GREBE	<i>Podiceps auritus</i>	Waterfowl	WOC	M	PR	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
DOUBLE-CRESTED CORMORANT	<i>Phalacrocorax auritus</i>	Waterfowl	PO BBS	M	PR	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
AMERICAN BITTERN	<i>Botaurus lentiginosus</i>	Wader	WOC	S	ST - T	TRS VCP SMA V&C IRE COR NIG BTR	
LEAST BITTERN	<i>Ixobrychus exilis</i>	Wader	R	S	ST - T	TRS VCP SMA V&C IRE COR NIG BTR	
GREAT BLUE HERON	<i>Ardea herodias</i>	Wader	WOC BBA BBS CBC	S	PR	TRS VCP SMA V&C IRE COR NIG BTR	
GREAT EGRET	<i>Casmerodius albus</i>	Wader	WOC	S	ST - T	TRS VCP SMA V&C IRE COR NIG BTR	
SNOWY EGRET	<i>Egretta thula</i>	Wader	WOC	S	PR - C1	TRS VCP SMA V&C IRE COR NIG BTR	
LITTLE BLUE HERON	<i>Egretta caerulea</i>	Wader	WOC	S	PR	TRS VCP SMA V&C IRE COR NIG BTR	
TRICOLORED HERON	<i>Egretta tricolor</i>	Wader	R	A	PR	TRS VCP SMA V&C IRE COR NIG BTR	
CATTLE EGRET	<i>Bubulcus ibis</i>	Wader	WOC	S	PR - C3	TRS VCP SMA V&C IRE COR NIG BTR	
GREEN-BACKED HERON	<i>Butorides striatus</i>	Wader	WOC BBA BBS	S	PR	TRS VCP SMA V&C IRE COR NIG BTR	
BLACK-CROWNED NIGHT-HERON	<i>Nycticorax nycticorax</i>	Wader	WOC BBA	S	PR	TRS VCP SMA V&C IRE COR NIG BTR	
YELLOW-CROWNED NIGHT-HERON	<i>Nyctanassa violacea</i>	Wader	WOC	S	ST - T	TRS VCP SMA V&C IRE COR NIG BTR	
GLOSSY IBIS	<i>Plegadis falcinellus</i>	Wader	R	M	PR	TRS VCP SMA V&C IRE COR NIG BTR	
BLACK VULTURE	<i>Coragyps atratus</i>	Raptor	WOC BBA CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
TURKEY VULTURE	<i>Cathartes aura</i>	Raptor	PTC PO WOC BBA CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	NRCE BRCE
TUNDRA SWAN	<i>Olor columbianus</i>	Waterfowl	R	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
MUTE SWAN	<i>Cygnus olor</i>	Waterfowl	BBA	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
GREATER WHITE-FRONTED GOOSE	<i>Anser albifrons</i>	Waterfowl	WOC	A	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
SNOW GOOSE	<i>Chen caerulescens</i>	Waterfowl	WOC CBC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
CANADA GOOSE	<i>Branta canadensis</i>	Waterfowl	PTC PO WOC BBA BBS CBC	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	NRCE
WOOD DUCK	<i>Aix sponsa</i>	Waterfowl	PTC WOC BBA CBC	S	GM	ROC NBT TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	BRCE
GREEN-WINGED TEAL	<i>Anas crecca</i>	Waterfowl	WOC	S	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
AMERICAN BLACK DUCK	<i>Anas rubripes</i>	Waterfowl	WOC BBA CBC	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
MALLARD	<i>Anas platyrhynchos</i>	Waterfowl	PTC PO WOC BBA BBS CBC	R	GM	FSV TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	NRCE BRCE
NORTHERN PINTAIL	<i>Anas acuta</i>	Waterfowl	WOC	M	GM - C3	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
BLUE-WINGED TEAL	<i>Anas discors</i>	Waterfowl	WOC	S	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
NORTHERN SHOVELER	<i>Anas clypeata</i>	Waterfowl	R	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
GADWALL	<i>Anas strepera</i>	Waterfowl	WOC CBC	M	GM - C3	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	

APPENDIX 3. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
AMERICAN WIGEON	<i>Anas americana</i>	Waterfowl	WOC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
CANVASBACK	<i>Aythya valisineria</i>	Waterfowl	WOC CBC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
REDHEAD	<i>Aythya americana</i>	Waterfowl	WOC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
RING-NECKED DUCK	<i>Aythya collaris</i>	Waterfowl	WOC CBC	W	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
GREATER SCAUP	<i>Aythya marila</i>	Waterfowl	WOC CBC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
LESSER SCAUP	<i>Aythya affinis</i>	Waterfowl	WOC CBC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
BLACK SCOTER	<i>Melanitta nigra</i>	Waterfowl	WOC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
WHITE-WINGED SCOTER	<i>Melanitta fusca</i>	Waterfowl	WOC	W	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
OLDSQUAW	<i>Clangula hyemalis</i>	Waterfowl	WOC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
COMMON GOLDENEYE	<i>Bucephala clangula</i>	Waterfowl	WOC CBC	W	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
BUFFLEHEAD	<i>Bucephala albeola</i>	Waterfowl	WOC CBC	W	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
HOODED MERGANSER	<i>Lophodytes cucullatus</i>	Waterfowl	WOC CBC	S	GM	NBT TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
COMMON MERGANSER	<i>Mergus merganser</i>	Waterfowl	WOC CBC	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
RED-BREASTED MERGANSER	<i>Mergus serrator</i>	Waterfowl	WOC	M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
RUDDY DUCK	<i>Oxyura jamaicensis</i>	Waterfowl	WOC CBC	M	GM - C3	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	
OSPREY	<i>Pandion haliaetus</i>	Raptor	PO WOC BBA	S	SE - E	BTR TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
BALD EAGLE	<i>Haliaeetus leucocephalus</i>	Raptor	WOC	R	FE - E	BTR TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
NORTHERN HARRIER	<i>Circus cyaneus</i>	Raptor	WOC CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
SHARP-SHINNED HAWK	<i>Accipiter striatus</i>	Raptor	PO WOC BBA CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
COOPER'S HAWK	<i>Accipiter cooperii</i>	Raptor	WOC CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
NORTHERN GOSHAWK	<i>Accipiter gentilis</i>	Raptor	WOC CBC	R	PR - C2	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
RED-SHOULDERED HAWK	<i>Buteo lineatus</i>	Raptor	WOC CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
BROAD-WINGED HAWK	<i>Buteo platypterus</i>	Raptor	WOC BBA BBS	S	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
RED-TAILED HAWK	<i>Buteo jamaicensis</i>	Raptor	PTC PO WOC BBA BBS CBC	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	NRCE BRCE
ROUGH-LEGGED HAWK	<i>Buteo lagopus</i>	Raptor	CBC	W	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
GOLDEN EAGLE	<i>Aquila chysaetos</i>	Raptor	WOC	M	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
AMERICAN KESTREL	<i>Falco sparverius</i>	Raptor	PO WOC BBA BBS CBC	R	PR	NBT TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
MERLIN	<i>Falco columbarius</i>	Raptor	CBC	M	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
PEREGRINE FALCON	<i>Falco peregrinus</i>	Raptor	WOC	M	FE	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	
RING-NECKED PHEASANT	<i>Phasianus colchicus</i>	Groundbird	WOC BBA BBS CBC	R	GM	TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	
RUFFED GROUSE	<i>Bonasa umbellus</i>	Groundbird	WOC BBA	R	GM	TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	
WILD TURKEY	<i>Meleagris gallopavo</i>	Groundbird	R	R	GM	ROC TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	

APPENDIX 3. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
NORTHERN BOBWHITE	<i>Colinus virginianus</i>	Groundbird	WOC BBA BBS	R	GM - C3	TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	
KING RAIL	<i>Rallus elegans</i>	Wader	R	S	SE - E	TRS VCP SMA V&C IRE COR NIG BTR	
VIRGINIA RAIL	<i>Rallus limicola</i>	Wader	BBA	S	GM	TRS VCP SMA V&C IRE COR NIG BTR	
SORA	<i>Porzana carolina</i>	Wader	R	S	GM	TRS VCP SMA V&C IRE COR NIG BTR	
COMMON MOORHEN	<i>Gallinula chloropus</i>	Wader	WOC	S	GM	TRS VCP SMA V&C IRE COR NIG BTR	
AMERICAN COOT	<i>Fulica americana</i>	Wader	WOC CBC	R	GM	TRS VCP SMA V&C IRE COR NIG BTR	
SEMPALMATED PLOVER	<i>Charadrius semipalmatus</i>	Shorebird	WOC	M	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
KILLDEER	<i>Charadrius vociferus</i>	Shorebird	WOC BBA BBS CBC	S	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
GREATER YELLOWLEGS	<i>Tringa melanoleuca</i>	Shorebird	WOC	M	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
LESSER YELLOWLEGS	<i>Tringa flavipes</i>	Shorebird	WOC	M	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
SOLITARY SANDPIPER	<i>Tringa solitaria</i>	Shorebird	WOC	M	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
SPOTTED SANDPIPER	<i>Actitis macularia</i>	Shorebird	WOC BBA BBS	S	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
LEAST SANDPIPER	<i>Calidris minutilla</i>	Shorebird	WOC	M	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
UPLAND SANDPIPER	<i>Bartramia longicauda</i>	Shorebird	R	S	ST - T	TRS V&C NCO NIG BTR AER NET BAN CRE	
SEMPALMATED SANDPIPER	<i>Calidris pusilla</i>	Shorebird	WOC	M	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
COMMON SNIPE	<i>Gallinago gallinago</i>	Shorebird	PO	S	GM - T	TRS V&C NCO NIG BTR AER NET BAN CRE	
AMERICAN WOODCOCK	<i>Scolopax minor</i>	Shorebird	WOC BBA	S	GM	TRS V&C NCO NIG BTR AER NET BAN CRE	
LAUGHING GULL	<i>Larus atricilla</i>	Shorebird	WOC	S	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
BONAPARTE'S GULL	<i>Larus philadelphia</i>	Shorebird	WOC	W	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
RING-BILLED GULL	<i>Larus delawarensis</i>	Shorebird	PTC WOC CBC	R	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	NRCE
HERRING GULL	<i>Larus argentatus</i>	Shorebird	WOC CBC	R	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
LESSER BLACK-BACKED GULL	<i>Larus fuscus</i>	Shorebird	R	W	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
GREAT BLACK-BACKED GULL	<i>Larus marinus</i>	Shorebird	WOC	R	PR	TRS V&C NCO NIG BTR AER NET BAN CRE	
COMMON TERN	<i>Sterna hirundo</i>	Shorebird	R	S	EX - X	TRS V&C NCO NIG BTR AER NET BAN CRE	
ROCK DOVE	<i>Columba livia</i>	Groundbird	PTC PO WOC BBA BBS CBC	R	GM	FSV TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	NRCE
MOURNING DOVE	<i>Zenaidura macroura</i>	Groundbird	PTC PO WOC BBA BBS CBC	R	GM	FSV TRS VCP PCO SMA V&C COR TRA NCO FLC NIG RCE NET SNR BAN CRE LTT	NRCE BRCE
BLACK-BILLED CUCKOO	<i>Coccyzus erythrophthalmus</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
YELLOW-BILLED CUCKOO	<i>Coccyzus americana</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
COMMON BARN OWL	<i>Tyto alba</i>	Owl	WOC BBS CBC	R	PR - C1	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	
EASTERN SCREECH OWL	<i>Otus asio</i>	Owl	PTC WOC BBA BBS CBC	R	PR	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	NOS
GREAT HORNED OWL	<i>Bubo virginiana</i>	Owl	PTC WOC BBA BBS CBC	R	PR	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	NOS
BARRED OWL	<i>Strix varia</i>	Owl	WOC BBA	R	PR	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	

APPENDIX 3. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
LONG-EARED OWL	<i>Asio otus</i>	Owl	R	S	PR - C3	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	
SHORT-EARED OWL	<i>Asio flammeus</i>	Owl	R	S	SE	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	
NORTHERN SAW-WHET OWL	<i>Aegolius acadicus</i>	Owl	R	S	PR - C3	TRS PCO SMA V&C COR OPI ROC RCE BAN CRE	
COMMON NIGHTHAWK	<i>Chordeiles minor</i>	Passerine	WOC BBA BBS	S	PR - C3	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WHIP-POOR-WILL	<i>Caprimulgus vociferus</i>	Passerine	WOC	S	PR - C3	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CHIMNEY SWIFT	<i>Chaetura pelagica</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
RUBY-THROATED HUMMINGBIRD	<i>Archilochus colubris</i>	Passerine	WOC BBA BBS	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BELTED KINGFISHER	<i>Ceryle alcyon</i>	Passerine	WOC BBA CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
RED-HEADED WOODPECKER	<i>Melanerpes erythrocephalus</i>	Woodpecker	WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	
RED-BELLIED WOODPECKER	<i>Melanerpes carolinus</i>	Woodpecker	PTC WOC BBA BBS CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	NRCE BRCE
YELLOW-BELLIED SAPSUCKER	<i>Sphyrapicus varius</i>	Woodpecker	WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
DOWNY WOODPECKER	<i>Picoides pubescens</i>	Woodpecker	PTC PO WOC BBA BBS CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	NRCE BRCE
HAIRY WOODPECKER	<i>Picoides villosus</i>	Woodpecker	PO WOC BBA BBS CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	
NORTHERN FLICKER	<i>Colaptes auratus</i>	Woodpecker	PTC PO WOC BBA BBS CBC	S	PR	NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	NRCE BRCE
PILEATED WOODPECKER	<i>Dryocopus pileatus</i>	Woodpecker	WOC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE FSV	
OLIVE-SIDED FLYCATCHER	<i>Contopus borealis</i>	Passerine	WOC	S	PR - X	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
EASTERN WOOD-PEEWEE	<i>Contopus virens</i>	Passerine	PTC WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
YELLOW-BELLIED FLYCATCHER	<i>Empidonax flaviventris</i>	Passerine	WOC	S	ST	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
ACADIAN FLYCATCHER	<i>Empidonax virescens</i>	Passerine	WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
ALDER FLYCATCHER	<i>Empidonax alnorum</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WILLOW FLYCATCHER	<i>Empidonax traillii</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
LEAST FLYCATCHER	<i>Empidonax minimus</i>	Passerine	WOC BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
EASTERN PHOEBE	<i>Sayornis phoebe</i>	Passerine	PTC PO WOC BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
GREAT CRESTED FLYCATCHER	<i>Myiarchus cinerascens</i>	Passerine	PTC WOC BBA BBS	S	PR	NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE
EASTERN KINGBIRD	<i>Tyrannus tyrannus</i>	Passerine	PTC WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
HORNED LARK	<i>Eremophila alpestris</i>	Passerine	BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PURPLE MARTIN	<i>Progne subis</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
TREE SWALLOW	<i>Tachycineta bicolor</i>	Passerine	WOC BBA	S	PR	NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
NORTHERN ROUGH-WINGED SWALLOW	<i>Stelgidopteryx serripennis</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BANK SWALLOW	<i>Riparia riparia</i>	Passerine	PTC WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
CLIFF SWALLOW	<i>Hirundo pyrrhonota</i>	Passerine	WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BARN SWALLOW	<i>Hirundo rustica</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE

APPENDIX 3. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
BLUE JAY	<i>Cyanocitta cristata</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
AMERICAN CROW	<i>Corvus brachyrhynchos</i>	Passerine	PTC PO WOC BBA BBS CBC	R	GM	FSV ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
FISH CROW	<i>Corvus ossifragus</i>	Passerine	PTC PO WOC BBA BBS CBC	R	GM	ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE
COMMON RAVEN	<i>Corvus corax</i>	Passerine	R	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BLACK-CAPPED CHICKADEE	<i>Poecile atricapillus</i>	Passerine	WOC BBA BBS CBC	R	PR	FSV NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CAROLINA CHICKADEE	<i>Poecile carolinensis</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
TUFTED TITMOUSE	<i>Baeolophus bicolor</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
RED-BREASTED NUTHATCH	<i>Sitta canadensis</i>	Passerine	WOC BBS CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WHITE-BREASTED NUTHATCH	<i>Sitta carolinensis</i>	Passerine	PTC WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
BROWN CREEPER	<i>Certhia americana</i>	Passerine	WOC CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CAROLINA WREN	<i>Thryothorus ludovicianus</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
BEWICK'S WREN	<i>Thryomanes bewickii</i>	Passerine	R	S	SE - X	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
HOUSE WREN	<i>Troglodytes aedon</i>	Passerine	PTC WOC BBA BBS	S	PR	NBT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
WINTER WREN	<i>Troglodytes troglodytes</i>	Passerine	WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SEDGE WREN	<i>Cistothorus platensis</i>	Passerine	R	S	ST - T	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
MARSH WREN	<i>Cistothorus palustris</i>	Passerine	WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
GOLDEN-CROWNED KINGLET	<i>Regulus satrapa</i>	Passerine	WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
RUBY-CROWNED KINGLET	<i>Regulus calendula</i>	Passerine	PTC PO WOC CBC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	BRCE
BLUE-GRAY GNATCATCHER	<i>Poliptila caerulea</i>	Passerine	PTC WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
EASTERN BLUEBIRD	<i>Sialia sialis</i>	Passerine	WOC BBA CBC	S	PR	NBT FSV ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
VEERY	<i>Catharus fuscescens</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
GRAY-CHEEKED THRUSH	<i>Catharus minimus</i>	Passerine	WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SWAINSON'S THRUSH	<i>Catharus ustulatus</i>	Passerine	WOC	S	PR - C2	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
HERMIT THRUSH	<i>Catharus guttatus</i>	Passerine	WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WOOD THRUSH	<i>Hylocichla mustelina</i>	Passerine	PTC WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
AMERICAN ROBIN	<i>Turdus migratorius</i>	Passerine	PTC PO WOC BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
GRAY CATBIRD	<i>Dumetella carolinensis</i>	Passerine	PTC WOC BBA BBS CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
NORTHERN MOCKINGBIRD	<i>Mimus polyglottos</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
BROWN THRASHER	<i>Toxostoma rufum</i>	Passerine	WOC BBA BBS CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
AMERICAN PIPIT	<i>Anthus rubescens</i>	Passerine	WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CEDAR WAXWING	<i>Bombycilla cedrorum</i>	Passerine	WOC BBA BBS CBC	R	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
NORTHERN SHRIKE	<i>Lanius excubitor</i>	Passerine	R	W	PR	BCT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	

APPENDIX 3. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
LOGGERHEAD SHRIKE	<i>Lanius ludovicianus</i>	Passerine	R	M	EX - X	BCT TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
EUROPEAN STARLING	<i>Stumus vulgaris</i>	Passerine	PTC PO WOC BBA BBS CBC	R	NN	FSV ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
WHITE-EYED VIREO	<i>Vireo griseus</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BLUE-HEADED VIREO	<i>Vireo solitarius</i>	Passerine	PTC WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
YELLOW-THROATED VIREO	<i>Vireo flavifrons</i>	Passerine	WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WARBLING VIREO	<i>Vireo gilvus</i>	Passerine	WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PHILADELPHIA VIREO	<i>Vireo philadelphicus</i>	Passerine	PO WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
RED-EYED VIREO	<i>Vireo olivaceus</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
BLUE-WINGED WARBLER	<i>Vermivora pinus</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
GOLDEN-WINGED WARBLER	<i>Vermivora chrysoptera</i>	Passerine	WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
TENNESSEE WARBLER	<i>Vermivora peregrina</i>	Passerine	PTC WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	BRCE
ORANGE-CROWNED WARBLER	<i>Vermivora celata</i>	Passerine	WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
NASHVILLE WARBLER	<i>Vermivora ruficapilla</i>	Passerine	WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
NORTHERN PARULA	<i>Parula americana</i>	Passerine	PTC PO WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE
YELLOW WARBLER	<i>Dendroica petechia</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
CHESTNUT-SIDED WARBLER	<i>Dendroica pensylvanica</i>	Passerine	PTC PO WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
MAGNOLIA WARBLER	<i>Dendroica magnolia</i>	Passerine	PTC WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
CAPE MAY WARBLER	<i>Dendroica tigrina</i>	Passerine	PO WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BLACK-THROATED BLUE WARBLER	<i>Dendroica caerulescens</i>	Passerine	PO WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
YELLOW-RUMPED WARBLER	<i>Dendroica coronata</i>	Passerine	PTC PO WOC CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
BLACK-THROATED GREEN WARBLER	<i>Dendroica virens</i>	Passerine	PTC PO WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
BLACKBURNIAN WARBLER	<i>Dendroica fusca</i>	Passerine	PTC PO WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
YELLOW-THROATED WARBLER	<i>Dendroica dominica</i>	Passerine	WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PINE WARBLER	<i>Dendroica pinus</i>	Passerine	WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PRAIRIE WARBLER	<i>Dendroica discolor</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PALM WARBLER	<i>Dendroica palmarum</i>	Passerine	WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BAY-BREASTED WARBLER	<i>Dendroica castanea</i>	Passerine	PTC PO WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE
BLACKPOLL WARBLER	<i>Dendroica striata</i>	Passerine	PTC PO WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
CERULEAN WARBLER	<i>Dendroica cerulea</i>	Passerine	WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BLACK-AND-WHITE WARBLER	<i>Mniotilta varia</i>	Passerine	PTC WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	BRCE
AMERICAN REDSTART	<i>Setophaga ruticilla</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
PROTHONOTARY WARBLER	<i>Protonotaria citrea</i>	Passerine	WOC BBA	S	PR - C1	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	

