National Park Service
U.S. Department of the Interior

Northeast Region
Natural Resource Stewardship and Science

George Washington Birthplace National Monument Avian Inventory

Technical Report NPS/NER/NRTR—2008/112

ON THE COVER
Red-bellied Woodpecker (Melanerpes carolinus)
Photograph by: Dana Bradshaw

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Abstract

A comprehensive, year-round inventory of birds was conducted at George Washington Birthplace National Monument (GEWA) in 2002 and 2003. The inventory yielded 141 species documenting 96% of the species expected to occur. No listed threatened or endangered species were detected; although, the previously listed Bald Eagle (*Haliaeetus leucocephalus*) which nests on the park proper as well as on several surrounding properties, was observed frequently. A total of 24 species observed are recognized as species of special concern, species of management concern, or priority species under national conservation initiatives.

The park's greatest asset is its proximity to Pope's Creek, which is one of the most significant winter waterfowl concentration areas anywhere in the Bay for at least a few select species. It is also within the boundaries of a large wintering Bald Eagle concentration area that is roughly centered on the park. The fact that GEWA is located within a network of large farms also predisposes it to the full suite of open-land species that would not otherwise be found on such a small site. The park is facing numerous challenges in the future from issues ranging from the spread of invasive species to the effects of sea-level rise.

Acknowledgements

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Introduction

Background

The National Park Service has established the Inventory and Monitoring Program (I&M) to gather existing and new information about natural resources in the parks and to make that information easily available at different levels to park resource managers, the scientific community, and the public. For park managers to effectively maintain biological diversity and ecological health within their parks, they must have a basic knowledge of what natural resources exist in parks, as well as an understanding of those factors that may threaten them. One of the first goals of the I&M Program has been to establish baseline biological inventories for vascular plant and vertebrate species in order to provide reliable species lists, a fundamental tool for management.

This report presents the results of a baseline bird inventory conducted at George Washington Birthplace National Monument (GEWA), located on the southern bank of the Potomac River in Westmoreland County, Virginia. The primary project objective was to document at least 90% of birds expected to occur at the Park, by confirming the existence of species expected from published data, and documenting year-round species diversity in the park. Local records, surveys, and published literature were used to develop a list of species expected to occur in the park (Trollinger and Reay 2001; Kain 1987). The list is composed of 140 species, of which 85 were species expected to occur during breeding season, 42 wintering species, and 13 to occur only as transient migrants.

Study Area

George Washington Birthplace National Monument is a relatively small park within the Northeast Coastal and Barrier Network of parks. It comprises some 223 ha (551 ac.) of land on the Northern Neck of Virginia, about 45 miles east of Fredericksburg on Hwy 3 and about 80 miles south of Washington D.C. in Westmoreland County (Figure 1). The park is relatively flat topographically and is bounded by the Potomac River on the north, Pope's Creek to the east and south, and private farmland to the south and west. Habitats include about 113 ha (280 acre) of open grasslands, 89 ha (220 acre) of forest, 10 ha (25 acre) of marshes and estuaries, 8.5 ha (21 acre) of cultural landscapes and development, and 2 ha (5 acre) of beaches and dune habitats.

Habitat Types

The habitats of GEWA were separated out by unique features rather than attempting to consolidate them into major types. This was done to better define bird affinities and distribution within the park. Although GEWA is basically a pine dominated upland, with agricultural grasslands, and coastal marsh habitats, the following nine habitat descriptors were used to segregate GEWA into its unique attributes:

Wooded Pond

There are two ponds at GEWA that are surrounded by forest. One is an impoundment of approximately .25 ha (.6 acre) embedded within a freshwater creek. The other is an isolated pond of approximately 5 ha (12 acre) adjacent to the beach access on the Potomac River. Both are enclosed within a forested buffer creating a microhabitat unlike other wetland sites in the park. There is one additional spring-fed pond adjacent to the pine plantation, that is surrounded by forest, and although small, does hold water year-round.

Mature Pine

The majority of the upland forest at GEWA is dominated by a loblolly pine (*Pinus taeda*) overstory with a near co-dominant canopy of willow oak (*Quercus phellos*). Other species include sweetgum (*Liquidambar styraciflua*), American beech (*Fagus grandifolia*), Virginia pine (*Pinus virginiana*) and other oaks (*Quercus* sp.). As the forest slopes in elevation toward the marshes, red maples (*Acer rubrum*) and blackgum (*Nyssa sylvattica*) become more abundant. Midstory species include an abundance of American holly (*Ilex opaca*) and red cedar (*Juniperus virginiana*). Pawpaw (*Asimina triloba*) and American Holly are among the few shrubs present due to over grazing by deer.

Riparian Buffer

All of the creeks are bordered by a forested buffer of at least a few meters in width. This habitat type is used to describe the narrow buffer that separates the grassland, and developed uplands from the open water of Popes Creek and the Potomac River. The habitat was particularly rich in bird activity during migration. Common tree species in this buffer are loblolly pine, red maple, willow oak, and tuliptree (*Liriodendron tulipfera*).

Riparian Pine Woodlot

Describing only one unique habitat, this identifier references only the open pine stand at, and around, the picnic area on the shore of Pope's Creek. It encompasses approx. 1.6 ha (4 acre) of old growth loblolly pine openly spaced with no appreciable midstory or understory other than mowed grass and gravel.

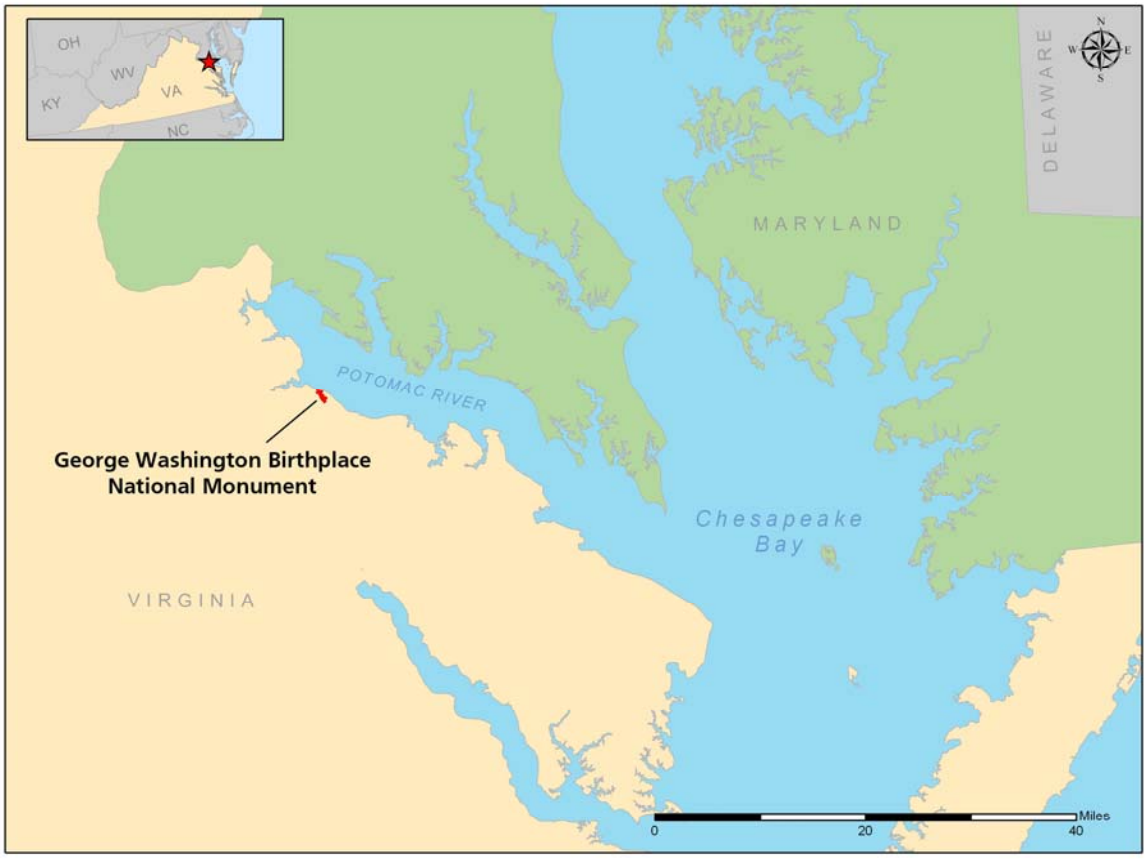

Figure 1. Location of George Washington Birthplace National Park

Plantation Pine / Coastal Scrub

The northern section of the park is dominated by a plantation pine stand approximately 20 years old interspersed with corridors of coastal scrub habitat. The young pine habitat is a dense stand of loblolly pine with predominantly wax myrtle (*Morella cerifera*) , high-tide bush (*Iva frutescens*) and cattails (*Typha angustifolia*) interspersed.

Low Density Developed

This habitat references the open, widely spaced trees that surround the birthplace and associated outbuildings and farmstead. Dominated by red cedar and loblolly pine, there are also a number of statuesque oaks, and tuliptrees present. This habitat is typical of the land associated with many small farms, or rural homes.

Upland/Marsh Edge

This terminology was used to describe the habitat corridors that border the tidal and nontidal marsh sections that traverse GEWA. They provide a corridor of vegetation and visual screen to the adjacent wetlands which benefits birds. The bird community associated with this habitat is more of facultative community deriving benefits from both marsh habitats and the adjacent woods, whereas the Riparian Buffer of Pope's Creek and the Potomac River is more of a singular use habitat harboring birds that would typically only be found in the wooded border, with no ties to the open water. The habitat in the upland/marsh edge corridors comprised a mix of species including loblolly pine, red maple, tuliptree, willow oak, and sweetgum along with eastern red cedar, flowering dogwood (*Cornus florida*) and redbud (*Cercis canadensis*).
Coastal Scrub/ Marsh: This habitat primarily references the high marsh area along the Potomac River on the east end of the northern section of the Park. The salt scrub contains salt meadow cordgrass (*Spartina patens)*, saltgrass (*Distichlis spicata*), saltbush (*Baccharis halimifolia),* high-tide bush, and wax myrtle adjacent to a marsh dominated by *Spartina cynoseroides* and *Phragmites*.

Grassland

The grassland habitats of GEWA were primarily areas of retired farmland ranging from recently fallow fields with evidence of harvested rowcrops and still exposed soil to more mature grasslands now in dense stands of fescue (*Festuca arundinacea*) interspersed with pockets of orchard grass and Johnson grass. The fields are separated by hedgerows of mostly red cedar.

Methodology

Expected species list development

Before field surveys were initiated an expected species list for the park was generated from several sources. An initial breeding species list was assembled from data taken from the Virginia Breeding Bird Atlas Project 1985-1989 (Trollinger and Reay 2001) and the Atlas of the Breeding Birds of Maryland and the District of Columbia (Robbins 1996). Data were compiled from a survey area that extended five USGS 7 ½ minute topo maps wide by five topos high, centered around GEWA. Additional data were compiled using results from over 20 years of data from the five nearest Breeding Bird Survey routes (USFWS 2003) that surround GEWA in all directions and from Christmas Bird Count data collected in and around GEWA for several years before and during the survey period (Portlock 2003). Finally, field guide range maps (Peterson 1980, Sibley 2000;) were consulted along with years of combined local knowledge of the area avifauna by professional colleagues. These lists were consolidated and edited to reflect only those species that would be subject to occur within the habitats known to exist at GEWA. Likewise, a list of spring and fall migrants expected to utilize habitats at GEWA were assembled from the same field guides and local knowledge, in addition to data on wintering locations and migration routes (Faaborg and Terborgh 1980; Degraaf and Rappole 1995; Dunn and Garrett 1997). A total of 142 species was expected to occur at GEWA, of which 87 species were expected during the breeding season, 42 species in winter and 13 species to occur as transient migrants (Appendix A). Seasonal separation was determined as follows: birds expected during the breeding season included all resident birds, and any temperate or neotropical migrants known to breed at areas close to GEWA; winter birds included only those birds unique to the winter season, typically temperate migrants that do not breed at the latitude of GEWA; transient migrants included those that do not breed or winter in Virginia, but utilize GEWA only as a “refueling” or stopover area in route to points north or south.

