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Avian Inventory of Sagamore Hill National Historical Site

Technical Report NPS/NER/NRTR--2008/119



ON THE COVER

American black duck (*Anas rubripes*) in flight.
Photograph by: US Fish and Wildlife Service ©

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Technical Report NPS/NER/NRTR--2008/119

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Table of Contents

Table of Contents	iii
Figures.....	v
Tables.....	vii
Appendices.....	ix
Summary	xi
Introduction.....	1
Materials and Methods.....	5
Avian Censusing	5
Guild Specific Censusing.....	9
Determination of Breeding Activity Levels.....	11
Habitat Structure Assessment	11
Results.....	17
Avian Censusing.....	17
Guild Specific Censusing.....	17
Determination of Breeding Activity Levels.....	20
Habitat Structure Assessment	20
Discussion	21
Avian Utilization of Sagmore Hill National Historic Site	21
Overall Assessment of On-site Habitat Assemblages.....	22
Conclusions.....	35
Habitat Management Recommendations	35
Checklist	36
Literature Cited.....	37

Figures

Figure 1. Habitat Management Zones and avian census points. Habitat Management Zones are labeled 1 through 20; Census Points are labeled A through L.....	2
Figure 2. Spatial pattern chart for habitat structure assessment protocol 2003.	14

Tables

Table 1. Habitat Management Zone and Census Point coverage.	6
Table 2. Avian survey sampling site locations.	7
Table 3. New York State Breeding Bird Atlas Project protocol (FNYSBC and NYSDEC 2000) protocol codes for behaviors indicative of breeding activity.....	12
Table 4. Birds of Sagamore Hill National Historic Site.	19
Table 5. Avian Utilization of Sagamore Hill National Historic Site.	23
Table 6. Avian Utilization of the Suburban Landscaped Habitat	25
Table 7. Avian Utilization of the Mature Forest Habitat	27
Table 8. Avian Utilization of the Successional Forest Habitat.....	29
Table 9. Avian Utilization of the Salt Marsh Habitat	31
Table 10. Avian Utilization of the Beach Habitat.....	33
Table 11. Avian Utilization of the Open Water (Cold Spring Harbor) Habitat.....	33

Appendices

Appendix A. Sample field data sheets.	39
Appendix B. Alpha code keys.	47
Appendix C. Annual summary.	49
Appendix D. Zone-based data summaries.	53
Appendix E. Breeding status and behaviors.	75
Appendix F. Habitat structure assessments.	77
Appendix G. Checklist of the birds of Sagamore Hill National Historic Site.	99

Summary

Theodore Roosevelt Sanctuary and Audubon Center conducted avian surveys at Sagamore Hill National Historic Site from January through December, 2003. All on-site habitats (landscaped, woodland, beach, and salt marsh) were thoroughly sampled. Guild-specific surveys for owls, woodcock, nightjars, and nocturnal marsh birds were also conducted. 116 species of birds were observed during 2003, including 26 confirmed breeders and an additional 24 probable breeding species.

Introduction

Sagamore Hill National Historic Site (SAHI) is located on the peninsula of Cove Neck, Long Island, New York. It is a generally rectangular parcel of land which measures approximately 1,200 m in length and a maximum of 400 m in width. It contains 35 ha which include a parking lot and visitor center (less than 1 ha combined), paved driveways and mowed lawns (4 ha), 5 ha of fields, and 20 ha of mature forest. The largest contiguous area of mature hardwood forest is located in the eastern half of the site, between the easternmost building and the salt marsh. The 4-ha Eel Creek salt marsh is an excellent example of the tidal marshes that once lined the north shore of Long Island. Separated from Cold Spring Harbor by a broad and high beach of gravelly sand, the marsh contains a well developed but shallow tidal creek which runs north to south through the entire width of the SAHI site. The easternmost forested and salt marsh areas of SAHI were declared a "Natural Environmental Study Area" by Congress in the early 1970's.

In 1997, a member of the Bard College Field Station conducted a habitat assessment of SAHI by request of the Eastern Regional Office of The Nature Conservancy (Kiviat 1997). The purpose of the assessment was to determine if any habitats exist in the park that should be surveyed for rare animal species listed by the New York Natural Heritage Program. A prior review of the Natural Heritage Program site data in 1996 revealed no reports of existing rare animals on file at that time. Based upon the results of the 1997 assessment, twenty-one distinct Habitat Management Zones were identified by National Park Service (NPS) personnel (Figure 1). Included in the study's results was a recommendation to conduct a breeding bird survey in the mature hardwood forest and beach-marsh complex.

The National Park Service is currently developing a General Management Plan for SAHI and has identified the need for surveys of birds at this site, which is part of the Coastal and Barrier Network. Acquiring such natural resource information is consistent with the Vail Agenda mandate to the NPS's Natural Resource Inventory and Monitoring Program (NPS 1998). One of the five long-term goals established by the program is to complete baseline inventories of basic biological and geophysical natural resources for the national parks. During Phase I of the natural resource inventory the NPS has set an objective of documenting the presence of at least 80% of all plant and animal (excluding invertebrates) species occurring within a park's boundaries; the stated objective for avian surveys of the parks of the Northeast Region is 90%.

In a typical year, Long Island hosts over 300 species of birds. Of this number just over one-quarter are confirmed year-round residents; the remainder are winter visitors, summer breeders or post-breeding wanderers, spring or autumn migrants, or vagrants (Barton and Pelkowski 1999). No one location will attract anywhere near this total number; many species occur only in south shore marshes, east end farmlands, or on the open ocean, to name just a few of the many habitat specializations found among all bird species. In order to develop a reasonable estimate of the number of species likely to be present at SAHI, it is necessary to consider avian data from as many nearby locations as possible.

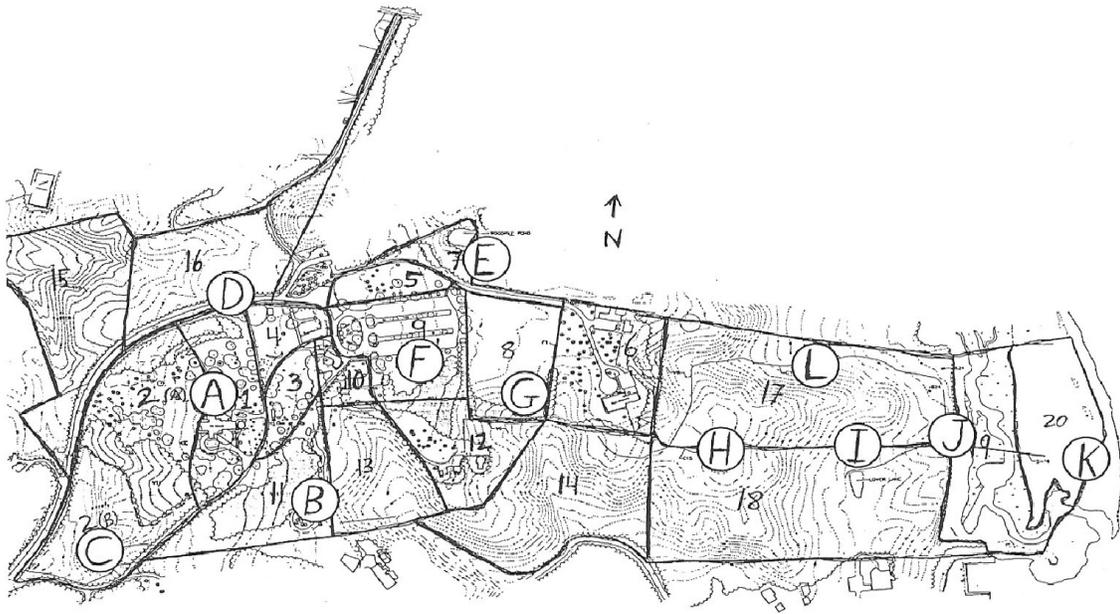


Figure 1. Habitat Management Zones and avian census points. Habitat Management Zones are labeled 1 through 20; Census Points are labeled A through L.

Theodore Roosevelt Sanctuary and Audubon Center is located approximately 1.6 km southwest of SAHI, at the intersection of Cove and Cove Neck Roads. The checklist for this 5-ha wooded site lists 125 species of birds which have been found there since the early 1980's (TRS 1996). Of these, 38 species are considered rare or accidental, leaving 87 species which occur with some regularity at the site. Due to the presence of additional habitats at the SAHI site, it is reasonable to expect that approximately 10 species of water birds (loons, cormorants, swans, and ducks), five species of waders (herons, egrets, and rails), five shorebird species, and two further species of gulls and terns will be added to the list of species from TRS. In addition, allowance should be made for the appearance of approximately five to ten "rarities" annually during the course of any research project, resulting in an expected tally of 114 to 119 species at SAHI.

A similar estimate can be derived from ongoing research conducted since 1996 by TRS staff at Hoffman Center in Muttontown. Although an inland site, the 63-ha Hoffman Center contains small ponds which have attracted a variety of waders, shorebirds, and waterfowl, and has been overflowed by several species of gulls, loons, and cormorants. Through the end of 2002, TRS staff recorded 133 bird species at Hoffman Center. Reducing this total for "puddle" ducks (four species), grassland birds (nine species), and one-time rarities such as Red-headed Woodpecker and "Lawrence's" Warbler (14 species), none of which would be expected at SAHI, then adding back the appropriate numbers of "bay" ducks (six species), waders and rails (two species), terns (two species), and five to ten "rarities" yields an estimate of 121 to 126 species expected at SAHI.

These derived estimates are supported by a number of published checklists. Caumsett State Park is located on Lloyd Neck, on the east side of Cold Spring Harbor. The park checklist lists 130 species which regularly occur at this nearly 650-ha park (Queens College 1996). Less than one mile east of Caumsett is Target Rock National Wildlife Refuge, a 32-ha former estate which in many ways is similar to the SAHI site in location, topography, and habitats. The preserve's checklist identifies exactly 100 regularly-occurring species and an additional 45 which are seen occasionally (USFWS 1996). Farther east, the 485+ ha Sunken Meadow State Park in Smithtown regularly hosts 108 species of birds (NYSOPRHP 1993).

NPS contracted the National Audubon Society's Theodore Roosevelt Sanctuary and Audubon Center (TRS) to conduct avian species surveys within all habitats at SAHI. This study provides important baseline natural resource information that can be used by the park for management purposes. This study consisted of general avian censusing within all habitat management zones; guild-specific censusing for owls, woodcock, nightjars, and nocturnal marsh birds; determination of avian breeding activity levels; and habitat structure assessments of all habitat management zones.

Materials and Methods

Avian Censusing

Census Point Selection

As originally envisioned in the TRS proposal, five to six census points were to be located throughout the SAHI site, as calculated on the basis of habitat type and patch size. Each census point was to be the midpoint of a 100 or 200-m long sampling transect, which would be used during non-breeding periods. All census points were to be located a minimum of 250 m apart, in order to minimize the possibility of “double counting” loud or highly mobile birds.

During census point selection, NPS staff informed TRS personnel that the SAHI site was previously divided into 21 Habitat Management Zones by earlier researchers (see Figure 1). In order to maintain consistency with the prior studies undertaken at this site, this delineation was retained as the framework for the current research and the census point selection process modified accordingly. Census point locations were based upon the following criteria:

1. Each Habitat Management Zone must be sampled from at least one census point;
2. To the maximum extent possible, census points should be away from areas of public activity and potential disturbance;
3. The distance between census points should be maximized, but in some cases may be less than 250 m when necessary to ensure adequate sampling of smaller zones; and
4. The number of census points should be minimized so as to help maintain adequate distance between points, and to allow completion of a sampling run in a reasonable amount of time, thereby reducing the potential for changes in avian activity levels during the course of each sampling visit.

The above criteria resulted in a doubling of the number of planned census points, with twelve points selected throughout the SAHI site. It was determined that sampling of these points could be completed in approximately two hours. To compensate for possible time-related changes in avian activity levels, alternate sampling runs were conducted in opposite directions (i.e. the first survey was performed from point A to point L, the next from L to A, third from A to L, etc.). The survey route can best be described as a “figure-eight”, consisting of a western loop from the parking lot to point A and back to point F, followed by an eastern loop from point G through point L. Point K, overlooking the beach and Cold Spring Harbor, was a short detour from the main trail via point J. Therefore, point J was always sampled before point K, regardless of the direction of the overall survey route. The Habitat Management Zone coverage achieved by these census points is listed in Table 1. On April 17, 2004, NPS staff (Mr. Dennis Skidds, URI Environmental Data Center) used a portable Global Positioning System (GPS) unit to log the coordinates of each census point, as listed in Table 2.

Table 1. Habitat Management Zone and Census Point coverage.

Census Point	Zone(s) Sampled	Zone	Sampled from Census Point(s)
A	1, 2A, 3, 4	1	A
B	11, 13	2A	A
C	2B	2B	C
D	15, 16	3	A
E	5, 7	4	A
F	5, 9, 10, 12	5	E, F
G	6, 8, 12, 14	6	G
H	17, 18	7	E
I	17, 18, 19	8	G
J	19, 20	9	F
K	19, 20, "Bay"	10	F
L	17, 19	11	B
		12	F, G
		13	B
		14	G
		15	D
		16	D
		17	H, I, L
		18	H, I
		19	I, J, K, L
		20	J, K
		"Bay"	K

Table 2. Avian survey sampling site locations. Location data collected on April 17, 2004. UTM meters, Zone 18N, NAD 1983.

Point	GPS time	Latitude(DD)	Longitude(DD)	UTM X Coord.	UTM Y Coord.
A	09:08:35am	-73.5012	40.8858	626274	4527160
B	09:17:13am	-73.4997	40.8848	626398	4527050
C	09:25:19am	-73.5026	40.8842	626157	4526980
D	09:41:33am	-73.5011	40.8871	626275	4527300
E	09:52:23am	-73.4981	40.8874	626530	4527350
F	09:57:28am	-73.4985	40.8864	626501	4527230
G	10:03:42am	-73.4974	40.886	626590	4527190
H	10:10:44am	-73.4946	40.8855	626824	4527130
I	10:16:30am	-73.4929	40.8853	626971	4527120
J	10:21:22am	-73.4916	40.8855	627081	4527140
K	10:26:19am	-73.4897	40.8854	627241	4527130
L	10:32:59am	-73.4932	40.8864	626940	4527240

Due to crowding associated with the doubling of the number of census points, all transects were standardized at 100 m in length. In addition, all detections along a transect were referenced back to the associated census point, rather than being measured directly from the spot on the transect where the detection occurred. For example, a bird detected 1 m away from the end of a transect would be recorded as >50 m from the census point, rather than 0-25 m from the transect. In this way, transects improved detections within the sampling area but did not increase the size of the sampling area. The rationale for this approach was that while this 35-ha site could accommodate twelve 50-m radius sampling circles, expanding each circle into a 200 m long by 100 m wide oblong would result in significant sampling overlap and likely double counting of individual birds.

Sampling Protocol

A stratified point count technique was used to measure bird density and occurrence throughout the year at each census point. Each point consisted of a 50-m radius circle with the observer located at the center. Birds were identified by sight and/or vocalization, and recorded according to standard distance intervals from the census point (0-25m, 25-50m, >50m, and flyover). Distance determinations for vocalizations were based upon both loudness and triangulation. In the latter method the observer would move up to 10 m to one side and observe the apparent change in direction of the sound. In other instances the observer may also move a short distance so as to confirm a visual identification. All birds found as a result of such movement are measured from the census point, not from the observer's present location. Birds are recorded at their closest approach to the census point. Thus, a bird first detected at >50m from the census point, but which subsequently (within the sampling interval) approaches to within 10 m is recorded in the 0-25m distance interval.

The Habitat Management Zone in which each bird occurred was distinguished by the use of a four-color ballpoint pen. Each census point sampled no more than four Habitat Management Zones (see Table 1). Therefore, each ink color (blue, black, red, or green) was "assigned" to a particular zone and used uniformly throughout the study. For example, at census point A birds found in zone 1 were marked in black, those at zone 2A in green, birds from zone 3 in red, and birds in zone 4 were recorded in blue. When pencil had to be used (during subfreezing or wet conditions) geometric shapes (circle, square, underline) were used to differentiate the sightings in each zone. Examples of completed field data sheets are included in Appendix A.

A sampling interval of seven minutes was used at each census point. Due to the high number of census points, extra care was taken to avoid double counting of individual birds at multiple census points. Loud species such as Northern Flicker, Blue Jay, and American Crow can easily be heard from a considerable distance. In practice, an individual bird is tallied at the first survey point where it is heard, unless that individual is subsequently seen or heard *at a closer distance interval* to another census point. In that case, the bird is tallied at the new census point and deleted from the original census point's tally. This situation actually occurred very rarely during the course of this study.

A total of 32 census point surveys were conducted during the year.

Alpha Codes

Every North American bird species is assigned a unique four-letter Alpha code by the American Ornithologist's Union, as a shorthand notation for use by researchers in the collection and presentation of data. An Alpha code is typically some combination of the first letters of the words in a bird's name, such as MALL for Mallard, RWBL for Red-winged Blackbird, GBHE for Great Blue Heron, or GBBG for Great Black-backed Gull. The Alpha code for most two-word names, such as American Robin, consists of the first two letters of each word, in this example, AMRO. Exceptions to this rule exist in cases where a code derived in such manner could be applied to two or more species. For example "CEWA" could theoretically represent either Cedar Waxwing or Cerulean Warbler. To prevent confusion, these species are coded as CEDW and CERW, respectively. In rare instances, the AOU has needed to use other than first letters to identify species. Thus, Black-throated Green Warbler is BTNW, to distinguish it from the alphabetically-similar Black-throated Gray Warbler (BTYW) of western North America. In addition, some species' names have changed since the adoption of Alpha codes and no longer "match" their assigned code. Local examples include Northern Flicker, coded as YSFL for "Yellow-shafted Flicker"; Tufted Titmouse, ETTI for "Eastern Tufted Titmouse"; Yellow-rumped Warbler, MYWA for "Myrtle Warbler"; and Dark-eyed Junco, still coded as SCJU for "Slate-colored Junco".