APPENDIX 3. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
WORM-EATING WARBLER	<i>Helminthos vermivorus</i>	Passerine	WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SWAINSON'S WARBLER	<i>Limnithypis swainsonii</i>	Passerine	R	A	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
OVENBIRD	<i>Seiurus aurocapillus</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
NORTHERN WATERTHRUSH	<i>Seiurus noveboracensis</i>	Passerine	WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
LOUISIANA WATERTHRUSH	<i>Seiurus motacilla</i>	Passerine	WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
KENTUCKY WARBLER	<i>Oporomis formosus</i>	Passerine	PTC WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
CONNECTICUT WARBLER	<i>Oporomis agilis</i>	Passerine	WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
MOURNING WARBLER	<i>Oporomis philadelphia</i>	Passerine	WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
COMMON YELLOWTHROAT	<i>Geothlypis trichas</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
HOODED WARBLER	<i>Wilsonia citrina</i>	Passerine	WOC BBA	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WILSON'S WARBLER	<i>Wilsonia pusilla</i>	Passerine	WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CANADA WARBLER	<i>Wilsonia canadensis</i>	Passerine	PTC PO WOC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE
YELLOW-BREASTED CHAT	<i>Icteria virens</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SUMMER TANAGER	<i>Piranga rubra</i>	Passerine	R	S	PR - C2	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SCARLET TANAGER	<i>Piranga olivacea</i>	Passerine	PTC PO WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
NORTHERN CARDINAL	<i>Cardinalis cardinalis</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
ROSE-BREASTED GROSBEAK	<i>Pheucticus ludovicianus</i>	Passerine	PTC WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	BRCE
BLUE GROSBEAK	<i>Guiraca caerulea</i>	Passerine	WOC BBA	S	PR - C2	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
INDIGO BUNTING	<i>Passerina cyanea</i>	Passerine	PTC WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
DICKCISSEL	<i>Spiza americana</i>	Passerine	WOC CBC	S	PR - C3	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
EASTERN TOWHEE	<i>Pipilo erythrophthalmus</i>	Passerine	PTC PO WOC BBA BBS CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
AMERICAN TREE SPARROW	<i>Spizella arborea</i>	Passerine	WOC CBC	W	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
CHIPPING SPARROW	<i>Spizella passerina</i>	Passerine	PTC WOC BBA BBS CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
FIELD SPARROW	<i>Spizella pusilla</i>	Passerine	PO WOC BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
VESPER SPARROW	<i>Poocetes gramineus</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SAVANNAH SPARROW	<i>Passerculus sandwichensis</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
GRASSHOPPER SPARROW	<i>Ammodramus savannarum</i>	Passerine	BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
HENSLow'S SPARROW	<i>Ammodramus henslowii</i>	Passerine	R	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
FOX SPARROW	<i>Passerella iliaca</i>	Passerine	WOC CBC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SONG SPARROW	<i>Melospiza melodia</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
LINCOLN'S SPARROW	<i>Melospiza lincolni</i>	Passerine	WOC	M	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SWAMP SPARROW	<i>Melospiza georgiana</i>	Passerine	WOC BBA CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	

APPENDIX 3. (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	PRO-CITE	OCCURRENCE STATUS	RESIDENCY	LEGAL POP.	PROTOCOL	FIELD TESTED PROTOCOL
		GROUP NAME		STATUS	STATUS		
WHITE-THROATED SPARROW	<i>Zonotrichia albicollis</i>	Passerine	PTC PO WOC CBC	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
WHITE-CROWNED SPARROW	<i>Zonotrichia leucophrys</i>	Passerine	WOC CBC	W	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
DARK-EYED JUNCO	<i>Junco hyemalis</i>	Passerine	PTC PO WOC CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	BRCE
LAPLAND LONGSPUR	<i>Calcarius lapponicus</i>	Passerine	R	W	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
SNOW BUNTING	<i>Plectrophenax nivalis</i>	Passerine	R	W	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BOBOLINK	<i>Dolichonyx oryzivorus</i>	Passerine	WOC BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
RED-WINGED BLACKBIRD	<i>Agelaius phoeniceus</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV ROC FLC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
EASTERN MEADOWLARK	<i>Sturnella magna</i>	Passerine	PTC WOC BBA BBS CBC	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
RUSTY BLACKBIRD	<i>Euphagus carolinus</i>	Passerine	WOC CBC	W	PR	ROC FLC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
COMMON GRACKLE	<i>Quiscalus quiscula</i>	Passerine	PTC WOC BBA BBS CBC	R	PR	FSV ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
BROWN-HEADED COWBIRD	<i>Molothrus ater</i>	Passerine	PTC WOC BBA BBS CBC	S	PR	FSV ROC TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
ORCHARD ORIOLE	<i>Icterus spurius</i>	Passerine	WOC BBA BBS	S	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
BALTIMORE ORIOLE	<i>Icterus galbula</i>	Passerine	PTC WOC BBA BBS	S	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
PINE GROSBEAK	<i>Pinicola enucleator</i>	Passerine	WOC	W	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PURPLE FINCH	<i>Carpodacus purpureus</i>	Passerine	WOC CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
HOUSE FINCH	<i>Carpodacus mexicanus</i>	Passerine	PTC PO WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
RED CROSSBILL	<i>Loxia curvirostra</i>	Passerine	R	W	PR - C3	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
WHITE-WINGED CROSSBILL	<i>Loxia leucoptera</i>	Passerine	R	W	PR	TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
COMMON REDPOLL	<i>Carduelis flammea</i>	Passerine	WOC	W	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
PINE SISKIN	<i>Carduelis pinus</i>	Passerine	WOC CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
AMERICAN GOLDFINCH	<i>Carduelis tristis</i>	Passerine	PTC WOC BBA BBS CBC	R	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	NRCE BRCE
EVENING GROSBEAK	<i>Coccothraustes vespertinus</i>	Passerine	WOC	W	PR	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	
HOUSE SPARROW	<i>Passer domesticus</i>	Passerine	WOC BBA BBS CBC	R	NN	FSV TRS VCP PCO SMA V&C COR NCO NET BAN CRE	

Appendix 4. *Pro-Cite* Group Names for all orders of avian species in the Faunal Database for Gettysburg National Military Park and Eisenhower National Historic Site, Hopewell Furnace National Historic Site, and Valley Forge National Historical Park (Variable No. 5).

Pro-Cite Group	Orders
Waterfowl	Gaviiformes, Podicipediformes, Pelecaniformes, and Anseriformes
Shorebird	Charadriiformes
Wader	Ciconiiformes and Gruiformes
Upland Groundbird	Galliformes and Columbiformes
Raptor	Falconiformes
Owl	Strigiformes
Woodpecker	Piciformes
Passerine	Caprimulgiformes, Cuculiformes, Apodiformes, Coraciiformes, and Passeriformes

Appendix 5. Codes for sources of documentation used for the occurrence status in the Faunal Database for Gettysburg National Military Park and Eisenhower National Historic Site, Hopewell Furnace National Historic Site, and Valley Forge National Historical Park (Variable No. 8).

Code	Documentation
PTC	Observation while conducting a protocol
PO	Personal observation
WOC	National Park Service wildlife observation card
BBA	Pennsylvania Game Commission Breeding Bird Atlas
BBS	U.S. Fish and Wildlife Service Breeding Bird Survey
CBC	Audubon Society Christmas Bird Count
R	Predicted occurrence from published range maps

Appendix 6. Codes for the residency status of avian species in the Faunal Database for Gettysburg National Historic Park and Eisenhower National Historic Site, Hopewell Furnace National Historic Site, and Valley Forge National Historical Park (Variable 9).

Code	Residency Status
W	Winter Resident
S	Summer Resident
R	Year-round Resident
M	Migrant
A	Accidental

Appendix 7. Codes for the federal and state legal population status of avian species in the Faunal Database for Gettysburg National Military Park and Eisenhower National Historic Site, Hopewell Furnace National Historic Site, and Valley Forge National Historical Park (Variable No. 10).

Legal Status:

FE = Federally Endangered

FT = Federally Threatened

SE = State Endangered

ST = State Threatened

SV = State Vulnerable

EX = State Extirpated

NN = State Non-native

PR = State Protected

GM = State Game

FB = State Furbearer

PA Biological Survey Classification:

E = Endangered

T = Threatened

X = Extirpated

C1 = State At Risk Candidate Species

C2 = State Rare Candidate Species

C3 = State Status Undetermined Species

Appendix 8. Codes for the survey protocols for inventorying and monitoring avian species in the Faunal Database at Gettysburg National Military Park and Eisenhower National Historic Site, Hopewell Furnace National Historic Site, Valley Forge National Historical Park (Variable No. 11 and No. 12)

FTRS	=	Fixed-width Transect
VTRS	=	Variable-width Transect
FPCO	=	Fixed-radius Point Count
UPCO	=	Unlimited-radius Point Count
VCP	=	Variable-width Circular-plot
SMA	=	Spot-mapping
V&C	=	Communication (and Vocalization) Index
NOS	=	Nocturnal Owl Survey
IRE	=	Interspecific Recording
COR	=	Conspecific Recording
SCI	=	Scat/Sign Index
OPI	=	Pellet Index
DLI	=	Dam/Lodge/Den Index
TRA	=	Tracking
SST	=	Scent Station
NCO	=	Nest Count
ROC	=	Roost Count
FLC	=	Flush Count
NIG	=	Nightlighting
SOU	=	Sounding
RKI	=	Road Kill
RCE	=	Road Survey
NRCE	=	Non-stop method
BRCE	=	BBS method
BTR	=	Boat Survey
AER	=	Aerial Survey
QUA	=	Quadrat
NET	=	Netting (Mist-net)
TNE	=	Tadpole Netting
SNR	=	Snaring
PFT	=	Pitfall Trapping
STT	=	Snap-trapping
LTT	=	Live-trapping
BCT	=	Bal-chatri Trapping
NBT	=	Nestbox Trapping
FTR	=	Funnel-trapping
DFE	=	Drift Fence
MAR	=	Marking
BAN	=	Banding/Tagging
CRE	=	Capture-recapture
LTR	=	Log-turning/Rock-turning
CVB	=	Coverboard
AST	=	Artificial Shelter
TSE	=	Timed Search
FSV	=	Feeder Survey

Appendix 9. Instructions for ordering a copy of the Faunal Database from the National Park Service.

For a copy of the Faunal Database send a letter to: National Park Service, Chief Scientist, Chesapeake System Support Office, U.S. Custom House, 200 Chestnut Street, Philadelphia, PA 19106. The letter should include the following:

- (1) Your name and mailing address.
- (2) Requested form of the database: 3.5" or 5.25" diskette or hard copy.
- (3) National park(s) of interest: Gettysburg National Military Park/Eisenhower National Historic Site, Hopewell Furnace National Historic Site, or Valley Forge National Historical Park.

Appendix 10. Bird species, number of individuals, and, in parentheses, density (no./ha) during all seasons and at all study sites using 30-m and 50-m fixed width transects (TRAN-30 and TRAN-50, respectively), unlimited-distance transects (TRAN-UL), 30-m radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) at Gettysburg National Military Park and Eisenhower National Historic Site.

HABITAT: Grassland

SITE: Pennsylvania Monument Grassland (PMG)

SEASON: 1993 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Black Vulture	1 (0.21)	1 (0.13)	1	--	--
Turkey Vulture	3 (0.63)	3 (0.38)	3	--	--
Mourning Dove	3 (0.63)	3 (0.38)	3	--	--
Northern Flicker	1 (0.21)	1 (0.13)	1	--	--
Barn Swallow	1 (0.21)	1 (0.13)	1	--	--
Northern Mockingbird	1 (0.21)	1 (0.13)	1	--	--
European Starling	3 (0.63)	3 (0.38)	3	--	--
Indigo Bunting	0 (0.00)	1 (0.13)	1	--	--
Chipping Sparrow	1 (0.21)	1 (0.13)	1	--	--
Grasshopper Sparrow	12 (2.50)	12 (1.50)	12	--	--
Eastern Meadowlark	5 (1.04)	5 (0.63)	5	--	--
Total No. Individuals	31	32	32	--	--
Total No. Species	10	11	11	--	--

Appendix 10. (continued)

HABITAT: Old-Field
 SITE: Warfield Ridge Old-Field (WOF)
 SEASON: 1993 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	--	--	--	1 (0.88)	1
Red-tailed Hawk	--	--	--	1 (0.88)	1
Mourning Dove	--	--	--	7 (6.16)	7
Chimney Swift	--	--	--	1 (0.88)	1
Red-bellied Woodpecker	--	--	--	1 (0.88)	1
Northern Flicker	--	--	--	0 (0.00)	1
Black-capped Chickadee	--	--	--	4 (3.52)	4
Tufted Titmouse	--	--	--	1 (0.88)	1
White-breasted Nuthatch	--	--	--	0 (0.00)	1
House Wren	--	--	--	5 (4.40)	5
Wood Thrush	--	--	--	0 (0.00)	1
American Robin	--	--	--	2 (1.76)	2
Gray Catbird	--	--	--	9 (7.92)	9
Brown Thrasher	--	--	--	1 (0.88)	1
Prairie Warbler	--	--	--	1 (0.88)	1
Common Yellowthroat	--	--	--	2 (1.76)	2

Appendix 10. (continued)

HABITAT: Old-Field
 SITE: Warfield Ridge Old-Field (WOF)
 SEASON: 1993 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Northern Cardinal	--	--	--	7 (6.16)	7
Indigo Bunting	--	--	--	2 (1.76)	3
Eastern Towhee	--	--	--	2 (1.76)	2
Field Sparrow	--	--	--	9 (7.92)	10
Song Sparrow	--	--	--	5 (4.40)	6
Common Grackle	--	--	--	1 (0.88)	1
Brown-headed Cowbird	--	--	--	1 (0.88)	1
House Finch	--	--	--	1 (0.88)	1
American Goldfinch	--	--	--	6 (5.28)	6
Total No. Individuals	--	--	--	70	76
Total No. Species	--	--	--	22	25

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Picnic Old-Field (POF)

SEASON: 1993 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Downy Woodpecker	0 (0.00)	1 (0.50)	1	--	--
Wood Thrush	3 (2.50)	3 (1.50)	3	--	--
Gray Catbird	3 (2.50)	3 (1.50)	3	--	--
Brown Thrasher	0 (0.00)	1 (0.50)	1	--	--
Northern Cardinal	2 (1.67)	2 (1.00)	2	--	--
Eastern Towhee	1 (0.83)	1 (0.50)	1	--	--
Total No. Individuals	10	11	11	--	--
Total No. Species	6	6	6	--	--

Appendix 10. (continued)

HABITAT: Old-Field

SITE: McMillan Old-Field (MOF)

SEASON: 1993 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Mourning Dove	4 (1.90)	4 (1.14)	4	--	--
Chimney Swift	1 (0.48)	1 (0.29)	1	--	--
Red-bellied Woodpecker	4 (1.90)	4 (1.14)	4	--	--
Northern Flicker	1 (0.48)	1 (0.29)	1	--	--
Eastern Wood-pewee	1 (0.48)	1 (0.29)	1	--	--
Great Crested Flycatcher	1 (0.48)	1 (0.29)	1	--	--
American Crow	4 (1.90)	4 (1.14)	4	--	--
Fish Crow	4 (1.90)	4 (1.14)	4	--	--
House Wren	2 (0.95)	2 (0.57)	2	--	--
American Robin	2 (0.95)	2 (0.57)	2	--	--
Gray Catbird	5 (2.38)	5 (1.43)	5	--	--
Northern Cardinal	6 (2.86)	6 (1.71)	6	--	--
Eastern Towhee	3 (1.43)	3 (0.86)	3	--	--
Chipping Sparrow	3 (1.43)	3 (0.86)	3	--	--
Field Sparrow	4 (1.90)	4 (1.14)	4	--	--
House Finch	10 (4.76)	10 (2.86)	10	--	--
American Goldfinch	4 (1.90)	4 (1.14)	4	--	--
Total No. Individuals	57	57	57	--	--
Total No. Species	17	17	17	--	--

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Devil's Den Old-Field (DOF)

SEASON: 1993 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Killdeer	--	--	--	0 (0.00)	1
Red-bellied Woodpecker	--	--	--	1 (1.77)	1
Northern Flicker	--	--	--	1 (1.77)	1
Eastern Wood-pewee	--	--	--	1 (1.77)	4
Great Crested Flycatcher	--	--	--	1 (1.77)	1
Blue Jay	--	--	--	3 (5.31)	3
Fish Crow	--	--	--	2 (3.54)	2
Black-capped Chickadee	--	--	--	1 (1.77)	1
Tufted Titmouse	--	--	--	4 (7.08)	4
White-breasted Nuthatch	--	--	--	1 (1.77)	1
Brown Creeper	--	--	--	1 (1.77)	1
House Wren	--	--	--	10 (17.70)	10
Blue-gray Gnatcatcher	--	--	--	2 (3.54)	2
Wood Thrush	--	--	--	0 (0.00)	3
Gray Catbird	--	--	--	7 (12.39)	7
Northern Mockingbird	--	--	--	0 (0.00)	5

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Devil's Den Old-Field (DOF)

SEASON: 1993 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Brown Thrasher	--	--	--	2 (3.54)	2
Northern Cardinal	--	--	--	5 (8.85)	5
Eastern Towhee	--	--	--	2 (3.54)	2
Indigo Bunting	--	--	--	3 (5.31)	3
House Finch	--	--	--	1 (1.77)	1
Total No. Individuals	--	--	--	48	60
Total No. Species	--	--	--	18	21

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Devil's Den Lowland (DDL)

SEASON: 1993 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Black Vulture	--	--	--	2 (3.54)	2
Mourning Dove	--	--	--	1 (1.77)	1
Red-headed Woodpecker	--	--	--	2 (3.54)	2
Red-bellied Woodpecker	--	--	--	4 (7.08)	4
Downy Woodpecker	--	--	--	2 (3.54)	2
Northern Flicker	--	--	--	4 (7.08)	7
Pileated Woodpecker	--	--	--	0 (0.00)	1
Eastern Wood-pewee	--	--	--	1 (1.77)	5
Great Crested Flycatcher	--	--	--	1 (1.77)	1
Blue Jay	--	--	--	7 (12.39)	7
American Crow	--	--	--	2 (3.54)	4
Fish Crow	--	--	--	0 (0.00)	1
Black-capped Chickadee	--	--	--	8 (14.16)	8
Tufted Titmouse	--	--	--	14 (24.78)	14
White-breasted Nuthatch	--	--	--	2 (3.54)	3
House Wren	--	--	--	17 (30.09)	20

Appendix 10. (continued)

HABITAT: Lowland-Forest
 SITE: Devil's Den Lowland (DDL)
 SEASON: 1993 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Eastern Bluebird	--	--	--	0 (0.00)	3
Wood Thrush	--	--	--	11 (19.47)	13
Gray Catbird	--	--	--	6 (10.62)	6
Red-eyed Vireo	--	--	--	4 (7.08)	5
Scarlet Tanager	--	--	--	2 (3.54)	2
Northern Cardinal	--	--	--	14 (24.78)	16
Eastern Towhee	--	--	--	1 (1.77)	1
Field Sparrow	--	--	--	0 (0.00)	2
Common Grackle	--	--	--	3 (5.31)	3
Total No. Individuals	--	--	--	108	133
Total No. Species	--	--	--	21	25

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Landfill Lowland (LFL)

SEASON: 1993 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Great Blue Heron	1 (0.28)	1 (0.17)	1	--	--
Chimney Swift	1 (0.28)	1 (0.17)	1	--	--
Belted Kingfisher	0 (0.00)	1 (0.17)	1	--	--
Red-bellied Woodpecker	1 (0.28)	1 (0.17)	1	--	--
Downy Woodpecker	1 (0.28)	1 (0.17)	1	--	--
Northern Flicker	3 (0.83)	3 (0.50)	3	--	--
Eastern Wood-pewee	1 (0.28)	1 (0.17)	1	--	--
Black-capped Chickadee	1 (0.28)	1 (0.17)	1	--	--
Tufted Titmouse	1 (0.28)	1 (0.17)	1	--	--
House Wren	8 (2.22)	8 (1.33)	8	--	--
Wood Thrush	3 (0.83)	3 (0.50)	3	--	--
Gray Catbird	6 (1.67)	6 (1.00)	6	--	--
Scarlet Tanager	2 (0.56)	3 (0.50)	3	--	--
Northern Cardinal	3 (0.83)	3 (0.50)	3	--	--
Eastern Towhee	2 (0.56)	2 (0.33)	2	--	--
Common Grackle	8 (2.22)	8 (1.33)	8	--	--
Total No. Individuals	42	44	44	--	--
Total No. Species	15	16	16	--	--