Site Selection and unit descriptions

The avian inventory began with a review of recent aerial imagery (2000 color-infrared digital orthophoto imagery) from which park boundaries and habitat types were evaluated. The imagery was provided by NPS along with the most current park unit boundary files. Upon examination of the imagery, all significant habitat types were noted for each park unit along with size and distribution of each. Any trails, roads, or other access points were noted as well for use in establishing the most efficient survey routes. Potential survey points were laid out on the imagery to give the most effective coverage of available habitats. These points were uploaded to handheld GPS units and taken in the field for ground truthing. Once in the field, observers selected a point on the ground that best approximated the photo location and collected a final GPS location with the handheld unit that would serve as the official survey point (Figure 2).

Rather than a random distribution of points, this project used points that were subjectively selected to encompass both edge and interior components of each distinct habitat type, where applicable. This technique was used to better assess bird diversity within specific habitat types

as an aid to long term management. In addition, some of the habitat units were small, which when evaluated in terms of a 250 m minimum separation between survey points (Ralph 1993)

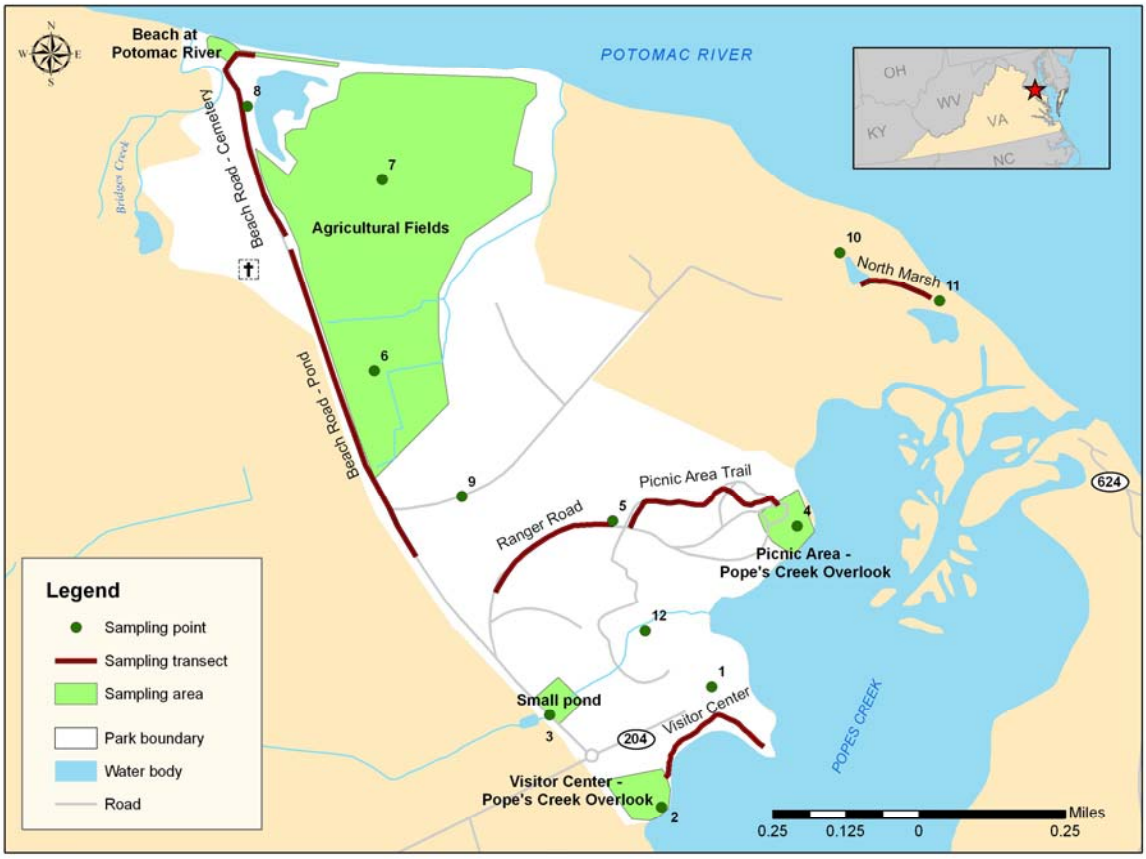

Figure 2. Distribution of survey points and line transects in George Washington Birthplace National Park.

made it important to be sure that key habitats were sampled. Therefore, the habitat type was a primary consideration in point selection.

Field Surveys

In order to effectively inventory bird communities at GEWA, a number of sampling techniques were conducted during different times of the year. All techniques employed standardized methodologies, but often multiple techniques were used during a single season to maximize species detection probabilities.

Point count Surveys – This project used a standardized point count methodology during breeding season that used 10 minute periods to record all birds seen or heard in all directions from a fixed survey point (Ralph 1993). Count data were segregated within this 10 minute period into consecutive segments of 3, 2, 2, and 3 minutes. Count data were also recorded relative to distance intervals, recognizing all birds detected within a radius of 50 m from the count center and those beyond 50 m. This data recording methodology allows for better comparison with other survey data from other times and/or places, and provides data for generating density estimates for species detected within a fixed radius. It is most useful as a breeding season technique, when most species are vocal and easily detected. However point count methodologies can be modified for migration or winter surveys as well.

Transect Surveys - Transects typically involve a measured route walked through a particular habitat while recording birds out to a specified distance to either side. In this project, transects were used simply for presence/absence detection and so no distance parameters were set. All birds out to any distance were recorded. The technique is most useful in grassland habitats in winter where birds are detected when flushing in front, or to the side, of an observer. It is also useful in detecting birds in forested habitats in migration that are both vocal and highly mobile, and are better detected and identified by a mobile observer.

Area Search – This technique has benefits for small habitats that can be easily surveyed in their entirety, and are too small to incorporate more than one point count. The technique essentially involves canvassing the entire habitat and recording all birds detected. Its application at GEWA was most often used in the context of searching the open water of Pope's Creek and the Potomac River from the shoreline with binoculars, and in canvassing the grassland and shrub habitats for winter birds.

Audio-playback surveys - This technique normally implies playing a pre-recorded vocalization of a target species at high volumes to extend its range. During the appropriate season, target species will tend to respond to conspecifics within their territory thereby allowing detection. It is most useful for nocturnal species that are otherwise difficult to detect. Duration and frequency of playback is variable depending on species, season, and number of points to be surveyed. The technique is also effective for diurnal passerines, but the repeated use of this technique for detecting any species should be discouraged due to the unnecessary stress it potentially places on breeding, or territorial, species.

Breeding Season

The primary inventory objective was to determine which bird species occurred on GEWA during the breeding season. A total of 12 points distributed among all major habitat types were sampled over the course of the survey period using point counts (Appendix B). All breeding season surveys were initiated at sunrise and terminated no later than 4 hours after sunrise. Surveys assumed reasonably fair weather and light winds. No surveys were undertaken in heavy rain or winds exceeding an average of 15 mph. Each point was surveyed twice during a single breeding season, determined to occur 1 June to 15 July. Because of the relatively small size of the park, all survey points at GEWA could be surveyed in a single day. Species detected between point counts were compiled separately and used only to supplement the overall species list. Likewise, birds observed as "fly-overs" during the count period were not used in the density estimates, but were recorded as part of the overall species list.

Relative abundance was calculated for all species detected within the 50 m radius count circle. This value was measured as the total number of detections of a single species over the combined total of detections across all species. The data were analyzed using Statistica v6.1 (Statsoft 2003) and presented in tabular form representing relative abundance for species detected by unit and for species detected by habitat type for each of the primary habitat categories.

Migration Surveys

A secondary objective of this project was to assess migration and winter use to develop a year round profile of bird diversity at GEWA. Because migration survey work requires intensive effort to develop meaningful data on bird density and distribution which is beyond the scope of this project, diversity and abundance of migrants during peak periods of migration was the focus of this objective. The number of available observers was not adequate to undertake a systematic methodology to capture the entirety of bird migration. As a result, data were not collected for detailed analysis, but rather to evaluate the Park units and their habitats for areas of significant importance to migrants as foraging or staging areas during peak times of migration. For this purpose, multiple survey methods were employed on three dates during the peak of migration. One method made use of the existing survey points, where a subset of those original points were surveyed. There was no temporal segregation of data for migration point counts. For additional survey effort, transects were walked between survey points recording all birds detected to either side of the transect. Migration surveys for passerines were conducted during the first 4 hours after sunrise. The migration periods for GEWA was determined to be 15 March to 31 May and 15 August to 15 November. The bulk of the migration survey effort was undertaken between 15 April and 15 May, which covers the peak of the spring passerine migration in eastern Virginia.

Winter Surveys

Winter surveys were conducted similar to those during migration. Given the tendencies of birds to form mixed-species foraging flocks during winter and adopt a more nomadic existence, there can be tremendous heterogeneity in bird distribution across a given habitat (Morse 1970). With this in mind, point counts, transects, and area searches were conducted during the winter surveys at GEWA. Winter data were only to be used to build a winter species profile for the park. An initial survey was conducted at each permanent survey point originally established in January 2002. Surveys were conducted throughout the day, with emphasis on the first 5 hours after sunrise. Additional transect surveys were conducted within specific habitat types (forested

wetlands, shrub/scrub, and residential habitats) during the following winter in an effort to detect new wintering species. Area searches of the open water habitats of Pope's Creek and the Potomac River were conducted at each visit to the park. A total of four winter surveys were conducted between 15 November and 15 March.

Grassland Surveys

In addition to point count surveys conducted in some of the agricultural fields and open areas, transect surveys were conducted in all open fields that exceeded 1 ha in size. Transects were used to supplement breeding season point counts in order to help locate grassland species that sing infrequently. Surveys involved walking the long axis of the field within 50 meters of an edge, and then a second transect at least 100 meters from the edge or through the center of the field, whichever was furthest from an edge. Transects were used as the primary survey method in grassland habitats for winter and fall migration surveys. They were used primarily to determine presence/absence of birds, rather than density.

Nocturnal Surveys

Several species groups are not readily detected by conventional passerine survey techniques. Among those are nocturnal species and birds of prey. Among the nocturnal species, nightjars and owls are the two groups of relevance at GEWA. As a result, night surveys were conducted using taped playbacks of conspecific calls for each species of interest. Chuck-will's-widows and Whip-poor-wills were surveyed from roadsides adjacent to suitable habitats. The survey sequence employed a 2 minute period of listening followed by 30 seconds of playbacks, 2 minutes of listening, 30 seconds of playback and a final 2 minutes of listening. This sequence was followed for both species at each stop. The same protocol was followed on a second date, but with the species calls reversed. Surveys were conducted only on calm nights with clear skies and at least some moon light. A total of four roadside points were sampled on each of the two nights.