Alpha codes were used on all field data sheets and, for space considerations, in most tables in the appendices to this report. Appendix B lists the Alpha codes of all birds found at SAHI, in both taxonomic and alphabetical order. A complete list of Alpha codes of all North American bird species is available online at (<http://www.pwrc.usgs.gov>), the website of the USGS Patuxent Wildlife Research Center.

Guild Specific Censusing

Some groups of birds are not well represented in standard breeding bird surveys due to their specific activity periods and/or habitat associations. Among these groups are water birds, marsh birds, owls, and other nocturnal species. Several guild specific surveys were conducted, as described below.

Waterfowl

Although initially proposed as a guild specific survey group, shoreline waterfowl surveys were routinely performed as part of the general avian censusing since one of the twelve census points was located on the beach between Eel Creek Marsh and Cold Spring Harbor with an unobstructed view of the latter water body. A second census point was located within Eel Creek Marsh. No special procedures or equipment were necessary to adequately census this guild.

Nocturnal Marsh Birds

A nocturnal marsh bird census was conducted within Eel Creek Marsh on June 26, 2003 from 8:15 pm to 9:50 pm. Prior to the census, an audiotape was prepared using a SONY model CFS-W430 radio cassette-corder. Appropriate calls were dubbed from commercially available bird song cassette tapes ("Eastern/Central Bird Songs", "Eastern/Central Birding by Ear", and

“Eastern/Central More Birding by Ear”, all titles in the Peterson Field Guides series) to a single Maxell UR 60-minute cassette tape. Calls contained on the finished tape were those of all six North American rails (Virginia, Clapper, King, Black, Yellow, and Sora), Pied-billed Grebe, Common Moorhen, Least Bittern, American Bittern, Green Heron, Black-crowned Night-Heron, and Yellow-crowned Night-Heron.

Playback in the field was performed with a Radio Shack CTR-88 Compact Cassette Tape Recorder, which was operated by an assistant to the primary researcher. The researcher stood at least 25 m from the tape player, so as to be able to hear any response calls. The tape was played at four locations within the marsh: at the western third of the boardwalk, at the eastern end of the boardwalk, at the western end of the inlet, and at the northern end of the marsh just west of the beach. At each location the tape was played twice, with pauses of 20 to 30 seconds between the calls of each species.

While traversing the edge of the beach between the inlet and the northern end of the marsh, both observers looked for signs of Piping Plover nests. Since this species remains on or close to its nest throughout the night, this was an ideal time to search for this species.

Owls

Although owls are usually present year-round, they typically only respond vocally during winter and early spring, the height of their breeding season. Owl surveys were conducted on the morning of January 12, 2003 (4:30 am to 6:20 am) and evening of December 19, 2003 (8:00 pm to 10:10 pm). On both visits, the route followed was identical to a “reversed” general avian survey (moving from point L to point A) except that the beach at point K was not surveyed. At each census point, the researcher stopped for several minutes and vocally imitated the calls of Eastern Screech-Owl and Great Horned Owl. With a skilled researcher this method is often more successful than the use of tape playback, as owls can readily detect the mechanical noises associated with a tape player. Since Great Horned Owls will readily eat Screech-Owls, the smaller birds will usually not respond if they believe their larger relative is nearby. Accordingly, the researcher performed the Screech-Owl calls first at each location, only commencing the Great Horned Owl call when satisfied that all nearby Screech-Owls had been tallied. The distance and zone of each responding bird were recorded in the same manner as in a general avian survey.

Woodcock

American Woodcock is a reclusive, grassland dwelling species that in early spring performs an elaborate and highly visible aerial courtship display above forest clearings, grasslands, and other open areas. These display flights begin shortly after sunset, and on moonlit nights may continue into the early morning hours. On March 17, 2003 the grasslands in Habitat Management Zones 2A and 8 were monitored from 8:10 pm to 8:45 pm for the presence of this species.

Nightjars

Two nightjar species, Whip-poor-will and Chuck-will’s-widow, are known to breed on Long Island. Both are loud and continuous nocturnal singers and, if present, would be readily

detectable from any point within SAHI. Both species were listened for during the nocturnal marsh bird survey on June 26, 2003 from 8:15 pm to 9:50 pm, as well as during the transit to and from the marsh. Including transit and some time spent seeking these species at the conclusion of the marsh bird survey, these birds were sought from approximately 8:00 pm until 10:15 pm.

Determination of Breeding Activity Levels

During the course of each regular and guild-specific census, notes regarding observed and/or suspected breeding behavior were recorded in conformance with the New York State Breeding Bird Atlas Project protocol (FNYSBC and NYSDEC 2000). This protocol includes a hierarchy of behaviors indicative of breeding activity within three categories of breeding certainty: Possible, Probable, and Confirmed. These behaviors and their applicable protocol codes are summarized in Table 3 in order of increasing certainty.

Habitat Structure Assessment

On-site habitats were characterized in accordance with the Monitoring Avian Productivity and Survivorship (MAPS) Habitat Structure Assessment Protocol 2003 (Nott et al. 2003). This protocol was developed to correlate habitat characteristics with mist-netting results, but can be readily applied to avian censuses as well. The purposes of these assessments are:

- a) to provide a general classification and characterization of the habitat of the study area to allow for broad comparisons and groupings among study sites;
- b) to provide a method for monitoring major changes in the vegetation that occur as a result of natural successional change, new management practices, or the occurrence of a major catastrophe such as fire or flood; and
- c) to provide a relatively rapid assessment of the habitat structure and spatial patterns of vegetation.

Typically, a single Habitat Structure Assessment would be performed for each approximately 20-ha MAPS banding station. Since the 35-ha SAHI site was previously divided into 21 separate Habitat Management Zones, a detailed Habitat Structure Assessment was performed for each zone and a composite assessment developed for the entire site. Consistent with the MAPS protocol, all assessments were performed in June and July, the period of maximum canopy and shrub cover.

Table 3. New York State Breeding Bird Atlas Project protocol (FNYSBC and NYSDEC 2000) protocol codes for behaviors indicative of breeding activity.

Code	Description
“Possible Breeding”	
X	Species observed in possible nesting habitat. Singing male(s) present in breeding season.
“Probable Breeding”	
S	Singing male present (or breeding calls heard) on more than one date in the same place.
P	Pair observed in suitable habitat in breeding season.
T	Bird (or pair) apparently holding territory.
D	Courtship and display, agitated behavior or anxiety calls suggesting nest or young nearby.
N	Visiting probable nest site. Nest building by wrens and woodpeckers.
B	Nest building or excavation of a nest hole.
“Confirmed Breeding”	
DD	Distraction display or injury-feigning.
UN	Used nest found, provided it is recent and identifiable to species.
FE	Female with egg in the oviduct (by bird bander).
FL	Recently fledged young, including downy young of precocious species).
ON	Adult(s) entering or leaving nest hole in circumstances indicating occupied nest.
FS	Adult carrying fecal sac.
FY	Adult(s) with food for young.
NE	Identifiable nest and eggs, bird sitting on nest or eggs.
NY	Nest with young.

Measured parameters consist of horizontal arrangement, vertical structure, and type of vegetation, as well as presence of non-vegetative features such as ponds, streams, roads, and buildings. Vegetation types are classified using plant formations and alliances described by a federally accepted standard (National Vegetation Classification Standard 1997). Each of these parameters is described in greater detail below.

Horizontal arrangement

The horizontal arrangement of vegetation is described in terms of cover and pattern. “Cover” is simply the percentage of the site (or sub-site) occupied by vegetation. Coding of cover relies upon eleven categories representative of the midpoints of the NVCS ranges of percent cover. The eleven categories range from <5, 10, 20, ..., 90, >95, encompassing the NVCS percent cover ranges of 0-5%, 5-15%, 15-25%, ..., 85-95%, 95-100%, respectively. Cover is defined as “the sum of the areas delimited by the vertical projections of plant perimeters onto the ground” and not to light passing through the foliage of a single tree, shrub, or fern. Any area inside the “drip-line” of an individual plant or tree is considered as fully covered. Any overlap of cover between neighboring individual plants or trees is considered only once; a completely closed canopy forest with overlapping crowns can total only 100% cover.

“Pattern” describes the overall horizontal spatial distribution of the target habitat type or vegetation layer. Basically, for a given percentage cover, different spatial arrangements alter the perimeter:area ratio which reflects how “simple”, “clumped”, or “dispersed” the pattern can be. The spatial patterns used in the MAPS protocol are illustrated in Figure 2.

Vertical structure

The MAPS protocol divides the vegetation within each habitat into four layers: upperstory, midstory, understory, and ground cover, based solely on their heights as described below.

Upperstory is the layer encompassing all vegetation above 15 m from the ground, including coniferous or broad-leaved trees, vines, and epiphytic plants.

Midstory is the middle layer of the canopy, encompassing all vegetation between 5 and 15 m above the ground. Such vegetation includes saplings and tall shrubs as well as vines, epiphytic plants, lower branches of tall trees, and vegetation hanging down from the upperstory level. It does not include the trunks of trees that reach into the upperstory layer.

Understory includes vegetation found between 0.5 and 5 m above the ground and consists mostly of shrubs and small saplings. This layer may also include herbaceous vegetation extending up from the ground layer. It does not include the trunks of trees that extend into the upperstory or midstory, nor does it include the trunks of fallen trees regardless of their size.

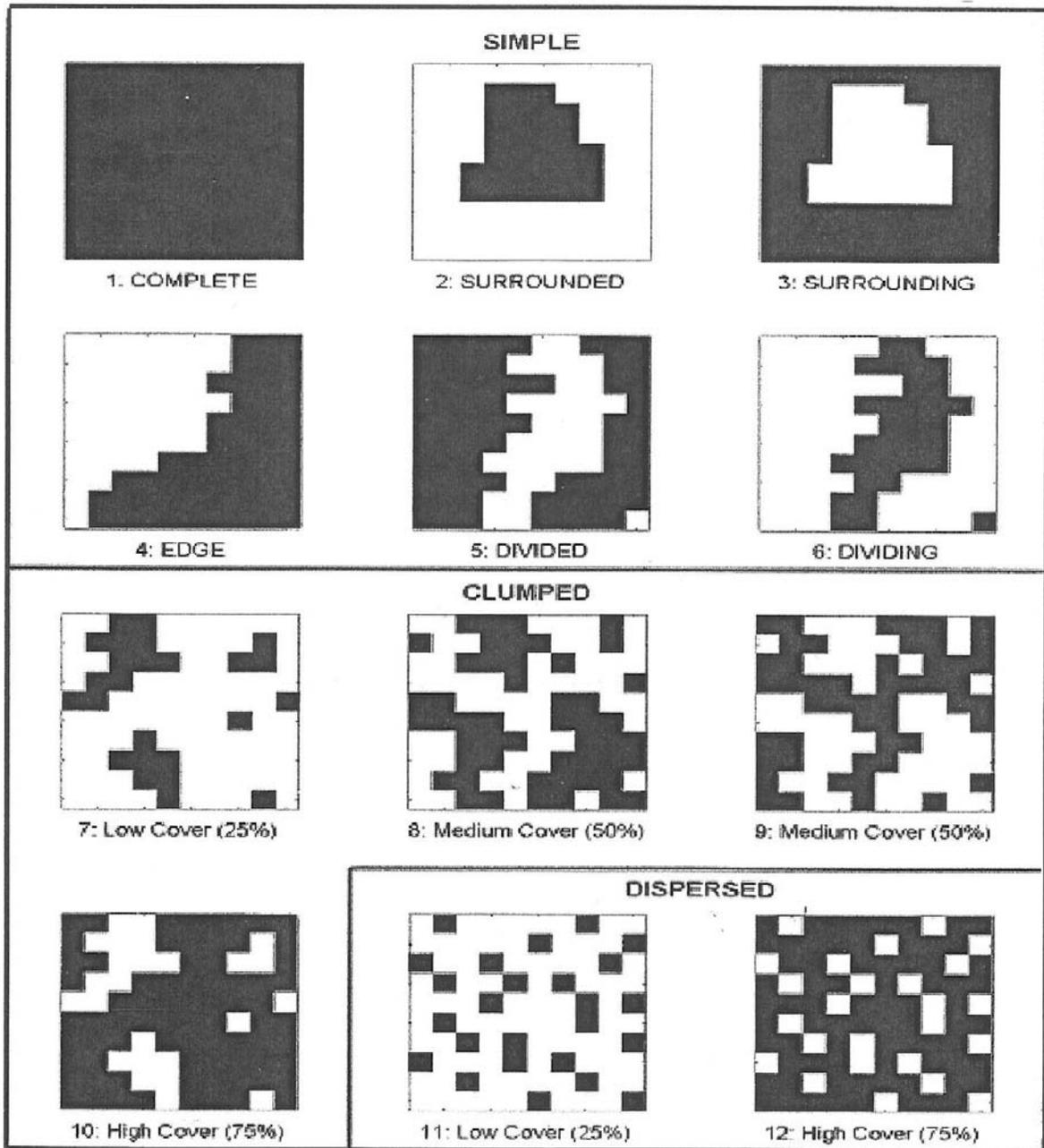


Figure 2. Spatial pattern chart for habitat structure assessment protocol 2003.

Ground cover includes all vegetation below 0.5 m as well as everything on the ground. It does not include trunks of trees that extend above this layer or woody stems of shrubs that extend into the understory. This layer is split into the following three components:

“Live vegetation” includes seedlings of woody vegetation, grass-like vegetation, forbs and ferns, and nonvascular ground cover such as mosses and lichens;

“Dead vegetation” includes all dead leaves, empty seed cases, twigs, branches, and logs that lie on the ground in the surveyed habitat; and

“Total non-vegetative” includes bare ground covered by rock, stones, or gravel, sand or dirt, water, or human-made cover such as roads, parking lots, and other development.

Horizontal parameters (cover and pattern) were determined for each of the four vegetative layers in each Habitat Management Zone. In the top three zones, vegetative cover is expressed as a single percentage; the nature of any remaining space (e.g. air, building, etc.) is of no concern. Up to three percentages may be recorded in the ground cover layer, one for each of the three components identified above. In this layer the cover percentages must equal 100%.

Vegetation types

Vegetation types within each vertical layer are broadly characterized as coniferous, broadleaf (deciduous), forbs and ferns, and grass-like. The relative percentages of each type within the vegetative community (not within the entire layer) is recorded. These percentages must equal 100% in each layer. For example, an upperstory layer may consist of 40% vegetative cover (the remaining 60% being airspace) which is evenly divided between coniferous and deciduous species. These vegetation types are each recorded as comprising 50% of the vegetation within each layer, not as covering 20% of the total area within the layer.

Non-vegetative features

Whenever non-vegetative features occur within the ground cover layer, the MAPS protocol requests additional information regarding the size and nature of four features of particular interest: running water, standing water, human-made corridors, and human-made structures. Such features were characterized as part of the assessment of each zone. Other non-vegetative parameters (soil drainage, slope, and geography) were briefly characterized.

Results

Avian Censusing

A total of 111 species were identified during the general site surveys. One additional species, Turkey Vulture, was sighted by SAHI staff during a non-survey day. The Turkey Vulture is a visually distinctive bird that is unlikely to be confused with any other locally-occurring species. In addition, it is a rare spring migrant through Long Island, with only a handful of sightings island-wide in any given year. During other seasons, it is completely absent from our area. In light of the demonstrated bird identification skills of SAHI staff, the distinctiveness of this species, and the low probability of replicating this sighting during a survey visit, this species was added to the park list on the basis of this sighting.

Each individual sighting has been recorded in an Excel database on CD-ROM. The data has also been summarized in several formats for easy reference and analysis in this report. Appendix C contains a site-wide Annual Summary. This summary tallies the number of individuals of each species present on each survey date, without reference to the specific Habitat Management Zone in which each sighting occurred. This Annual Summary reveals seasonal patterns of avian use of the site, but is of limited value in developing management strategies for this property. Management planning will require the use of zone-specific data summaries, which are presented in Appendix D. Zone summaries track avian activity levels within each zone during the course of the study year, revealing those time periods in which the zone is of greatest importance to local avian populations.

Guild Specific Censusing

Four additional species were identified as a result of the various guild-specific censuses performed during the course of this study. All guild-specific results are included in the Excel Database and in the applicable Zone-based Summaries (Appendix D).

Owls

The owl survey conducted on the morning of January 12, 2003 tallied eight Eastern Screech-Owls, distributed as follows:

One owl each in Zones 2B and 16; and
Two owls each in Zones 6, 13, and 17.

All eight owls were detected by vocalization. Sightings were obtained of the owl in Zone 16 and of one of the Zone 17 owls.

The owl survey conducted in the evening of December 19, 2003 recorded only three Eastern Screech-Owls, all of which were clustered in Zone 17. The lower response on this date is not surprising, as this is at the very beginning of the species' breeding cycle and many birds will not yet be nesting or holding territory.

Although not encountered on either census visit, a calling Great Horned Owl was reliably reported by SAHI staff from the vicinity of Zone 17 during both spring and autumn. Due to the unmistakable nature of its vocalizations, this species was added to the park list on the basis of these reports.

Woodcock

American Woodcock was not detected during the guild-specific survey for this species on March 17, 2003. This species nests sporadically throughout Long Island, usually in larger and more heavily overgrown grasslands than those found at SAHI (Andrle and Carroll, 1988); therefore its absence from this site is not surprising. Subsequent discussions with SAHI staff confirmed that American Woodcock is not known to occur on this site.

Nightjars

Neither nightjar species, Whip-poor-will nor Chuck-will's-widow, was detected during the guild-specific survey conducted on June 26, 2003. These locally uncommon species tend to nest in pine barrens (Whip-poor-will) or south shore barrier island (Chuck-will's-widow) habitats on Long Island (Andrle and Carroll, 1988). Neither species is known to nest in Nassau County, so their absence from this site is not unexpected.