Appendix 10. (continued)

HABITAT: Upland-Forest

SITE: Little Round Top Upland (LRU)

SEASON: 1993 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Red-headed Woodpecker	1 (0.33)	1 (0.20)	1	--	--
Red-bellied Woodpecker	3 (1.00)	3 (0.60)	3	--	--
Downy Woodpecker	1 (0.33)	1 (0.20)	1	--	--
Northern Flicker	1 (0.33)	2 (0.40)	2	--	--
Eastern Wood-pewee	4 (1.33)	4 (0.80)	4	--	--
Great Crested Flycatcher	1 (0.33)	1 (0.20)	1	--	--
Blue Jay	11 (3.67)	13 (2.60)	13	--	--
Fish Crow	1 (0.33)	1 (0.20)	1	--	--
Black-capped Chickadee	8 (2.67)	8 (1.60)	8	--	--
Tufted Titmouse	4 (1.33)	4 (0.80)	4	--	--
White-breasted Nuthatch	1 (0.33)	1 (0.20)	1	--	--
House Wren	3 (1.00)	3 (0.60)	3	--	--
Wood Thrush	14 (4.67)	16 (3.20)	16	--	--
American Robin	3 (1.00)	3 (0.60)	3	--	--
Gray Catbird	1 (0.33)	1 (0.20)	1	--	--
Red-eyed Vireo	4 (1.33)	4 (0.80)	4	--	--

Appendix 10. (continued)

HABITAT: Upland-Forest
 SITE: Little Round Top Upland (LRU)
 SEASON: 1993 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Ovenbird	5 (1.67)	8 (1.60)	8	--	--
Scarlet Tanager	1 (0.33)	1 (0.20)	1	--	--
Northern Cardinal	10 (3.33)	10 (2.00)	10	--	--
Eastern Towhee	5 (1.67)	5 (1.00)	5	--	--
Common Grackle	11 (3.67)	11 (2.20)	11	--	--
Total No. Individuals	93	102	102	--	--
Total No. Species	21	21	21	--	--

Appendix 10. (continued)

HABITAT: Upland-Forest

SITE: Big Round Top Upland (BRU)

SEASON: 1993 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Red-bellied Woodpecker	--	--	--	2 (1.18)	2
Downy Woodpecker	--	--	--	3 (1.77)	4
Northern Flicker	--	--	--	1 (0.59)	2
Pileated Woodpecker	--	--	--	2 (1.18)	5
Eastern Wood-pewee	--	--	--	2 (1.18)	5
Blue Jay	--	--	--	9 (5.31)	11
American Crow	--	--	--	5 (2.95)	7
Black-capped Chickadee				5 (2.95)	5
Tufted Titmouse	--	--	--	9 (5.31)	11
White-breasted Nuthatch	--	--	--	0 (0.00)	1
House Wren	--	--	--	3 (1.77)	4
Wood Thrush	--	--	--	18 (10.62)	25
American Robin	--	--	--	1 (0.59)	1
Red-eyed Vireo	--	--	--	3 (1.77)	5
Ovenbird	--	--	--	2 (1.18)	5
Scarlet Tanager	--	--	--	2 (1.18)	2
Northern Cardinal	--	--	--	2 (1.18)	6
Total No. Individuals	--	--	--	101	69
Total No. Species	--	--	--	17	18

Appendix 10. (continued)

HABITAT: Grassland

SITE: Pennsylvania Monument Grassland (PMG)

SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Northern Mockingbird	2 (0.42)	2 (0.25)	2	--	--
Grasshopper Sparrow	1 (0.21)	1 (0.13)	1	--	--
Eastern Meadowlark	2 (0.42)	2 (0.25)	2	--	--
American Goldfinch	2 (0.42)	2 (0.25)	2	--	--
Total No. Individuals	7	7	7	--	--
Total No. Species	4	4	4	--	--

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Warfield Ridge Old-Field (WOF)

SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	--	--	--	1 (0.88)	1
Red-tailed Hawk	--	--	--	1 (0.88)	1
Mourning Dove	--	--	--	1 (0.88)	1
Red-headed Woodpecker	--	--	--	1 (0.88)	1
Red-bellied Woodpecker	--	--	--	5 (4.40)	5
Downy Woodpecker	--	--	--	1 (0.88)	1
Northern Flicker	--	--	--	4 (3.54)	4
Eastern Phoebe	--	--	--	2 (1.77)	2
Blue Jay	--	--	--	25 (22.10)	25
Black-capped Chickadee	--	--	--	4 (3.54)	4
Tufted Titmouse	--	--	--	17 (15.03)	17
House Wren	--	--	--	4 (3.54)	4
American Robin	--	--	--	23 (20.34)	23
Gray Catbird	--	--	--	27 (23.87)	28
Northern Mockingbird	--	--	--	4 (3.54)	4
Cedar Waxwing	--	--	--	40 (35.37)	40

Appendix 10. (continued)

HABITAT: Old-Field
 SITE: Warfield Ridge Old-Field (WOF)
 SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Red-eyed Vireo	--	--	--	1 (0.88)	1
Magnolia Warbler	--	--	--	6 (5.31)	6
Common Yellowthroat	--	--	--	3 (2.65)	3
Northern Cardinal	--	--	--	9 (7.96)	9
Eastern Towhee	--	--	--	4 (3.54)	4
Chipping Sparrow	--	--	--	2 (1.77)	2
Song Sparrow	--	--	--	1 (0.88)	1
Common Grackle	--	--	--	50 (44.00)	50
House Finch	--	--	--	4 (3.54)	4
American Goldfinch	--	--	--	4 (3.54)	4
Total No. Individuals	--	--	--	237	238
Total No. Species	--	--	--	26	26

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Picnic Old-Field (POF)

SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Blue Jay	2 (1.67)	2 (1.00)	2	--	--
American Crow	2 (1.67)	2 (1.00)	2	--	--
Black-capped Chickadee	2 (1.67)	2 (1.00)	2	--	--
Tufted Titmouse	1 (0.83)	1 (0.50)	1	--	--
Red-breasted Nuthatch	2 (1.67)	2 (1.00)	2	--	--
Ruby-crowned Kinglet	1 (0.83)	1 (0.50)	1	--	--
Gray-cheeked Thrush	1 (0.83)	1 (0.50)	1	--	--
American Robin	7 (5.83)	7 (3.50)	7	--	--
Chipping Sparrow	1 (0.83)	1 (0.50)	1	--	--
American Goldfinch	3 (2.50)	3 (1.50)	3	--	--
Total No. Individuals	22	22	22	--	--
Total No. Species	10	10	10	--	--

Appendix 10. (continued)

HABITAT: Old-Field

SITE: McMillan Old-Field (MOF)

SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Red-tailed Hawk	1 (0.48)	1 (0.29)	1	--	--
Red-bellied Woodpecker	2 (0.95)	2 (0.57)	2	--	--
Northern Flicker	1 (0.48)	1 (0.29)	1	--	--
Black-capped Chickadee	1 (0.48)	1 (0.29)	1	--	--
Tufted Titmouse	2 (0.95)	2 (0.57)	2	--	--
House Wren	2 (0.95)	2 (0.57)	2	--	--
Cedar Waxwing	4 (1.90)	4 (1.14)	4	--	--
European Starling	1 (0.48)	1 (0.29)	1	--	--
Northern Cardinal	4 (1.90)	4 (1.14)	4	--	--
Chipping Sparrow	1 (0.48)	1 (0.29)	1	--	--
Field Sparrow	22 (10.48)	22 (6.29)	22	--	--
Dark-eyed Junco	1 (0.48)	1 (0.29)	1	--	--
Common Grackle	108 (51.43)	108 (61.71)	108	--	--
House Finch	4 (1.90)	4 (1.14)	4	--	--
Total No. Individuals	159	159	159	--	--
Total No. Species	16	16	16	--	--

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Devil's Den Old-Field (DOF)

SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	--	--	--	5 (8.84)	5
Red-headed Woodpecker	--	--	--	2 (3.54)	4
Red-bellied Woodpecker	--	--	--	4 (7.07)	4
Yellow-bellied Sapsucker	--	--	--	2 (3.54)	2
Northern Flicker	--	--	--	1 (1.77)	1
Blue Jay	--	--	--	30 (53.05)	30
Black-capped Chickadee	--	--	--	9 (15.92)	9
Tufted Titmouse	--	--	--	11 (19.45)	11
Carolina Wren	--	--	--	1 (1.77)	1
House Wren	--	--	--	2 (3.54)	2
Ruby-crowned Kinglet	--	--	--	1 (1.77)	1
American Robin	--	--	--	1 (1.77)	1
Gray Catbird	--	--	--	7 (12.38)	7
Brown Thrasher	--	--	--	1 (1.77)	1
Magnolia Warbler	--	--	--	2 (3.54)	2
Black-throated Green Warbler	--	--	--	1 (1.77)	1

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Devil's Den Old-Field (DOF)

SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Pine Warbler	--	--	--	1 (1.77)	1
Common Yellowthroat	--	--	--	1 (1.77)	1
Scarlet Tanager	--	--	--	1 (1.77)	1
Northern Cardinal	--	--	--	6 (10.61)	6
Chipping Sparrow	--	--	--	6 (10.61)	6
Field Sparrow	--	--	--	11 (19.45)	11
Dark-eyed Junco	--	--	--	1 (1.77)	1
Total No. Individuals	--	--	--	106	108
Total No. Species	--	--	--	22	22

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Devil's Den Lowland (DDL)

SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Black Vulture	--	--	--	1 (0.71)	1
Turkey Vulture	--	--	--	2 (1.41)	2
Red-headed Woodpecker	--	--	--	8 (5.66)	8
Red-bellied Woodpecker	--	--	--	14 (9.90)	14
Yellow-bellied Sapsucker	--	--	--	1 (0.71)	1
Downy Woodpecker	--	--	--	4 (2.83)	4
Northern Flicker	--	--	--	3 (2.12)	3
Eastern Wood-pewee	--	--	--	1 (0.71)	1
Blue Jay	--	--	--	27 (19.10)	28
American Crow	--	--	--	1 (0.71)	1
Black-capped Chickadee	--	--	--	18 (12.73)	18
Tufted Titmouse	--	--	--	20 (14.15)	20
Red-breasted Nuthatch	--	--	--	2 (1.41)	2
White-breasted Nuthatch	--	--	--	7 (4.95)	7
Brown Creeper	--	--	--	1 (0.71)	1
Winter Wren	--	--	--	1 (0.71)	1

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Devil's Den Lowland (DDL)

SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Hermit Thrush	--	--	--	1 (0.71)	1
Wood Thrush	--	--	--	3 (2.12)	3
American Robin	--	--	--	10 (7.07)	10
Gray Catbird	--	--	--	2 (1.41)	2
Chestnut-sided Warbler	--	--	--	1 (0.71)	1
Magnolia Warbler	--	--	--	5 (3.54)	6
Black-throated Blue Warbler	--	--	--	1 (0.71)	1
Scarlet Tanager	--	--	--	1 (0.71)	1
Northern Cardinal	--	--	--	8 (5.66)	8
Common Grackle	--	--	--	1 (0.71)	100
American Goldfinch	--	--	--	1 (0.71)	1
Total No. Individuals	--	--	--	144	246
Total No. Species	--	--	--	27	27

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Landfill Lowland (LFL)

SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	1 (0.17)	1	--	--
Wood Duck	4 (1.11)	4 (0.67)	4	--	--
Sharp-shinned Hawk	1 (0.28)	1 (0.17)	1	--	--
Belted Kingfisher	1 (0.28)	2 (0.33)	2	--	--
Red-bellied Woodpecker	2 (0.56)	2 (0.33)	2	--	--
Yellow-bellied Sapsucker	1 (0.28)	1 (0.17)	1	--	--
Downy Woodpecker	2 (0.56)	2 (0.33)	2	--	--
Hairy Woodpecker	1 (0.28)	1 (0.17)	1	--	--
Northern Flicker	1 (0.28)	1 (0.17)	1	--	--
Pileated Woodpecker	2 (0.56)	2 (0.33)	2	--	--
Eastern Wood-pewee	1 (0.28)	2 (0.33)	2	--	--
Blue Jay	10 (2.78)	10 (1.67)	10	--	--
American Crow	0 (0.00)	1 (0.17)	1	--	--
Black-capped Chickadee	5 (1.39)	5 (0.83)	5	--	--
Tufted Titmouse	3 (0.83)	3 (0.50)	3	--	--
White-breasted Nuthatch	1 (0.28)	1 (0.17)	1	--	--

Appendix 10. (continued)

HABITAT: Lowland-Forest
 SITE: Landfill Lowland (LFL)
 SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Carolina Wren	1 (0.28)	1 (0.17)	1	--	--
American Robin	1 (0.28)	1 (0.17)	1	--	--
Gray Catbird	3 (0.83)	3 (0.50)	3	--	--
Tennessee Warbler	2 (0.56)	2 (0.33)	2	--	--
Magnolia Warbler	2 (0.56)	2 (0.33)	2	--	--
Black-throated Blue Warbler	1 (0.28)	1 (0.17)	1	--	--
Pine Warbler	1 (0.28)	1 (0.17)	1	--	--
Common Yellowthroat	2 (0.56)	2 (0.33)	2	--	--
Scarlet Tanager	1 (0.28)	1 (0.17)	1	--	--
Northern Cardinal	4 (1.94)	4 (1.17)	4	--	--
Total No. Individuals	53	57	57	--	--
Total No. Species	25	27	27	--	--

Appendix 10. (continued)

HABITAT: Upland-Forest

SITE: Little Round Top Upland (LRU)

SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Red-bellied Woodpecker	4 (1.33)	5 (1.00)	5	--	--
Blue Jay	0 (0.00)	2 (0.40)	2	--	--
American Crow	0 (0.00)	3 (0.60)	3	--	--
Tufted Titmouse	1 (0.33)	1 (0.20)	1	--	--
Wood Thrush	2 (0.67)	3 (0.60)	3	--	--
Northern Cardinal	1 (0.33)	1 (0.20)	1	--	--
Total No. Individuals	8	15	15	--	--
Total No. Species	4	6	6	--	--

Appendix 10. (continued)

HABITAT: Upland-Forest

SITE: Big Round Top Upland (BRU)

SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	--	--	--	30 (17.7)	30
Black Vulture	--	--	--	2 (1.18)	2
Red-bellied Woodpecker	--	--	--	13 (7.66)	13
Downy Woodpecker	--	--	--	3 (1.77)	3
Common Flicker	--	--	--	1 (0.59)	1
Pileated Woodpecker	--	--	--	1 (0.59)	1
Blue Jay	--	--	--	15 (8.84)	17
American Crow	--	--	--	0 (0.00)	1
Black-capped Chickadee	--	--	--	14 (8.25)	14
Carolina Chickadee	--	--	--	4 (2.36)	4
Tufted Titmouse	--	--	--	12 (7.07)	12
Red-breasted Nuthatch	--	--	--	2 (1.18)	2
White-breasted Nuthatch	--	--	--	3 (1.77)	4
Carolina Wren	--	--	--	3 (1.77)	4
Ruby-crowned Kinglet	--	--	--	1 (0.59)	1
Gray-cheeked Thrush	--	--	--	1 (0.59)	1

Appendix 10. (continued)

HABITAT: Upland-Forest
 SITE: Big Round Top Upland (BRU)
 SEASON: 1993 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Wood Thrush	--	--	--	10 (5.89)	10
American Robin	--	--	--	2 (1.18)	2
Magnolia Warbler	--	--	--	1 (0.59)	1
Northern Cardinal	--	--	--	1 (0.59)	1
House Finch	--	--	--	2 (1.18)	2
Total No. Individuals	--	--	--	121	126
Total No. Species	--	--	--	20	21

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Warfield Ridge Old-Field (WOF)

SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	0	2 (1.77)	2
Red-tailed Hawk	0 (0.00)	1 (0.25)	1	1 (0.88)	1
Mourning Dove	0 (0.00)	0 (0.00)	0	2 (1.77)	2
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	0	5 (4.40)	5
Downy Woodpecker	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Northern Flicker	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Blue Jay	2 (0.83)	3 (0.75)	3	5 (4.40)	5
American Crow	0 (0.00)	4 (1.00)	2	2 (1.77)	2
Black-capped Chickadee	1 (0.42)	2 (0.50)	2	2 (1.77)	2
Tufted Titmouse	0 (0.00)	1 (0.25)	1	3 (2.65)	3
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	2 (1.77)	2
Golden-crowned Kinglet	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Eastern Bluebird	0 (0.00)	0 (0.00)	0	6 (5.31)	6
American Robin	5 (2.08)	5 (1.25)	5	0 (0.00)	0
Northern Mockingbird	2 (0.83)	2 (0.50)	2	1 (0.88)	1
European Starling	5 (2.08)	5 (1.25)	5	1 (0.88)	1

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Warfield Ridge Old-Field (WOF)

SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Northern Cardinal	3 (1.25)	6 (1.50)	6	4 (3.54)	4
Eastern Towhee	0 (0.00)	2 (0.50)	2	0 (0.00)	0
Dark-eyed Junco	2 (0.83)	2 (0.50)	2	0 (0.00)	0
Common Grackle	0 (0.00)	1 (0.25)	1	1 (0.88)	1
House Finch	0 (0.00)	3 (0.75)	3	9 (7.96)	9
Total No. Individuals	19	37	37	49	49
Total No. Species	7	13	13	18	18

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Picnic Old-Field (POF)

SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Killdeer	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Mourning Dove	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-bellied Woodpecker	1 (0.83)	1 (0.50)	1	0 (0.00)	0
Blue Jay	5 (4.17)	5 (2.50)	5	0 (0.00)	1
Black-capped Chickadee	5 (4.17)	5 (2.50)	5	0 (0.00)	0
Tufted Titmouse	0 (0.00)	0 (0.00)	0	4 (7.07)	4
American Robin	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Northern Mockingbird	2 (1.67)	2 (1.00)	2	0 (0.00)	0
Cedar Waxwing	2 (1.67)	2 (1.00)	2	0 (0.00)	0
Northern Cardinal	2 (1.67)	3 (1.50)	3	1 (1.77)	1
Dark-eyed Junco	1 (0.83)	1 (0.50)	1	0 (0.00)	0
Common Grackle	0 (0.00)	0 (0.00)	0	1 (1.77)	1
House Finch	0 (0.00)	0 (0.00)	0	1 (1.77)	3
Total No. Individuals	18	19	19	8	13
Total No. Species	7	7	7	5	8

Appendix 10. (continued)

HABITAT: Old-Field

SITE: McMillan Old-Field (MOF)

SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	2 (0.95)	2 (0.57)	2	1 (1.18)	1
Turkey Vulture	0 (0.00)	0 (0.00)	0	3 (3.54)	3
Downy Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Northern Flicker	2 (0.95)	2 (0.57)	2	0 (0.00)	0
Blue Jay	1 (0.48)	1 (0.29)	1	4 (4.72)	4
American Crow	0 (0.00)	2 (0.57)	2	0 (0.00)	0
Fish Crow	2 (0.95)	2 (0.57)	2	3 (3.54)	3
Black-capped Chickadee	0 (0.00)	0 (0.00)	0	1 (1.18)	1
Tufted Titmouse	0 (0.00)	1 (0.29)	1	0 (0.00)	0
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	0 (0.00)	1
American Robin	0 (0.00)	0 (0.00)	0	7 (8.25)	7
European Starling	0 (0.00)	0 (0.00)	0	3 (3.54)	3
Northern Cardinal	7 (3.33)	7 (2.00)	7	1 (1.18)	2
White-throated Sparrow	1 (0.48)	1 (0.29)	1	0 (0.00)	0
Dark-eyed Junco	8 (3.81)	8 (2.29)	8	1 (1.18)	2
Common Grackle	1 (0.48)	1 (0.29)	1	10 (11.79)	10

Appendix 10. (continued)

HABITAT: Old-Field

SITE: McMillan Old-Field (MOF)

SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Brown-headed Cowbird	0 (0.00)	0 (0.00)	0	1 (1.18)	1
Purple Finch	2 (0.95)	2 (0.57)	2	0 (0.00)	0
House Finch	0 (0.00)	2 (0.57)	2	10 (11.79)	10
American Goldfinch	0 (0.00)	0 (0.00)	0	3 (3.54)	3
Total No. Individuals	26	31	31	48	52
Total No. Species	9	12	12	13	15

