Comprehensive Inventory Program for Birds at Six Pennsylvania National Parks

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Summary

National parks are becoming more insular due to increased habitat fragmentation in the surrounding landscape. These parks are becoming increasingly valuable for the long-term maintenance of faunal diversity (e.g., bird diversity) and the functional integrity of ecosystems. The National Park Service has determined the need for in-depth inventorying of bird populations at six national parks in Pennsylvania: Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO). The objectives of bird inventory project were to (1) obtain a comprehensive inventory of birds and (2) develop recommendations for establishing a long-term sampling plan to monitor bird populations at these parks in Pennsylvania.

To meet objective 1, we surveyed bird populations during the spring-migratory, breeding, fall-migratory, and winter seasons, May 1999 - May 2001, using point-count, vehicular-road, diurnal raptor and vulture, owl, loggerhead shrike (*Lanius ludovicianus*), and riparian-bird surveys. We detected 113 species at ALPO, including 13 species of special concern. At EISE, we documented 111 species and 15 species of special concern, highlighted by two state-endangered birds, loggerhead shrike and short-eared owl (*Asio flammeus*). We detected 151 species and 23 species of special concern at GETT, including two state-endangered birds, short-eared owl and yellow-crowned night-heron (*Nyctanassa violacea*). At HOFU, we observed 120 species, including 17 species of special concern, such as the federally-threatened bald eagle (*Haliaeetus leucocephalus*). We detected 94 species at JOFL, including 10 species of special concern. At VAFO, we documented 163 species and 22 species of special concern, particularly the state-threatened osprey (*Pandion haliaetus*).

Based on field-testing of survey protocols and conducting 2 years of inventories, we developed recommendations for monitoring bird populations at the six national parks. We recommend conducting point-count, vehicular-road, and diurnal raptor and vulture surveys twice a season during all seasons for 2 consecutive years out of every 5-year period. To supplement this work, owl surveys should be conducted three times each winter season for two consecutive winters out of every 5 years. At EISE, we recommend surveying loggerhead shrikes at least four times every year between May and early July. At VAFO, we recommend surveying riparian birds eight to 10 times between October and April for 2 consecutive years during every 5-year period.

By implementing these recommendations, resource management specialists will be creating an extensive long-term database of birds and adding to information already accumulated on presence, relative abundance, and distribution of species within each national park. Based on knowledge and information derived from this database, resource management specialists will be able to make informed decisions on how best to manage the natural resources within the national parks.

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Introduction

The National Park Service has determined the need for in-depth inventorying of birds at six national parks in Pennsylvania: Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (Fig. 1). A previous study has surveyed the literature to determine predicted and documented bird species at four of these parks, and several protocols have been identified and tested for inventorying and monitoring bird populations in national parks (Yahner et al. 1998; Yahner and Keller 2000). However, additional information is needed on distribution, abundance, and long-term population trends of bird species at each of these parks. Thus, a major goal of the proposed study and that of park personnel was to initiate a comprehensive inventory program for birds at each of these six parks in Pennsylvania. Information on presence, relative abundance, and distribution of birds 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. Large tracts of public lands, such as national parks, are becoming more insular due to increased habitat fragmentation because of agricultural development, urbanization, or other land use. These public 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. 1998).

Each of the six national parks is unique with regard to habitat types and adjacent land uses, which may have significant effects on the bird communities. For instance, ALPO is mainly forested, occurs at relatively high elevation, and is surrounded by considerable forest habitat. In contrast, EISE is largely agricultural; GETT contains a mixture of agricultural and forest habitat, and the major land use surrounding both parks is farmland (pasture and cropland); JOFL is mainly grassland and early successional habitat, with some forested areas and bottomland riparian areas adjacent to the Little Conemaugh River; VAFO contains a mixture of grassland and forest, is bordered on all sides by residential land uses, and is traversed by a major river (the Schuylkill River); HOFU is primarily forested and is adjacent to extensively forested French Creek State Park and state game lands.

To some extent, the abundance and distribution of cover types within and surrounding the parks affected the number of permanent sampling points established for long-term bird inventorying and monitoring at a given park. For example, HOFU has appreciable forest cover in the park compared to GETT. Thus, the proportion of sampling points established in forest cover types at HOFU was greater than in GETT, based on randomly stratifying the number of points per amount of each habitat type (Green 1979). Although vehicular-road surveys were used at EISE, GETT, HOFU, JOFL, and VAFO, no vehicular-road route was established at ALPO because of the lack of roads bordering or traversing the park.

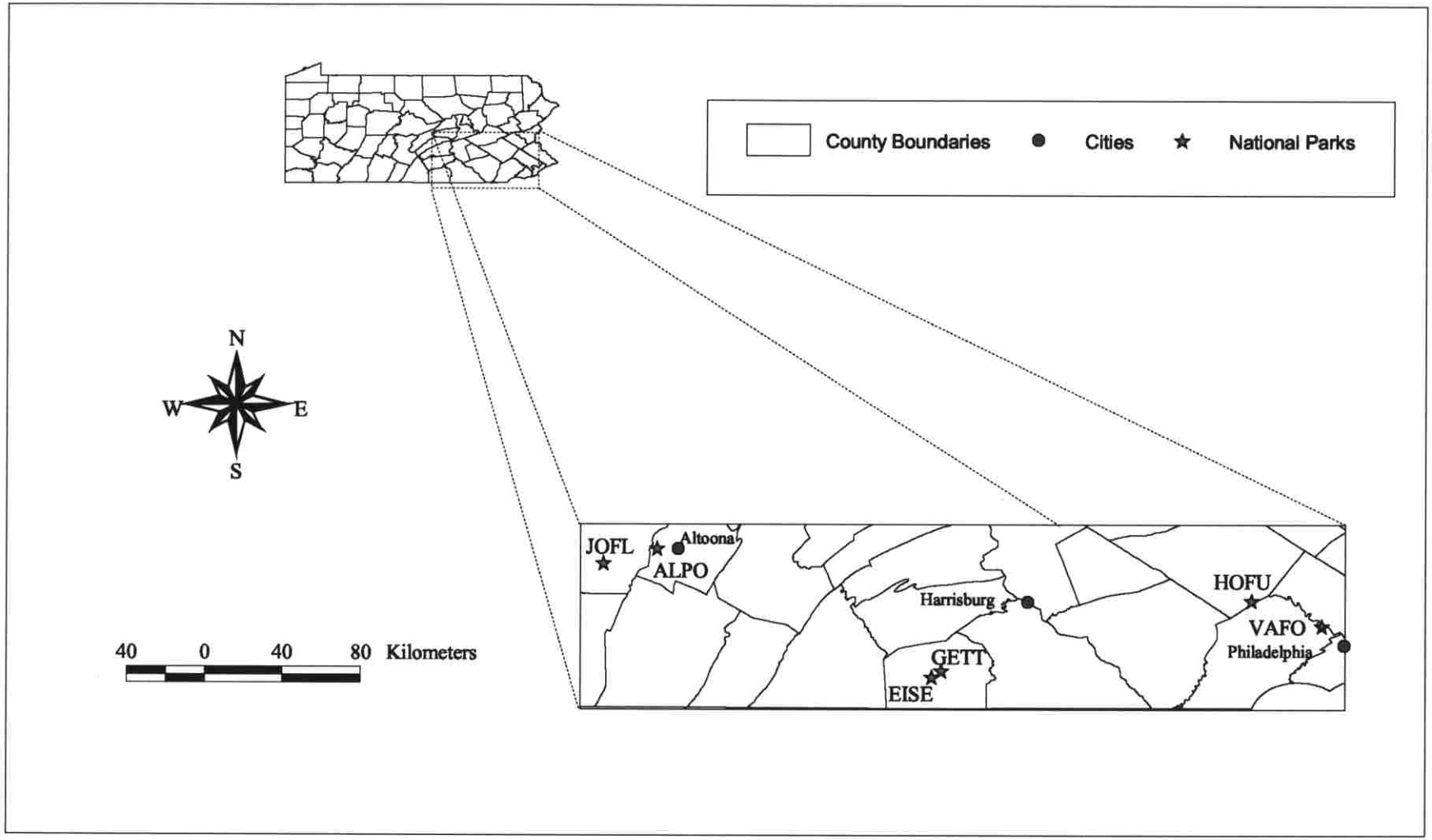


Figure 1. Locations of six national parks in Pennsylvania used as study sites: Allegheny Portage National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO).

The objectives of the research project were to:

1. obtain a comprehensive inventory data set (based on 2 years of surveys) on birds at six national parks in Pennsylvania; and

2. develop recommendations for establishing a long-term sampling plan to monitor bird populations at six national parks in Pennsylvania.

Study Areas

Allegheny Portage Railroad National Historic Site

Allegheny Portage Railroad National Historic Site is located in Cambria and Blair Counties, central Pennsylvania (Fig. 1), and comprises 500 ha (Appendix A) (Yahner and Keller 2000). It is approximately 10 km west of the city of Altoona. The park is located within the Allegheny Mountain Section of the Appalachian Plateau Province, which corresponds to the Transitional Life Zone (Rhoads 1903; Genoways and Brenner 1985).

The park is long and narrow, following the historic railroad trace northwest to southeast. Elevation within the park ranges from 346 m near Duncansville to 734 m at Cresson Summit near the visitor center. There is one small pond (less than 0.2 ha) and numerous small or intermittent streams.

Forested habitat dominates the park (approximately 380 ha) and is composed of plateau, pioneer, and northern hardwoods. Approximately 80 ha of the park is early successional habitat. Grass and forbs (25 ha) and coniferous forest (< 5 ha) comprise a small portion of the park.

Eisenhower National Historic Site

Eisenhower National Historic Site is located in Adams County, south central Pennsylvania (Fig. 1). It comprises 279 ha (Appendix B) and is southwest of and contiguous to GETT. The park is located within the Triassic Lowland Section of the Piedmont Province, which corresponds to the Carolinian Life Zone (Rhoads 1903; Genoways and Brenner 1985).

Agricultural land (232 ha) dominates EISE, with forestland (8 ha) and maintained areas, residential areas, and other developed land (39 ha) making up the remainder of the park (Yahner et al. 1991). Crop species at the park 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). Marsh Creek and Willoughby Run are permanent water sources that are located within the boundaries of EISE.

Gettysburg National Military Park

Gettysburg National Military Park is located in Adams County, south central Pennsylvania (Fig. 1), and comprises 1,511 ha surrounding the town of Gettysburg (Appendix C). The park is 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 park 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 park 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 park.

Gettysburg National Military Park is primarily agricultural land (cropland and pasture) (756 ha) and secondarily forestland (547 ha). The remaining 208 ha of land is comprised of maintained areas, residential areas, or other types of human-dominated developed land (Yahner et al. 1991). As at EISE, crop species 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, hickory, and tulip poplar (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 approximately 10 km southwest of Pottstown (Fig. 1). The 350-ha park is situated in a rural setting (Appendix D) and is contiguous on all but the southeast side with French Creek State Park. 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. A forested south-facing slope, with a maximum elevation of 280 m and a mean slope of 10%, dominate the northern one-third of the park. The minimum elevation near the headwaters of French Creek is 146 m (Russell 1987).

Forest occurs on 262 ha of HOFU. The principal overstory trees are oak, tulip poplar, red maple (*Acer rubrum*), sycamore (*Platanus occidentalis*), eastern 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 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).

Johnstown Flood National Memorial

Johnstown Flood National Memorial is located in Cambria County, central Pennsylvania (Fig. 1), and comprises 63 ha (Appendix E). It is located approximately 13 km east of the city of Johnstown. The park is located within the Allegheny Mountain Section of the Appalachian Plateau Province, which corresponds to the Transitional Life Zone (Rhoads 1903; Genoways and Brenner 1985).

The topography of the park is gentle. Elevation within JOFL ranges from 479 m at river level to 552 m near the visitor center. The main drainage in the park is the Little Conemaugh River, and wetlands and river acreage compose approximately 3 ha.

JOFL is dominated by early successional habitat (27 ha) located primarily adjacent to the river, and 21 ha of the habitat at JOFL is deciduous forest (plateau and pioneer hardwood). Herbaceous habitat (grass and forbs) accounts for 15 ha, and it is located near the visitor center.

Valley Forge National Historical Park

Valley Forge National Historical Park is located in Montgomery and Chester Counties, southeastern Pennsylvania and is approximately 20 km northwest of Philadelphia (Fig. 1). The 1,192-ha park is surrounded by urban-suburban land-use types (Appendix F). 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. The Schuylkill River is the major drainage and traversus the park from west to east. Six hundred and seventy-nine hectares of the park is composed of old-fields, fields mowed annually, and fields mowed biweekly; 453 ha is woodlands. The remaining 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).

Methods

The draft study plan titled "Comprehensive Inventory Program for Birds at Six Pennsylvania National Parks: Phase II" was sent to resource management specialists at each park and to John Karish, Regional Chief Scientist in January 1999 prior to conducting the bird inventories at the parks from May 1999 - May 2001. After the resource management specialists and regional chief scientist reviewed the draft study plan, meetings were held at each of the six parks to discuss with resource management specialists any concerns or modifications that needed to be made to the plan prior to beginning the bird inventories in May 1999. Corrections, suggestions, and additions were made to the draft study plan; prior to initiating the research, a study plan was agreed upon by all parties.

To meet the first objective of the draft study plan, investigators conducted surveys of bird communities for 2 years (May 1999 - May 2001) at each of the six parks using point-count and vehicular-road surveys (Yahner et al. 1998). In addition, we conducted surveys of loggerhead shrike (*Lanius ludovicianus*) at EISE and birds associated with riparian areas at JOFL and VAFO. Protocols for inventorying birds were selected based on taxonomic groups of interest, habitats, special needs, and infrastructure of each park.

Geographic Analyses

Geographic analyses were conducted to determine coarse-scale cover type, spatial location, elevation information, and potential sampling points for each park (Table 1). All analyses were conducted using the Arc/Info geographic information system (Environmental Systems Research Institute, Inc., Redlands, Calif., USA). All geographic coverages and associated documentation (i.e., metadata) are publicly available via the Pennsylvania Spatial Data Access World Wide Web server (http://www.pasda.psu.edu).

Park boundaries were used to bound all subsequent analyses. Coarse-scale land-cover information was extracted for each park from classified Thematic Mapper imagery developed for the Pennsylvania Gap Analysis Project (School of Forest Resources, The Pennsylvania State University, University Park, PA). Eight cover types were identified in the imagery (Table 1). Image resolution was 30- x 30-m. A majority filter was used to smooth the classified images. Each pixel was reclassified, if necessary, so as to be the same cover type as the majority of its two neighbors in all directions. The result was a smoother image with fewer extremely small habitat fragments.

Road and stream coverages were obtained from the Pennsylvania Department of Transportation (Harrisburg, PA). All roads and blue-line streams appearing on 1:24,000 topographic maps were included in the coverages, and no distinctions were made based on road type or stream order. Buffers (50-m width) were constructed around roads and streams to identify areas that were spatially proximal to linear features of the landscape. The spatial location of all areas was classified as interior (i.e., not contained within a buffer), road edge, stream edge, or overlap of road and stream edge habitats (Table 1). Overlap in road and stream edge habitats was eliminated from further analysis.

Table 1. Description of cover types, spatial locations, and elevations used to define habitats at six national parks in Pennsylvania.

Habitat Category	Habitat	Description
Cover type		Derived from thematic mapper imagery, 30- x 30-m resolution
	Water	Areas dominated by water
	Coniferous forest	Forested areas dominated by coniferous-tree species
	Mixed forest	Forested areas dominated by a mixture of coniferous- and deciduous-tree species
	Deciduous forest	Forested areas dominated by deciduous-tree species
	Early successional	Areas dominated by early successional habitats
	Perennial herbaceous	Areas dominated by perennial-herbaceous cover (e.g., pasture, lawn, grasslands)
	Annual herbaceous	Areas dominated by annual-herbaceous cover (e.g., cropland)
	Terrestrial unvegetated	Terrestrial areas dominated by lack of vegetation (e.g., urbanized land, roads, strip mines, bare ground)
Spatial location		Derived from Pennsylvania Department of Transportation digital road and stream coverage
	Interior	Areas > 50 m from a road or stream
	Road edge	Areas $\leq$ 50 m from a road
	Stream edge	Areas $\leq$ 50 m from a stream
Elevation		Derived from 100- x 100-m Digital Elevation Models (DEMs)
	Low	Areas $\leq$ mean (non-plateau) elevation
	High	Areas > mean (non-plateau) elevation
	Plateau	Subjectively designated high-elevation plateau. For ALPO, areas 600-733 m (see text).

Elevation was determined from 2-arc-second (30 minute), USGS digital elevation models (DEMs) with 100- x 100-m pixel resolution. Because of their spatial proximity, EISE and GETT were combined for elevation analyses. Total relief for each park was calculated based on DEMs. For parks with less than 100-m total relief (EISE, GETT, and JOFL), no elevation categories were constructed. For parks with at least 100 m of total relief and no distinct plateau region (HOFU and VAFO), areas lower than the mean elevation were designated as low elevation; areas higher than the mean elevation were designated high elevation. Because ALPO exhibited extreme relief and had a distinct high-elevation plateau, three elevation categories were designated: low ($\leq$ mean non-plateau elevation ranging from 347-415 m), high (> mean non-plateau elevation ranging from 416-600 m), and plateau (600-733 m) (Table 1).

All data layers (cover type, spatial location, and elevation) were integrated to provide characterization of habitat distributions for each park. The area of each park used for geographic analyses differed slightly from actual areas of parks because of differences in resolutions of the data layers used to generate the habitat information. The total area of all habitats for each park was used to allocate sampling points for point-count surveys. Digital orthophoto quarterquads (DOQQs) with 2-m resolution were obtained from the Pennsylvania Spatial Data Access (PASDA) web site and used to more accurately estimate point locations and cover types within each park.

Sampling Point Identification

A systematic grid was generated for each park to identify potential sampling points for point-count surveys. The south and west bounding coordinates of each park boundary were used as the origin of the grid. Grids were generated at 150-m resolution. Potential sampling points were placed at the centroids of each cell in the grid. The potential sampling points subsequently were characterized as to cover type, spatial location, and elevation. This information was used to randomly select sampling points in proportion to availability of the habitats at each of the six parks.

Each park contained between 10-75 potential sampling points for conducting the point-count survey protocol, depending upon park size. Parks less than 150 ha in total area contained 10 sampling points. Parks between 150 and 1500 ha contained approximately one sampling point for every 20 ha of park area. Parks greater than 1500 ha in area contained 75 sampling points. We allocated 28 bird point-count sampling points to ALPO (Appendices A and G), 15 to EISE (Appendices B and H), 75 to GETT (Appendices C and I), 20 to HOFU (Appendices D and J), 10 to JOFL (Appendices E and K), and 60 to VAFO (Appendices F and L).

Point-count sampling points were distributed throughout each park using a stratified random design. The sampling points were selected based on three factors listed in order of importance: cover type (e.g., deciduous forest, perennial herbaceous), spatial location (interior, road edge, stream edge), and elevation (plateau, high, low). Cover types comprising at least 15% of the total park area were divided into interior (> 50 m from edge) and edge (0-50 m from edge) spatial locations. If a cover type within a given spatial location (i.e., deciduous forest in an interior location) comprised at least 15% of the total park area, it was divided into elevations if applicable for the park. Overall cover types, cover types within a given spatial location, and

cover types within a given spatial location and elevation (i.e., deciduous forest in an interior location at high elevation) that comprised less than 2.5% of the total park area were not allocated any sampling points. Sampling points were allocated proportionally to the availability of each habitat. For example, if 50% of the total park area were located within deciduous forest in an interior location at high elevation, then 50% of the sample points for point-count surveys were located within this habitat.

The locations of all sampling points were visited to ensure each point was properly classified according to geographic analyses of cover types and spatial locations. Points located within misclassified habitats were discarded and one of the other randomly located points with the same cover type and spatial location classification replaced the misclassified point. A limited number of sampling points was included in the point-count surveys to address habitats of special concern to resource managers within each park (e.g., vernal wetlands and areas proposed for management). All sampling points were located at least 150-m apart to avoid multiple counting of birds. The location of each sampling point was mapped using a Trimble global positioning system for future reference.

This process also can be used to inventory or monitor specific taxonomic or functional groups of birds. For example, if a resource management specialist wishes to conduct research on forest-interior birds, then the total area for locating points will equal the sum of habitat categories containing interior deciduous, mixed, and coniferous forest rather than including all cover types and spatial locations. Sample points then can be distributed in proportion to the availability of each type of interior forest rather than all habitats.

Avian Surveys

Point-Count Surveys

We surveyed birds using the point-count survey protocol at each of the six parks (International Bird Census Committee 1977; Fuller and Langslow 1984; Hutto et al. 1986; Verner and Ritter 1986; Buskirk and McDonald 1995; Dawson et al.1995; Savard and Hooper 1995). Birds were surveyed for 2 years (May 1999 - May 2001) and we conducted four surveys (two per year) at each sampling point during each of four seasons: spring-migratory (15 April-25 May), breeding (25 May-15 July), fall-migratory (25 August-10 October), and winter seasons (1 December-15 March). The two point-count surveys were spaced at regular intervals throughout each season. Point-count surveys were conducted in the morning (sunrise to 5 hours following sunrise) during the spring-migratory and breeding seasons and throughout the day (30 minutes after sunrise to 30 minutes before sunset) during the fall-migratory and winter seasons. Surveys were conducted on days with little or no precipitation and wind less than 25 kph. Prior to all point-count surveys, date, starting time, temperature (C), wind velocity (kph), cloud cover (%), and precipitation were recorded.

When conducting a point-count survey, the investigator stopped at a sampling point for a 1-minute equilibrium period. Following the equilibrium period, the number and species of all birds seen or heard were recorded for 10 minutes. Data were tabulated for the first 3 minutes, the first 5 minutes, and for the total 10 minutes for possible comparison to studies that use different

time durations. Although we recorded all birds that could be identified, we recorded the horizontal distance to each bird for comparison to studies that use different radii for point-count surveys.

Vehicular-road Surveys

Investigators used previously established vehicular-road survey routes at EISE, GETT, HOFU, JOFL, and VAFO to conduct the vehicular-road survey protocol, diurnal raptor and vulture survey protocol, and owl survey protocol (Yahner et al. 1997; Yahner et al. 1998). No vehicular-road route was established at ALPO because of the low number of roads throughout the park. Vehicular-road survey stations along the routes were mapped using a Trimble global positioning system for future reference and are identified in Appendices B, D-F, and H-M. Routes were designed for use on secondary roads and encompassed a variety of habitats represented within each park. Locations of the vehicular-road route and survey stations were visited to ensure that each route incorporated only secondary roads and that stations were placed in habitats present within each park.

Lengths of the routes varied among parks, depending upon park size and number of low-use secondary roads (Yahner et al. 1998). The routes contained five survey stations at EISE, 20 survey stations at GETT, eight survey stations at HOFU, four survey stations at JOFL, and 18 survey stations at VAFO.

Birds were surveyed at each of the five parks using the vehicular-road survey protocol (Petraborg et al. 1953; Diem and Lu 1960; Hewitt 1967; Saunder et al. 1971; Yahner et al. 1998). Information derived from the vehicular road surveys complemented the information obtained from point-count surveys by increasing habitats and regions covered within each park. Birds were surveyed for 2 years (May 1999 - May 2001) and we conducted four surveys (two per year) at stations along the routes during each of the spring-migratory, breeding, fall-migratory, and winter seasons. The two vehicular-road surveys were spaced at regular intervals throughout each season. Surveys were conducted in the morning (sunrise to 5 hours following sunrise) during the spring-migratory and breeding seasons and throughout the day (30 minutes after sunrise to 30 minutes before sunset) during the fall-migratory and winter seasons. Surveys were conducted on days with little or no precipitation and wind less than 25 kph. Prior to each survey, starting time, temperature (C), wind velocity (kph), cloud cover (%), and precipitation were recorded.

When conducting a vehicular-road survey, the investigator stopped the engine and exited the vehicle at each station along the vehicular-road survey route (Robbins et al. 1986). Following a 1-minute equilibrium period, the number and species of all birds seen or heard were recorded for 5 minutes at each station. Data were tabulated for the first 3 minutes and for the total 5 minutes for possible comparison to studies that use either time duration.

Diurnal Raptor and Vulture Surveys

Diurnal raptors and vultures were surveyed for 2 years (May 1999 - May 2001) at EISE, GETT, HOFU, JOFL, and VAFO using the vehicular-road survey routes. Approximately one-half of the survey stations used for the vehicular-road survey protocol were used for raptor and vulture

surveys (Appendices H-L and N-R). Surveys were conducted twice per season, with the two vehicular-road surveys spaced at regular intervals throughout each season. Surveys were conducted during all seasons (spring-migratory, breeding, fall-migratory, and winter) beginning between 1000 and 1500 hours EST on days with little or no precipitation and wind less than 25 kph (Grimm and Yahner 1985). Prior to each survey, starting time, temperature (C), wind velocity (kph), cloud cover (%), and precipitation were recorded. To expedite surveys during the fall-migratory and winter seasons, diurnal raptor and vulture surveys were conducted at the same time as vehicular-road surveys; during spring-migratory and breeding seasons, surveys were conducted separately.

The investigators slowly traversed the vehicular-road survey route, with velocity depending on road type and traffic volume. At each station along the route, the investigators stopped the engine and exited the vehicle. Following a 1-minute equilibrium period, diurnal raptors and vultures were surveyed for 5 minutes. All raptors and vultures identified at the station during the survey period or while driving between stations were recorded.

Owl Surveys

Owl populations were surveyed for 2 winter seasons (1 December 1999 - 15 March 2001) at each of the six parks using the owl survey protocol (Foster 1965; Lynch and Smith 1984; Morrell 1993). Owls were surveyed three times during each winter season with surveys spaced at regular intervals throughout the time period. Each survey included a portion of the stations located along the vehicular-road survey routes for EISE, GETT, HOFU, JOFL, and VAFO (Appendices H-L and N-R). At ALPO, survey stations for owls were established on the plateau, along the old railroad trace, and in the southeastern portion of the park bordering Old Route 22 (Appendices A and G). Surveys were conducted between 1 hour after sunset to 1 hour before sunrise on nights with little or no precipitation, wind less than 25 kph, and cloud cover less than 50%. Prior to each survey, investigators recorded the date, starting and ending times, temperature (C), wind velocity (kph), percent cloud cover (%), precipitation, and depth (cm) of snow cover.

At each station, the investigator played the calls of five owl species in the following order: northern saw-whet (*Aegolius acadicus*), eastern-screech (*Otus asio*), barred (*Strix varia*), long-eared (*Asio otus*), and great horned (*Bubo virginianus*) owls. Following a 1-minute equilibrium period, the investigator played an owl call for 15 seconds. After a pause of 45 seconds, the investigator repeated two additional calling periods (call + 45 second pause = calling period) and a fourth call by the same species followed by a 2-minute pause period. The investigator conducted this sequence (minus the equilibrium period) consecutively for each owl species at each sample point. Investigators recorded the number and species of owls observed or heard during the 1-minute equilibrium, calling, and pause periods.

To complement surveys of these five owl species, additional survey stations were visited to survey for short-eared owls (*Asio flammeus*) at EISE, GETT, and VAFO and stations were included at GETT, HOFU, and VAFO to survey for barn owls (*Tyto alba*). The investigator played the calls of the owl species (either short-eared or barn) targeted for survey at each of these stations. Following a 1-minute equilibrium period, the investigator played a short-eared or barn owl call for 15 seconds. After a 45 second pause, the investigator repeated two additional calling

periods (call + 45 second pause = calling period) and a fourth call by the same species followed by a 2-minute pause period.

Loggerhead Shrike Surveys

The loggerhead shrike was surveyed using a 13.7-km survey route at EISE (Yahner et al. 1997). The route contained 17 stations and encompassed secondary roads traversing the four farms at EISE and areas proximal to the park that recently contained nesting shrikes (Appendices H and N). The location of each station was mapped using a global positioning system for future reference. Stations were located adjacent to pasture and/or barbed-wire fencing, and the distance between stations was greater than 0.36-km (0.2 miles).

Loggerhead shrike populations were monitored for 2 years (May 1999 - June 2001) based on guidelines established by Yahner et al. (1997). Investigators conducted at least four vehicular-road surveys for shrikes per year; one during each of the following time periods: 1-15 May, 16-31 May, 1-15 June, and 16-30 June. Surveys were conducted in the morning (sunrise to 5 hours following sunrise) on days with little or no precipitation and wind less than 25 kph. Prior to each survey, starting time, temperature (C), wind velocity (kph), cloud cover (%), and precipitation were recorded.

The investigators slowly traversed the vehicular-road survey route, with velocity depending on road type and traffic volume. At each station along the route, the investigators stopped the engine and exited the vehicle. Following a 1-minute equilibrium period, shrikes were surveyed for 3 minutes. All shrikes or signs of shrike activity (e.g, impailed food items) identified at the station during the survey period or while driving between stations were recorded.

Riparian Bird Surveys

Birds associated with riparian areas (e.g, waterfowl, waders, and shorebirds) were surveyed for 2 years (May 1999 - May 2001) along the Little Conemaugh River at JOFL and the Schuylkill River at VAFO. Surveys were conducted twice each year during late fall (1 October-1 December) and twice each year during early spring (15 April-1 June) at JOFL, with surveys spaced at regular intervals throughout each season. Surveys were conducted three times during each winter season at VAFO. One survey each was conducted in December, in January, and between 1 February-15 March. The survey protocol followed the methods of Stott and Olson (1972) and Thornburg (1973). Each survey included a visit to stations located along the riverbanks. Two stations were established at JOFL so that the entire portion of the Little Conemaugh River within the park could be surveyed (Appendices K and Q). For VAFO, the initial station was located so that the most northwest portion of the Schuylkill River within the park could be observed (Appendices L and R). Additional stations were be spaced approximately 0.8-km (0.5-mile) apart along the riverbank to assure complete coverage of the Schuylkill River located within the park while not duplicating records of birds at adjacent stations. The location of each of the nine stations was mapped using a global positioning system for future reference. Prior to each survey, investigators recorded the date, starting time, temperature (C), wind velocity (kph), cloud cover (%), and precipitation.

Surveys were conducted in the morning (sunrise to 5 hours following sunrise) on days when visibility was not limited by precipitation. Investigators surveyed the river and adjacent habitat for approximately 5 minutes (time depending on the number and activity of riparian birds) at each station using binoculars and spotting scopes. Investigators recorded all waterfowl, waders, and shorebirds identified at each station.

Vegetative Measurements

Point-count Surveys

Investigators measured vegetative characteristics at sampling points between 16 June-6 August 1999, following the methods of James and Shugart (1970), Best (1977), and Harvey and Finley (1995). Measurements included density (no./ha) of overstory trees, understory trees, tall shrubs, and short shrubs; basal area (m^2/ha) of overstory trees; canopy cover (%); vegetative ground cover (%); and mean height (cm) of vegetative cover (Table 2).

Vehicular-road, Diurnal Raptor and Vulture, Owl, and Shrike Surveys

Investigators used coarse-scale identification of the characteristics associated with each vehicular-road, diurnal raptor and vulture, owl, and shrike survey station. Cover types, spatial location, and elevation was determined for each station using digital orthophoto quarterquads (DOQQs) and digital elevation models (Table 1). Cover type and spatial location were ground-truthed at each station to determine the accuracy of the information classified from the DOQQs.

Analyses

Information computed from data obtained from surveying birds at six national parks in Pennsylvania included species richness and relative abundance by park, season, and habitat. Results of our bird inventory were compared to historical records taken from the NPSpecies database (National Park Service 2001). NPSpecies is a National Park Service database that contains documented observances of flora and fauna within all the parks. We used the NPSpecies database because it is continually being updated and currently contains scientifically credible records of species that exist or have existed within the parks. Relative abundance (average number/point/survey) of species identified from 100-m radius point-count sampling points within forested, herbaceous, and/or all cover types combined are presented for each season at each park. If a park contained greater than 10 sampling points located in the interior spatial location of forest or herbaceous cover type, then the relative abundance of bird species was presented specifically for each cover type that met this criterion. If a park failed to meet this criterion for forest and herbaceous cover types, then the relative abundance of birds within 100 m of all point-count sampling points within the park was presented. Point-count surveys (100-m radius) and interior spatial location of cover types were used so that only birds associated with the cover type of interest were included in these analyses of relative abundance. Results of the relative abundance of the most common bird species are presented for forest and herbaceous cover types at GETT and VAFO, forest cover type at ALPO and HOFU, and all cover types combined at EISE and JOFL. These data are valuable to resource management specialists as a baseline, comprehensive inventory of birds for each park.

Table 2. Vegetative characteristics (and survey methods) measured at the point-count sampling points in six national parks in Pennsylvania.

Vegetation Characteristic	Method
Overstory:	
Overstory Tree Density (no./ha)	Number of trees ≥ 1.5-m tall and > 7.5-cm diameter at breast height (dbh) (1.37 m) by species in a 11.4-m radius plot centered on each sampling point.
Overstory Basal Area (m^2/ha)	Basal area of overstory trees by species in a 11.4-m radius plot centered on each sampling point.
Understory:	
Understory Tree Density (no./ha)	Number of trees ≥ 1.5-m tall and 2.5-cm to 7.5-cm dbh by species along 1- x 22.8-m north-south and east-west azimuths that intersect at the plot center.
Tall Shrub Density (no./ha)	Number of shrubs ≥ 1.5-m tall and < 2.5-cm dbh by species along 1- x 22.8-m north-south and east-west azimuths that intersect at the plot center.
Short Shrub Density (no./ha)	Number of shrubs < 1.5-m tall and < 2.5-cm diameter by species along 1- x 22.8-m north-south and east-west azimuths that intersect at the plot center.
Cover:	
Canopy Cover (%)	Percent canopy cover measured using a grid sighting device held 2-m from ground level (Harvey and Finley 1995) at the 20 points located at 2-m intervals along north-south (n = 10) and east-west (n = 10) azimuths.
Vegetative Ground Cover (%)	Number of the 20 points located at 2-m intervals along north-south (n = 10) and east-west (n = 10) azimuths that the cross hairs of an ocular tube intercept vegetative ground cover.
Height:	
Herbaceous Vegetative Height (cm)	Height of herbaceous vegetation located 2-m from the center point along north-south (n = 2) and east-west (n = 2) azimuths.

Results

Bird richness at the six parks ranged from 94 species at JOFL to 163 species at VAFO from May 1999 - May 2001 (Table 3). A total of 186 species was detected for all parks combined. The parks provided habitat for several species of special concern (Table 4). The number of species of special concern detected at the parks varied from 10 at JOFL to 23 at GETT, and a total of 31 species of special concern (plus brewster's warbler; scientific names are given in Table 3) were found in all parks combined. Most notably, 21 of these species were located within at least one of the parks during their respective breeding seasons.