Nocturnal Marsh Birds

Two nocturnally-active marsh bird species were found during the guild-specific survey of June 26, 2003. Five Black-crowned Night-Herons flew into the southern end of Eel Creek marsh, apparently in response to a taped call. The birds appeared agitated and made several visual attempts to locate the presumed intruder. Cessation of tape playing caused the birds to relax, and they foraged on a mud flat for approximately fifteen minutes before departing.

Shortly thereafter, a single Virginia Rail responded vocally to a tape of its species' vocalizations. The calls came from the southern section of the western edge of the marsh, but the bird was never located visually in the failing light.

All 116 bird species detected during this study are listed in Table 4.

Table 4. Birds of Sagamore Hill National Historic Site.

Red-throated Loon	Eastern Screech-Owl ²	Northern Mockingbird ¹
Common Loon	Great Horned Owl ²	European Starling ¹
Double-crested Cormorant ³	Chimney Swift	Cedar Waxwing ³
Great Blue Heron ¹	Belted Kingfisher ³	Northern Parula
Great Egret ²	Red-bellied Woodpecker ¹	Yellow Warbler ²
Snowy Egret ²	Yellow-bellied Sapsucker	Magnolia Warbler
Green Heron ¹	Downy Woodpecker ²	Cape May Warbler
Black-crowned Night-Heron ²	Hairy Woodpecker ¹	Yellow-rumped Warbler
Turkey Vulture	Northern Flicker ¹	Black-throated Green Warbler
Mute Swan	Eastern Wood-Pewee ²	Blackburnian Warbler
Canada Goose ¹	Eastern Phoebe	Pine Warbler ³
American Black Duck	Great Crested Flycatcher ¹	Palm Warbler
Mallard ²	Eastern Kingbird ¹	Blackpoll Warbler
Greater Scaup	White-eyed Vireo ³	Black-and-white Warbler
Long-tailed Duck	Yellow-throated Vireo	American Redstart ²
Bufflehead	Blue-headed Vireo	Ovenbird
Common Goldeneye	Warbling Vireo ²	Northern Waterthrush
Red-breasted Merganser	Red-eyed Vireo ²	Common Yellowthroat ³
Osprey ²	Blue Jay ²	Scarlet Tanager ³
Bald Eagle	American Crow ¹	Eastern Towhee
Sharp-shinned Hawk ³	Fish Crow ²	American Tree Sparrow
Red-tailed Hawk ²	Purple Martin	Chipping Sparrow ¹
Ring-necked Pheasant	Tree Swallow ³	Song Sparrow ²
Wild Turkey ³	Barn Swallow ¹	White-throated Sparrow
Virginia Rail ²	Black-capped Chickadee ¹	Dark-eyed Junco
Greater Yellowlegs	Tufted Titmouse ¹	Northern Cardinal ¹
Spotted Sandpiper	White-breasted Nuthatch ²	Indigo Bunting ³
Sanderling	Carolina Wren ¹	Red-winged Blackbird ¹
Wilson's Snipe	House Wren ²	Rusty Blackbird
Laughing Gull ³	Winter Wren	Common Grackle ²
Ring-billed Gull ³	Marsh Wren	Brown-headed Cowbird ¹
Herring Gull ³	Golden-crowned Kinglet	Orchard Oriole ²
Great Black-backed Gull ³	Ruby-crowned Kinglet	Baltimore Oriole ¹
Common Tern ³	Eastern Bluebird	Purple Finch
Least Tern ³	Veery ³	House Finch ²
Rock Dove ³	Hermit Thrush	Pine Siskin
Mourning Dove ¹	Wood Thrush ¹	American Goldfinch ¹
Black-billed Cuckoo	American Robin ¹	House Sparrow ¹
Yellow-billed Cuckoo	Gray Catbird ¹	

Breeding status:

¹ Confirmed breeding bird

² Probable breeding bird

³ Possible breeding bird

Determination of Breeding Activity Levels

Of the 116 bird species detected during this study, 69 showed some type of breeding activity at the Sagamore Hill site. Confirmed (26 species), probable (24 species), and possible (19 species) breeders are listed in Table 4. Further information on each listed species, including the specific breeding behaviors observed, is contained in Appendix E.

With few exceptions, confirmed breeding cannot be ascribed with certainty to a particular Habitat Management Zone. The smallest unit in the Breeding Bird Atlas protocol is the 5 km x 5 km square “Atlas block”. The most commonly encountered confirmed breeding behaviors, carrying food for young or the presence of recently fledged young, may occur at considerable distance from the actual nest location. While such distances would probably not exceed the dimensions of a particular Atlas block, they could easily cross several Habitat Management Zone boundaries at this relatively small study site. Similarly, such confirmations observed near the edges of this site may in fact reflect nesting that occurred off-site but near this property. If so, the presence of birds engaged in such behaviors on this site still indicates that this parcel plays an important role in the breeding success of those individuals.

Ironically, many “possible” or “probable” breeding behaviors can be assigned with confidence to a particular Habitat Management Zone. The location of the occurrence of such behaviors, for example the repeated presence of a singing male, territorial defense behavior, or visiting a probable nest site, can be determined with certainty, although none of the behaviors are sufficient to confirm that breeding has occurred. Wherever applicable, breeding behaviors occurring in each Habitat Management Zone will be summarized in the “Discussion” section of this report.

Habitat Structure Assessment

Individual Habitat Structure Assessments were prepared for each of the 21 previously designated Habitat Management Zones, and are presented in Appendix F of this report. In preparing these assessments, it was observed that the boundaries of many Habitat Management Zones appear to have been drawn along readily recognizable features such as paths or elevation changes, and do not perfectly delineate the edges of NVCS-recognized habitats. Many zones contain a dominant habitat and edges of one or more minor habitats, and many habitats “spill over” into adjacent zones. For this reason, no attempt was made to classify each Habitat Management Zone within the NVCS system. Such habitat classification was utilized in the overall site assessment, as will be discussed in the “Discussion” section of this report.

Discussion

Avian Utilization of Sagamore Hill National Historic Site

Avian use of a site can be described in terms of a hierarchy which reflects the ability of the site to meet the basic needs (food, shelter, breeding habitat) of each species. For example, in the case of year-round resident species, it is assumed that the site supplies one or more (and frequently, all three) of these parameters throughout the year. Accordingly, year-round resident status reflects the closest bond between the species and the site. One caveat which must be recognized is the fact that year-round resident status applies to the species, not necessarily to the individual. For example, most if not all locally-breeding American Robins will migrate southward in winter, to be replaced in this area by more northerly breeders overwintering here. Nevertheless, the site does provide basic needs of members of the American Robin species throughout the year. This study identified 29 species as year-round residents of Sagamore Hill National Historic Site. Twenty-four of these species exhibited “probable” or “confirmed” breeding activity at this site and are marked with an asterisk in Table 5 of this report. A word of explanation should be provided regarding the presumed year-round resident status of Eastern Screech- and Great Horned Owls. Both species are known to be non-migratory with a high degree of natal site fidelity (Johnsgard, 2002). In addition, both species are vocal only during their breeding season, remaining quiet and virtually non-detectable during the rest of the year. Since both species were repeatedly detected during their breeding season, it would be unreasonable to assume that these species do not reside year-round at this site.

The next step in the hierarchy is that of summer resident. Most summer residents are insectivorous or fruit-eating “neotropical migrants” which must return to their tropical homelands to find food during the cold northern winters. In addition to offering food and shelter on a seasonal basis, this site frequently provides these species with suitable breeding habitat in which to raise the next generation of birds. As listed in Table 5, 40 species have been identified as summer residents of SAHI. “Probable” or “confirmed” breeding activity has been observed in 26 of these species, as denoted by an asterisk in Table 5. Summer resident species are frequently also present at the site during the spring and fall migratory periods but are not listed again on that lower hierarchical step.

The third step in the hierarchy is winter resident. These species typically breed further north and only retreat to this site to escape colder weather in their preferred ranges. Winter residents rarely utilize the site for breeding habitat, although it does play a vital role in providing suitable food and shelter during the least hospitable time of the year. As noted in Table 5, 13 species are winter residents at this site. As is the case with summer residents, these species may also be present during the fall and spring migratory periods while traveling to and from this site. One winter resident species, Mute Swan, met a Breeding Bird Atlas criterion for “probable” breeding activity. A pair was observed in suitable habitat (Eel Creek marsh) during the nesting season, which in this species begins as early as mid-March. While there were no subsequent on-site sightings of Mute Swans, this species is known to breed within both Cold Spring Harbor and Oyster Bay Harbor and therefore its breeding activity status at this site is consistent with the Breeding Bird Atlas protocol.

The last and lowest step of the site use hierarchy is that of migrants. These are species that pass through the site during the spring and/or autumn migration periods, stopping only briefly if at all. They never use the site for breeding habitat and use it for food or shelter only on a temporary, transient basis. As shown in Table 5, 34 species fall into this category. In Table 5, each species name is followed by a letter “S” and/or “F”, indicating whether the species is found during spring and/or fall migration, respectively.

As can be seen from a review of Table 5, the site is well represented by most bird families typically found on the north shore of Long Island. In addition to the previously explained absence of all members of the Nightjar family, the only group of birds which is significantly underrepresented at this site is the guild of grassland-dwelling species. This is not surprising, considering that the site contains three small, disconnected, and frequently disturbed areas of grassland. Three typical grassland species (Tree Swallow, Eastern Bluebird, and Indigo Bunting) each appeared on only one survey date, while several others (including American Kestrel, Northern Bobwhite, Killdeer, American Woodcock, Willow Flycatcher, Savannah Sparrow, Grasshopper Sparrow, Bobolink, and Eastern Meadowlark) were entirely absent from the site.

Two surprising results were the complete absence from this site of the locally common Brown Thrasher and the status of the normally common summer-resident Eastern Towhee as a rare spring and fall migrant through this site. Since both of these species are normally dependent on thickets and dense brushy cover, their absence from this site suggests that this preferred habitat makes up a small portion of the overall site landscape.

Overall Assessment of On-site Habitat Assemblages

The 21 Habitat Management Zones can be organized into five distinct habitats: Suburban Landscaped, Mature Eastern Hardwood Forest, Successional Eastern Hardwood Forest, Salt Marsh, and Beach. A sixth habitat, the open water of Cold Spring Harbor, was also sampled during this study. Each of these habitats is described in detail below.

Table 5. Avian Utilization of Sagamore Hill National Historic Site.

Red-throated Loon (F)	Eastern Screech-Owl (Y*)	Northern Mockingbird (Y*)
Common Loon (Sp/F)	Great Horned Owl (Y*)	European Starling (Y*)
Double-crested Cormorant (Su)	Chimney Swift(Su*)	Cedar Waxwing (Su*)
Great Blue Heron (Y*)	Belted Kingfisher (Y)	Northern Parula (Sp/F)
Great Egret (Su*)	Red-bellied Woodpecker (Y*)	Yellow Warbler (Su*)
Snowy Egret (Su)	Yellow-bellied Sapsucker (W)	Magnolia Warbler (Sp)
Green Heron (Su*)	Downy Woodpecker (Y*)	Cape May Warbler (F)
Black-crowned Night-Heron (Su*)	Hairy Woodpecker (Y*)	Yellow-rumped Warbler (Sp/F)
Turkey Vulture (Sp)	Northern Flicker (Y*)	Black-throated Green Warbler (Sp)
Mute Swan (W*)	Eastern Wood-Pewee (Su*)	Blackburnian Warbler (Sp)
Canada Goose (Y*)	Eastern Phoebe (Sp/F)	Pine Warbler (Su)
American Black Duck (W)	Great Crested Flycatcher (Su*)	Palm Warbler (F)
Mallard (Y*)	Eastern Kingbird (Su*)	Blackpoll Warbler (Sp)
Greater Scaup (Sp)	White-eyed Vireo (Su)	Black-and-white Warbler (Sp)
Long-tailed Duck (W)	Yellow-throated Vireo (Sp)	American Redstart (Su*)
Bufflehead (W)	Blue-headed Vireo (Sp/F)	Ovenbird (Sp)
Common Goldeneye (W)	Warbling Vireo (Su*)	Northern Waterthrush (Sp)
Red-breasted Merganser (W)	Red-eyed Vireo (Su*)	Common Yellowthroat (Su)
Osprey (Su*)	Blue Jay (Y*)	Scarlet Tanager (Su)
Bald Eagle (F)	American Crow (Y*)	Eastern Towhee (Sp/F)
Sharp-shinned Hawk (Y)	Fish Crow (Su*)	American Tree Sparrow (F)
Red-tailed Hawk (Y*)	Purple Martin (Sp)	Chipping Sparrow (Su*)
Ring-necked Pheasant (W)	Tree Swallow (Su)	Song Sparrow (Y*)
Wild Turkey (Su*)	Barn Swallow (Su*)	White-throated Sparrow (W)
Virginia Rail (Su)	Black-capped Chickadee (Y*)	Dark-eyed Junco (W)
Greater Yellowlegs (Sp)	Tufted Titmouse (Y*)	Northern Cardinal (Y*)
Spotted Sandpiper (Sp)	White-breasted Nuthatch (Y*)	Indigo Bunting (Su)
Sanderling (Sp)	Carolina Wren (Y*)	Red-winged Blackbird (Su*)
Wilson's Snipe (F)	House Wren (Su*)	Rusty Blackbird (F)
Laughing Gull (Su)	Winter Wren (Sp)	Common Grackle (Su*)
Ring-billed Gull (Y)	Marsh Wren (F)	Brown-headed Cowbird (Su*)
Herring Gull (Y)	Golden-crowned Kinglet (W)	Orchard Oriole (Su*)
Great Black-backed Gull (Y)	Ruby-crowned Kinglet (F)	Baltimore Oriole (Su*)
Common Tern (Su)	Eastern Bluebird (F)	Purple Finch (F)
Least Tern (Su)	Veery (Su)	House Finch (Su*)
Rock Dove (Su)	Hermit Thrush (W)	Pine Siskin (W)
Mourning Dove (Y*)	Wood Thrush (Su*)	American Goldfinch (Y*)
Black-billed Cuckoo (Sp)	American Robin (Y*)	House Sparrow (Y*)
Yellow-billed Cuckoo (Sp)	Gray Catbird (Su*)	

Key:

Year round resident – Y
 Summer resident - Su
 Winter resident – W
 Spring migrant – Sp
 Fall migrant – F

Probable or Confirmed breeding activity - *

Suburban Landscaped Habitat

This habitat consists of Habitat Management Zones 1, 2A, 3, 4, 5, 6, 7, 8, 9, 10, and the western (developed) portion of zone 12. This is the second largest and most diverse habitat on the site, encompassing approximately 10 hectares and containing all on-site buildings, paved driveways and parking lot, lawns, landscaping, and fields. This last feature, which comprises one-half of the total land area of this habitat, offers the potential to become a separate, “grassland” habitat but is not considered as such at this time, for the following reasons:

1. The five hectares of “fields” are divided among four isolated Habitat Management Zones (2A, 3, 5, and 8), interspersed among Suburban Landscaped zones, thereby minimizing their potential to develop into fully functional, independent grasslands;
2. Current management practices result in moderate to severe seasonal disturbance (e.g. mowing) of each of these zones, further impeding their ability to develop into fully functional grasslands; and
3. As noted above, these zones have been unable to attract typical grassland birds. Rather, their current avifauna consists of species typical of the entire Suburban Landscaped complex.

The National Vegetation Classification Standard (NVCS) system focuses on naturally occurring ecosystems and does not yet include a Formation code for this man-made habitat.

One feature deserving of special mention is the small pond located within Habitat Management Zone 7. It is reasonably certain that this pond is not connected to the underlying groundwater and therefore depends upon runoff from the parking lot and adjacent lawn areas for its continued existence. It is a well established principle of hydrogeology that groundwater contours generally mirror ground surface elevations, albeit at greatly reduced amplitudes. While site-specific groundwater data was not available to the current researchers, reasonable approximations can be made by comparison to a similar geological feature. Nissequogue peninsula in Smithtown is bounded on the west by the Nissequogue River, on the north by Long Island Sound, and on the east by Stony Brook Harbor. The peninsula measures approximately 2.4 km in length (north-to-south), 1.9 km in width (east-to-west), and 55 meters in maximum elevation. These dimensions are very similar to the corresponding 2.4 km length, 1.6 km width, and 44 meter elevation of the Cove Neck peninsula. According to the most recent groundwater maps released by the Suffolk County Water Authority (2004), the maximum groundwater elevation in the Nissequogue peninsula is less than 3.5 meters above mean sea level, well below the bottom elevation of the pond in zone 7. This, coupled with the presence of lower, dry-bottomed depressions in zones 8, 13, and 16, strongly suggests that this pond is a perched water feature which is likely maintained by the presence of an impermeable clay lens beneath it.