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Devil's Den Old-Field (DOF)

SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	15 (8.33)	15 (5.00)	15	0 (0.00)	0
Red-tailed Hawk	1 (0.56)	1 (0.67)	1	0 (0.00)	0
Barred Owl	0 (0.00)	3 (1.00)	3	0 (0.00)	0
Red-headed Woodpecker	3 (1.67)	4 (1.33)	4	0 (0.00)	1
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	0	3 (5.31)	3
Downy Woodpecker	1 (0.56)	1 (0.33)	1	1 (1.77)	1
Blue Jay	0 (0.00)	0 (0.00)	0	3 (5.31)	4
American Crow	0 (0.00)	1 (0.33)	1	0 (0.00)	1
Black-capped Chickadee	1 (0.56)	1 (0.33)	1	13 (22.99)	13
Carolina Chickadee	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Tufted Titmouse	3 (1.67)	4 (1.33)	4	3 (5.31)	3
White-breasted Nuthatch	5 (2.78)	7 (2.33)	7	3 (5.31)	3
Brown Creeper	1 (0.56)	1 (0.33)	1	0 (0.00)	0
Carolina Wren	0 (0.00)	0 (0.00)	0	1 (1.77)	2
Northern Mockingbird	1 (0.56)	1 (0.33)	1	7 (12.28)	7
Northern Cardinal	5 (2.78)	5 (1.67)	5	1 (1.77)	1

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Devil's Den Old-Field (DOF)

SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
American Tree Sparrow	2 (1.11)	2 (0.67)	2	0 (0.00)	0
Field Sparrow	2 (1.11)	2 (0.67)	2	9 (15.92)	9
Song Sparrow	6 (3.33)	6 (2.00)	6	2 (3.54)	2
White-throated Sparrow	0 (0.00)	0 (0.00)	0	7 (12.38)	8
Dark-eyed Junco	22 (12.22)	22 (7.33)	22	50 (88.42)	50
Total No. Individuals	68	76	76	104	109
Total No. Species	14	16	16	14	16

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Devil's Den Lowland (DDL)

SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	0	13 (9.20)	13
Wood Duck	9 (2.50)	9 (1.50)	9	0 (0.00)	0
Black Vulture	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Turkey Vulture	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Red-headed Woodpecker	2 (0.56)	2 (0.33)	2	8 (5.66)	8
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	0	5 (3.54)	5
Downy Woodpecker	1 (0.28)	1 (0.17)	1	5 (3.54)	3
Northern Flicker	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Blue Jay	0 (0.00)	1 (0.17)	1	5 (3.54)	7
American Crow	4 (1.11)	6 (1.00)	6	4 (2.83)	6
Black-capped Chickadee	0 (0.00)	0 (0.00)	0	9 (6.37)	9
Tufted Titmouse	0 (0.00)	0 (0.00)	0	5 (3.54)	5
Red-breasted Nuthatch	0 (0.00)	0 (0.00)	0	1 (0.71)	1
White-breasted Nuthatch	1 (0.28)	1 (0.17)	1	8 (5.66)	8
Brown Creeper	0 (0.00)	0 (0.00)	0	1 (0.71)	1

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Devil's Den Lowland (DDL)

SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Golden-crowned Kinglet	0 (0.00)	0 (0.00)	0	2 (1.41)	2
American Robin	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Song Sparrow	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Dark-eyed Junco	0 (0.00)	0 (0.00)	0	10 (7.07)	10
Total No. Individuals	19	22	22	76	84
Total No. Species	7	8	8	17	18

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Landfill Lowland (LFL)

SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	19 (5.28)	19 (3.17)	19	2 (1.41)	3
Wood Duck	1 (0.28)	1 (0.17)	1	3 (0.71)	3
Mallard	3 (0.83)	3 (0.50)	3	4 (2.83)	4
Turkey Vulture	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Red-tailed Hawk	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Killdeer	0 (0.00)	0 (0.00)	0	2 (1.41)	2
Belted Kingfisher	1 (0.56)	1 (0.33)	1	0 (0.00)	0
Red-bellied Woodpecker	2 (0.56)	3 (0.50)	3	3 (2.12)	1
Downy Woodpecker	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
American Crow	2 (0.56)	2 (0.33)	2	5 (3.54)	7
Black-capped Chickadee	15 (4.17)	15 (2.50)	15	3 (2.12)	3
Carolina Chickadee	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Tufted Titmouse	1 (0.28)	1 (0.17)	1	3 (2.12)	3
White-breasted Nuthatch	3 (0.83)	3 (0.50)	3	5 (3.54)	5
Carolina Wren	1 (0.28)	1 (0.17)	1	0 (0.00)	0

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Landfill Lowland (LFL)

SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Winter Wren	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Eastern Bluebird	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Cedar Waxwing	3 (0.83)	3 (0.50)	3	0 (0.00)	0
Northern Cardinal	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Song Sparrow	5 (1.39)	5 (0.83)	5	9 (6.37)	9
White-throated Sparrow	47 (13.06)	47 (7.83)	47	0 (0.00)	0
Dark-eyed Junco	41 (11.39)	41 (6.83)	41	9 (6.37)	9
House Finch	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Total No. Individuals	148	149	149	51	57
Total No. Species	18	18	18	17	19

Appendix 10. (continued)

HABITAT: Upland-Forest
 SITE: Little Round Top Upland (LRU)
 SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	0 (0.00)	0 (0.00)	0	2 (1.77)	2
Sharp-shinned Hawk	1 (0.33)	1 (0.20)	1	0 (0.00)	0
Red-bellied Woodpecker	1 (0.33)	3 (0.61)	3	1 (0.88)	2
Downy Woodpecker	0 (0.00)	2 (0.40)	2	2 (1.77)	3
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Blue Jay	0 (0.00)	0 (0.00)	0	0 (0.00)	1
American Crow	1 (0.33)	3 (0.60)	30	4 (3.54)	5
Common Raven	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Tufted Titmouse	0 (0.00)	1 (0.20)	1	1 (0.88)	2
White-breasted Nuthatch	0 (0.00)	2 (0.40)	2	3 (2.65)	3
Brown Creeper	4 (1.33)	4 (0.80)	4	1 (0.88)	1
Carolina Wren	0 (0.00)	1 (0.20)	1	0 (0.00)	0
Eastern Bluebird	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Dark-eyed Junco	0 (0.00)	0 (0.00)	0	2 (1.77)	2
Total No. Individuals	7	17	17	17	24
Total No. Species	4	8	8	9	12

Appendix 10. (continued)

HABITAT: Upland-Forest

SITE: Big Round Top Upland (BRU)

SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	40 (8.89)	40 (5.33)	40	0 (0.00)	0
Black Vulture	2 (0.44)	2 (0.27)	2	2 (1.18)	2
Turkey Vulture	3 (0.67)	7 (0.93)	7	20 (11.79)	20
Red-tailed Hawk	0 (0.00)	0 (0.00)	0	1 (0.59)	2
Red-headed Woodpecker	0 (0.00)	0 (0.00)	0	1 (0.59)	1
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	0	2 (1.18)	2
Downy Woodpecker	0 (0.00)	0 (0.00)	0	3 (1.77)	4
Pileated Woodpecker	0 (0.00)	1 (0.13)	1	0 (0.00)	0
Blue Jay	0 (0.00)	0 (0.00)	0	1 (0.59)	2
American Crow	1 (0.22)	2 (0.27)	2	3 (1.77)	3
Black-capped Chickadee	3 (0.67)	3 (0.40)	3	8 (4.72)	8
Tufted Titmouse	1 (0.22)	2 (0.27)	2	0 (0.00)	0
Red-breasted Nuthatch	0 (0.00)	0 (0.00)	0	1 (0.59)	1
White-breasted Nuthatch	0 (0.00)	1 (0.13)	1	9 (5.31)	10
Brown Creeper	0 (0.00)	0 (0.00)	0	1 (0.59)	1
Common Grackle	50 (11.11)	51 (6.80)	51	0 (0.00)	0

Appendix 10. (continued)

HABITAT: Upland-Forest

SITE: Big Round Top Upland (BRU)

SEASON: 1993-94 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
House Finch	1 (0.22)	1 (0.13)	1	0 (0.00)	0
Pine Siskin	0 (0.00)	0 (0.00)	0	1 (0.59)	1
Total No. Individuals	101	110	110	54	58
Total No. Species	8	10	10	14	14

Appendix 10. (continued)

HABITAT: Grassland

SITE: Pennsylvania Monument Grassland (PMG)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Mourning Dove	1 (0.21)	1 (0.13)	1	--	--
Blue Jay	1 (0.21)	1 (0.13)	1	--	--
Northern Mockingbird	2 (0.42)	2 (0.25)	2	--	--
European Starling	2 (0.42)	4 (0.50)	4	--	--
Grasshopper Sparrow	4 (0.83)	4 (0.50)	4	--	--
Eastern Meadowlark	5 (1.04)	5 (0.63)	5	--	--
Total No. Individuals	15	17	17	--	--
Total No. Species	6	6	6	--	--

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Warfield Ridge Old-Field (WOF)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Double-crested Cormorant	0	0	0	10	10
Turkey Vulture	1 (0.42)	1 (0.25)	1	0 (0.00)	0
Mourning Dove	0 (0.00)	0 (0.00)	0	4 (3.52)	4
Yellow-billed Cuckoo	1 (0.42)	1 (0.25)	1	0 (0.00)	0
Chimney Swift	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Northern Flicker	1 (0.42)	1 (0.25)	1	0 (0.00)	0
Blue Jay	0 (0.00)	2 (0.50)	2	4 (3.52)	4
American Crow	0 (0.00)	2 (0.50)	2	0 (0.00)	0
Tufted Titmouse	2 (0.83)	2 (0.50)	2	0 (0.00)	0
House Wren	4 (1.67)	4 (1.00)	4	3 (2.64)	4
Blue-gray Gnatcatcher	1 (0.42)	1 (0.25)	1	0 (0.00)	0
Wood Thrush	2 (0.83)	2 (0.50)	2	1 (0.88)	1
American Robin	0 (0.00)	0 (0.00)	0	3 (2.64)	3
Gray Catbird	2 (0.83)	3 (0.75)	3	4 (3.52)	4
Northern Mockingbird	6 (2.50)	6 (1.50)	6	3 (2.64)	3
Brown Thrasher	1 (0.42)	1 (0.25)	1	2 (1.76)	2

Appendix 10. (continued)

HABITAT: Old-Field
 SITE: Warfield Ridge Old-Field (WOF)
 SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
European Starling	0 (0.00)	0 (0.00)	0	1 (0.88)	1
White-eyed Vireo	0 (0.00)	0 (0.00)	0	2 (1.76)	2
Chestnut-sided Warbler	1 (0.42)	1 (0.25)	1	1 (0.88)	1
Black-throated Blue Warbler	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Common Yellowthroat	3 (1.25)	3 (0.75)	3	3 (2.64)	5
Northern Cardinal	4 (1.67)	4 (1.00)	4	2 (1.76)	2
Eastern Towhee	4 (1.67)	4 (1.00)	4	6 (5.28)	7
Field Sparrow	5 (2.08)	5 (1.25)	5	7 (6.16)	7
Song Sparrow	0 (0.00)	0 (0.00)	0	1 (0.88)	2
White-throated Sparrow	6 (2.50)	6 (1.50)	6	4 (3.52)	4
Red-winged Blackbird	0 (0.00)	2 (0.50)	2	0 (0.00)	0
Eastern Meadowlark	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Common Grackle	1 (0.42)	1 (0.25)	1	2 (1.76)	2
Brown-headed Cowbird	1 (0.42)	1 (0.25)	1	0 (0.00)	0
House Finch	0 (0.00)	0 (0.00)	0	1 (0.88)	2
Total No. Individuals	46	53	53	66	74
Total No. Species	18	21	21	22	23

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Picnic Old-Field (POF)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Black Vulture	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Turkey Vulture	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Killdeer	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Mourning Dove	4 (3.33)	4 (2.00)	4	3 (5.31)	4
Chimney Swift	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Red-bellied Woodpecker	0 (0.00)	1 (0.50)	1	0 (0.00)	0
Great Crested Flycatcher	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Blue Jay	2 (1.67)	3 (1.50)	3	3 (5.31)	4
Tufted Titmouse	1 (0.83)	1 (0.50)	1	2 (3.54)	2
House Wren	2 (1.67)	2 (1.00)	2	1 (1.77)	1
Wood Thrush	3 (2.50)	3 (1.50)	3	3 (5.31)	3
American Robin	3 (2.50)	3 (1.50)	3	5 (8.85)	5
Gray Catbird	1 (0.83)	1 (0.50)	1	0 (0.00)	0
Brown Thrasher	1 (0.83)	1 (0.50)	1	0 (0.00)	0
Yellow-rumped Warbler	1 (0.83)	1 (0.50)	1	0 (0.00)	0
Common Yellowthroat	0 (0.00)	0 (0.00)	0	0 (0.00)	1

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Picnic Old-Field (POF)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Northern Cardinal	2 (1.67)	2 (1.00)	2	0 (0.00)	1
Eastern Towhee	0 (0.00)	1 (0.50)	1	3 (5.31)	4
Field Sparrow	2 (1.67)	2 (1.00)	2	0 (0.00)	2
White-throated Sparrow	1 (0.83)	1 (0.50)	1	0 (0.00)	0
Common Grackle	3 (2.50)	3 (1.50)	3	7 (12.39)	7
House Finch	1 (0.83)	1 (0.50)	1	1 (1.77)	1
American Goldfinch	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Total No. Individuals	27	30	30	34	41
Total No. Species	14	16	16	14	18

Appendix 10. (continued)

HABITAT: Old-Field

SITE: McMillan Old-Field (MOF)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Mourning Dove	2 (0.95)	2 (0.57)	2	3 (3.54)	3
Barred Owl	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Chimney Swift	0 (0.00)	0 (0.00)	0	7 (8.26)	7
Downy Woodpecker	1 (0.48)	2 (0.57)	2	0 (0.00)	0
Northern Flicker	1 (0.48)	1 (0.29)	1	1 (1.18)	1
Great Crested Flycatcher	1 (0.48)	1 (0.29)	1	0 (0.00)	0
Tree Swallow	0 (0.00)	0 (0.00)	0	2 (2.36)	2
Blue Jay	2 (0.95)	5 (1.43)	5	1 (1.18)	1
American Crow	3 (1.43)	3 (0.86)	3	2 (2.36)	3
Fish Crow	2 (0.95)	4 (1.14)	4	0 (0.00)	2
Black-capped Chickadee	4 (1.90)	4 (1.14)	4	1 (1.18)	1
Tufted Titmouse	2 (0.95)	2 (0.57)	2	2 (2.36)	2
House Wren	1 (0.48)	1 (0.29)	1	1 (1.18)	1
Ruby-crowned Kinglet	1 (0.48)	2 (0.57)	2	0 (0.00)	0
Blue-gray Gnatcatcher	0 (0.00)	0 (0.00)	0	1 (1.18)	1
American Robin	3 (1.43)	3 (0.86)	3	0 (0.00)	0

Appendix 10. (continued)

HABITAT: Old-Field

SITE: McMillan Old-Field (MOF)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
European Starling	0 (0.00)	1 (0.29)	1	2 (2.36)	2
Gray Catbird	2 (0.95)	2 (0.57)	2	3 (3.54)	3
Northern Mockingbird	1 (0.48)	1 (0.29)	1	0 (0.00)	2
Northern Cardinal	4 (1.90)	5 (1.43)	5	3 (3.54)	3
Eastern Towhee	3 (1.43)	3 (0.86)	3	1 (1.18)	2
Chipping Sparrow	2 (0.95)	2 (0.57)	2	2 (2.36)	2
Field Sparrow	5 (2.38)	5 (1.43)	5	1 (1.18)	3
Dark-eyed Junco	1 (0.48)	1 (0.29)	1	0 (0.00)	0
White-throated Sparrow	1 (0.48)	1 (0.29)	1	0 (0.00)	0
Red-winged Blackbird	1 (0.48)	2 (0.57)	2	0 (0.00)	0
Common Grackle	5 (2.38)	5 (1.43)	5	1 (1.18)	1
Brown-headed Cowbird	1 (0.48)	2 (0.57)	2	1 (1.18)	1
House Finch	4 (2.38)	4 (1.43)	4	3 (3.54)	3
American Goldfinch	4 (1.90)	5 (1.43)	5	0 (0.00)	1
Total No. Individuals	58	70	70	38	48
Total No. Species	26	27	27	18	23

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Devil's Den Old-Field (DOF)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	1 (0.33)	1	0 (0.00)	0
Black Vulture	1 (0.56)	1 (0.33)	1	2 (3.54)	2
Turkey Vulture	0 (0.00)	0 (0.00)	0	4 (7.08)	4
Red-tailed Hawk	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Barred Owl	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Chimney Swift	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-headed Woodpecker	2 (1.11)	2 (0.67)	2	0 (0.00)	0
Red-bellied Woodpecker	0 (0.00)	1 (0.33)	1	0 (0.00)	1
Downy Woodpecker	1 (0.56)	1 (0.33)	1	0 (0.00)	0
Northern Flicker	2 (1.11)	2 (0.67)	2	2 (3.54)	2
Eastern Phoebe	1 (0.56)	1 (0.33)	1	0 (0.00)	1
Blue Jay	2 (1.11)	3 (1.00)	3	0 (0.00)	0
Black-capped Chickadee	3 (1.67)	3 (1.00)	3	0 (0.00)	1
Tufted Titmouse	4 (2.22)	4 (1.33)	4	2 (3.54)	2
House Wren	2 (1.11)	2 (0.67)	2	3 (5.31)	3
Blue-gray Gnatcatcher	0 (0.00)	0 (0.00)	0	1 (1.77)	1

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Devil's Den Old-Field (DOF)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Wood Thrush	3 (1.67)	3 (1.00)	3	0 (0.00)	0
Gray Catbird	3 (1.67)	3 (1.00)	3	2 (3.54)	2
Northern Mockingbird	0 (0.00)	0 (0.00)	0	3 (5.31)	3
Brown Thrasher	1 (0.56)	1 (0.33)	1	0 (0.00)	0
Cedar Waxwing	0 (0.00)	0 (0.00)	0	9 (15.93)	9
Blue-winged Warbler	2 (1.11)	2 (0.67)	2	1 (1.77)	1
Chestnut-sided Warbler	1 (0.56)	1 (0.33)	1	1 (1.77)	1
Yellow-rumped Warbler	1 (0.56)	1 (0.33)	1	0 (0.00)	0
Prairie Warbler	1 (0.56)	1 (0.33)	1	0 (0.00)	0
Black-and-White Warbler	0 (0.00)	0 (0.00)	0	2 (3.54)	2
Common Yellowthroat	1 (0.56)	1 (0.33)	1	0 (0.00)	0
Northern Cardinal	3 (1.67)	4 (1.33)	4	2 (3.54)	2
Eastern Towhee	3 (1.67)	3 (1.00)	3	6 (10.62)	7
Field Sparrow	2 (1.11)	4 (1.33)	4	1 (1.77)	1
Song Sparrow	1 (0.56)	1 (0.33)	1	2 (3.54)	2
White-throated Sparrow	5 (2.78)	5 (1.67)	5	2 (3.54)	3

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Devil's Den Old-Field (DOF)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Dark-eyed Junco	2 (1.11)	2 (0.67)	2	0 (0.00)	0
Common Grackle	2 (1.11)	2 (0.67)	2	0 (0.00)	0
House Finch	2 (1.11)	2 (0.67)	2	0 (0.00)	0
American Goldfinch	0 (0.00)	0 (0.00)	0	2 (3.54)	2
Total No. Individuals	51	57	57	48	58
Total No. Species	25	27	27	19	25

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Devil's Den Lowland (DDL)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	0	2 (3.54)	2
Wood Duck	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Turkey Vulture	1 (0.28)	1 (0.17)	1	5 (8.85)	5
Mourning Dove	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Yellow-billed Cuckoo	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Red-headed Woodpecker	3 (0.83)	3 (0.50)	3	0 (0.00)	0
Red-bellied Woodpecker	3 (0.83)	3 (0.50)	3	2 (3.54)	3
Downy Woodpecker	3 (0.83)	3 (0.50)	3	3 (5.31)	3
Northern Flicker	3 (0.83)	3 (0.50)	3	1 (1.77)	1
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	1 (1.77)	2
Eastern Phoebe	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Great Crested Flycatcher	0 (0.00)	0 (0.00)	0	3 (5.31)	3
Blue Jay	1 (0.28)	1 (0.17)	1	0 (0.00)	0
American Crow	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Black-capped Chickadee	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Carolina Chickadee	0 (0.00)	0 (0.00)	0	1 (1.77)	1

Appendix 10. (continued)