Table 3. Bird species identified (indicated by an "X") from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO).

Species	ALPO	EISE	GETT	HOFU	JOFL	VAFO
Acadian Flycatcher (*Empidonax virescens*)	X	X	X	X		X
Alder Flycatcher (*Empidonax alnorum*)					X	X
American Black Duck (*Anas rubripes*)						X
American Coot (*Fulica americana*)						X
American Crow (*Corvus brachyrhynchos*)	X	X	X	X	X	X
American Goldfinch (*Carduelis tristis*)	X	X	X	X	X	X
American Kestrel (*Falco sparverius*)		X	X	X	X	X
American Redstart (*Setophaga ruticilla*)	X	X	X	X	X	X
American Robin (*Turdus migratorius*)	X	X	X	X	X	X
American Tree Sparrow (*Spizella arborea*)	X	X	X		X	X
American Woodcock (*Scolopax minor*)	X	X	X	X		X
Bald Eagle (*Haliaeetus leucocephalus*)				X		
Baltimore Oriole (*Icterus galbula*)	X	X	X	X	X	X
Barn Owl (*Tyto alba*)			X			
Barn Swallow (*Hirundo rustica*)		X	X	X	X	X
Barred Owl (*Strix varia*)		X	X	X	X	X
Bay-breasted Warbler (*Dendroica castanea*)	X		X	X		X
Belted Kingfisher (*Ceryle alcyon*)	X	X	X	X	X	X

Table 3. Bird species identified (indicated by an "X") from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (continued).

Species	ALPO	EISE	GETT	HOFU	JOFL	VAFO
Black Vulture (*Coragyps atratus*)		X	X	X		X
Black-and-white Warbler (*Mniotilta varia*)	X		X	X	X	X
Black-billed Cuckoo (*Coccyzus erythropthalmus*)	X		X	X		X
Black-capped Chickadee (*Poecile atricapilla*)	X		X	X	X	
Blackburnian Warbler (*Dendroica fusca*)	X		X	X	X	X
Blackpoll Warbler (*Dendroica striata*)	X		X	X	X	X
Black-throated Blue Warbler (*Dendroica caerulescens*)	X		X	X	X	X
Black-throated Green Warbler (*Dendroica virens*)	X	X	X	X	X	X
Blue Jay (*Cyanocitta cristata*)	X	X	X	X	X	X
Blue-gray Gnatcatcher (*Polioptila caerulea*)	X	X	X	X	X	X
Blue Grosbeak (*Guiraca caerulea*)						X
Blue-headed Vireo (*Vireo solitarius*)	X	X	X	X	X	X
Blue-winged Warbler (*Vermivora pinus*)	X		X	X	X	X
Bobolink (*Dolichonyx oryzivorus*)		X	X		X	X
Brewster's Warbler (*Blue-winged warbler and Golden-winged warbler hybrid*)				X		
Broad-winged Hawk (*Buteo platypterus*)	X		X	X	X	X
Brown Creeper (*Certhia americana*)	X	X	X	X	X	X
Brown Thrasher (*Toxostoma rufum*)	X	X	X	X	X	X

Table 3. Bird species identified (indicated by an "X") from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (continued).

Species	ALPO	EISE	GETT	HOFU	JOFL	VAFO
Brown-headed Cowbird (*Molothrus ater*)	X	X	X	X	X	X
Bufflehead (*Bucephala albeola*)						X
Canada Goose (*Branta canadensis*)	X	X	X	X	X	X
Canada Warbler (*Wilsonia canadensis*)	X		X	X		X
Cape May Warbler (*Dendroica tigrina*)	X		X			X
Carolina Chickadee (*Poecile carolinensis*)		X	X	X		X
Carolina Wren (*Thyothorus ludovicianus*)	X	X	X	X	X	X
Cedar Waxwing (*Bombycilla cedrorum*)	X	X	X	X	X	X
Cerulean Warbler (*Dendroica cerulea*)	X		X	X		X
Chestnut-sided Warbler (*Dendroica pensylvanica*)	X	X	X	X	X	X
Chimney Swift (*Chaetura pelagica*)	X	X	X	X		X
Chipping Sparrow (*Spizella passerina*)	X	X	X	X	X	X
Cliff Swallow (*Petrochelidon pyrrhonota*)				X		
Common Goldeneye (*Bucephala clangula*)						X
Common Grackle (*Quiscalus quiscula*)	X	X	X	X	X	X
Common Merganser (*Mergus merganser*)						X
Common Nighthawk (*Chordeiles minor*)			X			X
Common Raven (*Corvus corax*)	X		X	X		X

Table 3. Bird species identified (indicated by an "X") from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (continued).

Species	ALPO	EISE	GETT	HOFU	JOFL	VAFO
Common Redpoll (*Carduelis flammea*)	X					
Common Snipe (*Gallinago gallinago*)		X	X			X
Common Yellowthroat (*Geothlypis trichas*)	X	X	X	X	X	X
Cooper's Hawk (*Accipiter cooperii*)	X	X	X	X		X
Dark-eyed Junco (*Junco hyemalis*)	X	X	X	X	X	X
Double-crested Cormorant (*Phalacrocorax auritus*)			X			X
Downy Woodpecker (*Picoides pubescens*)	X	X	X	X	X	X
Eastern Bluebird (*Sialia sialis*)	X	X	X	X	X	X
Eastern Kingbird (*Tyrannus tyrannus*)	X	X	X	X	X	X
Eastern Meadowlark (*Sturnella magna*)	X	X	X		X	X
Eastern Phoebe (*Sayornis phoebe*)	X	X	X	X	X	X
Eastern Screech-owl (*Otus asio*)	X		X	X		X
Eastern Towhee (*Pipilo erythrophthalmus*)	X	X	X	X	X	X
Eastern Wood-pewee (*Contopus virens*)	X	X	X	X		X
European Starling (*Sturnus vulgaris*)	X	X	X	X	X	X
Field Sparrow (*Spizella pusilla*)	X	X	X	X	X	X
Fish Crow (*Corvus ossifragus*)	X	X	X	X		X
Fox Sparrow (*Passerella iliaca*)			X			X

Table 3. Bird species identified (indicated by an "X") from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (continued).

Species	ALPO	EISE	GETT	HOFU	JOFL	VAFO
Golden Eagle (*Aquila chrysaetos*)						X
Golden-crowned Kinglet (*Regulus satrapa*)	X	X	X	X	X	X
Grasshopper Sparrow (*Ammodramus savannarum*)		X	X		X	X
Gray Catbird (*Dumetella carolinensis*)	X	X	X	X	X	X
Gray-cheeked Thrush (*Catharus minimus*)						X
Great Blue Heron (*Ardea herodias*)	X	X	X			X
Great Crested Flycatcher (*Myiarchus crinitus*)	X	X	X	X	X	X
Great Horned Owl (*Bubo virginianus*)	X		X	X	X	X
Green Heron (*Butorides virescens*)		X	X			X
Hairy Woodpecker (*Picoides villosus*)	X	X	X	X	X	X
Henslow's Sparrow (*Ammodramus henslowii*)			X		X	
Hermit Thrush (*Catharus guttatus*)	X	X	X	X		X
Herring Gull (*Larus argentatus*)						X
Hooded Merganser (*Lophodytes cucullatus*)						X
Hooded Warbler (*Wilsonia citrina*)	X		X	X		X
Horned Lark (*Eremophila alpestris*)			X			X
House Finch (*Carpodacus mexicanus*)	X	X	X	X	X	X
House Sparrow (*Passer domesticus*)		X	X	X	X	X

Table 3. Bird species identified (indicated by an "X") from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (continued).

Species	ALPO	EISE	GETT	HOFU	JOFL	VAFO
House Wren (*Troglodytes aedon*)	X	X	X	X	X	X
Indigo Bunting (*Passerina cyanea*)	X	X	X	X	X	X
Kentucky Warbler (*Oporornis formosus*)		X	X			X
Killdeer (*Charadrius vociferus*)		X	X	X	X	X
Laughing Gull (*Larus atricilla*)			X			
Least Flycatcher (*Empidonax minimus*)	X		X	X		X
Least Sandpiper (*Calidris minutilla*)						X
Lesser Scaup (*Aythya affinis*)						X
Lesser Yellowlegs (*Tringa flavipes*)						X
Lincoln's Sparrow (*Melospiza lincolnii*)		X				X
Loggerhead Shrike (*Lanius ludovicianus*)		X				
Long-eared Owl (*Asio otus*)				X		X
Louisiana Waterthrush (*Seiurus motacilla*)	X	X	X	X		X
Magnolia Warbler (*Dendroica magnolia*)	X	X	X	X		X
Marsh Wren (*Cistothorus palustris*)						X
Mallard (*Anas platyrhynchos*)	X	X	X	X	X	X
Mourning Dove (*Zenaida macroura*)	X	X	X	X	X	X
Nashville Warbler (*Vermivora ruficapilla*)	X		X	X		X

Table 3. Bird species identified (indicated by an "X") from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (continued).

Species	ALPO	EISE	GETT	HOFU	JOFL	VAFO
Northern Cardinal (*Cardinalis cardinalis*)	X	X	X	X	X	X
Northern Flicker (*Colaptes auratus*)	X	X	X	X	X	X
Northern Harrier (*Circus cyaneus*)		X	X			X
Northern Mockingbird (*Mimus polyglottos*)		X	X	X		X
Northern Parula (*Parula americana*)	X		X	X		X
Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)		X	X	X	X	X
Northern Saw-whet Owl (*Aegolius acadicus*)	X		X	X		X
Northern Shrike (*Lanius excubitor*)					X	
Northern Waterthrush (*Seiurus noveboracensis*)	X	X				X
Orange-crowned Warbler (*Vermivora celata*)			X			
Orchard Oriole (*Icterus spurius*)		X	X	X		X
Osprey (*Pandion haliaetus*)			X			X
Ovenbird (*Seiurus aurocapillus*)	X	X	X	X	X	X
Palm Warbler (*Dendroica palmarum*)		X	X	X		X
Pectoral Sandpiper (*Calidris melanotos*)						X
Philadelphia Vireo (*Vireo philadelphicus*)	X			X		X
Pied-billed Grebe (*Podilymbus podiceps*)						X
Pileated Woodpecker (*Dryocopus pileatus*)	X	X	X	X	X	X

Table 3. Bird species identified (indicated by an "X") from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (continued).

Species	ALPO	EISE	GETT	HOFU	JOFL	VAFO
Pine Siskin (*Carduelis pinus*)			X			
Pine Warbler (*Dendroica pinus*)	X	X	X	X		X
Prairie Warbler (*Dendroica discolor*)		X	X			X
Purple Finch (*Carpodacus purpureus*)	X	X	X	X	X	X
Purple Martin (*Progne subis*)			X			
Red-bellied Woodpecker (*Melanerpes carolinus*)	X	X	X	X	X	X
Red-breasted Nuthatch (*Sitta canadensis*)		X	X	X	X	X
Red-eyed Vireo (*Vireo olivaceus*)	X	X	X	X	X	X
Red-headed Woodpecker (*Melanerpes erythrocephalus*)		X	X	X		X
Red-shouldered Hawk (*Buteo lineatus*)	X	X	X	X	X	X
Red-tailed Hawk (*Buteo jamaicensis*)	X	X	X	X	X	X
Red-winged Blackbird (*Agelaius phoeniceus*)	X	X	X	X	X	X
Ring-billed Gull (*Larus delawarensis*)		X	X	X		X
Ring-necked Duck (*Aythya collaris*)						X
Ring-necked Pheasant (*Phasianus colchicus*)			X	X		X
Rock Dove (*Columba livia*)	X	X	X	X	X	X
Rose-breasted Grosbeak (*Pheucticus ludovicianus*)	X	X	X	X	X	X
Ruby-crowned Kinglet (*Regulus calendula*)	X	X	X	X		X

Table 3. Bird species identified (indicated by an "X") from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (continued).

Species	ALPO	EISE	GETT	HOFU	JOFL	VAFO
Ruby-throated Hummingbird (*Archilochus colubris*)	X	X	X	X	X	X
Ruffed Grouse (*Bonasa umbellus*)	X			X	X	
Rusty Blackbird (*Euphagus carolinus*)			X			
Savannah Sparrow (*Passerculus sandwichensis*)	X	X	X		X	X
Scarlet Tanager (*Piranga olivacea*)	X	X	X	X	X	X
Sharp-shinned Hawk (*Accipiter striatus*)		X	X	X		X
Short-eared Owl (*Asio flammeus*)		X	X			
Snow Bunting (*Plectrophenax nivalis*)					X	
Solitary Sandpiper (*Tringa solitaria*)						X
Song Sparrow (*Melospiza melodia*)	X	X	X	X	X	X
Spotted Sandpiper (*Actitis macularia*)						X
Swainson's Thrush (*Catharus ustulatus*)	X		X			X
Swamp Sparrow (*Melospiza georgiana*)	X	X	X		X	X
Tennessee Warbler (*Vermivora peregrina*)			X	X		X
Tree Swallow (*Tachycineta bicolor*)	X	X	X	X	X	X
Tufted Titmouse (*Baeolophus bicolor*)	X	X	X	X	X	X
Tundra Swan (*Cygnus columbianus*)	X		X			X
Turkey Vulture (*Cathartes aura*)	X	X	X	X	X	X

Table 3. Bird species identified (indicated by an "X") from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (continued).

Species	ALPO	EISE	GETT	HOFU	JOFL	VAFO
Upland Sandpiper (*Bartramia longicauda*)			X			
Veery (*Catharus fuscescens*)	X	X	X	X		X
Vesper Sparrow (*Pooecetes gramineus*)	X	X	X		X	X
Warbling Vireo (*Vireo gilvus*)		X	X			X
White-breasted Nuthatch (*Sitta carolinensis*)	X	X	X	X	X	X
White-crowned Sparrow (*Zonotrichia leucophrys*)		X	X			
White-eyed Vireo (*Vireo griseus*)	X	X	X	X	X	X
White-throated Sparrow (*Zonotrichia albicollis*)	X	X	X	X	X	X
Wild Turkey (*Meleagris gallopavo*)	X		X		X	
Willow Flycatcher (*Empidonax traillii*)	X	X	X	X	X	X
Wilson's Warbler (*Wilsonia pusilla*)			X			X
Winter Wren (*Troglodytes troglodytes*)	X		X		X	X
Wood Duck (*Aix sponsa*)			X		X	X
Wood Thrush (*Hylocichla mustelina*)	X	X	X	X	X	X
Worm-eating Warbler (*Helmitheros vermivorus*)	X	X	X	X		X
Yellow Warbler (*Dendroica petechia*)	X	X	X	X	X	X
Yellow-bellied Flycatcher (*Empidonax flaviventris*)						X
Yellow-bellied Sapsucker (*Sphyrapicus varius*)	X	X	X	X		X

Table 3. Bird species identified (indicated by an "X") from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (continued).

Species	ALPO	EISE	GETT	HOFU	JOFL	VAFO
Yellow-billed Cuckoo (*Coccyzus americanus*)	X	X	X	X	X	X
Yellow-breasted Chat (*Icteria virens*)	X					
Yellow-crowned Night-heron (*Nyctanassa violacea*)			X			
Yellow-rumped Warbler (*Dendroic coronata*)	X	X	X	X	X	X
Yellow-throated Vireo (*Vireo flavifrons*)	X		X	X	X	X
Yellow-throated Warbler (*Dendroica dominica*)				X		
Total Number of Species	113	111	151	120	94	163

Table 4. Bird species of special concern detected during spring migratory (S), breeding (B), fall migratory (F), and winter seasons (W), May 1999 - May 2001 and from historical records at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO).

Species	Status[a]	May 1999 - May 2001 (Park - Season[b])	Historical Records[c]
American Black Duck	AW	VAFO - W	GETT, HOFU, & VAFO
Bald Eagle	FT & SE	HOFU - B	GETT & VAFO
Barn Owl	SV	GETT - W	GETT & VAFO
Black-throated Blue Warbler	AW	ALPO - S & F GETT - S & F HOFU - S & F JOFL - S & F VAFO - S & F	ALPO, GETT, HOFU, JOFL, & VAFO
Blue-winged Warbler	FMC	HOFU - S JOFL - S VAFO - S & B	GETT, HOFU, JOFL, & VAFO
Brewster's Warbler	FMC	HOFU - S	NONE
Canada Warbler	AW	ALPO - S & F GETT - F HOFU - S & F VAFO - S	ALPO, HOFU, JOFL, & VAFO
Cerulean Warbler	FMC & AW	ALPO - S GETT - S & B HOFU - S & F VAFO - S	HOFU & VAFO
Chestnut-sided Warbler	FMC	ALPO - S, B, & F EISE - S & F GETT - S & F HOFU - S & F JOFL - S & B VAFO - S & F	ALPO, GETT, HOFU, JOFL, & VAFO

Table 4. Bird species of special concern detected during spring migratory (S), breeding (B), fall migratory (F), and winter seasons (W), May 1999 - May 2001 and from historical records at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (continued).

Species	Status	May 1999 - May 2001 (Park - Season)	Historical Records
Common Snipe	SV	EISE - W GETT - W	GETT
Eastern Meadowlark	FMC	ALPO - S EISE - S, B, F, & W GETT - S, B, F, & W JOFL - S & B VAFO - S, B, F, & W	GETT, HOFU, JOFL, & VAFO
Field Sparrow	FMC	ALPO - S, B, & F EISE - S, B, F, & W GETT - S, B, F, & W HOFU - S & B JOFL - S, B, F, & W VAFO - S, B, & F	ALPO, GETT, HOFU, JOFL, & VAFO
Grasshopper Sparrow	FMC	EISE - S & B GETT - S, B, & F JOFL - S VAFO - S, B, & F	GETT & HOFU
Henslow's Sparrow	FMC & AW	GETT - F JOFL - S & B	HOFU
Loggerhead Shrike	FMC & SE	EISE - S & B	HOFU
Long-eared Owl	SI	HOFU - W VAFO - W	NONE
Louisiana Waterthrush	FMC & AW	ALPO - S & B EISE - S GETT - S HOFU - S & B VAFO - S & B	ALPO, GETT, HOFU, & VAFO
Marsh Wren	SI/SV	VAFO - F	GETT & VAFO

Table 4. Bird species of special concern detected during spring migratory (S), breeding (B), fall migratory (F), and winter seasons (W), May 1999 - May 2001 and from historical records at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (continued).

Species	Status	May 1999 - May 2001 (Park - Season)	Historical Records
Northern Flicker	FMC	ALPO - S, B, F, & W EISE - S, B, F, & W GETT - S, B, F, & W HOFU - S, B, F, & W JOFL - S, B, & F VAFO - S, B, F, & W	ALPO, GETT, HOFU, JOFL, & VAFO
Northern Harrier	FMC & SV	EISE - F & W GETT - F & W VAFO - B & W	GETT, HOFU, & VAFO
Northern Saw-whet Owl	SV	ALPO - W GETT - W HOFU - W VAFO - W	GETT
Osprey	ST	GETT - S VAFO - B	GETT & HOFU
Pied-billed Grebe	SV	VAFO - W	HOFU & VAFO
Red-headed Woodpecker	FMC	EISE - S, B, F, & W GETT - S, B, F, & W HOFU - S, B, & W VAFO - S	GETT, HOFU, & VAFO
Red-shouldered Hawk	FMC	ALPO - S EISE - S, B, F, & W GETT - S, B, F, & W HOFU - F JOFL - F VAFO - S, F, & W	GETT & VAFO
Short-eared Owl	FMC & SE	EISE - W GETT - W	GETT
Upland Sandpiper	SCI/SI & AW	GETT - S	NONE

Table 4. Bird species of special concern detected during spring migratory (S), breeding (B), fall migratory (F), and winter seasons (W), May 1999 - May 2001 and from historical records at Allegheny Portage Railroad National Historic Site (ALPO), Eisenhower National Historic Site (EISE), Gettysburg National Military Park (GETT), Hopewell Furnace National Historic Site (HOFU), Johnstown Flood National Memorial (JOFL), and Valley Forge National Historical Park (VAFO) (continued).

Species	Status	May 1999 - May 2001 (Park - Season)	Historical Records
Veery	FMC	ALPO - F EISE - F GETT - S, B & F HOFU - S, B, & F VAFO - S & F	ALPO, GETT, HOFU, & VAFO
Wood Thrush	FMC & AW	ALPO - S, B, & F EISE - S & B GETT - S, B, & F HOFU - S, B, & F JOFL - S & B VAFO - S, B, & F	ALPO, GETT, HOFU, JOFL, & ALPO
Worm-eating Warbler	FMC & AW	ALPO - S EISE - B GETT - S & F HOFU - S, B, & F VAFO - S, B, & F	ALPO, GETT, HOFU, & VAFO
Yellow-crowned Night-heron	SE	GETT - B	GETT & VAFO

[a] The status of birds of special concern was determined from the following sources: federally endangered (FE), threatened (FT) (http://endangered.fws.gov/wildlife.html#Species), or management concern (FMC) (United States Fish and Wildlife Service 1995); state endangered (SE), threatened (ST), critically imperiled (SCI), imperiled (SI), or vulnerable (SV) (http://www.dcnr.state.pa.us/forestry/pndi/pndiweb.htm); Audubon Watchlist (AW) for the northern Ridge and Valley and Allegheny Plateau physiographic provinces in Pennsylvania (Muehter 1998).

[b] The season refers to the following time periods: spring migration (15 April - 25 May), breeding (25 May - 15 July), fall migration (25 August - 10 October), and winter (1 December - 15 March).

[c] Historical records were taken from the NPSpecies database (National Park Service 2001).

Allegheny Portage Railroad National Historic Site

All Seasons Combined

We detected 113 bird species at Allegheny Portage Railroad National Historic Site (ALPO) using point-count and owl surveys (Table 3). Previously, 78 species had been documented within the park, including six species that we did not observe during the current project (Kentucky warbler, mourning warbler, palm warbler, warbling vireo, white-crowned sparrow, and willow flycatcher) (Appendix S). However, five of these species were observed during an earlier study at ALPO (Yahner and Keller 2000). We found 39 species not previously documented within the park, including waterfowl (e.g., tundra swan, Canada goose), owls (e.g., great horned owl, eastern screech-owl), sparrows (e.g., American tree sparrow, vesper sparrow), Neotropical migrants (e.g., blue-winged warbler, cerulean warbler), and winter residents (e.g., common redpoll, dark-eyed junco).

Thirteen species of special concern occurred at ALPO, including one state vulnerable species, the northern saw-whet owl (Table 4). Most (n = 11) species of special concern were found in the park during spring migration (e.g., cerulean warbler). We found five species of special concern that probably breed within the park, including chestnut-sided warbler, field sparrow, Louisiana waterthrush, northern flicker, and wood thrush.

Spring Migration

We found the highest number of species at ALPO during the 2000-01 spring-migratory seasons (n = 92) (Appendix T). Based on all surveys combined for spring migration, five species were categorized as abundant (i.e., located in large numbers and in more than one habitat) (American goldfinch, black-throated green warbler, chipping sparrow, ovenbird, red-eyed vireo). Of the 12 species categorized as common (i.e., located in fairly large numbers in appropriate habitat), six were permanent residents. The highest number of bird species (n = 40) were categorized as occasional (i.e., present in some parcels of appropriate habitat, but not certain to be detected), including 16 long-distance migrants.

The most prevalent species in forested habitat tended to be long-distance migrants (Appendix U). The eight most prevalent species were black-throated green warbler (1.2 average number/point/survey), ovenbird (1.0), red-eyed vireo (0.7), blue-headed vireo (0.7), blue jay (0.6), American goldfinch (0.4), American redstart (0.4), and American robin (0.4). Although the 10 most prevalent long-distance migrants all breed within the park, three of the most prevalent short-distance migrants (ruby-crowned kinglet, white-throated sparrow, and hermit thrush) were migratory transients or winter residents.

Breeding Season

We observed 60 species at ALPO during the 1999-2000 breeding seasons (Appendix T). Only two species, ovenbird and red-eyed vireo, were categorized as abundant during the breeding season, based on all surveys combined. Twelve species, including five long-distance migrants, were classified as common. Most species (n = 28) were occasionally detected.

Nine of the 12 most prevalent species in forested habitat were long-distance migrants (Appendix V). The six most prevalent species at ALPO, all of which are long-distance migrants, were red-eyed vireo (2.1 average number/point/survey), ovenbird (0.9), black-throated green warbler (0.8), scarlet tanager (0.4), American redstart (0.3), and acadian flycatcher (0.3). Permanent-resident species were relatively uncommon in forested habitat at ALPO during the breeding season; no species averaged more than 0.1 average number/point/survey.

Fall Migration

We recorded 62 bird species during the 1999-2000 fall-migratory seasons at ALPO (Appendix T). Four species were categorized as abundant during fall migration, based on all surveys combined, and all were permanent residents (American goldfinch, black-capped chickadee, blue jay, cedar waxwing). Most species (n = 33) were classified as occasionally occurring within the park.

Unlike other seasons, seven of the nine most prevalent species in forested habitat were permanent residents rather than long-distance or short-distance migrants (Appendix W). Only one long-distance migrant (red-eyed vireo) and one short-distance migrant (gray catbird) averaged greater than 0.1 average number/point/survey, and only five short-distance migrants were documented at ALPO during fall migration. The four most prevalent species at forested point counts were black-capped chickadee (0.6 average number/point/survey), white-breasted nuthatch (0.3), blue jay (0.3), and cedar waxwing (0.3).

Winter Season

We noted 34 species during the 1999-2001 winter seasons at ALPO (Appendix T). Only one species was categorized as abundant during the winter season at ALPO based on all surveys combined (black-capped chickadee). Most species (n = 17) were occasionally observed within the park.

Only two short-distance migrants, golden-crowned kinglet and dark-eyed junco, were detected using point counts in forested habitat (Appendix X). The five most prevalent species were black-capped chickadee (0.7 average number/point/survey), golden-crowned kinglet (0.4), white-breasted nuthatch (0.4), tufted titmouse (0.3), and hairy woodpecker (0.3).

Eisenhower National Historic Site

All Seasons Combined

Bird species records for Eisenhower National Historic Site (EISE) have not been maintained separate from those of Gettysburg National Military Park because of the close proximity of the two parks. Therefore, all species that we detected represent "new" species for EISE. Combining infromation from point-count, vehicular-road, diurnal raptor and vulture, loggerhead shrike, and owl surveys, we detected 111 species within EISE boundaries (Table 3).

Fifteen species of special concern were detected at EISE (Table 4). Most notable, EISE was the only park in which we documented the loggerhead shrike, a state-endangered species; this species breeds in the vicinity of the park. Breeding species of special concern included eastern meadowlark, field sparrow, grasshopper sparrow, northern flicker, red-headed woodpecker, red-shouldered hawk, wood thrush, and worm-eating warbler. We also found three state-listed species of special concern, including short-eared owl (state endangered) and common snipe and northern harrier (both state vulnerable).

Spring Migration

We detected 88 species at EISE during the 2000-01 spring-migratory seasons (Appendix Y). Thirteen species, including 11 permanent residents, were classified as abundant, based on all surveys combined. In addition, of the 14 species categorized as common, nine were permanent residents. Most species (n = 28) were classified as occasional.

The most prevalent species noted at point-count sampling points in all cover types combined tended to be permanent residents rather than long-distance or short-distance migrants and species that are associated with herbaceous (e.g., barn swallow, bobolink) or edge habitat (e.g., house wren, chipping sparrow, gray catbird) (Appendix Z). Of the 21 most prevalent migrants, only one, yellow-rumped warbler, was a migratory transient or winter resident; all other migratory species breed within the park. The seven most prevalent species were European starling (3.7 average number/point/survey), red-winged blackbird (2.8), American robin (1.8), barn swallow (1.2), song sparrow (0.9), house sparrow (0.8), and Canada goose (0.7).

Breeding Season

We found 72 bird species at EISE during the 1999-2000 breeding seasons (Appendix Y). Of the 12 bird species categorized as abundant during the breeding season, most (n = 10) were permanent residents. Twenty species were classified as uncommon (i.e., present in appropriate habitat, but not located in large numbers) and twenty as occasional within EISE; these relative abundance categories contained the greatest number of species.

Except for barn swallow, long-distance migrants were not prevalent; no species averaged more than 0.3 average number/point/survey (Appendix AA). Whereas the most prevalent short-distance migrants and permanent residents within all cover types combined were species associated with herbaceous and edge habitats (e.g., house wren, grasshopper sparrow, gray

catbird, eastern meadowlark), the most prevalent long-distance migrants were forest species (e.g., eastern wood-pewee, great crested flycatcher, red-eyed vireo, wood thrush). The seven most prevalent species from all point counts combined were European starling (2.5 average number/point/survey), red-winged blackbird (2.0), barn swallow (1.5), American robin (0.8), house sparrow (0.8), house wren (0.8), and song sparrow (0.8).

Fall Migration

We observed 61 species during the 1999-2000 fall-migratory seasons at EISE (Appendix Y). Species categorized as abundant during fall migration tended to be permanent residents at EISE (9 out of 10 abundant species). Most species (n = 16) were classified as occasional.

As with other seasons, long-distance migrants were uncommon; only one species, eastern wood-pewee, averaged more than 0.1 average number/point/survey (Appendix AB). Two of the 11 most prevalent long-distance migrants (magnolia warbler and black-throated green warbler) and two of the 10 most prevalent short-distance migrants (palm warbler and yellow-rumped warbler) were migratory transients or winter residents. The seven most prevalent species from all point counts were European starling (3.9 average number/point/survey), mourning dove (1.4), American goldfinch (1.0), killdeer (1.0), blue jay (0.6), house finch (0.6), and house sparrow (0.6).

Winter Season

We recorded 54 species during the 1999-2001 winter seasons at EISE (Appendix Y). As in other seasons, most (12 of 13) species classified as abundant were permanent residents at EISE. The most (n = 18) species were classified as occasional in the park.

Five of the 10 most prevalent short-distance migrants were winter residents, including dark-eyed junco, golden-crowned kinglet, white-crowned sparrow, yellow-rumped warbler, and white-throated sparrow (Appendix AC). Based on point counts in all cover types combined, the six most prevalent species were red-winged blackbird (3.9 average number/point/survey), European starling (3.3), American robin (2.4), common grackle (2.3), dark-eyed junco (1.5), and mourning dove (0.9).

All Seasons Combined

We found 151 bird species at Gettysburg National Military Park (GETT) from May 1999 to May 2001 using point-count, vehicular-road, diurnal raptor and vulture, and owl surveys, including 16 species not found previously within the park (Table 3 and Appendix AD). One-hundred fifty-nine bird species had been documented within GETT prior to our inventory and compiled in the NPSpecies database. These species included 24 that we did not find during this project; however, we documented 14 of those species during a previous project at GETT (e.g., gray-cheeked thrush, great egret, and Philadelphia vireo) (Yahner et al. 1998). Species previously documented but not recorded in our inventory were waterbirds (e.g., American coot, American wigeon), raptors (e.g., bald eagle, golden eagle, merlin), and two non-native species that were probably escapees (gray partridge and scaled quail). Species found but not previously documented within the park included many Neotropical migrants (e.g., bay-breasted warbler, Canada warbler, cerulean warbler, Kentucky warbler), short-distance migrants (e.g., orange-crowned warbler, rusty blackbird), and sparrows (Henslow's sparrow, savannah sparrow, swamp sparrow, and vesper sparrow).

Twenty-three species of special concern were found at GETT, including two state endangered species (short-eared owl during winter and yellow-crowned night-heron during the breeding season), one state threatened species (osprey during spring), one state critically imperiled species (upland sandpiper during spring), and four state vulnerable species (barn owl, common snipe and northern saw-whet owl during winter, and northern harrier during fall and winter) (Table 4). In addition to the state endangered yellow-crowned night-heron, nine other species of federal management concern were documented during the breeding season, including cerulean warbler, eastern meadowlark, field sparrow, grasshopper sparrow, northern flicker, red-headed woodpecker, red-shouldered hawk, veery, and wood thrush.

Spring Migration

We documented 125 species at GETT during the 2000-01 spring-migratory seasons, which was the highest seasonal total at any of the six parks (Appendix AE). Species categorized as abundant, based on all surveys combined, primarily (9 of 10 species) were permanent residents. In contrast, most species (n = 45) were classified as rare (i.e., detected only a few times at most per season), and 21 species were long-distance migrants.

Fifteen of the 21 most prevalent migrants in forest cover type also were present during the breeding season; only two long-distance migrants (black-throated blue warbler and magnolia warbler) and four short-distance migrants (yellow-rumped warbler, white-throated sparrow, ruby-crowned kinglet, and blue-headed vireo) were migratory transients or winter residents (Appendix AF). The seven most prevalent species in forest habitat during spring migration were wood thrush (1.5 average number/point/survey), blue jay (1.2), tufted titmouse (1.2), northern cardinal (0.9), Carolina chickadee (0.9), red-bellied woodpecker (0.8), and eastern wood-pewee (0.7).

In herbaceous habitat, permanent residents were more prevalent than other migratory guilds (Appendix AF). We found seven long-distance migrants in herbaceous habitat, including two grassland specialists, bobolink and upland sandpiper. The six most prevalent species during spring migration were red-winged blackbird (3.3 average number/point/survey), European starling (2.2), American robin (1.4), barn swallow (1.0), eastern meadowlark (1.0), and bobolink (0.7).

Breeding Season

We detected 95 bird species during the 1999-2000 breeding seasons at GETT (Appendix AE). Of the eight species classified as abundant during the breeding season, most (n = 6) were permanent residents. These included American crow, American robin, blue jay, European starling, red-winged blackbird, and turkey vulture. The other two species categorized as abundant were long-distance migrants (eastern wood-pewee and wood thrush). Most species were classified as rare (n = 30).

Point counts in forest cover type were dominated by long-distance migrants and permanent residents; only seven short-distance migrants were found at forested points, and each was recorded at low densities ($\leq$ 0.2 average number/point/survey) (Appendix AG). The seven most prevalent species in forest habitat were wood thrush (2.3 average number/point/survey), eastern wood-pewee (1.0), blue jay (0.9), tufted titmouse (0.9), northern cardinal (0.6), red-eyed vireo (0.6), and white-breasted nuthatch (0.6).

With the exception of two aerial feeders (barn swallow and chimney swift) and two grassland specialists (bobolink and red-winged blackbird), few migrants were found in herbaceous habitats (Appendix AG). The seven most prevalent species recorded at herbaceous point counts were European starling (5.0 average number/point/survey), red-winged blackbird (3.6), eastern meadowlark (1.2), barn swallow (1.0), American robin (0.6), bobolink (0.6), and chimney swift (0.6).