Bird species utilizing this habitat are listed in Table 6. This habitat had the highest numbers of both year-round and summer resident species, but a disproportionately low number of migrants. The numerically dominant species in this habitat were Blue Jay, American Crow, European Starling, Chipping Sparrow, American Goldfinch, and House Sparrow. Four species (Chimney

Table 6. Avian Utilization of the Suburban Landscaped Habitat

Year-round residents (16 species)		
Red-bellied Woodpecker	Tufted Titmouse	European Starling
Downy Woodpecker	White-breasted Nuthatch	Song Sparrow
Northern Flicker	Carolina Wren	Northern Cardinal
Blue Jay	American Robin	American Goldfinch
American Crow	Northern Mockingbird	House Sparrow
Black-capped Chickadee		
Summer residents (26 species)		
Sharp-shinned Hawk	Warbling Vireo	Common Yellowthroat
Wild Turkey	Red-eyed Vireo	Chipping Sparrow
Mourning Dove	Fish Crow	Red-winged Blackbird
Chimney Swift	Tree Swallow	Common Grackle
Hairy Woodpecker	Barn Swallow	Brown-headed Cowbird
Eastern Wood-Pewee	House Wren	Orchard Oriole
Great Crested Flycatcher	Veery	Baltimore Oriole
Eastern Kingbird	Gray Catbird	House Finch
White-eyed Vireo	Yellow Warbler	
Winter residents (4 species)		
Ring-necked Pheasant	White-throated Sparrow	Dark-eyed Junco
Eastern Screech-Owl		
Present during Spring and Fall only (16 species)		
Green Heron (S)	Eastern Bluebird (F)	Pine Warbler (S)
Mallard (S)	Wood Thrush (S)	Palm Warbler (F)
Red-tailed Hawk (S/F)	Cedar Waxwing (S/F)	Blackpoll Warbler (S)
Eastern Phoebe (F)	Northern Parula (S)	Black-and-white Warbler (S)
Purple Martin (S)	Yellow-rumped Warbler (F)	Scarlet Tanager (F)
Ruby-crowned Kinglet (F)		

Swift, Purple Martin, Tree Swallow, and Eastern Bluebird) were unique to this habitat, while two others (Eastern Kingbird and Brown-headed Cowbird) were found almost exclusively here.

Thirty-four species exhibited signs of probable or confirmed breeding within this habitat.

Notable breeding activity included:

Red-bellied Woodpeckers singing on multiple occasions in zones 7 and 12,

Eastern Kingbirds holding territory in zone 5,

Warbling Vireo singing on multiple occasions in zone 8,

White-breasted Nuthatch singing on multiple occasions in zone 1,

Northern Mockingbirds singing on multiple occasions in zone 5 and nesting in zone 10,

European Starlings nesting in zone 1,

Yellow Warblers singing on multiple occasions in zones 5 and 7,

Song Sparrow singing on multiple occasions in zone 7,

Northern Cardinal singing on multiple occasions in zone 7, and

Baltimore Orioles singing on multiple occasions in zone 7 and nesting in zone 8.

Mature Eastern Hardwood Forest Habitat

This habitat comprises Habitat Management Zones 2B, 13, 14, 17, 18, and the southern and eastern portions of zone 12. It is the largest habitat on site, containing approximately 16 hectares. With the exception of zone 2B which is isolated in the southwestern corner of the site, these zones comprise one continuous ecosystem along most of the southern and all of the eastern upland portions of Sagamore Hill.

This habitat is identified in the NVCS as Formation code I.B.2.N.a., a “Cold-deciduous lowland oak-maple forest”. Dominant trees include White, Red, Black, and Chestnut Oaks, Red and Norway Maples, Tulip, and Hickory. Midstory trees include Black Birch, Sassafras, Black Cherry, and Cedar. The well-developed understory contains Flowering Dogwood, Mountain Laurel, Jewelweed, Spicebush, and a variety of woody vines and briars.

There is a small seasonal pond in the eastern half of zone 18. This pond was observed to dry out in the summer and for this reason, as well as the reasons discussed above with regard to the pond in zone 7, is most likely not hydraulically connected to the underlying groundwater table.

Birds found in this habitat are listed in Table 7. This habitat had the highest number of winter-resident, migrant, and total species, as well as high numbers of year-round and summer residents. The most abundant species included Red-bellied Woodpecker, Blue Jay, American Crow, Black-capped Chickadee, Tufted Titmouse, White-breasted Nuthatch, and Northern Cardinal, as well as seasonally high numbers of Gray Catbirds and American Robins. Fourteen species (Bald Eagle, Black-billed Cuckoo, Great Horned Owl, Yellow-throated Vireo, Blue-headed Vireo, Winter Wren, Golden-crowned Kinglet, Hermit Thrush, Magnolia Warbler, Blackburnian Warbler, American Redstart, Ovenbird, Northern Waterthrush, and Purple Finch) were found only in this habitat, while Wood Thrush was found almost exclusively here.

Table 7. Avian Utilization of the Mature Forest Habitat

Year-round residents (15 species)		
Red-tailed Hawk	Northern Flicker	White-breasted Nuthatch
Mourning Dove	Blue Jay	Carolina Wren
Red-bellied Woodpecker	American Crow	European Starling
Downy Woodpecker	Black-capped Chickadee	Northern Cardinal
Hairy Woodpecker	Tufted Titmouse	American Goldfinch
Summer residents (21 species)		
Eastern Wood-Pewee	Veery	Scarlet Tanager
Great Crested Flycatcher	Wood Thrush	Chipping Sparrow
Eastern Kingbird	American Robin	Song Sparrow
White-eyed Vireo	Gray Catbird	Red-winged Blackbird
Red-eyed Vireo	Cedar Waxwing	Common Grackle
Fish Crow	Yellow Warbler	Baltimore Oriole
House Wren	American Redstart	House Sparrow
Winter residents (7 species)		
Ring-necked Pheasant	Hermit Thrush	White-throated Sparrow
Eastern Screech-Owl	Northern Mockingbird	Dark-eyed Junco
Golden-crowned Kinglet		
Present during Spring and Fall only (30 species)		
Bald Eagle (F)	Blue-headed Vireo (S/F)	Pine Warbler (S)
Sharp-shinned Hawk (F)	Warbling Vireo (S)	Palm Warbler (F)
Wild Turkey (S)	Winter Wren (S)	Blackpoll Warbler (S)
Rock Dove (S)	Ruby-crowned Kinglet (F)	Black-and-white Warbler (S)
Black-billed Cuckoo (S)	Northern Parula (S/F)	Ovenbird (S)
Yellow-billed Cuckoo (S)	Magnolia Warbler (S)	Northern Waterthrush (S)
Great Horned Owl (S/F)	Cape May Warbler (F)	Common Yellowthroat (S)
Belted Kingfisher (F)	Yellow-rumped Warbler (S/F)	Eastern Towhee (F)
Eastern Phoebe (S)	Black-throated Green Warbler (S)	Purple Finch (F)
Yellow-throated Vireo (S)	Blackburnian Warbler (S)	House Finch (F)

There were 29 probable or confirmed breeding species within this habitat, including:
Eastern Screech-Owl singing on multiple occasions in zone 17,
Great Horned Owl singing on multiple occasions in zone 17,
Downy Woodpecker singing on multiple occasions in zone 17,
Eastern Wood-Pewee singing on multiple occasions in zone 14,
Great Crested Flycatcher singing on multiple occasions in zone 2B,
Red-eyed Vireo singing on multiple occasions in zone 2B,
Tufted Titmouse singing on multiple occasions in zone 13,
White-breasted Nuthatch singing on multiple occasions in zones 17 and 18,
Carolina Wren singing on multiple occasions in zones 17 and 18,
American Robin singing on multiple occasions in zones 17 and 18,
Gray Catbird singing on multiple occasions in zones 17 and 18,
Yellow Warbler singing on multiple occasions in zones 17 and 18,
American Redstart singing on multiple occasions in zone 17,
Song Sparrow singing on multiple occasions in zone 17,
Northern Cardinal singing on multiple occasions in zone 17 and a recent fledgling in zone 18,
Baltimore Oriole singing on multiple occasions in zone 17, and
American Goldfinch singing on multiple occasions in zone 17.

Successional Eastern Hardwood Forest habitat

This habitat consists of Habitat Management Zones 11, 15, 16, the southern portion of zone 9, and northern portion of zone 12. This habitat contains approximately four hectares divided among three discrete areas within the western half of Sagamore Hill. The largest area is found within zones 15 and 16, separated from the rest of the site by a paved, two-lane access road.

Like the Mature Eastern Hardwood Forest Habitat discussed previously, this habitat is identified with NVCS Formation code I.B.2.N.a., a “Cold-deciduous lowland oak-maple forest”. It can be differentiated from the previous habitat by the age of the trees present, the relative proportions of the dominant tree species, and the presence of secondary vegetation not found in the mature forest. Dominant trees in this habitat are Red and Norway Maples, Red Oak, Walnut, and Black Cherry. Secondary vegetation includes Ailanthus, Black Locust, Flowering Dogwood, and Catalpa. Undergrowth consists primarily of poison ivy and other woody vines.

There are no water features within this habitat, although a deep, dry kettlehole is present within the eastern edge of Habitat Management Zone 16.

Table 8 lists the bird species found within this habitat. Numbers of both species and total individuals were generally moderate to low, with the most notable paucity occurring in the number of year-round resident species. The most numerous species in this habitat were Blue Jay, American Crow, Black-capped Chickadee, and Tufted Titmouse, with seasonally high numbers of Gray Catbirds. Only two species (Yellow-bellied Sapsucker and Indigo Bunting) were unique to this habitat, and each was sighted only once.

Table 8. Avian Utilization of the Successional Forest Habitat

Year-round residents (9 species)		
Red-bellied Woodpecker	Black-capped Chickadee	American Robin
Blue Jay	Tufted Titmouse	Northern Mockingbird
American Crow	White-breasted Nuthatch	American Goldfinch
Summer residents (17 species)		
Yellow-billed Cuckoo	Carolina Wren	Song Sparrow
Downy Woodpecker	House Wren	Northern Cardinal
Hairy Woodpecker	Gray Catbird	Indigo Bunting
Northern Flicker	Yellow Warbler	Common Grackle
Red-eyed Vireo	Pine Warbler	House Sparrow
Fish Crow	Chipping Sparrow	
Winter residents (5 species)		
Eastern Screech-Owl	European Starling	Dark-eyed Junco
Yellow-bellied Sapsucker	White-throated Sparrow	
Present during Spring and Fall only (15 species)		
Red-tailed Hawk (S)	Veery (F)	Blackpoll Warbler (S)
Ring-necked Pheasant (S)	Northern Parula (S)	Eastern Towhee (S)
Mourning Dove (S)	Yellow-rumped Warbler (S)	Red-winged Blackbird (S/F)
Great Crested Flycatcher (S)	Black-throated Green Warbler (S)	Orchard Oriole (S)
Ruby-crowned Kinglet (F)	Palm Warbler (S)	Baltimore Oriole (S/F)

There were 15 probable or confirmed breeding species within this habitat, including:
Northern Flicker singing on multiple occasions in zone 16,
Red-eyed Vireo singing on multiple occasions in zone 15,
Blue Jay singing on multiple occasions in zone 15,
Black-capped Chickadee at an active nest site in zone 11,
House Wren singing on multiple occasions in zone 11,
American Robin singing on multiple occasions in zone 16,
Song Sparrow singing on multiple occasions in zone 11, and
Northern Cardinal singing on multiple occasions in zone 16.

Salt Marsh Habitat

This habitat consists entirely of the four hectare Eel Creek salt marsh identified as Habitat Management Zone 19, located within the eastern quadrant of Sagamore Hill National Historic Site.

This habitat is identified as NVCS Formation code V.A.5.N.n.1., a “Temperate grassland, tidal: “*Spartina alterniflora* tidal herbaceous”. *Spartina alterniflora* is the dominant species of vegetation, covering approximately half of the area of this habitat. The remainder consists primarily of water surface and mud flats, the proportion of each depending upon the phase of the tide.

Bird species found within this habitat are listed in Table 9. Despite its small size, this habitat had the second highest numbers of summer resident, winter resident, and migrant species. The most numerous species in this habitat were Canada Goose, American Black Duck, Red-winged Blackbird, and Common Grackle. Seven species (Black-crowned Night Heron, Virginia Rail, Spotted Sandpiper, Wilson’s Snipe, Belted Kingfisher, Marsh Wren, and Rusty Blackbird) were unique to this habitat, and American Black Duck was found almost exclusively here.

There were 17 probable or confirmed breeding species in this habitat. Notable sightings of breeding activity included:

Black-crowned Night Herons responding to taped calls,
Canada Goose nesting,
Yellow Warbler singing on multiple occasions, and
Song Sparrow at a probable nesting site.

Beach Habitat

This habitat consists of the approximately one hectare low-lying cobble beach and sand/cobble flats between Eel Creek salt marsh and the open waters of Cold Spring Harbor. Located at the eastern end of Sagamore Hill National Historic Site, it is contained entirely within Habitat Management Zone 20.

Table 9. Avian Utilization of the Salt Marsh Habitat

Year-round residents (8 species)		
Great Blue Heron	Red-bellied Woodpecker	European Starling
Mallard	Blue Jay	American Goldfinch
Herring Gull	American Crow	
Summer residents (24 species)		
Great Egret	Rock Dove	Gray Catbird
Snowy Egret	Mourning Dove	Northern Mockingbird
Green Heron	Northern Flicker	Yellow Warbler
Black-crowned Night Heron	Eastern Kingbird	Song Sparrow
Osprey	Red-eyed Vireo	Red-winged Blackbird
Red-tailed Hawk	Barn Swallow	Common Grackle
Virginia Rail	Carolina Wren	Baltimore Oriole
Spotted Sandpiper	American Robin	House Sparrow
Winter residents (5 species)		
Canada Goose	Ring-billed Gull	White-throated Sparrow
American Black Duck	Belted Kingfisher	
Present during Spring and Fall only (16 species)		
Double-crested Cormorant (S/F)	Yellow-billed Cuckoo (S)	Dark-eyed Junco (F)
Mute Swan (S)	Fish Crow (F)	Northern Cardinal (S)
Wild Turkey (S)	Tufted Titmouse (S)	Rusty Blackbird (F)
Greater Yellowlegs (S)	Marsh Wren (F)	Brown-headed Cowbird (F)
Wilson's Snipe (F)	Ruby-crowned Kinglet (F)	Orchard Oriole (S)
Great Black-backed Gull (S)		

This beach habitat is best described by NVCS Formation code VII.C.2.N.a., “Sparsely vegetated sand flats”. It contains a small stand of young black locust trees, and is otherwise sparsely to moderately vegetated with beach grasses and herbaceous forbs. During high tide, a narrow north-south swale floods along most of the length of this habitat, nearly dividing it into eastern and western halves.

Birds found within this habitat are listed in Table 10. Although host to a good number of summer resident species, this habitat had the lowest number of total species of all on-site habitats. The most numerous species present in this habitat were gulls (Herring, Ring-billed, Great Black-backed, and Laughing) and European Starling, with occasional peaks of Canada Goose, Barn Swallow, Red-winged Blackbird, and House Sparrow. Three species (Sanderling, American Tree Sparrow, and Pine Siskin) were found only in this habitat, and each was found on only one occasion.

There were 14 probable or confirmed breeding species within this habitat, also the lowest total among all on-site habitats. Notable breeding activities included: Northern Mockingbird singing on multiple occasions among the black locust trees, with the subsequent appearance of fledged young in the same area, and Song Sparrow at a probable nesting site.

Open Water Habitat

Although not within the boundaries of Sagamore Hill National Historic Site, the adjacent open waters of Cold Spring Harbor offer possible foraging and resting opportunities for on-site birds and therefore were surveyed as part of this study. This habitat is not defined by any NVCS code.

Birds found in this open water habitat are listed in Table 11. Not surprisingly, this habitat had the lowest numbers of species in all categories except “winter resident”, in which it tied for the highest number of species. The most abundant frequently encountered species were American Black Duck and Herring Gull, with extreme seasonal highs of Greater Scaup. Seven species (Red-throated Loon, Common Loon, Greater Scaup, Long-tailed Duck, Bufflehead, Common Goldeneye, and Red-breasted Merganser) were unique to this habitat. All of these unique species are migrant and/or overwintering waterfowl. There was no breeding activity observed in this habitat.

Table 10. Avian Utilization of the Beach Habitat

Year-round residents (4 species)		
Canada Goose	Herring Gull	Great Black-backed Gull
Ring-billed Gull		
Summer residents (21 species)		
Double-crested Cormorant	Common Tern	European Starling
Great Egret	Least Tern	Song Sparrow
Snowy Egret	Mourning Dove	Red-winged Blackbird
Green Heron	Eastern Kingbird	Common Grackle
Mallard	American Crow	House Finch
Osprey	Barn Swallow	American Goldfinch
Laughing Gull	Northern Mockingbird	House Sparrow
Winter residents (2 species)		
American Black Duck	Pine Siskin	
Present during Spring and Fall only (11 species)		
Great Blue Heron (F)	Eastern Phoebe (F)	Yellow-rumped Warbler (F)
Greater Yellowlegs (F*)	Blue Jay (F)	Palm Warbler (F)
Sanderling (S)	American Robin (S)	American Tree Sparrow (F)
Northern Flicker (F)	Cape May Warbler (F)	

Table 11. Avian Utilization of the Open Water (Cold Spring Harbor) Habitat

Year-round residents (3 species)		
Mallard	Herring Gull	Great Black-backed Gull
Summer residents (8 species)		
Double-crested Cormorant	Osprey	Least Tern
Great Blue Heron	Ring-billed Gull	Barn Swallow
Great Egret	Common Tern	
Winter residents (7 species)		
Mute Swan	Long-tailed Duck	Common Goldeneye
Canada Goose	Bufflehead	Red-breasted Merganser
American Black Duck		
Present during Spring and Fall only (4 species)		
Red-throated Loon	Greater Scaup	Laughing Gull
Common Loon		

Conclusions

Habitat Management Recommendations

Due to the nature and mission of Sagamore Hill National Historic Site, park management plans must strike a balance between historical integrity and ecological management. The eastern half of the site (Zones 14, 17, 18, 19, and 20) has retained much of its natural character, consisting as it does of mature forest, salt marsh, and beach habitats. These areas are rich in avian abundance and diversity, and every effort should be made to avoid any changes to, or new impacts upon, these areas. The existing low levels of public use, consisting of both ranger-led and unguided nature walks, can be supported within these Habitat Management Zones. New active or intensive recreational uses should not be introduced into these ecologically-sensitive areas.