HABITAT: Lowland-Forest
 SITE: Devil's Den Lowland (DDL)
 SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Tufted Titmouse	3 (0.83)	4 (0.67)	4	6 (10.62)	6
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	8 (14.16)	8
House Wren	6 (1.67)	6 (1.00)	6	10 (17.70)	11
Winter Wren	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Ruby-crowned Kinglet	1 (0.28)	1 (0.17)	1	1 (1.77)	1
Blue-gray Gnatcatcher	3 (0.83)	3 (0.50)	3	4 (7.08)	5
Eastern Bluebird	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Wood Thrush	2 (0.56)	2 (0.33)	2	4 (7.08)	5
American Robin	0 (0.00)	0 (0.00)	0	2 (3.54)	2
Gray Catbird	1 (0.28)	1 (0.17)	1	1 (1.77)	1
Philadelphia Vireo	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Northern Parula	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Chestnut-sided Warbler	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Yellow-rumped Warbler	0 (0.00)	0 (0.00)	0	3 (5.31)	3
Black-throated Green Warbler	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Prairie Warbler	0 (0.00)	0 (0.00)	0	0 (0.00)	1

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Devil's Den Lowland (DDL)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
American Redstart	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Hooded Warbler	0 (0.00)	0 (0.00)	0	2 (3.54)	2
Scarlet Tanager	1 (0.28)	1 (0.17)	1	1 (1.77)	2
Northern Cardinal	1 (0.28)	1 (0.17)	1	6 (10.62)	7
Rose-breasted Grosbeak	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Indigo Bunting	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Eastern Towhee	0 (0.00)	0 (0.00)	0	2 (3.54)	2
Field Sparrow	0 (0.00)	1 (0.17)	1	0 (0.00)	0
White-throated Sparrow	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Common Grackle	0 (0.00)	0 (0.00)	0	2 (3.54)	2
Brown-headed Cowbird	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Purple Finch	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Total No. Individuals	48	53	53	72	86
Total No. Species	24	28	28	26	31

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Landfill Lowland (LFL)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	8 (2.22)	8 (1.33)	8	3 (2.13)	4
Wood Duck	11 (3.06)	11 (1.83)	11	20 (1.42)	4
Mallard	3 (0.83)	3 (0.50)	3	0 (0.00)	1
Turkey Vulture	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Red-shouldered Hawk	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Spotted Sandpiper	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Red-bellied Woodpecker	3 (0.83)	3 (0.50)	3	3 (2.13)	4
Downy Woodpecker	3 (0.83)	3 (0.50)	3	6 (4.26)	7
Northern Flicker	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Pileated Woodpecker	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Great-crested Flycatcher	0 (0.00)	1 (0.17)	1	0 (0.00)	1
Blue Jay	4 (1.11)	4 (0.67)	4	1 (0.71)	1
American Crow	4 (1.11)	8 (1.33)	8	0 (0.00)	1
Black-capped Chickadee	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Carolina Chickadee	3 (0.83)	3 (0.50)	3	0 (0.00)	0
Tufted Titmouse	3 (0.83)	4 (0.67)	4	4 (2.84)	5

Appendix 10. (continued)

HABITAT: Lowland-Forest
 SITE: Landfill Lowland (LFL)
 SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	5 (3.55)	5
House Wren	8 (2.22)	8 (1.33)	8	11 (7.81)	11
Ruby-crowned Kinglet	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Blue-gray Gnatcatcher	5 (1.39)	5 (0.83)	5	5 (3.55)	5
Gray-cheeked Thrush	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Wood Thrush	6 (1.67)	6 (1.00)	6	4 (2.84)	5
American Robin	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Gray Catbird	5 (1.39)	5 (0.83)	5	0 (0.00)	0
Cedar Waxwing	0 (0.00)	0 (0.00)	0	12 (8.52)	12
European Starling	0 (0.00)	0 (0.00)	0	1 (0.71)	1
White-eyed Vireo	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Northern Parula	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Yellow-rumped Warbler	5 (1.39)	5 (0.83)	5	1 (0.71)	1
Prairie Warbler	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Black-and-White Warbler	1 (0.28)	1 (0.17)	1	0 (0.00)	0
American Redstart	1 (0.28)	1 (0.17)	1	1 (0.71)	1

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Landfill Lowland (LFL)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Common Yellowthroat	2 (0.56)	2 (0.33)	2	1 (0.71)	1
Northern Cardinal	4 (1.11)	4 (0.67)	4	5 (3.55)	5
Eastern Towhee	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Song Sparrow	1 (0.28)	1 (0.17)	1	1 (0.71)	1
White-throated Sparrow	2 (0.56)	3 (0.50)	3	3 (2.13)	3
Eastern Meadowlark	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Common Grackle	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Brown-headed Cowbird	4 (1.11)	4 (0.67)	4	0 (0.00)	0
House Finch	1 (0.28)	1 (0.17)	1	0 (0.00)	0
American Goldfinch	2 (0.56)	2 (0.33)	2	2 (1.42)	2
Total No. Individuals	96	106	106	82	93
Total No. Species	29	33	33	30	34

Appendix 10. (continued)

HABITAT: Upland-Forest

SITE: Little Round Top Upland (LRU)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Black Vulture	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Turkey Vulture	0 (0.00)	0 (0.00)	0	3 (2.64)	3
Cooper's Hawk	0 (0.00)	1 (0.20)	1	0 (0.00)	0
Downy Woodpecker	1 (0.33)	1 (0.20)	1	0 (0.00)	1
Northern Flicker	1 (0.33)	1 (0.20)	1	1 (0.88)	1
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Great Crested Flycatcher	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Blue Jay	0 (0.00)	1 (0.20)	1	5 (4.40)	5
Tufted Titmouse	0 (0.00)	3 (0.60)	3	2 (1.76)	2
White-breasted Nuthatch	1 (0.33)	1 (0.20)	1	1 (0.88)	1
House Wren	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Ruby-crowned Kinglet	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Blue-gray Gnatcatcher	1 (0.33)	1 (0.20)	10	0 (0.00)	0
Hermit Thrush	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Wood Thrush	7 (2.33)	8 (1.60)	8	5 (4.40)	5

Appendix 10. (continued)

HABITAT: Upland-Forest
 SITE: Little Round Top Upland (LRU)
 SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
American Robin	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Red-eyed Vireo	0 (0.00)	0 (0.00)	0	2 (1.76)	2
Black-throated Blue Warbler	1 (0.33)	1 (0.20)	1	1 (0.88)	1
Yellow-rumped Warbler	3 (1.00)	3 (0.60)	3	0 (0.00)	0
Black-throated Green Warbler	1 (0.33)	2 (0.40)	2	0 (0.00)	1
Ovenbird	4 (1.33)	5 (1.00)	5	3 (2.64)	4
Scarlet Tanager	2 (0.67)	2 (0.40)	2	1 (0.88)	1
Northern Cardinal	7 (2.33)	10 (2.00)	10	6 (5.28)	7
Red-winged Blackbird	2 (0.67)	4 (0.80)	4	5 (4.40)	5
Common Grackle	0 (0.00)	0 (0.00)	0	1 (0.88)	1
American Goldfinch	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Total No. Individuals	31	44	44	44	49
Total No. Species	12	15	15	21	24

Appendix 10. (continued)

HABITAT: Upland-Forest

SITE: Big Round Top Upland (BRU)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	2 (0.27)	2	0 (0.00)	0
Black Vulture	1 (0.22)	1 (0.13)	1	2 (1.18)	2
Turkey Vulture	5 (1.11)	5 (0.67)	5	20 (11.80)	20
Broad-winged Hawk	1 (0.22)	1 (0.13)	1	0 (0.00)	0
Mourning Dove	2 (0.44)	2 (0.27)	2	0 (0.00)	0
Red-bellied Woodpecker	0 (0.00)	2 (0.27)	2	2 (1.18)	2
Downy Woodpecker	4 (0.89)	4 (0.53)	4	1 (0.59)	1
Pileated Woodpecker	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	3
Eastern Wood-pewee	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Great Crested Flycatcher	1 (0.22)	1 (0.13)	1	0 (0.00)	0
Blue Jay	4 (0.89)	6 (0.80)	6	3 (1.77)	4
Fish Crow	0 (0.00)	3 (0.40)	3	0 (0.00)	0
Black-capped Chickadee	1 (0.22)	1 (0.13)	1	0 (0.00)	2
Carolina Chickadee	1 (0.22)	1 (0.13)	1	0 (0.00)	0
Tufted Titmouse	1 (0.22)	1 (0.13)	1	0 (0.00)	0
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	1 (0.59)	1
House Wren	0 (0.00)	0 (0.00)	0	0 (0.00)	1

Appendix 10. (continued)

HABITAT: Upland-Forest
 SITE: Big Round Top Upland (BRU)
 SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Winter Wren	3 (0.67)	3 (0.40)	3	1 (0.59)	3
Hermit Thrush	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Wood Thrush	5 (1.11)	5 (0.67)	5	4 (2.36)	7
Red-eyed Vireo	3 (0.67)	3 (0.40)	3	1 (0.59)	2
Black-throated Blue Warbler	0 (0.00)	0 (0.00)	0	2 (1.18)	2
Black-throated Green Warbler	1 (0.22)	2 (0.27)	2	0 (0.00)	1
Blackburnian Warbler	2 (0.44)	2 (0.27)	2	0 (0.00)	0
American Redstart	0 (0.00)	0 (0.00)	0	1 (0.59)	1
Worm-eating Warbler	0 (0.00)	0 (0.00)	0	1 (0.59)	1
Ovenbird	0 (0.00)	3 (0.40)	3	0 (0.00)	8
Hooded Warbler	0 (0.00)	1 (0.13)	1	0 (0.00)	0
Scarlet Tanager	2 (0.44)	2 (0.27)	2	0 (0.00)	2
Northern Cardinal	1 (0.22)	1 (0.13)	1	0 (0.00)	2
Common Grackle	0 (0.00)	0 (0.00)	0	2 (1.18)	2
American Goldfinch	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Total No. Individuals	38	52	52	41	70
Total No. Species	17	22	22	13	23

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Warfield Ridge Old-Field (WOF)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Mourning Dove	0 (0.00)	0 (0.00)	0	2 (1.76)	3
Red-headed Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-bellied Woodpecker	0 (0.00)	1 (0.25)	1	0 (0.00)	0
Eastern Wood-pewee	0 (0.00)	1 (0.25)	1	0 (0.00)	1
Great Crested Flycatcher	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Tree Swallow	0 (0.00)	0 (0.00)	0	0 (0.00)	10
Blue Jay	0 (0.00)	1 (0.25)	1	1 (0.88)	4
American Crow	3 (1.25)	3 (0.75)	3	0 (0.00)	0
Black-capped Chickadee	0 (0.00)	0 (0.00)	0	1 (0.88)	1
Tufted Titmouse	1 (0.42)	1 (0.25)	1	0 (0.00)	0
White-breasted Nuthatch	2 (0.83)	2 (0.50)	2	0 (0.00)	0
House Wren	2 (0.83)	2 (0.50)	2	1 (0.88)	2
Wood Thrush	0 (0.00)	1 (0.25)	1	0 (0.00)	1
American Robin	0 (0.00)	1 (0.25)	1	1 (0.88)	1
Gray Catbird	3 (1.25)	3 (0.75)	3	8 (7.04)	9
Northern Mockingbird	2 (0.83)	2 (0.50)	2	0 (0.00)	2

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Warfield Ridge Old-Field (WOF)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Brown Thrasher	2 (0.83)	2 (0.50)	2	0 (0.00)	0
Cedar Waxwing	1 (0.42)	1 (0.25)	1	0 (0.00)	0
Blue-winged Warbler	1 (0.42)	1 (0.25)	1	0 (0.00)	1
Common Yellowthroat	2 (0.83)	4 (1.00)	4	3 (2.64)	5
Scarlet Tanager	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Northern Cardinal	1 (0.42)	1 (0.25)	1	3 (2.64)	5
Indigo Bunting	2 (0.83)	2 (0.50)	2	3 (2.64)	4
Eastern Towhee	2 (0.83)	2 (0.50)	2	2 (1.76)	4
Field Sparrow	1 (0.42)	2 (0.50)	2	4 (3.52)	4
Song Sparrow	0 (0.00)	0 (0.00)	0	2 (1.76)	2
Brown-headed Cowbird	1 (0.42)	2 (0.50)	2	0 (0.00)	0
American Goldfinch	1 (0.42)	1 (0.25)	1	0 (0.00)	0
Total No. Individuals	27	36	36	32	65
Total No. Species	16	21	21	13	21

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Picnic Old-Field (POF)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	0	0 (0.00)	2
Red-tailed Hawk	1 (0.83)	1 (0.50)	1	0 (0.00)	0
Chimney Swift	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Downy Woodpecker	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Eastern Wood-pewee	0 (0.00)	1 (0.50)	1	0 (0.00)	1
Blue Jay	0 (0.00)	1 (0.50)	1	0 (0.00)	0
Black-capped Chickadee	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Tufted Titmouse	1 (0.83)	1 (0.50)	1	0 (0.00)	0
House Wren	1 (0.83)	1 (0.50)	1	0 (0.00)	1
Wood Thrush	0 (0.00)	2 (1.00)	2	1 (1.77)	3
American Robin	1 (0.83)	2 (1.00)	2	1 (1.77)	2
Gray Catbird	0 (0.00)	0 (0.00)	0	2 (3.54)	3
Cedar Waxwing	0 (0.00)	0 (0.00)	0	10 (17.70)	10
Red-eyed Vireo	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Magnolia Warbler	2 (1.67)	2 (1.00)	2	0 (0.00)	0
Blackpoll	1 (0.83)	1 (0.50)	1	0 (0.00)	0

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Picnic Old-Field (POF)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Common Yellowthroat	1 (0.83)	1 (0.50)	1	0 (0.00)	0
Northern Cardinal	1 (0.83)	1 (0.50)	1	0 (0.00)	1
Eastern Towhee	3 (2.50)	3 (1.50)	3	0 (0.00)	2
Field Sparrow	1 (0.83)	1 (0.50)	1	1 (1.77)	1
Common Grackle	0 (0.00)	0 (0.00)	0	2 (3.54)	3
Brown-headed Cowbird	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Total No. Individuals	13	18	18	18	34
Total No. Species	10	13	13	7	16

Appendix 10. (continued)

HABITAT: Old-Field

SITE: McMillan Old-Field (MOF)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Yellow-billed Cuckoo	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Chimney Swift	4 (1.90)	4 (1.14)	4	1 (1.18)	1
Downy Woodpecker	0 (0.00)	0 (0.00)	0	1 (1.18)	2
Great Crested Flycatcher	1 (0.48)	2 (0.57)	2	3 (3.54)	5
Blue Jay	0 (0.00)	0 (0.00)	0	1 (1.18)	5
American Crow	0 (0.00)	2 (0.57)	2	0 (0.00)	3
Fish Crow	1 (0.48)	1 (0.29)	1	1 (1.18)	2
Black-capped Chickadee	0 (0.00)	0 (0.00)	0	1 (1.18)	2
Tufted Titmouse	1 (0.48)	2 (0.57)	2	0 (0.00)	3
Brown Creeper	0 (0.00)	0 (0.00)	0	1 (1.18)	1
House Wren	2 (0.95)	2 (0.57)	2	2 (2.36)	5
Wood Thrush	0 (0.00)	0 (0.00)	0	0 (0.00)	1
American Robin	0 (0.00)	0 (0.00)	0	1 (1.18)	1
Northern Mockingbird	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Brown Thrasher	1 (0.48)	1 (0.29)	1	0 (0.00)	0

Appendix 10. (continued)

HABITAT: Old-Field

SITE: McMillan Old-Field (MOF)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
European Starling	1 (0.48)	1 (0.29)	1	0 (0.00)	0
Northern Cardinal	3 (1.43)	3 (0.86)	3	3 (3.54)	5
Indigo Bunting	0 (0.00)	1 (0.29)	1	0 (0.00)	2
Eastern Towhee	2 (0.95)	2 (0.57)	2	0 (0.00)	1
Chipping Sparrow	1 (0.48)	1 (0.29)	1	0 (0.00)	0
Field Sparrow	5 (2.38)	5 (1.43)	5	2 (2.36)	3
Brown-headed Cowbird	3 (1.43)	3 (0.86)	3	0 (0.00)	1
House Finch	0 (0.00)	0 (0.00)	0	1 (1.18)	2
American Goldfinch	4 (1.90)	4 (1.14)	4	5 (5.90)	9
Total No. Individuals	28	34	34	22	57
Total No. Species	13	15	15	13	23

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Devil's Den Old-Field (DOF)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Black-billed Cuckoo	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-headed Woodpecker	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Red-bellied Woodpecker	1 (0.56)	1 (0.33)	1	1 (1.77)	2
Great Crested Flycatcher	0 (0.00)	1 (0.33)	1	0 (0.00)	1
Eastern Wood-pewee	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Blue Jay	0 (0.00)	2 (0.66)	2	1 (1.77)	2
American Crow	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Black-capped Chickadee	1 (0.56)	1 (0.33)	1	1 (1.77)	2
Tufted Titmouse	1 (0.56)	1 (0.33)	1	1 (1.77)	3
House Wren	5 (2.78)	6 (2.00)	6	2 (3.54)	4
Wood Thrush	0 (0.00)	2 (0.66)	2	0 (0.00)	1
Gray Catbird	1 (0.56)	1 (0.33)	1	3 (5.31)	3
Red-eyed Vireo	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Black-throated Blue Warbler	1 (0.56)	1 (0.33)	1	0 (0.00)	0
Chestnut-sided Warbler	1 (0.56)	1 (0.33)	1	0 (0.00)	0
American Redstart	1 (0.56)	1 (0.33)	1	0 (0.00)	0

Appendix 10. (continued)

HABITAT: Old-Field

SITE: Devil's Den Old-Field (DOF)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Scarlet Tanager	0 (0.00)	1 (0.33)	1	0 (0.00)	0
Northern Cardinal	1 (0.56)	2 (0.66)	2	2 (3.54)	3
Eastern Towhee	1 (0.56)	1 (0.33)	1	2 (3.54)	3
Song Sparrow	1 (0.56)	1 (0.33)	1	1 (1.77)	2
Brown-headed Cowbird	1 (0.56)	1 (0.33)	1	0 (0.00)	0
House Finch	1 (0.56)	1 (0.33)	1	0 (0.00)	0
Total No. Individuals	17	25	25	18	31
Total No. Species	13	17	17	13	16

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Devil's Den Lowland (DDL)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Turkey Vulture	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Barred Owl	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Chimney Swift	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Red-headed Woodpecker	0 (0.00)	0 (0.00)	0	2 (3.54)	2
Red-bellied Woodpecker	0 (0.00)	3 (0.50)	3	2 (3.54)	6
Downy Woodpecker	0 (0.00)	0 (0.00)	0	1 (1.77)	2
Northern Flicker	2 (0.55)	4 (0.67)	4	2 (3.54)	3
Eastern Wood-pewee	1 (0.28)	1 (0.17)	1	1 (1.77)	3
Acadian Flycatcher	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Great Crested Flycatcher	2 (0.55)	2 (0.33)	2	3 (5.31)	3
Blue Jay	2 (0.55)	7 (1.17)	7	0 (0.00)	3
Black-capped Chickadee	1 (0.28)	1 (0.17)	1	1 (1.77)	1
Carolina Chickadee	1 (0.28)	1 (0.17)	1	3 (5.31)	3
Tufted Titmouse	3 (0.83)	5 (0.50)	5	2 (3.54)	5
White-breasted Nuthatch	1 (0.28)	1 (0.17)	1	4 (7.08)	4

Appendix 10. (continued)

HABITAT: Lowland-Forest
 SITE: Devil's Den Lowland (DDL)
 SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
House Wren	5 (1.39)	5 (0.83)	5	4 (7.08)	6
Blue-gray Gnatcatcher	3 (0.83)	3 (0.50)	3	0 (0.00)	0
Wood Thrush	1 (0.28)	1 (0.17)	1	3 (5.31)	9
Gray Catbird	1 (0.28)	1 (0.17)	1	2 (3.54)	3
Red-eyed Vireo	1 (0.28)	1 (0.17)	1	2 (3.54)	2
Cedar Waxwing	0 (0.00)	0 (0.00)	0	9 (15.93)	9
American Redstart	2 (0.55)	2 (0.33)	2	0 (0.00)	0
Scarlet Tanager	0 (0.00)	1 (0.17)	1	0 (0.00)	2
Northern Cardinal	2 (0.55)	2 (0.33)	2	4 (7.08)	5
Eastern Towhee	2 (0.55)	2 (0.33)	2	1 (1.77)	1
Common Grackle	0 (0.00)	0 (0.00)	0	1 (1.77)	1
Brown-headed Cowbird	1 (0.28)	1 (0.17)	1	0 (0.00)	0
American Goldfinch	1 (0.28)	1 (0.17)	1	1 (1.77)	1
Total No. Individuals	33	47	47	50	77
Total No. Species	19	22	22	21	24