Fall Migration

We observed 98 species at GETT during the 1999-2000 fall-migratory seasons (Appendix AE). Of the eight species classified as abundant and five species classified as common during fall migration, all were permanent residents. In contrast, 50 species were categorized as rare, and 26 of these species were long-distance migrants.

Several migratory transients and winter residents were prevalent in forested habitat at GETT during fall migration (Appendix AH). Four of the 11 most prevalent long-distance migrants (black-throated blue warbler, black-throated green warbler, blackpoll warbler, and magnolia warbler) and six of the eight most prevalent short-distance migrants (blue-headed vireo, golden-crowned kinglet, hermit thrush, palm warbler, ruby-crowned kinglet, and yellow-rumped warbler) were transients or winter residents. However, permanent residents were much more prevalent than long-distance or short-distance migrants. The six most prevalent species during fall migration in forested habitat were permanent residents: American robin (1.4 average

number/point/survey), blue jay (1.3), red-bellied woodpecker (0.9), Carolina chickadee (0.9), tufted titmouse (0.9), and white-breasted nuthatch (0.7).

Only two species of long-distance migrants, chimney swift and eastern kingbird, were found in herbaceous habitat (Appendix AH). As with forested habitat, permanent residents were more prevalent than short-distance migrants. The European starling was ubiquitous within the herbaceous cover type (8.4 average number/point/survey), followed by eastern meadowlark (0.5), American goldfinch (0.5), eastern bluebird (0.5), mourning dove (0.4), and rock dove (0.4).

Winter Season

We observed 69 species during the 1999-2001 winter seasons at GETT (Appendix AE). Of the nine abundant species during the winter season, only the dark-eyed junco was not a permanent resident. Twenty of the 69 species found during winter were classified as rare, which was the highest total for any relative abundance category.

With the exception of dark-eyed junco, short-distance migrants were relatively uncommon; only four short-distance migratory species were detected using point-counts in forested habitat (Appendix AI). The seven most prevalent species in forested habitat were dark-eyed junco (1.0 average number/point/survey), red-bellied woodpecker (0.9), tufted titmouse (0.9), white-breasted nuthatch (0.9), blue jay (0.6), American robin (0.6), and Carolina chickadee (0.5).

Only two short-distance migrants were found in herbaceous habitat during winter (white-throated sparrow and white-crowned sparrow), and both were scarce ($\leq$ 0.1 average number/point/survey). The six most prevalent species in herbaceous habitat were American crow (0.6 average number/point/survey), Canada goose (0.6), mourning dove (0.4), eastern bluebird (0.3), eastern meadowlark (0.3), and turkey vulture (0.3).

Hopewell Furnace National Historic Site

All Seasons Combined

We encountered 120 species at HOFU using point-count, vehicular-road, diurnal raptor and vulture, and owl surveys (Table 3). We found 14 species (and one hybrid [Brewster's warbler]) not previously documented within the park, including several Neotropical migrants (e.g., black-billed cuckoo, Nashville warbler, Philadelphia vireo, yellow-throated warbler), owls (e.g., barred owl, long-eared owl), and raptors (bald eagle, red-shouldered hawk) (Appendix AJ). One-hundred seventy species were documented previously within the park, including 54 species that we did not detect during this project. We found 10 of these 54 species during a previous study at HOFU (Yahner et al. 1998). Most species not documented were waterfowl (e.g., northern pintail, red-breasted merganser, ruddy duck) and sparrows (e.g., savannah sparrow, swamp sparrow, vesper sparrow, white-crowned sparrow).

We found 17 species of special concern at HOFU between May 1999 - May 2001 (Table 4). The most notable species of special concern was the federally threatened and state endangered bald eagle, which was detected during the breeding season. Two owl species of special concern were detected while conducting nocturnal-owl surveys during winter, including the long-eared owl (state imperiled) and the northern saw-whet owl (state vulnerable). Relatively few species of special concern were detected during the breeding season. In addition to the federally threatened bald eagle, species of federal management concern that breed at HOFU included the field sparrow, Louisiana waterthrush, northern flicker, red-headed woodpecker, veery, wood thrush, and worm-eating warbler.

Spring Migration

As with other parks, the highest species richness (n = 98) for HOFU was documented during the 2000-01 spring-migratory seasons (Appendix AK). In contrast to GETT and EISE, the highest number (n = 5) of species categorized as abundant at HOFU during spring migration were long-distance migrants rather than permanent residents. These included barn swallow, ovenbird, red-eyed vireo, scarlet tanager, and wood thrush. Most (n = 41) of the 98 species documented at HOFU during spring were categorized as occasional.

Long-distance migrants were well represented at point-count sampling points in forested habitat (Appendix AL). Three species averaged at least 1.0 average number/point/survey. Three of the 13 most prevalent long-distance migrants (black-throated green warbler, blackpoll warbler, and black-throated blue warbler) and two of the 10 most prevalent short-distance migrants (yellow-rumped warbler and hermit thrush) were migratory transients or winter residents. The six most prevalent species during spring were ovenbird (1.6 average number/point/survey), red-eyed vireo (1.1), wood thrush (1.0), blue jay (0.9), yellow-rumped warbler (0.8), and scarlet tanager (0.7).

Breeding Season

We found 71 bird species during the 1999-2000 breeding seasons at HOFU (Appendix AK).

Similar to spring migration, five of the eight species classified as abundant were long-distance migrants, including barn swallow, eastern wood-pewee, ovenbird, red-eyed vireo, and scarlet tanager. Twenty-six of the 71 species found during the breeding season were categorized as occasional.

Short-distance migrants were relatively uncommon; only seven species were detected in forested habitat, and no species averaged more than 0.2 average number/point/survey (Appendix AM). Five of the seven most prevalent species in forested habitat were long-distance migrants including red-eyed vireo (1.8 average number/point/survey), ovenbird (0.9), scarlet tanager (0.8), eastern wood-pewee (0.5), and wood thrush (0.5).

Fall Migration

We observed 65 bird species during the 1999-2000 fall migratory seasons at HOFU (Appendix AK). In contrast to other seasons at HOFU, the six most abundant species during fall migration were all permanent residents (American crow, blue jay, Canada goose, Carolina chickadee, common grackle, and turkey vulture). Nearly half (n = 32) of the 65 species detected were occasionally found in the park.

Although richness of migratory transients was relatively high, they were uncommon at point counts in forested habitat ($\leq$ 0.1 average number/point/survey) (Appendix AN). Four of five short-distance migrants were migratory transients or winter residents (white-throated sparrow, palm warbler, ruby-crowned kinglet, and yellow-rumped warbler), and five of the 14 most prevalent long-distance migrants were migratory transients (black-throated blue warbler, black-throated green warbler, Canada warbler, magnolia warbler, and Tennessee warbler). The seven most prevalent species at forested point-count sampling points during fall migration were Carolina chickadee (1.0 average number/point/survey), blue jay (0.7), tufted titmouse (0.7), white-breasted nuthatch (0.4), downy woodpecker (0.3), eastern wood-pewee (0.3), and red-bellied woodpecker (0.3).

Winter Season

We found 44 species during the 1999-2001 winter seasons at HOFU (Appendix AK). Five species were classified as abundant including eastern screech-owl, which was primarily detected using nocturnal-owl surveys. Other abundant species were all permanent residents (American crow, Canada goose, Carolina chickadee, and turkey vulture). Twenty of the 44 species detected were classified as occasional.

Similar to fall migration, few short-distance migrants were recorded in forested habitat during winter (Appendix AO). Three winter residents (golden-crowned kinglet, dark-eyed junco, and yellow-bellied sapsucker) and one summer resident (red-winged blackbird) were found at point counts. The five most prevalent species at point counts in forested habitat during winter were Carolina chickadee (0.5 average number/point/survey), red-bellied woodpecker (0.4), American crow (0.4), tufted titmouse (0.3), and white-breasted nuthatch (0.3).

Johnstown Flood National Memorial

All Seasons Combined

We found 94 species at JOFL using point-count, vehicular-road, diurnal raptor and vulture, riparian bird, and owl surveys, including 39 species not previously documented within the park (Table 3 and Appendix AP). This species richness is surprisingly high given the relatively small size of the park (63 ha). Species not previously documented included owls (e.g., barred owl and great horned owl), raptors (e.g., broad-winged hawk and red-shouldered hawk), Neotropical migrants (e.g., alder flycatcher, black-and-white warbler, and great crested flycatcher), wintering species (e.g., American tree sparrow, dark-eyed junco, northern shrike, and snow bunting), and grassland species (e.g., bobolink, grasshopper sparrow, and Henslow's sparrow). Seventy species were previously recorded at JOFL, based on data contained in NPSpecies. Fifteen species not found during this project were previously documented during a previous study at JOFL (Yahner and Keller 2000).

We detected 10 species of federal management concern and/or on the Audubon Watchlist at JOFL between May 1999 - May 2001 (Table 4). No federally or state threatened species were found. Most species of special concern (n = 7) were recorded during the breeding season, including chestnut-sided warbler, eastern meadowlark, field sparrow, Henslow's sparrow, northern flicker, red-shouldered hawk, and wood thrush.

Spring Migration

We documented 75 bird species during the 2000-01 spring-migratory seasons at JOFL (Appendix AQ). Nine species were classified as abundant during spring migration. Most species were edge specialists (American goldfinch, common yellowthroat, eastern towhee, field sparrow, red-winged blackbird, song sparrow, and yellow warbler). Twenty-one species were classified as rare, which was the highest total of any relative abundance category.

None of the 11 most prevalent long-distance migrants detected via point-count sampling within all cover types combined was a migratory transient, and only one short-distance migrant, yellow-rumped warbler, was a transient (Appendix AR). The five most prevalent species at JOFL were red-winged blackbird (1.9 average number/point/survey), song sparrow (1.7), American goldfinch (1.0), common yellowthroat (1.0), and yellow warbler (1.0).

Breeding Season

We detected 59 bird species during the 1999-2000 breeding seasons at JOFL (Appendix AQ). Based on all surveys combined, 12 species were categorized as abundant, including five permanent residents (American crow, American goldfinch, American robin, red-winged blackbird, and song sparrow). Only two forest specialists (ovenbird and red-eyed vireo) were classified as abundant. Seventeen species were considered uncommon, and 17 were classified as occasional.

Species that were prevalent within all cover types at JOFL during the breeding season were primarily edge species (e.g., indigo bunting, willow flycatcher, chestnut-sided warbler, common yellowthroat, gray catbird, and field sparrow) (Appendix AS). The nine most prevalent species at all point-count sampling points combined were song sparrow (2.0 average number/point/survey), red-winged blackbird (1.2), common yellowthroat (1.0), red-eyed vireo (0.9), American goldfinch (0.8), gray catbird (0.8), indigo bunting (0.8), field sparrow (0.7), and yellow warbler (0.7).

Fall Migration

We observed 42 species during the 1999-2000 fall-migratory seasons at JOFL (Appendix AQ). Of the 42 species detected during fall migration, only six were categorized as abundant, including American goldfinch, American robin, blue jay, cedar waxwing, common grackle, and red-winged blackbird. Most species (n = 11) rarely were found in the park.

Species richness and relative abundance of long-distance migrants were low; only five species were detected, and indigo bunting was the only species that averaged greater than 0.1 average number/point/survey (Appendix AT). The six most prevalent species at point-count sampling points within the park tended to be characteristic of open habitats: common grackle (3.0 average number/point/survey), American goldfinch (1.1), cedar waxwing (1.0), red-winged blackbird (0.8), American robin (0.7), and common yellowthroat (0.5).

Winter Season

We found 32 bird species during the 1999-2001 winter seasons at JOFL (Appendix AQ). Four species were classified as abundant, including three permanent residents (American crow, Canada goose, and song sparrow) and one short-distance migrant (American tree sparrow). Both the uncommon and occasional relative abundance categories contained the most species (n = 9).

Short-distance migrants were not prevalent within all cover types combined during winter (Appendix AU). Five species were detected, and only one species (American tree sparrow) averaged more than 0.1 average number/point/survey. The six most prevalent species were song sparrow (0.8 average number/point/survey), American crow (0.6), American tree sparrow (0.5), black-capped chickadee (0.3), American robin (0.2), and eastern bluebird (0.2).

Valley Forge National Historical Park

All Seasons Combined

We recorded the highest species richness of all six parks at VAFO (n = 163), using point-count, vehicular-road, diurnal raptor and vulture, riparian bird, and owl surveys (Table 3). We found 10 species not previously documented in the park (i.e., alder flycatcher, common raven, common snipe, grasshopper sparrow, horned lark, long-eared owl, northern saw-whet owl, osprey, tundra swan, and vesper sparrow) (Appendix AV). Two-hundred sixteen species were recorded in NPSpecies, including 62 species that we did not find during this project. Species not found included waterfowl (black scoter and gadwall), waders (e.g., black-crowned night-heron, cattle egret, and glossy ibis), gulls (great black-backed gull and laughing gull), raptors (bald eagle, merlin, and northern goshawk), rare migrants (Connecticut warbler and olive-sided flycatcher), and irruptive species (common redpoll, evening grosbeak, and pine grosbeak).

We documented 22 species of special concern at VAFO between May 1999 - May 2001 (Table 4). No federally endangered or threatened species were detected, but we did find one state threatened (i.e., osprey), two state imperiled (i.e., long-eared owl and marsh wren), and three state vulnerable (northern harrier, northern saw-whet owl, and pied-billed grebe) species. Osprey, northern harrier, and eight species of federal management concern were documented during the breeding season, including blue-winged warbler, eastern meadowlark, field sparrow, grasshopper sparrow, Louisiana waterthrush, northern flicker, wood thrush, and worm-eating warbler.

Spring Migration

We documented the highest number of species (n = 123) during the 2000-01 spring-migratory seasons at VAFO (Appendix AW). Of the 11 species that were classified as abundant at VAFO during spring migration, nine were permanent residents. The only migratory species classified as abundant based on all surveys combined were gray catbird (short-distance migrant) and red-eyed vireo (long-distance migrant). The highest number of species (n = 40) was categorized as rare.

Although species richness was relatively high during spring, transients were not prevalent at VAFO (Appendix AX). Only two of the 10 most prevalent long-distance migrants were transients (black-throated blue warbler and blackpoll warbler), and they were present at in relatively low densities (0.2 average number/point/survey). In contrast, four of the 11 most prevalent short-distance migrants were winter residents in forested habitat (white-throated sparrow, yellow-rumped warbler, dark-eyed junco, and yellow-bellied sapsucker). However, none of these species was present in large numbers (0.1 average number/point/survey). The nine most prevalent species in forest cover type during spring tended to be permanent residents except red-eyed vireo (1.5 average number/point/survey) and wood thrush (0.5): blue jay (0.9), cedar waxwing (0.7), Carolina chickadee (0.7), American robin (0.7), northern cardinal (0.6), red-bellied woodpecker (0.6), and tufted titmouse (0.5).

Similar to forested habitat, permanent residents also were more prevalent in herbaceous habitat during spring migration (Appendix AX). Only one long-distance migrant (barn swallow

[1.1 average number/point/survey]) and one short-distance migrant (red-winged blackbird [1.2]) were among the eight most common species at VAFO with the remaining six species being permanent residents; these European starling (2.7), American robin (0.9), Canada goose (0.7), cedar waxwing (0.5), eastern meadowlark (0.5), and common grackle (0.5).

Breeding Season

We observed 91 species during the 1999-2000 breeding seasons at VAFO (Appendix AW). Of the 91 species documented during the breeding season, 10 and 11 species were categorized as abundant and common, respectively. Of these species, most (7 abundant and 9 common species) were permanent residents. Both the occasional and rare relative abundance categories contained the most species (n = 24).

Short-distance migrants were relatively uncommon at VAFO in forested habitats; we detected only six species, and only three (gray catbird, eastern towhee, and brown-headed cowbird) averaged greater than 0.1 average number/point/survey (Appendix AY). The nine most prevalent species at forested point-count sampling points tended to be long-distance migrants including red-eyed vireo (1.6 average number/point/survey), wood thrush (0.8), and ovenbird (0.4) or permanent residents including blue jay (0.7), northern cardinal (0.7), Carolina chickadee (0.5), cedar waxwing (0.4), and red-bellied woodpecker (0.4).

In contrast, permanent residents dominated herbaceous points (Appendix AY). Of the most prevalent migrants, most were edge specialists; only the bobolink, eastern kingbird, killdeer, and red-winged blackbird are grassland specialists. The seven most common species at herbaceous point counts were European starling (5.4 average number/point/survey), mourning dove (1.3), red-winged blackbird (0.9), barn swallow (0.8), eastern meadowlark (0.7), Canada goose (0.6), and American crow (0.6).

Fall Migration

We observed 95 bird species during the 1999-2000 fall migratory seasons at VAFO (Appendix AW). Only eight of these were categorized as abundant; each was a permanent resident. Most (n = 44) of the 95 species were rarely encountered.

In both forest and herbaceous habitats, migrants were scarce; only gray catbird at forested point-count sampling points and chimney swift and palm warbler at herbaceous point counts averaged greater than 0.1 average number/point/survey (Appendix AZ). However, six of the 16 most common migratory species in forested habitat and seven of the 18 most common migratory species in herbaceous habitat were either transients or winter residents. The seven most prevalent species in forested habitat were American robin (3.0 average number/point/survey), Carolina chickadee (1.5), blue jay (1.0), tufted titmouse (0.6), red-bellied woodpecker (0.5), northern cardinal (0.3), and downy woodpecker (0.3). In herbaceous habitat, the seven most prevalent species were European starling (5.2), American goldfinch (1.0), blue jay (0.9), American crow (0.7), mourning dove (0.7), palm warbler (0.4), and song sparrow (0.4).

Winter Season

We documented 71 species during the 1999-2001 winter seasons at VAFO (Appendix AW). Based on all surveys combined, 12 species were classified as abundant. Of the 12 abundant species, six primarily were detected during riparian bird surveys (bufflehead, Canada goose, common merganser, mallard, ring-billed gull, and ring-necked duck). Of the 71 species documented at VAFO, the most (n = 23) were classified as occasional.

Few short-distance migrants were detected in both forested (n = 2) and herbaceous (n = 6) habitats (Appendix BA). The four most prevalent species in forested habitat were Carolina chickadee (0.7 average number/point/survey), tufted titmouse (0.6), American robin (0.5), and red-bellied woodpecker (0.3). In herbaceous habitat, the six most common species included one short-distance migrant (dark-eyed junco [0.6 average number/point/survey]), whereas the others were permanent residents: European starling (2.3), Canada goose (1.9), eastern bluebird (0.7), American crow (0.6), and eastern meadowlark (0.6).

Discussion

Species richness at each park during 1999-2001 was very high, ranging between 94 and 163 species and totaling 186 for all parks combined. Most notably, the parks provided habitat for 31 species of special concern, with 21 present during the breeding season. At GETT, HOFU, and VAFO, the total number of species found was lower than the number recorded historically. Several factors may influence this discrepancy between historically recorded versus currently observed number of species. First, considerable research has been conducted previously at these parks (National Park Service 2001), and emphasis has been placed on documenting birds by resource management specialists. Second, we collected only 2 years of data for each season. Species that are rare (e.g., Cerulean warbler and golden-winged warbler), of special concern (e.g., bald eagle), irruptive (e.g., evening grosbeak and northern shrike), or secretive (e.g., northern saw-whet owl) may not occur at a park every year or may occur in such low densities that they are not easily detected. In particular, park personnel at VAFO have compiled ornithological data at the park for the past 15 years. This has resulted in many rare and irruptive species being documented (e.g., American pipit and Connecticut warbler). Third, migratory transients, such as bay-breasted warbler, are present in the parks for a relatively short amount of time during spring and fall. Therefore, not all species are expected to be documented every year within a given park during that short time period. However, during 2 years of data collection, between 10 and 39 species not previously recorded were documented within each park. Although a large number of species has been documented, further inventory and monitoring likely will continue to increase the number of species observed within each park.

Each of the six national parks is unique with regard to habitat types and adjacent land uses, making each park an important location for bird conservation in Pennsylvania. To some extent, the abundance and distribution of cover types and landscape features within and surrounding the parks affected the number and type of bird species found within each park. For example, ALPO and HOFU have appreciable forest cover within and surrounding the parks compared to EISE, which is largely agricultural. Not surprisingly, the most abundant species at ALPO and HOFU were birds associated with forested habitats (e.g., ovenbird, red-eyed vireo, scarlet tanager, and black-capped and Carolina chickadees), whereas the most abundant species at EISE were birds associated with open, herbaceous habitats, (e.g., barn swallow, red-winged blackbird, European starling, and eastern meadowlark). Landscape features, such as the Schuylkill River that runs through VAFO, provide habitat and resources for riparian birds (e.g, American coot, bufflehead, and common golden-eye) and helped increase the number of speceis present within VAFO. Cumulatively, these different cover types and landscape features, as well as important combinations of cover types associated with landscape features (e.g., early successional habitat associated with the Little Conemaugh River at JOFL) present within parks, will continue to be important habitat for birds each season.

Allegheny Portage Railroad National Historic Site

The uniqueness of the avian community at each park can be attributed to many factors. At ALPO, a large amount of forested habitat is characterized as northern hardwoods, and is located in the Appalachian Plateau Province. This habitat type contained species breeding within the park that are characteristic of more northerly locations (e.g., blackburnian warbler, black-throated green warbler, and magnolia warbler). However, most species characteristic of open habitats (e.g., bobolink, grasshopper sparrow, and northern harrier) were not present at the park because of the relatively small amount of herbaceous or grassland habitat. Continued monitoring at ALPO likely will result in documentation of species that are typical of coniferous habitat, relatively rare migrants, and winter-irruptive species (e.g., alder flycatcher, evening grosbeak, gray-cheeked thrush, olive-sided flycatcher, and white-winged crossbill).

Eisenhower National Historic Site

In contrast to ALPO, EISE is dominated by herbaceous habitat, and the bird community was composed largely of uncommon and declining species of open grassland and edge habitats (e.g., bobolink, eastern meadowlark, field sparrow, Lincoln's sparrow, northern harrier, savannah sparrow, and vesper sparrow). Because EISE contains a very limited amount of forested habitat, several forest-interior species have not been documented at the park (e.g., black-and-white warbler, cerulean warbler, hooded warbler, northern parula, northern saw-whet owl, and yellow-throated vireo). Future monitoring of birds at the park, particularly in the extensive open habitats, will confirm the regional importance of this park during the breeding season for uncommon, rare, and threatened grassland species, including state-endangered loggerhead shrikes.

Gettysburg National Military Park

The large size of GETT and expansive forest and grassland areas within the park resulted in a relatively high species richness (n = 151) during 1999-2001, including an impressive number of species of special concern (n = 23). However, several species of migratory ground-nesting or shrub-nesting species, such as hooded warbler, Kentucky warbler, Louisiana waterthrush, and veery, were not abundant during the breeding season. Overbrowsing of ground and shrub vegetation by white-tailed deer (*Odocoileus virginianus*) at GETT has created a low density of understory cover, which in turn adversely affects ground- and shrub-nesting birds (Storm et al. 1989; Fairweather and Cavanaugh 1990; DeCalesta 1994; Fredericksen et al. 1998). With continued deer management, numbers of these species should begin to increase in the near future. In addition, species conspicuously absent at GETT were migratory transients (e.g., alder flycatcher, gray-cheeked thrush, northern waterthrush, and Philadelphia vireo); further inventory efforts during spring and fall-migratory seasons should increase the number of species documented at the park.

Hopewell Furnace National Historic Site

Like ALPO, HOFU is primarily a forested park with relatively little open habitat. Whereas species richness and abundance of long-distance migrants and forest-interior specialists were

impressive at HOFU, several species characteristic of open habitats at other parks (e.g., American tree sparrow, eastern meadowlark, savannah sparrow, and vesper sparrow) were not found at HOFU. The small size of grasslands and conversion of grasslands to agricultural fields make it unlikely that these species will breed at HOFU or that species requiring large patches of open habitat (e.g., grasshopper sparrow or northern harrier) will be documented at the park. In contrast, given the amount of contiguous forest, especially when combined with the adjacent French Creek State Park, future inventory efforts in the park will probably increase the documentation of breeding forest-interior specialists (e.g., cerulean warbler, hooded warbler, Kentucky warbler, and sharp-shinned hawk).

Johnstown Flood National Memorial

We were able to document a surprisingly high number of species (n = 94) at JOFL between 1999-2001 despite the small size of the park (63 ha) and the few number of point-count sampling points (N = 10). The number of grassland species, including eastern meadowlark, grasshopper sparrow, Henslow's sparrow, and savannah sparrow, was particularly high given the relatively small amount of grassland habitat. Like ALPO, the location of JOFL in the Appalachian Plateau Province resulted in the presence of more northerly species in the park, such as black-throated green warbler during the breeding season and northern shrike and snow bunting during winter. However, the small size of the park may have precluded forest-interior specialists (e.g., black-and-white warbler and yellow-throated vireo) that were present during migration from breeding within the park. Long-term monitoring likely will show that JOFL is an important stopover site for long-distance migrants (e.g., golden-winged warbler and Wilson's warbler), an important breeding area for birds of early-successional habitat (e.g., chestnut-sided warbler, eastern towhee, and willow flycatcher), and an important wintering location for irruptive species (e.g., common redpoll, evening grosbeak, northern shrike, and snow bunting).

Valley Forge National Historical Park

Although VAFO is surrounded by urban and suburban development and hosts a high number of tourists, it had the highest number of bird species (n = 163). One feature significantly influencing the avian community is the Schuylkill River, which traverses the park. We found 23 waterbird species associated with the river at VAFO, including bufflehead, common goldeneye, and herring gull. In addition, the large size of the park, variety of habitats, and large size of the forest and grassland areas all contributed to very high species richness, particularly during spring migration. However, the extremely high deer population and consequent absence of understory cover and forest regeneration will likely continue to limit the avian breeding community (Cypher 1986; DeCalesta 1994; Fredericksen 1998). Densities of ground-nesting or shrub-nesting species, such as black-billed cuckoo, hooded warbler, Kentucky warbler, white-eyed vireo, and worm-eating warbler, will continue to remain low throughout the park unless steps are taken to increase regeneration. Continued monitoring, particularly during migration, will probably increase the already impressive species list of rare southern-breeding species (e.g., blue grosbeak, cattle egret, prothonotary warbler, and yellow-throated warbler) and species out of their typical range (e.g., greater white-fronted goose, pine grosbeak, and red-necked grebe).

Monitoring Recommendations

Point-count Surveys

A bird monitoring program at each of the parks should primarily involve point-count surveys. Results from point-count surveys provide information on bird species richness and abundance and can be compared among years, among seasons, and, if conducted at our point-count sampling locations, to results from this project because of a standard time length (10 minutes) and survey protocol. We recommend conducting point-counts for at least 2 consecutive years out of every 5 years. This will provide the most reliable data, increase the likelihood of incorporating an irruptive year for wintering species, and provide enough information to track long-term trends.

The highest species richness at each park was consistently found during spring migration. However, we documented a large number of species during other seasons that were not recorded during spring migration (20 species at ALPO, 24 at EISE, 26 at GETT, 23 at HOFU, 19 at JOFL, and 38 at VAFO); hence many species may be overlooked if surveys are conducted only during spring migration. Surveys should be conducted during all seasons to maximize the number of species detected, thereby increasing the likelihood of observing uncommon winter residents (e.g., American tree sparrow, red-breasted nuthatch, white-crowned sparrow, and yellow-bellied sapsucker) and late-arriving breeding species (e.g., acadian flycatcher, ruby-throated hummingbird, willow flycatcher, and yellow-billed cuckoo).

Vehicular-road Surveys

If time and monies are available, vehicular-road surveys should be conducted for 2 consecutive years during each 5-year period to increase information on species richness and abundance as a supplement to point-count surveys. Vehicular-road surveys may be conducted during the same years as point-count surveys or in place of them during 2 of the 3 years when point-count surveys are not conducted. However, because they are not particularly suitable for inventorying and monitoring forest-interior species, vehicular-road surveys should not replace point-count surveys unless time and monies are severely limited.

Additional Surveys

Diurnal raptor and vulture surveys require little time and effort, and should continue at each park for 2 consecutive years out of every 5-year period. Although year-round surveys are recommended to maximize species richness and abundance estimates for raptors and vultures, emphasis should be placed on fall migration and winter seasons when species are most conspicuous, especially if there are time, funding, and/or labor constraints.

Owl surveys are the only protocol that provides an accurate estimate of species richness and abundance for owls. Because owls rarely vocalize during the day and are inconspicuous, point-count and vehicular-road surveys will considerably underestimate the abundance of these species. Therfore, we recommend owl surveys be conducted for 2 consecutive years out of every 5-year period.

Because loggerhead shrikes are endangered in Pennsylvania and the particular population in and around EISE is vulnerable, shrike surveys should be conducted yearly at EISE from May through early July. When shrikes are located during the surveys, additional observations should be made to determine possible nesting locations and productivity of breeding adults.

Riparian bird surveys at VAFO should be conducted during winter, and if possible, be expanded to include spring and fall-migratory seasons to more accurately determine the abundance of birds of riparian habitats throughout the year. Although we conducted riparian bird surveys three times during the winter months, we recommend between eight and 10 surveys from October through early April because of the dynamic nature of these populations. This also will improve the chances of increasing the species richness of riparian birds by documenting rare species (e.g., black scoter) that may be present for only a short time. As with point-count, vehicular-road, diurnal raptor and vulture, and owl surveys, riparian bird surveys should be conducted at least 2 years out of every 5-year period. Because of the small size of the Little Conemaugh River and lack of waterbirds utilizing the river within the park, we believe that the riparian bird surveys should be discontinued at JOFL.

Proposed Schedule for Monitoring Birds

If funding, labor, and time are available, we recommend conducting point-count, vehicular-road, diurnal raptor and vulture, and owl surveys during all four seasons each year at all six parks, and riparian bird surveys from October - April each year at VAFO. However, given money and time constraints, the following is a proposed schedule that will provide necessary inventory coverage of birds over a 5-year time period.

Year 1: point-count (all parks) and loggerhead-shrike surveys (EISE only).

Year 2: point-count (all parks) and loggerhead-shrike surveys (EISE only).

Year 3: vehicular-road (all parks), diurnal raptor and vulture (all parks), owl (all parks), and loggerhead-shrike surveys (EISE only).

Year 4: vehicular-road (all parks), diurnal raptor and vulture (all parks), owl (all parks), loggerhead-shrike (EISE only), and riparian bird surveys (VAFO only).

Year 5: loggerhead-shrike (EISE only) and riparian bird surveys (VAFO only).

Conclusions

National parks are becoming more insular due to increased habitat fragmentation in the surrounding landscape. They thus become more valuable for the long-term maintenance of bird diversity and diversity of other fauna. The National Park Service determined the need to obtain a comprehensive inventory database on birds and to develop recommendations for establishing a long-term monitoring program for bird populations at ALPO, EISE, GETT, HOFU, JOFL, and VAFO. Based on surveys of birds during this and previous research projects at Pennsylvania national parks (1992-2001), we recommend conducting point-count, vehicular-road, and diurnal raptor and vulture surveys during all seasons and owl surveys during winter seasons for 2 consecutive years every 5-year period at each park. In addition, loggerhead shrike surveys should be conducted every year between May and early July at EISE, and riparian-bird surveys should be conducted eight to 10 times between October and April for 2 consecutive years every 5-year period at VAFO.

By implementing these recommendations, resource management specialists will be creating an extensive long-term database on bird populations and adding to information already accumulated on presence, relative abundance, and distribution of this fauna within each national park. Data collected during this project combined with information from future monitoring efforts will be valuable, especially if long-term trends in bird populations continue to decline in the eastern United States. Information available in long-term databases will enable resource management specialists to make informed decisions on how best to manage the natural resources within the national parks.

Information Storage

The relative abundance and species richness of birds and the locations of sampling points and survey stations at each park are stored in hard copy and electronic format. The bird survey information and sampling and survey locations are available in this report and in Microsoft Access computer files. Arc View shape files containing locations of the sampling points and survey stations and their accompanying UTM coordinates are available at the Pennsylvania State University and at each park. Copies of this report, Microsoft Access computer files, and Arc View shape files are on file with Dr. Richard H. Yahner, Professor of Wildlife Conservation, The Pennsylvania State University; Mr. John Karish, Regional Chief Scientist, National Park Service Philadelphia Support Office; Dr. Bert Frost, Resource Management Specialist, EISE and GETT; and Mr. Brian Lambert, Resource Management Specialist, VAFO.

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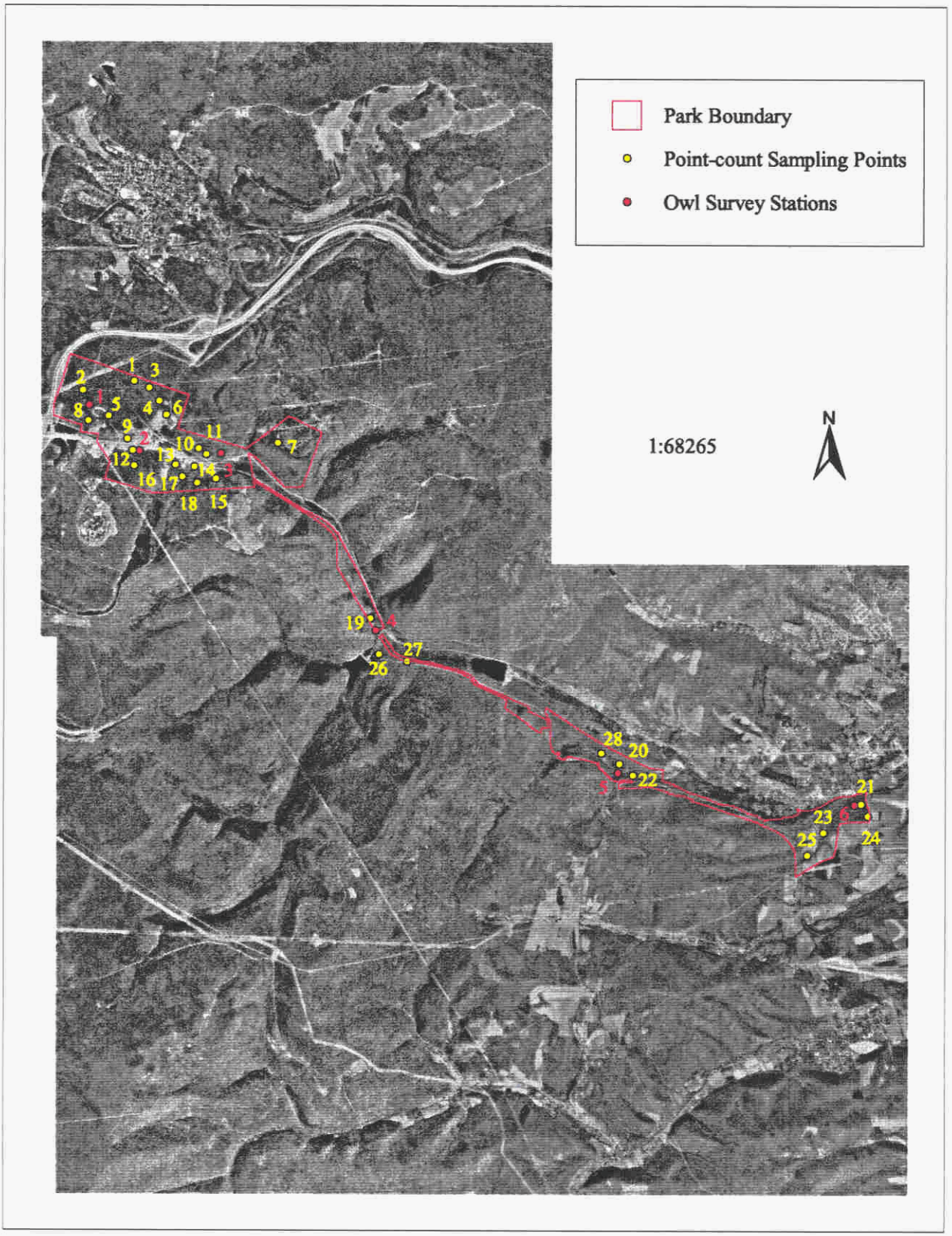
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Appendix A. Location of the point-count sampling points and owl survey stations at Allegheny Portage Railroad National Historic Site.