Owls were surveyed from roadsides and/or forest interior locations depending on habitat conditions. Four species were targeted: Great Horned Owl, Barred Owl, Barn Owl, and Eastern Screech Owl. The same sequence of playing and listening was done for owls as for nightjars. Distance between survey points for both owls and nightjars was a minimum of 1 km.

Results

Inventory Results

Of 142 species expected to occur at GEWA, 136 (96%) were documented, in addition to 5 other species that had not been expected, bringing the total to 141 species detected (Table 1;Appendix A). Of these, 73 species were confirmed, or suspected of breeding within the park based on repeated observations within appropriate habitat during the breeding season. An additional 11 species known to breed locally, or within the region, were also observed in the park. Another 13 species were detected only as transients during the spring and/or fall migration. And a final 44 species were detected as wintering birds only. By season, the percentage of each group of expected species that were detected equaled 96% (84 of 87) of the breeding season species; 92% (12 of 13) of the transient migratory species; and 95% (40 of 42) of the expected winter species. The species detected included 66 temperate migrants, 51 neotropical migrants, and 24 resident species (Table 1). Twenty-four species are of conservation concern within the state, or region (Appendix B).

Species Relative Abundance Data

Relative abundance was calculated for all breeding season survey points by habitat type. The analysis was limited to that collected within the 50 m survey radius due to the typically small size of habitat patches and subsequent attempt to reduce the influence from habitats that were not part of GEWA property. Table 2 provides relative abundance for each species as well as species composition for each of the habitat types surveyed at GEWA.

Nocturnal Surveys

All three of the local owl species were detected during daytime surveys, and so were not surveyed at night using voice playback techniques. Both nightjars were surveyed, using a total of 4 survey points along existing roadways at GEWA. Surveys were conducted at moderate to high moonlight levels to correspond to recommended survey techniques by Wilson and Watts (2006). No nightjars were detected.

Table 1. Total species detected by seasonal status at George Washington Birthplace National Monument during inventories conducted in 2002-2003[1].

#	Species	Migration Status	Seasonal Status
1	Common Loon	Temperate migrant	Winter
2	Red-necked Grebe	Temperate migrant	Winter
3	Horned Grebe	Temperate migrant	Winter
4	Double-crested Cormorant	Temperate migrant	Breeds in region
5	Great Blue Heron	Neotropical migrant	Breeds locally
6	Great Egret	Neotropical migrant	Breeds locally
7	Green Heron	Neotropical migrant	Breeds locally
8	Mute Swan	Resident	Breeds locally
9	Tundra Swan	Temperate migrant	Winter
10	Canada Goose	Temperate migrant	Winter
11	Snow Goose	Temperate migrant	Winter
12	Mallard	Temperate migrant	Winter
13	American Black Duck	Temperate migrant	Winter
14	Gadwall	Temperate migrant	Winter
15	Northern Pintail	Neotropical migrant	Winter
16	American Wigeon	Temperate migrant	Winter
17	Canvasback	Temperate migrant	Winter
18	Redhead	Temperate migrant	Winter
19	Ring-necked Duck	Temperate migrant	Winter
20	Greater Scaup	Temperate migrant	Winter
21	Lesser Scaup	Temperate migrant	Winter
22	Surf Scoter	Temperate migrant	Winter
23	Common Goldeneye	Temperate migrant	Winter
24	Bufflehead	Temperate migrant	Winter
25	Hooded Merganser	Temperate migrant	Winter
26	Common Merganser	Temperate migrant	Winter
27	Red-breasted Merganser	Temperate migrant	Winter
28	Ruddy Duck	Temperate migrant	Winter
29	Turkey Vulture	Temperate migrant	Breeds in region
30	Black Vulture	Temperate migrant	Breeds in region
31	Northern Harrier	Temperate migrant	Winter
32	Cooper's Hawk	Neotropical migrant	Breeds locally
33	Red-tailed Hawk	Resident	Breeding
34	Bald Eagle	Resident	Breeding
35	Osprey	Neotropical Migrant	Breeding
36	American Kestrel	Temperate migrant	Winter
37	Northern Bobwhite	Resident	Breeding
38	Wild Turkey	Resident	Breeding
39	American Coot	Temperate migrant	Winter
40	Killdeer	Neotropical Migrant	Breeding

Table 1. Total species detected by seasonal status at George Washington Birthplace National Monument during inventories conducted in 2002-2003[1] (continued).

#	Species	Migration Status	Seasonal Status
41	Spotted Sandpiper	Neotropical migrant	Transient
42	Ring-billed Gull	Temperate migrant	Winter
43	Herring Gull	Temperate migrant	Winter
44	Great Black-backed Gull	Temperate migrant	Winter
45	Caspian Tern	Temperate migrant	Transient
46	Forster's Tern	Neotropical migrant	Transient
47	Mourning Dove	Temperate migrant	Breeding
48	Rock Dove	Resident	Breeding
49	Yellow-billed Cuckoo	Neotropical Migrant	Breeding
50	Great Horned Owl	Resident	Breeding
51	Barred Owl	Resident	Breeding
52	Eastern Screech Owl	Resident	Breeding
53	Chimney Swift	Neotropical migrant	Breeding
54	Ruby-throated Hummingbird	Neotropical migrant	Breeding
55	Belted Kingfisher	Temperate Migrant	Breeding
56	Red-headed Woodpecker	Resident	Breeding
57	Red-bellied Woodpecker	Resident	Breeding
58	Yellow-bellied Sapsucker	Neotropical Migrant	Winter
59	Downy Woodpecker	Resident	Breeding
60	Hairy Woodpecker	Resident	Breeding
61	Northern Flicker	Temperate migrant	Breeding
62	Pileated Woodpecker	Resident	Breeding
63	Eastern Wood-Pewee	Neotropical migrant	Breeding
64	Acadian Flycatcher	Neotropical Migrant	Breeding
65	Eastern Phoebe	Neotropical migrant	Breeding
66	Great Crested Flycatcher	Neotropical migrant	Breeding
67	Eastern Kingbird	Neotropical migrant	Breeding
68	Red-eyed Vireo	Neotropical migrant	Breeding
69	White-eyed Vireo	Neotropical migrant	Breeding
70	Yellow-throated Vireo	Neotropical migrant	Breeding
71	Blue Jay	Temperate Migrant	Breeding
72	American Crow	Resident	Breeding
73	Fish Crow	Temperate migrant	Breeding
74	Horned Lark	Temperate migrant	Winter
75	Purple Martin	Neotropical migrant	Breeding
76	Northern Rough-winged Swallow	Neotropical migrant	Breeds locally
77	Tree Swallow	Neotropical Migrant	Breeds locally
78	Barn Swallow	Neotropical Migrant	Breeding
79	Eastern Tufted Titmouse	Resident	Breeding
80	Carolina Chickadee	Resident	Breeding

Table 1. Total species detected by seasonal status at George Washington Birthplace National Monument during inventories conducted in 2002-2003[1] (continued).

#	Species	Migration Status	Seasonal Status
81	Red-breasted Nuthatch	Temperate migrant	Winter
82	White-breasted Nuthatch	Resident	Breeding
83	Brown Creeper	Temperate migrant	Winter
84	Carolina Wren	Resident	Breeding
85	Winter Wren	Temperate migrant	Winter
86	Golden-crowned Kinglet	Temperate migrant	Winter
87	Ruby-crowned Kinglet	Temperate migrant	Winter
88	Blue-gray Gnatcatcher	Neotropical Migrant	Breeding
89	Eastern Bluebird	Temperate migrant	Breeding
90	American Robin	Temperate migrant	Breeding
91	Wood Thrush	Neotropical Migrant	Breeding
92	Swainson's Thrush	Neotropical Migrant	Transient
93	Hermit Thrush	Temperate migrant	Winter
94	Gray Catbird	Neotropical migrant	Breeding
95	Northern Mockingbird	Resident	Breeding
96	Brown Thrasher	Temperate migrant	Breeding
97	European Starling	Resident	Breeding
98	American Pipit	Temperate migrant	Winter
99	Cedar Waxwing	Temperate migrant	Breeding
100	Northern Parula	Neotropical migrant	Breeding
101	Tennessee Warbler	Neotropical Migrant	Transient
102	Chestnut-sided Warbler	Neotropical migrant	Transient
103	Magnolia Warbler	Neotropical Migrant	Transient
104	Cape May Warbler	Neotropical migrant	Transient
105	Black-throated Blue Warbler	Neotropical Migrant	Transient
106	Myrtle Warbler	Temperate migrant	Transient
107	Black-throated Green Warbler	Neotropical Migrant	Transient
108	Prairie Warbler	Neotropical migrant	Breeding
109	Pine Warbler	Temperate migrant	Breeding
110	Blackpoll Warbler	Neotropical migrant	Transient
111	Yellow-throated Warbler	Neotropical migrant	Breeding
112	Black-and-white Warbler	Neotropical Migrant	Breeds locally
113	American Redstart	Neotropical Migrant	Breeding
114	Ovenbird	Neotropical Migrant	Breeding
115	Common Yellowthroat	Neotropical migrant	Breeding
116	Hooded Warbler	Neotropical migrant	Breeding
117	Yellow-breasted Chat	Neotropical Migrant	Breeding
118	Summer Tanager	Neotropical migrant	Breeding
119	Scarlet Tanager	Neotropical Migrant	Breeding
120	Northern Cardinal	Resident	Breeding

Table 1. Total species detected by seasonal status at George Washington Birthplace National Monument during inventories conducted in 2002-2003[1] (continued).

#	Species	Migration Status	Seasonal Status
121	Rose-breasted Grosbeak	Neotropical Migrant	Transient
122	Blue Grosbeak	Neotropical Migrant	Breeding
123	Indigo Bunting	Neotropical Migrant	Breeding
124	Eastern Towhee	Temperate migrant	Breeding
125	Field Sparrow	Temperate migrant	Breeding
126	Chipping Sparrow	Temperate migrant	Breeding
127	Grasshopper Sparrow	Temperate migrant	Breeding
128	Savannah Sparrow	Temperate migrant	Winter
129	White-throated Sparrow	Temperate migrant	Winter
130	White-crowned Sparrow	Temperate migrant	Winter
131	Song Sparrow	Temperate migrant	Breeding
132	Swamp Sparrow	Temperate migrant	Winter
133	Dark-eyed Junco	Temperate migrant	Winter
134	Lapland Longspur	Temperate migrant	Winter
135	Eastern Meadowlark	Temperate migrant	Breeding
136	Brown-headed Cowbird	Resident	Breeding
137	Red-winged Blackbird	Temperate migrant	Breeding
138	Common Grackle	Temperate migrant	Breeding
139	Orchard Oriole	Neotropical Migrant	Breeding
140	House Finch	Resident	Breeding
141	American Goldfinch	Temperate Migrant	Breeding

Table 2. Relative abundance (%) of species by habitat type[2] from point count data collected during breeding season at George Washington Birthplace National Monument.

