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Landbird Community Monitoring at Kennesaw Mountain National Battlefield Park

2012 Data Summary

Natural Resource Data Series NPS/SECN/NRDS—2016/1017

ON THE COVER
Ruby-crowned kinglet (*Regulus calendula*)
Photo courtesy of Rachel Holzman

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All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

Data in this report were collected and analyzed using methods based on established peer-reviewed protocols and were analyzed and interpreted within the guidelines of the protocols.

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Executive Summary

Birds are an important component of park ecosystems. Due to their high body temperature, rapid metabolism, and high ecological position in most food webs, birds are also good indicators of the effects of local and regional ecosystem changes. Patterns in the community composition, distribution, and occurrence of breeding birds provide a metric for assessing ecological integrity and sustainability in southeastern U. S. ecosystems. Further, trends in these attributes in relation to activities occurring at Kennesaw Mountain National Battlefield Park (e.g., management actions, natural disturbance, invasive-species treatment) will improve our understanding of the effects of various management actions and other stressors on the condition of park resources.

This report summarizes data collected during implementation of the SECN landbird community monitoring protocol (Byrne et al. 2014) at Kennesaw Mountain National Battlefield Park in 2012.

1. Automated recording devices collected bird detection/non-detection data from 27 of the 30 spatially balanced random locations at the park.
2. Approximately 1,600 minutes of recordings were collected May–June, to represent a closed population, and were evaluated to detect the presence of vocalizing birds.
3. Sixty-two species of birds were detected during the sampling effort.
4. Northern cardinal, Carolina wren, tufted titmouse, blue jay, white-breasted nuthatch,Carolina chickadee, pine warbler, and red-bellied woodpecker were the most frequently occurring and widely distributed species (i.e., occurring at 80% or more of all sampling locations). American crow was also widely distributed across the park, occurring at 70% of all sampling locations.
5. One non-native species, house finch, was detected during the sampling effort.
6. The full dataset, and associated metadata, can be acquired from the NPS data store at the Integrated Resource Management Applications portal (https://irma.nps.gov/App/Portal/Home).

Introduction

Overview

Birds play several critical roles in park ecosystems. They occupy and interact with several trophic levels of the food web, including their role as both predator and prey. Among their many functions, birds regulate rodent populations (Ims and Andreassen 2000), regulate insect populations (Mols and Visser 2002), and scavenge dead animals (Pain et al. 2003). Some avian species aid in pollination of wild and cultivated crop plants (Stiles 1978) and provide mechanisms for seed dispersal (Howe and Smallwood 1982). Bird guano contains nutrients necessary for many vegetation communities (Wootton 1991). Management activities aimed at preserving habitat for bird populations (e.g., neotropical migrants) frequently have the added benefit of preserving entire ecosystems and their attendant ecosystem services (Karr 1991, Maurer and Heywood 1993).

A wide range of stressors affect bird communities, and birds often respond quickly to environmental stressors, perturbations, or changes. Therefore, characteristics of the bird community at a park are good indicators of the extent of the impact of those stressors on park lands. Many bird species have been extensively studied; their biology and life histories are well defined and their habitat-use patterns have been identified. Consequently, the composition, richness and diversity, and distribution of bird communities provide substantial insight into the ecological condition of park resources. Information about the landbird community also provides derivative information about other characteristics of the park and surrounding area (e.g., vegetation community types, extent of fragmentation).

Because many birds are primarily diurnal, visible and vocal, and attractive, they are a major point of interest for many park visitors and for the general public. Birds have a strong public appeal and are the recreational focus for many park visitors. Birdwatching has a substantial and positive impact on the U.S. economy, contributing well over $100 billion annually (Carver 2013), and it is one of the most popular recreational activities pursued by Americans (Cordell et al. 2007).

Over 400 species of birds, representing 61 families, use Southeast Coast Network (SECN) parks annually for breeding, wintering, or as a migratory stopover area. The high bird diversity in the Southeast Coast Network exists because of the juxtaposition of SECN parks within the Atlantic Flyway. Many SECN parks occur in a highly fragmented landscape, and because the network encompasses inland and coastal areas, it provides a wide range of bird habitat types.

This report summarizes data collected with the SECN landbird community monitoring protocol (Byrne et al. 2014). Protocol objectives that are addressed in this report include:

a) Determine the species richness and diversity of the landbird community at each park,

b) Determine the frequency of detection of selected landbirds, and

c) Determine the distribution of landbirds within park lands.

Study Area

Kennesaw Mountain National Battlefield Park (KEMO), a 2,923-acre (1,183-hectare) park in the metropolitan Atlanta area, includes the 1,808-foot (551-meter) peak of Kennesaw Mountain, Little Kennesaw Mountain, and hundreds of acres of mixed hardwood/pine forests intermixed with a number of grassy fields (Figure 1). Forested areas generally consist of oaks, hickories (*Carya* spp.), and loblolly pine. Included are more than 22 miles (35.4 kilometers) of designated hiking trails that attract hundreds of recreational visitors daily. The park's location in the metropolitan Atlanta area makes it the second-most visited battlefield in the National Park System, and has earned it a position on the Secretary of Interior's list of 25 most threatened parks.

Largely because of its proximity to Atlanta, major threats to natural resources exist at Kennesaw Mountain. The development of Cobb County and greater metro Atlanta makes the lands within Kennesaw Mountain relatively valuable for localized plant and animal communities. Cobb County has plans to expand roads and highways that traverse the park and pose a potential threat to both cultural and natural resources. Air pollution also poses a major threat to the park, which is located in a designated ozone nonattainment area. Vegetation in the park is considered at high risk of injury from ozone.

Additionally, there are minor threats from encroachment of adjacent landowners, non-native invasive plant species, and industrial air and water pollution. Since 1993, southern pine beetle (*Dendroctonus frontalis*) infestations have killed thousands of pine trees throughout the park and the resulting increase in fuels laying on the forest floor pose an increased fire risk. The mitigation of encroachments and the removal of non-native plants are ongoing programs.

Despite many of these threats, Kennesaw Mountain is a major stopover and breeding site for many species of Neotropical and resident birds.

Kennesaw Mountain National Battlefield Park has 207 known bird species (Appendix A-1; NPSpecies 2015).

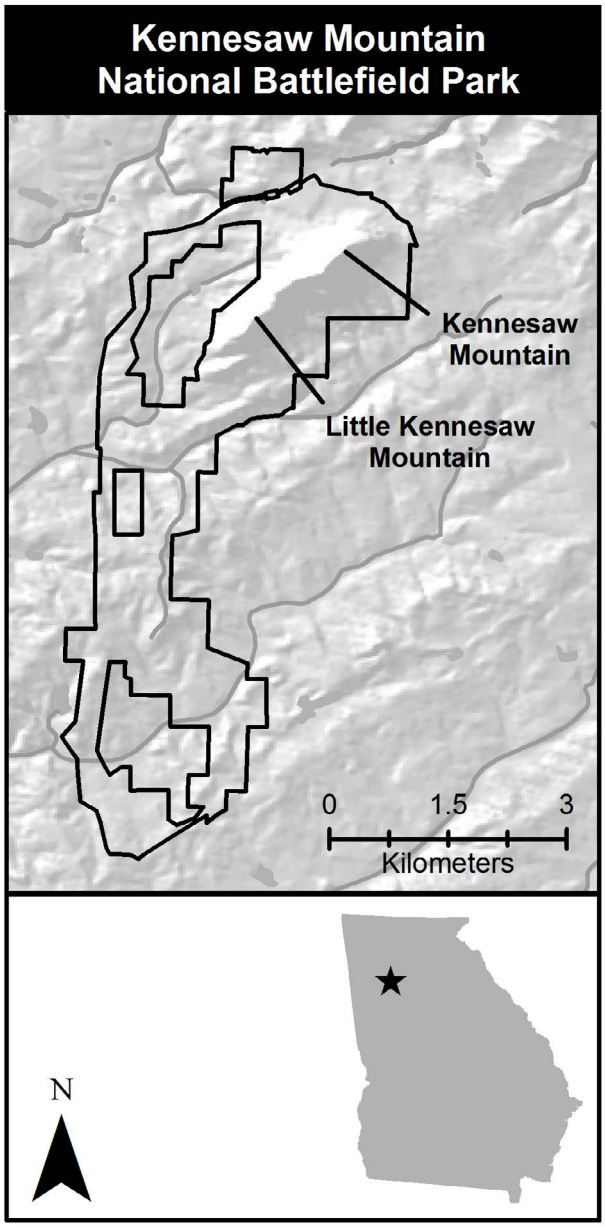

Figure 1. Location of Kennesaw Mountain National Battlefield Park.

Methods

Sampling Design

The sampling design and sampling-location selection is detailed in Appendix B of the SECN landbird community monitoring protocol (Byrne et al. 2014) and in the sampling-location selection standard operating procedure #1.1.01 (Byrne 2012). In summary, the administrative boundary was used as the sampling frame to allow for park-wide inference. The sampling frame was divided into a systematic 0.5-hectare grid superimposed over the entire sampling frame (i.e., park boundary); the center point of each grid cell served as the potential sampling location. A spatially balanced sample was drawn from this grid using the Reversed Randomized Quadrant-Recursive Raster (RRQRR) algorithm (Theobald et al. 2007). Alternate points were used when specified selection criteria (e.g., safety issues, accessibility) were not met. A sample size of 30 was chosen based on consideration of the park size, hypothesized variability, and logistical issues; however, the final sample size was 27.

Taxonomic Standards

Taxonomy and nomenclature follow that set forth in the Integrated Taxonomic Information System (ITIS; http://www.itis.gov/). The National Park Service uses the online application NPSpecies (https://irma.nps.gov/npspecies) to document "our knowledge about the occurrence and status of species on National Park Service lands," including maintenance of species lists for NPS properties. The taxonomy and nomenclature in NPSpecies is periodically updated with the most current ITIS catalog. As noted on the ITIS webpage, the system intends not to "serve as a forum for cutting-edge taxonomic classifications," but rather to use "classifications that have gained broad acceptance in the taxonomic literature and by professionals who work with the taxa."

All bird vocalizations are identified to the finest resolution possible in the taxonomic hierarchy. Only vocalizations identified to the species level are used in the analyses presented herein.

Data Collection

Automatic recording devices (ARDs) were deployed at sampling locations March–June, 2012. ARDs are deployed at the center point of each 0.5-hectare grid cell (i.e., the sampling location) and are programmed to record from 07:30 – 07:42 and 08:00 – 08:12 (i.e., 12 minutes) every five days for a period of 77 days (Byrne et al. 2014). This schedule results in 20 discrete sampling events for each sampling location. Species occurrences were derived from analyzing five recordings collected May–June at each sampling location, which represents a closed population.

Manual Evaluation of Recordings

Ambient / background noise influences detectability in auditory avian surveys (Alldredge et al. 2007, Simons et al. 2008, Pacifici et al. 2008, Simons et al. 2009). To minimize the impact of background noise on detectability, three strategies are applied to all recordings: (1) omit recordings with a background noise level above approximately 45dB, if possible, (2) quantify background noise categorically, and (3) use existing software tools to remove or minimize the influence of frequency ranges that are exclusive to the background noise and outside the frequency range of target vocalizations (Byrne et al. 2014). In general, sounds with a sound pressure level greater than 45 dB preclude hearing birds located over 100 meters (328 feet [ft]) from the observer. To provide a frame of reference, the approximate loudness of a watch or clock ticking is 20 dB, a quiet whisper is 30 dB, a steady and heavy rain is 50 dB, and normal conversation is 60 dB.

High levels of background noise can make it difficult to discern vocalizations, and this limits the researcher's ability to adequately detect and classify bird vocalizations. Therefore, the background noise level for each recording was classified a priori, and an index score ranging from one (low) to three (high) was assigned. Each three-minute segment (i.e., 0–3, 3–6, 6–9, and 9–12) of the recordings was a priori categorized according to background noise level (i.e., 1=low, 2=moderate, and 3=high), and an average noise score was calculated for the entire 12-minute recording. In general, the background noise level of the recording was defined as follows: (a) "low" characterizes a recording in which the vocalizations are clear and distinct, the vocalizations are the primary source of sound, and background noise is a low-volume muffle; (b) "moderate" characterizes a recording with uniform loudness of less than 45dB, in which vocalizations are identifiable and some are clear and distinct while others blend into the background noise, which may contain a low- to medium-speed wind or light rain, distant traffic, or rustling vegetation; or (c) "high" characterizes a recording in which background noise is the dominant sound, above 45dB,

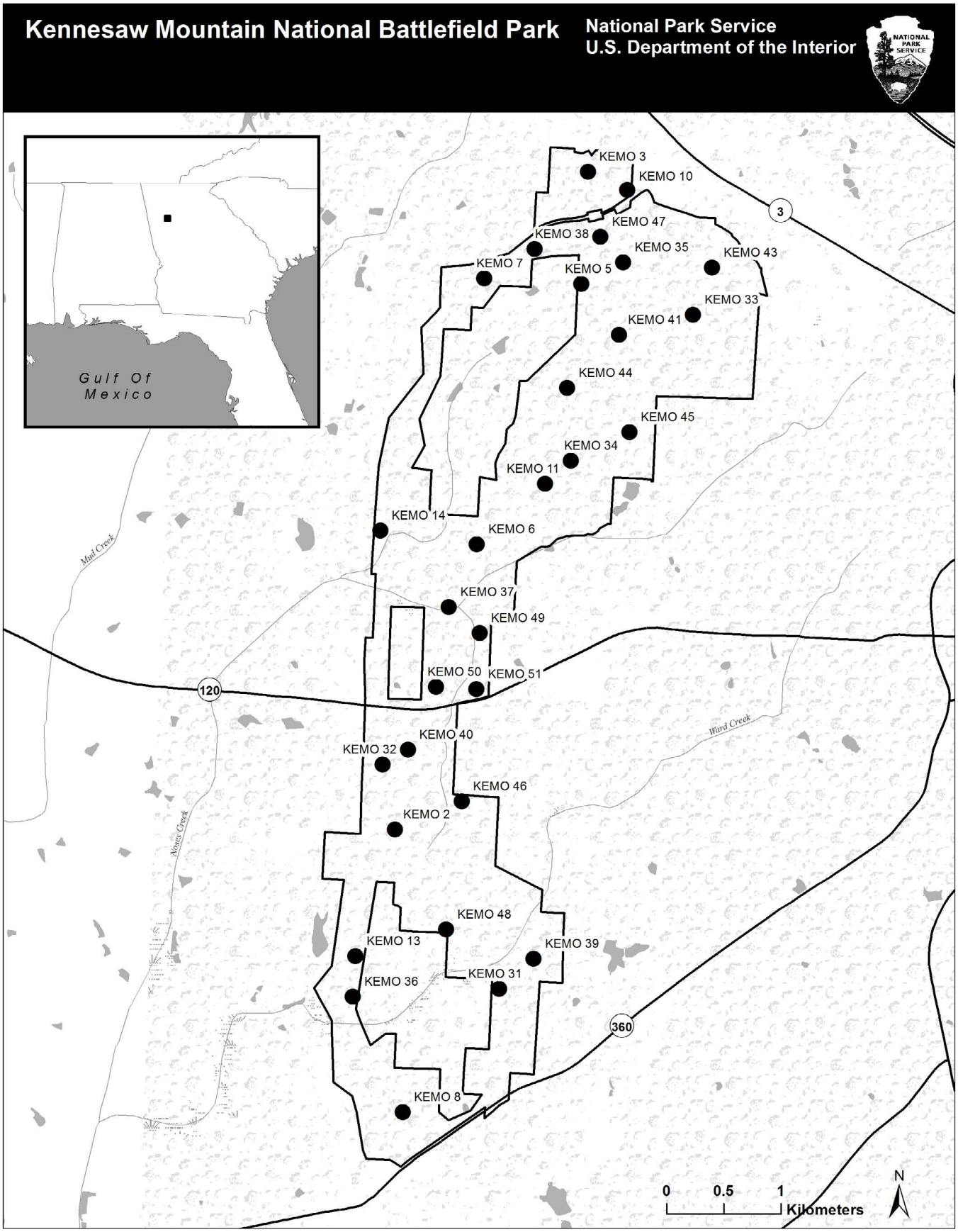

Figure 2. Landbird-community monitoring sampling locations at Kennesaw Mountain National Battlefield Park in 2012.

and some vocalizations are difficult to separate from the background noise.