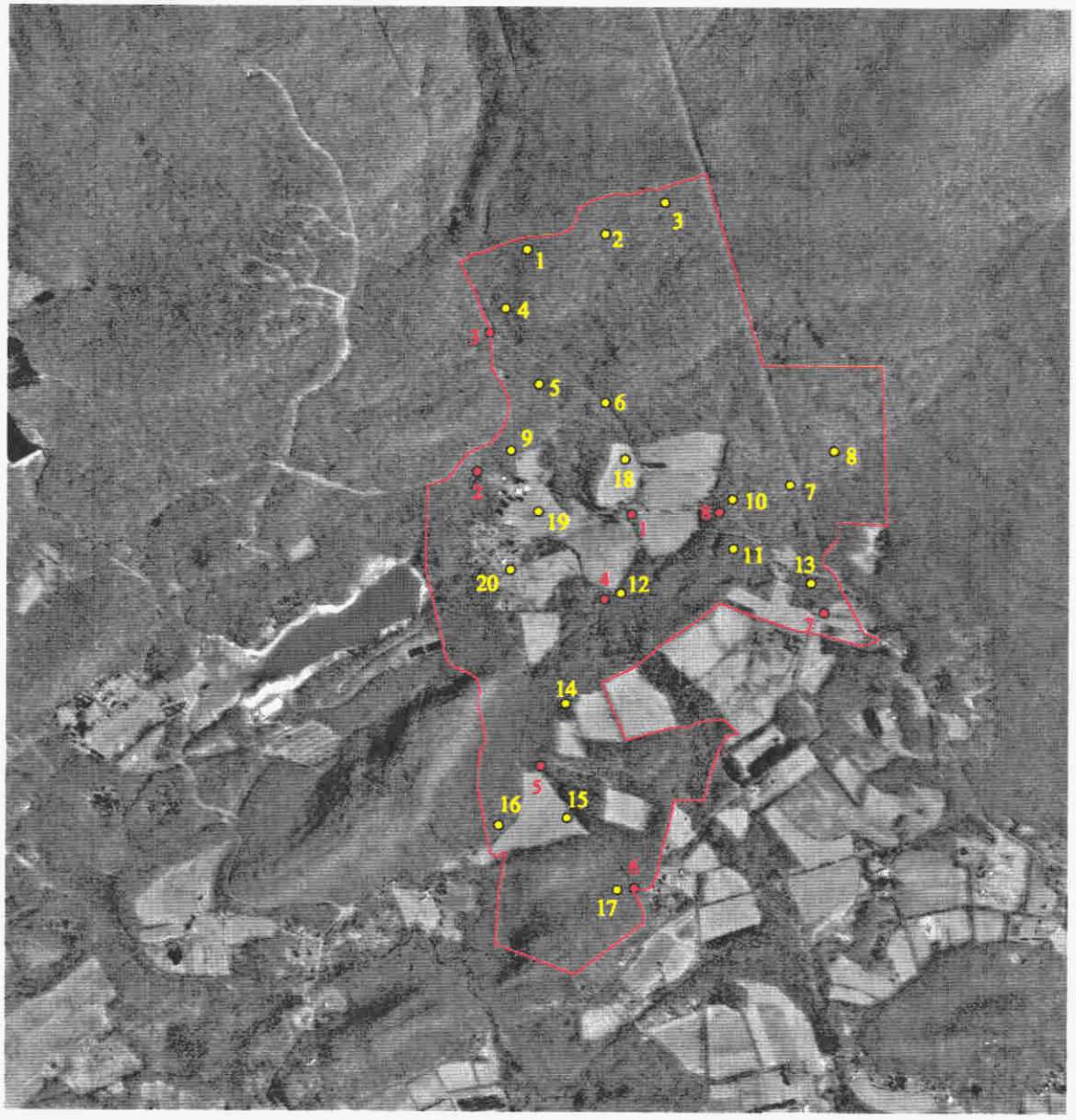
Appendix B. Location of the point-count sampling points and vehicular-road survey stations at Eisenhower National Historic Site.



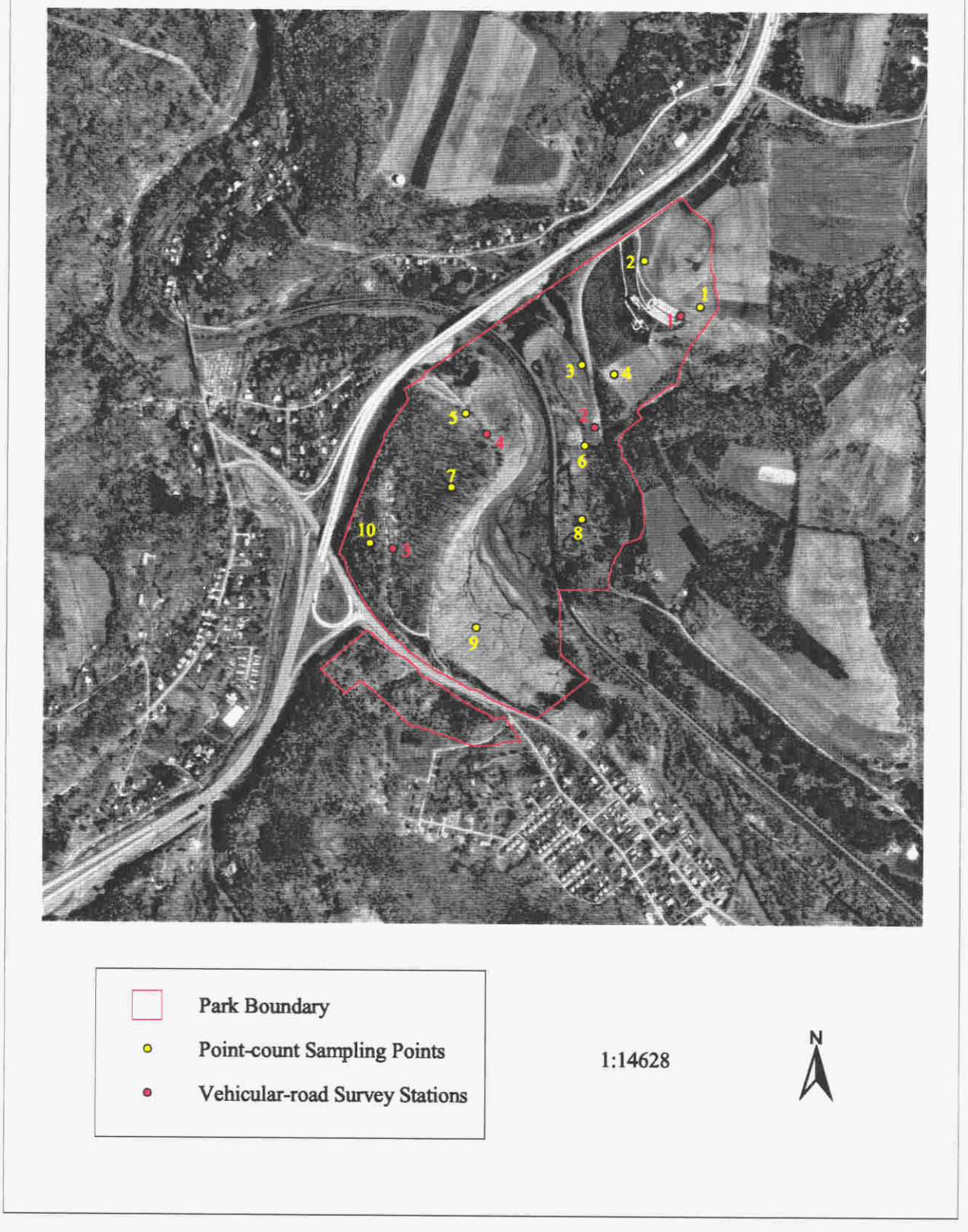
Appendix C. Location of the point-count sampling points at Gettysburg National Military Park.



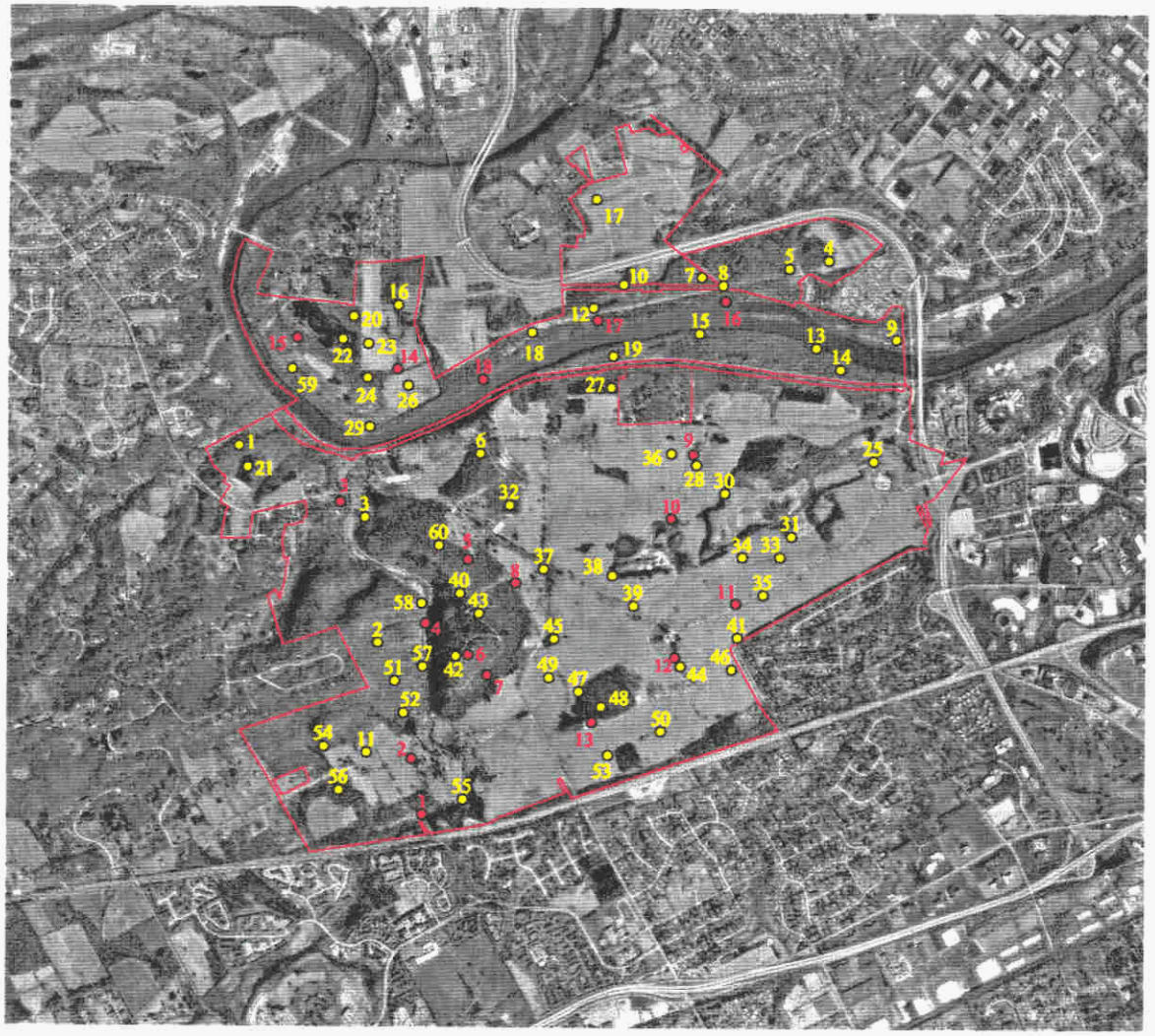
Appendix D. Location of the point-count sampling points and the vehicular-road survey stations at Hopewell Furnace National Historic Site.



Appendix E. Location of the point-count sampling points and the vehicular-road survey stations at Johnstown Flood National Memorial.



Appendix F. Location of the point-count sampling points and vehicular-road survey stations at Valley Forge National Historical Park



Appendix G. Habitat information and geographic coordinates for the point-count sampling points and owl survey stations at Allegheny Portage Railroad National Historic Site. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 17N projected on the North American Datum (NAD) of 1983.

Point	Point Type	Cover Type	Spatial Location	Elevation	UTM-East	UTM-North
1	Point-count	Deciduous Forest	Interior	Plateau	707362	4481960
2	Point-count	Early Successional	Interior	Plateau	706742	4481845
3	Point-count	Deciduous Forest	Interior	Plateau	707542	4481876
4	Point-count	Deciduous Forest	Interior	Plateau	707657	4481720
5	Point-count	Deciduous Forest	Road Edge	Plateau	707050	4481544
6	Point-count	Early Successional	Road Edge	Plateau	707746	4481555
7	Point-count	Mixed Forest	Interior	Plateau	709079	4481215
8	Point-count	Deciduous Forest	Interior	Plateau	706811	4481486
9	Point-count	Early Successional	Road Edge	Plateau	707282	4481263
10	Point-count	Deciduous Forest	Interior	Plateau	708134	4481147
11	Point-count	Deciduous Forest	Interior	Plateau	708227	4481081
12	Point-count	Deciduous Forest	Stream Edge	Plateau	707344	4481124
13	Point-count	Deciduous Forest	Stream Edge	Plateau	707859	4480949
14	Point-count	Perennial Herbaceous	Interior	Plateau	708086	4480927
15	Point-count	Deciduous Forest	Interior	Plateau	708341	4480784
16	Point-count	Deciduous Forest	Interior	Plateau	707359	4480938
17	Point-count	Deciduous Forest	Interior	Plateau	707944	4480809
18	Point-count	Deciduous Forest	Interior	Plateau	708114	4480734
19	Point-count	Deciduous Forest	Interior	High	710186	4479105
20	Point-count	Deciduous Forest	Stream Edge	Low	713182	4477358
21	Point-count	Early Successional	Interior	Low	716077	4476880
22	Point-count	Deciduous Forest	Road Edge	Low	713337	4477224
23	Point-count	Deciduous Forest	Stream Edge	Low	715628	4476537

Appendix G. Habitat information and geographic coordinates for the point-count sampling points and owl survey stations at Allegheny Portage Railroad National Historic Site. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 17N projected on the North American Datum (NAD) of 1983 (continued).

Point	Point Type	Cover Type	Spatial Location	Elevation	UTM-East	UTM-North
24	Point-count	Coniferous Forest	Road Edge	Low	716155	4476739
25	Point-count	Deciduous Forest	Interior	Low	715434	4476261
26	Point-count	Deciduous Forest	Stream Edge	High	710287	4478674
27	Point-count	Deciduous Forest	Stream Edge	High	710623	4478586
28	Point-count	Perennial Herbaceous	Stream Edge	Low	712969	4477487
1	Owl	Mixed Forest	Interior	Plateau	706821	4481670
2	Owl	Deciduous Forest	Stream Edge	Plateau	707343	4481133
3	Owl	Deciduous Forest	Interior	Plateau	708401	4481089
4	Owl	Deciduous Forest	Interior	High	710248	4478963
5	Owl	Deciduous Forest	Stream Edge	Low	713163	4477253
6	Owl	Early Successional	Interior	Low	716078	4476884

Appendix H. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, owl, and loggerhead shrike survey stations at Eisenhower National Historic Site. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983.

Point	Point Type	Cover Type	Spatial Location	UTM-East	UTM-North
1	Point-count	Perennial Herbaceous	Interior	306354	4408353
2	Point-count	Perennial Herbaceous	Interior	306097	4408192
3	Point-count	Deciduous Forest	Road-Stream Edge	305271	4407721
4	Point-count	Deciduous Forest	Interior	306690	4408853
5	Point-count	Annual Herbaceous	Road Edge	305790	4407687
6	Point-count	Annual Herbaceous	Road Edge	305722	4407528
7	Point-count	Perennial Herbaceous	Interior	306417	4407410
8	Point-count	Perennial Herbaceous	Interior	305519	4407309
9	Point-count	Early Successional	Road-Stream Edge	305828	4407192
10	Point-count	Terrestrial Unvegetated	NA	306141	4407045
11	Point-count	Deciduous Forest	Interior	305828	4406799
12	Point-count	Annual Herbaceous	Interior	306619	4406252
13	Point-count	Terrestrial Unvegetated	NA	306201	4407405
14	Point-count	Deciduous Forest	Stream	305224	4407512
15	Point-count	Perennial Herbaceous	Stream	306345	4406979
1	Vehicular-road	Perennial Herbaceous	Road Edge	306701	4407003
2	Vehicular-road	Annual Herbaceous	Road Edge	305958	4407139
3	Vehicular-road	Annual Herbaceous	Road-Stream Edge	304717	4407624
4	Vehicular-road	Perennial Herbaceous	Road Edge	306355	4407791
5	Vehicular-road	Perennial Herbaceous	Road Edge	306397	4407344

Appendix H. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, owl, and loggerhead shrike survey stations at Eisenhower National Historic Site. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983 (continued).

Point	Point Type	Cover Type	Spatial Location	UTM-East	UTM-North
1	Raptor & Vulture	Perennial Herbaceous	Road Edge	306702	4407003
2	Raptor & Vulture	Annual Herbaceous	Road-Stream Edge	305717	4407642
3	Raptor & Vulture	Perennial Herbaceous	Road Edge	306355	4407791
1	Owl	Deciduous Forest	Road Edge	306702	4407003
2	Owl	Deciduous Forest	Interior	305269	4407732
3	Short-eared Owl	Perennial Herbaceous	Road Edge	306355	4407791
1	Shrike	Perennial Herbaceous	Road Edge	306702	4407003
2	Shrike	Perennial Herbaceous	Road Edge	306241	4407095
3	Shrike	Annual Herbaceous	Road Edge	305958	4407139
4	Shrike	Perennial Herbaceous	Road Edge	305568	4407210
5	Shrike	Annual Herbaceous	Road Edge	305098	4406958
6	Shrike	Annual Herbaceous	Road Edge	305717	4407624
7	Shrike	Perennial Herbaceous	Road Edge	306029	4408263
8	Shrike	Terrestrial Unvegetated	NA	306179	4408465
9	Shrike	Annual Herbaceous	Road Edge	306304	4408666
10	Shrike	Terrestrial Unvegetated	NA	305451	4406893
11	Shrike	Perennial Herbaceous	Road-Stream Edge	305105	4406256
12	Shrike	Early Successional	Road Edge	304240	4406325
13	Shrike	Perennial Herbaceous	Road Edge	302816	4406543
14	Shrike	Perennial Herbaceous	Road Edge	302482	4406662
15	Shrike	Perennial Herbaceous	Road Edge	305592	4408057
16	Shrike	Perennial Herbaceous	Road Edge	306355	4407791
17	Shrike	Perennial Herbaceous	Road Edge	306396	4407344

Appendix I. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, and owl survey stations at Gettysburg National Military Park. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983.

Point	Point Type	Cover Type	Spatial Location	UTM-East	UTM-North
1	Point-count	Perennial Herbaceous	Interior	309563	4413036
2	Point-count	Perennial Herbaceous	Road Edge	308130	4413168
3	Point-count	Annual Herbaceous	Interior	308600	4408322
4	Point-count	Perennial Herbaceous	Interior	308817	4408344
5	Point-count	Perennial Herbaceous	Interior	307498	4412919
6	Point-count	Annual Herbaceous	Interior	307916	4413069
7	Point-count	Annual Herbaceous	Road Edge	308355	4412912
8	Point-count	Annual Herbaceous	Stream Edge	307206	4413020
9	Point-count	Perennial Herbaceous	Road Edge	308134	4412787
10	Point-count	Perennial Herbaceous	Interior	308459	4412735
11	Point-count	Perennial Herbaceous	Stream Edge	307127	4412840
12	Point-count	Perennial Herbaceous	Interior	307314	4412839
13	Point-count	Annual Herbaceous	Road Edge	308848	4412616
14	Point-count	Perennial Herbaceous	Interior	307449	4412577
15	Point-count	Perennial Herbaceous	Road Edge	307785	4412446
16	Point-count	Annual Herbaceous	Interior	307563	4412198
17	Point-count	Perennial Herbaceous	Interior	307368	4412050
18	Point-count	Perennial Herbaceous	Road Edge	310612	4411112
19	Point-count	Deciduous Forest	Stream Edge	307057	4411753
20	Point-count	Deciduous Forest	Interior	310365	4409220
21	Point-count	Mixed Forest	Road Edge	307925	4411193
22	Point-count	Perennial Herbaceous	Interior	309775	4410864

Appendix I. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, and owl survey stations at Gettysburg National Military Park. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983 (continued).

Point	Point Type	Cover Type	Spatial Location	UTM-East	UTM-North
23	Point-count	Early Successional	Interior	309791	4410601
24	Point-count	Deciduous Forest	Interior	309996	4410269
25	Point-count	Mixed Forest	Interior	307710	4410475
26	Point-count	Early Successional	Interior	307966	4410442
27	Point-count	Deciduous Forest	Interior	310094	4410216
28	Point-count	Deciduous Forest	Road Edge	309985	4409818
29	Point-count	Mixed Forest	Road Edge	309836	4410095
30	Point-count	Deciduous Forest	Interior	310216	4409732
31	Point-count	Deciduous Forest	Interior	307306	4410526
32	Point-count	Mixed Forest	Interior	309197	4409000
33	Point-count	Deciduous Forest	Stream Edge	310410	4409663
34	Point-count	Perennial Herbaceous	Interior	308355	4409729
35	Point-count	Perennial Herbaceous	Road Edge	308686	4409625
36	Point-count	Deciduous Forest	Stream Edge	309203	4409516
37	Point-count	Perennial Herbaceous	Interior	308934	4408999
38	Point-count	Deciduous Forest	Interior	309502	4408616
39	Point-count	Perennial Herbaceous	Stream Edge	308294	4407911
40	Point-count	Perennial Herbaceous	Interior	308725	4409004
41	Point-count	Deciduous Forest	Interior	310359	4410086
42	Point-count	Mixed Forest	Interior	307199	4409198
43	Point-count	Annual Herbaceous	Interior	307972	4409185
44	Point-count	Early Successional	Interior	308391	4408747
45	Point-count	Mixed Forest	Interior	309915	4408601

Appendix I. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, and owl survey stations at Gettysburg National Military Park. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983 (continued).

Point	Point Type	Cover Type	Spatial Location	UTM-East	UTM-North
46	Point-count	Annual Herbaceous	Interior	307743	4408865
47	Point-count	Deciduous Forest	Interior	309687	4408603
48	Point-count	Mixed Forest	Stream Edge	308307	4408584
49	Point-count	Deciduous Forest	Interior	306677	4409113
50	Point-count	Early Successional	Stream Edge	307196	4409036
51	Point-count	Perennial Herbaceous	Interior	307498	4408504
52	Point-count	Deciduous Forest	Stream	308215	4408397
53	Point-count	Early Successional	Interior	309063	4408449
54	Point-count	Deciduous Forest	Interior	306800	4407215
55	Point-count	Terrestrial Unvegetated	NA	307995	4408209
56	Point-count	Perennial Herbaceous	Interior	307852	4408018
57	Point-count	Deciduous Forest	Interior	306781	4407406
58	Point-count	Deciduous Forest	Interior	308750	4407731
59	Point-count	Deciduous Forest	Road Edge	309027	4407650
60	Point-count	Early Successional	Stream Edge	307899	4406702
61	Point-count	Early Successional	Interior	307402	4408086
62	Point-count	Deciduous Forest	Stream Edge	307721	4407416
63	Point-count	Deciduous Forest	Interior	314403	4412087
64	Point-count	Deciduous Forest	Interior	308602	4407002
65	Point-count	Deciduous Forest	Interior	308632	4406832
66	Point-count	Deciduous Forest	Interior	308200	4406504
67	Point-count	Deciduous Forest	Interior	307999	4406303
68	Point-count	Deciduous Forest	Interior	307694	4405997

Appendix I. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, and owl survey stations at Gettysburg National Military Park. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983 (continued).

Point	Point Type	Cover Type	Spatial Location	UTM-East	UTM-North
69	Point-count	Deciduous Forest	Road Edge	306870	4407980
70	Point-count	Deciduous Forest	Interior	307445	4405928
71	Point-count	Mixed Forest	Interior	308088	4406887
72	Point-count	Deciduous Forest	Interior	307508	4406123
73	Point-count	Mixed Forest	Interior	307576	4406985
74	Point-count	Annual Herbaceous	Interior	314413	4410003
75	Point-count	Perennial Herbaceous	Interior	314105	4410965
1	Vehicular-road	Perennial Herbaceous	Road Edge	309932	4410468
2	Vehicular-road	Deciduous Forest	Road Edge	309958	4409677
3	Vehicular-road	Perennial Herbaceous	Road Edge	309608	4410097
4	Vehicular-road	Perennial Herbaceous	Road Edge	307458	4411840
5	Vehicular-road	Annual Herbaceous	Road Edge	307884	4413226
6	Vehicular-road	Annual Herbaceous	Road Edge	308156	4412729
7	Vehicular-road	Mixed Forest	Road Edge	307827	4410458
8	Vehicular-road	Perennial Herbaceous	Road Edge	307363	4409569
9	Vehicular-road	Annual Herbaceous	Road Edge	306959	4408953
10	Vehicular-road	Terrestrial Unvegetated	Road Edge	306855	4407958
11	Vehicular-road	Perennial Herbaceous	Road Edge	306974	4406494
12	Vehicular-road	Deciduous Forest	Road-Stream Edge	307620	4406354
13	Vehicular-road	Mixed Forest	Road Edge	308151	4406709
14	Vehicular-road	Deciduous Forest	Road Edge	308610	4407216
15	Vehicular-road	Early Successional	Road Edge	308232	4407322
16	Vehicular-road	Deciduous Forest	Road Edge	307983	4407253

Appendix I. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, and owl survey stations at Gettysburg National Military Park. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983 (continued).

Point	Point Type	Cover Type	Spatial Location	UTM-East	UTM-North
17	Vehicular-road	Deciduous Forest	Road Edge	307713	4407686
18	Vehicular-road	Perennial Herbaceous	Road Edge	307648	4408261
19	Vehicular-road	Perennial Herbaceous	Road Edge	308291	4408171
20	Vehicular-road	Perennial Herbaceous	Road Edge	308690	4408683
1	Raptor & Vulture	Perennial Herbaceous	Road Edge	309931	4410468
2	Raptor & Vulture	Perennial Herbaceous	Road Edge	309607	4410097
3	Raptor & Vulture	Perennial Herbaceous	Road Edge	307458	4411841
4	Raptor & Vulture	Annual Herbaceous	Road Edge	307885	4413226
5	Raptor & Vulture	Perennial Herbaceous	Road Edge	307363	4409569
6	Raptor & Vulture	Terrestrial Unvegetated	Road Edge	306885	4407958
7	Raptor & Vulture	Perennial Herbaceous	Road Edge	306974	4406494
8	Raptor & Vulture	Early Successional	Road Edge	308232	4407322
9	Raptor & Vulture	Perennial Herbaceous	Road Edge	307648	4408260
10	Raptor & Vulture	Perennial Herbaceous	Road Edge	308689	4408683
1	Owl	Deciduous Forest	Stream Edge	307073	4411741
2	Owl	Deciduous Forest	Interior	308072	4413395
3	Owl	Mixed Forest	Road Edge	309836	4410641
4	Owl	Deciduous Forest	Road Edge	310344	4409620
5	Owl	Mixed Forest	Interior	309916	4408478
6	Owl	Mixed Forest	Interior	307464	4410418
7	Owl	Mixed Forest	Road Edge	306773	4408869
8	Owl	Mixed Forest	Road-Stream Edge	307814	4406301
9	Owl	Mixed Forest	Road Edge	308467	4406781

Appendix I. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, and owl survey stations at Gettysburg National Military Park. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983 (continued).

Point	Point Type	Cover Type	Spatial Location	UTM-East	UTM-North
10	Owl	Deciduous Forest	Road-Stream Edge	307687	4407272
11	Owl	Deciduous Forest	Road Edge	308676	4407743
12	Short-eared Owl	Perennial Herbaceous	Interior	308721	4409002
13	Barn Owl	Terrestrial Unvegetated	NA	307365	4412065
14	Barn Owl	Terrestrial Unvegetated	NA	307209	4412840

Appendix J. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, and owl survey stations at Hopewell Furnace National Historic Site. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983.

Point	Point Type	Cover Type	Spatial Location	Elevation	UTM-East	UTM-North
1	Point-count	Mixed Forest	Interior	High	434228	4452137
2	Point-count	Mixed Forest	Interior	High	434556	4452205
3	Point-count	Mixed Forest	Interior	High	434803	4452337
4	Point-count	Mixed Forest	Interior	High	434140	4451893
5	Point-count	Mixed Forest	Interior	High	434281	4451578
6	Point-count	Mixed Forest	Road Edge	Low	434557	4451502
7	Point-count	Mixed Forest	Interior	Low	435328	4451160
8	Point-count	Mixed Forest	Interior	Low	435510	4451304
9	Point-count	Deciduous Forest	Interior	Low	434166	4451300
10	Point-count	Mixed Forest	Stream Edge	Low	435090	4451100
11	Point-count	Early Successional	Interior	Low	435095	4450895
12	Point-count	Deciduous Forest	Road Edge	Low	434626	4450706
13	Point-count	Mixed Forest	Interior	Low	435414	4450752
14	Point-count	Deciduous Forest	Interior	Low	434400	4450242
15	Point-count	Perennial Herbaceous	Interior	High	434407	4449767
16	Point-count	Deciduous Forest	Road Edge	High	434123	4449736
17	Point-count	Mixed Forest	Interior	High	434618	4449468
18	Point-count	Perennial Herbaceous	Interior	Low	434641	4451267
19	Point-count	Early Successional	Interior	Low	434282	4451045
20	Point-count	Terrestrial Unvegetated	NA	Low	434164	4450802

Appendix J. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, and owl survey stations at Hopewell Furnace National Historic Site. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983 (continued).

Point	Point Type	Cover Type	Spatial Location	Elevation	UTM-East	UTM-North
1	Vehicular-road	Perennial Herbaceous	Road-Stream Edge	Low	434670	4451035
2	Vehicular-road	Mixed Forest	Road Edge	Low	434025	4451213
3	Vehicular-road	Deciduous Forest	Road Edge	High	434077	4451791
4	Vehicular-road	Deciduous Forest	Road-Stream Edge	Low	434560	4450682
5	Vehicular-road	Mixed Forest	Road Edge	High	434295	4449982
6	Vehicular-road	Deciduous Forest	Road Edge	High	434687	4449475
7	Vehicular-road	Terrestrial Unvegetated	NA	Low	435468	4450628
8	Vehicular-road	Mixed Forest	Road Edge	Low	435035	4451046
1	Raptor & Vulture	Perennial Herbaceous	Road-Stream Edge	Low	434676	4451038
2	Raptor & Vulture	Deciduous Forest	Road Edge	High	434077	4451788
3	Raptor & Vulture	Perennial Herbaceous	Road Edge	High	434292	4449965
4	Raptor & Vulture	Terrestrial Unvegetated	NA	Low	435474	4450626
1	Owl	Mixed Forest	Road Edge	High	434077	4452122
2	Owl	Mixed Forest	Road Edge	Low	434024	4451210
3	Owl	Mixed Forest	Road Edge	High	434300	4449998
4	Owl	Mixed Forest	Stream Edge	Low	435094	4451096
5	Barn Owl	Terrestrial Unvegetated	NA	Low	434167	4450867

Appendix K. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, owl, and riparian bird survey stations at Johnstown Flood National Memorial. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 17N projected on the North American Datum (NAD) of 1983.

Point	Point Type	Cover Type	Spatial Location	UTM-East	UTM-North
1	Point-count	Perennial Herbaceous	Road Edge	689308	4469073
2	Point-count	Perennial Herbaceous	Interior	689451	4468956
3	Point-count	Early Successional	Road Edge	689149	4468809
4	Point-count	Early Successional	Interior	689231	4468785
5	Point-count	Deciduous Forest	Road Edge	688858	4468683
6	Point-count	Early Successional	Stream Edge	689159	4468602
7	Point-count	Deciduous Forest	Interior	688822	4468494
8	Point-count	Perennial Herbaceous	Interior	689153	4468415
9	Point-count	Early Successional	Interior	688888	4468139
10	Point-count	Deciduous Forest	Road Edge	688617	4468353
1	Vehicular-road	Perennial Herbaceous	Road Edge	689402	4468934
2	Vehicular-road	Early Successional	Road Edge	689185	4468649
3	Vehicular-road	Deciduous Forest	Road Edge	688676	4468339
4	Vehicular-road	Early Successional	Road Edge	688911	4468631
1	Raptor & Vulture	Perennial Herbaceous	Road Edge	689397	4468934
2	Raptor & Vulture	Early Successional	Road Edge	688907	4468633
1	Owl	Early Successional	Road Edge	689183	4468654
2	Owl	Deciduous Forest	Road Edge	688674	4468325
1	Riparian Bird	River	River Edge	688891	4468774
2	Riparian Bird	River	River Edge	688895	4468478

Appendix L. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, owl, and riparian bird survey stations at Valley Forge National Historical Park. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983.