Species	WP	MP	RB	RPW	PP/CS	LDD	U/ME	GR	CS/M
Red-bellied Woodpecker	9.6	4.1	4.5	4.2		4.3			
Eastern Tufted Titmouse	7.7	6.1	2.3		8.0				
Carolina Wren	7.7	4.1	4.5		8.0	4.3	3.6		9.1
Red-eyed Vireo	7.7	4.1		4.2	4.0		3.6		4.5
Acadian Flycatcher	5.8	6.1					7.1		
Carolina Chickadee	5.8	4.1	6.8	4.2	12.0				
Northern Cardinal	5.8	2.0	4.5	8.3	8.0	4.3			13.6
Indigo Bunting	5.8		4.5	8.3	8.0	8.7	7.1	16.2	4.5
Common Yellowthroat	5.8				4.0		10.7	13.5	9.1
Green Heron	5.8								
American Robin	3.8	10.2		4.2				5.4	
Blue-gray Gnatcatcher	3.8	4.1		8.3		4.3	10.7		
Eastern Wood-Pewee	3.8	4.1							
Ruby-throated Hummingbird	3.8						3.6		
Blue Jay	1.9	6.1	2.3		4.0	4.3			
American Crow	1.9	4.1	6.8						
Common Grackle	1.9	2.0	13.3			4.3		5.4	
Yellow-billed Cuckoo	1.9	2.0							
Eastern Phoebe	1.9			8.3	4.0		3.6		
Scarlet Tanager	1.9			4.2					
Cedar Waxwing	1.9					4.3			
Pileated Woodpecker	1.9								
Great Blue Heron	1.9								
Pine Warbler		14.3	6.8	8.3	8.0				
Brown-headed Cowbird		4.1		4.2				8.1	
Great Crested Flycatcher		4.1			4.0				
Mourning Dove		4.1						10.8	
Wood Thrush		4.1		4.2					
American Goldfinch		2.0	2.3				7.1	2.7	
Ovenbird		2.0							
Downy Woodpecker		2.0							
Chipping Sparrow			11.4	16.7		30.4			
European Starling			11.4						
House Finch			6.8			8.7			
Brown Thrasher			4.5						9.1
Yellow-throated Warbler			2.3	4.2			3.6		
Eastern Kingbird			2.3			8.7		2.7	4.5
Northern Mockingbird			2.3			4.3			
Northern Flicker				4.2					
Osprey				4.2					4.5
Prairie Warbler					16.0			2.7	13.6
Blue Grosbeak					4.0	4.3		8.1	
Yellow-breasted Chat					4.0				
Bald Eagle					4.0				
Orchard Oriole						4.3			4.5
Red-winged Blackbird							25.0		22.7
Hairy Woodpecker							3.6		
Northern Parula							10.7		
Eastern Bluebird								8.1	

Table 2. Relative abundance (%) of species by habitat type[2] from point count data collected during breeding season at George Washington Birthplace National Monument (continued).

Species	WP	MP	RB	RPW	PP/CS	LDD	U/ME	GR	CS/M
Eastern Meadowlark								8.1	
Grasshopper Sparrow								5.4	
Northern Bobwhite								2.7	

[2] WP = Wooded Pond; MP = Mature Pine; RB = Riparian Buffer; RPW = Riparian Pine Woodlot; PP/CS = Plantation Pine/Coastal Scrub; U/ME = Upland/Marsh Edge; GR = Grassland; CS/M = Coastal Scrub/Marsh

Discussion

Species Inventory

Results of the species inventory conducted at GEWA represent 96% of the species that were expected to occur in the park. These results were good given the high number of expected species for the park which had been based on years of Christmas Bird Count data in addition to anecdotal data from regular visitors to the park.

Species of special concern

The previously listed Bald Eagle was removed from the federal list of threatened species in late June 2007, although it still retains 'threatened' status in the state. It is hoped that the existing population on protected lands as well as the remaining federal statutes to protect eagles will be enough to sustain this species' recovery. Bald Eagles nest on GEWA in two locations, and the park is surrounded by at least four other nests along Pope's Creek within a couple of kilometers of GEWA. As many as 30 Bald Eagles have been observed perched around the mouth of Pope's Creek in winter, attracted by the scores of waterfowl that seek shelter in the protection of this creek (Watts pers.comm.).

Eighteen additional species maintain recognition as either Species of Management Concern (SMC) within the Northeast Region, State Special Concern (SSC) species, or both. Of the nine species recognized by the U.S. Fish and Wildlife Service (1995) as Species of Management Concern within the region (Table 3; Appendix B) six of these breed at GEWA: Red-headed Woodpecker, Northern Flicker, Wood Thrush, Field Sparrow, Grasshopper Sparrow, and Eastern Meadowlark. The rarest, Red-headed Woodpecker, is also one of the only two resident species of the group. This species requires mature open woods with numerous dead trees. It was only detected in the vicinity of the small wooded pond. Northern Flicker is the other resident species, and was only slightly more common, detected usually between the Visitor Center and the historical buildings to the north. Wood Thrush is one of two neotropical migrants of the group; a species that is declining from forest fragmentation, winter habitat loss, and nest parasitism. Despite its commonness at GEWA, Breeding Bird Survey data suggests it continues to decline in numbers (Roth et al 1996). The other neotropical migrant is Grasshopper Sparrow, present in very small numbers at GEWA, probably due to marginal grassland habitat. This is a species that is disappearing from New England, placing a premium on its conservation in the mid-Atlantic region (Vickery 1996). It was more frequently heard vocalizing from adjacent properties. The remaining two species are both temperate migrants, and neither were common at GEWA. Field Sparrows were not even detected during the breeding season, but there presence during winter, and migration, suggested that the species was probably there during breeding season in at least very small numbers. Eastern Meadowlarks were hindered by the relatively poor state of grasslands at GEWA, a reason for their decline elsewhere as well.

Table 3. Species of conservation concern and their status at George Washington Birthplace National Monument during inventories in 2002-2003.

Species	Status at GEWA	Abundance at GEWA	Management Status
Common Loon	Winters	Rare	SMC
Great Egret	Breeds locally	Uncommon	SSC
Northern Harrier	Winters	Rare	SMC, SSC
Caspian Tern	Transient	Rare	SSC
Forster's Tern	Transient	Uncommon	SSC
Red-headed Woodpecker	Breeds	Rare	SMC
Northern Flicker	Breeds	Common	SMC
Red-breasted Nuthatch	Winters	Rare	SSC
Brown Creeper	Winters	Uncommon	SSC
Winter Wren	Winters	Uncommon	SSC
Golden-crowned Kinglet	Winters	Common	SSC
Wood Thrush	Breeds	Common	SMC
Hermit Thrush	Winters	Common	SSC
Chestnut-sided Warbler	Transient	Rare	SMC
Magnolia Warbler	Transient	Rare	SSC
Field Sparrow	Breeds	Uncommon	SMC
Grasshopper Sparrow	Breeds	Uncommon	SMC
Eastern Meadowlark	Breeds	Common	SMC

[7] SSC – State Special Concern; SMC – USFWS Species of Management Concern in the Northeast

The three remaining SMC species only occur at GEWA during the winter or migration. Common Loon and Northern Harrier both occur as wintering species at GEWA, but neither are common there. Common Loons winter in the Chesapeake Bay and occasionally wander up inland rivers (Kain 1987). Harriers depend on grasslands and/or marshes for their prey. The grasslands were of poor quality at GEWA, and the marshes too small to attract foraging harriers. So it is uncommon to see this species at GEWA. Chestnut-sided Warbler was the transient species of management concern detected at GEWA. It is a breeder in the western part of the state, but a rare spring migrant in the east (Kain 1987) so its status has little bearing on the habitats or conditions of GEWA.

Ten species are listed in Table 3 as State Special Concern (SSC) species in Virginia. This designation applies to the breeding population of each species, and therefore does not apply to any of the SSC species recorded at GEWA other than Great Egret. Red-breasted Nuthatch, Brown Creeper, Winter Wren, Golden-crowned Kinglet, and Hermit Thrush only breed in Virginia in the mountains or northern Piedmont, and occur only as winter visitors elsewhere in the state(Trollinger and Reay 2001; Kain 1987). Magnolia Warblers also breed in Virginia in the mountains, and are seen elsewhere in the state only in migration. Likewise, in Virginia, Caspian Terns and Forster's Terns only breed on the barrier islands of the Eastern Shore, and occur at GEWA either as transient migrants on the way to more northern breeding grounds, or as post-breeding birds dispersing up the tidal rivers(Kain 1987). Great Egrets however breed in coastal Virginia and have nested in Westmoreland County, although they do not nest at GEWA (Watts 1993).

And finally, Northern Harrier occurs on both lists. It is declining in the Northeast, and coastal Virginia represents the southern terminus of its breeding range along the Atlantic coast (MacWhirter and Bildstein 1996). In Virginia the species requires extensive marsh or grassland systems, typically of hundreds of acres, in which to nest. Investigation of known breeding sites and landscape characteristics suggest the state breeding population may not exceed 25 pairs (Watts and Rottenborn 2001). This species is frequently encountered in winter however as the more northern breeding population moves south, and it was wintering birds that were documented at GEWA.

A final seven species are ranked among Partners in Flight's (PIF) top tier of species within the mid-Atlantic Coastal Plain (Watts 1999). Species scoring 22 or higher (out of 30) in the PIF prioritization scheme indicate high vulnerability of populations throughout the physiographic are, and often throughout the species range. One of these species was already listed in the USFWS Species of Management Concern list: Wood Thrush. Its numbers were lower than anticipated within most appropriate habitat types at GEWA. The complete list of PIF priority species for this physiographic area that were detected at GEWA is shown in Table 3.

Table 4. Partners in Flight Tier 1 priority species detected at George Washington Birthplace National Monument, during inventories in 2002-2003.

Species	**PIF Score**	**Status**	**Abundance at GEWA**
American Black Duck	24	Breeds	Rare
Eastern Wood-Pewee	22	Breeds	Common
Acadian Flycatcher	23	Breeds	Common
White-eyed Vireo	22	Breeds	Common
Yellow-throated Vireo	23	Breeds	Uncommon
Wood Thrush	25	Breeds	Common
Prairie Warbler	25	Breeds	Uncommon

Black Duck is perhaps the species of most concern, and was the least detected. With the mid-Atlantic as its population center, efforts are underway to protect or restore as much coastal marsh habitat as possible to preserve this species' population (Watts 1999). George Washington Birthplace has very little of that habitat type. Of the two species listed as 'Uncommon' at GEWA, both are relatively common within appropriate habitats. The preferred habitats were simply poorly represented at GEWA. Yellow-throated Vireo is a species of primarily deciduous forest and forested wetlands, but most of the mature forest at GEWA was predominantly pine making it less suitable for this species. Prairie Warbler is another species with its highest population density occurring in the mid-Atlantic region (Watts 1999), but it is associated with a typically ephemeral habitat that is declining within, and outside, the region. This species requires early successional woody and/or scrub/shrub habitat. In this case, the coastal scrub/ plantation pine section of GEWA's northern unit was adequate to support at least a couple of pairs of this species.

Habitat Associations

Species richness was greatest in the wooded pond habitat [Table 5]. This habitat was nearest in composition to a deciduous forested wetland which is one of the most ecologically diverse habitats in temperate forests of the eastern United States (Odum 1979; Blem and Blem 1975). The presence of water and increased foliage diversity normally yields greater insect abundance and consequently more foraging opportunities for birds to exploit (Wharton et al 1981). The mature pine habitat was nearly the same in species richness as the wooded pond habitat because of its maturity and structurally complex midstory and the infiltration of marsh headwater wetlands.

Table 5. Habitat association data for breeding birds by conservation and migration status at George Washington Birthplace National Monument, VA, from 2002-2003.