Examples of background noise in recordings in the "high" category include proximate automobile traffic, high winds in vegetation, insects (e.g., cicadas), frog choruses, trains, heavy rain, or thunderstorms. If both the alternate and primary recordings have similar background noise issues, then the next consecutive sampling event (i.e., next day) is reviewed. This process continues until five monitoring events within the May to mid-June window with the lowest noise levels are selected for evaluation for each sampling location. If all recordings from a sampling location have a substantial amount of background noise, the required number of recordings to meet our analysis objectives will continue to be analyzed such that sample size and replicates are not lost, and background noise is categorized as previously mentioned to be later used as an explanatory variable when modeling detectability. The methodology, implemented as part of Byrne et al. (2014), was designed specifically to create an alternate recording for each day of monitoring. This facilitates the screening process and minimizes the influence of anomalous sound events that could impede or preclude species detection.

All recordings were evaluated by one trained observer, with several years of birding experience, astute at vocalization identification, whose skills were reviewed and tested. The observer performed the evaluation by listening to the recordings while simultaneously examining spectrograms in Song Scope software (Wildlife Acoustics, Inc.). The observer spent approximately one hour analyzing each 12-minute recording, including the time spent clarifying uncertain identifications with a digital library of vocalizations, online resources, or confirmation with other expert birders. All identifiable birds in each recording were documented. Some vocalizations were unidentifiable due to background noise or distance from the sampling location.

A total of 137 recordings from 27 sampling locations were evaluated (1,644 minutes total).

Data Analysis

Data in this report represent one year and are summarized in three general but closely linked categories: composition, richness, and distribution. Appendix B depicts all species detected by sampling location, and Appendix C depicts individual-species distribution maps.

Composition

Measures of community composition are often good indicators of abiotic variability, disturbance, or other stressors. Summaries related to composition include the total number of species detected (i.e., species richness) and naïve occupancy. Species richness is simply the number of native species detected, and is presented for the ARD method. Naïve occupancy is the percentage of the sampling locations where a species was detected at least once, without adjusting for probability of detection (i.e., detectability). Naïve occupancy is also referred to as frequency of occurrence. Naïve occupancy provides insight into the distribution of a species across a park and whether the species can be considered common or uncommon. Species with high values occur at more locations than those with low values.

Richness

Species richness is a major component of species diversity. Magurran (2004) defines diversity as "the variety and abundance of species in a defined unit of study." Diversity is a community property that is related to trophic structure, productivity, stability (McIntosh 1967, McNaughton 1977), immigration/emigration (Colwell and Lees 2000), and ecological condition (i.e., ecological integrity, as defined by Karr and Chu 1995). Species diversity consists of two components: the number of species (i.e., species richness) and the relative abundance of those species (i.e., species evenness/dominance) within a defined community (Margalef 1958, Lloyd and Ghelardi 1964, Pielou 1966). The methodology implemented by the Southeast Coast Network does not collect abundance data; therefore, the analysis focuses on species richness estimation of the landbird community. Further, the term community refers to the assemblage of species populations that occur together in space and time (Begon et al. 1986), and we consider the all taxa-species populations that occur at a park as the community, as per the conceptual ecological models presented in our monitoring plan (see Chapter 2 in DeVivo et al. 2008).

Species richness and diversity is presented in the form of indices. Because richness and diversity indices respond differently to various mechanisms that influence community change, several indices must be used to adequately characterize richness and diversity in SECN parks (Haedrick 1975, Boyle et al. 1984). Based on characteristics of the SECN dataset and careful appraisal of the advantages and disadvantages of several richness indices, the selected

richness indices are presented in Table 1, including notes on value interpretation. Because observed species richness (i.e., S_{obs}) is an underestimate (i.e., influenced by detectability, observer error) of true species richness, richness indices more closely approximate true species richness for a defined area. In this analysis, richness estimates are based only on landbird observations identified to the species level, and detections/occurrences of non-native species were not included in the calculations.

Distribution

Understanding changes in the distribution of landbirds is integral to informed management of species and their requisite habitats. Changes in species distributions over time provide useful information at both the local and landscape scale regarding how species respond to large-scale influences such as changing land use, climate, hydrology, or habitat availability and condition. Shifting species distributions alter species interactions and the food-web structure, thereby producing cascading effects on ecosystem processes (Montoya and Raffaelli 2010). Distribution maps for all bird species detected are presented in Appendix C.

Table 1. Incidence-based species richness indices used in this analysis, corresponding symbol, community attribute that the index reflects, range of index values, and notes on each index.

Index	Symbol	Community Attribute	Index Citation	Notes
Native Species Richness	**S_{obs}**	Richness	n/a	Value is a positive integer that indicates the number of native species in the sample. Intuitive. Good discriminant ability if sampling effort is comparable; sensitive to sample size, the occurrence of rare species, or those with low detectability; does not account for relative abundances.
Chao 2	**Chao2**	Richness	Chao (1984) Chao (1987)	Values indicate an estimate of total species richness (including species not present in the sample); incidence-based estimate; works well with dataset containing several infrequent observations.
Incidence-based Coverage	**ICE**	Richness	Lee and Chao (1994) Chazdon et al. (1998)	Values indicate an estimate of total species richness (including species not present in the sample); incidence-based estimate.
Jackknife 1	**Jack1**	Richness	Burnham and Overton (1978) Burnham and Overton (1979) Heltshe and Forrester (1983)	Values indicate an estimate of total species richness (including species not present in the sample); incidence-based estimate; the higher the value the higher the species richness. This procedure requires no assumptions regarding the data distribution.
Jackknife 2	**Jack2**	Richness	Smith and van Bell (1984)	Values indicate an estimate of species richness; incidence-based estimate.
Bootstrap	**Boot**	Richness	Smith and van Bell (1984)	Values indicate an estimate of species richness; incidence-based estimate.

Results

Composition

Northern cardinal, Carolina wren, tufted titmouse, blue jay, white-breasted nuthatch, Carolina chickadee, pine warbler, and red-bellied woodpecker were the most frequently occurring and widely distributed species (i.e., occurring at 80% or more of all sampling locations). American crow was also widely distributed across the park, occurring at 70% of all sampling locations. Several species were detected at only one sampling location (i.e., uncommon), including barn swallow, blue-headed vireo, cedar waxwing, chipping sparrow, common yellowthroat, Cooper's hawk, field sparrow, fish crow, gray catbird, green heron, northern mockingbird, prairie warbler, red-tailed hawk, song sparrow, white-throated sparrow, yellow-billed cuckoo, and yellow-breasted chat (Table 2).

Table 2. Naïve occupancy estimates (i.e., proportion of sampling locations in which a species was detected) for birds at Kennesaw Mountain National Battlefield Park in 2012.

Common Name	Scientific Name	Naïve Occupancy
Northern Cardinal	*Cardinalis cardinalis*	0.90
Carolina Wren	*Thryothorus ludovicianus*	0.87
Tufted Titmouse	*Baeolophus bicolor*	0.87
Blue Jay	*Cyanocitta cristata*	0.83
White-breasted Nuthatch	*Sitta carolinensis*	0.83
Carolina Chickadee	*Poecile carolinensis*	0.80
Pine Warbler	*Dendroica pinus*	0.80
Red-bellied Woodpecker	*Melanerpes carolinus*	0.80
American Crow	*Corvus brachyrhynchos*	0.70
Eastern Towhee	*Pipilo erythrophthalmus*	0.67
Red-eyed Vireo	*Vireo olivaceus*	0.67
Summer Tanager	*Piranga rubra*	0.57
Blue-gray Gnatcatcher	*Polioptila caerulea*	0.47
Downy Woodpecker	*Picoides pubescens*	0.47
American Robin	*Turdus migratorius*	0.40
Chimney Swift	*Chaetura pelagica*	0.40
American Goldfinch	*Carduelis tristis*	0.37
Great Crested Flycatcher	*Myiarchus crinitus*	0.37
Mourning Dove	*Zenaida macroura*	0.37
Scarlet Tanager	*Piranga olivacea*	0.37
Wood Thrush	*Hylocichla mustelina*	0.30
Canada Goose	*Branta canadensis*	0.27
Northern Flicker	*Colaptes auratus*	0.27
Brown-headed Nuthatch	*Sitta pusilla*	0.23
Hairy Woodpecker	*Picoides villosus*	0.23
Kentucky Warbler	*Oporornis formosus*	0.17
Red-headed Woodpecker	*Melanerpes erythrocephalus*	0.17
Red-shouldered Hawk	*Buteo lineatus*	0.17
Hooded Warbler	*Wilsonia citrina*	0.13
House Finch	*Carpodacus mexicanus*	0.13
Indigo Bunting	*Passerina cyanea*	0.13
Pileated Woodpecker	*Dryocopus pileatus*	0.13
Blue Grosbeak	*Guiraca caerulea*	0.10
Brown-headed Cowbird	*Molothrus ater*	0.10

Common Name	Scientific Name	Naïve Occupancy
Eastern Bluebird	*Sialia sialis*	0.10
Purple Martin	*Progne subis*	0.10
White-eyed Vireo	*Vireo griseus*	0.10
Acadian Flycatcher	*Empidonax virescens*	0.07
Brown Thrasher	*Toxostoma rufum*	0.07
Common Grackle	*Quiscalus quiscula*	0.07
Eastern Phoebe	*Sayornis phoebe*	0.07
Louisiana Waterthrush	*Seiurus motacilla*	0.07
Sharp-shinned Hawk	*Accipiter striatus*	0.07
Wild Turkey	*Meleagris gallopavo*	0.07
Yellow-throated Vireo	*Vireo flavifrons*	0.07
Barn Swallow	*Hirundo rustica*	0.03
Blue-headed Vireo	*Vireo salitarius*	0.03
Cedar Waxwing	*Bombycilla cedrorum*	0.03
Chipping Sparrow	*Spizella passerina*	0.03
Common Yellowthroat	*Geothlypis trichas*	0.03
Cooper's Hawk	*Accipiter cooperii*	0.03
Field Sparrow	*Spizella pusilla*	0.03
Fish Crow	*Corvus ossifragus*	0.03
Gray Catbird	*Dumetella carolinensis*	0.03
Green Heron	*Butorides virescens*	0.03
Northern Mockingbird	*Mimus polyglottos*	0.03
Prairie Warbler	*Dendroica discolor*	0.03
Red-tailed Hawk	*Buteo jamaicensis*	0.03
Song Sparrow	*Melospiza melodia*	0.03
White-throated Sparrow	*Zonotrichia albicollis*	0.03
Yellow-billed Cuckoo	*Coccyzus americanus*	0.03
Yellow-breasted Chat	*Icteria virens*	0.03

Richness

The native species richness for landbirds at Kennesaw Mountain National Battlefield Park in 2012 was 61. Species richness indices were based only on native species and confidence intervals for each index were estimated with a bootstrap procedure. Richness indices ranged widely from 68.40 to 85.99 (Table 3). The high variability indicates characteristics in the dataset affected the estimates differently. Observed species richness differs from the estimated true species richness (i.e., all of the richness indices combined) by approximately 22%, suggesting that further surveys are necessary to estimate true species richness.

Distribution

Distribution maps for all species detected are presented in Appendix C (Figures C-1 – C-62), and indicate the sampling location(s) in which each species occurred. Northern cardinal, Carolina wren, tufted titmouse, blue jay, white-breasted nuthatch, Carolina chickadee, pine warbler, and red-bellied woodpecker were the most frequently occurring and widely distributed species (i.e., occurring at 80% or more of all sampling locations). American crow was also widely distributed across the park, occurring at 70% of all sampling locations. Several species were detected at only one sampling location (i.e., uncommon), including barn swallow, blue-headed vireo, cedar waxwing, chipping sparrow, common yellowthroat, Cooper's hawk, field sparrow, fish crow, gray catbird, green heron, northern mockingbird, prairie warbler, red-tailed hawk, song sparrow, white-throated sparrow, yellow-billed cuckoo, and yellow-breasted chat. One non-native species, house finch, was also detected. Approximately 56% of detected species occurred at 10% or less of all sampling locations.

Table 3. Species richness indices for birds at Kennesaw Mountain National Battlefield Park in 2012.