Point	Point Type	Cover Type	Spatial Location	Elevation	UTM-East	UTM-North
1	Point-count	Deciduous Forest	Stream Edge	Low	459878	4439252
2	Point-count	Deciduous Forest	Interior	Low	460775	4437997
3	Point-count	Mixed Forest	Road Edge	Low	460688	4438801
4	Point-count	Perennial Herbaceous	Interior	Low	463631	4440451
5	Point-count	Deciduous Forest	Interior	Low	463377	4440398
6	Point-count	Deciduous Forest	Road Edge	Low	461419	4439211
7	Point-count	Early Successional	Interior	Low	462820	4440343
8	Point-count	Perennial Herbaceous	Interior	Low	462960	4440287
9	Point-count	Terrestrial Unvegetated	NA	Low	464062	4439948
10	Point-count	Mixed Forest	Interior	Low	462326	4440291
11	Point-count	Perennial Herbaceous	Interior	Low	460705	4437293
12	Point-count	Deciduous Forest	Interior	Low	462132	4440143
13	Point-count	Deciduous Forest	Stream Edge	Low	463549	4439895
14	Point-count	Deciduous Forest	Stream Edge	Low	463709	4439757
15	Point-count	Deciduous Forest	Stream Edge	Low	462812	4439983
16	Point-count	Perennial Herbaceous	Interior	Low	460894	4440155
17	Point-count	Annual Herbaceous	Interior	Low	462150	4440835
18	Point-count	Deciduous Forest	Interior	Low	461738	4439987
19	Point-count	Deciduous Forest	Stream Edge	Low	462261	4439836
20	Point-count	Deciduous Forest	Interior	Low	460609	4440082

Appendix L. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, owl, and riparian bird survey stations at Valley Forge National Historical Park. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983 (continued).

Point	Point Type	Cover Type	Spatial Location	Elevation	UTM-East	UTM-North
21	Point-count	Coniferous Forest	Interior	Low	459937	4439118
22	Point-count	Coniferous Forest	Interior	Low	460543	4439938
23	Point-count	Perennial Herbaceous	Interior	Low	460704	4439910
24	Point-count	Deciduous Forest	Interior	Low	460697	4439693
25	Point-count	Terrestrial Unvegetated	NA	Low	463917	4439171
26	Point-count	Perennial Herbaceous	Interior	Low	460957	4439646
27	Point-count	Coniferous Forest	Interior	Low	462252	4439635
28	Point-count	Perennial Herbaceous	Interior	High	462792	4439142
29	Point-count	Mixed Forest	Stream Edge	Low	460718	4439381
30	Point-count	Mixed Forest	Interior	Low	462973	4438959
31	Point-count	Perennial Herbaceous	Interior	High	463398	4438688
32	Point-count	Deciduous Forest	Interior	High	461602	4438879
33	Point-count	Annual Herbaceous	Interior	High	463088	4438552
34	Point-count	Perennial Herbaceous	Interior	High	463329	4438553
35	Point-count	Perennial Herbaceous	Road Edge	High	463218	4438313
36	Point-count	Perennial Herbaceous	Interior	High	462632	4439212
37	Point-count	Deciduous Forest	Road Edge	High	461823	4438474
38	Point-count	Perennial Herbaceous	Interior	High	462261	4438435
39	Point-count	Perennial Herbaceous	Road Edge	High	462393	4438241
40	Point-count	Deciduous Forest	Interior	High	461287	4438316

Appendix L. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, owl, and riparian bird survey stations at Valley Forge National Historical Park. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983 (continued).

Point	Point Type	Cover Type	Spatial Location	Elevation	UTM-East	UTM-North
41	Point-count	Coniferous Forest	Road Edge	High	463062	4438037
42	Point-count	Deciduous Forest	Interior	High	461263	4437915
43	Point-count	Deciduous Forest	Road Edge	High	461409	4438187
44	Point-count	Annual Herbaceous	Interior	High	462699	4437855
45	Point-count	Deciduous Forest	Interior	High	461889	4438028
46	Point-count	Perennial Herbaceous	Interior	High	463028	4437833
47	Point-count	Deciduous Forest	Interior	High	462045	4437688
48	Point-count	Deciduous Forest	Interior	High	462190	4437592
49	Point-count	Perennial Herbaceous	Interior	High	461855	4437779
50	Point-count	Perennial Herbaceous	Interior	High	462576	4437436
51	Point-count	Deciduous Forest	Interior	High	460877	4437755
52	Point-count	Deciduous Forest	Interior	High	460937	4437549
53	Point-count	Perennial Herbaceous	Interior	High	462237	4437283
54	Point-count	Deciduous Forest	Interior	High	460432	4437330
55	Point-count	Deciduous Forest	Stream Edge	Low	461311	4436996
56	Point-count	Coniferous Forest	Interior	High	460529	4437052
57	Point-count	Deciduous Forest	Road-Stream Edge	Low	461060	4437845
58	Point-count	Deciduous Forest	Road-Stream Edge	Low	461052	4438252
59	Point-count	Deciduous Forest	Interior	Low	460222	4439751
60	Point-count	Deciduous Forest	Interior	High	461157	4438624

Appendix L. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, owl, and riparian bird survey stations at Valley Forge National Historical Park. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983 (continued).

Point	Point Type	Cover Type	Spatial Location	Elevation	UTM-East	UTM-North
1	Vehicular-road	Mixed Forest	Road-Stream Edge	Low	461061	4436899
2	Vehicular-road	Perennial Herbaceous	Road Edge	High	460986	4437253
3	Vehicular-road	Terrestrial Unvegetated	NA	Low	460526	4438896
4	Vehicular-road	Mixed Forest	Road-Stream Edge	Low	461071	4438125
5	Vehicular-road	Deciduous Forest	Road Edge	High	461336	4438534
6	Vehicular-road	Mixed Forest	Road Edge	High	461340	4437921
7	Vehicular-road	Deciduous Forest	Road Edge	High	461463	4437793
8	Vehicular-road	Deciduous Forest	Road Edge	High	461646	4438384
9	Vehicular-road	Perennial Herbaceous	Road Edge	High	462772	4439209
10	Vehicular-road	Perennial Herbaceous	Road Edge	Low	462634	4438799
11	Vehicular-road	Perennial Herbaceous	Road Edge	High	463051	4438254
12	Vehicular-road	Annual Herbaceous	Road Edge	High	462662	4437911
13	Vehicular-road	Annual Herbaceous	Road Edge	High	462131	4437490
14	Vehicular-road	Perennial Herbaceous	Road Edge	Low	460891	4439747
15	Vehicular-road	Deciduous Forest	Road Edge	Low	460252	4439945
16	Vehicular-road	Deciduous Forest	Stream Edge	Low	462980	4440189
17	Vehicular-road	Deciduous Forest	Stream Edge	Low	462156	4440062
18	Vehicular-road	Deciduous Forest	Stream Edge	Low	461428	4439686

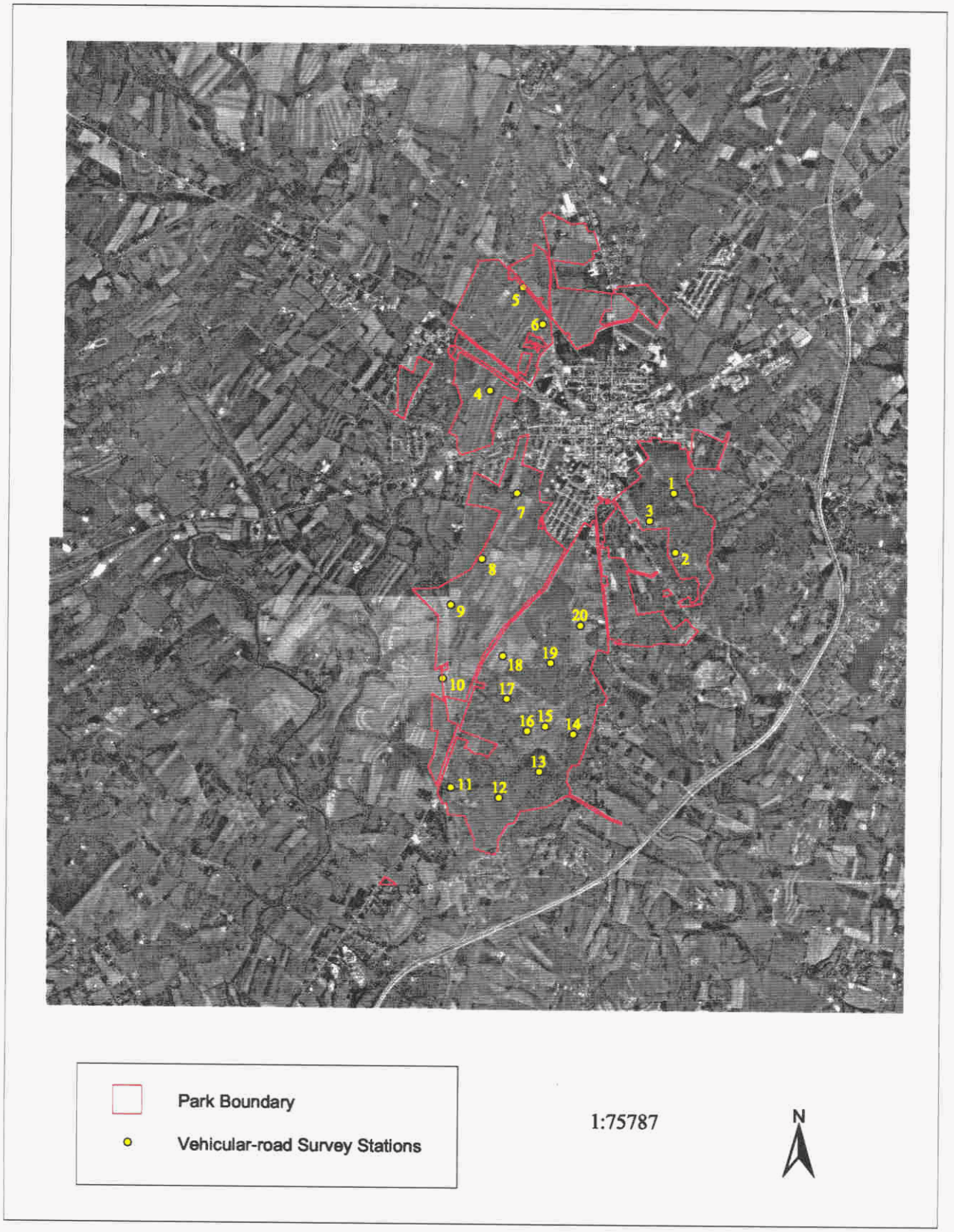
Appendix L. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, owl, and riparian bird survey stations at Valley Forge National Historical Park. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983 (continued).

Point	Point Type	Cover Type	Spatial Location	Elevation	UTM-East	UTM-North
1	Raptor & Vulture	Perennial Herbaceous	Road Edge	High	460986	4437253
2	Raptor & Vulture	Mixed Forest	Road-Stream Edge	Low	461071	4438125
3	Raptor & Vulture	Mixed Forest	Road Edge	High	461340	4437921
4	Raptor & Vulture	Deciduous Forest	Road Edge	High	461646	4438384
5	Raptor & Vulture	Perennial Herbaceous	Road Edge	Low	462634	4438799
6	Raptor & Vulture	Perennial Herbaceous	Road Edge	High	463051	4438254
7	Raptor & Vulture	Annual Herbaceous	Road Edge	High	462131	4437489
8	Raptor & Vulture	Perennial Herbaceous	Road Edge	Low	460891	4439747
9	Raptor & Vulture	Deciduous Forest	Stream Edge	Low	462981	4440189
10	Raptor & Vulture	Deciduous Forest	Stream Edge	Low	461428	4439685
1	Owl	Coniferous Forest	Interior	High	460546	4437069
2	Owl	Mixed Forest	Interior	High	459865	4439084
3	Owl	Perennial Herbaceous	Interior	Low	461023	4439570
4	Owl	Mixed Forest	Interior	Low	460666	4439955
5	Owl	Deciduous Forest	Road Edge	High	461336	4433534
6	Owl	Deciduous Forest	Road Edge	High	461463	4437793
7	Owl	Mixed Forest	Interior	High	462933	4439593
8	Owl	Deciduous Forest	Road Edge	Low	462634	4438799
9	Owl	Deciduous Forest	Road Edge	High	462123	4437503
10	Barn Owl	Terrestrial Unvegetated	NA	Low	460826	4439918

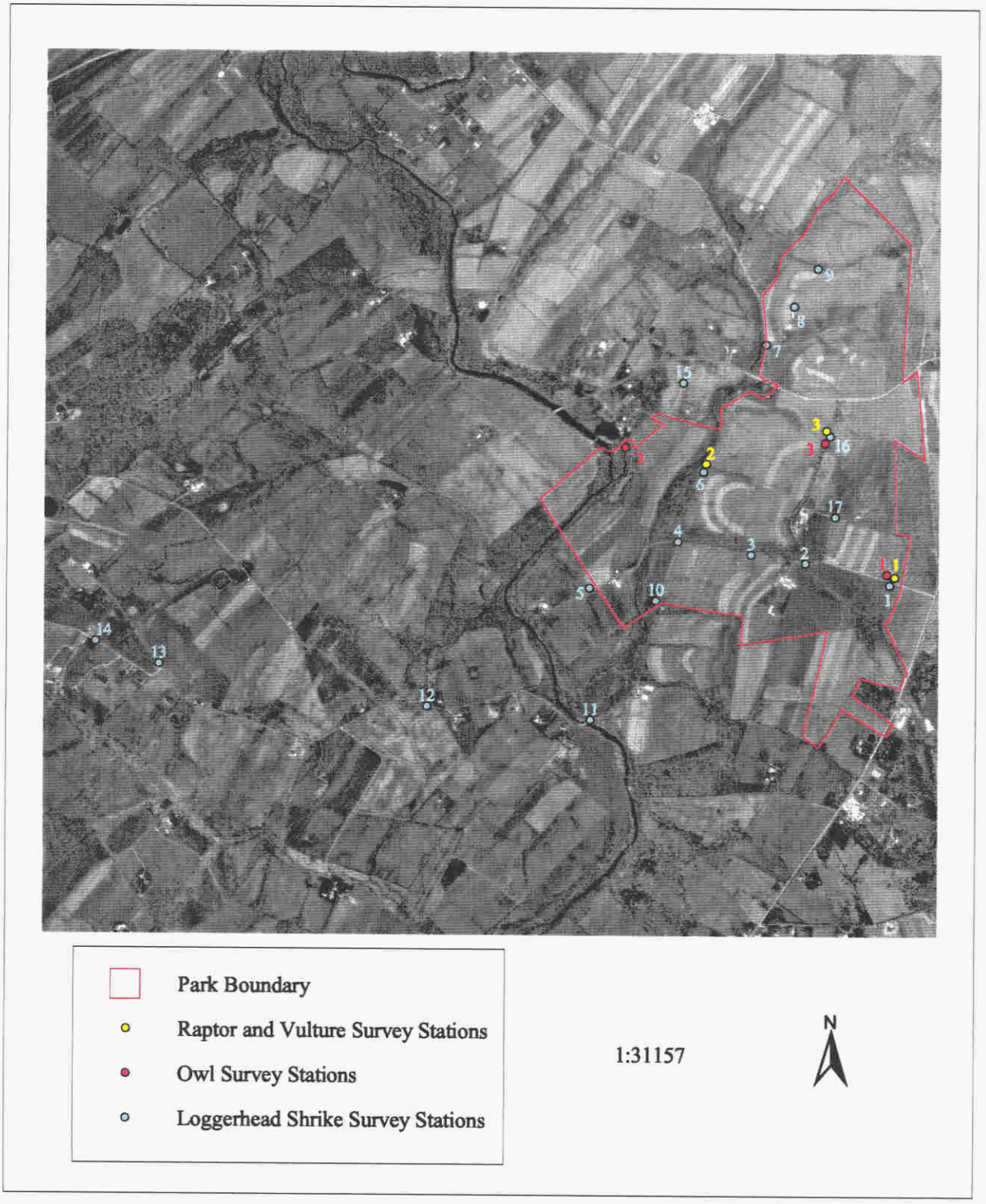
Appendix L. Habitat information and geographic coordinates for the point-count sampling points and vehicular-road, diurnal raptor and vulture, owl, and riparian bird survey stations at Valley Forge National Historical Park. Definitions of habitat information are found in Table 1. Coordinates are universal transverse mercator (UTM) projection Zone 18N projected on the North American Datum (NAD) of 1983 (continued).

Point	Point Type	Cover Type	Spatial Location	Elevation	UTM-East	UTM-North
1	Riparian Bird	Deciduous Forest	River Edge	Low	459884	4440198
2	Riparian Bird	Deciduous Forest	River Edge	Low	460163	4439667
3	Riparian Bird	Deciduous Forest	River Edge	Low	460827	4439371
4	Riparian Bird	Deciduous Forest	River Edge	Low	461429	4439685
5	Riparian Bird	Deciduous Forest	River Edge	Low	462009	4439978
6	Riparian Bird	Deciduous Forest	River Edge	Low	462694	4440142
7	Riparian Bird	Deciduous Forest	River Edge	Low	462980	4440189
8	Riparian Bird	Deciduous Forest	River Edge	Low	463516	4440107
9	Riparian Bird	Terrestrial Unvegetated	River Edge	Low	464081	4439878

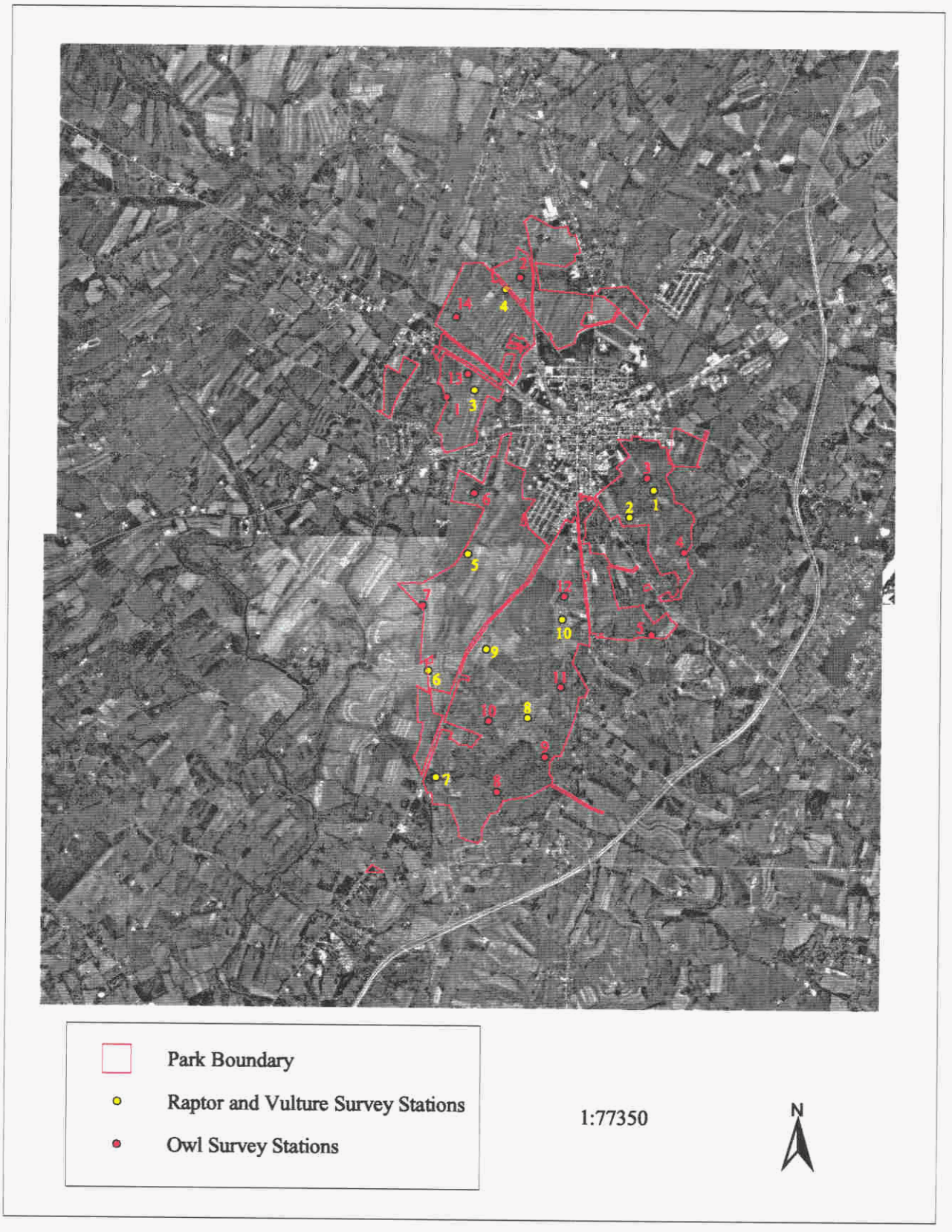
Appendix M. Location of the vehicular-road survey stations at Gettysburg National Military Park.



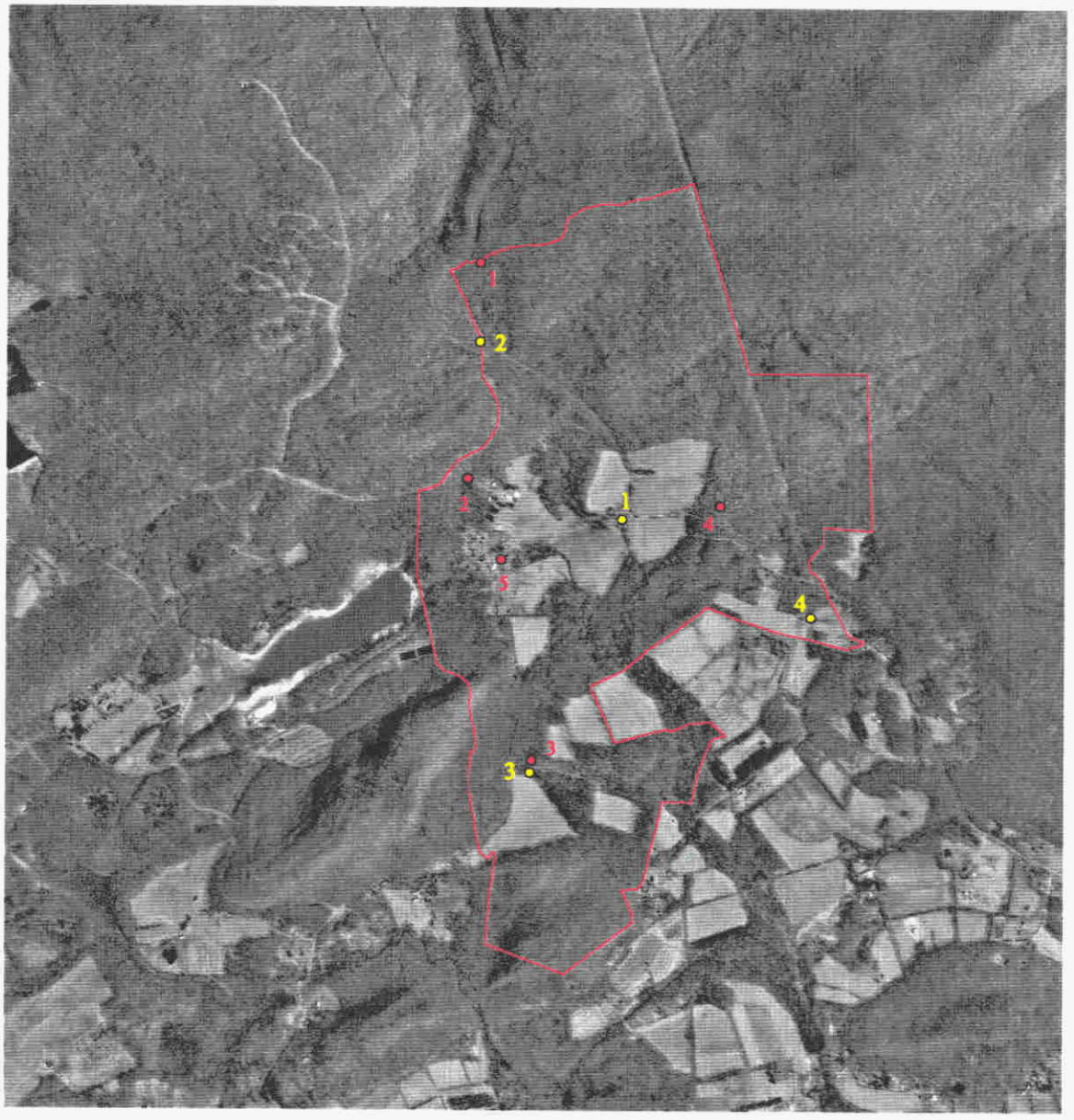
Appendix N. Location of the diurnal raptor and vulture, owl, and loggerhead shrike survey stations at Eisenhower National Historic Site.



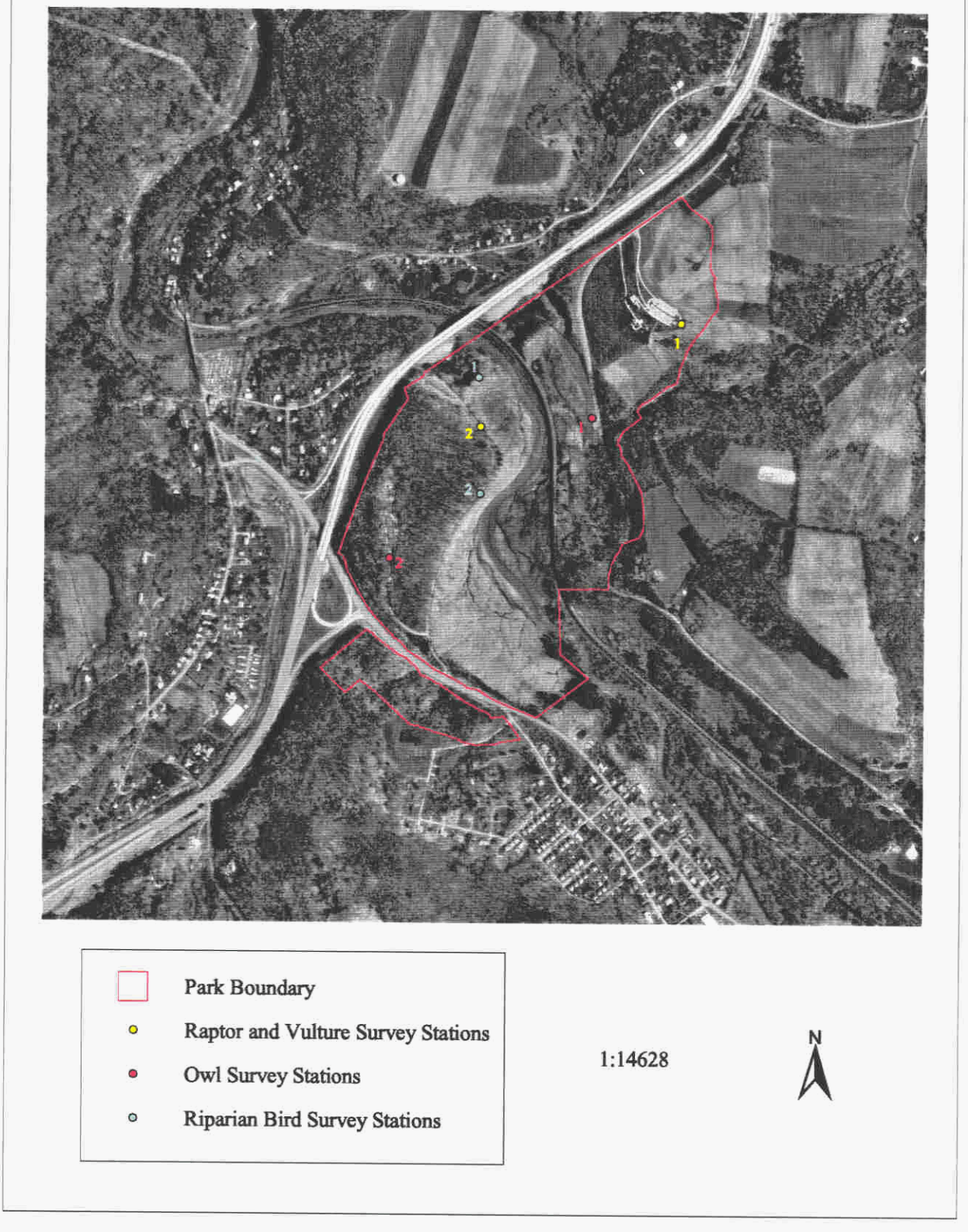
Appendix O. Location of the diurnal raptor and vulture and owl survey stations at Gettysburg National Military Park.



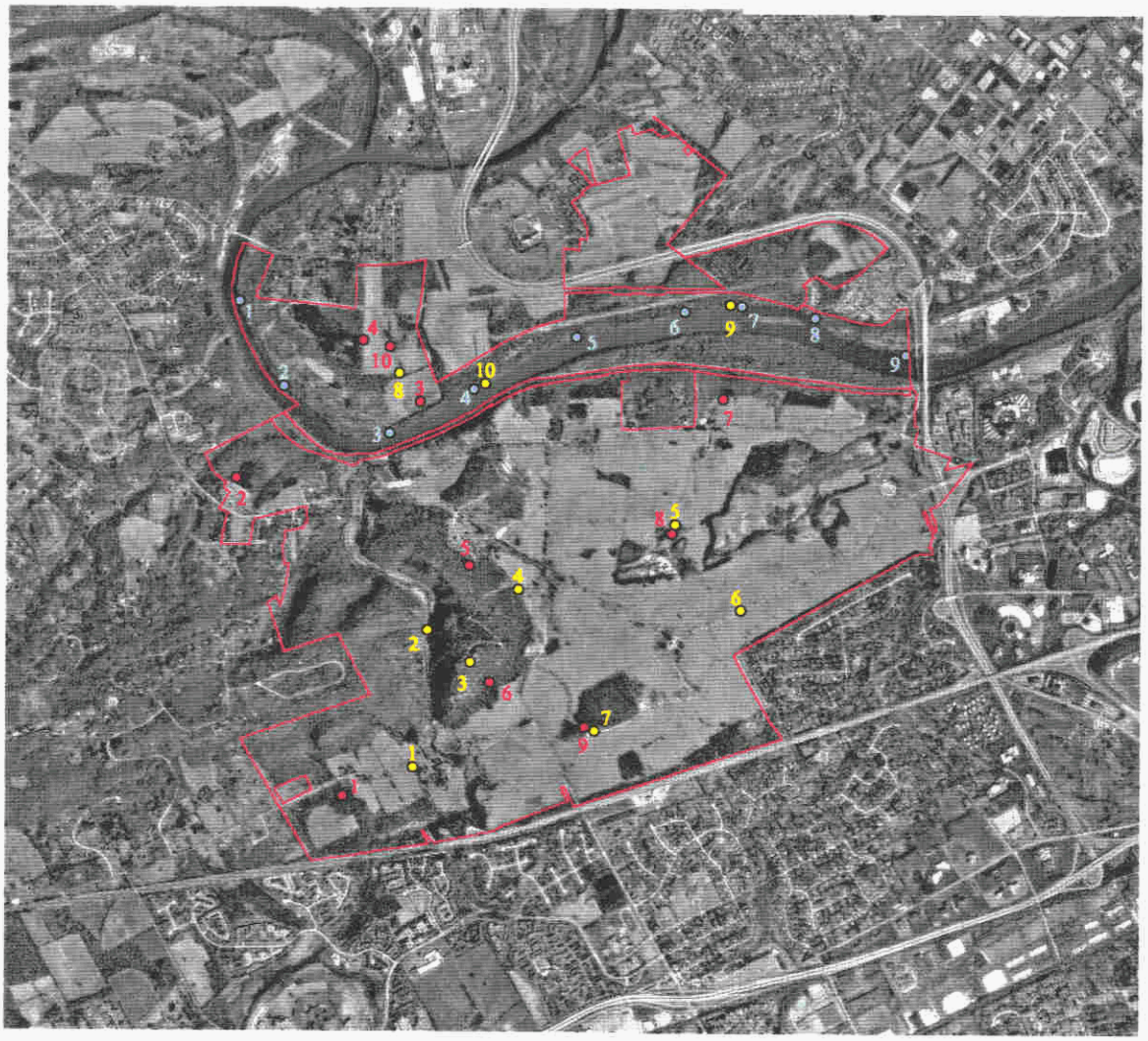
Appendix P. Location of the diurnal raptor and vulture and owl survey stations at Hopewell Furnace National Historic Site.



Appendix Q. Location of the diurnal raptor and vulture, owl, and riparian bird survey stations at Johnstown Flood National Memorial.



Appendix R. Location of the diurnal raptor and vulture, owl, and riparian bird survey stations at Valley Forge National Historical Park.



Park Boundary

Raptor and Vulture Survey Stations

Owl Survey Stations

Riparian Bird Survey Stations

1:46998

N

Appendix S. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site.

Species	Historical Records[a]	May 1999 - May 2001
Acadian Flycatcher	X	X
American Crow	X	X
American Goldfinch	X	X
American Redstart	X	X
American Robin	X	X
American Tree Sparrow		X
American Woodcock		X
Baltimore Oriole	X	X
Bay-breasted Warbler	X	X
Belted Kingfisher		X
Black-and-white Warbler	X	X
Black-billed Cuckoo		X
Black-capped Chickadee	X	X
Blackburnian Warbler	X	X
Blackpoll Warbler	X	X
Black-throated blue Warbler	X	X
Black-throated Green Warbler	X	X
Blue Jay	X	X
Blue-gray Gnatcatcher	X	X
Blue-headed Vireo	X	X
Blue-winged Warbler		X
Broad-winged Hawk	X	X
Brown Creeper	X	X
Brown Thrasher		X

Appendix S. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (continued).

Species	Historical Records	May 1999 - May 2001
Brown-headed Cowbird	X	X
Canada Goose		X
Canada Warbler	X	X
Cape May Warbler	X	X
Carolina Wren	X	X
Cedar Waxwing	X	X
Cerulean Warbler		X
Chestnut-sided Warbler	X	X
Chimney Swift	X	X
Chipping Sparrow	X	X
Common Grackle	X	X
Common Raven	X	X
Common Redpoll		X
Common Yellowthroat	X	X
Cooper's Hawk	X	X
Dark-eyed Junco		X
Downy Woodpecker	X	X
Eastern bluebird		X
Eastern Kingbird		X
Eastern Meadowlark		X
Eastern Phoebe	X	X
Eastern Screech-owl		X
Eastern Towhee	X	X
Eastern Wood-pewee	X	X

Appendix S. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (continued).