Habitat Type	# Species	Priority Species[1]	Neotropical	Temperate	Resident
Wooded Pond	23	2	12	3	8
Mature Pine	22	4	8	5	9
Riparian Buffer	18	0	3	5	10
Riparian Pine Woodlot	16	2	8	4	4
Pine Plantation/Coastal Scrub	15	2	8	1	6
Low Density Developed	14	0	5	3	6
Upland/Marsh Edge	13	1	9	2	2
Grassland	14	2	5	7	2
Coastal Scrub/Marsh	11	1	7	2	2

[1] Priority Species implies species listed as state or federal T&E species; species of management concern under USFWS guidelines; or priority species under Partners in Flight regional rankings.

No species were encountered across all habitats, although Indigo Bunting was detected in all but the mature pine forest, and Northern Cardinal was detected in all but the grassland and upland/marsh edge habitat. Its absence from the upland/marsh edge habitat was an oversight however, since those habitat attributes are also conducive to cardinals. Grasslands, the only non-wooded habitat, had four unique species, the highest number of all habitats. This was not unexpected since separation between vegetative community types was small in most of the wooded habitats. The wooded pond habitat had three unique species, and the highest number of neotropical migratory species at twelve, making over half of its species composition neotropical migrants. The riparian buffer habitat harbored the greatest number of resident species, since most of these species are generalist species, with little sensitivity to habitat patch size or other area constraints. In migration however, this changed, since many of the migrants passing through were often encountered in the riparian buffer.

Although four unique species were documented in grassland, the overall species richness during breeding season was low compared to other habitats. Only two of the 14 species recorded in grasslands were actually grassland-obligate species: Eastern Meadowlark and Grasshopper Sparrow. However, in winter, there were 5 additional grassland obligate species detected at GEWA: American Kestrel, Horned Lark, American Pipit, Savannah Sparrow, and Lapland

Longspur. The Horned Larks, pipits, and longspurs were all detected in recently fallow agricultural fields, only marginally qualifying as grasslands. Evidence of old row crops and exposed soil were more conducive to these species. However, the bulk of the agricultural grasslands are dominated by fescue, and habitat quality is degraded for grassland obligate species. Only one Grasshopper Sparrow was detected in this grassland complex during summer, and only two Savannah Sparrows were detected in winter. The presence of high densities of fescue undermines the quality of grasslands because it is a sod-forming grass that excludes access to the bare soil beneath and typically results in a monoculture stand of virtually no value to birds (KDFWR 2004). In winter, rain and snow tend to flatten it in waves, leaving little room for cover beneath**.** This precludes use of these fields by the two prominent grassland obligate species: Grasshopper Sparrows (breeding) and Savannah Sparrows (wintering), and minimizes foraging opportunities for a number of other grassland users such as meadowlarks, finches, and blackbirds There are however a healthy population of bobwhites that make use of the existing grasslands.

The most significant habitat feature at GEWA is the actual physiography of Popes Creek where it shares a boundary with GEWA. This large tidal creek to the Potomac River is unique in having a greatly expanded width near its connection to the Potomac. More than the width however, is the fact that past storms, sediment deposition, and shoreline accretion have all but closed off the mouth of the creek leaving a sharp truncation of the shoreline to form a narrow exit channel into the Potomac. The net effect of this has been to create a small, well-protected estuary along one of the wider sections of the lower Potomac River. The area of this expanded, open-water section measures nearly one square kilometer, creating a significant harbor for wintering waterfowl. With prevailing winter winds out of the northwestern quadrant, the southeast flowing Potomac River allows great distances of fetch to generate significant wind-borne waves along the lower river reaches. This creates a demand among winter waterfowl for protected coves and marshes. Pope's Creek affords this protection both by its orientation counter to the prevailing winds, and its mostly natural, protected shoreline owned by the National Park.

The value of Popes Creek to winter waterfowl cannot be overestimated. It consistently holds some of the largest concentrations of Canvasbacks, Scaup, and Tundra Swans of any place on the Potomac, and often more than any other place on the Chesapeake Bay, as determined by Department of Game and Inland Fisheries mid-winter waterfowl surveys (G. Costanza, pers. comm.). Twenty-four species of waterfowl were ultimately detected during the survey period and almost all of those were recorded in Pope's Creek. The dense concentrations of winter waterfowl also serve to attract foraging Bald Eagles. Eagles often exploit waterfowl as a winter food source particularly where waterfowl densities are high and predictable (Stalmaster 1988). As many as 30 Bald Eagles have been reported at one time perched around the perimeter of Popes Creek near its mouth in winter (B. Watts, pers.comm.).

Seasonal Variation

<u>Breeding Season</u>

There were no species detected that had not been expected during the breeding season. Of the 87 expected breeding species, only three were not detected: Laughing Gull, Yellow Warbler, and House Sparrow. Laughing Gulls nest locally on the barrier islands of Virginia and Maryland,

and nonbreeding adults are common along the main Virginia rivers near the coast. Post-breeding flocks often move upriver to the Fall Line (Kain 1987). On the Potomac River, this species is normally observed as far inland as Washington D.C. (Trollinger and Reay 2001). Although they do not nest near GEWA, Laughing Gulls are a vocal, and highly visible species and should have been detected along the coast there. It is likely that this species was simply missed during survey periods that did not coincide with its presence on site.

The Yellow Warbler nests in shrub dominated wetlands and riparian thickets in the mid-Atlantic region (Dunn and Garrett 1997). Although not common along many of the coastal Chesapeake Bay and Potomac River counties, it has been documented on the Northern Neck of Virginia as well as the corresponding coast of Maryland on the other side of the Potomac (Robbins 1996: Trollinger and Reay 2001). Given the suitability of habitat, in conjunction with the length of riparian corridors along GEWA, this species may ultimately nest there; and probably already occurs at least intermittently in migration.

The absence of House Sparrow, more than anything else, speaks to the rural landscape at, and around, GEWA. This is primarily a species of metropolitan areas and townships with their likelihood of exposed garbage and litter. It is not common in rural areas with high ratios of forest cover. Although it is essentially a ubiquitous species, small properties like GEWA may not harbor this species if there are no overt characteristics to favor them. It is possible that this species exists at GEWA and went undetected simply because not all buildings and grounds surrounding buildings, were surveyed. However, the species was not detected in the course of the surveys there, and should not be considered a relevant component of the avifauna at this time.

There were also two species that were not detected during the breeding season but were listed as breeding locally and so are included with species occurring during the breeding season. Those two species were Tree Swallow and Black-and-White Warbler. Both breed locally around GEWA, but were only detected in migration. Although neither species was documented at GEWA during the breeding season, they should be considered as part of the greater breeding bird community of the area, because they both occur as breeders nearby (Trollinger and Reay 2001). The Black-and-white Warbler is an area sensitive species, and will likely never be recorded as a breeder at GEWA because of the relatively small size of the forest patches present there (Robbins et al 1989). Tree Swallows likely do no nest at GEWA because of the lack of suitable habitat. This species nests in cavities and prefers open woodlands typically near water (Trollinger and Reay 2001). Most of the habitat near water at GEWA is either young pine habitat that is too young to have cavities, or mature hardwood habitat that is embedded within a dense mid-story making it unsuitable for Tree Swallows. This species responds readily to nest boxes however, and could probably become part of the breeding avifauna at GEWA with the initiation of a nest box program.

Migration

Of the thirteen expected transient migrants, only one was not observed at GEWA: Palm Warbler. Palm Warblers winter throughout the West Indies and as far north as the North Carolina coast (Wilson 1996), making it likely to be encountered in the Coastal Plain of Virginia in migration. Habitats in migration include weedy fields, forest edges, and fence-rows, typical of most sparrows (McPeek 1994). Unlike most migrant warblers, Palm Warblers are most likely to be

seen on the ground (Parnell 1969). Collectively, these attributes suggest this species probably occurs regularly in migration at GEWA. Its absence was likely a result of either survey oversight, or timing differences between the species presence at GEWA and the migration survey rounds. This species should still be considered an expected species at GEWA.

There were three additional migrant species detected at GEWA that had not been expected: Tennessee Warbler, Chestnut-sided Warbler, and Rose-breasted Grosbeak. Both warblers are trans-gulf migrants from Central and South America and therefore less likely to be observed east of the Appalachians in spring (Dunn and Garrett 1997). The Tennessee Warbler is only rarely observed in the Coastal Plain; the Chestnut-sided Warbler is only slightly more common (Kaine 1987). Both warblers were observed in a mixed species foraging flock along the riparian woodline near the Visitor Center in mid-May. Likewise, one Rose-breasted Grosbeak was also observed near the Visitor Center in early May. This species occurs casually in winter in the West Indies (Raffaele et al 1998) and is likely to be represented in at least small numbers making a Florida arrival and advancing through the Coastal Plain (Degraaf and Rappole 1995; Faaborg and Terborgh 1980). Kain (1987) recognizes it as an uncommon to rare transient in the Coastal Plain.

Winter

Two of the 42 expected wintering species were not detected at GEWA: Sharp-shinned Hawk and American Woodcock. Sharp-shinned Hawks winter throughout Virginia, and nest in the mountains (Bildstein and Meyer 2000). Kain (1987) reports them as uncommon transients and winter residents in the Coastal Plain. They are somewhat secretive, although are often observed hunting forest edges and hedgerows, two habitats common to GEWA. With lots of edge habitat, fields, and hedgerows, this species should have been encountered sometime during the year. Its absence does not likely reflect a gap in its distribution, but merely a survey miss. This species certainly occurs at GEWA in both migration and winter, at least intermittently, if not regularly.

American Woodcock, like Sharp-shinned Hawk, is a species that occurs in the Coastal Plain throughout the winter as well as during migration. Unlike the hawk however, woodcocks also breed in the Coastal Plain. It is listed as a wintering species simply because it is most often detected during its courtship flights and vocalizations in February and March. American Woodcocks conduct courtship flights and calling rituals typically in fields or other open areas usually adjacent to young forests or thickets (Keppie and Whiting 1994). The park has very good habitat to accommodate this species and if not a wintering or nesting species, should at least be observed occasionally in migration.

Surprising was the number of species detected in winter that had not been expected to occur at GEWA. There were four: Red-necked Grebe, Redhead, Red-breasted Nuthatch, and Lapland Longspur. The Red-necked Grebe is primarily an oceanic species wintering off both the Atlantic and Pacific coasts. It's occurrence along inland rivers is normally tied to severe winters or the freezing of the Great Lakes, where at least a portion of the population winters (Stout and Nuechterlein 1999). It is extremely uncommon for this species to be recorded this far interior off the mid-Atlantic coast (Kain 1987). The Redhead is another species more likely to be found on Bay waters than interior rivers, however only a small portion of this species population is thought to winter in the Chesapeake Bay, and even that has declined over the last few decades

(Michot 2000). The dramatic decline in submerged aquatic vegetation in the Bay is thought to be one of the primary causes (Perry and Deller 1996). For these two very uncommon species to be so far up the Potomac River is another testament to the significance of Popes Creek to wintering waterfowl.

Within the upland habitats, Red-breasted Nuthatch is one of a suite of irruptive northern species that moves south during years of poor cone production (Harrap and Quinn 1996). Its presence in the Coastal Plain is sporadic at best, but the mature pine forest of GEWA affords a good habitat along the coast for this species. Lapland Longspurs have a broad winter range across most of temperate North America, but eastern Virginia is about as far south as they occur along the Atlantic coast (Hussell and Montgomerie 2002). It is a species of vast open areas and no doubt is drawn to the open agricultural landscape of GEWA together with its surrounding neighbors. This species exemplifies the value of this landscape context scenario; with GEWA holding little value for it in the absence of the neighboring fields.