Index	Symbol	Value	Lower 95% CI	Upper 95% CI	Value Interpretation
Native Spp. Richness	**S_{obs}**	61.00	53.79	68.21	Number of native species detected; Species richness at the park is considered to be moderate
Chao 2	**Chao2**	78.39	66.46	116.38	Estimated true species richness; Considered to be high; Large confidence interval (variability)
Incidence-based Coverage	**ICE**	79.76	72.68	86.84	Estimated true species richness; Considered to be moderate
Jackknife 1	**Jack1**	77.37	64.87	89.87	Estimated true species richness; Considered to be moderate
Jackknife 2	**Jack2**	85.99	77.35	94.63	Estimated true species richness; Considered to be high
Bootstrap	**Boot**	68.40	65.30	71.50	Estimated true species richness; Considered to be moderate

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Appendix A—Species List

Table A-1. Birds known to occur at Kennesaw Mountain National Battlefield Park based on records in NPSpecies (2015), and birds detected during this sampling effort.

Order	Family	Scientific Name	Common Name	NPSpecies	ARD 2012
Accipitriformes	Accipitridae	*Accipiter cooperii*	Cooper's Hawk	X	X
Accipitriformes	Accipitridae	*Accipiter striatus*	Sharp-shinned Hawk	X	X
Accipitriformes	Accipitridae	*Buteo jamaicensis*	Red-tailed Hawk	X	X
Accipitriformes	Accipitridae	*Buteo lineatus*	Red-shouldered Hawk	X	X
Accipitriformes	Accipitridae	*Buteo platypterus*	Broad-winged Hawk	X	
Accipitriformes	Accipitridae	*Circus cyaneus*	Northern Harrier	X	
Accipitriformes	Accipitridae	*Haliaeetus leucocephalus*	Bald Eagle	X	
Accipitriformes	Accipitridae	*Ictinia mississippiensis*	Mississippi Kite	X	
Accipitriformes	Cathartidae	*Cathartes aura*	Turkey Vulture	X	
Accipitriformes	Cathartidae	*Coragyps atratus*	Black Vulture	X	
Accipitriformes	Pandionidae	*Pandion haliaetus*	Osprey	X	
Anseriformes	Anatidae	*Aix sponsa*	Wood Duck	X	
Anseriformes	Anatidae	*Anas acuta*	Northern Pintail	X	
Anseriformes	Anatidae	*Anas americana*	American Wigeon	X	
Anseriformes	Anatidae	*Anas discors*	Blue-winged Teal	X	
Anseriformes	Anatidae	*Anas platyrhynchos*	Mallard	X	
Anseriformes	Anatidae	*Anas rubripes*	American black Duck	X	
Anseriformes	Anatidae	*Anas strepera*	Gadwall	X	
Anseriformes	Anatidae	*Branta canadensis*	Canada Goose	X	X
Anseriformes	Anatidae	*Lophodytes cucullatus*	Hooded Merganser	X	
Anseriformes	Anatidae	*Mergus merganser*	Common Merganser	X	
Apodiformes	Apodidae	*Chaetura pelagica*	Chimney Swift	X	X
Apodiformes	Trochilidae	*Archilochus colubris*	Ruby-throated Hummingbird	X	
Caprimulgiformes	Caprimulgidae	*Caprimulgus carolinensis*	Chuck-will's-widow	X	
Caprimulgiformes	Caprimulgidae	*Chordeiles minor*	Common Nighthawk	X	
Charadriiformes	Charadriidae	*Charadrius vociferus*	Killdeer	X	
Charadriiformes	Laridae	*Larus delawarensis*	Ring-billed Gull	X	
Charadriiformes	Laridae	*Larus philadelphia*	Bonaparte's Gull	X	
Charadriiformes	Scolopacidae	*Actitis macularia*	Spotted Sandpiper	X	
Charadriiformes	Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	X	
Charadriiformes	Scolopacidae	*Calidris minutilla*	Least Sandpiper	X	
Charadriiformes	Scolopacidae	*Calidris pusilla*	Semipalmated Sandpiper	X	
Charadriiformes	Scolopacidae	*Scolopax minor*	American Woodcock	X	
Charadriiformes	Scolopacidae	*Tringa flavipes*	Lesser Yellowlegs	X	
Charadriiformes	Scolopacidae	*Tringa melanoleuca*	Greater Yellowlegs	X	
Charadriiformes	Scolopacidae	*Tringa solitaria*	Solitary Sandpiper	X	
Columbiformes	Columbidae	*Zenaida macroura*	Mourning Dove	X	X
Coraciiformes	Alcedinidae	*Megaceryle alcyon*	Belted Kingfisher	X	
Cuculiformes	Cuculidae	*Coccyzus americanus*	Yellow-billed Cuckoo	X	X
Cuculiformes	Cuculidae	*Coccyzus erythropthalmus*	Black-billed Cuckoo	X	
Falconiformes	Falconidae	*Falco columbarius*	Merlin	X	
Falconiformes	Falconidae	*Falco peregrinus*	Peregrine Falcon	X	
Falconiformes	Falconidae	*Falco sparverius*	American Kestrel	X	
Galliformes	Phasianidae	*Meleagris gallopavo*	Wild Turkey	X	X

Table A-1 (continued). Birds known to occur at Kennesaw Mountain National Battlefield Park based on records in NPSpecies (2015), and birds detected during this sampling effort.

Order	Family	Scientific Name	Common Name	NPSpecies	ARD 2012
Gaviiformes	Gaviidae	*Gavia immer*	Common Loon	X	
Gruiformes	Gruidae	*Grus canadensis*	Sandhill Crane	X	
Gruiformes	Rallidae	*Fulica americana*	American Coot	X	
Gruiformes	Rallidae	*Porphyrula martinica*	Purple Gallinule	X	
Gruiformes	Rallidae	*Porzana carolina*	Sora	X	
Gruiformes	Rallidae	*Rallus elegans*	King Rail	X	
Gruiformes	Rallidae	*Rallus limicola*	Virginia Rail	X	
Passeriformes	Bombycillidae	*Bombycilla cedrorum*	Cedar Waxwing	X	X
Passeriformes	Cardinalidae	*Cardinalis cardinalis*	Northern Cardinal	X	X
Passeriformes	Cardinalidae	*Passerina caerulea*	Blue Grosbeak	X	X
Passeriformes	Cardinalidae	*Passerina cyanea*	Indigo Bunting	X	X
Passeriformes	Cardinalidae	*Pheucticus ludovicianus*	Rose-breasted Grosbeak	X	
Passeriformes	Certhiidae	*Certhia americana*	Brown Creeper	X	
Passeriformes	Corvidae	*Corvus brachyrhynchos*	American Crow	X	X
Passeriformes	Corvidae	*Corvus ossifragus*	Fish Crow	X	X
Passeriformes	Corvidae	*Cyanocitta cristata*	Blue Jay	X	X
Passeriformes	Emberizidae	*Ammodramus henslowii*	Henslow's Sparrow	X	
Passeriformes	Emberizidae	*Ammodramus leconteii*	Le Conte's Sparrow	X	
Passeriformes	Emberizidae	*Ammodramus savannarum*	Grasshopper Sparrow	X	
Passeriformes	Emberizidae	*Junco hyemalis*	Dark-eyed Junco	X	
Passeriformes	Emberizidae	*Melospiza georgiana*	Swamp Sparrow	X	
Passeriformes	Emberizidae	*Melospiza lincolnii*	Lincoln's Sparrow	X	
Passeriformes	Emberizidae	*Melospiza melodia*	Song Sparrow	X	X
Passeriformes	Emberizidae	*Passerculus sandwichensis*	Savannah Sparrow	X	
Passeriformes	Emberizidae	*Passerella iliaca*	Fox Sparrow	X	
Passeriformes	Emberizidae	*Pipilo erythrophthalmus*	Eastern Towhee	X	X
Passeriformes	Emberizidae	*Pooecetes gramineus*	Vesper Sparrow	X	
Passeriformes	Emberizidae	*Spizella passerina*	Chipping Sparrow	X	X
Passeriformes	Emberizidae	*Spizella pusilla*	Field Sparrow	X	X
Passeriformes	Emberizidae	*Zonotrichia albicollis*	White-throated Sparrow	X	X
Passeriformes	Emberizidae	*Zonotrichia leucophrys*	White-crowned Sparrow	X	
Passeriformes	Fringillidae	*Carduelis pinus*	Pine Siskin	X	
Passeriformes	Fringillidae	*Carduelis tristis*	American Goldfinch	X	X
Passeriformes	Fringillidae	*Carpodacus mexicanus*	House Finch	X	X
Passeriformes	Fringillidae	*Carpodacus purpureus*	Prothonotary Warbler	X	
Passeriformes	Fringillidae	*Coccothraustes vespertinus*	Evening Grosbeak	X	
Passeriformes	Fringillidae	*Loxia curvirostra*	Red Crossbill	X	
Passeriformes	Hirundinidae	*Hirundo rustica*	Barn Swallow	X	X
Passeriformes	Hirundinidae	*Petrochelidon pyrrhonota*	Cliff Swallow	X	
Passeriformes	Hirundinidae	*Progne subis*	Purple Martin	X	X
Passeriformes	Hirundinidae	*Riparia riparia*	Bank Swallow	X	
Passeriformes	Hirundinidae	*Stelgidopteryx serripennis*	Northern Rough-winged Swallow	X	
Passeriformes	Hirundinidae	*Tachycineta bicolor*	Tree Swallow	X	
Passeriformes	Icteridae	*Agelaius phoeniceus*	Red-winged Blackbird	X	
Passeriformes	Icteridae	*Dolichonyx oryzivorus*	Bobolink	X	
Passeriformes	Icteridae	*Euphagus carolinus*	Rusty Blackbird	X	

Table A-1 (continued). Birds known to occur at Kennesaw Mountain National Battlefield Park based on records in NPSpecies (2015), and birds detected during this sampling effort.

Order	Family	Scientific Name	Common Name	NPSpecies	ARD 2012
Passeriformes	Icteridae	*Icterus galbula*	Baltimore Oriole	X	
Passeriformes	Icteridae	*Icterus spurius*	Orchard Oriole	X	
Passeriformes	Icteridae	*Molothrus ater*	Brown-headed Cowbird	X	X
Passeriformes	Icteridae	*Quiscalus quiscula*	Common Grackle	X	X
Passeriformes	Icteridae	*Sturnella magna*	Eastern Meadowlark	X	
Passeriformes	Mimidae	*Dumetella carolinensis*	Gray Catbird	X	X
Passeriformes	Mimidae	*Mimus polyglottos*	Northern Mockingbird	X	X
Passeriformes	Mimidae	*Toxostoma rufum*	Brown Thrasher	X	X
Passeriformes	Paridae	*Baeolophus bicolor*	Tufted Titmouse	X	X
Passeriformes	Paridae	*Poecile carolinensis*	Carolina Chickadee	X	X
Passeriformes	Parulidae	*Dendroica caerulescens*	Black-throated blue Warbler	X	
Passeriformes	Parulidae	*Dendroica castanea*	Bay-breasted Warbler	X	
Passeriformes	Parulidae	*Dendroica cerulea*	Cerulean Warbler	X	
Passeriformes	Parulidae	*Dendroica coronata*	Yellow-Rumped Warbler	X	
Passeriformes	Parulidae	*Dendroica discolor*	Prairie Warbler	X	X
Passeriformes	Parulidae	*Dendroica dominica*	Yellow-throated Warbler	X	
Passeriformes	Parulidae	*Dendroica fusca*	Blackburnian Warbler	X	
Passeriformes	Parulidae	*Dendroica magnolia*	Magnolia Warbler	X	
Passeriformes	Parulidae	*Dendroica nigrescens*	Black-throated gray Warbler	X	
Passeriformes	Parulidae	*Dendroica palmarum*	Palm Warbler	X	
Passeriformes	Parulidae	*Dendroica palmarum*	Palm Warbler	X	
Passeriformes	Parulidae	*Dendroica pensylvanica*	Chestnut-sided Warbler	X	
Passeriformes	Parulidae	*Dendroica petechia*	Yellow Warbler	X	
Passeriformes	Parulidae	*Dendroica pinus*	Pine Warbler	X	X
Passeriformes	Parulidae	*Dendroica striata*	Blackpoll Warbler	X	
Passeriformes	Parulidae	*Dendroica tigrina*	Cape May Warbler	X	
Passeriformes	Parulidae	*Dendroica virens*	Black-throated green Warbler	X	
Passeriformes	Parulidae	*Geothlypis trichas*	Common Yellowthroat	X	X
Passeriformes	Parulidae	*Helmitheros vermivorus*	Worm-eating Warbler	X	
Passeriformes	Parulidae	*Icteria virens*	Yellow-breasted Chat	X	X
Passeriformes	Parulidae	*Limnothlypis swainsonii*	Swainson's Warbler	X	
Passeriformes	Parulidae	*Mniotilta varia*	Black-and-white Warbler	X	
Passeriformes	Parulidae	*Oporornis agilis*	Connecticut Warbler	X	
Passeriformes	Parulidae	*Oporornis formosus*	Kentucky Warbler	X	X
Passeriformes	Parulidae	*Oporornis philadelphia*	Mourning Warbler	X	
Passeriformes	Parulidae	*Parula americana*	Northern Parula	X	
Passeriformes	Parulidae	*Protonotaria citrea*	Prothonotary Warbler	X	
Passeriformes	Parulidae	*Seiurus aurocapillus*	Ovenbird	X	
Passeriformes	Parulidae	*Seiurus motacilla*	Louisiana Waterthrush	X	X
Passeriformes	Parulidae	*Seiurus noveboracensis*	Northern Waterthrush	X	
Passeriformes	Parulidae	*Setophaga ruticilla*	American Redstart	X	
Passeriformes	Parulidae	*Vermivora celata*	Orange-crowned Warbler	X	
Passeriformes	Parulidae	*Vermivora chrysoptera*	Golden-winged Warbler	X	
Passeriformes	Parulidae	*Vermivora peregrina*	Tennessee Warbler	X	
Passeriformes	Parulidae	*Vermivora pinus*	Blue-winged Warbler	X	
Passeriformes	Parulidae	*Vermivora ruficapilla*	Nashville Warbler	X	

Table A-1 (continued). Birds known to occur at Kennesaw Mountain National Battlefield Park based on records in NPSpecies (2015), and birds detected during this sampling effort.