Species	Historical Records	May 1999 - May 2001
European Starling		X
Field Sparrow	X	X
Fish Crow		X
Golden-crowned Kinglet		X
Gray Catbird	X	X
Great Blue Heron		X
Great Crested Flycatcher		X
Great Horned Owl		X
Hairy Woodpecker	X	X
Hermit Thrush		X
Hooded Warbler	X	X
House Finch		X
House Wren	X	X
Indigo Bunting	X	X
Kentucky Warbler	X	
Least Flycatcher	X	X
Louisiana Waterthrush	X	X
Magnolia Warbler	X	X
Mallard	X	X
Mourning Dove		X
Mourning Warbler (*Oporornis philadelphia*)	X	
Nashville Warbler	X	X
Northern Cardinal	X	X

Appendix S. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (continued).

Species	Historical Records	May 1999 - May 2001
Northern Flicker	X	X
Northern Parula	X	X
Northern Saw-whet Owl		X
Northern Waterthrush	X	X
Ovenbird	X	X
Palm Warbler	X	
Philadelphia Vireo	X	X
Pileated Woodpecker	X	X
Pine Warbler		X
Purple Finch		X
Red-bellied Woodpecker	X	X
Red-eyed Vireo	X	X
Red-shouldered Hawk		X
Red-tailed Hawk		X
Red-winged Blackbird	X	X
Rock Dove		X
Rose-breasted Grosbeak	X	X
Ruby-crowned Kinglet	X	X
Ruby-throated Hummingbird		X
Ruffed Grouse	X	X
Savannah Sparrow		X
Scarlet Tanager	X	X
Song Sparrow	X	X
Swainson's Thrush	X	X

Appendix S. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (continued).

Species	Historical Records	May 1999 - May 2001
Swamp Sparrow		X
Tree Swallow	X	X
Tufted Titmouse	X	X
Tundra Swan		X
Turkey Vulture	X	X
Veery	X	X
Vesper Sparrow		X
Warbling Vireo	X	
White-breasted Nuthatch	X	X
White-crowned Sparrow	X	
White-eyed Vireo		X
White-throated Sparrow	X	X
Wild Turkey		X
Willow Flycatcher	X	X
Winter wren		X
Wood thrush	X	X
Worm-eating warbler	X	X
Yellow warbler	X	X
Yellow-bellied sapsucker		X
Yellow-billed cuckoo	X	X
Yellow-breasted chat		X

Appendix S. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (continued).

Species	Historical Records	May 1999 - May 2001
Yellow-rumped warbler	X	X
Yellow-throated vireo		X
Total Number of Species	78	113

[a] Historical records were taken from the NPSpecies database (National Park Service 2001).

Appendix T. Classifications[a] of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site.

Species	Spring Migration	Breeding	Fall Migration	Winter
Acadian Flycatcher	O	U	--	--
American Crow	C	C	C	C
American Goldfinch	A	U	A	U
American Redstart	C	C	O	--
American Robin	C	C	U	U
American Tree Sparrow	--	--	--	O
American Woodcock	--	--	R	R
Baltimore Oriole	O	O	--	--
Bay-breasted Warbler	--	--	R	--
Belted Kingfisher	R	--	R	--
Black-and-white Warbler	O	O	O	--
Black-billed Cuckoo	R	--	R	--
Black-capped Chickadee	C	U	A	A
Blackburnian Warbler	U	O	--	--
Blackpoll Warbler	O	--	R	--
Black-throated Blue Warbler	O	--	O	--
Black-throated Green Warbler	A	C	O	--
Blue Jay	C	U	A	U
Blue-gray Gnatcatcher	O	O	--	--
Blue-headed Vireo	C	U	O	--
Blue-winged Warbler	--	--	R	--
Broad-winged Hawk	O	R	--	--
Brown Creeper	O	--	O	O

Appendix T. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Brown Thrasher	O	R	--	--
Brown-headed Cowbird	U	O	--	--
Canada Goose	--	--	C	--
Canada Warbler	R	--	O	--
Cape May Warbler	R	--	--	--
Carolina Wren	O	R	O	O
Cedar Waxwing	--	U	A	O
Cerulean Warbler	R	--	--	--
Chestnut-sided Warbler	O	O	O	--
Chimney Swift	O	O	--	--
Chipping Sparrow	A	C	O	--
Common Grackle	O	O	--	--
Common Raven	O	--	O	R
Common Redpoll	--	--	--	R
Common Yellowthroat	C	C	U	--
Cooper's hawk	--	--	--	R
Dark-eyed Junco	O	--	--	U
Downy Woodpecker	U	O	U	U
Eastern Bluebird	O	O	O	--
Eastern Kingbird	R	--	--	--
Eastern Meadowlark	O	--	--	--
Eastern Phoebe	O	R	O	--
Eastern Screech-owl	R	--	--	C

Appendix T. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Eastern Towhee	C	C	U	--
Eastern Wood-pewee	O	U	O	--
European Starling	O	U	--	O
Field Sparrow	C	U	O	--
Fish Crow	R	--	--	--
Golden-crowned Kinglet	--	--	--	C
Gray Catbird	U	C	C	--
Great Blue Heron	--	--	--	R
Great Crested Flycatcher	R	O	--	--
Great Horned Owl	R	R	R	O
Hairy Woodpecker	O	O	O	U
Hermit Thrush	O	--	--	--
Hooded Warbler	--	--	R	--
House Finch	R	--	--	O
House Wren	U	U	R	--
Indigo Bunting	U	C	O	--
Least Flycatcher	O	--	R	--
Louisiana Waterthrush	U	O	--	--
Magnolia Warbler	O	O	O	--
Mallard	O	--	--	--
Mourning Dove	O	O	R	--
Nashville Warbler	O	--	O	--
Northern Cardinal	U	U	O	O

Appendix T. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Northern Flicker	U	O	O	O
Northern Parula	O	O	--	--
Northern Saw-whet Owl	--	--	--	O
Northern Waterthrush	R	--	--	--
Ovenbird	A	A	O	--
Philadelphia Vireo	R	--	O	--
Pileated Woodpecker	O	O	O	O
Pine Warbler	O	--	O	--
Purple Finch	O	--	O	--
Red-bellied Woodpecker	O	O	O	O
Red-eyed Vireo	A	A	U	--
Red-shouldered Hawk	R	--	--	--
Red-tailed Hawk	O	--	R	O
Red-winged Blackbird	U	O	--	--
Rock Dove	--	O	--	--
Rose-breasted Grosbeak	O	O	O	--
Ruby-crowned Kinglet	U	--	--	--
Ruby-throated Hummingbird	--	O	O	--
Ruffed Grouse	O	--	--	O
Savannah Sparrow	--	--	R	--
Scarlet Tanager	U	C	O	--
Song Sparrow	C	C	O	O
Swainson's Thrush	O	--	O	--

Appendix T. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Allegheny Portage Railroad National Historic Site (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Swamp Sparrow	R	--	--	--
Tree Swallow	O	O	--	--
Tufted Titmouse	C	U	U	U
Tundra Swan	R	--	--	--
Turkey Vulture	R	--	--	--
Veery	--	--	R	--
Vesper Sparrow	O	--	--	--
White-breasted nuthatch	U	O	U	U
White-eyed vireo	R	--	--	--
White-throated sparrow	O	--	--	O
Wild Turkey	--	O	--	O
Winter wren	R	--	--	--
Wood thrush	C	C	O	--
Worm-eating warbler	O	--	--	--
Yellow warbler	U	U	--	--
Yellow-bellied sapsucker	--	--	R	--
Yellow-billed cuckoo	R	O	--	--
Yellow-rumped warbler	U	--	--	--
Yellow-throated vireo	--	O	--	--
Total Number of Species	92	60	62	34

[a] Classifications refer to the following categories: A, abundant (should be located in large numbers and in more than one habitat); C, common (should be located in fairly large numbers in appropriate habitat); U, uncommon (present in appropriate habitat, but not located in large numbers); O, occasional (present in some parcels of appropriate habitat, but not certain to be detected); R, rare (detected only a few times at most per season); --, none detected during the season.

Appendix U. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest cover type during spring-migratory seasons (15 April - 25 May, 2000 and 2001) at Allegheny Portage Railroad National Historic Site.

Resident Status	Species	Average Number/Point/Survey
Long-distant Migrant	Black-throated Green Warbler	1.2
	Ovenbird	1.0
	Red-eyed Vireo	0.7
	American Redstart	0.4
	Wood Thrush	0.3
	Scarlet Tanager	0.2
	Black-and-white Warbler	0.1
	Blackburnian Warbler	0.1
	Chestnut-sided Warbler	0.1
	Louisiana Waterthrush	0.1
	Magnolia Warbler	0.1
	Rose-breasted Grosbeak	0.1
Short-distance Migrant	Blue-headed Vireo	0.7
	Eastern Towhee	0.3
	Common Yellowthroat	0.3
	Yellow-rumped Warbler	0.3
	Brown-headed Cowbird	0.1
	Chipping Sparrow	0.1
	House Wren	0.1
	Ruby-crowned Kinglet	0.1
	White-throated Sparrow	0.1
	Blue-gray Gnatcatcher	0.1
	Gray Catbird	0.1
	Hermit Thrush	0.1

Appendix U. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest cover type during spring-migratory seasons (15 April - 25 May, 2000 and 2001) at Allegheny Portage Railroad National Historic Site (continued).

Resident Status	Species	Average Number/Point/Survey
Permanent Resident	Blue Jay	0.6
	American Goldfinch	0.4
	American Robin	0.4
	Tufted Titmouse	0.3
	Black-capped Chickadee	0.3
	American Crow	0.2
	White-breasted Nuthatch	0.2
	Northern Cardinal	0.2
	Hairy Woodpecker	0.1
	Pileated Woodpecker	0.1

Appendix V. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident bird species identified from point-count sampling points in forest cover type during breeding seasons (25 May - 15 July, 1999 and 2000) at Allegheny Portage Railroad National Historic Site.

Resident Status	Species	Average Number/Point/Survey
Long-distance Migrant	Red-eyed Vireo	2.1
	Ovenbird	0.9
	Black-throated Green Warbler	0.8
	Scarlet Tanager	0.4
	American Redstart	0.3
	Acadian Flycatcher	0.3
	Wood Thrush	0.2
	Indigo Bunting	0.2
	Eastern Wood-pewee	0.2
	Blackburnian Warbler	0.1
	Magnolia Warbler	0.1
	Yellow-billed Cuckoo	0.1
Short-distance Migrant	Common Yellowthroat	0.2
	Blue-headed Vireo	0.2
	Eastern Towhee	0.2
	Gray Catbird	0.1
	Brown-headed Cowbird	0.1
	Chipping Sparrow	0.1
	Field Sparrow	0.1
	Blue-gray Gnatcatcher	< 0.1
	Eastern Phoebe	< 0.1
	House Wren	< 0.1

Appendix V. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident bird species identified from point-count sampling points in forest cover type during breeding seasons (25 May - 15 July, 1999 and 2000) at Allegheny Portage Railroad National Historic Site (continued).

Resident Status	Species	Average Number/Point/Survey
Permanent Resident	American Crow	0.1
	White-breasted Nuthatch	0.1
	American Robin	0.1
	Northern Cardinal	0.1
	Black-capped Chickadee	0.1
	Downy Woodpecker	0.1
	Tufted Titmouse	0.1
	Blue Jay	0.1
	Hairy Woodpecker	0.1
	Red-bellied Woodpecker	0.1
	Song Sparrow	0.1

Appendix W. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest cover type during fall-migratory seasons (25 August - 10 October, 1999 and 2000) at Allegheny Portage Railroad National Historic Site.

Resident Status	Species	Average Number/Point/Survey
Long -distance Migrant	Red-eyed Vireo	0.2
	Black-throated Green Warbler	0.1
	Indigo Bunting	0.1
	Rose-breasted Grosbeak	0.1
	Ovenbird	0.1
	Eastern Wood-pewee	0.1
	Wood Thrush	0.1
	American Redstart	0.1
	Black-and-white Warbler	0.1
	Canada Warbler	0.1
	Chestnut-sided Warbler	0.1
	Magnolia Warbler	0.1
	Philadelphia Vireo	0.1
	Scarlet Tanager	0.1
Short-distance Migrant	Gray Catbird	0.2
	Common Yellowthroat	0.1
	Eastern Towhee	0.1
	Blue-headed Vireo	0.1
	Pine Warbler	< 0.1

Appendix W. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest cover type during fall-migratory seasons (25 August - 10 October, 1999 and 2000) at Allegheny Portage Railroad National Historic Site (continued).

Resident Status	Species	Average Number/Point/Survey
Permanent Resident	Black-capped Chickadee	0.6
	Whtie-breasted Nuthatch	0.3
	Blue Jay	0.3
	Cedar Waxwing	0.3
	Downy Woodpecker	0.2
	American Goldfinch	0.2
	American Robin	0.2
	Red-bellied Woodpecker	0.1
	Tufted Titmouse	0.1
	Hairy Woodpecker	0.1
	Northern cardinal	0.1

Appendix X. Relative abundance (average number/point/survey) of the most common short-distance migrant and permanent-resident species identified from point-count sampling points in forest cover type during winter seasons (1 December - 15 March, 1999-00 and 2000-01) at Allegheny Portage Railroad National Historic Site.

Resident Status	Species	Average Number/Point/Survey
Short-distance Migrant	Golden-crowned Kinglet	0.4
	Dark-eyed Junco	0.2
Permanent Resident	Black-capped Chickadee	0.7
	White-breasted Nuthatch	0.4
	Tufted Titmouse	0.3
	Hairy Woodpecker	0.3
	Downy Woodpecker	0.2
	American Crow	0.2
	American Robin	0.2
	American Goldfinch	0.1
	Northern Cardinal	0.1
	Cedar Waxwing	0.1
	Red-tailed Hawk	0.1

Appendix Y. Classifications[a] of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Eisenhower National Historic Site.

Species	Spring Migration	Breeding	Fall Migration	Winter
Acadian Flycatcher	--	R	--	--
American Crow	A	A	A	A
American Goldfinch	U	C	A	C
American Kestrel	C	O	U	U
American Redstart	--	R	--	--
American Robin	A	A	C	A
American Tree Sparrow	R	--	--	O
Baltimore Oriole	U	U	--	--
Barn Swallow	A	A	--	--
Barred Owl	--	--	--	O
Belted Kingfisher	O	R	O	O
Black Vulture	--	U	--	R
Black-throated Green Warbler	R	--	O	--
Blue Jay	C	U	A	A
Blue-gray Gnatcatcher	O	O	--	--
Blue-headed Vireo	R	--	--	--
Bobolink	C	C	--	--
Brown Creeper	--	--	--	R
Brown Thrasher	U	U	--	--
Brown-headed Cowbird	C	U	--	O
Canada Goose	A	U	A	A
Carolina Chickadee	C	U	U	C
Carolina Wren	O	O	O	O

Appendix Y. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Eisenhower National Historic Site (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Cedar Waxwing	--	U	O	--
Chestnut-sided Warbler	R	--	R	--
Chimney Swift	O	U	R	--
Chipping Sparrow	O	C	O	--
Common Grackle	A	C	O	A
Common Snipe	--	--	--	U
Common Yellowthroat	C	O	O	--
Cooper's Hawk	--	--	--	O
Dark-eyed Junco	O	--	--	A
Downy Woodpecker	O	U	U	U
Eastern Bluebird	U	C	A	C
Eastern Kingbird	U	C	R	--
Eastern Meadowlark	A	A	U	U
Eastern Phoebe	O	U	U	O
Eastern Towhee	U	O	O	--
Eastern Wood-pewee	U	C	U	--
European Starling	A	A	A	A
Field Sparrow	C	U	O	R
Fish Crow	O	O	--	--
Golden-crowned Kinglet	R	--	--	O
Grasshopper Sparrow	U	C	--	--
Gray Catbird	U	C	U	--
Great Blue Heron	O	R	O	O

Appendix Y. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Eisenhower National Historic Site (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Great Crested Flycatcher	O	U	--	--
Green Heron	R	O	--	--
Hairy Woodpecker	R	O	R	O
Hermit Thrush	O	--	--	R
House Finch	C	C	C	A
House Sparrow	A	A	C	C
House Wren	A	A	O	--
Indigo Bunting	O	O	R	--
Kentucky Warbler	R	--	--	--
Killdeer	U	U	A	U
Lincoln's Sparrow	--	--	R	--
Loggerhead Shrike	R	O	--	--
Louisiana Waterthrush	O	--	--	--
Magnolia Warbler	--	--	O	--
Mallard	O	O	--	U
Mourning Dove	C	A	A	A
Northern Cardinal	C	C	U	U
Northern Flicker	U	O	U	U
Northern Harrier	--	--	U	O
Northern Mockingbird	C	A	U	U
Northern Rough-winged Swallow	O	--	--	--
Northern Waterthrush	R	--	--	--
Orchard Oriole	U	O	--	--

Appendix Y. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Eisenhower National Historic Site (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Ovenbird	R	--	--	--
Palm Warbler	O	--	O	--
Pileated Woodpecker	R	--	R	O
Pine Warbler	R	--	--	--
Prairie Warbler	R	R	--	--
Purple Finch	R	--	--	--
Red-bellied Woodpecker	C	U	C	A
Red-breasted Nuthatch	--	--	R	R
Red-eyed Vireo	O	U	O	--
Red-headed Woodpecker	U	U	U	O
Red-shouldered Hawk	O	O	R	O
Red-tailed Hawk	A	C	A	C
Red-winged Blackbird	A	A	C	A
Ring-billed Gull	--	--	--	O
Rock Dove	O	U	U	A
Rose-breasted Grosbeak	R	--	--	--
Ruby-crowned Kinglet	O	--	R	--
Ruby-throated Hummingbird	R	--	--	--
Savannah Sparrow	U	O	--	--
Scarlet Tanager	R	--	R	--
Sharp-shinned Hawk	--	--	O	--
Song Sparrow	A	A	C	A
Swamp Sparrow	O	--	--	--

Appendix Y. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Eisenhower National Historic Site (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Tree Swallow	O	O	--	--
Tufted Titmouse	C	C	C	C
Turkey Vulture	A	A	A	U
Veery	--	--	R	--
Vesper Sparrow	--	R	--	--
Warbling Vireo	O	O	--	--
White-breasted Nuthatch	U	U	U	C
White-crowned Sparrow	--	--	--	U
White-eyed Vireo	O	--	--	--
White-throated Sparrow	O	--	R	O
Willow Flycatcher	--	O	--	--
Wood Thrush	O	U	R	--
Worm-eating Warbler	--	R	--	--
Yellow Warbler	O	O	--	--
Yellow-bellied Sapsucker	--	--	--	O
Yellow-billed Cuckoo	--	O	--	--
Yellow-rumped Warbler	C	--	O	O
Total Number of Species	88	72	61	54

[a] Classifications refer to the following categories: A, abundant (should be located in large numbers and in more than one habitat); C, common (should be located in fairly large numbers in appropriate habitat); U, uncommon (present in appropriate habitat, but not located in large numbers); O, occasional (present in some parcels of appropriate habitat, but not certain to be detected); R, rare (detected only a few times at most per season); --, none detected during the season.

Appendix Z. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points during spring-migratory seasons (15 April - 25 May, 2000 and 2001) at Eisenhower National Historic Site.

Resident Status	Species	Average Number/Point/Survey
Long-distance Migrant	Barn Swallow	1.2
	Bobolink	0.2
	Eastern Kingbird	0.2
	Orchard Oriole	0.2
	Eastern Wood-pewee	0.1
	Indigo Bunting	0.1
	Baltimore Oriole	0.1
	Red-eyed Vireo	0.1
	Great Crested Flycatcher	0.1
	Wood Thrush	0.1
	Yellow Warbler	0.1
Short-distance Migrant	Red-winged Blackbird	2.8
	House Wren	0.5
	Chipping Sparrow	0.4
	Yellow-rumped Warbler	0.4
	Brown-headed Cowbird	0.3
	Gray Catbird	0.2
	Eastern Towhee	0.2
	Field Sparrow	0.2
	Grasshopper Sparrow	0.2
	Savannah Sparrow	0.1

Appendix Z. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points during spring-migratory seasons (15 April - 25 May, 2000 and 2001) at Eisenhower National Historic Site (continued).

Resident Status	Species	Average Number/Point/Survey
Permanent Resident	European Starling	3.7
	American Robin	1.8
	Song Sparrow	0.9
	House Sparrow	0.8
	Canada Goose	0.7
	Common Grackle	0.6
	House Finch	0.6
	Eastern Meadowlark	0.5
	Mourning Dove	0.4
	Northern Cardinal	0.3

Appendix AA. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points during breeding seasons (25 May - 15 July, 1999 and 2000) at Eisenhower National Historic Site.

Resident Status	Species	Average Number/Point/Survey
Long-distance Migrant	Barn Swallow	1.5
	Eastern Wood-pewee	0.3
	Great Crested Flycatcher	0.2
	Baltimore Oriole	0.2
	Eastern Kingbird	0.2
	Chimney Swift	0.2
	Red-eyed Vireo	0.2
	Bobolink	0.1
	Wood Thrush	0.1
	Indigo Bunting	0.1
	Orchard Oriole	0.1
Short-distance Migrant	Red-winged Blackbird	2.0
	House Wren	0.8
	Grasshopper Sparrow	0.4
	Gray Catbird	0.4
	Chipping Sparrow	0.2
	Field Sparrow	0.2
	Killdeer	0.1
	Brown-headed Cowbird	0.1
	Brow Thrasher	0.1
	Tree Swallow	0.1

Appendix AA. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points during breeding seasons (25 May - 15 July, 1999 and 2000) at Eisenhower National Historic Site (continued).

Resident Status	Species	Average Number/Point/Survey
Permanent Resident	European Starling	2.5
	American Robin	0.8
	House Sparrow	0.8
	Song Sparrow	0.8
	Northern Mockingbird	0.5
	Eastern Meadowlark	0.5
	Mourning Dove	0.4
	Northern Cardinal	0.3
	American Goldfinch	0.3
	Common Grackle	0.3

Appendix AB. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points during fall-migratory seasons (25 August - 10 October, 1999 and 2000) at Eisenhower National Historic Site.

Resident Status	Species	Average Number/Point/Survey
Long-distance Migrant	Eastern Wood-pewee	0.2
	Magnolia Warbler	0.1
	Red-eyed Vireo	0.1
	Black-throated Green Warbler	< 0.1
	Chimney Swift	< 0.1
	Chestnut-sided Warbler	< 0.1
	Eastern Kingbird	< 0.1
	Indigo Bunting	< 0.1
	Scarlet Tanager	< 0.1
	Veery	< 0.1
	Wood Thrush	< 0.1
Short-distance Migrant	Killdeer	1.0
	Red-winged Blackbird	0.4
	Gray Catbird	0.2
	Eastern Phoebe	0.1
	Field Sparrow	0.1
	Common Yellowthroat	0.1
	Chipping Sparrow	0.1
	Eastern Towhee	0.1
	Palm Warbler	0.1
	Yellow-rumped Warbler	0.1

Appendix AB. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points during fall-migratory seasons (25 August - 10 October, 1999 and 2000) at Eisenhower National Historic Site (continued).

Resident Status	Species	Average Number/Point/Survey
Permanent Resident	European Starling	3.9
	Mounring Dove	1.4
	American Goldfinch	1.0
	Blue Jay	0.6
	House Finch	0.6
	House Sparrow	0.6
	American Robin	0.5
	Song Sparrow	0.5
	Eastern Bluebird	0.4
	American Crow	0.3

Appendix AC. Relative abundance (average number/point/survey) of the most common short-distance migrant and permanent-resident species identified from point-count sampling points during winter seasons (1 December - 15 March, 1999-00 and 2000-01) at Eisenhower National Historic Site.

Resident Status	Species	Average Number/Point/Survey
Short-distance Migrant	Red-winged Blackbird	3.9
	Dark-eyed Junco	1.5
	Common Snipe	0.3
	Killdeer	0.2
	Golden-crowned Kinglet	0.1
	White-crowned Sparrow	0.1
	Yellow-rumped Warbler	0.1
	Brown-headed Cowbird	< 0.1
	Eastern Phoebe	< 0.1
	White-throated Sparrow	< 0.1
Permanent Resident	European Starling	3.3
	American Robin	2.4
	Common Grackle	2.3
	Mourning Dove	0.9
	Song Sparrow	0.6
	American Goldfinch	0.6
	American Crow	0.5
	Tufted Titmouse	0.5
	Carolina Chickadee	0.5
	Red-bellied Woodpecker	0.4

Appendix AD. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Gettysburg National Military Park.

Species	Historical Records[a]	May 1999 - May 2001
Acadian Flycatcher	X	X
American Black Duck	X	
American Coot	X	
American Crow	X	X
American Goldfinch	X	X
American Kestrel	X	X
American Redstart	X	X
American Robin	X	X
American Tree Sparrow	X	X
American Wigeon (*Anas americana*)	X	
American Woodcock	X	X
Bald Eagle	X	
Baltimore Oriole	X	X
Barn Owl	X	X
Barn Swallow	X	X
Barred Owl	X	X
Bay-breasted Warbler		X
Belted Kingfisher	X	X
Black Vulture	X	X
Black-and-white Warbler	X	X
Black-billed Cuckoo	X	X
Black-capped Chickadee	X	X
Blackburnian Warbler	X	X

Appendix AD. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Gettysburg National Military Park (continued).

Species	Historical Records	May 1999 - May 2001
Blackpoll Warbler	X	X
Black-throated Blue Warbler	X	X
Black-throated Green Warbler	X	X
Blue Jay	X	X
Blue-gray Gnatcatcher	X	X
Blue-headed Vireo	X	X
Blue-Winged Teal (*Anas discors*)	X	
Blue-winged Warbler	X	X
Bobolink	X	X
Broad-winged Hawk	X	X
Brown Creeper	X	X
Brown Thrasher	X	X
Brown-headed Cowbird	X	X
Bufflehead	X	
Canada Goose	X	X
Canada Warbler		X
Cape May Warbler	X	X
Carolina Chickadee	X	X
Carolina Wren	X	X
Cedar Waxwing	X	X
Cerulean Warbler		X
Chestnut-sided Warbler	X	X
Chimney Swift	X	X
Chipping Sparrow	X	X

Appendix AD. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Gettysburg National Military Park (continued).

Species	Historical Records	May 1999 - May 2001
Common Grackle	X	X
Common Nighthawk	X	X
Common Raven	X	X
Common Snipe	X	X
Common Yellowthroat	X	X
Cooper's Hawk	X	X
Dark-eyed Junco	X	X
Double-crested Cormorant	X	X
Downy Woodpecker	X	X
Eastern Bluebird	X	X
Eastern Kingbird	X	X
Eastern Meadowlark	X	X
Eastern Phoebe	X	X
Eastern Screech-owl		X
Eastern Towhee	X	X
Eastern Wood-pewee	X	X
European Starling	X	X
Field Sparrow	X	X
Fish Crow	X	X
Fox Sparrow	X	X
Gadwall (*Anas strepera*)	X	
Golden Eagle	X	
Golden-crowned Kinglet	X	X
Grasshopper Sparrow	X	X

Appendix AD. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Gettysburg National Military Park (continued).

Species	Historical Records	May 1999 - May 2001
Gray Catbird	X	X
Gray Partridge (*Perdix perdix*)	X	
Gray-cheeked Thrush	X	
Great Blue Heron	X	X
Great Crested Flycatcher	X	X
Great Egret (*Ardea albus*)	X	
Great Horned Owl	X	X
Greater Yellowlegs (*Tringa melanoleuca*)	X	
Green Heron	X	X
Hairy Woodpecker	X	X
Henslow's Sparrow		X
Hermit Thrush	X	X
Hooded Merganser	X	
Hooded Warbler	X	X
Horned Grebe (*Podiceps auritus*)	X	
Horned Lark	X	X
House Finch	X	X
House Sparrow	X	X
House Wren	X	X
Indigo Bunting	X	X
Kentucky Warbler		X
Killdeer	X	X

Appendix AD. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Gettysburg National Military Park (continued).

Species	Historical Records	May 1999 - May 2001
Laughing Gull		X
Least Flycatcher		X
Louisiana Waterthrush	X	X
Magnolia Warbler	X	X
Marsh Wren	X	
Mallard	X	X
Merlin (*Falco columbarius*)	X	
Mourning Dove	X	X
Mute Swan (*Cygnus olor*)	X	
Nashville Warbler	X	X
Northern Bobwhite (*Colinus virginianus*)	X	
Northern Cardinal	X	X
Northern Flicker	X	X
Northern Harrier	X	X
Northern Mockingbird	X	X
Northern Parula	X	X
Northern Rough-winged Swallow	X	X
Northern Saw-whet Owl	X	X
Orange-crowned Warbler		X
Orchard Oriole	X	X
Osprey	X	X
Ovenbird	X	X
Palm Warbler		X

Appendix AD. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Gettysburg National Military Park (continued).

Species	Historical Records	May 1999 - May 2001
Philadelphia Vireo	X	
Pileated Woodpecker	X	X
Pine Siskin	X	X
Pine Warbler	X	X
Prairie Warbler	X	X
Purple Finch	X	X
Purple Martin	X	X
Red-bellied Woodpecker	X	X
Red-breasted Nuthatch	X	X
Red-eyed Vireo	X	X
Red-headed Woodpecker	X	X
Red-shouldered Hawk	X	X
Red-tailed Hawk	X	X
Red-winged Blackbird	X	X
Ring-billed Gull	X	X
Ring-necked Duck	X	
Ring-necked Pheasant	X	X
Rock Dove	X	X
Rose-breasted Grosbeak	X	X
Ruby-crowned Kinglet	X	X
Ruby-throated Hummingbird	X	X
Ruffed Grouse	X	
Rusty Blackbird		X
Savannah Sparrow		X

Appendix AD. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Gettysburg National Military Park (continued).

Species	Historical Records	May 1999 - May 2001
Scaled Quail (*Callipepla squamata*)	X	
Scarlet Tanager	X	X
Sharp-shinned Hawk	X	X
Short-eared Owl	X	X
Song Sparrow	X	X
Spotted Sandpiper	X	
Swainson's Thrush	X	X
Swamp Sparrow		X
Tennessee Warbler	X	X
Tree Swallow	X	X
Tufted Titmouse	X	X
Tundra Swan	X	X
Turkey Vulture	X	X
Upland Sandpiper		X
Veery	X	X
Vesper Sparrow		X
Warbling Vireo		X
White-breasted Nuthatch	X	X
White-crowned Sparrow	X	X
White-eyed Vireo	X	X
White-throated Sparrow	X	X
White-winged Crossbill (*Loxia leucoptera*)	X	
Wild Turkey	X	X

Appendix AD. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Gettysburg National Military Park (continued).

Species	Historical Records	May 1999 - May 2001
Willow Flycatcher	X	X
Wilson's Warbler	X	X
Winter Wren	X	X
Wood Duck	X	X
Wood Thrush	X	X
Worm-eating Warbler	X	X
Yellow Warbler	X	X
Yellow-bellied Sapsucker	X	X
Yellow-billed Cuckoo	X	X
Yellow-crowned Night-heron	X	X
Yellow-rumped Warbler	X	X
Yellow-throated Vireo	X	X
Total Number of Species	159	151

[a] Historical records were taken from the NPSpecies database (National Park Service 2001).

Appendix AE. Classifications[a] of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Gettysburg National Military Park.

Species	Spring Migration	Breeding	Fall Migration	Winter
Acadian Flycatcher	O	O	--	--
American Crow	A	A	A	A
American Goldfinch	C	U	C	U
American Kestrel	U	O	O	U
American Redstart	O	O	R	--
American Robin	A	A	A	A
American Tree Sparrow	R	--	--	R
American Woodcock	R	--	--	--
Baltimore Oriole	U	O	R	--
Barn Owl	--	--	--	R
Barn Swallow	C	C	O	--
Barred Owl	R	R	O	C
Belted Kingfisher	R	R	R	R
Black Vulture	C	O	O	O
Black-and-white Warbler	O	R	R	--
Black-billed Cuckoo	--	R	R	--
Black-capped Chickadee	--	R	--	--
Blackburnian Warbler	R	--	R	--
Blackpoll Warbler	O	R	R	--
Black-throated Blue Warbler	O	--	O	--
Black-throated Green Warbler	O	--	O	--
Blue Jay	A	A	A	A
Blue-gray Gnatcatcher	C	U	--	--

Appendix AE. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Gettysburg National Military Park (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Blue-headed Vireo	O	--	R	--
Bobolink	U	U	--	--
Broad-winged Hawk	O	R	R	--
Brown Creeper	R	R	R	O
Brown Thrasher	O	O	R	--
Brown-headed Cowbird	C	U	R	--
Canada Goose	C	U	A	A
Canada Warbler	--	--	R	--
Cape May Warbler	R	--	--	--
Carolina Chickadee	C	C	C	A
Carolina Wren	O	O	O	O
Cedar Waxwing	O	O	O	U
Cerulean Warbler	R	--	--	--
Chestnut-sided Warbler	R	--	--	--
Chimney Swift	U	C	U	--
Chipping Sparrow	U	U	--	--
Common Grackle	C	U	O	U
Common Nighthawk	R	--	--	--
Common Raven	R	--	R	R
Common Snipe	--	--	--	R
Common Yellowthroat	O	O	O	R
Cooper's Hawk	O	R	R	O
Dark-eyed Junco	O	--	--	A

Appendix AE. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Gettysburg National Military Park (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Double-crested Cormorant	R	--	--	--
Downy Woodpecker	U	U	U	U
Eastern Bluebird	U	U	U	C
Eastern Kingbird	U	U	R	--
Eastern Meadowlark	C	C	U	O
Eastern Phoebe	O	O	O	--
Eastern Screech-owl	--	--	--	O
Eastern Towhee	C	U	U	R
Eastern Wood-pewee	C	A	U	--
European Starling	A	A	A	A
Field Sparrow	C	U	O	R
Fish Crow	O	O	--	--
Fox Sparrow	--	--	--	R
Golden-crowned Kinglet	R	--	R	U
Grasshopper Sparrow	O	O	R	--
Gray Catbird	C	C	U	R
Great Blue Heron	R	R	R	R
Great Crested Flycatcher	C	C	R	--
Great Horned Owl	--	R	R	U
Green Heron	R	R	--	--
Hairy Woodpecker	O	O	O	O
Henslow's Sparrow	--	--	R	--
Hermit Thrush	R	--	R	--

Appendix AE. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Gettysburg National Military Park (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Hooded Warbler	R	R	--	--
Horned Lark	R	--	R	O
House Finch	U	O	O	C
House Sparrow	O	O	R	C
House Wren	C	C	O	--
Indigo Bunting	O	U	--	--
Kentucky Warbler	R	R	--	--
Killdeer	O	O	O	O
Laughing Gull	--	--	R	--
Least Flycatcher	R	R	--	--
Louisiana Waterthrush	R	--	--	--
Magnolia Warbler	O	--	O	--
Mallard	O	--	--	O
Mourning Dove	C	C	U	A
Nashville Warbler	R	--	R	--
Northern Cardinal	A	C	U	U
Northern Flicker	C	U	U	U
Northern Harrier	--	--	O	O
Northern Mockingbird	C	C	U	U
Northern Parula	O	O	R	--
Northern Rough-winged Swallow	--	O	--	--
Northern Saw-whet Owl	--	--	--	O
Orange-crowned Warbler	--	--	R	--

Appendix AE. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Gettysburg National Military Park (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Orchard Oriole	R	R	--	--
Osprey	R	--	--	--
Ovenbird	O	O	R	--
Palm Warbler	R	--	R	--
Pileated Woodpecker	O	O	O	O
Pine Siskin	--	--	--	R
Pine Warbler	R	--	R	--
Prairie Warbler	R	R	R	--
Purple Finch	O	--	--	R
Purple Martin	R	--	--	--
Red-bellied Woodpecker	A	C	A	C
Red-breasted Nuthatch	R	--	R	R
Red-eyed Vireo	U	C	O	--
Red-headed Woodpecker	C	U	C	C
Red-shouldered Hawk	R	R	R	R
Red-tailed Hawk	C	C	U	C
Red-winged Blackbird	A	A	O	C
Ring-billed Gull	R	--	--	--
Ring-necked Pheasant	--	R	--	--
Rock Dove	U	U	A	C
Rose-breasted Grosbeak	R	R	R	--
Ruby-crowned Kinglet	U	--	R	R
Ruby-throated Hummingbird	R	R	R	--

Appendix AE. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Gettysburg National Military Park (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Rusty Blackbird	O	--	--	R
Savannah Sparrow	R	R	--	--
Scarlet Tanager	U	U	R	--
Sharp-shinned Hawk	O	R	R	R
Short-eared Owl	--	--	--	O
Song Sparrow	C	C	O	U
Swainson's Thrush	R	--	--	--
Swamp Sparrow	--	R	--	--
Tennessee Warbler	R	--	R	--
Tree Swallow	O	O	R	--
Tufted Titmouse	A	C	C	A
Tundra Swan	--	--	--	U
Turkey Vulture	A	A	A	C
Upland Sandpiper	R	--	--	--
Veery	R	R	R	--
Vesper Sparrow	R	R	--	--
Warbling Vireo	R	R	--	--
White-breasted Nuthatch	U	U	C	C
White-crowned Sparrow	--	--	--	R
White-eyed Vireo	R	R	--	--
White-throated Sparrow	U	--	--	U
Wild Turkey	--	--	--	O
Willow Flycatcher	R	R	R	--

Appendix AE. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Gettysburg National Military Park (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Wilson's Warbler	--	--	R	--
Winter Wren	R	--	--	--
Wood Duck	R	R	--	--
Wood Thrush	A	A	O	--
Worm-eating Warbler	R	--	R	--
Yellow Warbler	O	O	R	--
Yellow-bellied Sapsucker	--	--	R	R
Yellow-billed Cuckoo	O	O	--	--
Yellow-rumped Warbler	C	--	R	O
Yellow-throated Vireo	O	O	R	--
Total Number of Species	125	95	98	69

[a] Classifications refer to the following categories: A, abundant (should be located in large numbers and in more than one habitat); C, common (should be located in fairly large numbers in appropriate habitat); U, uncommon (present in appropriate habitat, but not located in large numbers); O, occasional (present in some parcels of appropriate habitat, but not certain to be detected); R, rare (detected only a few times at most per season); --, none detected during the season.