Appendix 10. (continued)

HABITAT: Lowland-Forest

SITE: Landfill Lowland (LFL)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	7 (1.94)	7 (1.67)	7	0 (0.00)	0
Wood Duck	22 (6.11)	22 (3.67)	22	0 (0.00)	0
Mallard	9 (2.50)	9 (1.50)	9	5 (3.55)	5
Turkey Vulture	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Cooper's Hawk	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Chimney Swift	3 (0.83)	3 (0.50)	3	10 (7.10)	10
Belted Kingfisher	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Red-bellied Woodpecker	1 (0.28)	2 (0.33)	2	2 (1.42)	2
Downy Woodpecker	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Northern Flicker	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Eastern Wood-pewee	0 (0.00)	1 (0.17)	1	1 (0.71)	4
Acadian Flycatcher	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Great Crested Flycatcher	7 (1.94)	7 (1.67)	7	2 (1.42)	3
Blue Jay	0 (0.00)	0 (0.00)	0	0 (0.00)	1
American Crow	0 (0.00)	2 (0.33)	2	0 (0.00)	3
Carolina Chickadee	0 (0.00)	0 (0.00)	0	1 (0.71)	1

Appendix 10. (continued)

HABITAT: Lowland-Forest
 SITE: Landfill Lowland (LFL)
 SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Tufted Titmouse	4 (1.11)	4 (0.67)	4	3 (2.13)	3
White-breasted Nuthatch	1 (0.28)	1 (0.17)	1	3 (2.13)	3
House Wren	6 (1.67)	7 (1.67)	7	3 (2.13)	6
Blue-gray Gnatcatcher	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Eastern Bluebird	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Veery	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Wood Thrush	0 (0.00)	1 (0.17)	1	1 (0.71)	1
American Robin	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Gray Catbird	7 (1.94)	7 (1.67)	7	2 (1.42)	3
Red-eyed Vireo	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Yellow Warbler	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Cape May Warbler	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Blackpoll	0 (0.00)	0 (0.00)	0	3 (2.13)	3
American Redstart	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Scarlet Tanager	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Northern Cardinal	0 (0.00)	1 (0.17)	1	1 (0.71)	2

Appendix 10. (continued)

HABITAT: Lowland-Forest
 SITE: Landfill Lowland (LFL)
 SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Indigo Bunting	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Eastern Towhee	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Song Sparrow	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Common Grackle	0 (0.00)	0 (0.00)	0	5 (3.55)	5
Brown-headed Cowbird	1 (0.28)	1 (0.17)	1	1 (0.71)	1
American Goldfinch	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Total No. Individuals	79	86	86	53	70
Total No. Species	22	26	26	25	28

Appendix 10. (continued)

HABITAT: Upland-Forest

SITE: Little Round Top Upland (LRU)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Cooper's Hawk	1 (0.33)	1 (0.20)	1	0 (0.00)	0
Downy Woodpecker	0 (0.00)	0 (0.00)	0	2 (1.76)	3
Red-bellied Woodpecker	0 (0.00)	2 (0.41)	2	2 (1.76)	5
Northern Flicker	0 (0.00)	1 (0.20)	1	0 (0.00)	0
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Eastern Wood-pewee	1 (0.33)	2 (0.40)	2	1 (0.88)	4
Great Crested Flycatcher	0 (0.00)	0 (0.00)	0	0 (0.00)	2
Blue Jay	1 (0.33)	4 (0.80)	4	0 (0.00)	0
American Crow	0 (0.00)	1 (0.20)	1	0 (0.00)	0
Tufted Titmouse	1 (0.33)	3 (0.60)	3	0 (0.00)	2
White-breasted Nuthatch	1 (0.33)	1 (0.20)	1	1 (0.88)	1
Wood Thrush	5 (1.67)	7 (1.40)	7	6 (5.28)	8
Cedar Waxwing	0 (0.00)	0 (0.00)	0	3 (2.64)	3
Red-eyed Vireo	2 (1.00)	2 (0.40)	2	3 (2.64)	4
Magnolia Warbler	0 (0.00)	1 (0.20)	1	0 (0.00)	0
Blackpoll	0 (0.00)	0 (0.00)	0	0 (0.00)	1

Appendix 10. (continued)

HABITAT: Upland-Forest
 SITE: Little Round Top Upland (LRU)
 SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Ovenbird	1 (0.33)	2 (0.40)	2	1 (0.88)	1
Scarlet Tanager	0 (0.00)	1 (0.20)	1	1 (0.88)	3
Northern Cardinal	3 (1.00)	5 (1.00)	5	2 (1.76)	8
Brown-headed Cowbird	1 (0.33)	1 (0.20)	1	0 (0.00)	0
Total No. Individuals	17	34	34	22	46
Total No. Species	10	15	15	10	14

Appendix 10. (continued)

HABITAT: Upland-Forest

SITE: Big Round Top Upland (BRU)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	0 (0.00)	0 (0.00)	0	4 (2.36)	5
Broad-winged Hawk	1 (0.22)	1 (0.13)	1	0 (0.00)	0
Mourning Dove	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Chimney Swift	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-bellied Woodpecker	1 (0.22)	3 (0.40)	3	2 (1.18)	4
Downy Woodpecker	2 (0.44)	4 (0.53)	4	0 (0.00)	1
Northern Flicker	2 (0.44)	2 (0.27)	2	0 (0.00)	0
Pileated Woodpecker	0 (0.00)	1 (0.13)	1	0 (0.00)	1
Eastern Wood-pewee	0 (0.00)	2 (0.27)	2	1 (0.59)	8
Acadian Flycatcher	1 (0.22)	1 (0.13)	1	0 (0.00)	0
Great Crested Flycatcher	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Blue Jay	3 (0.67)	4 (0.53)	4	2 (1.18)	5
American Crow	0 (0.00)	0 (0.00)	0	0 (0.00)	3
Black-capped Chickadee	0 (0.00)	1 (0.13)	1	0 (0.00)	0
Carolina Chickadee	0 (0.00)	0 (0.00)	0	2 (1.18)	2
Tufted Titmouse	2 (0.44)	3 (0.40)	3	2 (1.18)	5

Appendix 10. (continued)

HABITAT: Upland-Forest
 SITE: Big Round Top Upland (BRU)
 SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
House Wren	1 (0.22)	1 (0.13)	1	0 (0.00)	1
Wood Thrush	3 (0.67)	12 (1.60)	12	2 (1.18)	4
American Robin	1 (0.22)	1 (0.13)	1	1 (0.59)	1
Cedar Waxwing	0 (0.00)	0 (0.00)	0	5 (2.95)	9
Red-eyed Vireo	4 (0.89)	4 (0.53)	4	2 (1.18)	5
Black-throated Green Warbler	0 (0.00)	1 (0.13)	1	0 (0.00)	0
Blackpoll	3 (0.67)	3 (0.40)	3	0 (0.00)	0
Ovenbird	1 (0.22)	3 (0.40)	3	1 (0.59)	3
Scarlet Tanager	2 (0.44)	4 (0.53)	4	2 (1.18)	4
Northern Cardinal	2 (0.44)	2 (0.27)	2	1 (0.59)	1
Total No. Individuals	29	54	54	27	65
Total No. Species	15	19	19	13	20

Appendix 11. Bird species, number of individuals, and, in parentheses, density (no./ha) during all seasons and at all study sites using 30-m and 50-m fixed width transects (TRAN-30 and TRAN-50, respectively), unlimited-distance transects (TRAN-UL), 30-m radius point counts (PNTC-30), and unlimited-radius point counts (PNTC-UL) at Hopewell Furnace National Historic Site.

HABITAT: Old-Field

SITE: Powerline Upland Old-Field (PUO)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Sharp-shinned Hawk	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Red-bellied Woodpecker	1 (0.28)	1 (0.17)	1	0 (0.00)	2
Northern Flicker	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Great Crested Flycatcher	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Blue Jay	2 (0.56)	4 (0.67)	4	4 (2.84)	6
American Crow	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Carolina Chickadee	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Ruby-crowned Kinglet	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Wood Thrush	1 (0.28)	1 (0.17)	1	1 (0.71)	4
Yellow-throated Vireo	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Northern Parula	1 (0.28)	1 (0.17)	1	0 (0.00)	0

Appendix 11. (continued)

HABITAT: Old-Field

SITE: Powerline Upland Old-Field (PUO)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Black-throated Blue Warbler	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Yellow-rumped Warbler	2 (0.56)	2 (0.33)	2	0 (0.00)	1
Black-throated Green Warbler	2 (0.56)	3 (0.50)	3	0 (0.00)	1
Worm-eating Warbler	0 (0.00)	1 (0.17)	1	0 (0.00)	1
Ovenbird	3 (0.83)	5 (0.83)	6	2 (1.42)	9
Common Yellowthroat	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Scarlet Tanager	1 (0.28)	1 (0.17)	1	1 (0.71)	2
Northern Cardinal	3 (0.83)	3 (0.50)	3	0 (0.00)	0
Indigo Bunting	2 (0.56)	2 (0.33)	2	2 (1.42)	3
Eastern Towhee	4 (1.11)	4 (0.67)	4	1 (0.71)	2
White-throated Sparrow	2 (0.56)	2 (0.33)	2	1 (0.71)	1
Common Grackle	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Brown-headed Cowbird	1 (0.28)	1 (0.17)	1	0 (0.00)	0
American Goldfinch	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Total No. Individuals	31	38	39	17	42
Total No. Species	18	20	20	12	21

Appendix 11. (continued)

HABITAT: Old-Field

SITE: Powerline Lowland Old-Field (PLO)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Killdeer	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-bellied Woodpecker	1 (0.28)	1 (0.17)	1	0 (0.00)	2
Downy Woodpecker	1 (0.28)	1 (0.17)	1	1 (0.71)	2
Northern Flicker	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	2
Blue Jay	0 (0.00)	0 (0.00)	0	2 (1.42)	3
American Crow	0 (0.00)	1 (0.17)	1	4 (2.84)	4
Black-capped Chickadee	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Carolina Chickadee	2 (0.56)	2 (0.33)	2	2 (1.42)	2
Tufted Titmouse	1 (0.28)	1 (0.17)	1	2 (1.42)	2
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Ruby-crowned Kinglet	3 (0.83)	3 (0.50)	3	1 (0.71)	1
Wood Thrush	1 (0.28)	2 (0.33)	2	0 (0.00)	4
American Robin	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Gray Catbird	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Solitary Vireo	1 (0.28)	1 (0.17)	1	0 (0.00)	0

Appendix 11. (continued)

HABITAT: Old-Field

SITE: Powerline Lowland Old-Field (PLO)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Yellow-throated Vireo	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Red-eyed Vireo	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Northern Parula	0 (0.00)	0 (0.00)	0	2 (1.42)	3
Yellow Warbler	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Black-throated Blue Warbler	0 (0.00)	0 (0.00)	0	5 (3.55)	6
Yellow-rumped Warbler	1 (0.28)	1 (0.17)	1	8 (5.68)	8
Black-throated Green Warbler	0 (0.00)	0 (0.00)	0	2 (1.42)	6
Blackburnian Warbler	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Worm-eating Warbler	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Ovenbird	2 (0.56)	3 (0.50)	3	3 (2.13)	8
Louisiana Waterthrush	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Common Yellowthroat	3 (0.83)	3 (0.50)	3	0 (0.00)	0
Scarlet Tanager	0 (0.00)	0 (0.00)	0	4 (2.84)	7
Northern Cardinal	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Indigo Bunting	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Eastern Towhee	0 (0.00)	0 (0.00)	0	0 (0.00)	2
White-throated Sparrow	5 (1.39)	5 (0.83)	5	0 (0.00)	1

Appendix 11. (continued)

HABITAT: Old-Field

SITE: Powerline Lowland Old-Field (PLO)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Common Grackle	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Brown-headed Cowbird	1 (0.28)	1 (0.17)	1	3 (2.13)	5
House Finch	1 (0.28)	1 (0.17)	1	0 (0.00)	0
American Goldfinch	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Total No. Individuals	27	31	31	54	85
Total No. Species	17	19	19	25	32

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: Powerline Lowland (PLL)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Red-shouldered Hawk	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-bellied Woodpecker	1 (0.28)	3 (0.50)	3	2 (1.42)	3
Downy Woodpecker	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Northern Flicker	2 (0.56)	2 (0.33)	2	1 (0.71)	3
Pileated Woodpecker	0 (0.00)	0 (0.00)	1	0 (0.00)	1
Eastern Wood-pewee	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Great Crested Flycatcher	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Blue Jay	2 (0.56)	3 (0.50)	3	0 (0.00)	1
American Crow	0 (0.00)	0 (0.00)	0	0 (0.00)	2
Carolina Chickadee	1 (0.28)	1 (0.17)	1	3 (2.13)	4
Tufted Titmouse	1 (0.28)	1 (0.17)	1	1 (0.71)	2
White-breasted Nuthatch	1 (0.28)	1 (0.17)	1	2 (1.42)	2
Ruby-crowned Kinglet	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Wood Thrush	3 (0.83)	4 (0.67)	4	2 (1.42)	6
Solitary Vireo	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Philadelphia Vireo	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Red-eyed Vireo	2 (0.56)	2 (0.33)	2	2 (1.42)	2
Northern Parula	0 (0.00)	0 (0.00)	0	1 (0.71)	2

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: Powerline Lowland (PLL)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Black-throated Blue Warbler	0 (0.00)	1 (0.17)	1	2 (1.42)	3
Yellow-rumped Warbler	0 (0.00)	0 (0.00)	0	2 (1.42)	3
Black-throated Green Warbler	0 (0.00)	0 (0.00)	0	0 (0.00)	3
Black-and-White Warbler	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Ovenbird	5 (1.39)	8	8	9 (6.38)	15
Louisiana Waterthrush	1 (0.28)	3 (0.50)	3	0 (0.00)	4
Scarlet Tanager	0 (0.00)	0 (0.00)	0	0 (0.00)	3
Northern Cardinal	1 (0.28)	1 (0.17)	1	1 (0.71)	3
White-throated Sparrow	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Common Grackle	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Brown-headed Cowbird	0 (0.00)	0 (0.00)	0	0 (0.00)	1
American Goldfinch	0 (0.00)	0 (0.00)	1	2 (1.42)	2
Total No. Individuals	25	35	37	34	72
Total No. Species	16	17	19	16	26

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: Hopewell Road Lowland (HOL)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	2	0 (0.00)	1
Wood Duck	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Killdeer	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Downy Woodpecker	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Northern Flicker	1 (0.28)	2 (0.33)	2	0 (0.00)	0
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	2
Acadian Flycatcher	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Great Crested Flycatcher	0 (0.00)	0 (0.00)	0	2 (1.42)	4
Blue Jay	2 (0.56)	3 (0.50)	3	0 (0.00)	2
American Crow	6 (1.67)	8 (1.33)	8	0 (0.00)	2
Black-capped Chickadee	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Carolina Chickadee	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Tufted Titmouse	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Blue-gray Gnatcatcher	4 (1.11)	4 (0.67)	4	1 (0.71)	1
Wood Thrush	0 (0.00)	1 (0.17)	1	0 (0.00)	0
American Robin	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Gray Catbird	4 (1.11)	4 (0.67)	4	2 (1.42)	2
Red-eyed Vireo	4 (1.11)	5 (0.83)	5	2 (1.42)	4

Appendix 11. (continued)

HABITAT: Lowland Forest
 SITE: Hopewell Road Lowland (HOL)
 SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Blue-winged Warbler	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Northern Parula	1 (0.28)	1 (0.17)	1	0 (0.00)	0
American Redstart	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Ovenbird	2 (0.56)	2 (0.33)	3	0 (0.00)	0
Louisiana Waterthrush	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Common Yellowthroat	5 (1.39)	5 (0.83)	5	3 (2.13)	6
Northern Cardinal	2 (0.56)	2 (0.33)	2	1 (0.71)	2
Common Grackle	2 (0.56)	2 (0.33)	2	2 (1.42)	2
House Finch	2 (0.56)	2 (0.33)	2	0 (0.00)	0
American Goldfinch	2 (0.56)	3 (0.50)	3	1 (0.71)	2
Total No. Individuals	44	51	54	20	40
Total No. Species	19	20	21	14	18

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: French Creek Riparian (FCR)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Red-bellied Woodpecker	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Northern Flicker	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Acadian Flycatcher	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Blue Jay	7 (1.96)	7 (1.17)	7	4 (2.84)	5
American Crow	0 (0.00)	0 (0.00)	0	0 (0.00)	2
Black-capped Chickadee	0 (0.00)	0 (0.00)	0	1 (0.71)	3
Tufted Titmouse	0 (0.00)	0 (0.00)	0	0 (0.00)	1
House Wren	2 (0.56)	2 (0.33)	2	2 (1.42)	2
Wood Thrush	3 (0.83)	3 (0.50)	4	2 (1.42)	4
American Robin	4 (1.11)	4 (0.67)	4	2 (1.42)	2
Philadelphia Vireo	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Red-eyed Vireo	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Blue-winged Warbler	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Northern Parula	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Black-throated Blue Warbler	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Yellow-rumped Warbler	0 (0.00)	0 (0.00)	0	2 (1.42)	3
Black-and-White Warbler	0 (0.00)	0 (0.00)	0	1 (0.71)	1

Appendix 11. (continued)

HABITAT: Lowland Forest
 SITE: French Creek Riparian (FCR)
 SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Ovenbird	1 (0.28)	3 (0.50)	5	3 (2.13)	7
Louisiana Waterthrush	3 (0.83)	3 (0.50)	3	2 (1.42)	2
Scarlet Tanager	2 (0.56)	2 (0.33)	2	1 (0.71)	3
Northern Cardinal	1 (0.28)	1 (0.17)	1	1 (0.71)	2
White-throated Sparrow	11 (3.08)	11 (1.82)	11	2 (1.42)	2
Brown-headed Cowbird	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Baltimore Oriole	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Total No. Individuals	36	38	41	29	50
Total No. Species	11	11	11	18	25

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: French Creek Lowland (FCL)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Chimney Swift	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Downy Woodpecker	1 (0.28)	3 (0.50)	3	3 (2.13)	3
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Great Crested Flycatcher	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Blue Jay	0 (0.00)	1 (0.17)	1	1 (0.71)	4
American Crow	0 (0.00)	0 (0.00)	0	0 (0.00)	2
Black-capped Chickadee	0 (0.00)	0 (0.00)	0	0 (0.00)	0
Carolina Chickadee	1 (0.28)	1 (0.17)	1	3 (2.13)	4
Tufted Titmouse	2 (0.56)	2 (0.33)	2	4 (2.84)	4
White-breasted Nuthatch	1 (0.28)	1 (0.17)	1	1 (0.71)	1
House Wren	2 (0.56)	2 (0.33)	2	2 (1.42)	3
Ruby-crowned Kinglet	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Blue-gray Gnatcatcher	2 (0.56)	2 (0.33)	2	2 (1.42)	2
Wood Thrush	2 (0.56)	3 (0.50)	3	0 (0.00)	2
American Robin	3 (0.83)	3 (0.50)	3	1 (0.71)	2
Gray Catbird	5 (1.39)	5 (0.83)	5	4 (2.84)	4
Red-eyed Vireo	1 (0.28)	1 (0.17)	1	2 (1.42)	2

Appendix 11. (continued)

HABITAT: Lowland Forest
 SITE: French Creek Lowland (FCL)
 SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Blue-winged Warbler	3 (0.83)	4 (0.67)	4	0 (0.00)	3
Chestnut-sided Warbler	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Black-throated Blue Warbler	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Ovenbird	2 (0.56)	3 (0.50)	4	0 (0.00)	5
Common Yellowthroat	11 (3.08)	11 (1.82)	11	6 (4.26)	8
Scarlet Tanager	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Northern Cardinal	4 (1.11)	4 (0.67)	4	3 (2.13)	5
Indigo Bunting	1 (0.28)	2 (0.33)	2	0 (0.00)	1
Field Sparrow	0 (0.00)	2 (0.33)	2	0 (0.00)	0
White-throated Sparrow	1 (0.28)	1 (0.17)	1	3 (2.13)	3
Dark-eyed Junco	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Brown-headed Cowbird	1 (0.28)	1 (0.17)	1	3 (2.13)	3
American Goldfinch	0 (0.00)	0 (0.00)	0	5 (3.55)	6
Total No. Individuals	46	55	56	50	76
Total No. Species	20	22	22	20	27

Appendix 11. (continued)