Order	Family	Scientific Name	Common Name	NPSpecies	ARD 2012
Passeriformes	Parulidae	*Vermivora virginiae*	Virginia's Warbler	X	
Passeriformes	Parulidae	*Wilsonia canadensis*	Canada Warbler	X	
Passeriformes	Parulidae	*Wilsonia citrina*	Hooded Warbler	X	X
Passeriformes	Parulidae	*Wilsonia pusilla*	Wilson's Warbler	X	
Passeriformes	Passeridae	*Passer domesticus*	House Sparrow	X	
Passeriformes	Polioptilidae	*Polioptila caerulea*	Blue-gray Gnatcatcher	X	X
Passeriformes	Regulidae	*Regulus calendula*	Ruby-crowned Kinglet	X	
Passeriformes	Regulidae	*Regulus satrapa*	Golden-crowned Kinglet	X	
Passeriformes	Sittidae	*Sitta canadensis*	Red-breasted Nuthatch	X	
Passeriformes	Sittidae	*Sitta carolinensis*	White-breasted Nuthatch	X	X
Passeriformes	Sittidae	*Sitta pusilla*	Brown-headed Nuthatch	X	X
Passeriformes	Sturnidae	*Sturnus vulgaris*	European Starling	X	
Passeriformes	Thraupidae	*Piranga olivacea*	Scarlet Tanager	X	X
Passeriformes	Thraupidae	*Piranga rubra*	Summer Tanager	X	X
Passeriformes	Troglodytidae	*Cistothorus palustris*	Marsh Wren	X	
Passeriformes	Troglodytidae	*Cistothorus platensis*	Sedge Wren	X	
Passeriformes	Troglodytidae	*Thryothorus ludovicianus*	Carolina Wren	X	X
Passeriformes	Troglodytidae	*Troglodytes aedon*	House Wren	X	
Passeriformes	Troglodytidae	*Troglodytes troglodytes*	Winter Wren	X	
Passeriformes	Turdidae	*Catharus fuscescens*	Veery	X	
Passeriformes	Turdidae	*Catharus guttatus*	Hermit Thrush	X	
Passeriformes	Turdidae	*Catharus minimus*	Gray-cheeked Thrush	X	
Passeriformes	Turdidae	*Catharus ustulatus*	Swainson's Thrush	X	
Passeriformes	Turdidae	*Hylocichla mustelina*	Wood Thrush	X	X
Passeriformes	Turdidae	*Sialia sialis*	Eastern Bluebird	X	X
Passeriformes	Turdidae	*Turdus migratorius*	American Robin	X	X
Passeriformes	Tyrannidae	*Contopus cooperi*	Olive-sided Flycatcher	X	
Passeriformes	Tyrannidae	*Contopus virens*	Eastern Wood-Pewee	X	
Passeriformes	Tyrannidae	*Empidonax alnorum*	Alder Flycatcher	X	
Passeriformes	Tyrannidae	*Empidonax flaviventris*	Yellow-bellied Flycatcher	X	
Passeriformes	Tyrannidae	*Empidonax minimus*	Least Flycatcher	X	
Passeriformes	Tyrannidae	*Empidonax traillii*	Willow Flycatcher	X	
Passeriformes	Tyrannidae	*Empidonax virescens*	Acadian Flycatcher	X	X
Passeriformes	Tyrannidae	*Myiarchus crinitus*	Great Crested Flycatcher	X	X
Passeriformes	Tyrannidae	*Sayornis phoebe*	Eastern Phoebe	X	X
Passeriformes	Tyrannidae	*Tyrannus tyrannus*	Eastern Kingbird	X	
Passeriformes	Vireonidae	*Vireo*	Blue-headed Vireo	X	X
Passeriformes	Vireonidae	*Vireo bellii*	Bell's Vireo	X	
Passeriformes	Vireonidae	*Vireo flavifrons*	Yellow-throated Vireo	X	X
Passeriformes	Vireonidae	*Vireo gilvus*	Warbling Vireo	X	
Passeriformes	Vireonidae	*Vireo griseus*	White-eyed Vireo	X	X
Passeriformes	Vireonidae	*Vireo olivaceus*	Red-eyed Vireo	X	X
Passeriformes	Vireonidae	*Vireo philadelphicus*	Philadelphia Vireo	X	
Pelecaniformes	Ardeidae	*Ardea alba*	Great Egret	X	
Pelecaniformes	Ardeidae	*Ardea herodias*	Great Blue Heron	X	
Pelecaniformes	Ardeidae	*Butorides virescens*	Green Heron	X	X

Table A-1 (continued). Birds known to occur at Kennesaw Mountain National Battlefield Park based on records in NPSpecies (2015), and birds detected during this sampling effort.

Order	Family	Scientific Name	Common Name	NPSpecies	ARD 2012
Pelecaniformes	Ardeidae	*Egretta caerulea*	Little Blue Heron	X	
Piciformes	Picidae	*Colaptes auratus*	Northern Flicker	X	X
Piciformes	Picidae	*Dryocopus pileatus*	Pileated Woodpecker	X	X
Piciformes	Picidae	*Melanerpes carolinus*	Red-bellied Woodpecker	X	X
Piciformes	Picidae	*Melanerpes erythrocephalus*	Red-headed Woodpecker	X	X
Piciformes	Picidae	*Picoides pubescens*	Downy Woodpecker	X	X
Piciformes	Picidae	*Picoides villosus*	Hairy Woodpecker	X	X
Piciformes	Picidae	*Sphyrapicus varius*	Yellow-bellied Sapsucker	X	
Podicipediformes	Podicipedidae	*Podilymbus podiceps*	Pied-billed Grebe	X	
Strigiformes	Strigidae	*Asio flammeus*	Short-eared Owl	X	
Strigiformes	Strigidae	*Bubo virginianus*	Great Horned Owl	X	
Strigiformes	Strigidae	*Megascops asio*	Eastern Screech Owl	X	
Strigiformes	Strigidae	*Strix varia*	Barred Owl	X	
Suliformes	Phalacrocoracidae	*Phalacrocorax auritus*	Double-crested Cormorant	X	

Appendix B—Species Detection Matrix

Table B-1. Species detected at each sampling location at Kennesaw Mountain National Battlefield Park in 2012. Refer to Figure 2 for labeled sampling locations.

Species	02	03	05	06	07	08	11	13	14	31	32	33	35	36	37	38	39	40	41	43	44	45	46	48	49	50	51
Acadian Flycatcher						X											X										
American Crow	X		X		X	X	X	X	X	X	X	X	X		X		X	X	X		X	X	X	X	X	X	
American Goldfinch	X		X			X		X		X							X	X			X		X		X	X	
American Robin		X	X		X					X		X	X			X				X	X	X		X	X		
Barn Swallow																X											
Blue Grosbeak	X							X													X						
Blue Jay	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Blue-gray Gnatcatcher	X							X	X	X	X	X			X		X	X	X		X		X	X			X
Blue-headed Vireo																				X							
Brown Thrasher			X																X								
Brown-headed Cowbird								X		X						X											
Brown-headed Nuthatch	X		X					X	X								X	X				X					
Canada Goose								X	X	X					X		X				X			X	X		
Carolina Chickadee	X		X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Carolina Wren	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cedar Waxwing					X																						
Chimney Swift	X							X	X		X	X	X			X			X	X	X		X			X	
Chipping Sparrow								X																			
Common Grackle				X													X										
Common Yellowthroat								X																			
Cooper's Hawk																						X					
Downy Woodpecker				X	X				X	X	X	X			X	X	X	X		X			X	X		X	
Eastern Bluebird								X											X							X	
Eastern Phoebe									X	X																	
Eastern Towhee	X		X		X		X	X	X	X	X	X	X	X		X	X	X	X	X	X		X	X			X
Field Sparrow								X																			
Fish Crow		X																									
Gray Catbird								X																			
Great Crested Flycatcher	X	X	X					X	X			X					X	X			X			X		X	
Green Heron									X																		
Hairy Woodpecker	X		X	X	X	X							X										X				
Hooded Warbler			X										X	X										X			

Table B-1 (continued). Species detected at each sampling location at Kennesaw Mountain National Battlefield Park in 2012. Refer to Figure 2 for labeled sampling locations.

Species	02	03	05	06	07	08	11	13	14	31	32	33	35	36	37	38	39	40	41	43	44	45	46	48	49	50	51
House Finch										X						X	X						X				
Indigo Bunting								X						X			X	X									
Kentucky Warbler									X					X	X			X						X			
Louisiana Waterthrush											X				X												
Mourning Dove			X			X	X		X	X	X						X	X	X				X	X			
Northern Cardinal	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Northern Flicker		X		X	X	X		X	X										X					X			
Northern Mockingbird										X																	
Pileated Woodpecker									X		X						X								X		
Pine Warbler		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X	X	X	X
Prairie Warbler								X																			
Purple Martin															X						X			X			
Red-bellied Woodpecker	X		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Red-eyed Vireo	X	X		X		X	X	X	X	X	X	X			X		X	X	X	X			X	X	X	X	X
Red-headed Woodpecker	X																X	X						X	X		
Red-shouldered Hawk				X	X						X						X							X			
Red-tailed Hawk																									X		
Scarlet Tanager	X		X			X	X	X		X		X	X		X					X			X				
Sharp-shinned Hawk													X												X		
Song Sparrow										X																	
Summer Tanager		X	X	X	X	X	X			X		X	X		X	X		X	X	X	X				X		X
Tufted Titmouse	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
White-breasted Nuthatch	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
White-eyed Vireo								X											X				X				
White-throated Sparrow										X																	
Wild Turkey				X	X																						
Wood Thrush		X				X		X		X	X				X	X							X			X	
Yellow-billed Cuckoo				X																							
Yellow-breasted Chat								X																			
Yellow-throated Vireo												X									X						

Appendix C—Species Distribution Maps

Ordered alphabetically by common name

Contents

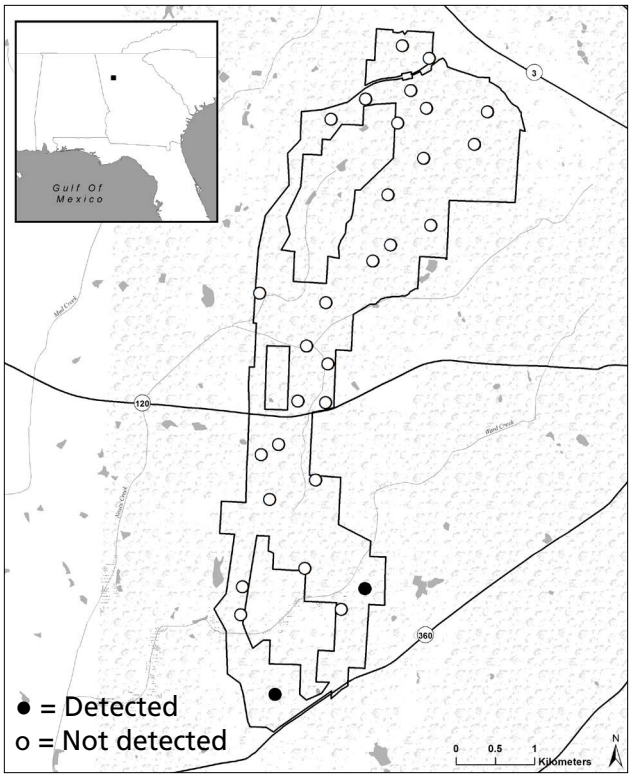

Figure C-1. Sampling locations where Acadian flycatcher (*Empidonax virescens*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

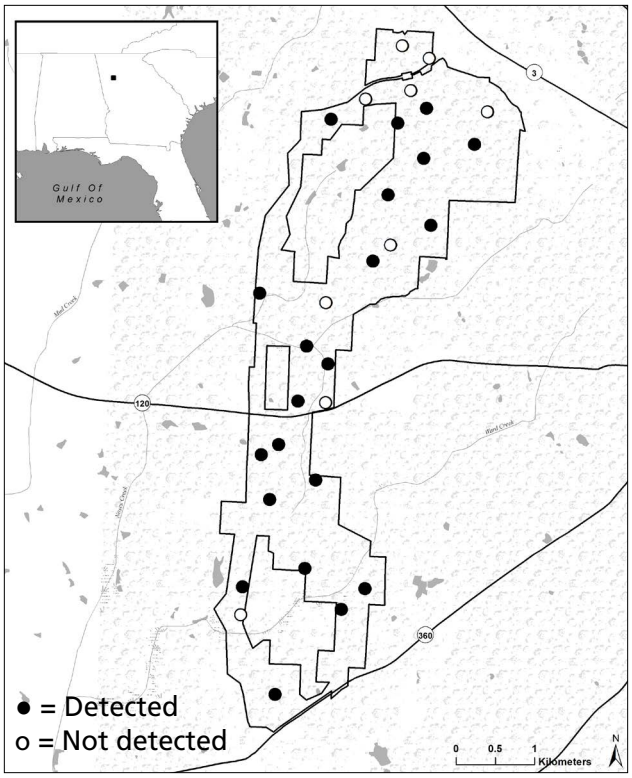

Figure C-2. Sampling locations where American crow (*Corvus brachyrhynchos*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

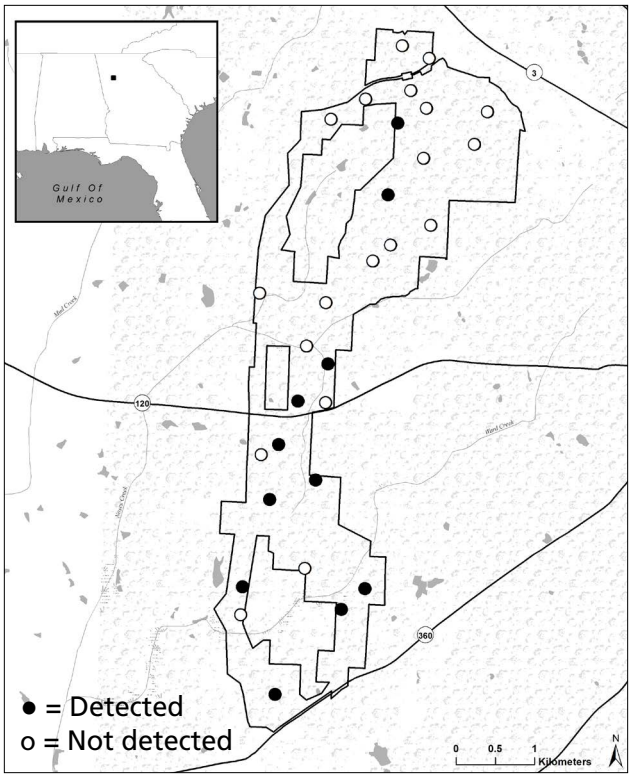

Figure C-3. Sampling locations where American goldfinch (*Carduelis tristis*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