Appendix AF. Relative abundance (average number/point/survey) of the most common long distance-migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest and herbaceous cover types during spring-migratory seasons (15 April - 25 May, 2000 and 2001) at Gettysburg National Military Park.

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Long-distance Migrant	Wood Thrush (1.5)	Barn Swallow (1.0)
	Eastern Wood-pewee (0.7)	Bobolink (0.7)
	Red-eyed Vireo (0.6)	Chimney Swift (0.3)
	Great Crested Flycatcher (0.5)	Eastern Kingbird (0.2)
	Scarlet Tanager (0.5)	Yellow Warbler (0.1)
	Black-throated Blue Warbler (0.2)	Upland Sandpiper (< 0.1)
	Ovenbird (0.2)	Wood Thrush (< 0.1)
	American Redstart (0.2)	
	Acadian Flycatcher (0.2)	
	Magnolia Warbler (0.1)	
Short-distance Migrant	Blue-gray Gnatcatcher (0.6)	Red-winged Blackbird (3.3)
	Yellow-rumped Warbler (0.6)	Gray Catbird (0.2)
	White-throated Sparrow (0.5)	Killdeer (0.2)
	Eastern Towhee (0.5)	Grasshopper Sparrow (0.2)
	Ruby-crowned Kinglet (0.4)	Brown Thrasher (0.2)
	House Wren (0.2)	House Wren (0.2)
	Brown-headed Cowbird (0.2)	Brown-headed Cowbird (0.1)
	Red-winged Blackbird (0.2)	Tree Swallow (0.1)
	Gray Catbird (0.1)	Eastern Towhee (0.1)
	Blue-headed Vireo (0.1)	Field Sparrow (0.1)
	Chipping Sparrow (0.1)	Chipping Sparrow (0.1)

Appendix AF. Relative abundance (average number/point/survey) of the most common long distance-migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest and herbaceous cover types during spring-migratory seasons (15 April - 25 May, 2000 and 2001) at Gettysburg National Military Park (continued).

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Permanent Resident	Blue Jay (1.2)	European Starling (2.2)
	Tufted Titmouse (1.2)	American Robin (1.4)
	Northern Cardinal (0.9)	Eastern Meadowlark (1.0)
	Carolina Chickadee (0.9)	Common Grackle (0.3)
	Red-bellied Woodpecker (0.8)	Song Sparrow (0.3)
	Downy Woodpecker (0.5)	American Crow (0.3)
	White-breasted Nuthatch (0.4)	American Goldfinch (0.3)
	American Goldfinch (0.4)	Blue Jay (0.2)
	Northern Flicker (0.3)	American Kestrel (0.2)
	Red-headed Woodpecker (0.3)	Mourning Dove (0.2)
		Northen Mockingbird (0.2)

Appendix AG. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest and herbaceous cover types during breeding seasons (25 May - 15 July, 1999 and 2000) at Gettysburg National Military Park.

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Long-distance Migrant	Wood Thrush (2.3)	Barn Swallow (1.0)
	Eastern Wood-pewee (1.0)	Chimney Swift (0.6)
	Red-eyed Vireo (0.6)	Bobolink (0.6)
	Scarlet Tanager (0.4)	Eastern Kingbird (0.1)
	Great Crested Flycatcher (0.3)	Baltimore Oriole (< 0.1)
	Acadian Flycatcher (0.3)	Yellow Warbler (< 0.1)
	Ovenbird (0.2)	
	Rose-breasted Grosbeak (0.1)	
	Baltimore Oriole (0.1)	
	Northern Parula (0.1)	
Short-distance Migrant	Eastern Towhee (0.2)	Red-winged Blackbird (3.6)
	House Wren (0.2)	House Wren (0.3)
	Blue-gray Gnatcatcher (0.2)	Grasshopper Sparrow (0.2)
	Brown-headed Cowbird (0.2)	Chipping Sparrow (0.2)
	Gray Catbird (0.2)	Field Sparrow (0.2)
	Eastern Phoebe (0.1)	Killdeer (0.1)
	Red-winged Blackbird (< 0.1)	Brown-headed Cowbird (0.1)
		Gray Catbird (0.1)
		Tree Swallow (0.1)
		Eastern Phoebe (0.1)

Appendix AG. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest and herbaceous cover types during breeding seasons (25 May - 15 July, 1999 and 2000) at Gettysburg National Military Park (continued).

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Permanent Resident	Blue Jay (0.9)	European Starling (5.0)
	Tufted Titmouse (0.9)	Eastern Meadowlark (1.2)
	Northern Cardinal (0.6)	American Robin (0.6)
	White-breasted Nuthatch (0.6)	Common Grackle (0.5)
	American Robin (0.4)	Northen Mockingbird (0.5)
	Red-bellied Woodpecker (0.4)	Song Sparrow (0.3)
	Carolina Chickadee (0.4)	Mourning Dove (0.3)
	Downy Woodpecker (0.3)	American Kestrel (0.2)
	Red-headed Woodpecker (0.2)	Northern Cardinal (0.2)
	American Crow (0.1)	American Crow (0.2)

Appendix AH. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest and herbaceous cover types during fall-migratory seasons (25 August - 10 October, 1999 and 2000) at Gettysburg National Military Park.

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Long-distance Migrant	Eastern Wood-pewee (0.4)	Chimney Swift (0.3)
	Black-throated Blue warbler (0.3)	Eastern Kingbird (0.1)
	Red-eyed Vireo (0.3)	
	Black-throated Green Warbler (0.2)	
	Wood Thrush (0.1)	
	Black-and-white Warbler (0.1)	
	Ovenbird (0.1)	
	Blackpoll Warbler (0.1)	
	Magnolia Warbler (0.1)	
	Rose-breasted Grosbeak (0.1)	
	Scarlet Tanager (0.1)	
Short-distance Migrant	Eastern Towhee (0.1)	Killdeer (0.2)
	Gray Catbird (0.1)	Eastern Phoebe (0.1)
	Blue-headed Vireo (< 0.1)	Gray Catbird (0.1)
	Golden-crowned Kinglet (< 0.1)	Eastern Towhee (0.1)
	Hermit Thrush (< 0.1)	Grasshopper Sparrow (0.1)
	Palm Warbler (< 0.1)	Tree Swallow (0.1)
	Ruby-crowned Kinglet (< 0.1)	Field Sparrow (< 0.1)
	Yellow-rumped Warbler (< 0.1)	Henslow's Sparrow (< 0.1)
		Palm Warbler (< 0.1)

Appendix AH. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest and herbaceous cover types during fall-migratory seasons (25 August - 10 October, 1999 and 2000) at Gettysburg National Military Park (continued).

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Permanent Resident	American Robin (1.4)	European Starling (8.4)
	Blue Jay (1.3)	Eastern Meadowlark (0.5)
	Red-bellied Woodpecker (0.9)	American Goldfinch (0.5)
	Carolina Chickadee (0.9)	Eastern Bluebird (0.5)
	Tufted Titmouse (0.9)	Mourning Dove (0.4)
	White-breasted Nuthatch (0.7)	Rock Dove (0.4)
	Red-headed Woodpecker (0.3)	American Crow (0.3)
	Northern Flicker (0.3)	Turkey Vulture (0.2)
	Downy Woodpecker (0.3)	Blue Jay (0.2)
	American Crow (0.1)	Northern Mockingbird (0.2)
	Cedar Waxwing (0.1)	
	Common Grackle (0.1)	
	European Starling (0.1)	
	Hairy Woodpecker (0.1)	
	Northern Cardinal (0.1)	

Appendix AI. Relative abundance (average number/point/survey) of the most common short-distance migrant and permanent-resident bird species identified from point-count sampling points in forest and herbaceous cover types during winter seasons (1 December - 15 March, 1999-00 and 2000-01) at Gettysburg National Military Park.

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Short-distance Migrant	Dark-eyed Junco (1.0)	White-throated Sparrow (0.1)
	Golden-crowned Kinglet (0.2)	White-crowned Sparrow (< 0.1)
	White-throated Sparrow (0.1)	
	Yellow-bellied Sapsucker (< 0.1)	
Permanent Resident	Red-bellied Woodpecker (0.9)	American Crow (0.6)
	Tufted Titmouse (0.9)	Canada Goose (0.6)
	White-breasted Nuthatch (0.9)	Mourning Dove (0.4)
	Blue Jay (0.6)	Eastern Bluebird (0.3)
	American Robin (0.6)	Turkey Vulture (0.3)
	Carolina Chickadee (0.5)	Eastern Meadowlark (0.3)
	Downy Woodpecker (0.4)	American Goldfinch (0.2)
	European Starling (0.4)	European Starling (0.2)
	American Crow (0.3)	House Finch (0.2)
	Red-headed Woodpecker (0.3)	American Kestrel (0.2)

Appendix AJ. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Hopewell Furnace National Historic Site.

Species	Historical Records[a]	May 1999 - May 2001
Acadian Flycatcher	X	X
Alder Flycatcher	X	
American Black Duck	X	
American Crow	X	X
American Goldfinch	X	X
American Kestrel	X	X
American Pipit (*Anthus rubescens*)	X	
American Redstart	X	X
American Robin	X	X
American Tree Sparrow	X	
American Wigeon	X	
American Woodcock		X
Bald Eagle		X
Baltimore Oriole	X	X
Bank Swallow (*Riparia riparia*)	X	
Barn Swallow	X	X
Barred Owl		X
Bay-breasted Warbler	X	X
Belted Kingfisher	X	X
Black Vulture	X	X
Black-and-white Warbler	X	X
Black-billed Cuckoo		X

Appendix AJ. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Hopewell Furnace National Historic Site (continued).

Species	Historical Records	May 1999 - May 2001
Black-capped Chickadee	X	X
Black-crowned Night-heron (*Nycticorax nycticorax*)	X	
Blackburnian Warbler	X	X
Blackpoll Warbler	X	X
Black-throated Blue Warbler	X	X
Black-throated Green Warbler	X	X
Blue Jay	X	X
Blue-gray Gnatcatcher	X	X
Blue-headed Vireo	X	X
Blue-winged Teal	X	
Blue-winged Warbler	X	X
Bobolink	X	
Brewster's Warbler		X
Broad-winged Hawk	X	X
Brown Creeper	X	X
Brown Thrasher	X	X
Brown-headed Cowbird	X	X
Bufflehead	X	
Canada Goose	X	X
Canada Warbler	X	X
Canvasback (*Aythya valisineria*)	X	
Cape May Warbler	X	
Carolina Chickadee	X	X

Appendix AJ. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Hopewell Furnace National Historic Site (continued).

Species	Historical Records	May 1999 - May 2001
Carolina Wren	X	X
Cedar Waxwing	X	X
Cerulean Warbler	X	X
Chestnut-sided Warbler	X	X
Chimney Swift	X	X
Chipping Sparrow	X	X
Cliff Swallow	X	X
Common Goldeneye	X	
Common Grackle	X	X
Common Loon (*Gavia immer*)	X	
Common Merganser	X	
Common Raven		X
Common Yellowthroat	X	X
Cooper's Hawk	X	X
Dark-eyed Junco	X	X
Double-crested Cormorant	X	
Downy Woodpecker	X	X
Eastern Bluebird	X	X
Eastern Kingbird	X	X
Eastern Meadowlark	X	
Eastern Phoebe	X	X
Eastern Screech-owl	X	X
Eastern Towhee	X	X
Eastern Wood-pewee	X	X

Appendix AJ. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Hopewell Furnace National Historic Site (continued).

Species	Historical Records	May 1999 - May 2001
European Starling	X	X
Evening Grosbeak (*Coccothraustes vespertinus*)	X	
Field Sparrow	X	X
Fish Crow	X	X
Fox Sparrow	X	
Gadwall	X	
Golden-crowned Kinglet	X	X
Grasshopper Sparrow	X	
Gray Catbird	X	X
Gray-cheeked Thrush	X	
Great Blue Heron	X	
Great Egret	X	
Great Crested Flycatcher	X	X
Great Horned Owl	X	X
Greater Scaup (*Aythya marila*)	X	
Green Heron	X	
Green-winged Teal (*Anas crecca*)	X	
Hairy Woodpecker	X	X
Henslow's Sparrow	X	
Hermit Thrush	X	X
Herring Gull	X	
Hooded Merganser	X	
Hooded Warbler	X	X

Appendix AJ. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Hopewell Furnace National Historic Site (continued).

Species	Historical Records	May 1999 - May 2001
Horned Grebe	X	
Horned Lark	X	
House Finch	X	X
House Sparrow	X	X
House Wren	X	X
Indigo Bunting	X	X
Kentucky Warbler	X	
Killdeer	X	X
Least Flycatcher	X	X
Lesser Scaup	X	
Little Blue Heron (*Egretta caerulea*)	X	
Loggerhead Shrike	X	
Long-eared Owl		X
Louisiana Waterthrush	X	X
Magnolia Warbler	X	X
Mallard	X	X
Mourning Dove	X	X
Nashville Warbler		X
Northern Cardinal	X	X
Northern Flicker	X	X
Northern Harrier	X	
Northern Mockingbird	X	X
Northern Parula	X	X

Appendix AJ. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Hopewell Furnace National Historic Site (continued).

Species	Historical Records	May 1999 - May 2001
Northern Pintail (*Anas acuta*)	X	
Northern Rough-winged Swallow	X	X
Northern Saw-whet Owl		X
Northern Waterthrush	X	
Oldsquaw (*Clangula hyemalis*)	X	
Olive-sided Flycatcher (*Contopus borealis*)	X	
Orchard Oriole	X	X
Osprey	X	
Ovenbird	X	X
Palm Warbler	X	X
Philadelphia Vireo		X
Pied-billed Grebe	X	
Pileated Woodpecker	X	X
Pine Siskin	X	
Pine Warbler	X	X
Prairie Warbler	X	
Purple Finch	X	X
Red-bellied Woodpecker	X	X
Red-breasted Merganser (*Mergus serrator*)	X	
Red-breasted Nuthatch	X	X
Red-eyed Vireo	X	X
Red-headed Woodpecker	X	X

Appendix AJ. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Hopewell Furnace National Historic Site (continued).

Species	Historical Records	May 1999 - May 2001
Red-shouldered Hawk		X
Red-tailed Hawk	X	X
Red-winged Blackbird	X	X
Redhead (*Aythya americana*)	X	
Ring-billed Gull		X
Ring-necked Duck	X	
Ring-necked Pheasant	X	X
Rock Dove	X	X
Rose-breasted Grosbeak	X	X
Rough-legged Hawk (*Buteo lagopus*)	X	
Ruby-crowned Kinglet	X	X
Ruby-throated Hummingbird	X	X
Ruddy Duck (*Oxyura jamaicensis*)	X	
Ruffed Grouse	X	X
Rusty Blackbird	X	
Savannah Sparrow	X	
Scarlet Tanager	X	X
Sharp-shinned Hawk	X	X
Snow Bunting	X	
Song Sparrow	X	X
Spotted Sandpiper	X	
Swainson's Thrush	X	
Swamp Sparrow	X	

Appendix AJ. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Hopewell Furnace National Historic Site (continued).

Species	Historical Records	May 1999 - May 2001
Tennessee Warbler	X	X
Tree Swallow	X	X
Tufted Titmouse	X	X
Tundra Swan	X	
Turkey Vulture	X	X
Veery	X	X
Vesper Sparrow	X	
White-breasted Nuthatch		X
White-crowned Sparrow	X	
White-eyed Vireo	X	X
White-throated Sparrow	X	X
Wild Turkey	X	
Willow Flycatcher		X
Wilson's Warbler	X	
Winter Wren	X	
Wood Duck	X	
Wood Thrush	X	X
Worm-eating Warbler	X	X
Yellow Warbler	X	X
Yellow-bellied Sapsucker	X	X
Yellow-billed Cuckoo	X	X
Yellow-breasted Chat	X	
Yellow-rumped Warbler	X	X

Appendix AJ. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Hopewell Furnace National Historic Site (continued).

Species	Historical Records	May 1999 - May 2001
Yellow-throated Vireo	X	X
Yellow-throated Warbler		X
Total Number of Species	170	120

[a] Historical records were taken from the NPSpecies database (National Park Service 2001).

Appendix AK. Classifications[a] of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Hopewell Furnace National Historic Site.

Species	Spring Migration	Breeding	Fall Migration	Winter
Acadian Flycatcher	O	O	--	--
American Crow	A	A	A	A
American Goldfinch	C	U	C	U
American Kestrel	--	R	U	--
American Redstart	U	R	O	--
American Robin	C	C	U	R
Bald Eagle	--	R	--	--
Baltimore Oriole	C	O	--	--
Barn Swallow	A	A	--	--
Barred Owl	--	--	--	O
Bay-breasted Warbler	O	--	--	--
Belted Kingfisher	--	--	R	--
Black Vulture	O	U	U	O
Black-and-white Warbler	O	O	O	--
Black-billed Cuckoo	O	O	O	--
Black-capped Chickadee	O	--	--	--
Blackburnian Warbler	R	--	--	--
Blackpoll Warbler	U	R	O	--
Black-throated Blue Warbler	O	--	O	--
Black-throated Green Warbler	U	--	O	--
Blue Jay	A	A	A	O
Blue-gray Gnatcatcher	U	U	R	--
Blue-headed Vireo	O	--	O	--

Appendix AK. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Hopewell Furnace National Historic Site (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Blue-winged Warbler	O	--	--	--
Brewster's Warbler	R	--	--	--
Broad-winged Hawk	O	O	O	--
Brown Creeper	--	--	--	O
Brown Thrasher	R	--	--	--
Brown-headed Cowbird	C	C	--	--
Canada Goose	O	--	A	A
Canada Warbler	R	--	O	--
Carolina Chickadee	C	C	A	A
Carolina Wren	O	U	O	R
Cedar Waxwing	A	U	--	--
Cerulean Warbler	O	--	R	--
Chestnut-sided Warbler	O	--	R	--
Chimney Swift	O	O	O	--
Chipping Sparrow	A	C	C	--
Cliff Swallow	--	R	--	--
Common Grackle	O	O	A	O
Common Raven	R	--	--	O
Common Yellowthroat	C	U	O	--
Cooper's Hawk	O	--	--	R
Dark-eyed Junco	R	--	--	C
Downy Woodpecker	U	U	U	U
Eastern Bluebird	U	U	C	C

Appendix AK. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Hopewell Furnace National Historic Site (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Eastern Kingbird	O	O	--	--
Eastern Phoebe	O	O	O	--
Eastern Screech-owl	--	--	--	A
Eastern Towhee	U	O	--	--
Eastern Wood-pewee	U	A	U	--
European Starling	A	C	C	C
Field Sparrow	O	O	--	--
Fish Crow	O	O	--	--
Golden-crowned Kinglet	--	--	--	U
Gray Catbird	C	C	O	--
Great Crested Flycatcher	U	U	--	--
Great Horned Owl	--	O	--	U
Hairy Woodpecker	O	O	O	U
Hermit Thrush	R	--	--	--
Hooded Warbler	O	--	--	--
House Finch	U	U	U	U
House Sparrow	O	O	U	O
House Wren	U	U	--	--
Indigo Bunting	U	C	--	--
Killdeer	R	--	R	--
Least Flycatcher	O	--	--	--
Long-eared Owl	--	--	--	R
Louisiana Waterthrush	U	O	--	--

Appendix AK. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Hopewell Furnace National Historic Site (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Magnolia Warbler	O	--	O	--
Mourning Dove	O	O	O	O
Nashville Warbler	O	--	O	--
Northern Cardinal	C	C	U	O
Northern Flicker	O	U	U	O
Northern Mockingbird	O	O	R	O
Northern Parula	O	R	--	--
Northern Rough-winged Swallow	O	--	--	--
Northern Saw-whet Owl	--	--	--	O
Orchard Oriole	O	O	--	--
Ovenbird	A	A	O	--
Palm Warbler	--	--	O	--
Philadelphia Vireo	R	--	--	--
Pileated Woodpecker	O	O	O	O
Pine Warbler	R	--	--	--
Purple Finch	--	--	--	O
Red-bellied Woodpecker	C	C	C	C
Red-breasted Nuthatch	--	--	O	R
Red-eyed Vireo	A	A	U	--
Red-headed Woodpecker	R	O	--	R
Red-shouldered Hawk	--	--	O	--
Red-tailed Hawk	C	U	U	O
Red-winged Blackbird	U	O	--	O

Appendix AK. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Hopewell Furnace National Historic Site (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Ring-billed Gull	--	--	--	O
Ring-necked Pheasant	--	R	--	O
Rock Dove	R	--	--	--
Rose-breasted Grosbeak	O	O	--	--
Ruby-crowned Kinglet	O	--	O	--
Ruby-throated Hummingbird	--	R	--	--
Ruffed Grouse	R	--	--	--
Scarlet Tanager	A	A	O	--
Sharp-shinned Hawk	--	--	O	--
Song Sparrow	U	U	O	O
Tennessee Warbler	--	--	O	--
Tree Swallow	O	O	--	--
Tufted Titmouse	C	C	C	C
Turkey Vulture	A	A	A	A
Veery	O	O	O	--
White-breasted Nuthatch	U	U	C	C
White-eyed Vireo	R	--	--	--
White-throated Sparrow	U	--	O	O
Willow Flycatcher	R	--	--	--
Wood Thrush	A	C	O	--
Worm-eating Warbler	O	R	R	--
Yellow Warbler	U	U	--	--
Yellow-bellied Sapsucker	--	--	R	R

Appendix AK. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Hopewell Furnace National Historic Site (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Yellow-billed Cuckoo	O	O	R	--
Yellow-rumped Warbler	A	--	O	--
Yellow-throated Vireo	O	U	--	--
Yellow-throated Warbler	R	--	--	--
Total Number of Species	98	71	65	44

[a] Classifications refer to the following categories: A, abundant (should be located in large numbers and in more than one habitat); C, common (should be located in fairly large numbers in appropriate habitat); U, uncommon (present in appropriate habitat, but not located in large numbers); O, occasional (present in some parcels of appropriate habitat, but not certain to be detected); R, rare (detected only a few times at most per season); --, none detected during the season.

Appendix AL. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest cover type during spring-migratory seasons (15 April - 25 May, 2000 and 2001) at Hopewell Furnace National Historic Site.

Resident Status	Species	Average Number/Point/Survey
Long-distance Migrant	Ovenbird	1.6
	Red-eyed Vireo	1.1
	Wood Thrush	1.0
	Scarlet Tanager	0.7
	Great Crested Flycatcher	0.3
	Eastern Wood-pewee	0.2
	Louisiana Waterthrush	0.1
	American Redstart	0.1
	Black-throated Green Warbler	0.1
	Baltimore Oriole	0.1
	Black-and-white Warbler	0.1
	Blackpoll Warbler	0.1
	Black-throated Blue Warbler	0.1
Short-distance Migrant	Yellow-rumped Warbler	0.8
	Brown-headed Cowbird	0.3
	Eastern Towhee	0.2
	Chipping Sparrow	0.1
	Common Yellowthroat	0.1
	Gray Catbird	0.1
	Blue-gray Gnatcatcher	0.1
	House Wren	0.1
	Eastern Phoebe	< 0.1
	Hermit Thrush	< 0.1

Appendix AL. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest cover type during spring-migratory seasons (15 April - 25 May, 2000 and 2001) at Hopewell Furnace National Historic Site (continued).

Resident Status	Species	Average Number/Point/Survey
Permanent Resident	Blue Jay	0.9
	Red-bellied Woodpecker	0.5
	Tufted Titmouse	0.5
	Cedar Waxwing	0.4
	Carolina Chickadee	0.2
	American Crow	0.2
	American Goldfinch	0.2
	American Robin	0.2
	Downy Woodpecker	0.2
	White-breasted Nuthatch	0.2

Appendix AM. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest cover type during breeding seasons (25 May - 15 July, 1999 and 2000) at Hopewell Furnace National Historic Site.

Resident Status	Species	Average Number/Point/Survey
Long-distance Migrant	Red-eyed Vireo	1.8
	Ovenbird	0.9
	Scarlet Tanager	0.8
	Eastern Wood-pewee	0.5
	Wood Thrush	0.5
	Indigo Bunting	0.2
	Acadian Flycatcher	0.1
	Great Crested Flyctcher	0.1
	Yellow-throated Vireo	0.1
	Veery	0.1
	Yellow-billed Cuckoo	0.1
Short-distance Migrant	Common Yellowthroat	0.2
	Brown-headed Cowbird	0.2
	Eastern Towhee	0.1
	Gray Catbird	0.1
	House Wren	0.1
	Blue-gray Gnatcatcher	0.1
	Chipping Sparrow	0.1

Appendix AM. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest cover type during breeding seasons (25 May - 15 July, 1999 and 2000) at Hopewell Furnace National Historic Site (continued).

Resident Status	Species	Average Number/Point/Survey
Permanent Resident	Carolina Chickadee	0.5
	Tufted Titmouse	0.5
	Blue Jay	0.4
	Northern Cardinal	0.3
	White-breasted Nuthatch	0.2
	Red-bellied Woodpecker	0.2
	American Crow	0.2
	Hairy Woodpecker	0.2
	American Goldfinch	0.1
	Downy Woodpecker	0.1

Appendix AN. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest cover type during fall-migratory seasons (25 August - 10 October, 1999 and 2000) at Hopewell Furnace National Historic Site.

Resident Status	Species	Average Number/Point/Survey
Long-distance Migrant	Eastern Wood-pewee	0.3
	Red-eyed Vireo	0.2
	Black-and-white Warbler	0.1
	Black-throated blue Warbler	0.1
	American Redstart	0.1
	Scarlet Tanager	0.1
	Black-billed Cuckoo	0.1
	Black-throated Green Warbler	0.1
	Canada Warbler	0.1
	Magnolia Warbler	0.1
	Ovenbird	0.1
	Tennessee Warbler	0.1
	Veery	0.1
	Wood Thrush	0.1
Short-distance Migrant	Common Yellowthroat	0.1
	White-throated Sparrow	0.1
	Palm Warbler	0.1
	Ruby-crowned Kinglet	0.1
	Yellow-rumped Warbler	0.1

Appendix AN. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest cover type during fall-migratory seasons (25 August - 10 October, 1999 and 2000) at Hopewell Furnace National Historic Site (continued).

Resident Status	Species	Average Number/Point/Survey
Permanent Resident	Carolina Chickadee	1.0
	Blue Jay	0.7
	Tufted Titmouse	0.7
	White-breasted Nuthatch	0.4
	Downy Woodpecker	0.3
	Red-bellied Woodpecker	0.3
	American Goldfinch	0.2
	Northern Cardinal	0.2
	Hairy Woodpecker	0.2
	American Crow	0.2

Appendix AO. Relative abundance (average number/point/survey) of the most common short-distance migrant and permanent-resident species identified from point-count sampling points in forest cover type during winter seasons (1 December - 15 March, 1999-00 and 2000-01) at Hopewell Furnace National Historic Site.

Resident Status	Species	Average Number/Point/Survey
Short-distance Migrant	Red-winged Blackbird	0.2
	Golden-crowned Kinglet	0.1
	Dark-eyed Junco	0.1
	Yellow-bellied Sapsucker	< 0.1
Permanent Resident	Carolina Chickadee	0.5
	Red-bellied Woodpecker	0.4
	American Crow	0.4
	Tufted Titmouse	0.3
	White-breasted Nuthatch	0.3
	American Goldfinch	0.1
	Hairy Woodpecker	0.1
	Common Grackle	0.1
	Downy Woodpecker	0.1
	House Finch	0.1

Appendix AP. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Johnstown Flood National Memorial.

Species	Historical Records[a]	May 1999 - May 2001
Alder Flycatcher		X
American Crow	X	X
American Goldfinch	X	X
American Kestrel		X
American Redstart	X	X
American Robin	X	X
American Tree Sparrow		X
Baltimore Oriole	X	X
Barn Swallow	X	X
Barred Owl		X
Bay-breasted Warbler	X	
Belted Kingfisher	X	X
Black-and-white Warbler		X
Black-capped Chickadee	X	X
Blackburnian Warbler	X	X
Blackpoll Warbler	X	X
Black-throated Blue Warbler	X	X
Black-throated Green Warbler	X	X
Blue Jay	X	X
Blue-gray Gnatcatcher	X	X
Blue-headed Vireo		X
Blue-winged Warbler	X	X
Bobolink		X

Appendix AP. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Johnstown Flood National Memorial (continued).

Species	Historical Records	May 1999 - May 2001
Broad-winged Hawk		X
Brown Creeper		X
Brown Thrasher		X
Brown-headed Cowbird	X	X
Canada Goose		X
Canada Warbler	X	
Cape May Warbler	X	
Carolina Wren		X
Cedar Waxwing	X	X
Chestnut-sided Warbler	X	X
Chimney Swift	X	
Chipping Sparrow	X	X
Common Grackle	X	X
Common Raven	X	
Common Yellowthroat	X	X
Dark-eyed Junco		X
Downy Woodpecker	X	X
Eastern Bluebird	X	X
Eastern Kingbird		X
Eastern Meadowlark	X	X
Eastern Phoebe		X
Eastern Towhee	X	X
Eastern Wood-pewee	X	
European Starling	X	X

Appendix AP. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Johnstown Flood National Memorial (continued).

Species	Historical Records	May 1999 - May 2001
Field Sparrow	X	X
Golden-crowned Kinglet	X	X
Golden-winged Warbler (*Vermivora chrysoptera*)	X	
Grasshopper Sparrow		X
Gray Catbird	X	X
Great Crested Flycatcher		X
Great Horned Owl		X
Hairy Woodpecker		X
Henslow's Sparrow		X
Hooded Warbler	X	
House Finch		X
House Sparrow		X
House Wren	X	X
Indigo Bunting	X	X
Killdeer		X
Magnolia Warbler	X	
Mallard	X	X
Mourning Dove		X
Mourning Warbler	X	
Nashville Warbler	X	
Northern Cardinal	X	X
Northern Flicker	X	X
Northern Parula	X	
Northern Rough-winged Swallow		X

Appendix AP. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Johnstown Flood National Memorial (continued).

Species	Historical Records	May 1999 - May 2001
Northern Shrike		X
Ovenbird	X	X
Pileated Woodpecker	X	X
Purple Finch		X
Red-bellied Woodpecker		X
Red-breasted Nuthatch		X
Red-eyed Vireo	X	X
Red-shouldered Hawk		X
Red-tailed Hawk	X	X
Red-winged Blackbird	X	X
Rock Dove		X
Rose-breasted Grosbeak	X	X
Ruby-throated Hummingbird		X
Ruffed Grouse		X
Savannah Sparrow	X	X
Scarlet Tanager	X	X
Snow Bunting		X
Song Sparrow	X	X
Summer Tanager (*Piranga rubra*)	X	
Swamp Sparrow	X	X
Tennessee Warbler	X	
Tree Swallow	X	X
Tufted Titmouse	X	X
Turkey Vulture	X	X

Appendix AP. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Johnstown Flood National Memorial (continued).

Species	Historical Records	May 1999 - May 2001
Vesper Sparrow		X
White-breasted Nuthatch	X	X
White-eyed Vireo	X	X
White-throated Sparrow	X	X
Wild Turkey		X
Willow Flycatcher	X	X
Wilson's Warbler	X	
Winter Wren		X
Wood Duck		X
Wood Thrush	X	X
Yellow Warbler	X	X
Yellow-billed Cuckoo	X	X
Yellow-rumped Warbler	X	X
Yellow-throated Vireo		X
Total Number of Species	70	94

[a] Historical records were taken from the NPSpecies database (National Park Service 2001).