Similar recommendations pertain to the forested areas along the southern portion of the site. Habitat Management Zone 2B in particular has hosted several unique and notable species, including Winter Wren, both kinglets, Hermit Thrush, Black-and-white Warbler, Great Crested Flycatcher, and Red-eyed Vireo, the latter two species likely breeding within this zone. In addition, Zones 2B and 13 contain substantial areas of steep slopes which should not be cleared or otherwise disturbed due to concerns regarding potential erosion. Habitat Management Zone 11, an area of successional forest between these two mature forested zones, also produced several notable species including Yellow-billed Cuckoo, House Wren, Ruby-crowned Kinglet, Veery, Blackpoll Warbler, Indigo Bunting, Orchard Oriole, and nesting Black-capped Chickadees.

The suburban landscaped areas offer the greatest opportunities for habitat improvement. As noted in the Discussion, four separate zones (2A, 3, 5, and 8) offer the potential to be managed as grasslands. Of the four, Zone 2A is the most promising, due to its larger size and relative isolation from areas of human activity. Zone 3 is small and located within areas of frequent human visitation, while Zone 8 is occasionally used for equestrian activities and other public events. Habitat Management Zone 5 is arguably at present the most successful of the four zones, with nesting Eastern Kingbirds and visiting Cedar Waxwings, Yellow and Palm Warblers, Chipping Sparrows, and both Orchard and Baltimore Orioles. Physical modification of the existing habitat within Zone 5 should be avoided if at all possible.

Management of Zone 2A as a grassland could be accomplished rather easily through the implementation of the following two practices:

Mowing should be limited to once per year, preferably in late October or November after most southbound fall migrants have passed through this area. Once-yearly mowing is necessary to prevent colonization by woody shrubs and eventual succession into old field/brushy habitat. Installation of suitably sized nest boxes around the perimeter of the field so as to attract cavity-nesting grassland species such as Tree Swallow and Eastern Bluebird. Due to the presence of other cavity-nesting species (European Starling, House Sparrow) around the main house and outbuildings, nest boxes should be actively managed to prevent their use by these undesirable species.

One additional management issue regarding the suburban landscaped area concerns the small pond within Habitat Management Zone 7. As noted in the Discussion, this pond is maintained by runoff from adjacent upland areas, primarily Zones 5, 7, 9, and the northwestern corner of Zone 8. Any physical modifications within this drainage area should be conducted in such a way as to preserve an adequate quantity and quality of stormwater runoff to this small pond.

The successional forested areas within Habitat Management Zones 15 and 16 contained relatively low levels of avian diversity and abundance. Both zones are dominated by Norway Maple, a non-native invasive species of limited value to wildlife. To the maximum extent practicable, individuals of this species should be removed and replaced by native trees typical of a northeastern successional forest, such as Red Maple, Flowering Dogwood, and various oaks and birches.

Checklist

Finally, Appendix G contains a checklist which can be adapted and reproduced for distribution to park visitors. The seasons and abundance categories as defined in the checklist are consistent with those used in similar checklists throughout the United States. Basically, each season consists of three complete months roughly corresponding to the precise solstice and equinox based seasonal delineation. Thus, in the checklist “spring” encompasses the period of March 1 through May 31, rather than the solar-based interval of approximately March 20 to June 21.

“Common” species should be seen on at least two-thirds of all site visits within a given season, while “fairly common” species would be expected on one-third to two-thirds of such visits and “uncommon” species would be found even less frequently. For the purpose of developing this checklist, “rare” species are those in which a single bird was found on a single date within the given season during this study; more frequent sightings or the presence of multiple birds on a single date qualify the species for at least “uncommon” status. The checklist should be regarded as a “living document.” Further observations by park visitors and staff are likely to eventually result in the inclusion of additional “rare” species and the possible upgrading of some rare species to “uncommon” status.

Mention should be made of the seasonal occurrence of Eastern Screech-Owl and Great Horned Owl as listed in the checklist. As noted in the Discussion section of this report it is highly likely that both species are present year-round at this location. However, from the perspective of a birder attempting to actually find these birds, success is likely only during those seasons in which these species are vocalizing. The checklist reflects this perspective, stressing as it does the likelihood of encountering a species on each site visit. For all other listed species, the checklist reflects the actual presence or absence of a species during each season.

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Appendix A. Sample field data sheets.

This appendix contains two complete sample field data sheets, illustrating both the “normal” and “reversed” routes used in censusing this site. These examples replicate the actual sheets as completed during the first two site visits, with typographical symbols, i.e. [#], “#”, and #, replacing the colored inks or geometric symbols (box, circle, underline) actually used in the field.

In the first example, all birds observed in Habitat Management Zone 1 from Census Point A are to be indicated by an unadorned number, those in zone 2A indicated by [brackets], birds in zone 3 by “quotation marks”, and in zone 4 by underline. The location notes in parenthesis, e.g. “(house)”, “(hill)”, etc., were present on the field data sheets to assist the researcher in maintaining his bearings throughout the site.

As read from the sample sheet, the actual results from Census Point A on January 5, 2003 were as follows:

Eleven Canada Geese overflowed zone 1 without landing within sight of the researcher;

Twelve European Starlings were observed within 0 - 25 m of the census point, all within zone 1;

Five American Crows were observed in zone 1 within the 0 - 25-m distance interval and two additional American Crows were found in zone 3, within the 25 - 50-m interval;

One White-breasted Nuthatch was in zone 4, 25 - 50 m from the census point; and

Two Tufted Titmice were found in zone 1, one bird within 25 - 50 m of the census point and the other more than 50 m away.

No birds were found within zone 2A during this visit.

The remaining census point results can be read in the same manner.

Appendix A. Sample field data sheets (continued).

Sagamore Hill

Date: 1/5/03

Census Point A	Time:		8:07 AM	8:14 AM
Zones: 1 (house); [2A] (hill); "3" (south); <u>4</u> (north)				
Species	0-25 m	25-50 m	> 50 m	Flyover
CAGO				11
EUST	12			
AMCR	5	"2"		
WBNU		<u>1</u>		
ETTI		1	1	

Temp: 30 F

Weather: Sunny

Census Point C	Time:		8:30 AM	8:37 AM
Zone: 2B				
Species	0-25 m	25-50 m	> 50 m	Flyover
BCCH		1		
CAGO				21
WBNU			1	
ETTI		2		
BLJA	1			
AMCR			3	1
DOWO		1		

Census Point B Time: 8:18 AM 8:25 AM

Zones: 11 (west); [13] (east, ravine)

Species 0-25 m 25-50 m > 50 m Flyover

BLJA	1	[1]	[1]	[1]
NOMO		[1]; 1		
MODO		[1]		
WBNU			[1]	
ETTI		1		

Census Point D Time: 8:45 AM 8:52 AM

Zones: 15 (west); [16] (east, here)

Species 0-25 m 25-50 m > 50 m Flyover

RBWO		2		
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Appendix A. Sample field data sheets (continued).

Sagamore Hill - page 2

Census Point E		Time: 8:57 AM 9:04 AM		
Zones: 5 (south); [7] (around pond)				
Species	0-25 m	25-50 m	> 50 m	Flyover
NOMO		[2]		
RBWO	[1]			
WBNU	[2]	1		
ETTI	[1]	1		
BCCH		[1]		

Date: 1/5/03

Census Point G		Time: 9:17 AM 9:24 AM		
Zones: 6 (house); [8] (field); "12" (SW); <u>14</u> (SE)				
Species	0-25 m	25-50 m	> 50 m	Flyover
BCCH	"2"			
EUST	"4"			[2]
AMGO		[2]		
RBWO		1		
CARW		"1" ; <u>1</u>		
BLJA		1		

Census Point F		Time: 9:06 AM 9:13 AM		
Zones: 5 (N); [9] (PL & south); "10" (Vis. Ctr); <u>12</u> (far S)				
Species	0-25 m	25-50 m	> 50 m	Flyover
AMCR	[3]			[2]
RBWO	[1]			
EUST	[3]	[6]		
DOWO		[1]		
CARW	[1]	[1]		
NOMO		[1]		
BLJA		[2]		
BCCH	[1]	[1]		

Census Point H		Time: 9:29 AM 9:36 AM		
Zones: 17 (north); [18] (south)				
Species	0-25 m	25-50 m	> 50 m	Flyover
RBWO	1			
BCCH	[2]	1		
WBNU		[1]		
NOCA	1			
BLJA		[3]	3	
HERG				3
NOMO		[1]		
ETTI		1		

Appendix A. Sample field data sheets (continued).

Sagamore Hill - page 3

Census Point I	Time:		9:40 AM	9:47 AM
Zones: 17 (north); [18] (south, pond); "19" (marsh)				
Species	0-25 m	25-50 m	> 50 m	Flyover
CARW		[2]		
ETTI	[2]	[2]		
DOWO	[1]			
WBNU	[1]	[2]		
BLJA	[3]		[2]	
BEKI			"1"	

Date: 1/5/03

Census Point K	Time:		10:02 AM	10:11 AM
Zones: 19 (marsh); [20] (beach); "Bay"				
Species	0-25 m	25-50 m	> 50 m	Flyover
HERG		[20]		
BUFF			"13"	
RBME		"6"	"16"	
LTDU			"1"	
BEKI				1
EUST				75
COGO			"4"	

Census Point J	Time:		9:51 AM	9:58 AM
Zones: 19 (marsh); [20] (beach)				
Species	0-25 m	25-50 m	> 50 m	Flyover
ABDU	18			1
MALL	2			
GBHE	1			
CAGO				16
HERG				1

Census Point L	Time:		10:19 AM	10:26 AM
Zones: 17 (here); [19] (marsh)				
Species	0-25 m	25-50 m	> 50 m	Flyover
AMCR			2	
RBWO	1	1	[1]	
BCCH		1		
ETTI	3		1	
DOWO	1			
WBNU			1	
AMGO		1		1

Appendix A. Sample field data sheets (continued).

Sagamore Hill - Reversed Date: 1/18/03

Census Point L	Time:		8:14 AM	8:21 AM
Zones: 17 (here); [19] (marsh)				
Species	0-25 m	25-50 m	> 50 m	Flyover
ETTI		2	1	
DOWO	2			
BLJA		1		
AMGO	11			2
RBWO	1			
CARW		1		
BCCH	3	1		1
WBNU		1		
RPHE		1		
NOCA	1			
AMCR			1	

Temp: 7 F Weather: Sunny

Census Point K	Time:		8:32 AM	8:39 AM
Zones: 19 (marsh); [20] (beach); "Bay"				
Species	0-25 m	25-50 m	> 50 m	Flyover
GBBG			"1"	
HERG			"120"	"3"
LTDU			"2"	
CAGO			"1"	
ABDU			"12"	
BUFF			"8"	
RBME			"4"	
MUSW			"2"	

Census Point J Time: 8:23 AM 8:30 AM

Zones: 19 (marsh); [20] (beach)

Species	0-25 m	25-50 m	> 50 m	Flyover
GBHE		1		

Census Point I Time: 8:43 AM 8:50 AM

Zones: 17 (north); [18] (south, pond); "19" (marsh)

Species	0-25 m	25-50 m	> 50 m	Flyover
BLJA		[3]	1	
NOCA		[2]		
ETTI	[1]	[1]		
HAWO		[1]		
WBNU		[1]		
AMGO	[1]	[2]		
AMCR				[1]
RBWO		1		

Appendix A. Sample field data sheets (continued).

Sagamore Hill - Reversed - page 2

Census Point H	Time:		8:53 AM	9:00 AM
Zones: 17 (north); [18] (south)				
Species	0-25 m	25-50 m	> 50 m	Flyover
BCCH	[1]			
RBWO	[1]			

Date: 1/18/03

Census Point F	Time:		9:15 AM	9:22 AM
Zones: 5 (N); [9] (PL & south); "10" (Vis. Ctr); <u>12</u> (far S)				
Species	0-25 m	25-50 m	> 50 m	Flyover
BLJA	1	<u>1</u>		
RBWO	1			
NOCA	1			

Census Point G	Time:		9:05 AM	9:12 AM
Zones: 6 (house); [8] (field); "12" (SW); <u>14</u> (SE)				
Species	0-25 m	25-50 m	> 50 m	Flyover
ETTI		"1"		
AMCR			<u>2</u> ; [1]	
EUST		[1]		

Census Point E	Time:		9:23 AM	9:30 AM
Zones: 5 (south); [7] (around pond)				
Species	0-25 m	25-50 m	> 50 m	Flyover
ETTI		[2]		
AMCR			[3]	[3]
BLJA	[1]		[1]	
WTSP	[7]			
SOSP	[1]			
NOMO	[2]			
YSFL	[1]			
EUST	[54]			
BCCH	1			

Appendix A. Sample field data sheets (continued).

Sagamore Hill - Reversed - page 3

Census Point D	Time:		9:37 AM	9:44 AM
Zones: 15 (west); [16] (east, here)				
Species	0-25 m	25-50 m	> 50 m	Flyover
RBWO			1	
YBSA			1	

Date: 1/18/03

Census Point B	Time:		10:05 AM	10:12 AM
Zones: 11 (west); [13] (east, ravine)				
Species	0-25 m	25-50 m	> 50 m	Flyover
HETH	[1]			
RBWO		[1]		
WBNU			[1]	
BCCH			[1]	
ETTI	1			

Census Point C	Time:		9:52 AM	9:59 AM
Zone: 2B				
Species	0-25 m	25-50 m	> 50 m	Flyover
BCCH	2	1		
BLJA	1	1		
ETTI	1	1		
WBNU		1		
RBWO	1			
AMCR		1		

Census Point A	Time:		10:16 AM	10:23 AM
Zones: 1 (house); [2A] (hill); "3" (south); <u>4</u> (north)				
Species	0-25 m	25-50 m	> 50 m	Flyover
RBWO		[1]		

Appendix B. Alpha code keys.

Alpha Code Key (in taxonomic order)

Code	Species Name	Code	Species Name	Code	Species Name
RTLO	Red-throated Loon	YBSA	Yellow-bellied Sapsucker	MAWA	Magnolia Warbler
COLO	Common Loon	DOWO	Downy Woodpecker	CMWA	Cape May Warbler
DCCO	Double-crested Cormorant	HAWO	Hairy Woodpecker	MYWA	Yellow-rumped Warbler
GBHE	Great Blue Heron	YSFL	Northern Flicker	BTNW	Black-throated Green Warbler
GREG	Great Egret	EAWP	Eastern Wood-Pewee	BLBW	Blackburnian Warbler
SNEG	Snowy Egret	EAPH	Eastern Phoebe	PIWA	Pine Warbler
GRHE	Green Heron	GCFL	Great Crested Flycatcher	YPWA	Palm Warbler
MUSW	Mute Swan	EAKI	Eastern Kingbird	BLPW	Blackpoll Warbler
CAGO	Canada Goose	WEVI	White-eyed Vireo	BAWW	Black-and-white Warbler
ABDU	American Black Duck	YTVI	Yellow-throated Vireo	AMRE	American Redstart
MALL	Mallard	BHVI	Blue-headed Vireo	OVEN	Ovenbird
GRSC	Greater Scaup	WAVI	Warbling Vireo	NOWA	Northern Waterthrush
LTDU	Long-tailed Duck	REVI	Red-eyed Vireo	COYE	Common Yellowthroat
BUFF	Bufflehead	BLJA	Blue Jay	SCTA	Scarlet Tanager
COGO	Common Goldeneye	AMCR	American Crow	EATO	Eastern Towhee
RBME	Red-breasted Merganser	FICR	Fish Crow	ATSP	American Tree Sparrow
OSPR	Osprey	PUMA	Purple Martin	CHSP	Chipping Sparrow
BAEA	Bald Eagle	TRES	Tree Swallow	SOSP	Song Sparrow
SSHA	Sharp-shinned Hawk	BARS	Barn Swallow	WTSP	White-throated Sparrow
RTHA	Red-tailed Hawk	BCCH	Black-capped Chickadee	SCJU	Dark-eyed Junco
RPHE	Ring-necked Pheasant	ETTI	Tufted Titmouse	NOCA	Northern Cardinal
WITU	Wild Turkey	WBNU	White-breasted Nuthatch	INBU	Indigo Bunting
GRYE	Greater Yellowlegs	CARW	Carolina Wren	RWBL	Red-winged Blackbird
SPSA	Spotted Sandpiper	HOWR	House Wren	RUBL	Rusty Blackbird
SAND	Sanderling	WIWR	Winter Wren	COGR	Common Grackle
WISN	Wilson's Snipe	MAWR	Marsh Wren	BHCO	Brown-headed Cowbird
LAGU	Laughing Gull	GCKI	Golden-crowned Kinglet	OROR	Orchard Oriole
RBGU	Ring-billed Gull	RCKI	Ruby-crowned Kinglet	BAOR	Baltimore Oriole
HERG	Herring Gull	EABL	Eastern Bluebird	PUFI	Purple Finch
GBBG	Great Black-backed Gull	VEER	Veery	HOFI	House Finch
COTE	Common Tern	HETH	Hermit Thrush	PISI	Pine Siskin
LETE	Least Tern	WOTH	Wood Thrush	AMGO	American Goldfinch
RODO	Rock Dove	AMRO	American Robin	HOSP	House Sparrow
MODO	Mourning Dove	GRCA	Gray Catbird		
BBCU	Black-billed Cuckoo	NOMO	Northern Mockingbird		
YBCU	Yellow-billed Cuckoo	EUST	European Starling		
CHSW	Chimney Swift	CEDW	Cedar Waxwing		
BEKI	Belted Kingfisher	NOPA	Northern Parula		
RBWO	Red-bellied Woodpecker	YWAR	Yellow Warbler		

Appendix B. Alpha code keys (continued).