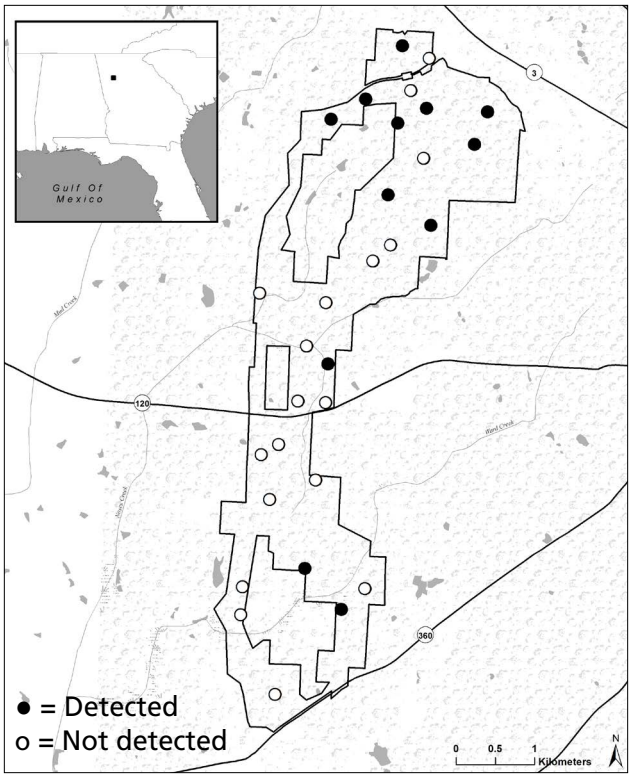

Figure C-4. Sampling locations where American robin (*Turdus migratorius*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

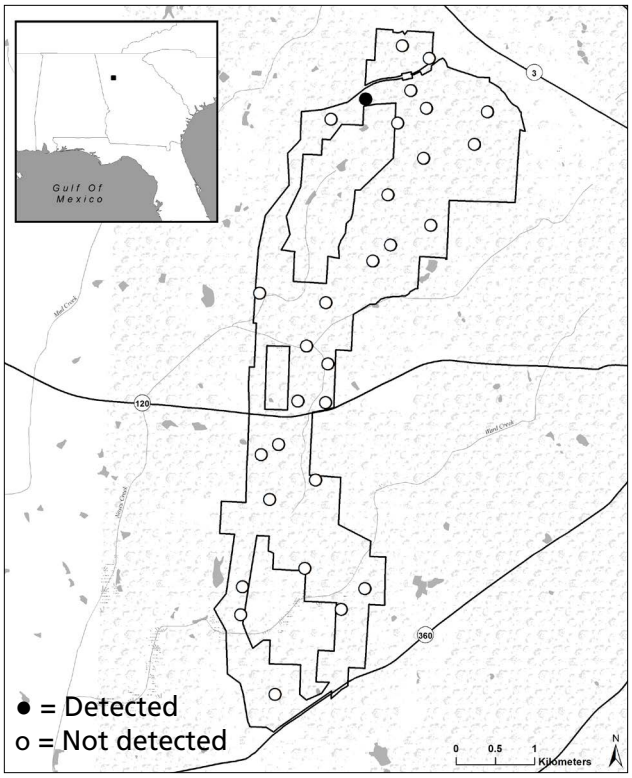

Figure C-5. Sampling locations where barn swallow (*Hirundo rustica*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

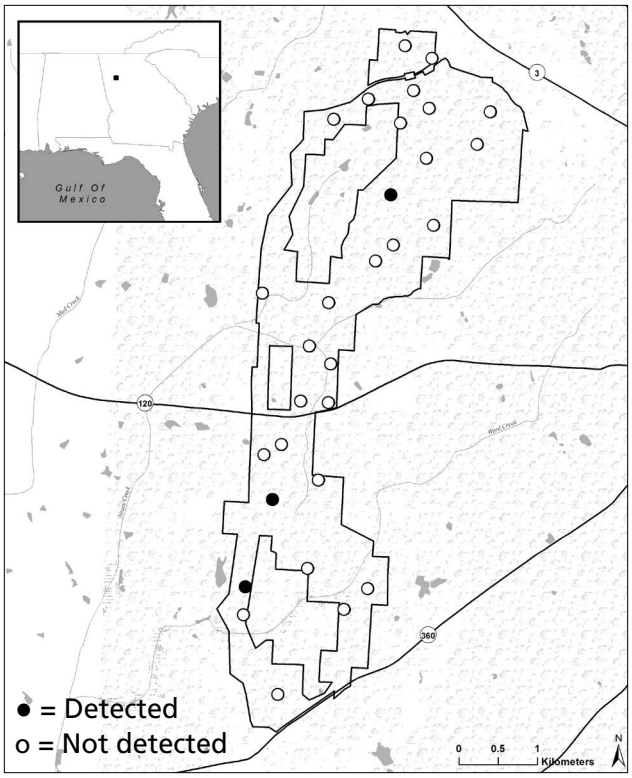

Figure C-6. Sampling locations where blue grosbeak (*Guiraca caerula*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

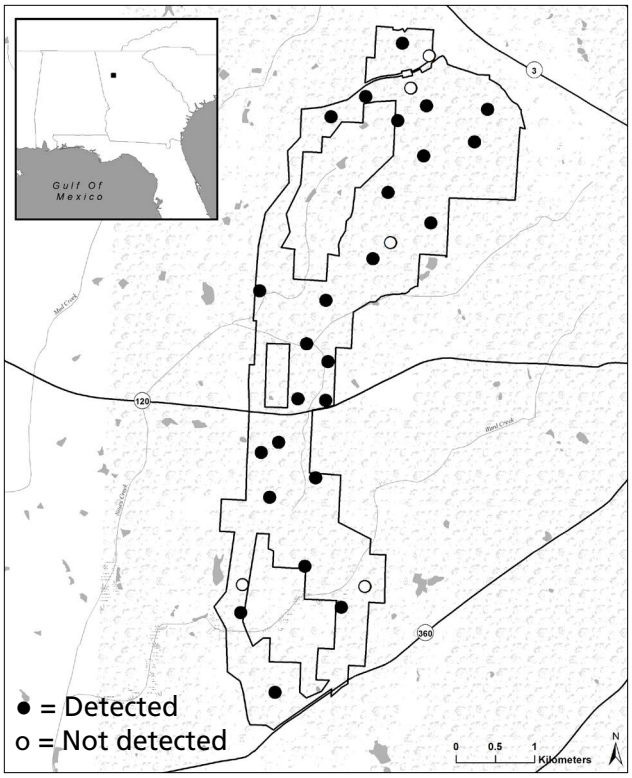

Figure C-7. Sampling locations where blue jay (*Cyanocitta cristata*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

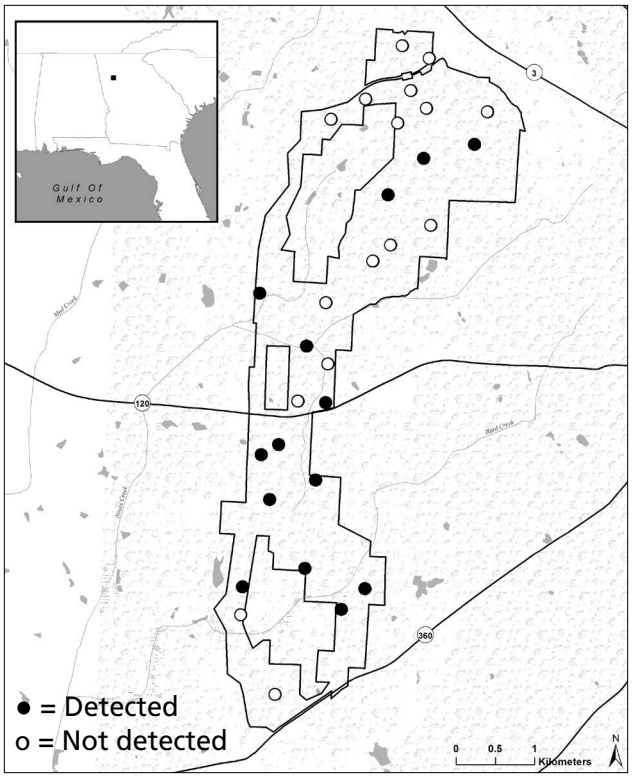

Figure C-8. Sampling locations where blue-gray gnatcatcher (*Polioptila caerulea*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

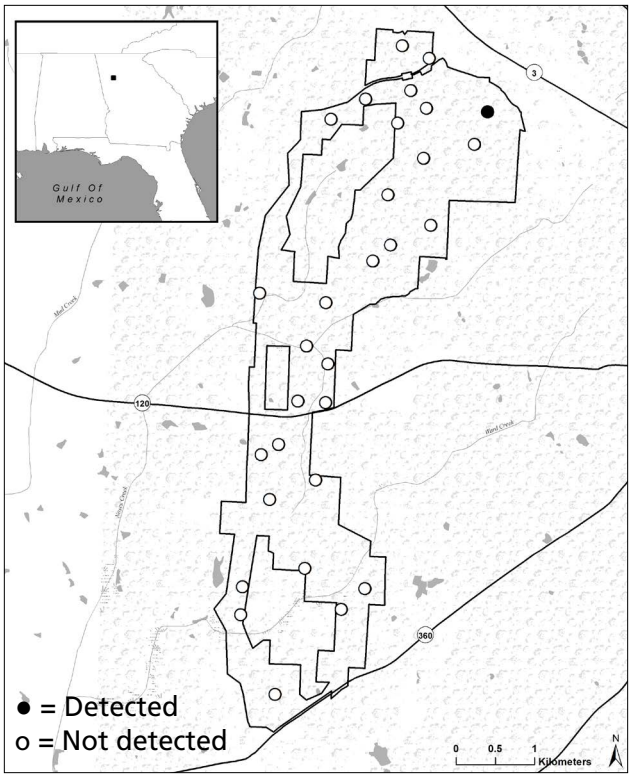

Figure C-9. Sampling locations where blue-headed vireo (*Vireo salitarius*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

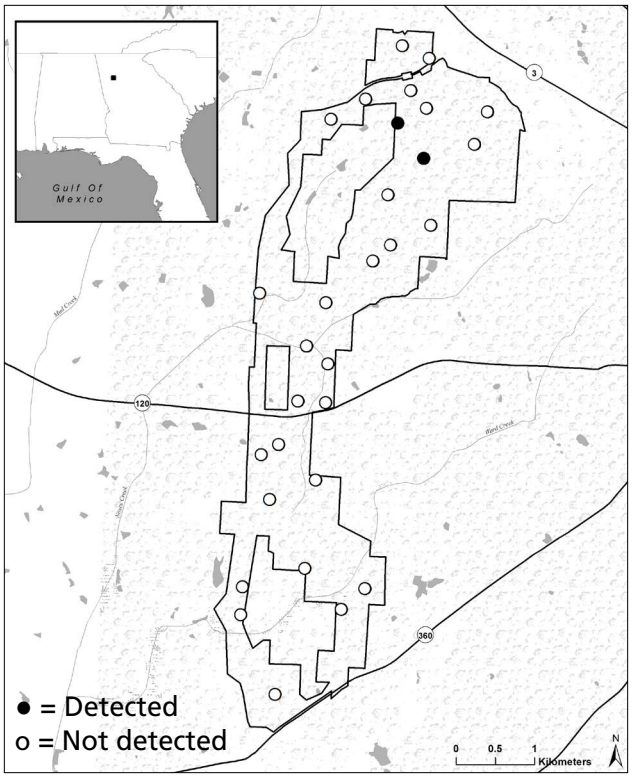

Figure C-10. Sampling locations where brown thrasher (*Toxostoma rufum*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

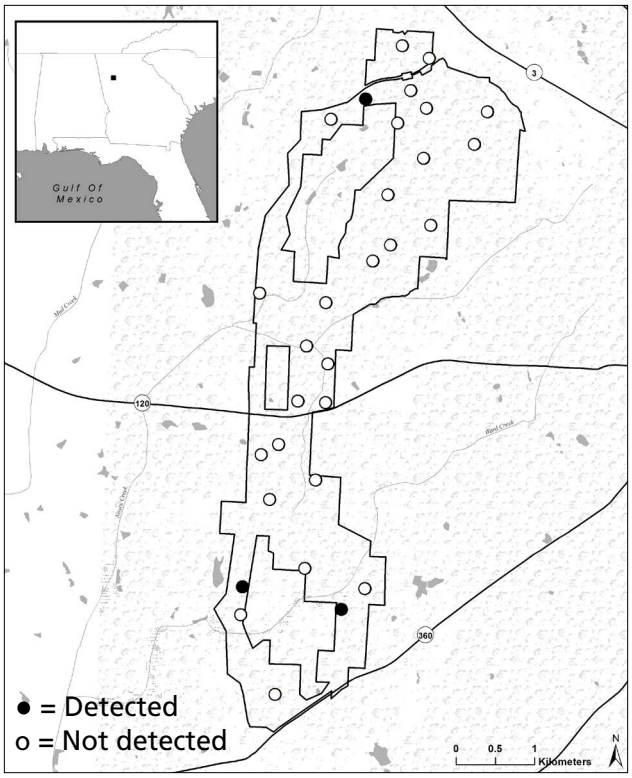

Figure C-11. Sampling locations where brown-headed cowbird (*Molothrus ater*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