Appendix AQ. Classifications[a] of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Johnstown Flood National Memorial.

Species	Spring Migration	Breeding	Fall Migration	Winter
Alder Flycatcher	--	O	--	--
American Crow	C	A	C	A
American Goldfinch	A	A	A	U
American Kestrel	--	U	--	--
American Redstart	O	O	--	--
American Robin	C	A	A	U
American Tree Sparrow	R	--	--	A
Baltimore Oriole	U	R	--	--
Barn Swallow	O	O	O	--
Barred Owl	--	--	--	O
Belted Kingfisher	U	R	R	--
Black-and-white Warbler	R	--	--	--
Black-capped Chickadee	U	U	C	C
Blackburnian Warbler	O	--	--	--
Blackpoll Warbler	R	--	--	--
Black-throated Blue Warbler	R	--	R	--
Black-throated Green Warbler	O	O	--	--
Blue Jay	C	U	A	U
Blue-gray Gnatcatcher	R	O	--	--
Blue-headed Vireo	R	--	--	--
Blue-winged Warbler	R	--	--	--
Bobolink	--	O	R	--
Broad-winged Hawk	R	--	--	--

Appendix AQ. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Johnstown Flood National Memorial (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Brown Creeper	R	--	--	--
Brown Thrasher	R	--	--	--
Brown-headed Cowbird	C	U	--	--
Canada Goose	U	--	--	A
Carolina Wren	O	R	--	R
Cedar Waxwing	O	C	A	O
Chestnut-sided Warbler	C	U	--	--
Chipping Sparrow	C	O	--	--
Common Grackle	U	U	A	--
Common Yellowthroat	A	A	C	--
Dark-eyed Junco	--	--	--	U
Downy Woodpecker	O	U	O	U
Eastern Bluebird	U	O	U	C
Eastern Kingbird	R	O	--	--
Eastern Meadowlark	O	U	--	--
Eastern Phoebe	O	O	--	--
Eastern Towhee	A	C	U	--
European Starling	U	C	C	U
Field Sparrow	A	A	U	R
Golden-crowned Kinglet	--	--	--	O
Grasshopper Sparrow	R	--	--	--
Gray Catbird	C	A	C	--
Great Crested Flycatcher	R	R	--	--

Appendix AQ. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Johnstown Flood National Memorial (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Great Horned Owl	--	--	--	U
Hairy Woodpecker	R	O	R	O
Henslow's Sparrow	R	R	--	--
House Finch	--	--	--	R
House Sparrow	--	--	--	O
House Wren	U	U	--	--
Indigo Bunting	C	A	U	--
Killdeer	O	R	R	R
Mallard	U	--	U	--
Mourning Dove	O	O	O	--
Northern Cardinal	U	U	U	O
Northern Flicker	U	U	O	--
Northern Rough-winged Swallow	U	U	--	--
Northern Shrike	--	--	--	R
Ovenbird	A	A	O	--
Pileated Woodpecker	O	O	R	U
Purple Finch	R	--	--	--
Red-bellied Woodpecker	O	--	--	--
Red-breasted Nuthatch	--	--	R	--
Red-eyed Vireo	A	A	U	--
Red-shouldered Hawk	--	--	U	--
Red-tailed Hawk	C	C	C	R
Red-winged Blackbird	A	A	A	--

Appendix AQ. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Johnstown Flood National Memorial (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Rock Dove	R	--	--	R
Rose-breasted Grosbeak	O	O	--	--
Ruby-throated Hummingbird	--	O	O	--
Ruffed Grouse	--	--	R	--
Savannah Sparrow	--	--	R	--
Scarlet Tanager	U	U	--	--
Snow Bunting	--	--	--	O
Song Sparrow	A	A	C	A
Swamp Sparrow	U	C	--	--
Tree Swallow	O	U	C	--
Tufted Titmouse	C	U	U	O
Turkey Vulture	U	U	U	--
Vesper Sparrow	O	O	--	R
White-breasted Nuthatch	O	O	O	U
White-eyed Vireo	R	--	--	--
White-throated Sparrow	R	--	--	O
Wild Turkey	--	--	R	--
Willow Flycatcher	--	C	--	--
Winter Wren	R	--	--	--
Wood Duck	O	--	--	--
Wood Thrush	O	U	--	--
Yellow Warbler	A	A	R	--

Appendix AQ. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Johnstown Flood National Memorial (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Yellow-billed Cuckoo	--	R	--	--
Yellow-rumped Warbler	U	--	--	--
Yellow-throated Vireo	R	--	--	--
Total Number of Species	75	59	42	32

[a] Classifications refer to the following categories: A, abundant (should be located in large numbers and in more than one habitat); C, common (should be located in fairly large numbers in appropriate habitat); U, uncommon (present in appropriate habitat, but not located in large numbers); O, occasional (present in some parcels of appropriate habitat, but not certain to be detected); R, rare (detected only a few times at most per season); --, none detected during the season.

Appendix AR. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points during spring-migratory seasons (15 April - 25 May, 2000 and 2001) at Johnstown Flood National Memorial.

Resident Status	Species	Average Number/Point/Survey
Long-distance Migrant	Yellow Warbler	1.0
	Ovenbird	0.5
	Red-eyed Vireo	0.5
	Indigo Bunting	0.3
	Chestnut-sided Warbler	0.2
	Northern rough-winged Swallow	0.2
	Baltimore oriole	0.1
	Black-throated Green Warbler	0.1
	Scarlet Tanager	0.1
	American Redstart	0.1
	Barn Swallow	0.1
Short-distance Migrant	Red-winged Blackbird	1.9
	Common Yellowthroat	1.0
	Eastern Towhee	0.5
	Field Sparrow	0.5
	Brown-headed Cowbird	0.4
	Yellow-rumped Warbler	0.3
	Gray Catbird	0.2
	Chipping Sparrow	0.2
	Swamp Sparrow	0.2
	House Wren	0.2

Appendix AR. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points during spring-migratory seasons (15 April - 25 May, 2000 and 2001) at Johnstown Flood National Memorial (continued).

Resident Status	Species	Average Number/Point/Survey
Permanent Resident	Song Sparrow	1.7
	American Goldfinch	1.0
	Blue Jay	0.4
	American Robin	0.4
	Common Grackle	0.2
	Northern Cardinal	0.2
	Tufted Titmouse	0.2
	European Starling	0.2
	American Crow	0.1
	Canada Goose	0.1

Appendix AS. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points during breeding seasons (25 May - 15 July, 1999 and 2000) at Johnstown Flood National Memorial.

Resident Status	Species	Average Number/Point/Survey
Long-distance Migrant	Red-eyed Vireo	0.9
	Indigo Bunting	0.8
	Yellow Warbler	0.7
	Ovenbird	0.6
	Willow Flycatcher	0.3
	Chestnut-sided Warbler	0.2
	Scarlet Tanager	0.1
	American Redstart	0.1
	Black-throated Green Warbler	0.1
	Barn Swallow	0.1
Short-distance Migrant	Red-winged Blackbird	1.2
	Common Yellowthroat	1.0
	Gray Catbird	0.8
	Field Sparrow	0.7
	Swamp Sparrow	0.4
	Eastern Towhee	0.3
	Brown-headed Cowbird	0.3
	Tree Swallow	0.2
	Eastern Phoebe	0.1
	House Wren	0.1

Appendix AS. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points during breeding seasons (25 May - 15 July, 1999 and 2000) at Johnstown Flood National Memorial (continued).

Resident Status	Species	Average Number/Point/Survey
Permanent Resident	Song Sparrow	2.0
	American Goldfinch	0.8
	American Robin	0.4
	European Starling	0.4
	Downy Woodpecker	0.3
	American Crow	0.2
	Northern Cardinal	0.2
	Tufted Titmouse	0.2
	Cedar Waxwing	0.1
	Eastern Meadowlark	0.1

Appendix AT. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points during fall-migratory seasons (25 August - 10 October, 1999 and 2000) at Johnstown Flood National Memorial.

Resident Status	Species	Average Number/Point/Survey
Long-distance Migrant	Indigo Bunting	0.2
	Red-eyed Vireo	0.1
	Ruby-throated Hummingbird	0.1
	Ovenbird	0.1
	Bobolink	< 0.1
Short-distance Migrant	Red-winged Blackbird	0.8
	Common Yellowthroat	0.5
	Gray Catbird	0.4
	Field Sparrow	0.2
	Eastern Towhee	0.1
	Tree Swallow	0.1
	Killdeer	< 0.1
	Savannah Sparrow	< 0.1
Permanent Resident	Common Grackle	3.0
	American Goldfinch	1.1
	Cedar Waxwing	1.0
	American Robin	0.7
	European Starling	0.4
	Black-capped Chickadee	0.4
	Song Sparrow	0.4
	Blue Jay	0.4
	Tufted Titmouse	0.2
	Eastern Bluebird	0.2

Appendix AU. Relative abundance (average number/point/survey) of the most common short-distance migrant and permanent-resident species identified from point-count sampling points during winter seasons (1 December - 15 March, 1999-00 and 2000-01) at Johnstown Flood National Memorial.

Resident Status	Species	Average Number/Point/Survey
Short-distance Migrant	American Tree Sparrow	0.5
	Snow Bunting	0.1
	Golden-crowned Kinglet	0.1
	Vesper Sparrow	< 0.1
	White-throated Sparrow	< 0.1
Permanent Resident	Song Sparrow	0.8
	American Crow	0.6
	Black-capped Chickadee	0.3
	American Robin	0.2
	Eastern Bluebird	0.2
	European Starling	0.1
	American Goldfinch	0.1
	Downy Woodpecker	0.1
	Pileated Woodpecker	0.1
	White-breasted Nuthatch	0.1

Appendix AV. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Valley Forge National Historical Park.

Species	Historical Records[a]	May 1999 - May 2001
Acadian Flycatcher	X	X
Alder Flycatcher		X
American Bittern (*Bontaurus lentiginosus*)	X	
American Black Duck	X	X
American Coot	X	X
American Crow	X	X
American Goldfinch	X	X
American Kestrel	X	X
American Pipit	X	
American Redstart	X	X
American Robin	X	X
American Tree Sparrow	X	X
American Wigeon	X	
American Woodcock	X	X
Bald Eagle	X	
Baltimore Oriole	X	X
Bank Swallow	X	
Barn Owl	X	
Barn Swallow	X	X
Barred Owl	X	X
Bay-breasted Warbler	X	X
Belted Kingfisher	X	X

Appendix AV. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Historical Records	May 1999 - May 2001
Black Scoter (*Melanitta nigra*)	X	
Black Vulture	X	X
Black-and-white Warbler	X	X
Black-billed Cuckoo	X	X
Black-capped Chickadee	X	
Black-crowned Night-heron	X	
Blackburnian Warbler	X	X
Blackpoll Warbler	X	X
Black-throated Blue Warbler	X	X
Black-throated Green Warbler	X	X
Blue Jay	X	X
Blue-gray Gnatcatcher	X	X
Blue Grosbeak	X	X
Blue-headed Vireo	X	X
Blue-winged Teal	X	
Blue-winged Warbler	X	X
Bobolink	X	X
Bonaparte's Gull (*Larus philadelphia*)	X	
Broad-winged Hawk	X	X
Brown Creeper	X	X
Brown Thrasher	X	X
Brown-headed Cowbird	X	X
Bufflehead	X	X

Appendix AV. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Historical Records	May 1999 - May 2001
Canada Goose	X	X
Canada Warbler	X	X
Canvasback	X	
Cape May Warbler	X	X
Carolina Chickadee	X	X
Carolina Wren	X	X
Cattle Egret (*Bubulcus ibis*)	X	
Cedar Waxwing	X	X
Cerulean Warbler	X	X
Chestnut-sided Warbler	X	X
Chimney Swift	X	X
Chipping Sparrow	X	X
Cliff Swallow	X	
Common Goldeneye	X	X
Common Grackle	X	X
Common Loon	X	
Common Merganser	X	X
Common Moorhen (*Gallinula chloropus*)	X	
Common Nighthawk	X	X
Common Raven		X
Common Redpoll	X	
Common Snipe		X
Common Yellowthroat	X	X

Appendix AV. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Historical Records	May 1999 - May 2001
Connecticut Warbler (*Oporornis agilis*)	X	
Cooper's Hawk	X	X
Dark-eyed Junco	X	X
Dicksissel (*Spiza americana*)	X	
Double-crested Cormorant	X	X
Downy Woodpecker	X	X
Eastern Bluebird	X	X
Eastern Kingbird	X	X
Eastern Meadowlark	X	X
Eastern Phoebe	X	X
Eastern Screech-owl	X	X
Eastern Towhee	X	X
Eastern Wood-pewee	X	X
European Starling	X	X
Evening Grosbeak	X	
Field Sparrow	X	X
Fish Crow	X	X
Fox Sparrow	X	X
Gadwall	X	
Glossy Ibis (*Plegadis falcinellus*)	X	
Golden Eagle	X	X
Golden-crowned Kinglet	X	X
Golden-winged Warbler	X	

Appendix AV. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Historical Records	May 1999 - May 2001
Grasshopper Sparrow		X
Gray Catbird	X	X
Gray-cheeked Thrush	X	X
Great Black-backed Gull (*Larus marinus*)	X	
Great Blue Heron	X	X
Great Crested Flycatcher	X	X
Great Egret	X	
Great Horned Owl	X	X
Greater Scaup	X	
Greater White-fronted Goose (*Anser albifrons*)	X	
Greater Yellowlegs	X	
Green Heron	X	X
Green-winged Teal	X	
Hairy Woodpecker	X	X
Hermit Thrush	X	X
Herring Gull	X	X
Hooded Merganser	X	X
Hooded Warbler	X	X
Horned Grebe	X	
Horned Lark		X
House Finch	X	X
House Sparrow	X	X
House Wren	X	X

Appendix AV. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Historical Records	May 1999 - May 2001
Indigo Bunting	X	X
Kentucky Warbler	X	X
Killdeer	X	X
Laughing Gull	X	
Least Flycatcher	X	X
Least Sandpiper	X	X
Lesser Scaup	X	X
Lesser Yellowlegs	X	X
Lincoln's Sparrow	X	X
Little Blue Heron	X	
Long-eared Owl		X
Louisiana Waterthrush	X	X
Magnolia Warbler	X	X
Marsh Wren	X	X
Mallard	X	X
Merlin	X	
Mourning Dove	X	X
Mourning Warbler	X	
Mute Swan	X	
Nashville Warbler	X	X
Northern Bobwhite	X	
Northern Cardinal	X	X
Northern Flicker	X	X
Northern Goshawk (*Accipiter gentilis*)	X	

Appendix AV. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Historical Records	May 1999 - May 2001
Northern Harrier	X	X
Northern Mockingbird	X	X
Northern Parula	X	X
Northern Pintail	X	
Northern Rough-winged Swallow	X	X
Northern Saw-whet Owl		X
Northern Waterthrush	X	X
Oldsquaw	X	
Olive-sided Flycatcher	X	
Orange-crowned Warbler	X	
Orchard Oriole	X	X
Osprey		X
Ovenbird	X	X
Palm Warbler	X	X
Peregrine Falcon (*Falco peregrinus*)	X	
Pectoral Sandpiper	X	X
Philadelphia Vireo	X	X
Pied-billed Grebe	X	X
Pileated Woodpecker	X	X
Pine Grosbeak (*Pinicola enucleator*)	X	
Pine Siskin	X	
Pine Warbler	X	X
Prairie Warbler	X	X

Appendix AV. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Historical Records	May 1999 - May 2001
Prothonotary Warbler (*Protonotaria citera*)	X	
Purple Finch	X	X
Purple Martin	X	
Red-bellied Woodpecker	X	X
Red-breasted Merganser	X	
Red-breasted Nuthatch	X	X
Red-eyed Vireo	X	X
Redhead	X	
Red-headed Woodpecker	X	X
Red-necked Grebe (*Podiceps grisegena*)	X	
Red-shouldered Hawk	X	X
Red-tailed Hawk	X	X
Red-winged Blackbird	X	X
Ring-billed Gull	X	X
Ring-necked Duck	X	X
Ring-necked Pheasant	X	X
Rock Dove	X	X
Rose-breasted Grosbeak	X	X
Ruby-crowned Kinglet	X	X
Ruby-throated Hummingbird	X	X
Ruddy Duck	X	
Ruffed Grouse	X	
Rusty Blackbird	X	

Appendix AV. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Historical Records	May 1999 - May 2001
Savannah Sparrow	X	X
Scarlet Tanager	X	X
Semipalmated Plover (*Charadrius semipalmatus*)	X	
Semipalmated Sandpiper (*Calidris pusilla*)	X	
Sharp-shinned Hawk	X	X
Snow Goose (*Chen caerulescens*)	X	
Snowy Egret (*Egretta thula*)	X	
Solitary Sandpiper	X	X
Song Sparrow	X	X
Spotted Sandpiper	X	X
Swainson's Thrush	X	X
Swamp Sparrow	X	X
Tennessee Warbler	X	X
Tree Swallow	X	X
Tufted Titmouse	X	X
Tundra Swan		X
Turkey Vulture	X	X
Veery	X	X
Vesper Sparrow		X
Warbling Vireo	X	X
Whip-poor-will (*Caprimulgus vociferus*)	X	
White-breasted Nuthatch	X	X

Appendix AV. Bird species noted (indicated by an "X") from historical records versus species detected from May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Historical Records	May 1999 - May 2001
White-crowned Sparrow	X	
White-eyed Vireo	X	X
White-throated Sparrow	X	X
White-winged Scoter (*Melanitta fusca*)	X	
Wild Turkey	X	
Willow Flycatcher	X	X
Wilson's Warbler	X	X
Winter Wren	X	X
Wood Duck	X	X
Wood Thrush	X	X
Worm-eating Warbler	X	X
Yellow Warbler	X	X
Yellow-bellied Flycatcher	X	X
Yellow-bellied Sapsucker	X	X
Yellow-billed Cuckoo	X	X
Yellow-breasted Chat	X	
Yellow-crowned Night-heron	X	
Yellow-rumped Warbler	X	X
Yellow-throated Vireo	X	X
Yellow-throated Warbler	X	
Total Number of Species	216	163

[a] Historical records were taken from the NPSpecies database (National Park Service 2001).

Appendix AW. Classifications[a] of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Valley Forge National Historical Park.

Species	Spring Migration	Breeding	Fall Migration	Winter
Acadian Flycatcher	R	O	--	--
Alder Flycatcher	R	--	--	--
American Black Duck	--	--	--	U
American Coot	--	--	--	O
American Crow	A	A	A	A
American Goldfinch	A	C	A	C
American Kestrel	O	U	U	O
American redstart	U	O	R	--
American Robin	A	A	A	A
American Tree Sparrow	--	--	--	O
American Woodcock	--	R	--	--
Baltimore Oriole	C	U	--	--
Barn Swallow	C	C	R	--
Barred Owl	--	--	--	O
Bay-breasted Warbler	R	--	R	--
Belted Kingfisher	O	O	O	O
Black Vulture	U	O	O	O
Black-and-white Warbler	O	R	R	--
Black-billed Cuckoo	R	R	--	--
Blackburnian Warbler	R	--	--	--
Blackpoll Warbler	O	O	R	--
Black-throated Blue Warbler	O	--	O	--
Black-throated Green Warbler	O	--	O	--

Appendix AW. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Blue Jay	A	A	A	C
Blue-gray Gnatcatcher	O	O	R	--
Blue-headed Vireo	R	--	R	--
Blue-winged Warbler	O	O	--	--
Bobolink	O	O	--	--
Broad-winged Hawk	O	--	O	--
Brown Creeper	R	--	R	O
Brown Thrasher	O	O	R	--
Brown-headed Cowbird	C	U	--	R
Bufflehead	--	--	--	A
Canada Goose	A	A	A	A
Canada Warbler	O	--	R	--
Cape May Warbler	R	--	--	--
Carolina Chickadee	C	C	A	A
Carolina Wren	U	U	U	U
Cedar Waxwing	C	U	U	U
Chestnut-sided Warbler	R	--	--	--
Chimney Swift	U	U	U	--
Chipping Sparrow	U	U	R	--
Common Goldeneye	--	--	--	U
Common Grackle	C	C	C	R
Common Merganser	--	--	--	A
Common Nighthawk	--	--	R	--

Appendix AW. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Common Raven	R	--	R	R
Common Snipe	R	--	--	--
Common Yellowthroat	U	U	O	--
Cooper's Hawk	O	R	O	R
Dark-eyed Junco	O	--	--	A
Double-crested Cormorant	R	--	R	--
Downy Woodpecker	U	U	U	U
Eastern Bluebird	O	O	O	U
Eastern Kingbird	U	C	--	--
Eastern Meadowlark	U	C	O	U
Eastern Phoebe	O	O	O	R
Eastern Screech-owl	--	--	--	U
Eastern Towhee	U	U	O	--
Eastern Wood-pewee	U	U	O	--
European Starling	A	A	A	A
Field Sparrow	O	O	R	--
Fish Crow	O	--	--	--
Fox Sparrow	--	--	--	R
Golden Eagle	--	--	O	--
Golden-crowned Kinglet	--	--	O	U
Grasshopper Sparrow	R	R	R	--
Gray Catbird	A	A	C	--
Great Blue Heron	O	O	O	O

Appendix AW. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Great Crested Flycatcher	U	U	R	--
Great Horned Owl	--	R	--	O
Green Heron	R	--	R	--
Hairy Woodpecker	O	O	O	O
Hermit Thrush	R	--	--	--
Herring Gull	--	--	--	U
Hooded Merganser	--	--	--	O
Horned Lark	R	--	--	--
House Finch	U	O	O	U
House Sparrow	R	R	R	O
House Wren	U	U	R	--
Indigo Bunting	U	U	--	--
Kentucky Warbler	R	R	--	--
Killdeer	O	O	--	O
Least Flycatcher	R	--	--	--
Least Sandpiper	R	--	--	--
Lesser Scaup	--	--	--	U
Lesser Yellowlegs	R	--	--	--
Lincoln's Sparrow	--	--	R	--
Long-eared Owl	--	--	--	O
Louisiana Waterthrush	--	R	--	--
Magnolia Warbler	O	--	O	--
Marsh Wren	--	--	R	--

Appendix AW. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Mallard	U	U	U	A
Mourning Dove	C	C	C	U
Nashville Warbler	R	--	R	--
Northern Cardinal	A	A	C	C
Northern Flicker	C	U	C	O
Northern Harrier	--	R	--	O
Northern Mockingbird	U	U	O	O
Northern Parula	O	O	R	--
Northern Rough-winged Swallow	O	R	--	--
Northern Saw-whet Owl	--	--	--	R
Orchard Oriole	O	U	--	--
Osprey	R	--	--	--
Ovenbird	U	U	R	--
Palm Warbler	R	--	O	--
Pectoral sandpiper	R	--	--	--
Philadelphia Vireo	R	--	R	--
Pied-billed Grebe	--	--	--	O
Pileated Woodpecker	O	R	O	R
Pine Warbler	R	--	R	--
Prairie Warbler	O	R	R	--
Purple Finch	--	R	--	--
Red-bellied Woodpecker	C	C	C	C
Red-breasted Nuthatch	--	--	R	R

Appendix AW. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Red-eyed Vireo	A	A	O	--
Red-headed Woodpecker	R	R	--	--
Red-shouldered Hawk	O	--	--	R
Red-tailed Hawk	C	C	U	C
Red-winged Blackbird	A	C	--	O
Ring-billed Gull	--	--	--	A
Ring-necked Duck	--	--	--	A
Rock Dove	O	O	O	O
Rose-breasted Grosbeak	O	O	R	--
Ruby-crowned Kinglet	O	--	R	R
Ruby-throated Hummingbird	R	R	R	--
Savannah Sparrow	R	--	R	--
Scarlet Tanager	U	U	R	--
Sharp-shinned Hawk	R	R	R	R
Solitary Sandpiper	R	--	--	--
Song Sparrow	C	C	U	C
Spotted Sandpiper	R	--	R	--
Swainson's Thrush	R	--	R	--
Swamp Sparrow	--	R	R	--
Tennessee Warbler	R	--	R	--
Tree Swallow	U	U	--	--
Tufted Titmouse	C	U	C	C
Tundra Swan	--	--	--	R

Appendix AW. Classifications of the relative abundance of bird species identified during spring-migratory (15 April - 25 May), breeding (25 May - 15 July), fall-migratory (25 August - 10 October), and winter seasons (1 December - 15 March), May 1999 - May 2001 at Valley Forge National Historical Park (continued).

Species	Spring Migration	Breeding	Fall Migration	Winter
Turkey Vulture	A	A	A	A
Veery	R	R	--	--
Vesper Sparrow	--	R	--	--
Warbling Vireo	O	O	--	--
White-breasted Nuthatch	U	O	U	U
White-eyed Vireo	R	R	R	--
White-throated Sparrow	U	--	O	C
Willow Flycatcher	R	R	R	--
Winter Wren	--	--	--	R
Wood Duck	O	O	O	O
Wood Thrush	C	A	O	--
Worm-eating Warbler	R	R	R	--
Yellow Warbler	U	O	R	--
Yellow-bellied Sapsucker	R	--	--	O
Yellow-billed Cuckoo	O	R	R	--
Yellow-rumped Warbler	U	--	O	O
Yellow-throated Vireo	O	O	--	--
Total Number of Species	123	91	95	71

[a] Classifications refer to the following categories: A, abundant (should be located in large numbers and in more than one habitat); C, common (should be located in fairly large numbers in appropriate habitat); U, uncommon (present in appropriate habitat, but not located in large numbers); O, occasional (present in some parcels of appropriate habitat, but not certain to be detected); R, rare (detected only a few times at most per season); --, none detected during the season.

Appendix AX. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest and herbaceous cover types during spring-migratory seasons (15 April - 25 May, 2000 and 2001) at Valley Forge National Historical Park.

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Long-distance Migrant	Red-eyed Vireo (1.5)	Barn Swallow (1.1)
	Wood Thrush (0.5)	Chimney Swift (0.4)
	Ovenbird (0.4)	Bobolink (0.4)
	American Redstart (0.3)	Baltimore Oriole (0.3)
	Eastern Wood-pewee (0.3)	Eastern Kingbird (0.3)
	Scarlet Tanager (0.3)	Blue-winged Warbler (0.2)
	Black-throated Blue Warbler (0.2)	Orchard Oriole (0.2)
	Blackpoll Warbler (0.2)	Red-eyed Vireo (0.1)
	Indigo Bunting (0.1)	Blackpoll Warbler (0.1)
	Black-and-white Warbler (0.1)	Northern Rough-winged Swallow (0.1)
		Yellow Warbler (0.1)
Short-distance Migrant	Brown-headed Cowbird (0.2)	Red-winged Blackbird (1.2)
	Gray Catbird (0.2)	Chipping Sparrow (0.4)
	Common Yellowthroat (0.1)	Common Yellowthroat (0.2)
	Eastern Towhee (0.1)	Brown-headed Cowbird (0.1)
	Blue-gray Gnatcatcher (0.1)	Gray Catbird (0.1)
	White-throated Sparrow (0.1)	Tree Swallow (0.1)
	Yellow-rumped Warbler (0.1)	Field Sparrow (0.1)
	Chipping Sparrow (0.1)	White-throated Sparrow (0.1)
	Dark-eyed Junco (0.1)	Blue-gray Gnatcatcher (0.1)
	Fish Crow (0.1)	Eastern Towhee (0.1)
	House Wren (0.1)	House Wren (0.1)
	Yellow-bellied Sapsucker (0.1)	

Appendix AX. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest and herbaceous cover types during spring-migratory seasons (15 April - 25 May, 2000 and 2001) at Valley Forge National Historical Park (continued).

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Permanent Resident	Blue Jay (0.9)	European Starling (2.7)
	Cedar Waxwing (0.7)	Americn Robin (0.9)
	Carolina Chickadee (0.7)	Canada Goose (0.7)
	American Robin (0.7)	Cedar Waxwing (0.5)
	Northern Cardinal (0.6)	Eastern Meadowlark (0.5)
	Red-bellied Woodpecker (0.6)	Common Grackle (0.5)
	Tufted Titmouse (0.5)	American Crow (0.4)
	American Goldfinch (0.4)	American Goldfinch (0.4)
	American Crow (0.4)	Song Sparrow (0.4)
	Northern Flicker (0.2)	Northern Cardinal (0.3)

Appendix AY. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest and herbaceous cover types during breeding seasons (25 May - 15 July, 1999 and 2000) at Valley Forge National Historical Park.

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Long-distance Migrant	Red-eyed Vireo (1.6)	Barn Swallow (0.8)
	Wood Thrush (0.8)	Eastern Kingbird (0.4)
	Ovenbird (0.4)	Indigo Bunting (0.3)
	Eastern Wood-pewee (0.3)	Chimney Swift (0.2)
	Scarlet Tanager (0.2)	Orchard Oriole (0.2)
	Indigo Bunting (0.2)	Red-eyed Vireo (0.2)
	Kentucky Warbler (0.1)	Baltimore Oriole (0.1)
	Acadian Flycatcher (0.1)	Bobolink (0.1)
	Baltimore Oriole (0.1)	Yellow Warbler (0.1)
	Great Crested Flycatcher (0.1)	Warbling Vireo (0.1)
	Worm-eating Warbler (0.1)	
Short-distance Migrant	Gray Catbird (0.4)	Red-winged Blackbird (0.9)
	Eastern Towhee (0.3)	Tree Swallow (0.4)
	Brown-headed Cowbird (0.2)	Chipping Sparrow (0.2)
	Common Yellowthroat (0.1)	Killdeer (0.2)
	Blue-gray Gnatcatcher (< 0.1)	Gray Catbird (0.1)
	Chipping Sparrow (< 0.1)	Common Yellowthroat (0.1)
		Eastern Towhee (0.1)
		Brown Thrasher (0.1)
		Eastern Phoebe (0.1)
		House Wren (0.1)

Appendix AY. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest and herbaceous cover types during breeding seasons (25 May - 15 July, 1999 and 2000) at Valley Forge National Historical Park (continued).

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Permanent Resident	Blue Jay (0.7)	European Starling (5.4)
	Northern Cardinal (0.7)	Mourning Dove (1.3)
	Carolina Chickadee (0.5)	Eastern Meadowlark (0.7)
	Cedar Waxwing (0.4)	Canada Goose (0.6)
	Red-bellied Woodpecker (0.4)	American Crow (0.6)
	Hairy Woodpecker (0.3)	Rock Dove (0.5)
	American Robin (0.3)	American Goldfinch (0.5)
	Tufted Titmouse (0.2)	Americn Robin (0.5)
	American Goldfinch (0.2)	Song Sparrow (0.5)
	Carolina Wren (0.2)	Blue Jay (0.5)

Appendix AZ. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest and herbaceous cover types during fall-migratory seasons (25 August - 10 October, 1999 and 2000) at Valley Forge National Historical Park.

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Long-distance Migrant	Red-eyed Vireo (0.1)	Chimney Swift (0.2)
	Black-throated Blue Warbler (0.1)	Black-throated Green Warbler (0.1)
	Nashville Warbler (0.1)	American Redstart (< 0.1)
	Scarlet Tanager (0.1)	Black-and-white Warbler (< 0.1)
	Wood Thrush (0.1)	Blackpoll Warbler (< 0.1)
	Black-and-white Warbler (< 0.1)	Canada Warbler (< 0.1)
	Magnolia Warbler (< 0.1)	Magnolia Warbler (< 0.1)
	Ovenbird (< 0.1)	
	Philadelphia Vireo (< 0.1)	
	Ruby-throated Hummingbird (< 0.1)	
	Worm-eating Warbler (< 0.1)	
Short-distance Migrant	Gray Catbird (0.2)	Palm Warbler (0.4)
	Golden-crowned Kinglet (0.1)	Gray Catbird (0.1)
	Eastern Towhee (0.1)	Savannah Sparrow (0.1)
	Ruby-crowned Kinglet (0.1)	Common Yellowthroat (0.1)
	Yellow-rumped Warbler (< 0.1)	Brown Thrasher (< 0.1)
		Eastern Phoebe (< 0.1)
		Grasshopper Sparrow (< 0.1)
		House Wren (< 0.1)
		Lincoln's Sparrow (< 0.1)
		Swamp Sparrow (< 0.1)
		Yellow-rumped Warbler (< 0.1)

Appendix AZ. Relative abundance (average number/point/survey) of the most common long-distance migrant, short-distance migrant, and permanent-resident species identified from point-count sampling points in forest and herbaceous cover types during fall-migratory seasons (25 August - 10 October, 1999 and 2000) at Valley Forge National Historical Park (continued).

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Permanent Resident	American Robin (3.0)	European Starling (5.2)
	Carolina Chickadee (1.5)	American Goldfinch (1.0)
	Blue Jay (1.0)	Blue Jay (0.9)
	Tufted Titmouse (0.6)	American Crow (0.7)
	Red-bellied Woodpecker (0.5)	Mourning Dove (0.7)
	Northern Cardinal (0.3)	Song Sparrow (0.4)
	Downy Woodpecker (0.3)	Eastern Bluebird (0.3)
	American Goldfinch (0.2)	Northern Flicker (0.3)
	White-breasted Nuthatch (0.2)	Carolina Chickadee (0.2)
	Hairy Woodpecker (0.2)	Eastern Meadowlark (0.2)
	Mourning Dove (0.2)	

Appendix BA. Relative abundance (average number/point/survey) of the most common short-distance migrant and permanent-resident species identified from point-count sampling points in forest and herbaceous cover types during winter seasons (1 December - 15 March, 1999-00 and 2000-01) at Valley Forge National Historical Park.

Resident Status	Forest	Herbaceous
	Species (Average Number/Point/Survey)	Species (Average Number/Point/Survey)
Short-distance Migrant	Golden-crowned Kinglet (0.1)	Dark-eyed Junco (0.6)
	White-throated Sparrow (0.1)	Killdeer (0.2)
		American Tree Sparrow (0.2)
		Northern Harrier (0.1)
		Red-winged Blackbird (0.1)
		White-throated Sparrow (0.1)
Permanent Resident	Carolina Chickadee (0.7)	European Starling (2.3)
	Tufted Titmouse (0.6)	Canada Goose (1.9)
	American Robin (0.5)	Eastern Bluebird (0.7)
	Red-bellied Woodpecker (0.3)	American Crow (0.6)
	Downy Woodpecker (0.2)	Eastern Meadowlark (0.6)
	White-breasted Nuthatch (0.2)	Song Sparrow (0.4)
	Cedar Waxwing (0.2)	Mallard (0.3)
	Carolina Wren (0.2)	House Finch (0.2)
	Song Sparrow (0.2)	American Goldfinch (0.2)
	American Crow (0.1)	Red-tailed Hawk (0.2)
	American Goldfinch (0.1)	