Alpha Code Key (in alphabetical order)

Code	Species Name	Code	Species Name	Code	Species Name
ABDU	American Black Duck	EUST	European Starling	RBME	Red-breasted Merganser
AMCR	American Crow	FICR	Fish Crow	RBWO	Red-bellied Woodpecker
AMGO	American Goldfinch	GBBG	Great Black-backed Gull	RCKI	Ruby-crowned Kinglet
AMRE	American Redstart	GBHE	Great Blue Heron	REVI	Red-eyed Vireo
AMRO	American Robin	GCFL	Great Crested Flycatcher	RODO	Rock Dove
ATSP	American Tree Sparrow	GCKI	Golden-crowned Kinglet	RPHE	Ring-necked Pheasant
BAEA	Bald Eagle	GRCA	Gray Catbird	RTHA	Red-tailed Hawk
BAOR	Baltimore Oriole	GREG	Great Egret	RTLO	Red-throated Loon
BARS	Barn Swallow	GRHE	Green Heron	RUBL	Rusty Blackbird
BAWW	Black-and-white Warbler	GRSC	Greater Scaup	RWBL	Red-winged Blackbird
BBCU	Black-billed Cuckoo	GRYE	Greater Yellowlegs	SAND	Sanderling
BCCH	Black-capped Chickadee	HAWO	Hairy Woodpecker	SCJU	Dark-eyed Junco
BEKI	Belted Kingfisher	HERG	Herring Gull	SCTA	Scarlet Tanager
BHCO	Brown-headed Cowbird	HETH	Hermit Thrush	SNEG	Snowy Egret
BHVI	Blue-headed Vireo	HOFI	House Finch	SOSP	Song Sparrow
BLBW	Blackburnian Warbler	HOSP	House Sparrow	SPSA	Spotted Sandpiper
BLJA	Blue Jay	HOWR	House Wren	SSHA	Sharp-shinned Hawk
BLPW	Blackpoll Warbler	INBU	Indigo Bunting	TRES	Tree Swallow
BTNW	Black-throated Green Warbler	LAGU	Laughing Gull	VEER	Veery
BUFF	Bufflehead	LETE	Least Tern	WAVI	Warbling Vireo
CAGO	Canada Goose	LTDU	Long-tailed Duck	WBNU	White-breasted Nuthatch
CARW	Carolina Wren	MALL	Mallard	WEVI	White-eyed Vireo
CEDW	Cedar Waxwing	MAWA	Magnolia Warbler	WISN	Wilson's Snipe
CHSP	Chipping Sparrow	MAWR	Marsh Wren	WITU	Wild Turkey
CHSW	Chimney Swift	MODO	Mourning Dove	WIWR	Winter Wren
CMWA	Cape May Warbler	MUSW	Mute Swan	WOTH	Wood Thrush
COGO	Common Goldeneye	MYWA	Yellow-rumped Warbler	WTSP	White-throated Sparrow
COGR	Common Grackle	NOCA	Northern Cardinal	YBCU	Yellow-billed Cuckoo
COLO	Common Loon	NOMO	Northern Mockingbird	YBSA	Yellow-bellied Sapsucker
COTE	Common Tern	NOPA	Northern Parula	YPWA	Palm Warbler
COYE	Common Yellowthroat	NOWA	Northern Waterthrush	YSFL	Northern Flicker
DCCO	Double-crested Cormorant	OROR	Orchard Oriole	YTVI	Yellow-throated Vireo
DOWO	Downy Woodpecker	OSPR	Osprey	YWAR	Yellow Warbler
EABL	Eastern Bluebird	OVEN	Ovenbird		
EAKI	Eastern Kingbird	PISI	Pine Siskin		
EAPH	Eastern Phoebe	PIWA	Pine Warbler		
EATO	Eastern Towhee	PUFI	Purple Finch		
EAWP	Eastern Wood-Pewee	PUMA	Purple Martin		
ETTI	Tufted Titmouse	RBGU	Ring-billed Gull		

Appendix C. Annual summary.

Annual Summary: 2003		Page 1																																	
Dates:	January		February		March		April			May				June		July			August			September				October		November		December					
	5	18	2	16	1	8	6	13	27	4	11	18	25	31	8	21	4	20	26	9	16	30	6	13	21	27	12	25	11	23	14	20			
RTLO																																	1		
COLO										2																	1			1					
DCCO							2	1	2	7	10	2		3	2	2	2	3	1		1			2	2	1	4	1							
GBHE	1	1															1	5						1	1	2	1	1	1	1			1		
GREG							1	1	1			1	1	3	1	1				2	1	1		1	1		1								
SNEG										1		2				1			1					1		1									
GRHE											1	1	1							2			2												
MUSW		2							1				2																						
CAGO	48	1	26	33		5		3	2	8			7		8								8			4	5		59	5	8				
ABDU	19	12	33	250	120	50	24	19																	2	8	37	28	34	9	60	142			
MALL	2		3		4	6	4			2		1	2		2		2	2					4	15			4	1					8		
GRSC					4500	3000		3																											
LTDU	1	2			1	3	1	4	2																		2		2				12		
BUFF	13	8			4		4																						14	44			3		
COGO	4				29																													1	
RBME	22	4		3			3	1	2																										
OSPR							3	1		1	1	4	1		1		1	1		1	1			3	1										
BAEA																											1								
SSHA							1	1									1													1					
RTHA			6		2		3	1		1	1	1		1	3												1		1						
RPHE		1		2		2	1																												
WITU							22	17					14		4																				
GRYE							1			1	1											1													
SPSA										1							1																		
SAND												5																							
WISN																																		1	
LAGU										1								2						36	57		1								
RBGU							10	2		2	4				4			1						1	1	1	1	2					6		
HERG	24	123	177	25	50	57	19	4	8	3	6	2	5				4	2	6	7	2	7	6	22	8	18	3	3	10	2	15	4			
GBBG		1	3	1	3	5	1			2			11		4	7	1		2	2	1	2	2	2	1				1				3		
COTE																																			
LETE																																			
RODO										1																									
MODO	1				5	2	1			7	4	3	3		11	7	7	1					6	6	1	2	1	2	1	4					
BBCU												1																							

Appendix C. Annual summary (continued).

Annual Summary: 2003		Page 2																																		
Dates:	January		February		March		April			May					June		July			August			September				October		November		December					
	5	18	2	16	1	8	6	13	27	4	11	18	25	31	8	21	4	20	26	9	16	30	6	13	21	27	12	25	11	23	14	20				
YBCU														2								1														
CHSW															2																					
BEKI	1							1					1														1		2							
RBWO	9	8	2	8	5	6	5	8	4	8	10	5	7	7	11	2	2	6	2	8	10	12	11	4	10	10	12	13	6	9	10	17				
YBSA		1																																		
DOWO	4	2			2	2	2	1	3	1	1	1	1		2	2	5	1	2	2	3	1	8	1	3	4		2	2	5	1	1				
HAWO		1		1			1	2	1				1		3		1	1		6	2	1	1		1					1	2					
YSFL		1	1			1		8	6	6	3	2	3	1	4	1	3	10		2	3	4	9	6	10	1	10	2	1	1						
EAWP									1	1			2		1	1																				
EAPH										1		1														1	1									
GCFL											6	1	1		4	2	3	1																		
EAKI										2	2	2	9	2	7	4	3	13	7	4																
WEVI																	2																			
YTVI										1																										
BHVI											1													1												
WAVI												3	1				2																			
REVI												3	2	2	5	2	1							1												
BLJA	19	10	2	13	10	19	2	8	7	4	4	10	4	11	5	12	9	3	13	17	18	29	14	34	20	30	47	25	31	17	16					
AMCR	18	12	30	17	29	35	29	31	17	19	14	14	19	13	19	17	30	12	11	12	33	11	16	10	18	15	16	19	13	11	4	10				
FICR							2	1		1							1		4	1	2					1										
PUMA													1																							
TRES															1																					
BARS									1	1	2	4	2	2	6	21	2	2	5	1	4															
BCCH	10	11	13	9	5	9	2	9	15	5	6	2	5	2	4	1	8	11	7	11	17	7	17	15	18	8	15	3	19	7	13	16				
ETTI	16	11	17	28	17	37	5	17	16	19	9	5	12	13	16	7	26	20	3	15	14	6	12		10	5	7	4	6	1	2	7				
WBNU	11	4	6	4	2	3	5	2		1	1				3	1	4	7		8	6	4	4	1	6	3	1	5	4	5	2	4				
CARW	6	1	2		2	1	2	2	2	2	2	2	1		1	3	2	3	1	6	3	4	3	4	3	1	8	3	1	3	2	1				
HOWR									1	5	1	1	1		1	2	3	1	2				1													
WIWR					1																															
MAWR																											1									
GCKI								1																							1		1			
RCKI																											2	10								
EABL																															2					
VEER											1				1		1							2												
HETH		1																										5								
WOTH											1	1	1		1	1	1								1											
AMRO					5		22	24	8	9	9	12	6	7	4	12	10	5	1	10	3	6	4	3	28	31	10	82	42	2					4	

Appendix C. Annual summary (continued).

Annual Summary: 2003		Page 3										
Dates:	January	February	March	April	May	June	July	August	September	October	November	December
	5 18	2 16	1 8	6 13 27	4 11 18 25 31	8 21	4 20 26	9 16 30	6 13 21 27	12 25	11 23	14 20
MAWA					1							
CMWA										2		
MYWA				4	2 1					10 3		
BTNW					1 1							
BLBW					1							
PIWA				1 2		1						
YPWA								3 2 12		4 1		
BLPW					6 1							
BAWW					1 1							
AMRE					1 1	1						
OVEN						2						
NOWA					1							
COYE					1	2						
SCTA					1		1			1		
EATO				1						1		
ATSP												2
CHSP				1 1 10	15 12 3 8 6	8 15	15 22 18	32 16 5	26 39	5	7 2 1	
SOSP	1	1	1	1 1 1	3 4 2 1 2	4 5	6 5 2	5 3 2		3	8 2 3 2 2	
WTSP	7	7		3 4 5 1							6 27 3 6 13 5	
SCJU		1	13								15 12 13 29 27	
NOCA	1 4 1 4 4	7	2 6 5	7 7 7 9 4	4 12	6 4	7 4	4 4 2 6 3		4 7 2 4 2 3		
INBU						1						
RWBL			2	1 12	12 10 10 14 15	17 60	10 13 8	1 1	2		## 1 16	
RUBL											4	
COGR				2 49	12 17 15 18 21	29 19	18 5		3 30 279	90 47		
BHCO						1	7 5				20	
OROR					2 3	1				1		
BAOR					3 4 4 2 5	4 5	3 1	2		1		
PUFI											4	
HOFI				1 1		3	1					
PISI												7
AMGO	4 16 1			1 5 10	7 14 6 9	8 16	5 10 4	19 17 4 11	11 1	2 6 6 8 2 23		
HOSP			4	6 12 4	2 1 3 2 4	3 4	38 13 14	9 29 9 7	1 13	7 10 4		3

Appendix D. Zone-based data summaries.

Habitat Structure Assessment Zone 1

General description of habitat: Residential character: Main house, turfgrass, ornamental trees and shrubs.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer			
			Conifer	Broadleaf	Forbs, Ferns	Grass-like Main Species
Upperstory : >15 m	40%	Clumped	50%	50%		N/A Norway Maple, White Pine, <i>Fagus</i> sp.
Midstory: 5 - 15 m	40%	Clumped	45%	55%		N/A Cherry, <i>Betula</i> sp.
Understory: 0.5 - 5 m	50%	Clumped	40%	60%		Flowering Dogwood

Ground cover: < 0.5 m			Woody	Nonvascular Forbs, Ferns	Grass-like
Live vegetation	90%	Surrounding			100%
Dead vegetation		N/A			
Non-vegetative	10%	N/A			

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	Paved driveway and path, gravel path, mown lawn areas.
Human-made Structures	Main house.

Drainage: Well drained.
Slope: Slight east-facing slope.
Geography: Hilltop.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 2A

General description of habitat: Tall grassland with scattered trees in northern section.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer			Main Species
			Conifer	Broadleaf	Forbs, Ferns Grass-like	
Upperstory : >15 m	10%	Edge		100%		N/A Red Oak, Black Birch, Norway Maple, Black Locust, Hickory
Midstory: 5 - 15 m	10%	Edge		100%		N/A Sassafras, Black Cherry
Understory: 0.5 - 5 m	80%	Edge		5%		95% Grasses
Ground cover: < 0.5 m			Woody	Nonvascular Forbs, Ferns	Grass-like	
Live vegetation	95%	Edge			100%	
Dead vegetation	5%	N/A	Leaves, twigs, branches, primarily in area under trees.			
Non-vegetative		N/A				

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	Later in season: mown lawn area.
Human-made Structures	

Drainage: Well drained.
Slope: Moderate west-facing slope.
Geography: Hillside.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 3

General description of habitat: Medium grassland with trees along edges.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer			Main Species
			Conifer	Broadleaf	Forbs, Ferns Grass-like	
Upperstory : >15 m	10%	Surrounding		100%		N/A Norway Maple, Sugar Maple
Midstory: 5 - 15 m	30%	Surrounding		100%		N/A same
Understory: 0.5 - 5 m	>95%	Complete		30%		70% same, grasses

Ground cover: < 0.5 m			Woody	Nonvascular Forbs, Ferns	Grass-like
Live vegetation	95%	Complete	5%		95%
Dead vegetation		N/A			
Non-vegetative	5%	N/A			

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	
Human-made Structures	Wooden tower

Drainage: Well drained.
Slope: Flat.
Geography: Plain.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 4

General description of habitat: Turfgrass with ornamental plantings and structures.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer				Main Species
			Conifer	Broadleaf	Forbs, Ferns	Grass-like	
Upperstory : >15 m	<5%	Clumped		100%			N/A White Oak
Midstory: 5 - 15 m	10%	Clumped		100%			N/A Ornamental cherry
Understory: 0.5 - 5 m	10%	Clumped		90%	10%		Ornamentals, flowers

Ground cover: < 0.5 m	Woody	Nonvascular	Forbs, Ferns	Grass-like
Live vegetation	>95%	Complete		5% 95%
Dead vegetation		N/A		
Non-vegetative	<5%	N/A		

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	Gravel path, mown lawn area.
Human-made Structures	Shed, gazebo, and fence.

Drainage: Well drained.
Slope: Flat.
Geography: Plain.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 5

General description of habitat: Short grassland with scattered shrubs and trees.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer			Main Species
			Conifer	Broadleaf	Forbs, Ferns Grass-like	
Upperstory : >15 m	0%					N/A
Midstory: 5 - 15 m	10%	Clumped	25%	75%		N/A Cedar, Crabapple
Understory: 0.5 - 5 m	20%	Clumped	15%	85%		Ornamental shrubs
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like
Live vegetation	100%	Complete				100%
Dead vegetation		N/A				
Non-vegetative		N/A				

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	
Human-made Structures	

Drainage: Well drained.
Slope: Flat.
Geography: Plain.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 6

General description of habitat: Residential character: Museum with landscaping; maintenance area; orchard.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer			Main Species
			Conifer	Broadleaf	Forbs, Ferns Grass-like	
Upperstory : >15 m	<5%	Edge		100%		N/A Red Oak, Hickory, Catalpa
Midstory: 5 - 15 m	10%	Clumped		100%		N/A Apple
Understory: 0.5 - 5 m	20%	Dispersed		100%		Apple, ornamental shrubs

Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like
Live vegetation	75%	Divided			<5%	>95%
Dead vegetation		N/A				
Non-vegetative	25%	N/A				

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	Paved driveway and parking lots, mown lawn area.
Human-made Structures	Museum, maintenance buildings, stockade fence, split-rail fence.

Drainage: Well drained.
Slope: Steep east-facing slope; slight to steep west-facing slope.
Geography: Ridgetop.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 7

General description of habitat: Small wooded area surrounding small pond.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer				Main Species
			Conifer	Broadleaf	Forbs, Ferns	Grass-like	
Upperstory : >15 m	80%	Surrounding		100%			N/A Red Oak, White Oak, Beech.
Midstory: 5 - 15 m	80%	Surrounding		100%			N/A Ginko
Understory: 0.5 - 5 m	70%	Surrounding	10%	40%	35%	15%	Ornamental Yew

Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like
Live vegetation	75%	Surrounding	10%		60%	30%
Dead vegetation	5%	N/A				
Non-vegetative	20%	N/A				

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	> 50 square meter pond.
Human-made Corridors	Paved driveway, concrete-lined drainage swale.
Human-made Structures	

Drainage: Poorly drained.
Slope: Land surfaces slope inward to water-filled depression.
Geography: Bottomland.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 8

General description of habitat: Short to medium grassland.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer			
			Conifer	Broadleaf	Forbs, Ferns	Grass-like Main Species
Upperstory : >15 m	<5%	Edge		100%		N/A Red Maple, Norway Maple; overhanging branches from Zone 12
Midstory: 5 - 15 m	<5%	Edge		100%		N/A Sassafras; overhanging branches from Zone 12
Understory: 0.5 - 5 m	40%	Edge		10%	20%	70% Poison Ivy, grasses

Ground cover: < 0.5 m		Woody	Nonvascular	Forbs, Ferns	Grass-like
Live vegetation	100%	Complete	5%	10%	85%
Dead vegetation		N/A			
Non-vegetative		N/A			

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	
Human-made Structures	Split-rail fence

Drainage: Well drained.
Slope: Steep south facing slope.
Geography: Hilltop and hillside.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 9

General description of habitat: Parking lot with landscaped islands and adjacent wooded picnic area.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer			Main Species
			Conifer	Broadleaf	Forbs, Ferns Grass-like	
Upperstory : >15 m	20%	Edge		100%		N/A Tulip trees, Black Oak
Midstory: 5 - 15 m	30%	Edge		100%		N/A Ornamental Cherry
Understory: 0.5 - 5 m	40%	Clumped		90%		10% Ornamental Cherry

Ground cover: < 0.5 m			Woody	Nonvascular Forbs, Ferns	Grass-like
Live vegetation	35%	Clumped			50%
Dead vegetation	5%	N/A	Leaf litter		
Non-vegetative	60%	N/A			

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	Paved driveway
Human-made Structures	Paved parking lot

Drainage: Well drained.
Slope: Flat.
Geography: Plain.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 10

General description of habitat: Visitor center, house, parking lot, and landscaping.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer				Main Species
			Conifer	Broadleaf	Forbs, Ferns	Grass-like	
Upperstory : >15 m	0%						N/A
Midstory: 5 - 15 m	10%	Clumped	50%	50%			N/A Norway Maple, Catalpa, Black Oak, White Pine
Understory: 0.5 - 5 m	20%	Clumped	25%	75%			Ornamental Cedars

Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like
Live vegetation	40%	Edge	10%		10%	80%
Dead vegetation		N/A				
Non-vegetative	60%	N/A				

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	Paved paths, mown lawn area.
Human-made Structures	Visitor center, house, paved parking lot, fence.