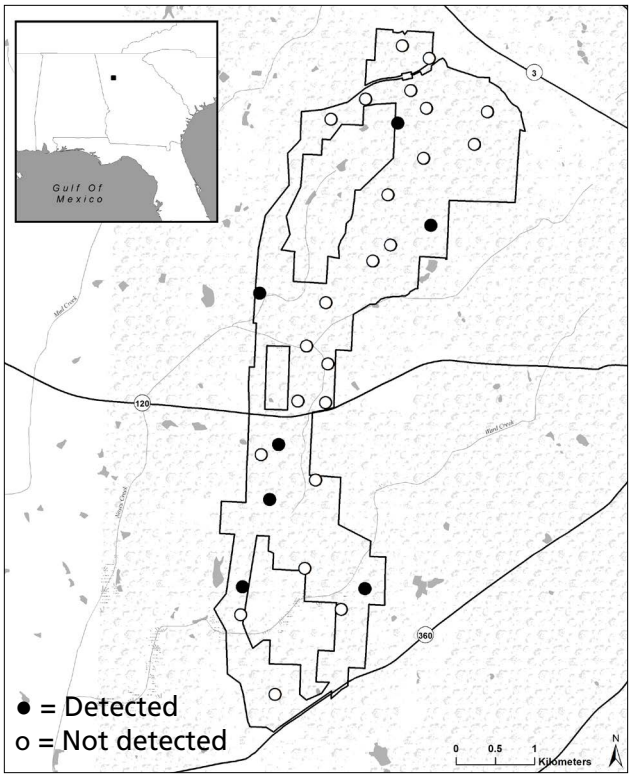

Figure C-12. Sampling locations where brown-headed nuthatch (*Sitta pusilla*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

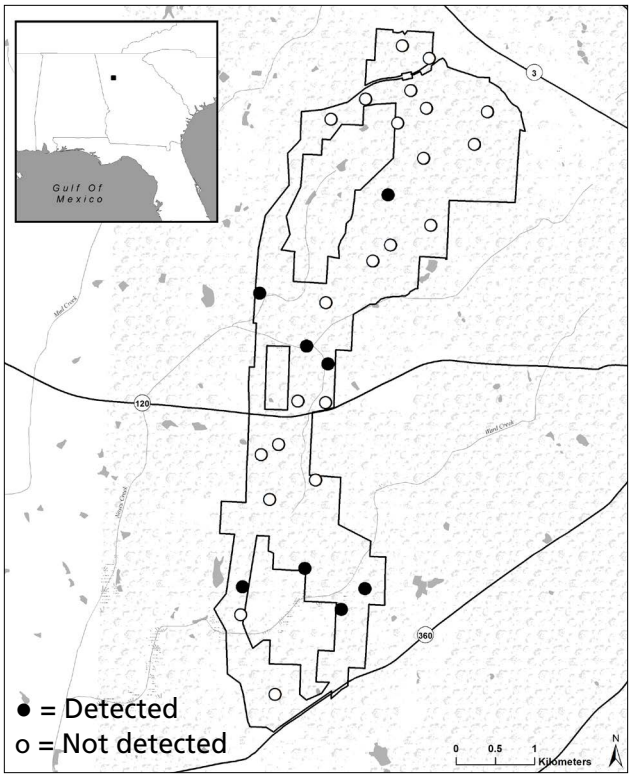

Figure C-13. Sampling locations where Canada goose (*Branta canadensis*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

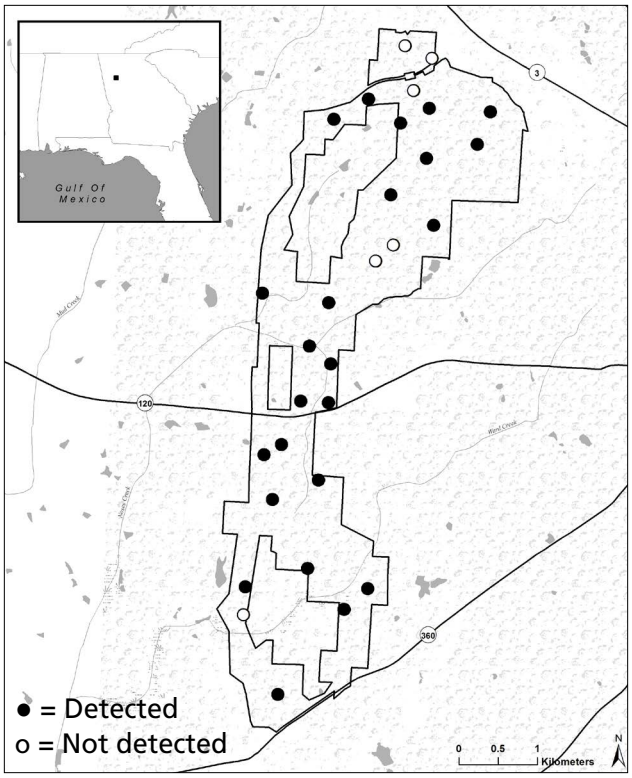

Figure C-14. Sampling locations where Carolina chickadee (*Poecile carolinensis*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

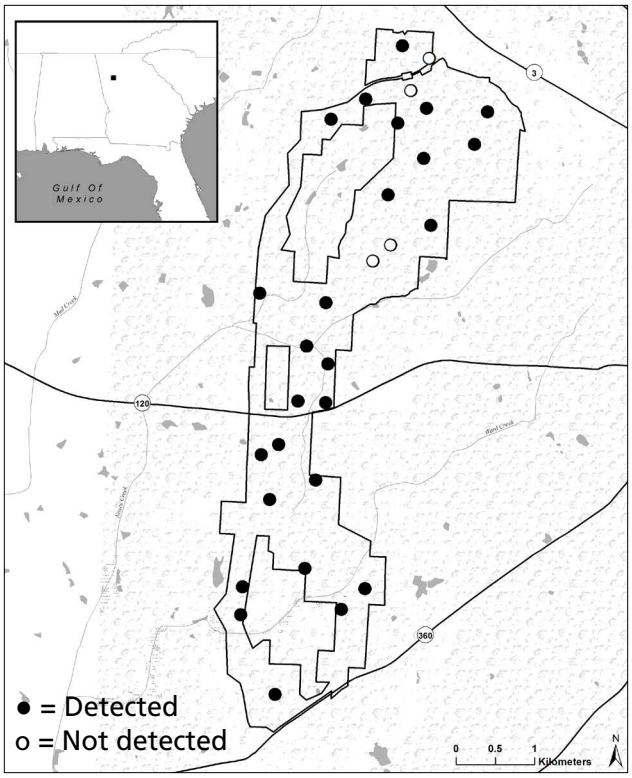

Figure C-15. Sampling locations where Carolina wren (*Thryothorus ludovicianus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

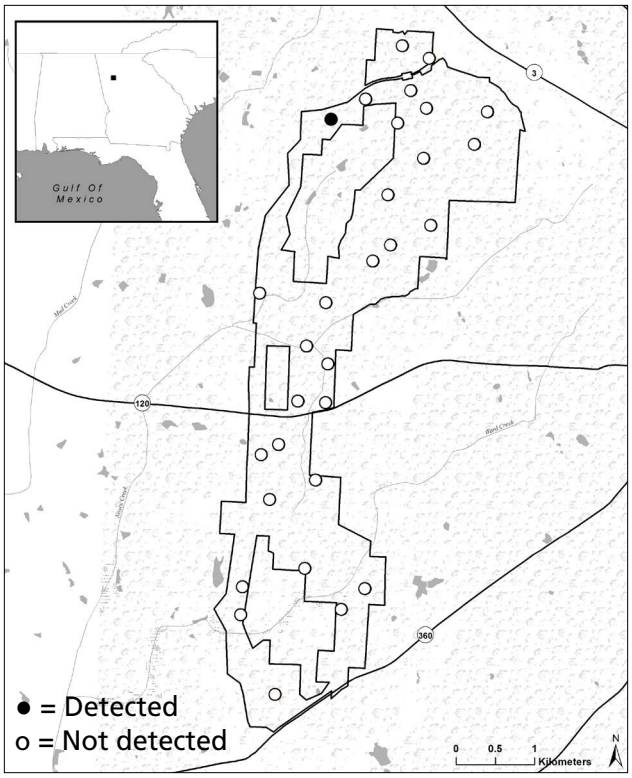

Figure C-16. Sampling locations where cedar waxwing (*Bombycilla cedrorum*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

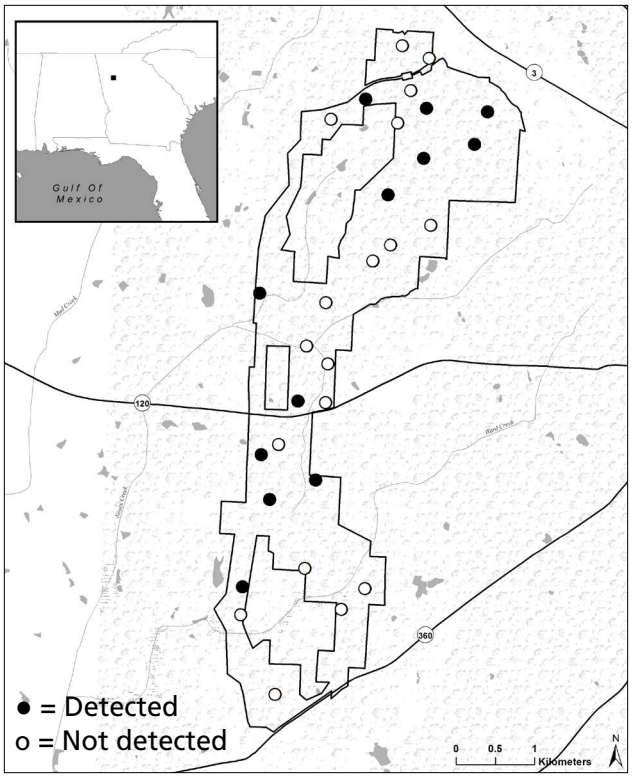

Figure C-17. Sampling locations where chimney swift (*Chaetura pelagica*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

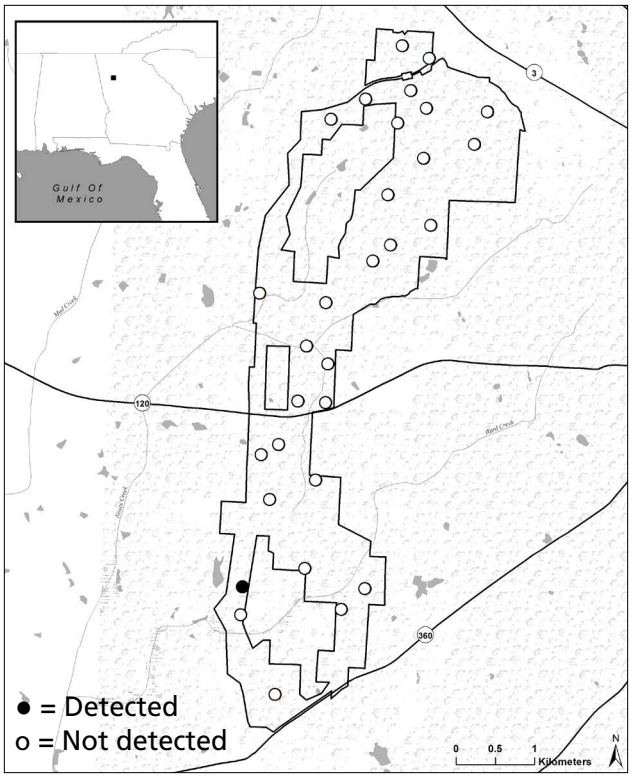

Figure C-18. Sampling locations where chipping sparrow (*Spizella passerina*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

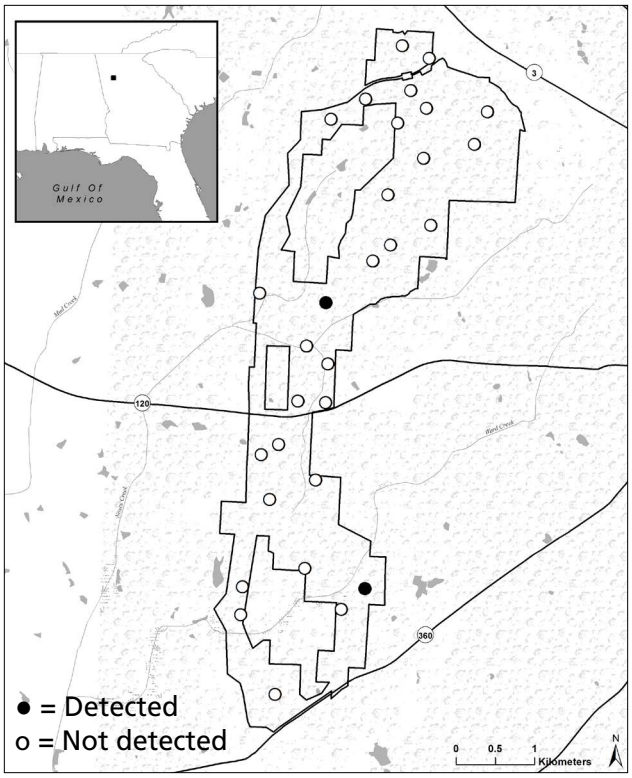

Figure C-19. Sampling locations where common grackle (*Quiscalus quiscula*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

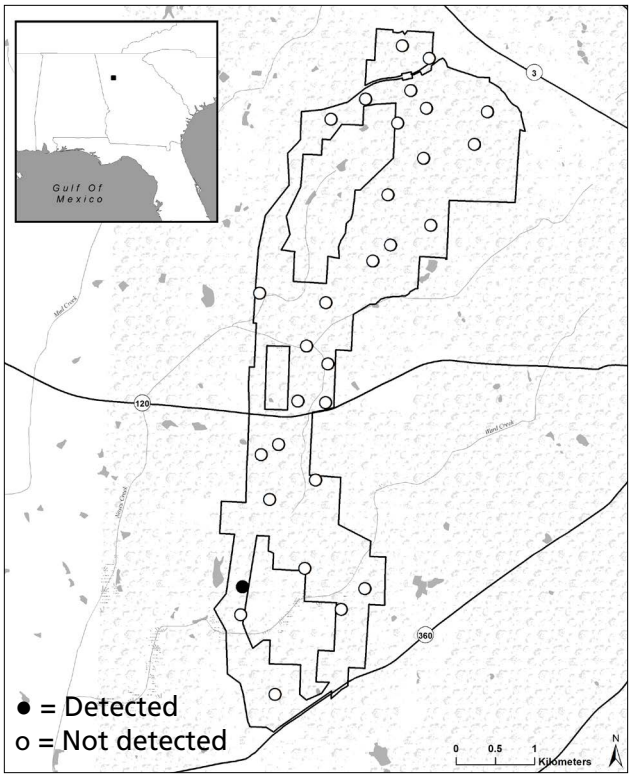

Figure C-20. Sampling locations where common yellowthroat (*Geothlypis trichas*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