Summary and Management Considerations

In summary, GEWA is a small park, but maintains significant avian species diversity throughout the year. This is primarily tied to its location on the coastline and proximity to extensive areas of open water. Both migrating terrestrial birds and waterbirds are drawn to it based on location alone. Furthermore, it is surrounded by rural farmland, and so benefits from this landscape context, providing area-sensitive upland species habitat opportunities not typical of small parks. This large assemblage of connected agricultural land and grasslands precipitate visitation by many of the uncommon open-land species. Likewise, the unique physiography of Popes Creek provides thousands of waterfowl winter shelter, and in turn, abundant prey for the assemblage of predatory birds found along the tributary. Although many of the habitat components of GEWA are small and do not maintain the full suite of breeding species, this complex of habitats provides a unique location for locating migrating birds. As such, it is a park that receives significant visitation from photographers and wildlife enthusiasts and should continue to do so. Despite the many positive attributes that enhance a diverse bird community at GEWA, many current and future issues may jeopardize this.

Deer Management

One problem often faced by public parks is the issue of wildlife management. The resident deer herd can become problematic within parks where hunting is reduced or prohibited. The deer browse line was evident during the surveys at GEWA and showed areas where understory vegetation was significantly reduced. This can have significant impacts for ground-nesting and foraging birds, by reducing habitat and prey availability, and could explain why some ground-nesting species were poorly represented during this inventory (McShea et al 1995). Although the park is not fenced off from adjacent properties it does serve as a sanctuary for deer because of the reduced hunting pressure relative to adjacent private lands. This is an issue that all public parks face, but one that can't be ignored, because of the potentially significant impacts to park resources. Deer management was not discussed with park staff for this report, and may already be a high profile management issue for the park.

Grassland Management

George Washington Birthplace National Monument benefits from its context within the surrounding landscape. Its agricultural grasslands share a boundary with private agricultural lands, collectively creating a large complex of open land. This type of landscape is preferred by area-sensitive species and yields unexpected benefits to the landowners whose individual land contribution is often not very large. The management of each of these individual parcels of land however, ultimately determines the continued occupancy of theses area-sensitive species (Watts 1996). The GEWA avian survey documented that most of the grassland-obligate species detected were predominantly occupying private land adjacent to the park, and were only infrequently visiting park fields. The poor quality of the grasslands at GEWA is the main reason for this.

Management of grassland habitats is probably the one area where the largest difference could be made in species diversity and habitat suitability. Conversion of fescue-dominated fields to warm season, native grasses could yield significant benefits for the avifauna as well as other taxa. This

strategy has already been identified and recommended in the park's Cultural Landcape Report. Unfortunately, this is a relatively expensive proposition, and understandably not a priority when funding is limited, and wildlife management is not a significant part of the park's mission. However, grassland management is not simply about converting fescue to native grasses, but also about evaluating the size and context of grasslands to determine if conversion is even the most useful strategy. Extensive work on grasslands within the mid-Atlantic region has shown that there is a size class below which grasslands are better left to succeed into shrublands for maximum species benefit (Watts et al 1997). This area tends to be around six hectares, or 15 acres. Since most grassland-obligate species tend to be area-sensitive, they derive no benefit from grasslands that fall below that minimum threshold of tolerance. Those fields therefore, are best left to succeed to the shrub stage, where they can harbor a suite of species that is in need of management attention easily as much as are grassland species (Watts 1999). Some of the immediate advantages of converting to shrubland are lower maintenance costs, due to less frequent maintenance; but park aesthetics must also be considered since GEWA is an intensely managed 18th century cultural landscape (R. Morawe, pers. comm.) Appomattox Court House National Historic Park is already involved in implementing some grassland conversion strategies on some of its fields with significant success. In addition, Colonial National Historical Park investigated the costs and benefits of grassland conversion and its implications for biodiversity within the park (Watts 2000). This report is available for general distribution and should be considered for guidance if grassland management is to be undertaken.

The complex of fields at GEWA is considerably larger than 6 ha and could sustain a viable grassland bird community during winter and summer if managed correctly. If conversion to warm season grasses is impractical, one useful strategy would be to control mowing periods to times that would minimize impacts to breeding and wintering birds. An early spring mowing (March) followed by a late summer mowing (August) is enough to control the growth of woody vegetation and maintain a field in suitable habitat for birds. This timetable allows for a period of re-growth before most breeding birds arrive, and postpones the second mowing until after breeding season is complete. The second mowing should occur in August to allow for some additional re-growth for foraging grassland migrants and over-wintering species. Edges of fields near woods, out to about 10 meters, could be allowed to grow unchecked for 3 to 5 years to facilitate a softening of the forest/field edge and encourage the breeding of shrub-nesting species. This habitat could then be cut back to discourage tree growth and allowed to start over.

Invasive Species Management

As a coastal park, GEWA has to confront the impacts from exotic and/or invasive species from both the coastal marsh zone as well as the uplands. Within the marsh system, *Phragmites australis* has become a national pest species affecting coastlines from the Keys to Maine. It is propagated via a network of underground rhizomes that make it difficult and expensive to eradicate. It forms dense stands of almost impenetrable cane-like stems that provide little value for wildlife. Although it does not readily displace existing marsh species, it excels at colonizing disturbed areas, allowing it to spread readily following storm damaged shorelines, dredge spoil areas, shoreline construction projects, etc. It alters the structure and function of marshes by changing the nutrient cycle and hydrology and decreases native biodiversity for multiple species groups (Benoit and Askins 1999). It is not yet problematic at GEWA, but it does occur along the

Park's coastal fringe and will likely become more prevalent over time. Management of this species is gaining more attention than almost any other invasive species, but no solution for eradication has yet been completely successful. Much research is being conducted on Virginia shorelines, so there is lots of local knowledge on how best to proceed if the park chooses to manage this species. Work is also being done on biological controls, following successes in Europe (Blossey et al 2002), so solutions for control are constantly emerging.

Within the upland system, there is the normal suite of exotics, such as Japanese honeysuckle (*Lonicera japonica*), multiflora rose (*Rosa muliflora*) and other shrubs, but M*icrostegium viminuem*, a relative newcomer, may be having the greatest impact. Commonly referred to as Nepalese browntop, or Japanese stiltgrass, *Microstegium* is a prolific seed disperser, capable of exploiting disturbed areas more quickly than most native plants. The seeds of this plant are extremely small, and are thought to be spread via a multitude of natural and anthropogenic means, from the coats and feet of mammals and birds to the shoes and clothes of pedestrians, automobile tires, wind, and rain. As a result, events such as hurricanes provide an ideal venue for the spread of *Microstegium* via stump holes and day-lighted areas from downed trees. It occurs and proliferates under more varied environmental conditions than any other invasive species, including all parts of the state, all soils, and almost all hydrologic and sun exposure conditions. The seeds remain viable in the soil for 5 to 7 years making it virtually impossible to eradicate once established (Tu 2000).

Although not extensively distributed within the park at the time of this survey, *Microstegium* has a well established presence and may begin to affect avian diversity in the coming years. It has been shown to displace communities of native plant species, but very little information exists on its impacts to wildlife (Barden 1987). Anecdotal evidence suggests that its growth form and tendency to overtake native species may create problems for ground nesting and foraging birds. At least one mid-Atlantic region park, Petersburg National Battlefield, has undertaken an aggressive effort to attempt to control the spread and ultimately eradicate the species in a few test areas. This is a pioneering effort within the park system and could yield significant benefits if a successful strategy can be developed.

Encroachment

Although GEWA is relatively isolated and in a very rural area of Westmoreland County, it resides in a region that is almost unprecedented in its rate of growth. The urban crescent from Baltimore through Washington DC to Virginia Beach has realized almost exponential growth for the last several decades. And as the American population ages, the rates of retirements and subsequent influx of retirees onto the landscape is increasing as well, and will likely hit epic proportions within the next few years. Given the increase in rural development over the last decade, it is difficult to imagine that GEWA will not feel this influence in the near future. Its impact may be as innocuous as increased visitation to the park, but it is more likely that the conversion of private land to developments in Westmoreland County will increase to the point where the landscape changes significantly enough to alter the context of the park within that landscape. As neighboring properties convert to development, the park will likely experience a corresponding shift in its biodiversity, reflecting more of the community attributes of the small park that it is. Increased recreational use of the Potomac River, and possibly even Popes Creek, could further compromise the natural features of the park, and ultimately impact wildlife

diversity. There is probably little that can be done to offset this sequence, but the Park has to be vigilant and responsive in the local planning process, and committed to promoting the benefits of this park toward the long-term health and quality of life, of the region.

Subsidence / Sea Level Rise

Tidal gauges show rates of sea level rise within the mid-Atlantic region to be twice that of the worldwide average (USGS 1998). It's not clear however whether the effect is solely that of increasing sea levels, or a combination of that and land subsidence. There are catalysts that may well be affecting both, ranging from global warming and subsequent polar ice melt; to sediment compaction from groundwater extraction, tectonic plate movements, or simply continuing shifting of the earth's crust that has been ongoing since the last ice age (USGS 1998). Whatever the cause, the net effect is the same, sea level is rising. How this will ultimately affect shorelines depends on many features of the shoreline. The prevailing consensus is that most coastal wetlands will survive if soil accretion equals the rate of relative sea level rise; in essence, if the wetland can migrate onto the previously existing upland (USCCSP 2002). However, many factors influence this, not the least of which is topography, followed by other non-natural land uses. In situations such as GEWA, where the marshes are confined to narrow corridors on either side of the tidal streams, and around the mouth of Popes Creek, there is little margin for movement of the marshes. The marsh strands associated with the mouth of the creek have no place to move to, and so will likely be lost. Likewise, the fringe marshes of the tidal creeks are predominantly up against mature forests, and the forests are likely to respond much more slowly than the marsh will require, and these marshes too may be lost.

Severe storms are likely to generate more erosive force with increased sea level and fragile coastal environments will be compromised. This may be especially problematic for the northern section of GEWA that rests on a bluff above the river. Erosion and undercutting of this bluff may seriously impact those shoreline habitats.

Conclusions

GEWA is a vital, small park in terms of its avian diversity and capability to support a broad spectrum of species. It is also at a critical juncture relative to the amount of potential adversity it could be facing in the near future. If management of natural resources is an objective of this park, it should be approached in a manner that will yield the greatest benefits. For birds, the value of this park lies in its proximity to water, and in particular, the presence of Pope's Creek. Toward that end, every effort should be made to protect Pope's Creek and its shoreline from disturbance. This should entail everything from the control of unnecessary boat traffic to the eradication of invasive species. To a lesser extent, the shoreline along the Potomac River is also important, and should be protected from degradation to the extent possible. The park should consider reforesting sections of the shoreline where fields currently exist. There is a Bay-wide push to install forested riparian buffers of at least 100ft in width. This could have additional benefits for birds at GEWA. And finally, the creeks that traverse the GEWA landscape could use additional protection as well. The current forested buffers along the creeks that cross the fields are inadequate for water quality protection, and birds could benefit from extending these forest buffers.