Drainage: Well drained.
Slope: Flat.
Geography: Plain.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 11

General description of habitat: Transitional area between landscaping and woodland. Early successional woodland, some disturbance as brush dump.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer			
			Conifer	Broadleaf	Forbs, Ferns	Grass-like Main Species
Upperstory : >15 m	50%	Clumped		100%		N/A Walnut, Cherry, Tulip, Red Oak, Red Maple
Midstory: 5 - 15 m	70%	Surrounded		100%		N/A Walnut, Catalpa, Red Maple, Flowering Dogwood
Understory: 0.5 - 5 m	50%	Clumped		100%		Walnut, Sassafras, Flowering Dogwood

Ground cover: < 0.5 m			Woody	Nonvascular Forbs, Ferns	Grass-like
Live vegetation	25%	Surrounding	40%		60% Poison Ivy, Jewelweed, woody vines, grasses
Dead vegetation	75%	N/A	Leaf litter, twigs, branches, recent treefall.		
Non-vegetative		N/A			

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	Dirt/mown paths, cleared area for brush dump.
Human-made Structures	

Drainage: Well drained.
Slope: Mostly flat, slight east-facing slope.
Geography: Plain.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 12

General description of habitat: Residential and Oak - Maple woodland. One house with driveway and landscaping, surrounded by forest.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer				Main Species
			Conifer	Broadleaf	Forbs, Ferns	Grass-like	
Upperstory : >15 m	30%	Surrounding		100%			N/A Norway Maple, Red Maple, Red Oak, Walnut, Hickory
Midstory: 5 - 15 m	40%	Surrounding	5%	95%			N/A <i>Ailanthus</i> , Sassafras, ornamentals
Understory: 0.5 - 5 m	50%	Clumped	5%	90%	5%		Sassafras, ornamentals

65

Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like
Live vegetation	85%	Surrounded			40%	60% ornamentals, turfgrass
Dead vegetation	5%	N/A	Leaves, twigs			
Non-vegetative	10%	N/A				

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	Paved driveway, mown lawn area.
Human-made Structures	House and garage.

Drainage: Well drained.
Slope: Mostly flat, moderate east-facing slope.
Geography: Plain and hillside.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 13

General description of habitat: Oak - Maple forested ravine.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer				Main Species
			Conifer	Broadleaf	Forbs, Ferns	Grass-like	
Upperstory : >15 m	90%	Clumped		100%			N/A Norway Maple, White Oak, Black Oak, Black Birch, Tulip
Midstory: 5 - 15 m	90%	Clumped		100%			N/A Norway Maple, Black Cherry, Sassafras
Understory: 0.5 - 5 m	80%	Clumped		100%			Grape, woody vines, Oriental Bittersweet

Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like
Live vegetation	40%	Clumped	90%			10%
Dead vegetation	60%	N/A	Leaf litter, twigs, branches, old logs.			
Non-vegetative		N/A				

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	
Human-made Structures	

Drainage: Well drained.
Slope: Steep-sided ravine opening toward south.
Geography: Hillside.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 14

General description of habitat: Mature Oak - Maple forest.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer			Main Species
			Conifer	Broadleaf	Forbs, Ferns Grass-like	
Upperstory : >15 m	>95%	Complete		100%		N/A Red Oak, White Oak, Black Oak, Red Maple, Norway Maple, Black Birch, Tulip, Chestnut Oak
Midstory: 5 - 15 m	90%	Dispersed		100%		N/A Hickory, Flowering Dogwood, same as above
Understory: 0.5 - 5 m	60%	Clumped		100%		Mountain Laurel, Virginia Creeper, Oriental Bittersweet, Wisteria, Poison Ivy
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like
Live vegetation	30%	Edge	100%			
Dead vegetation	70%	N/A	Leaf litter, twigs, branches, old logs.			
Non-vegetative		N/A				

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	
Human-made Structures	

Drainage: Well drained.
Slope: Flat in north and west, steep-sided ravine opening toward south.
Geography: Hilltop and hillside.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 15

General description of habitat: Mid-successional Oak - Maple woodland.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer				Main Species
			Conifer	Broadleaf	Forbs, Ferns	Grass-like	
Upperstory : >15 m	30%	Edge		100%			N/A Red Oak, Black Locust, Norway Maple, <i>Ailanthus</i>
Midstory: 5 - 15 m	40%	Edge		100%			N/A Hickory, Black Locust, Red Maple
Understory: 0.5 - 5 m	70%	Dispersed		100%			Flowering Dogwood

Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like
Live vegetation	50%	Clumped	90%		5%	5% Poison Ivy, woody vines
Dead vegetation	45%	N/A	Leaf litter, twigs, branches, old logs. Many tall snags.			
Non-vegetative	5%	N/A				

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	Paved roadway along southern edge.
Human-made Structures	

Drainage: Well drained.
Slope: Complex terrain; steep-sided northward and westward ravines.
Geography: Hillside.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 16

General description of habitat: Early- to mid-successional Maple woodland.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer				Main Species
			Conifer	Broadleaf	Forbs, Ferns	Grass-like	
Upperstory : >15 m	60%	Dispersed		100%			N/A Norway Maple, Red Oak
Midstory: 5 - 15 m	90%	Dispersed		100%			N/A Norway Maple, Red Oak, Black Cherry, Black Birch, Black Locust, <i>Ailanthus</i>
Understory: 0.5 - 5 m	80%	Dispersed		100%			Black Cherry, Black Locust

69

Ground cover: < 0.5 m			Woody Nonvascular Forbs, Ferns Grass-like			
Live vegetation	10%	Dispersed	>95%			<5% Poison Ivy, woody vines
Dead vegetation	85%	N/A	Leaf litter, twigs, branches, old logs. Few snags.			
Non-vegetative	5%	N/A				

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	Paved roadway along southern edge.
Human-made Structures	

Drainage: Well drained.
Slope: Slight to moderate west-facing slope; steep east-facing kettlehole in northeast quadrant.
Geography: Hillside.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 17

General description of habitat: Mature Oak -Maple forest.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer				Main Species
			Conifer	Broadleaf	Forbs, Ferns	Grass-like	
Upperstory : >15 m	>95%	Complete		100%			N/A Red Oak, White Oak, Black Oak, Red Maple, Tulip, Norway Maple, Hickory
Midstory: 5 - 15 m	90%	Dispersed	<5%	>95%			N/A Black Birch, Sassafras, Cedar, Black Cherry, Hickory
Understory: 0.5 - 5 m	90%	Dispersed	<5%	>95%	<5%		Flowering Dogwood, Jewelweed, ferns, Spicebush, Poison Ivy
Ground cover: < 0.5 m							
Live vegetation	80%	Dispersed	90%		10%		Poison Ivy, ferns
Dead vegetation	20%	N/A	Leaf litter, twigs, branches, old logs. Moderate number of snags.				
Non-vegetative		N/A					

Non-vegetative Features	Feature(s)
Running Water	Evidence of seasonal intermittent seep along northeastern edge.
Standing Water	
Human-made Corridors	Dirt trail.
Human-made Structures	

Drainage: Mostly well drained.
Slope: Steep east-facing and north-facing slopes.
Geography: Hillside.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 18

General description of habitat: Mature Oak -Maple forest.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer			Main Species
			Conifer	Broadleaf	Forbs, Ferns Grass-like	
Upperstory : >15 m	>95%	Complete	<5%	>95%		N/A Red Oak, White Oak, Black Oak, Red Maple, Tulip, Norway Maple, Beech, Hickory, Cedar
Midstory: 5 - 15 m	>95%	Complete	<5%	>95%		N/A Black Birch, Sassafras, Black Cherry
Understory: 0.5 - 5 m	>95%	Complete	<5%	>95%		Flowering Dogwood, Jewelweed, Spicebush, Poison Ivy, Multiflora Rose, American Chestnut
Ground cover: < 0.5 m			Woody			Nonvascular Forbs, Ferns Grass-like
Live vegetation	80%	Dispersed	90%		10%	
Dead vegetation	20%	N/A	Leaf litter, twigs, branches, old logs. Moderate number of snags.			
Non-vegetative	<5%	N/A				

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	Small pond.
Human-made Corridors	Dirt trail.
Human-made Structures	

Drainage: Mostly well drained; poorly drained in area of pond.
Slope: Steep east-facing and south-facing slopes.
Geography: Hillside.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 19

General description of habitat: Intertidal salt marsh.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer				Main Species
			Conifer	Broadleaf	Forbs, Ferns	Grass-like	
Upperstory : >15 m	0%						N/A
Midstory: 5 - 15 m	0%						N/A
Understory: 0.5 - 5 m	50%	Divided					100% <i>Spartina alterniflora</i>
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	50%	Divided					100% <i>Spartina alterniflora</i>
Dead vegetation	10%	N/A	Dead <i>Spartina</i> stalks on intertidal mud flats.				
Non-vegetative	40%	N/A	Tidal stream (water surface and intertidal mud flats, depending upon tide phase).				

Non-vegetative Features	Feature(s)
Running Water	Tidal stream.
Standing Water	
Human-made Corridors	
Human-made Structures	

Drainage: Poorly drained, intertidal.
Slope: Flat.
Geography: Bottomland.

Appendix D. Zone-based data summaries (continued).

Habitat Structure Assessment Zone 20

General description of habitat: Beach and low vegetated dune.

Vegetative Layers	Cover	Pattern	Vegetation types within each layer				Main Species
			Conifer	Broadleaf	Forbs, Ferns	Grass-like	
Upperstory : >15 m	0%						N/A
Midstory: 5 - 15 m	<5%	Surrounded		100%			N/A Black Locust
Understory: 0.5 - 5 m	30%	Dividing		10%	30%	60%	Beach grasses
Ground cover: < 0.5 m			Woody	Nonvascular Forbs, Ferns		Grass-like	
Live vegetation	60%	Surrounding			40%	60%	Beach grasses
Dead vegetation		N/A					
Non-vegetative	40%	N/A	Sand and cobble beach and dune.				

Non-vegetative Features	Feature(s)
Running Water	
Standing Water	
Human-made Corridors	
Human-made Structures	

Drainage: Well drained.
Slope: Flat.
Geography: Bottomland.

Appendix E. Breeding status and behaviors.

Species	Breeding Status			Species	Breeding Status			Species	Breeding Status		
	Poss.	Prob.	Conf.		Poss.	Prob.	Conf.		Poss.	Prob.	Conf.
Double-crested Cormorant	X			Chimney Swift	P			Wood Thrush			FL
Great Blue Heron			FL	Belted Kingfisher	X			American Robin			FL
Great Egret		P		Red-bellied Woodpecker			FL	Gray Catbird			FL
Snowy Egret		P		Downy Woodpecker		P		Northern Mockingbird			FL
Green Heron			FL	Hairy Woodpecker			FL	European Starling			FL
Black-crowned Night Heron		P		Northern Flicker			FL	Cedar Waxwing	X		
Canada Goose			NE	Eastern Wood-Pewee		S		Yellow Warbler			S
Mallard		P		Great Crested Flycatcher			FL	Pine Warbler	X		
Osprey		P		Eastern Kingbird			FL	American Redstart			S
Sharp-shinned Hawk	X			White-eyed Vireo	X			Common Yellowthroat	X		
Red-tailed Hawk		P		Warbling Vireo		S		Scarlet Tanager	X		
Wild Turkey	X			Red-eyed Vireo		S		Chipping Sparrow			FL
Virginia Rail		S		Blue Jay		P		Song Sparrow			N
Laughing Gull	X			American Crow			FL	Northern Cardinal			FY
Ring-billed Gull	X			Fish Crow		P		Indigo Bunting	X		
Herring Gull	X			Tree Swallow	X			Red-winged Blackbird			FL
Great Black-backed Gull	X			Barn Swallow			FL	Common Grackle			P
Common Tern	X			Black-capped Chickadee			ON	Brown-headed Cowbird			FL
Least Tern	X			Tufted Titmouse			FY	Orchard Oriole			P
Rock Dove	X			White-breasted Nuthatch		P		Baltimore Oriole			FY
Mourning Dove			FL	Carolina Wren			FL	House Finch			P
Eastern Screech-Owl		S		House Wren		S		American Goldfinch			FL
Great Horned Owl		S		Veery	X			House Sparrow			FL

Key to Breeding Status:

- Poss. = Possible Breeding
 Prob. = Probable Breeding
 Conf. = Confirmed Breeding
- X = Species observed in possible nesting habitat, but no other indication of breeding noted.
 S = Singing male present (or breeding calls heard) on more than one date in the same place.
 P = Pair observed in suitable habitat during the breeding season.
 N = Visiting probable nest site.
 FL = Recently fledged young.
 ON = Adult(s) entering or leaving nest site in circumstances indicating occupied nest.
 FY = Adult(s) with food for young.
 NE = Identifiable nest and eggs; bird sitting on nest or eggs.

Appendix F. Habitat structure assessments.

Habitat Structure Assessment		Zone 1					
General description of habitat:		Residential character: Main house, turfgrass, ornamental trees and shrubs.					
		Vegetation types within each layer					
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	40%	Clumped	50%	50%		N/A	Norway Maple, White Pine, <i>Fagus</i> sp.
Midstory: 5 - 15 m	40%	Clumped	45%	55%		N/A	Cherry, <i>Betula</i> sp.
Understory: 0.5 - 5 m	50%	Clumped	40%	60%			Flowering Dogwood
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	90%	Surrounding				100%	
Dead vegetation		N/A					
Non-vegetative	10%	N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors		Paved driveway and path, gravel path, mown lawn areas.					
Human-made Structures		Main house.					
Drainage:	Well drained.						
Slope:	Slight east-facing slope.						
Geography:	Hilltop.						

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 2A					
General description of habitat:		Tall grassland with scattered trees in northern section.					
		Vegetation types within each layer					
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	10%	Edge		100%		N/A	Red Oak, Black Birch, Norway Maple, Black Locust, Hickory
Midstory: 5 - 15 m	10%	Edge		100%		N/A	Sassafras, Black Cherry
Understory: 0.5 - 5 m	80%	Edge		5%		95%	Grasses
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	95%	Edge				100%	
Dead vegetation	5%	N/A	Leaves, twigs, branches, primarily in area under trees.				
Non-vegetative		N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors		Later in season: mown lawn area.					
Human-made Structures							
Drainage:	Well drained.						
Slope:	Moderate west-facing slope.						
Geography:	Hillside.						

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 2B						
General description of habitat:		Oak - Maple forest.						
		Vegetation types within each layer						
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species	
Upperstory : >15 m	90%	Dispersed	5%	95%		N/A	Red Oak, Black Oak, Chestnut Oak, Norway Maple, Red Maple, Walnut, Black Birch	
Midstory: 5 - 15 m	90%	Dispersed	5%	95%		N/A	Black Cherry, Japanese Maple	
Understory: 0.5 - 5 m	50%	Clumped	5%	60%	35%		English Ivy, Poison Ivy, various briars	
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like		
Live vegetation	25%	Clumped	40%	10%	45%	5%		
Dead vegetation	75%	N/A	Leaves, twigs, branches, old logs.					
Non-vegetative	<1%	N/A						
Non-vegetative Features		Feature(s)						
Running Water								
Standing Water								
Human-made Corridors		Dirt path						
Human-made Structures								
Drainage:		Moderately well drained. Seasonally muddy area in northwestern quadrant.						
Slope:		Moderate west-facing slope, level bottomlands.						
Geography:		Hillside and bottomland.						

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 3					
General description of habitat:		Medium grassland with trees along edges.					
			Vegetation types within each layer				
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	10%	Surrounding		100%		N/A	Norway Maple, Sugar Maple
Midstory: 5 - 15 m	30%	Surrounding		100%		N/A	same
Understory: 0.5 - 5 m	>95%	Complete		30%		70%	same, grasses
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	95%	Complete	5%			95%	
Dead vegetation		N/A					
Non-vegetative	5%	N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors							
Human-made Structures		Wooden tower					
Drainage:		Well drained.					
Slope:		Flat.					
Geography:		Plain.					

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 4					
General description of habitat:		Turfgrass with ornamental plantings and structures.					
			Vegetation types within each layer				
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	<5%	Clumped		100%		N/A	White Oak
Midstory: 5 - 15 m	10%	Clumped		100%		N/A	Ornamental cherry
Understory: 0.5 - 5 m	10%	Clumped		90%	10%		Ornamentals, flowers
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	>95%	Complete			5%	95%	
Dead vegetation		N/A					
Non-vegetative	<5%	N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors		Gravel path, mown lawn area.					
Human-made Structures		Shed, gazebo, and fence.					
Drainage:		Well drained.					
Slope:		Flat.					
Geography:		Plain.					

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 5					
General description of habitat:		Short grassland with scattered shrubs and trees.					
			Vegetation types within each layer				
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	0%					N/A	
Midstory: 5 - 15 m	10%	Clumped	25%	75%		N/A	Cedar, Crabapple
Understory: 0.5 - 5 m	20%	Clumped	15%	85%			Ornamental shrubs
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	100%	Complete				100%	
Dead vegetation		N/A					
Non-vegetative		N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors							
Human-made Structures							
Drainage:		Well drained.					
Slope:		Flat.					
Geography:		Plain.					