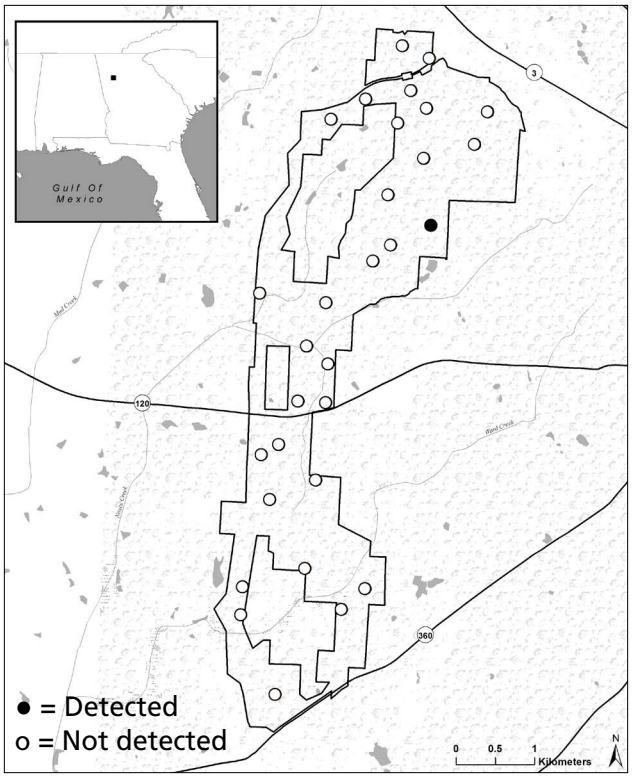

Figure C-21. Sampling locations where Cooper's hawk (*Accipiter cooperii*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

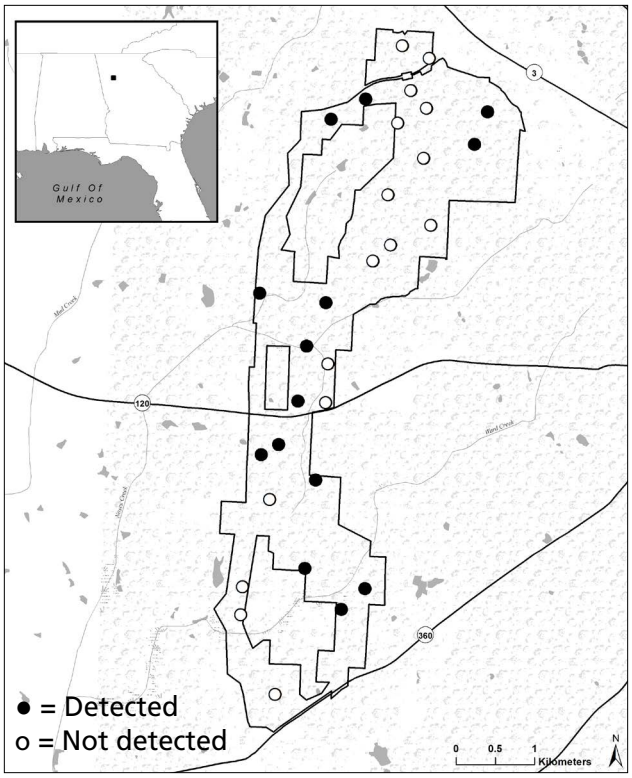

Figure C-22. Sampling locations where downy woodpecker (*Picoides pubescens*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

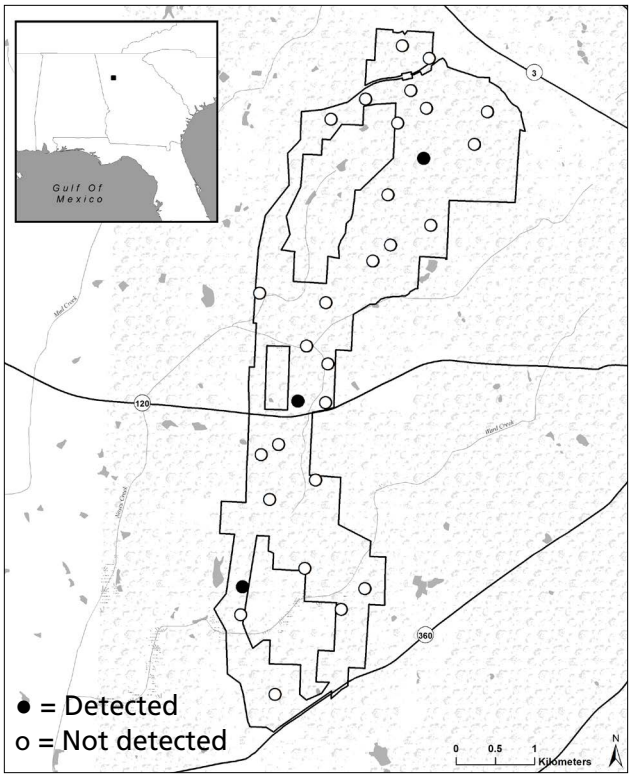

Figure C-23. Sampling locations where eastern bluebird (*Sialia sialis*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

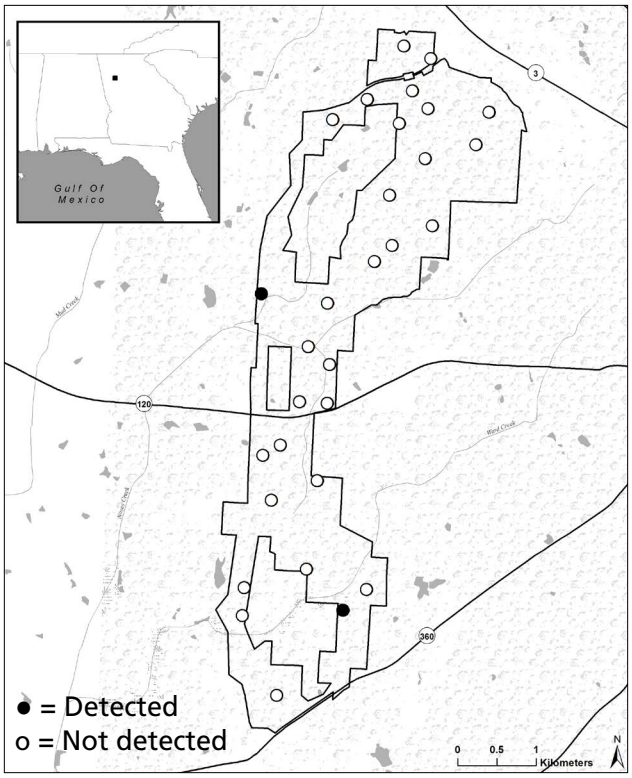

Figure C-24. Sampling locations where eastern phoebe (*Sayornis phoebe*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

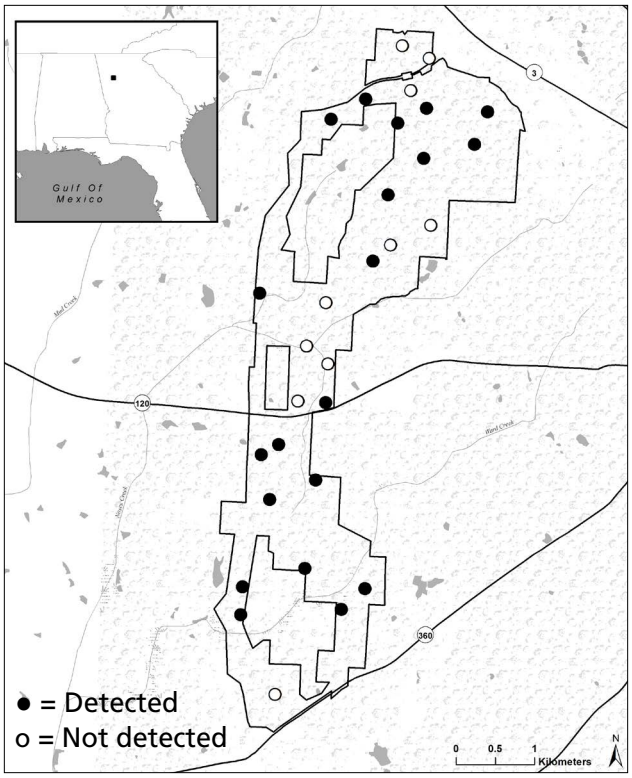

Figure C-25. Sampling locations where eastern towhee (*Piplio erythrophtalmus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

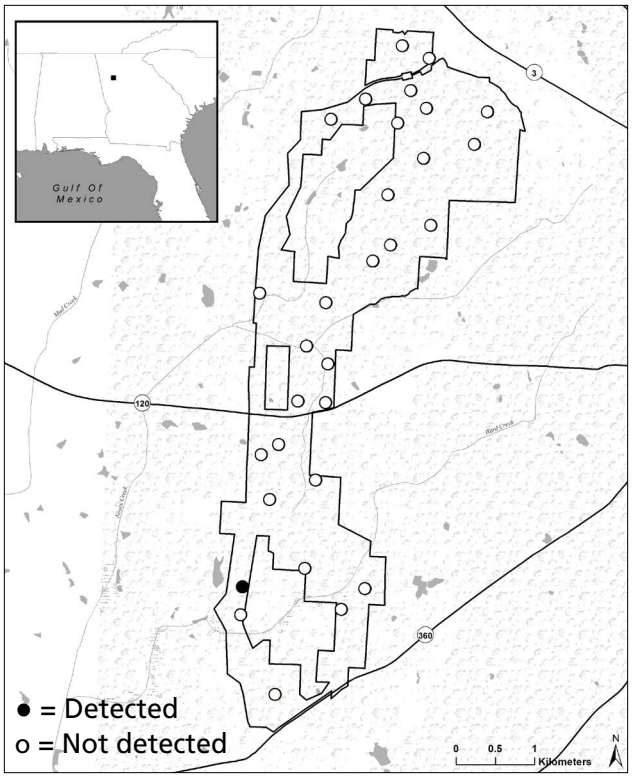

Figure C-26. Sampling locations where field sparrow (*Spizella pusilla*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

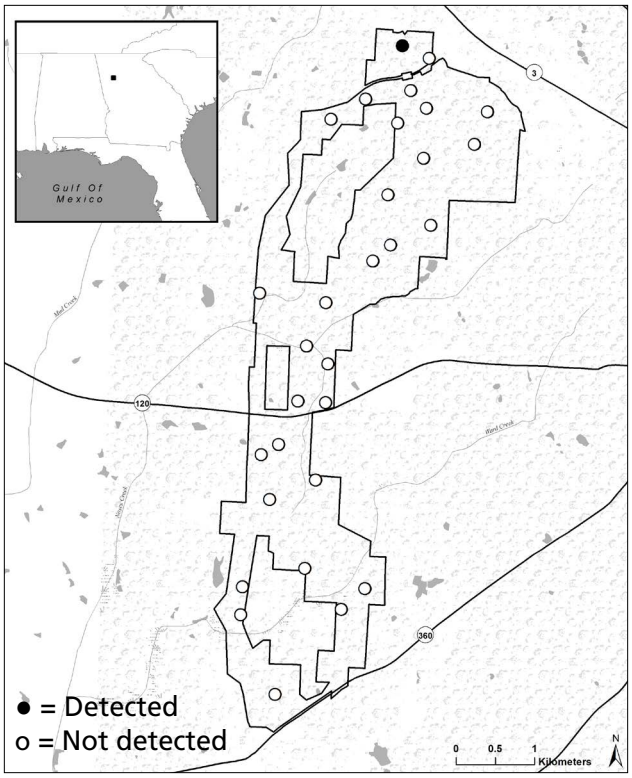

Figure C-27. Sampling locations where fish crow (*Corvus ossifragus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

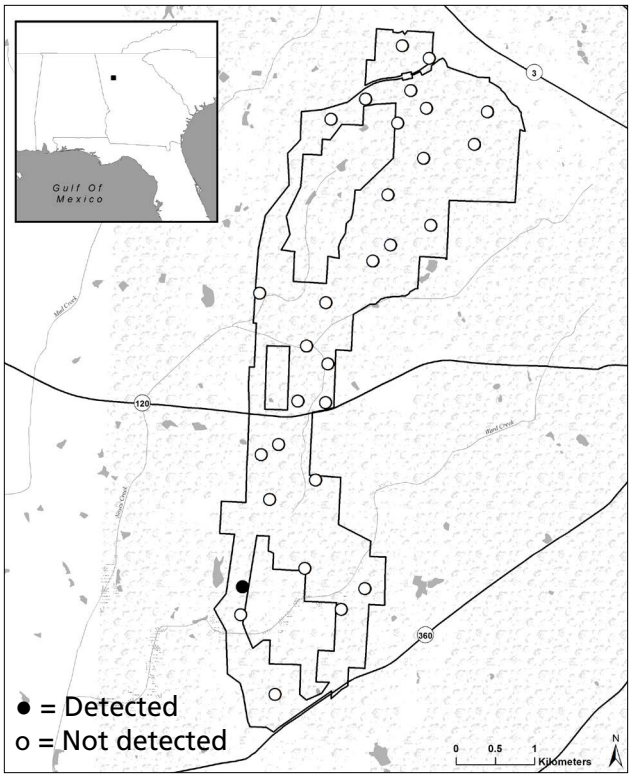

Figure C-28. Sampling locations where gray catbird (*Dumetella carolinensis*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