Second only to water resources is the complex of fields and open land on GEWA. Short of conversion to more beneficial grass species, these fields should be allowed to go fallow and be mowed only as often as necessary to curb the growth of woody species. And those mowings should fall within timeframes most suitable for breeding and wintering birds (preferably March and August). If adjacent landowners let their fields be lost to development, it will become more important for GEWA to consider conversion of existing grasslands to a more optimum suite of grass species. The existing fescue dominated fields, even if mowed appropriately, will not be able to support grassland birds in the absence of the influence from neighboring fields.

The forests of GEWA are the least significant component. Their main value is in the presence of large, mature loblolly pine trees that are serving as Bald Eagle nest and roost sites. The forests are too small to harbor area-sensitive species, and are therefore more prone to nest parasitism from cowbirds. The deer are degrading the understory, and the spread of *Microstegium* may have permanent impacts to ground-nesting birds. Their value above all else is to birds in migration, since GEWA is ideally positioned on the coastline and has a healthy mosaic of habitats associated with the forests. Here too, the eradication of invasive, exotic species should be considered a high priority, since they offer little benefit to migrating birds. If there are areas where the Park is considering reforesting, or planting additional trees, the emphasis should be on mast producing trees as well as berry producing shrubs and vines to cater to migrating birds.

And finally, in the wake of the well documented presence of West Nile Virus in the state, and the constant threat of the arrival of avian influenza, the park must remain vigilant in its day to day management of natural resources. There is little that can be done to prevent the occurrence of either of these diseases, but much can be accomplished by the rapid reporting and documentation of potential cases. This is particularly true for GEWA given the high densities of waterfowl that winter and pass through the Pope's Creek area each year. Avian cholera and botulism are diseases that flourish where large numbers of birds congregate; so special attention should be given dead, dying, or erratic behaving waterfowl, and dead birds found anywhere on the park should be investigated if no observable cause of death can be determined. Occurrences should be directed to the Department of Game and Inland Fisheries for action.

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Appendix A. Expected versus Detected Species at George Washington Birthplace National Monument (2002-2003 field season).

#	Species	Taxonomic_Name	Detected	Unexpected
1	Common Loon	*Gavia immer*	Detected	Expected
2	Red-necked Grebe	*Podiceps grisegena*	Detected	Not Expected
3	Horned Grebe	*Podiceps auritus*	Detected	Expected
4	Double-crested Cormorant	*Phalacrocorax auritus*	Detected	Expected
5	Great Blue Heron	*Ardea herodias*	Detected	Expected
6	Great Egret	*Ardea alba*	Detected	Expected
7	Green Heron	*Butorides virescens*	Detected	Expected
8	Mute Swan	Cygnus olor	Detected	Expected
9	Tundra Swan	*Cygnus columbianus*	Detected	Expected
10	Canada Goose	*Branta canadensis*	Detected	Expected
11	Snow Goose	*Chen caerulescens*	Detected	Expected
12	Mallard	*Anas platyrhynchos*	Detected	Expected
13	American Black Duck	*Anas rubripes*	Detected	Expected
14	Gadwall	*Anas strepera*	Detected	Expected
15	Northern Pintail	*Anas acuta*	Detected	Expected
16	American Wigeon	*Anas americana*	Detected	Expected
17	Canvasback	*Aythya valisineria*	Detected	Expected
18	Redhead	*Aythya americana*	Detected	Not Expected
19	Ring-necked Duck	*Aythya collaris*	Detected	Expected
20	Greater Scaup	*Aythya marila*	Detected	Expected
21	Lesser Scaup	*Aythya affinis*	Detected	Expected
22	Surf Scoter	*Melanitta perspicillata*	Detected	Expected
23	Common Goldeneye	*Bucephala clangula*	Detected	Expected
24	Bufflehead	*Bucephala albeola*	Detected	Expected
25	Hooded Merganser	*Lophodytes cucullatus*	Detected	Expected
26	Common Merganser	*Mergus merganser*	Detected	Expected
27	Red-breasted Merganser	*Mergus serrator*	Detected	Expected
28	Ruddy Duck	*Oxyura jamaicensis*	Detected	Expected
29	Turkey Vulture	*Cathartes aura*	Detected	Expected
30	Black Vulture	*Coragyps atratus*	Detected	Expected
31	Northern Harrier	*Circus cyaneus*	Detected	Expected
32	Sharp-shinned Hawk	Accipiter striatus	Not Detected	Expected
33	Cooper's Hawk	*Accipiter cooperii*	Detected	Expected
34	Red-tailed Hawk	*Buteo jamaicensis*	Detected	Expected
35	Bald Eagle	*Haliaeetus leucocephalus*	Detected	Expected
36	Osprey	*Pandion haliaetus*	Detected	Expected
37	American Kestrel	*Falco sparverius*	Detected	Expected
38	Northern Bobwhite	*Colinus virginianus*	Detected	Expected
39	Wild Turkey	*Meleagris gallopavo*	Detected	Expected
40	American Coot	*Fulica americana*	Detected	Expected
41	Killdeer	*Charadrius vociferus*	Detected	Expected
42	Spotted Sandpiper	*Actitis macularia*	Detected	Expected
43	American Woodcock	*Scolopax minor*	Not Detected	Expected
44	Laughing Gull	*Larus atricilla*	Not Detected	Expected
45	Ring-billed Gull	*Larus delawarensis*	Detected	Expected
46	Herring Gull	*Larus argentatus*	Detected	Expected
47	Great Black-backed Gull	*Larus marinus*	Detected	Expected
48	Caspian Tern	*Sterna caspia*	Detected	Expected
49	Forster's Tern	*Sterna forsteri*	Detected	Expected
50	Mourning Dove	*Zenaida macroura*	Detected	Expected
51	Rock Dove	*Columba livia*	Detected	Expected

Appendix A. Expected versus Detected Species at George Washington Birthplace National Monument (2002-2003 field season) (continued).

#	Species	Taxonomic_Name	Detected	Unexpected
52	Yellow-billed Cuckoo	*Coccyzus americanus*	Detected	Expected
53	Great Horned Owl	Bubo virginianus	Detected	Expected
54	Barred Owl	*Strix varia*	Detected	Expected
55	Eastern Screech Owl	*Otus asio*	Detected	Expected
56	Chimney Swift	*Chaetura pelagica*	Detected	Expected
57	Ruby-throated Hummingbird	*Archilochus colubris*	Detected	Expected
58	Belted Kingfisher	*Ceryle alcyon*	Detected	Expected
59	Red-headed Woodpecker	*Melanerpes erythrocephalus*	Detected	Expected
60	Red-bellied Woodpecker	*Melanerpes carolinus*	Detected	Expected
61	Yellow-bellied Sapsucker	*Sphyrapicus varius*	Detected	Expected
62	Downy Woodpecker	*Picoides pubescens*	Detected	Expected
63	Hairy Woodpecker	*Picoides villosus*	Detected	Expected
64	Northern Flicker	*Colaptes auratus*	Detected	Expected
65	Pileated Woodpecker	*Dryocopus pileatus*	Detected	Expected
66	Eastern Wood-Pewee	*Contopus virens*	Detected	Expected
67	Acadian Flycatcher	*Empidonax Virescens*	Detected	Expected
68	Eastern Phoebe	*Sayornis phoebe*	Detected	Expected
69	Great Crested Flycatcher	*Myiarchus crinitus*	Detected	Expected
70	Eastern Kingbird	*Tyrannus tyrannus*	Detected	Expected
71	Red-eyed Vireo	*Vireo olivaceus*	Detected	Expected
72	White-eyed Vireo	*Vireo griseus*	Detected	Expected
73	Yellow-throated Vireo	*Vireo flavifrons*	Detected	Expected
74	Blue Jay	*Cyanocitta cristata*	Detected	Expected
75	American Crow	*Corvus brachyrhynchos*	Detected	Expected
76	Fish Crow	*Corvus ossifragus*	Detected	Expected
77	Horned Lark	*Eremophila alpestris*	Detected	Expected
78	Purple Martin	*Progne subis*	Detected	Expected
79	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Detected	Expected
80	Tree Swallow	*Tachycineta bicolor*	Detected	Expected
81	Barn Swallow	*Hirundo rustica*	Detected	Expected
82	Eastern Tufted Titmouse	*Baeolophus bicolor*	Detected	Expected
83	Carolina Chickadee	*Poecile carolinensis*	Detected	Expected
84	Red-breasted Nuthatch	*Sitta canadensis*	Detected	Not Expected
85	White-breasted Nuthatch	*Sitta carolinensis*	Detected	Expected
86	Brown Creeper	*Certhia americana*	Detected	Expected
87	Carolina Wren	*Thryothorus ludovicianus*	Detected	Expected
88	Winter Wren	*Troglodytes troglodytes*	Detected	Expected
89	Golden-crowned Kinglet	*Regulus satrapa*	Detected	Expected
90	Ruby-crowned Kinglet	*Regulus calendula*	Detected	Expected
91	Blue-gray Gnatcatcher	*Polioptila caerulea*	Detected	Expected
92	Eastern Bluebird	*Sialia sialis*	Detected	Expected
93	Black-throated Blue Warbler	*Dendroica caerulescens*	Detected	Expected
94	American Robin	*Turdus migratorius*	Detected	Expected
95	Wood Thrush	*Hylocichla mustelina*	Detected	Expected
96	Swainson's Thrush	*Catharus ustulatus*	Detected	Expected
97	Hermit Thrush	*Catharus guttatus*	Detected	Expected
98	Gray Catbird	*Dumetella carolinensis*	Detected	Expected
99	Northern Mockingbird	*Mimus polyglottos*	Detected	Expected
100	Brown Thrasher	*Toxostoma rufum*	Detected	Expected
101	European Starling	*Sterna vulgaris*	Detected	Expected
102	American Pipit	*Anthus rubescens*	Detected	Expected

Appendix A. Expected versus Detected Species at George Washington Birthplace National Monument (2002-2003 field season) (continued).