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 6					
General description of habitat:		Residential character: Museum with landscaping; maintenance area; orchard.					
		Vegetation types within each layer					
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	<5%	Edge		100%		N/A	Red Oak, Hickory, Catalpa
Midstory: 5 - 15 m	10%	Clumped		100%		N/A	Apple
Understory: 0.5 - 5 m	20%	Dispersed		100%			Apple, ornamental shrubs
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	75%	Divided			<5%	>95%	
Dead vegetation		N/A					
Non-vegetative	25%	N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors		Paved driveway and parking lots, mown lawn area.					
Human-made Structures		Museum, maintenance buildings, stockade fence, split-rail fence.					
Drainage:		Well drained.					
Slope:		Steep east-facing slope; slight to steep west-facing slope.					
Geography:		Ridgetop.					

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 7					
General description of habitat:		Small wooded area surrounding small pond.					
			Vegetation types within each layer				
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	80%	Surrounding		100%		N/A	Red Oak, White Oak, Beech.
Midstory: 5 - 15 m	80%	Surrounding		100%		N/A	Ginko
Understory: 0.5 - 5 m	70%	Surrounding	10%	40%	35%	15%	Ornamental Yew
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	75%	Surrounding	10%		60%	30%	
Dead vegetation	5%	N/A					
Non-vegetative	20%	N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water		> 50 square meter pond.					
Human-made Corridors		Paved driveway, concrete-lined drainage swale.					
Human-made Structures							
Drainage:	Poorly drained.						
Slope:	Land surfaces slope inward to water-filled depression.						
Geography:	Bottomland.						

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 8					
General description of habitat:		Short to medium grassland.					
			Vegetation types within each layer				
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	<5%	Edge		100%		N/A	Red Maple, Norway Maple; overhanging branches from Zone 12
Midstory: 5 - 15 m	<5%	Edge		100%		N/A	Sassafras; overhanging branches from Zone 12
Understory: 0.5 - 5 m	40%	Edge		10%	20%	70%	Poison Ivy, grasses
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	100%	Complete	5%		10%	85%	
Dead vegetation		N/A					
Non-vegetative		N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors							
Human-made Structures		Split-rail fence					
Drainage:	Well drained.						
Slope:	Steep south facing slope.						
Geography:	Hilltop and hillside.						

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 9					
General description of habitat:		Parking lot with landscaped islands and adjacent wooded picnic area.					
			Vegetation types within each layer				
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	20%	Edge		100%		N/A	Tulip trees, Black Oak
Midstory: 5 - 15 m	30%	Edge		100%		N/A	Ornamental Cherry
Understory: 0.5 - 5 m	40%	Clumped		90%		10%	Ornamental Cherry
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	35%	Clumped			50%	50%	
Dead vegetation	5%	N/A	Leaf litter				
Non-vegetative	60%	N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors		Paved driveway					
Human-made Structures		Paved parking lot					
Drainage:		Well drained.					
Slope:		Flat.					
Geography:		Plain.					

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 10					
General description of habitat:		Visitor center, house, parking lot, and landscaping.					
			Vegetation types within each layer				
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	0%					N/A	
Midstory: 5 - 15 m	10%	Clumped	50%	50%		N/A	Norway Maple, Catalpa, Black Oak, White Pine
Understory: 0.5 - 5 m	20%	Clumped	25%	75%			Ornamental Cedars
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	40%	Edge	10%		10%	80%	
Dead vegetation		N/A					
Non-vegetative	60%	N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors		Paved paths, mown lawn area.					
Human-made Structures		Visitor center, house, paved parking lot, fence.					
Drainage:		Well drained.					
Slope:		Flat.					
Geography:		Plain.					

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 11					
General description of habitat:		Transitional area between landscaping and woodland. Early successional woodland, some disturbance as brush dump.					
		Vegetation types within each layer					
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	50%	Clumped		100%		N/A	Walnut, Cherry, Tulip, Red Oak, Red Maple
Midstory: 5 - 15 m	70%	Surrounded		100%		N/A	Walnut, Catalpa, Red Maple, Flowering Dogwood
Understory: 0.5 - 5 m	50%	Clumped		100%			Walnut, Sassafras, Flowering Dogwood
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	25%	Surrounding	40%			60%	Poison Ivy, Jewelweed, woody vines, grasses
Dead vegetation	75%	N/A	Leaf litter, twigs, branches, recent treefall.				
Non-vegetative		N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors		Dirt/mown paths, cleared area for brush dump.					
Human-made Structures							
Drainage:	Well drained.						
Slope:	Mostly flat, slight east-facing slope.						
Geography:	Plain.						

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 12					
General description of habitat:		Residential and Oak - Maple woodland. One house with driveway and landscaping, surrounded by forest.					
		Vegetation types within each layer					
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	30%	Surrounding		100%		N/A	Norway Maple, Red Maple, Red Oak, Walnut, Hickory
Midstory: 5 - 15 m	40%	Surrounding	5%	95%		N/A	<i>Ailanthus</i> , Sassafras, ornamentals
Understory: 0.5 - 5 m	50%	Clumped	5%	90%	5%		Sassafras, ornamentals
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	85%	Surrounded			40%	60%	ornamentals, turfgrass
Dead vegetation	5%	N/A	Leaves, twigs				
Non-vegetative	10%	N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors		Paved driveway, mown lawn area.					
Human-made Structures		House and garage.					
Drainage:		Well drained.					
Slope:		Mostly flat, moderate east-facing slope.					
Geography:		Plain and hillside.					

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 13					
General description of habitat:		Oak - Maple forested ravine.					
			Vegetation types within each layer				
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	90%	Clumped		100%		N/A	Norway Maple, White Oak, Black Oak, Black Birch, Tulip
Midstory: 5 - 15 m	90%	Clumped		100%		N/A	Norway Maple, Black Cherry, Sassafras
Understory: 0.5 - 5 m	80%	Clumped		100%			Grape, woody vines, Oriental Bittersweet
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	40%	Clumped	90%		10%		
Dead vegetation	60%	N/A	Leaf litter, twigs, branches, old logs.				
Non-vegetative		N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors							
Human-made Structures							
Drainage:	Well drained.						
Slope:	Steep-sided ravine opening toward south.						
Geography:	Hillside.						

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 14					
General description of habitat:		Mature Oak - Maple forest.					
			Vegetation types within each layer				
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	>95%	Complete		100%		N/A	Red Oak, White Oak, Black Oak, Red Maple, Norway Maple, Black Birch, Tulip, Chestnut Oak
Midstory: 5 - 15 m	90%	Dispersed		100%		N/A	Hickory, Flowering Dogwood, same as above
Understory: 0.5 - 5 m	60%	Clumped		100%			Mountain Laurel, Virginia Creeper, Oriental Bittersweet, Wisteria, Poison Ivy
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	30%	Edge	100%				
Dead vegetation	70%	N/A	Leaf litter, twigs, branches, old logs.				
Non-vegetative		N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors							
Human-made Structures							
Drainage:	Well drained.						
Slope:	Flat in north and west, steep-sided ravine opening toward south.						
Geography:	Hilltop and hillside.						

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 15					
General description of habitat:		Mid-successional Oak - Maple woodland.					
			Vegetation types within each layer				
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	30%	Edge		100%		N/A	Red Oak, Black Locust, Norway Maple, <i>Ailanthus</i>
Midstory: 5 - 15 m	40%	Edge		100%		N/A	Hickory, Black Locust, Red Maple
Understory: 0.5 - 5 m	70%	Dispersed		100%			Flowering Dogwood
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	50%	Clumped	90%		5%	5%	Poison Ivy, woody vines
Dead vegetation	45%	N/A	Leaf litter, twigs, branches, old logs. Many tall snags.				
Non-vegetative	5%	N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors		Paved roadway along southern edge.					
Human-made Structures							
Drainage:		Well drained.					
Slope:		Complex terrain; steep-sided northward and westward ravines.					
Geography:		Hillside.					

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 16					
General description of habitat:		Early- to mid-successional Maple woodland.					
		Vegetation types within each layer					
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	60%	Dispersed		100%		N/A	Norway Maple, Red Oak
Midstory: 5 - 15 m	90%	Dispersed		100%		N/A	Norway Maple, Red Oak, Black Cherry, Black Birch, Black Locust, <i>Ailanthus</i>
Understory: 0.5 - 5 m	80%	Dispersed		100%			Black Cherry, Black Locust
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	10%	Dispersed	>95%			<5%	Poison Ivy, woody vines
Dead vegetation	85%	N/A	Leaf litter, twigs, branches, old logs. Few snags.				
Non-vegetative	5%	N/A					
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors		Paved roadway along southern edge.					
Human-made Structures							
Drainage:		Well drained.					
Slope:		Slight to moderate west-facing slope; steep east-facing kettlehole in northeast quadrant.					
Geography:		Hillside.					

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment			Zone 17				
General description of habitat:			Mature Oak -Maple forest.				
			Vegetation types within each layer				
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	>95%	Complete		100%		N/A	Red Oak, White Oak, Black Oak, Red Maple, Tulip, Norway Maple, Hickory
Midstory: 5 - 15 m	90%	Dispersed	<5%	>95%		N/A	Black Birch, Sassafras, Cedar, Black Cherry, Hickory
Understory: 0.5 - 5 m	90%	Dispersed	<5%	>95%	<5%		Flowering Dogwood, Jewelweed, ferns, Spicebush, Poison Ivy
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	80%	Dispersed	90%		10%		Poison Ivy, ferns
Dead vegetation	20%	N/A	Leaf litter, twigs, branches, old logs. Moderate number of snags.				
Non-vegetative		N/A					
Non-vegetative Features		Feature(s)					
Running Water		Evidence of seasonal intermittent seep along northeastern edge.					
Standing Water							
Human-made Corridors		Dirt trail.					
Human-made Structures							
Drainage:	Mostly well drained.						
Slope:	Steep east-facing and north-facing slopes.						
Geography:	Hillside.						

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment			Zone 18					
General description of habitat:			Mature Oak -Maple forest.					
			Vegetation types within each layer					
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species	
Upperstory : >15 m	>95%	Complete	<5%	>95%		N/A	Red Oak, White Oak, Black Oak, Red Maple, Tulip, Norway Maple, Beech, Hickory, Cedar	
Midstory: 5 - 15 m	>95%	Complete	<5%	>95%		N/A	Black Birch, Sassafras, Black Cherry	
Understory: 0.5 - 5 m	>95%	Complete	<5%	>95%			Flowering Dogwood, Jewelweed, Spicebush, Poison Ivy, Multiflora Rose, American Chestnut	
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like		
Live vegetation	80%	Dispersed	90%		10%			
Dead vegetation	20%	N/A	Leaf litter, twigs, branches, old logs. Moderate number of snags.					
Non-vegetative	<5%	N/A						
Non-vegetative Features		Feature(s)						
Running Water								
Standing Water		Small pond.						
Human-made Corridors		Dirt trail.						
Human-made Structures								
Drainage:		Mostly well drained; poorly drained in area of pond.						
Slope:		Steep east-facing and south-facing slopes.						
Geography:		Hillside.						

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 19					
General description of habitat:		Intertidal salt marsh.					
			Vegetation types within each layer				
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	0%					N/A	
Midstory: 5 - 15 m	0%					N/A	
Understory: 0.5 - 5 m	50%	Divided				100%	<i>Spartina alterniflora</i>
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	50%	Divided				100%	<i>Spartina alterniflora</i>
Dead vegetation	10%	N/A	Dead <i>Spartina</i> stalks on intertidal mud flats.				
Non-vegetative	40%	N/A	Tidal stream (water surface and intertidal mud flats, depending upon tide phase).				
Non-vegetative Features		Feature(s)					
Running Water		Tidal stream.					
Standing Water							
Human-made Corridors							
Human-made Structures							
Drainage:	Poorly drained, intertidal.						
Slope:	Flat.						
Geography:	Bottomland.						

Appendix F. Habitat structure assessments (continued).

Habitat Structure Assessment		Zone 20					
General description of habitat:		Beach and low vegetated dune.					
			Vegetation types within each layer				
Vegetative Layers	Cover	Pattern	Conifer	Broadleaf	Forbs, Ferns	Grass-like	Main Species
Upperstory : >15 m	0%					N/A	
Midstory: 5 - 15 m	<5%	Surrounded		100%		N/A	Black Locust
Understory: 0.5 - 5 m	30%	Dividing		10%	30%	60%	Beach grasses
Ground cover: < 0.5 m			Woody	Nonvascular	Forbs, Ferns	Grass-like	
Live vegetation	60%	Surrounding			40%	60%	Beach grasses
Dead vegetation		N/A					
Non-vegetative	40%	N/A	Sand and cobble beach and dune.				
Non-vegetative Features		Feature(s)					
Running Water							
Standing Water							
Human-made Corridors							
Human-made Structures							
Drainage:	Well drained.						
Slope:	Flat.						
Geography:	Bottomland.						

Appendix G. Checklist of the birds of Sagamore Hill National Historic Site.

Species	Season				Species	Season			
	W	Sp	Su	F		W	Sp	Su	F
American Black Duck	C	F		C	Fish Crow *		U	F	U
American Crow *	C	C	C	C	Golden-crowned Kinglet	R	R		R
American Goldfinch *	C	C	C	C	Gray Catbird *		F	C	F
American Redstart *		U	R		Great Black-backed Gull	F	F	C	F
American Robin *	U	C	C	C	Great Blue Heron *	F		U	C
American Tree Sparrow				U	Great Crested Flycatcher *		U	F	
Bald Eagle				R	Great Egret *		C	C	F
Baltimore Oriole *		F	F	R	Great Horned Owl *		U		U
Barn Swallow *		F	C		Greater Scaup		U		
Belted Kingfisher	R	U		U	Greater Yellowlegs		U	R	
Black-and-white Warbler		U			Green Heron *		U	U	U
Black-billed Cuckoo		R			Hairy Woodpecker *	F	F	C	F
Blackburnian Warbler		R			Hermit Thrush	R			U
Black-capped Chickadee *	C	C	C	C	Herring Gull	C	C	C	C
Black-crowned Night Heron *			U		House Finch *		U	U	
Blackpoll Warbler		U			House Sparrow *	U	C	C	C
Black-throated Green Warbler		U			House Wren *		F	F	R
Blue Jay *	C	C	C	C	Indigo Bunting			R	
Blue-headed Vireo		R		R	Laughing Gull		R	U	F
Brown-headed Cowbird *		R	U	U	Least Tern			U	
Bufflehead	F	U		U	Long-tailed Duck	F	F		U
Canada Goose *	C	F	U	F	Magnolia Warbler		R		
Cape May Warbler				U	Mallard *	F	F	F	F
Carolina Wren *	C	C	C	C	Marsh Wren				R
Cedar Waxwing		U	U	U	Mourning Dove *	R	C	C	F
Chimney Swift *			U		Mute Swan	U	U		
Chipping Sparrow *		C	C	C	Northern Cardinal *	C	C	C	C
Common Goldeneye	U	U			Northern Flicker *	U	C	C	C
Common Grackle *		C	F	F	Northern Mockingbird *	F	C	C	U
Common Loon		U		U	Northern Parula		U		U
Common Tern			U		Northern Waterthrush		R		
Common Yellowthroat		R	U		Orchard Oriole *		U	R	R
Dark-eyed Junco	F	U		F	Osprey *		F	F	U
Double-crested Cormorant		C	C	F	Ovenbird		U		
Downy Woodpecker *	F	C	C	C	Palm Warbler			U	F
Eastern Bluebird				U	Pine Siskin	U			
Eastern Kingbird *		F	C		Pine Warbler		U	R	
Eastern Phoebe		U		U	Purple Finch				U
Eastern Screech-Owl *	F				Purple Martin		R		
Eastern Towhee		R		R	Red-bellied Woodpecker *	C	C	C	C
Eastern Wood-Pewee *		U	U		Red-breasted Merganser	F	U		
European Starling *	C	C	C	C	Red-eyed Vireo *		U	F	R

Appendix G. Checklist of the birds of Sagamore Hill National Historic Site (continued).

Species	Season				Species	Season			
	W	Sp	Su	F		W	Sp	Su	F
Red-tailed Hawk *	U	F	U	U	Turkey Vulture		R		
Red-throated Loon				R	Veery		R	U	U
Red-winged Blackbird *		C	C	F	Virginia Rail *			U	
Ring-billed Gull	U	F	F	F	Warbling Vireo *		U	U	
Ring-necked Pheasant	U	U			White-breasted Nuthatch *	C	F	C	C
Rock Dove		R	R		White-eyed Vireo			U	
Ruby-crowned Kinglet				U	White-throated Sparrow	F	F		F
Rusty Blackbird				U	Wild Turkey		U	U	
Sanderling		U			Wilson's Snipe				R
Scarlet Tanager		R	R	R	Winter Wren		R		
Sharp-shinned Hawk		U	R	R	Wood Thrush *		U	F	R
Snowy Egret *		U	U	U	Yellow Warbler *		F	F	
Song Sparrow *	F	C	C	F	Yellow-bellied Sapsucker	R			
Spotted Sandpiper		R	R		Yellow-billed Cuckoo		U	R	
Tree Swallow			R		Yellow-rumped Warbler		U		U
Tufted Titmouse *	C	C	C	C	Yellow-throated Vireo		R		

Key to Seasons:

W = December to February

Sp = March to May

Su = June to August

F = September to November

Key to Seasonal Occurrence:

C = Common (should be seen on at least two-thirds of daily site visits)

F = Fairly common (should be seen on more than one-third of daily site visits)

U = Uncommon (will be seen on fewer than one-third of daily site visits)

R = Rare (will be seen only a few times a season, at most)

* = species is a confirmed or probable breeder at this site.

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