HABITAT: Upland Forest
 SITE: Powerline Upland (PLU)
 SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Downy Woodpecker	0 (0.00)	0 (0.00)	0	3 (2.13)	6
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	2 (1.42)	4
Blue Jay	0 (0.00)	1 (0.17)	1	0 (0.00)	2
Carolina Chickadee	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Tufted Titmouse	0 (0.00)	0 (0.00)	0	0 (0.00)	1
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Ruby-crowned Kinglet	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Wood Thrush	1 (0.28)	2 (0.33)	2	0 (0.00)	4
Solitary Vireo	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Red-eyed Vireo	0 (0.00)	1 (0.17)	1	2 (1.42)	3
Black-throated Blue Warbler	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Yellow-rumped Warbler	0 (0.00)	0 (0.00)	0	3 (2.13)	3
Black-throated Green Warbler	0 (0.00)	0 (0.00)	0	0 (0.00)	1

Appendix 11. (continued)

HABITAT: Upland Forest

SITE: Powerline Upland (PLU)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Black-and-White Warbler	2 (0.56)	2 (0.33)	2	1 (0.71)	1
Worm-eating Warbler	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Ovenbird	2 (0.56)	4 (0.67)	5	3 (2.13)	10
Scarlet Tanager	0 (0.00)	0 (0.00)	0	1 (0.71)	3
Common Grackle	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Total No. Individuals	7	12	13	20	46
Total No. Species	5	7	7	11	18

Appendix 11. (continued)

HABITAT: Upland Forest

SITE: S-Curve Upland (SCU)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Mallard	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Turkey Vulture	2 (0.56)	2 (0.33)	2	1 (0.71)	1
Red-bellied Woodpecker	2 (0.56)	3 (0.50)	3	1 (0.71)	3
Downy Woodpecker	1 (0.28)	1 (0.17)	1	2 (1.42)	2
Great Crested Flycatcher	1 (0.28)	1 (0.17)	1	0 (0.00)	2
Blue Jay	5 (1.39)	5 (0.83)	5	7 (4.95)	9
Carolina Chickadee	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Tufted Titmouse	0 (0.00)	1 (0.17)	1	2 (1.42)	2
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	3 (2.13)	3
House Wren	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Blue-gray Gnatcatcher	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Wood Thrush	2 (0.56)	2 (0.33)	2	0 (0.00)	4
Solitary Vireo	0 (0.00)	2 (0.33)	2	0 (0.00)	1
Yellow-throated Vireo	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Red-eyed Vireo	1 (0.28)	1 (0.17)	1	1 (0.71)	2
Blue-winged Warbler	0 (0.00)	1 (0.17)	1	0 (0.00)	2
Northern Parula	0 (0.00)	0 (0.00)	0	1 (0.71)	1

Appendix 11. (continued)

HABITAT: Upland Forest

SITE: S-Curve Upland (SCU)

SEASON: 1994 Spring Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Black-throated Blue Warbler	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Yellow-rumped Warbler	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Black-throated Green Warbler	0 (0.00)	0 (0.00)	0	0 (0.00)	2
Black-and-White Warbler	0 (0.00)	1 (0.17)	1	2 (1.42)	3
Ovenbird	2 (0.56)	6 (1.00)	7	2 (1.42)	7
Scarlet Tanager	1 (0.28)	2 (0.33)	2	1 (0.71)	3
Northern Cardinal	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Indigo Bunting	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Eastern Towhee	0 (0.00)	2 (0.33)	2	0 (0.00)	0
Common Grackle	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Brown-headed Cowbird	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Baltimore Oriole	1 (0.28)	2 (0.33)	2	1 (0.71)	1
American Goldfinch	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Total No. Individuals	25	39	40	27	57
Total No. Species	16	21	21	14	25

Appendix 11. (continued)

HABITAT: Old-Field

SITE: Powerline Lowland Old-Field (PLO)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	1 (0.28)	1 (0.17)	1	1 (0.71)	3
Red-tailed Hawk	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-bellied Woodpecker	0 (0.00)	1 (0.17)	1	0 (0.00)	2
Downy Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Northern Flicker	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Pileated Woodpecker	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Eastern Wood-pewee	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Blue Jay	0 (0.00)	0 (0.00)	3	0 (0.00)	0
Carolina Chickadee	0 (0.00)	1 (0.17)	1	0 (0.00)	0
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Veery	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Wood Thrush	0 (0.00)	1 (0.17)	2	1 (0.71)	6
Gray Catbird	2 (0.56)	2 (0.33)	2	1 (0.71)	1
Red-eyed Vireo	2 (0.56)	5 (0.83)	5	1 (0.71)	2
Blackpoll	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Black-and-white Warbler	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Ovenbird	2 (0.56)	3 (0.50)	5	2 (1.42)	7
Common Yellowthroat	3 (0.83)	3 (0.50)	3	3 (2.13)	4

Appendix 11. (continued)

HABITAT: Old-Field

SITE: Powerline Lowland Old-Field (PLO)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Scarlet Tanager	0 (0.00)	1 (0.17)	3	0 (0.00)	2
Northern Cardinal	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Indigo Bunting	2 (0.56)	2 (0.33)	2	2 (1.42)	10
Eastern Towhee	2 (0.56)	2 (0.33)	3	0 (0.00)	0
Common Grackle	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Baltimore Oriole	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Total No. Individuals	18	27	36	13	44
Total No. Species	11	16	17	8	16

Appendix 11. (continued)

HABITAT: Old-Field

SITE: Powerline Upland Old-Field (PUO)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Red-tailed Hawk	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Red-bellied Woodpecker	0 (0.00)	1 (0.17)	1	0 (0.00)	2
Downy Woodpecker	1 (0.28)	1 (0.17)	1	0 (0.00)	2
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Eastern Wood-pewee	0 (0.00)	2 (0.33)	4	1 (0.71)	3
Great Crested Flycatcher	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Blue Jay	2 (0.56)	3 (0.50)	4	0 (0.00)	0
White-breasted Nuthatch	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Wood Thrush	1 (0.28)	2 (0.33)	3	0 (0.00)	5
Gray Catbird	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Cedar Waxwing	3 (0.83)	3 (0.50)	3	12	12
Red-eyed Vireo	1 (0.28)	1 (0.17)	1	0 (0.00)	2
Blackpoll	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Black-and-white Warbler	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Worm-eating Warbler	1 (0.28)	2 (0.33)	2	0 (0.00)	1
Ovenbird	4 (1.11)	5 (0.83)	7	1 (0.71)	3
Common Yellowthroat	1 (0.28)	2 (0.33)	2	2 (1.42)	3

Appendix 11. (continued)

HABITAT: Old-Field

SITE: Powerline Upland Old-Field (PUO)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Scarlet Tanager	1 (0.28)	2 (0.33)	3	2 (1.42)	3
Indigo Bunting	4 (1.11)	4 (0.67)	4	2 (1.42)	4
Eastern Towhee	4 (1.11)	5 (0.83)	5	3 (2.13)	3
Common Grackle	0 (0.00)	0 (0.00)	0	12	12
Brown-headed Cowbird	1 (0.28)	1 (0.17)	1	2 (1.42)	2
Total No. Individuals	28	39	46	41	63
Total No. Species	15	18	18	12	18

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: Powerline Lowland (PLL)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Downy Woodpecker	1 (0.28)	2 (0.33)	2	1 (0.71)	2
Hairy Woodpecker	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Eastern Wood-pewee	0 (0.00)	0 (0.00)	2	2 (1.42)	5
Acadian Flycatcher	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Carolina Chickadee	2 (0.56)	2 (0.33)	2	0 (0.00)	2
Veery	1 (0.28)	1 (0.17)	2	1 (0.71)	1
Wood Thrush	1 (0.28)	3 (0.50)	4	0 (0.00)	5
Gray Catbird	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Cedar Waxwing	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Red-eyed Vireo	4 (1.11)	5 (0.83)	5	1 (0.71)	5
Ovenbird	3 (0.83)	5 (0.83)	8	4 (2.84)	10
Scarlet Tanager	1 (0.28)	2 (0.33)	2	3 (2.13)	5
Total No. Individuals	14	22	29	14	39
Total No. Species	8	9	10	8	12

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: Hopewell Road Lowland (HOL)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Eastern Wood-pewee	0 (0.00)	0 (0.00)	1	0 (0.00)	0
Acadian Flycatcher	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Great Crested Flycatcher	1 (0.28)	2 (0.33)	2	0 (0.00)	1
American Crow	2 (0.56)	2 (0.33)	5	2 (1.42)	6
Black-capped Chickadee	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Tufted Titmouse	0 (0.00)	0 (0.00)	0	1 (0.71)	2
White-breasted Nuthatch	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Blue-gray Gnatcatcher	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Gray Catbird	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Red-eyed Vireo	4 (1.11)	6 (1.00)	7	1 (0.71)	7
Louisiana Waterthrush	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Common Yellowthroat	4 (1.11)	6 (1.00)	6	0 (0.00)	1
Scarlet Tanager	0 (0.00)	0 (0.00)	0	0 (0.00)	2
Northern Cardinal	1 (0.28)	1 (0.17)	1	1 (0.71)	1
Indigo Bunting	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Eastern Towhee	0 (0.00)	0 (0.00)	0	0 (0.00)	1
American Goldfinch	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Total No. Individuals	17	22	27	9	27
Total No. Species	9	9	10	7	12

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: French Creek Riparian (FCR)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	2
Downy Woodpecker	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Northern Flicker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Eastern Wood-pewee	0 (0.00)	0 (0.00)	0	0 (0.00)	3
Acadian Flycatcher	2 (0.56)	3 (0.50)	3	1 (0.71)	1
Eastern Phoebe	0 (0.00)	0 (0.00)	1	0 (0.00)	1
Blue Jay	0 (0.00)	0 (0.00)	3	2 (1.42)	10
American Crow	0 (0.00)	0 (0.00)	0	1 (0.71)	3
Carolina Chickadee	1 (0.28)	1 (0.17)	1	0 (0.00)	3
House Wren	0 (0.00)	1 (0.17)	1	0 (0.00)	1
Blue-gray Gnatcatcher	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Veery	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Wood Thrush	1 (0.28)	3 (0.50)	3	0 (0.00)	1
American Robin	0 (0.00)	1 (0.17)	1	1 (0.71)	3
Gray Catbird	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Cedar Waxwing	0 (0.00)	0 (0.00)	0	55	55
Red-eyed Vireo	1 (0.28)	2 (0.33)	2	2 (1.42)	4
Ovenbird	4 (1.11)	4 (0.67)	5	1 (0.71)	4

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: French Creek Riparian (FCR)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Louisiana Waterthrush	3 (0.83)	3 (0.50)	3	0 (0.00)	0
Scarlet Tanager	3 (0.83)	4 (0.67)	5	2 (1.42)	3
Northern Cardinal	0 (0.00)	0 (0.00)	0	1 (0.71)	4
Chipping Sparrow	0 (0.00)	0 (0.00)	1	0 (0.00)	0
Song Sparrow	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Common Grackle	0 (0.00)	0 (0.00)	0	10	10
Brown-headed Cowbird	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Total No. Individuals	16	24	31	78	114
Total No. Species	8	11	14	12	21

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: French Creek Lowland (FCL)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Mourning Dove	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	1	0 (0.00)	1
Downy Woodpecker	1 (0.28)	1 (0.17)	2	0 (0.00)	2
Eastern Wood-pewee	0 (0.00)	0 (0.00)	0	0 (0.00)	3
Acadian Flycatcher	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Blue Jay	0 (0.00)	0 (0.00)	1	0 (0.00)	1
American Crow	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Carolina Chickadee	0 (0.00)	1 (0.17)	1	0 (0.00)	1
Tufted Titmouse	1 (0.28)	2 (0.33)	2	1 (0.71)	2
White-breasted Nuthatch	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Blue-gray Gnatcatcher	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Veery	0 (0.00)	0 (0.00)	0	0 (0.00)	2
Wood Thrush	0 (0.00)	1 (0.17)	3	0 (0.00)	3
American Robin	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Gray Catbird	2 (0.56)	2 (0.33)	2	1 (0.71)	1
Cedar Waxwing	3 (0.83)	3 (0.50)	3	0 (0.00)	0
Red-eyed Vireo	0 (0.00)	2 (0.33)	4	0 (0.00)	2
Blue-winged Warbler	0 (0.00)	1 (0.17)	1	1 (0.71)	3

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: French Creek Lowland (FCL)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Ovenbird	0 (0.00)	1 (0.17)	1	0 (0.00)	2
Common Yellowthroat	5 (1.39)	5 (0.83)	6	3 (2.13)	9
Scarlet Tanager	1 (0.28)	1 (0.17)	2	1 (0.71)	2
Northern Cardinal	0 (0.00)	1 (0.17)	1	1 (0.71)	2
Indigo Bunting	3 (0.83)	4 (0.67)	5	0 (0.00)	3
Baltimore Oriole	0 (0.00)	0 (0.00)	0	1 (0.71)	1
American Goldfinch	4 (1.11)	4 (0.67)	4	1 (0.71)	1
Total No. Individuals	25	34	44	10	41
Total No. Species	12	18	20	8	21

Appendix 11. (continued)

HABITAT: Upland Forest

SITE: Powerline Upland (PLU)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Red-bellied Woodpecker	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Downy Woodpecker	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Eastern Wood-pewee	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Acadian Flycatcher	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Great Crested Flycatcher	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Blue Jay	0 (0.00)	1 (0.17)	1	0 (0.00)	2
Wood Thrush	2 (0.56)	2 (0.33)	4	0 (0.00)	1
Red-eyed Vireo	2 (0.56)	4 (0.67)	4	0 (0.00)	2
Worm-eating Warbler	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Ovenbird	3 (0.83)	5 (0.83)	7	0 (0.00)	5
Scarlet Tanager	1 (0.28)	3 (0.50)	4	0 (0.00)	2
Common Grackle	0 (0.00)	0 (0.00)	0	3 (2.13)	3
Total No. Individuals	9	16	21	5	22
Total No. Species	5	6	6	3	12

Appendix 11. (continued)

HABITAT: Upland Forest

SITE: S-Curve Upland (SCU)

SEASON: 1994 Breeding Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Red-bellied Woodpecker	1 (0.28)	1 (0.17)	1	1 (0.71)	3
Downy Woodpecker	1 (0.28)	1 (0.17)	2	2 (1.42)	2
Eastern Wood-pewee	0 (0.00)	1 (0.17)	1	1 (0.71)	6
Blue Jay	0 (0.00)	1 (0.17)	1	1 (0.71)	2
American Crow	0 (0.00)	0 (0.00)	1	0 (0.00)	1
Carolina Chickadee	1 (0.28)	1 (0.17)	1	0 (0.00)	0
White-breasted Nuthatch	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Wood Thrush	1 (0.28)	3 (0.50)	4	3 (2.13)	6
American Robin	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Gray Catbird	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-eyed Vireo	1 (0.28)	2 (0.33)	4	1 (0.71)	6
Northern Parula	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Worm-eating Warbler	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Ovenbird	1 (0.28)	3 (0.50)	5	1 (0.71)	4
Scarlet Tanager	0 (0.00)	1 (0.17)	2	0 (0.00)	3
Indigo Bunting	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Eastern Towhee	0 (0.00)	0 (0.00)	1	0 (0.00)	1
Baltimore Oriole	0 (0.00)	0 (0.00)	1	2 (1.42)	3
Total No. Individuals	7	15	25	14	43
Total No. Species	7	10	13	10	17

Appendix 11. (continued)

HABITAT: Old-Field

SITE: Powerline Lowland Old-Field (PLO)

SEASON: 1994 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Sharp-shinned Hawk	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-bellied Woodpecker	1 (0.28)	2 (0.33)	3	0 (0.00)	2
Downy Woodpecker	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Blue Jay	0 (0.00)	1 (0.17)	1	0 (0.00)	2
Carolina Chickadee	0 (0.00)	0 (0.00)	0	4 (2.84)	5
Tufted Titmouse	2 (0.56)	2 (0.33)	2	1 (0.71)	1
White-breasted Nuthatch	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Ruby-crowned Kinglet	0 (0.00)	0 (0.00)	0	2 (1.42)	2
American Robin	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Gray Catbird	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Magnolia Warbler	0 (0.00)	0 (0.00)	0	3 (2.13)	3
Yellow-rumped Warbler	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Black-throated Green Warbler	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Eastern Towhee	0 (0.00)	0 (0.00)	0	0 (0.00)	1
White-throated Sparrow	1 (0.28)	1 (0.17)	1	5 (3.55)	5
Total Frequency	7	9	10	20	30
Total No. Species	6	7	7	9	15

Appendix 11. (continued)

HABITAT: Old-Field

SITE: Powerline Upland Old-Field (PUO)

SEASON: 1994 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Red-bellied Woodpecker	1 (0.28)	2 (0.33)	2	0 (0.00)	1
Downy Woodpecker	1 (0.28)	1 (0.17)	3	1 (0.71)	1
American Crow	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Carolina Chickadee	0 (0.00)	0 (0.00)	0	4 (2.84)	4
White-breasted Nuthatch	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Eastern Towhee	1 (0.28)	1 (0.17)	1	0 (0.00)	1
White-throated Sparrow	6 (1.67)	6 (1.00)	6	6 (4.26)	6
Dark-eyed Junco	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Total Frequency	13	14	16	12	15
Total No. Species	6	6	6	4	7

Appendix 11. (continued)

HABITAT: Lowland Forest
 SITE: Powerline Lowland (PLL)
 SEASON: 1994 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	0	0 (0.00)	3
Turkey Vulture	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Downy Woodpecker	2 (0.56)	3 (0.50)	3	0 (0.00)	0
Pileated Woodpecker	0 (0.00)	0 (0.00)	1	0 (0.00)	0
Blue Jay	0 (0.00)	0 (0.00)	1	0 (0.00)	2
American Crow	0 (0.00)	0 (0.00)	1	0 (0.00)	1
Tufted Titmouse	0 (0.00)	0 (0.00)	0	0 (0.00)	1
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Total Frequency	2	3	6	1	11
Total No. Species	1	1	4	1	7

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: Hopewell Road Lowland (HOL)

SEASON: 1994 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Turkey Vulture	0 (0.00)	0 (0.00)	0	1 (0.71)	2
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	1	0 (0.00)	1
Yellow-bellied Sapsucker	0 (0.00)	1 (0.17)	1	1 (0.71)	1
Tree Swallow	0 (0.00)	0 (0.00)	0	6 (4.26)	6
Barn Swallow	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Blue Jay	1 (0.28)	1 (0.17)	1	0 (0.00)	3
American Crow	0 (0.00)	6 (1.00)	7	1 (0.71)	9
Carolina Chickadee	0 (0.00)	1 (0.17)	1	0 (0.00)	2
Tufted Titmouse	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Hermit Thrush	1 (0.28)	1 (0.17)	1	0 (0.00)	0
American Robin	21	21	21	0 (0.00)	2
Red-eyed Vireo	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Black-throated Blue Warbler	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Black-throated Green Warbler	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Northern Cardinal	1 (0.28)	1 (0.17)	1	0 (0.00)	0
White-throated Sparrow	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Total Frequency	30	38	40	10	28
Total No. Species	9	12	13	5	10

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: French Creek Riparian (FCR)

SEASON: 1994 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	0	0 (0.00)	5
Turkey Vulture	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Red-bellied Woodpecker	0 (0.00)	1 (0.17)	2	0 (0.00)	1
Downy Woodpecker	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Hairy Woodpecker	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Pileated Woodpecker	0 (0.00)	0 (0.00)	1	0 (0.00)	0
Acadian Flycatcher	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Blue Jay	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Carolina Chickadee	4 (1.11)	7 (1.17)	8	0 (0.00)	0
Swainson's Thrush	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Yellow-rumped Warbler	3 (0.83)	3 (0.50)	3	0 (0.00)	3
Black-throated Green Warbler	2 (0.56)	2 (0.33)	2	0 (0.00)	1
Mourning Warbler	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Total Frequency	14	19	22	2	13
Total No. Species	7	9	10	1	6

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: French Creek Lowland (FCL)

SEASON: 1994 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	5	0 (0.00)	0
Red-bellied Woodpecker	3 (0.83)	3 (0.50)	3	0 (0.00)	3
Downy Woodpecker	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Hairy Woodpecker	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Pileated Woodpecker	0 (0.00)	0 (0.00)	1	0 (0.00)	0
Blue Jay	0 (0.00)	0 (0.00)	1	0 (0.00)	3
American Crow	0 (0.00)	0 (0.00)	1	0 (0.00)	2
Tufted Titmouse	0 (0.00)	0 (0.00)	0	1 (0.71)	1
White-breasted Nuthatch	0 (0.00)	0 (0.00)	1	0 (0.00)	1
Carolina Wren	1 (0.28)	1 (0.17)	1	0 (0.00)	0
American Robin	30 (8.40)	30 (5.00)	30	2 (1.42)	8
Cedar Waxwing	0 (0.00)	0 (0.00)	0	3 (2.13)	3
Northern Cardinal	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Eastern Towhee	1 (0.28)	1 (0.17)	1	0 (0.00)	1
White-throated Sparrow	3 (0.83)	3 (0.50)	3	0 (0.00)	0
Total Frequency	40	40	49	6	23
Total No. Species	7	7	12	3	9