#	Species	Taxonomic_Name	Detected	Unexpected
103	Cedar Waxwing	*Bombycilla cedrorum*	Detected	Expected
104	Northern Parula	*Parula americana*	Detected	Expected
105	Tennessee Warbler	*Vermivora peregrina*	Detected	Expected
106	Yellow Warbler	Dendroica petechia	Not Detected	Expected
107	Chestnut-sided Warbler	Dendroica pensylvanica	Detected	Not Expected
108	Magnolia Warbler	*Dendroica magnolia*	Detected	Expected
109	Cape May Warbler	*Dendroica tigrina*	Detected	Expected
110	Myrtle Warbler	*Dendroica coronata*	Detected	Expected
111	Black-throated Green Warbler	*Dendroica virens*	Detected	Expected
112	Prairie Warbler	*Dendroica discolor*	Detected	Expected
113	Palm Warbler	Dendroica palmarum	Not Detected	Expected
114	Pine Warbler	*Dendroica pinus*	Detected	Expected
115	Blackpoll Warbler	Dendroica striata	Detected	Expected
116	Yellow-throated Warbler	*Dendroica dominica*	Detected	Expected
117	Black-and-white Warbler	*Mniotilta varia*	Detected	Expected
118	American Redstart	*Setophaga ruticilla*	Detected	Expected
119	Ovenbird	*Seiurus aurocapillus*	Detected	Expected
120	Common Yellowthroat	*Geothlypis trichas*	Detected	Expected
121	Hooded Warbler	*Wilsonia citrina*	Detected	Expected
122	Yellow-breasted Chat	*Icteria virens*	Detected	Expected
123	Summer Tanager	*Piranga rubra*	Detected	Expected
124	Scarlet Tanager	*Piranga olivacea*	Detected	Expected
125	Northern Cardinal	*Cardinalis cardinalis*	Detected	Expected
126	Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Detected	Expected
127	Blue Grosbeak	*Guiraca caerulea*	Detected	Expected
128	Indigo Bunting	*Passerina cyanea*	Detected	Expected
129	Eastern Towhee	Pipilo erythrophthalmus	Detected	Expected
130	Field Sparrow	*Spizella pusila*	Detected	Expected
131	Chipping Sparrow	*Spizella passerina*	Detected	Expected
132	Grasshopper Sparrow	*Ammodramus savannarum*	Detected	Expected
133	Savannah Sparrow	*Passerculus sandwichensis*	Detected	Expected
134	White-throated Sparrow	*Zonotrichia albicolis*	Detected	Expected
135	White-crowned Sparrow	*Zonotrichia leucophrys*	Detected	Expected
136	Song Sparrow	*Melospiza melodia*	Detected	Expected
137	Swamp Sparrow	*Melospiza georgiana*	Detected	Expected
138	Dark-eyed Junco	*Junco hyemalis*	Detected	Expected
139	Lapland Longspur	*Calcarius lapponicus*	Detected	Not Expected
140	Eastern Meadowlark	*Sturnella magna*	Detected	Expected
141	Brown-headed Cowbird	*Molothrus ater*	Detected	Expected
142	Red-winged Blackbird	*Agelaius phoeniceus*	Detected	Expected
143	Common Grackle	*Quiscalus quiscula*	Detected	Expected
144	Orchard Oriole	*Icterus spurius*	Detected	Expected
145	House Finch	*Carpodacus mexicanus*	Detected	Expected
146	American Goldfinch	*Carduelis tristis*	Detected	Expected
147	House Sparrow	Passer domesticus	Not Detected	Expected

Appendix B. Legal and Conservation Status of Birds Detected at George Washington Birthplace National Monument, 2002-2003.

#	Species	Migration Status	Fed.	State	PIF Score
1	Common Loon	Temperate migrant			
2	Red-necked Grebe	Temperate migrant			
3	Horned Grebe	Temperate migrant			
4	Double-crested Cormorant	Temperate migrant			
5	Great Blue Heron	Neotropical migrant			
6	Great Egret	Neotropical migrant		SC	
7	Green Heron	Neotropical migrant			
8	Mute Swan	Resident			
9	Tundra Swan	Temperate migrant			
10	Canada Goose	Temperate migrant			
11	Snow Goose	Temperate migrant			
12	Mallard	Temperate migrant			
13	American Black Duck	Temperate migrant			24
14	Gadwall	Temperate migrant			
15	Northern Pintail	Neotropical migrant			
16	American Wigeon	Temperate migrant			
17	Canvasback	Temperate migrant			
18	Redhead	Temperate migrant			
19	Ring-necked Duck	Temperate migrant			
20	Greater Scaup	Temperate migrant			
21	Lesser Scaup	Temperate migrant			
22	Surf Scoter	Temperate migrant			
23	Common Goldeneye	Temperate migrant			
24	Bufflehead	Temperate migrant			
25	Hooded Merganser	Temperate migrant			
26	Common Merganser	Temperate migrant			
27	Red-breasted Merganser	Temperate migrant			
28	Ruddy Duck	Temperate migrant			
29	Turkey Vulture	Neotropical Migrant			
30	Black Vulture	Neotropical Migrant			
31	Northern Harrier	Temperate migrant	SMC		
32	Sharp-shinned Hawk	Neotropical migrant			
33	Cooper's Hawk	Neotropical migrant			
34	Red-tailed Hawk	Resident			
35	Bald Eagle	Resident	LT	LT	
36	Osprey	Neotropical Migrant			
37	American Kestrel	Temperate migrant			
38	Northern Bobwhite	Resident			
39	Wild Turkey	Resident			
40	American Coot	Temperate migrant			
41	Killdeer	Neotropical Migrant			
42	Spotted Sandpiper	Neotropical migrant			
43	American Woodcock	Temperate migrant			
44	Laughing Gull	Neotropical migrant			
45	Ring-billed Gull	Temperate migrant			
46	Herring Gull	Temperate migrant			
47	Great Black-backed Gull	Temperate migrant			
48	Caspian Tern	Temperate migrant			
49	Forster's Tern	Neotropical migrant			

Appendix B. Legal and Conservation Status of Birds Detected at George Washington Birthplace National Monument, 2002-2003 (continued).

#	Species	Migration Status	Fed.	State	PIF Score
50	Mourning Dove	Temperate migrant			
51	Rock Dove	Resident			
52	Yellow-billed Cuckoo	Neotropical Migrant			
53	Great Horned Owl	Resident			
54	Barred Owl	Resident			
55	Eastern Screech Owl	Resident			
56	Chimney Swift	Neotropical migrant			
57	Ruby-throated Hummingbird	Neotropical migrant			
58	Belted Kingfisher	Temperate Migrant			
59	Red-headed Woodpecker	Resident	SMC		
60	Red-bellied Woodpecker	Resident			
61	Yellow-bellied Sapsucker	Neotropical Migrant			
62	Downy Woodpecker	Resident			
63	Hairy Woodpecker	Resident			
64	Northern Flicker	Temperate migrant	SMC		
65	Pileated Woodpecker	Resident			
66	Eastern Wood-Pewee	Neotropical migrant			22
67	Acadian Flycatcher	Neotropical Migrant			23
68	Eastern Phoebe	Neotropical migrant			
69	Great Crested Flycatcher	Neotropical migrant			
70	Eastern Kingbird	Neotropical migrant			
71	Red-eyed Vireo	Neotropical migrant			
72	White-eyed Vireo	Neotropical migrant			22
73	Yellow-throated Vireo	Neotropical migrant			23
74	Blue Jay	Resident			
75	American Crow	Resident			
76	Fish Crow	Temperate migrant			
77	Horned Lark	Temperate migrant			
78	Purple Martin	Neotropical migrant			
79	Northern Rough-winged Swallow	Neotropical migrant			
80	Tree Swallow	Neotropical Migrant			
81	Barn Swallow	Neotropical Migrant			
82	Eastern Tufted Titmouse	Resident			
83	Carolina Chickadee	Resident			
84	Red-breasted Nuthatch	Temperate migrant			
85	White-breasted Nuthatch	Resident			
86	Brown Creeper	Temperate migrant		SC-b	
87	Carolina Wren	Resident			
88	Winter Wren	Temperate migrant			
89	Golden-crowned Kinglet	Temperate migrant			
90	Ruby-crowned Kinglet	Temperate migrant			
91	Blue-gray Gnatcatcher	Neotropical Migrant			
92	Eastern Bluebird	Temperate migrant			
93	American Robin	Temperate migrant			
94	Wood Thrush	Neotropical Migrant	SMC		25
95	Swainson's Thrush	Neotropical Migrant			
96	Hermit Thrush	Temperate migrant		SC-b	
97	Gray Catbird	Neotropical migrant			
98	Northern Mockingbird	Resident			

Appendix B. Legal and Conservation Status of Birds Detected at George Washington Birthplace National Monument, 2002-2003 (continued).

#	Species	Migration Status	Fed.	State	PIF Score
99	Brown Thrasher	Temperate migrant			
100	European Starling	Resident			
101	American Pipit	Temperate migrant			
102	Cedar Waxwing	Temperate migrant			
103	Northern Parula	Neotropical migrant			
104	Tennessee Warbler	Neotropical Migrant			
105	Yellow Warbler	Neotropical migrant			
106	Chestnut-sided Warbler	Neotropical migrant	SMC		
107	Magnolia Warbler	Neotropical Migrant			
108	Cape May Warbler	Neotropical migrant			
109	Black-throated Blue Warbler	Neotropical Migrant			
110	Myrtle Warbler	Temperate migrant			
111	Black-throated Green Warbler	Neotropical Migrant			
112	Prairie Warbler	Neotropical migrant			25
113	Palm Warbler	Neotropical migrant			
114	Pine Warbler	Temperate migrant			
115	Blackpoll Warbler	Neotropical migant			
116	Yellow-throated Warbler	Neotropical migrant			
117	Black-and-white Warbler	Neotropical Migrant			
118	American Redstart	Neotropical Migrant			
119	Ovenbird	Neotropical Migrant			
120	Common Yellowthroat	Neotropical migrant			
121	Hooded Warbler	Neotropical migrant			
122	Yellow-breasted Chat	Neotropical Migrant			
123	Summer Tanager	Neotropical migrant			
124	Scarlet Tanager	Neotropical Migrant			
125	Northern Cardinal	Resident			
126	Rose-breasted Grosbeak	Neotropical Migrant			
127	Blue Grosbeak	Neotropical Migrant			
128	Indigo Bunting	Neotropical Migrant			
129	Eastern Towhee	Temperate migrant			
130	Field Sparrow	Temperate migrant	SMC		
131	Chipping Sparrow	Temperate migrant			
132	Grasshopper Sparrow	Temperate migrant			
133	Savannah Sparrow	Temperate migrant	SMC		
134	White-throated Sparrow	Temperate migrant			
135	White-crowned Sparrow	Temperate migrant			
136	Song Sparrow	Temperate migrant			
137	Swamp Sparrow	Temperate migrant			
138	Dark-eyed Junco	Temperate migrant			
139	Lapland Longspur	Temperate migrant			
140	Eastern Meadowlark	Temperate migrant	SMC		
141	Brown-headed Cowbird	Resident			
142	Red-winged Blackbird	Temperate migrant			
143	Common Grackle	Temperate migrant			
144	Orchard Oriole	Neotropical Migrant			
145	House Finch	Resident			
146	American Goldfinch	Temperate Migrant			
147	House Sparrow	Resident			

Abreviations: Fed. = Federal list of threatened and endangered species
SMC = Species of Management Concern
LT = Listed Threatened
State = State list of threatened and endangered species
SC-b = Special Concern as a breeding species
PIF Score = Partners in Flight conservation score; species with scores higher than 21 are considered to be of high conservation concern within the continent or the region.

Abreviations: Fed. = Federal list of threatened and endangered species
SMC = Species of Management Concern
LT = Listed Threatened
State = State list of threatened and endangered species
SC-b = Special Concern as a breeding species
PIF Score = Partners in Flight conservation score; species with scores higher than 21 are considered to be of high conservation concern within the continent or the region.

Appendix C. UTM Coordinates (NAD83) and description of habitat of avian survey point locations at George Washington Birthplace National Monument, VA, 2002-2003.

Pt #	XCoord.	Y Coord.	Location/Habitat [should use habitat descriptors consistent with the methods section]
1	4228149	332162	Low Density Developed
2	4227816	332023	Riparian Buffer
3	4228070	331716	Wooded Pond
4	4228591	332397	Riparian Pine Woodlot
5	4228605	331889	Mature Pine
6	4229020	331234	Grassland
7	4229547	331255	Grassland
8	4229749	330884	Wooded Pond
9	4228673	331474	Mature Pine
10	4229346	332514	Pine Plantation/Coastal Scrub
11	4229213	332788	Coastal Scrub / Marsh
12	4228302	331979	Upland / Marsh Edge

As the nation's primary conservation agency, the Department of the Interior has responsibility for most of our nationally owned public land and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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