Appendix 11. (continued)

HABITAT: Upland Forest
 SITE: Powerline Upland (PLU)
 SEASON: 1994 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	2	0 (0.00)	2
Yellow-bellied Sapsucker	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Blue Jay	0 (0.00)	0 (0.00)	2	0 (0.00)	0
Carolina Chickadee	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Tufted Titmouse	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Ruby-crowned Kinglet	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Hermit Thrush	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Total Frequency	2	4	8	2	4
Total No. Species	1	3	5	2	3

Appendix 11. (continued)

HABITAT: Upland Forest

SITE: S-Curve Upland (SCU)

SEASON: 1994 Fall Migration

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	5 (1.39)	5 (0.83)	5	0 (0.00)	0
Turkey Vulture	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	0	1 (0.71)	4
Yellow-bellied Sapsucker	0 (0.00)	0 (0.00)	0	0 (0.00)	2
Downy Woodpecker	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Tufted Titmouse	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Red-breasted Nuthatch	0 (0.00)	0 (0.00)	0	0 (0.00)	1
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Cedar Waxwing	0 (0.00)	0 (0.00)	0	0 (0.00)	1
American Goldfinch	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Total Frequency	5	6	6	7	15
Total No. Species	1	2	2	5	9

Appendix 11. (continued)

HABITAT: Old-Field

SITE: Powerline Lowland Old-Field (PLO)

SEASON: 1994-95 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Red-tailed Hawk	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Mourning Dove	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	1	0 (0.00)	2
Downy Woodpecker	0 (0.00)	1 (0.17)	1	1 (0.71)	2
Eastern Phoebe	0 (0.00)	0 (0.00)	0	0 (0.00)	1
American Crow	0 (0.00)	0 (0.00)	2	0 (0.00)	3
Black-capped Chickadee	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Carolina Chickadee	0 (0.00)	0 (0.00)	0	2 (1.42)	4
Tufted Titmouse	0 (0.00)	1 (0.17)	1	0 (0.00)	1
White-breasted Nuthatch	0 (0.00)	1 (0.17)	1	0 (0.00)	0
American Robin	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Northern Cardinal	0 (0.00)	0 (0.00)	1	0 (0.00)	0
Dark-eyed Junco	0 (0.00)	0 (0.00)	0	3 (2.13)	3
Total Frequency	4	7	11	7	18
Total No. Species	3	6	9	4	9

Appendix 11. (continued)

HABITAT: Old-Field

SITE: Powerline Upland Old-Field (PUO)

SEASON: 1994-95 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Downy Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	3
Eastern Phoebe	0 (0.00)	0 (0.00)	0	1 (0.71)	2
American Crow	1 (0.28)	1 (0.17)	3	0 (0.00)	1
Black-capped Chickadee	0 (0.00)	0 (0.00)	3	0 (0.00)	3
Carolina Chickadee	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Tufted Titmouse	0 (0.00)	0 (0.00)	1	0 (0.00)	3
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	0 (0.00)	2
Cedar Waxwing	0 (0.00)	0 (0.00)	0	3 (2.13)	3
American Goldfinch	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Total Frequency	2	2	8	5	20
Total No. Species	2	2	4	3	10

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: French Creek Riparian (FCR)

SEASON: 1994-95 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	0	0 (0.00)	5
Turkey Vulture	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Mourning Dove	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Red-bellied Woodpecker	3 (0.83)	3 (0.50)	3	0 (0.00)	1
Downy Woodpecker	0 (0.00)	2 (0.33)	2	1 (0.71)	2
Pileated Woodpecker	0 (0.00)	0 (0.00)	1	0 (0.00)	1
Eastern Phoebe	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Blue Jay	1 (0.28)	1 (0.17)	1	0 (0.00)	5
American Crow	0 (0.00)	0 (0.00)	3	0 (0.00)	0
Carolina Chickadee	2 (0.56)	2 (0.33)	2	2 (1.42)	3
Tufted Titmouse	0 (0.00)	2 (0.33)	2	1 (0.71)	2
Golden-crowned Kinglet	3 (0.83)	3 (0.50)	3	0 (0.00)	0
American Robin	0 (0.00)	1 (0.17)	1	4 (2.84)	6
Northern Cardinal	0 (0.00)	1 (0.17)	1	0 (0.00)	0
American Goldfinch	4 (1.11)	4 (0.67)	4	0 (0.00)	0
Total Frequency	14	20	24	9	29
Total No. Species	6	10	12	5	12

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: French Creek Lowland (FCL)

SEASON: 1994-95 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Canada Goose	0 (0.00)	0 (0.00)	2	0 (0.00)	0
Turkey Vulture	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Red-bellied Woodpecker	1 (0.28)	2 (0.33)	4	0 (0.00)	1
Downy Woodpecker	2 (0.56)	2 (0.33)	2	2 (1.42)	2
Eastern Phoebe	0 (0.00)	1 (0.17)	1	0 (0.00)	0
Blue Jay	0 (0.00)	0 (0.00)	0	0 (0.00)	1
American Crow	0 (0.00)	0 (0.00)	2	0 (0.00)	3
Black-capped Chickadee	1 (0.28)	1 (0.17)	1	5 (3.55)	6
Carolina Chickadee	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Tufted Titmouse	1 (0.28)	2 (0.33)	2	3 (2.13)	4
Red-breasted Nuthatch	0 (0.00)	0 (0.00)	0	1 (0.71)	1
White-breasted Nuthatch	1 (0.28)	2 (0.33)	2	0 (0.00)	0
American Robin	0 (0.00)	1 (0.17)	2	6 (4.26)	7
Northern Cardinal	0 (0.00)	1 (0.17)	1	0 (0.00)	1
Song Sparrow	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Dark-eyed Junco	11 (3.06)	11 (1.83)	12	13 (9.23)	16
Common Grackle	3 (0.83)	3 (0.50)	3	0 (0.00)	0
Total Frequency	21	27	35	33	45
Total No. Species	8	11	2	8	12

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: Hopewell Road Lowland (HOL)

SEASON: 1994-95 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Red-tailed Hawk	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Red-bellied Woodpecker	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Downy Woodpecker	1 (0.28)	1 (0.17)	1	2 (1.42)	2
Blue Jay	0 (0.00)	0 (0.00)	0	2 (1.42)	3
American Crow	2 (0.56)	2 (0.33)	4	8 (5.67)	20
Fish Crow	0 (0.00)	0 (0.00)	0	1 (0.71)	1
Black-capped Chickadee	1 (0.28)	1 (0.17)	1	2 (1.42)	2
Tufted Titmouse	3 (0.83)	3 (0.50)	3	3 (2.13)	3
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	2 (1.42)	2
American Robin	0 (0.00)	1 (0.17)	1	0 (0.00)	2
Northern Cardinal	1 (0.28)	1 (0.170)	2	0 (0.00)	2
Song Sparrow	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Dark-eyed Junco	10 (2.78)	10 (1.67)	10	5 (3.55)	5
Total Frequency	20	21	24	26	44
Total No. Species	8	9	9	9	12

Appendix 11. (continued)

HABITAT: Lowland Forest

SITE: Powerline Lowland (PLL)

SEASON: 1994-95 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Turkey Vulture	2 (0.56)	2 (0.33)	2	8 (5.67)	8
Cooper's Hawk	0 (0.00)	0 (0.00)	1	0 (0.00)	0
Rock Dove	1 (0.28)	1 (0.17)	1	0 (0.00)	0
Red-bellied Woodpecker	0 (0.00)	2 (0.33)	2	0 (0.00)	1
Pileated Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Eastern Phoebe	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Blue Jay	0 (0.00)	0 (0.00)	0	0 (0.00)	1
American Crow	0 (0.00)	0 (0.00)	3	0 (0.00)	4
Carolina Chickadee	0 (0.00)	0 (0.00)	0	3 (2.13)	4
Tufted Titmouse	0 (0.00)	0 (0.00)	0	2 (1.42)	4
White-breasted Nuthatch	1 (0.28)	2 (0.33)	2	1 (0.71)	3
Brown Creeper	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Golden-crowned Kinglet	0 (0.00)	0 (0.00)	0	2 (1.42)	2
Northern Cardinal	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Total Frequency	4	7	11	16	32
Total No. Species	3	4	6	5	12

Appendix 11. (continued)

HABITAT: Upland Forest

SITE: Powerline Upland (PLU)

SEASON: 1994-95 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Downy Woodpecker	1 (0.28)	1 (0.17)	1	0 (0.00)	1
Pileated Woodpecker	0 (0.00)	1 (0.17)	1	0 (0.00)	0
American Crow	0 (0.00)	0 (0.00)	3	0 (0.00)	2
Tufted Titmouse	0 (0.00)	1 (0.17)	1	0 (0.00)	0
White-breasted Nuthatch	0 (0.00)	1 (0.17)	1	0 (0.00)	1
Brown Creeper	1 (0.28)	1 (0.17)	1	0 (0.00)	0
American Robin	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Northern Cardinal	0 (0.00)	0 (0.00)	1	0 (0.00)	0
Common Grackle	0 (0.00)	0 (0.00)	0	1 (0.71)	1
House Finch	0 (0.00)	0 (0.00)	1	1 (0.71)	1
Total Frequency	2	5	9	2	8
Total No. Species	2	5	7	2	7

Appendix 11. (continued)

HABITAT: Upland Forest

SITE: S-Curve Upland (SCU)

SEASON: 1994-95 Winter Season

Species	TRAN-30	TRAN-50	TRAN-UL	PNTC-30	PNTC-UL
Ring-billed Gull	0 (0.00)	0 (0.00)	0	10 (7.09)	10
Red-bellied Woodpecker	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Downy Woodpecker	2 (0.56)	2 (0.33)	2	0 (0.00)	0
Pileated Woodpecker	0 (0.00)	0 (0.00)	1	0 (0.00)	1
Eastern Phoebe	0 (0.00)	0 (0.00)	1	0 (0.00)	1
Blue Jay	0 (0.00)	0 (0.00)	1	0 (0.00)	1
American Crow	0 (0.00)	0 (0.00)	1	0 (0.00)	2
Black-capped Chickadee	0 (0.00)	1 (0.17)	1	0 (0.00)	5
Tufted Titmouse	0 (0.00)	0 (0.00)	2	0 (0.00)	3
White-breasted Nuthatch	0 (0.00)	0 (0.00)	0	0 (0.00)	1
Northern Cardinal	0 (0.00)	0 (0.00)	1	0 (0.00)	0
Common Grackle	0 (0.00)	2 (0.33)	2	20 (14.20)	23
Total Frequency	2	5	12	30	38
Total No. Species	1	3	9	2	10

Appendix 12. Total number of bird species and individuals observed while conducting the 20.8 km vehicular-road survey protocol during the 1993-94 winter season (two surveys in March) and 1994 spring migration season (one survey in May) at Gettysburg National Military Park and Eisenhower National Historic Site.

Species	March	May
Canada Goose	69	16
Mallard	4	0
Black Vulture	3	0
Red-tailed Hawk	1	0
Turkey Vulture	5	0
American Kestrel	2	0
Ring-billed Gull	7	0
Killdeer	2	3
Rock Dove	2	0
Mourning Dove	0	3
Chimney Swift	0	1
Red-bellied Woodpecker	0	1
Downy Woodpecker	2	1
Eastern Wood-pewee	0	8
Great Crested Flycatcher	0	6
Eastern Kingbird	0	2
Purple Martin	0	4
Northern Rough-winged Swallow	0	2
Blue Jay	2	1
American Crow	14	0
Black-capped Chickadee	4	1
Tufted Titmouse	4	1
White-breasted Nuthatch	1	0
House Wren	0	5
Brown Creeper	1	0
Eastern Bluebird	5	2
Wood Thrush	0	3

Appendix 12. (continued)

Species	March	May
American Robin	12	9
Gray Catbird	0	3
Northern Mockingbird	2	3
Brown Thrasher	0	1
Cedar Waxwing	0	10
European Starling	28	10
Red-eyed Vireo	0	4
Yellow Warbler	0	1
Blackpoll	0	1
Scarlet Tanager	0	2
Northern Cardinal	1	5
Indigo Bunting	0	1
Eastern Towhee	0	1
Chipping Sparrow	0	1
Song Sparrow	5	1
Dark-eyed Junco	4	0
Red-winged Blackbird	0	7
Eastern Meadowlark	1	1
Brown-headed Cowbird	0	3
House Finch	0	4
House Sparrow	0	3
Total No. Individuals	181	132
Total No. Species	24	37

Appendix 13. Total number of bird species and individuals observed while conducting the 8.0 km vehicular-road survey protocol during the 1995 breeding season, 1995-96 winter season, and 1996 spring migration (two surveys for each method) at Hopewell Furnace National Historic Site.

Season: 1995 Breeding Season

Species	Non-stop Survey	BBS Survey
Canada Goose	0	20
Turkey Vulture	1	2
Broad-winged Hawk	0	1
Chimney Swift	0	1
Red-bellied Woodpecker	0	2
Downy Woodpecker	2	6
Northern Flicker	3	6
Eastern Wood-pewee	5	9
Eastern Phoebe	2	3
Great Crested Flycatcher	0	1
Eastern Kingbird	1	0
Tree Swallow	1	0
Purple Martin	1	0
Barn Swallow	2	25
Blue Jay	5	11
American Crow	0	5
Black-capped Chickadee	0	1
Carolina Chickadee	0	8
Tufted Titmouse	0	10
White-breasted Nuthatch	0	4
House Wren	7	11
Blue-gray Gnatcatcher	0	3
Eastern Bluebird	6	8
Veery	1	0

Appendix 13. (continued)

Season: 1995 Breeding Season

Species	Non-stop Survey	BBS Survey
Wood Thrush	14	16
American Robin	8	2
Gray Catbird	6	8
Northern Mockingbird	1	4
European Starling	7	11
Red-eyed Vireo	18	16
Ovenbird	6	0
Common Yellowthroat	4	3
Scarlet Tanager	7	13
Northern Cardinal	4	6
Rose-breasted Grosbeak	1	0
Indigo Bunting	3	1
Eastern Towhee	8	5
Chipping Sparrow	13	27
Song Sparrow	1	4
Brown-headed Cowbird	0	1
Baltimore Oriole	1	2
House Finch	0	3
American Goldfinch	1	10
Total Frequency	140	269
Total No. Species	30	37

Appendix 13. (continued)

Season: 1995-96 Winter

Species	Non-stop Survey	BBS Survey
Turkey Vulture	0	4
Red-tailed Hawk	0	1
Red-bellied Woodpecker	0	4
Downy Woodpecker	0	1
Blue Jay	8	4
American Crow	13	18
Carolina Chickadee	2	1
Tufted Titmouse	4	3
White-breasted Nuthatch	1	5
Eastern Bluebird	3	4
American Robin	27	10
Northern Mockingbird	2	1
European Starling	103	34
Northern Cardinal	0	1
Dark-eyed Junco	1	1
Common Grackle	1	0
House Finch	2	2
House Sparrow	9	8
Total Frequency	176	102
Total No. Species	13	17

Appendix 13. (continued)

Season: 1996 Spring Migration

Species	Non-stop Survey	BBS Survey
Canada Goose	0	11
Turkey Vulture	4	2
Cooper's Hawk	1	0
Red-bellied Woodpecker	3	2
Downy Woodpecker	4	2
Northern Flicker	1	2
Pileated Woodpecker	2	1
Eastern Wood-pewee	4	1
Acadian Flycatcher	2	2
Eastern Phoebe	3	1
Great Crested Flycatcher	4	1
Barn Swallow	4	7
Blue Jay	7	12
American Crow	4	8
Carolina Chickadee	2	3
Tufted Titmouse	6	5
White-breasted Nuthatch	1	4
House Wren	3	3
Blue-gray Gnatcatcher	4	2
Eastern Bluebird	5	2
Veery	2	1
Wood Thrush	9	7

Appendix 13. (continued)

Season: 1996 Spring Migration

Species	Non-stop Survey	BBS Survey
American Robin	5	3
Gray Catbird	2	3
Northern Mockingbird	1	1
European Starling	5	1
Solitary Vireo	0	2
Red-eyed Vireo	20	11
Blue-winged Warbler	2	2
Golden-winged Warbler	1	0
Northern Parula	1	2
Yellow Warbler	5	2
Chestnut-sided Warbler	1	1
Magnolia Warbler	4	2
Black-throated Green Warbler	1	1
Blackburnian Warbler	2	1
Black-and-white Warbler	0	1
American Redstart	5	2
Ovenbird	14	4
Kentucky Warbler	2	1
Common Yellowthroat	9	4
Hooded Warbler	1	0
Canada Warbler	1	1

Appendix 13. (continued)

Season: 1996 Spring Migration

Species	Non-stop Survey	BBS Survey
Scarlet Tanager	10	5
Northern Cardinal	3	4
Rose-breasted Grosbeak	1	0
Indigo Bunting	7	3
Eastern Towhee	3	2
American Tree Sparrow	1	0
Chipping Sparrow	7	8
Song Sparrow	2	3
White-throated Sparrow	6	3
Red-winged Blackbird	1	3
Common Grackle	0	2
Brown-headed Cowbird	8	7
Baltimore Oriole	7	3
House Finch	1	0
American Goldfinch	2	3
Total Frequency	216	170
Total No. Species	54	52

Appendix 14. Total number of bird species and individuals observed while conducting the 11.3 km vehicular-road survey protocol during the 1995-96 winter season (two surveys using the non-stop method and one survey using the BBS method) and 1996 spring migration (two surveys for each method) at Valley Forge National Historical Park.

Season: 1995-96 Winter Season

Species	Non-stop Survey	BBS Survey
Canada Goose	18	0
Mallard	12	12
Turkey Vulture	2	1
Red-tailed Hawk	4	3
Ring-billed Gull	1	0
Rock Dove	3	0
Mourning Dove	2	3
Red-bellied Woodpecker	0	1
Downy Woodpecker	3	1
American Crow	8	3
Carolina Chickadee	0	3
Tufted Titmouse	0	1
White-breasted Nuthatch	1	1
American Robin	2	2
European Starling	39	52
Northern Cardinal	1	2
Song Sparrow	0	1
White-throated Sparrow	2	1
Dark-eyed Junco	0	1
House Finch	0	1
American Goldfinch	0	2
Total Frequency	98	91
Total No. Species	14	18

Appendix 14. (continued)

Season: 1996 Spring Migration

Species	Non-stop Survey	BBS Survey
Wood Duck	0	2
Mallard	5	4
Turkey Vulture	1	1
Red-tailed Hawk	0	1
Rock Dove	2	0
Mourning Dove	1	1
Chimney Swift	3	2
Red-bellied Woodpecker	4	2
Downy Woodpecker	2	1
Northern Flicker	1	2
Eastern Wood-pewee	3	5
Eastern Phoebe	6	1
Great Crested Flycatcher	2	0
Eastern Kingbird	5	4
Barn Swallow	1	0
Blue Jay	9	7
American Crow	2	3
Fish Crow	2	0
Carolina Chickadee	3	5
Tufted Titmouse	6	2
White-breasted Nuthatch	1	0
Carolina Wren	1	1

Appendix 14. (continued)

Season: 1996 Spring Migration

Species	Non-stop Survey	BBS Survey
House Wren	3	2
Ruby-crowned Kinglet	0	2
Blue-gray Gnatcatcher	2	1
Wood Thrush	11	9
American Robin	28	12
Gray Catbird	9	7
Northern Mockingbird	4	2
European Starling	39	20
Solitary Vireo	2	1
Red-eyed Vireo	14	12
Tennessee Warbler	0	2
Northern Parula	1	0
Yellow Warbler	4	3
Chestnut-sided Warbler	1	1
Magnolia Warbler	3	2
Yellow-rumped Warbler	3	4
Black-throated Green Warbler	1	1
Blackburnian Warbler	1	1
Bay-breasted Warbler	2	0
Blackpoll	2	1
Black-and-white Warbler	0	2
American Redstart	3	1

Appendix 14. (continued)

Season: 1996 Spring Migration

Species	Non-stop Survey	BBS Survey
Ovenbird	10	5
Kentucky Warbler	1	2
Common Yellowthroat	6	5
Canada Warbler	1	0
Scarlet Tanager	5	2
Northern Cardinal	3	2
Rose-breasted Grosbeak	0	1
Indigo Bunting	2	2
Eastern Towhee	8	3
Chipping Sparrow	5	2
Song Sparrow	1	3
White-throated Sparrow	2	4
Red-winged Blackbird	2	2
Eastern Meadowlark	9	6
Common Grackle	6	2
Brown-headed Cowbird	4	1
Baltimore Oriole	9	6
House Finch	3	1
American Goldfinch	3	2
Total Frequency	273	181
Total No. Species	57	55