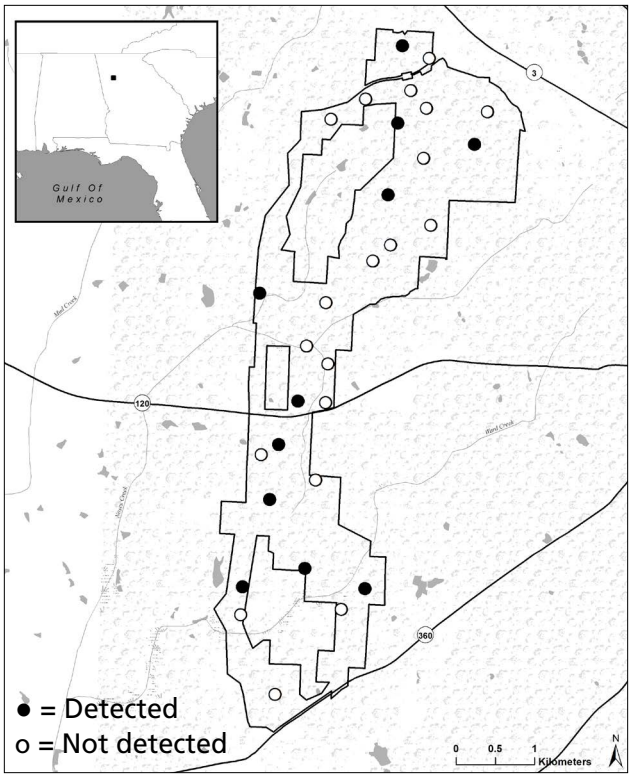

Figure C-29. Sampling locations where great crested flycatcher (*Myiarchus crinitus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

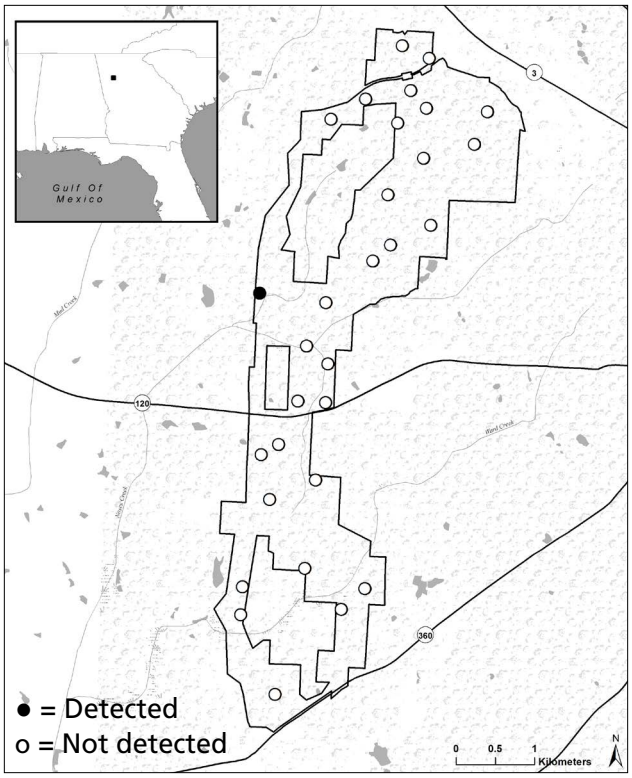

Figure C-30. Sampling locations where green heron (*Butorides virescens*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

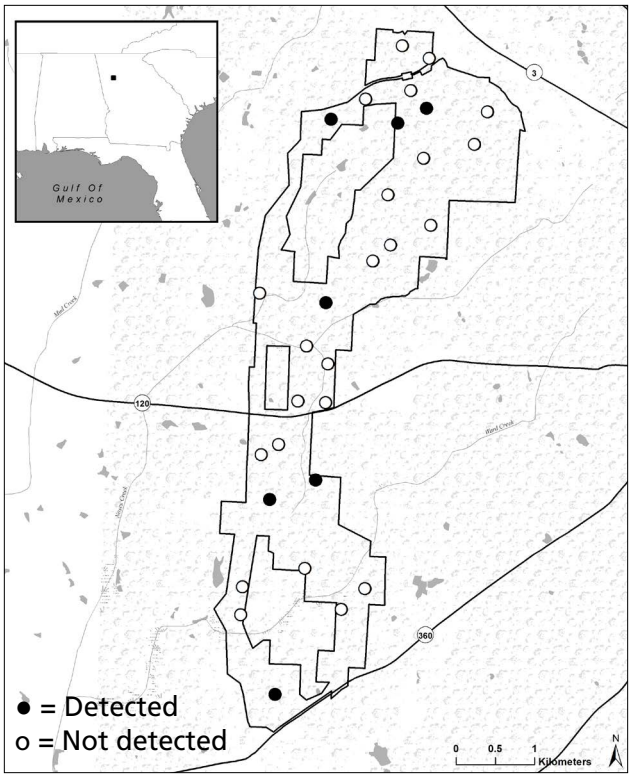

Figure C-31. Sampling locations where hairy woodpecker (*Picoides villosus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

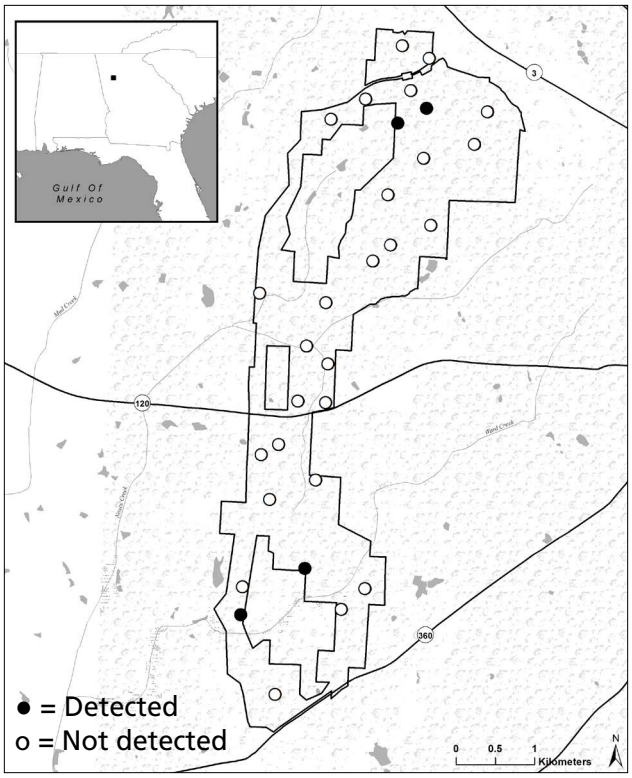

Figure C-32. Sampling locations where hooded warbler (*Wilsonia citrina*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

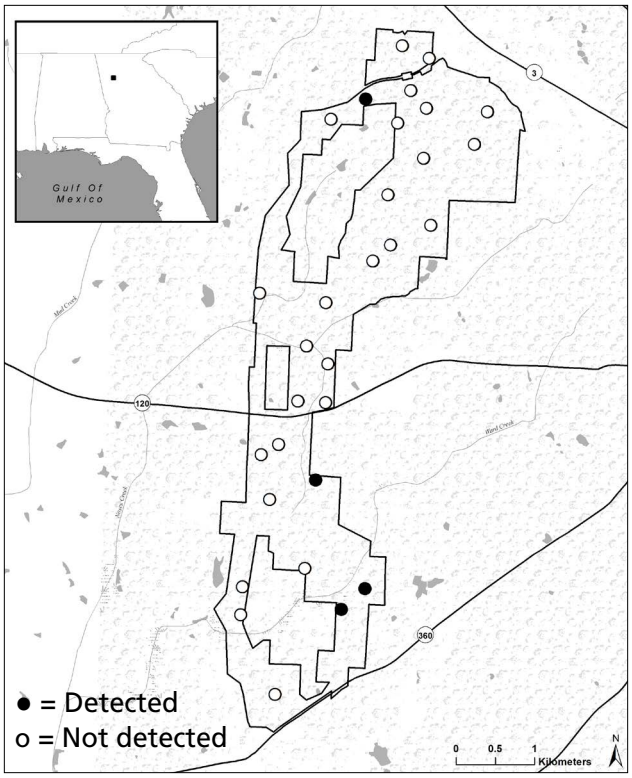

Figure C-33. Sampling locations where house finch (*Carpodacus mexicanus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

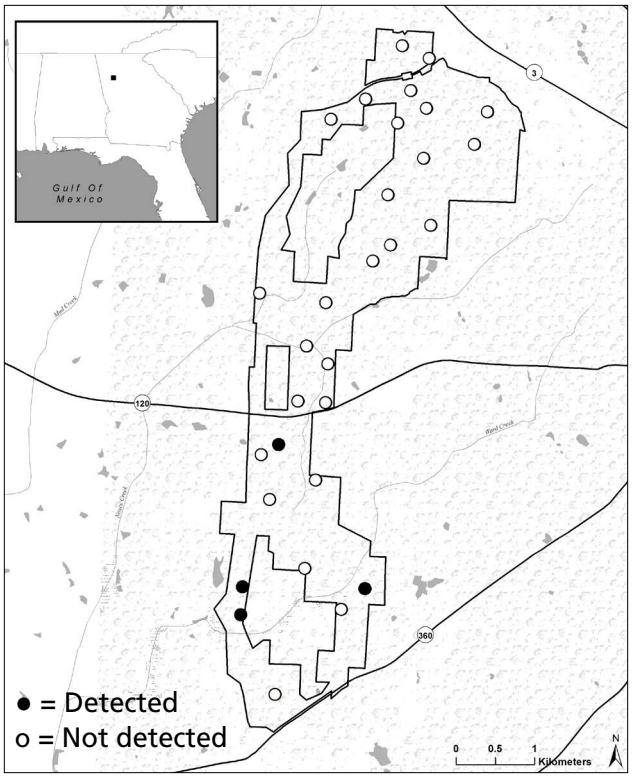

Figure C-34. Sampling locations where indigo bunting (*Passerina cyanea*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

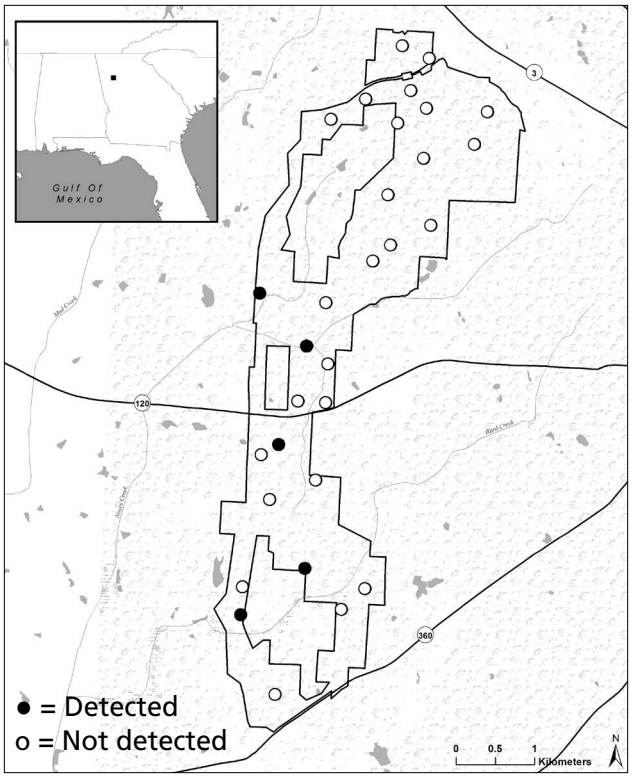

Figure C-35. Sampling locations where Kentucky warbler (*Oporornis formosus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

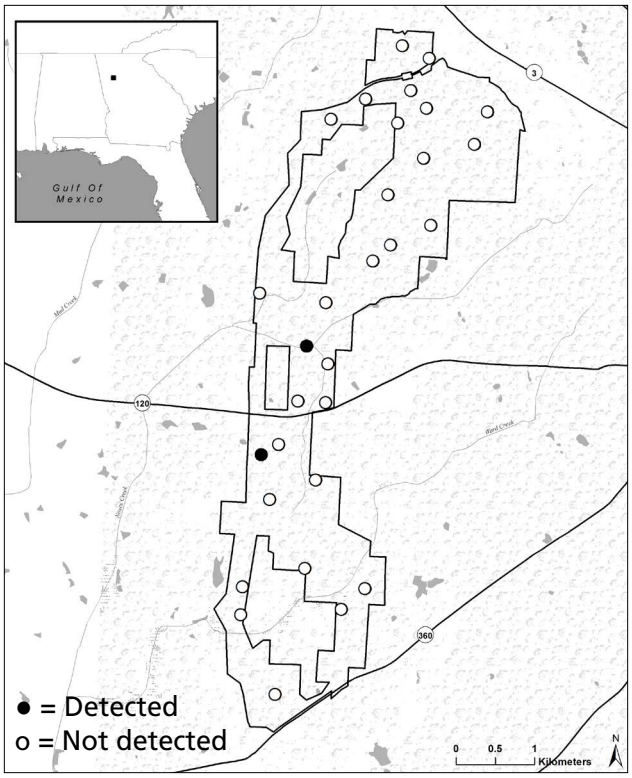

Figure C-36. Sampling locations where Louisiana waterthrush (*Seiurus motacilla*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

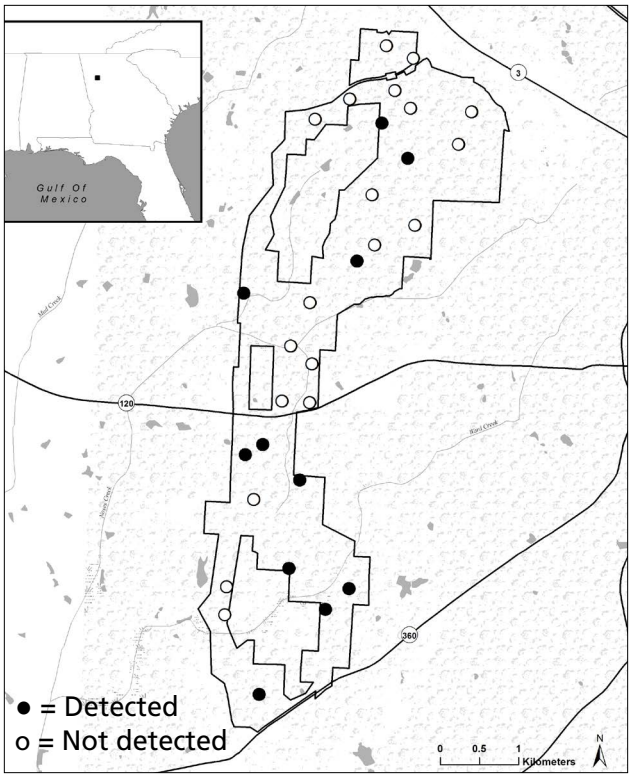

Figure C-37. Sampling locations where mourning dove (*Zenaida macroura*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

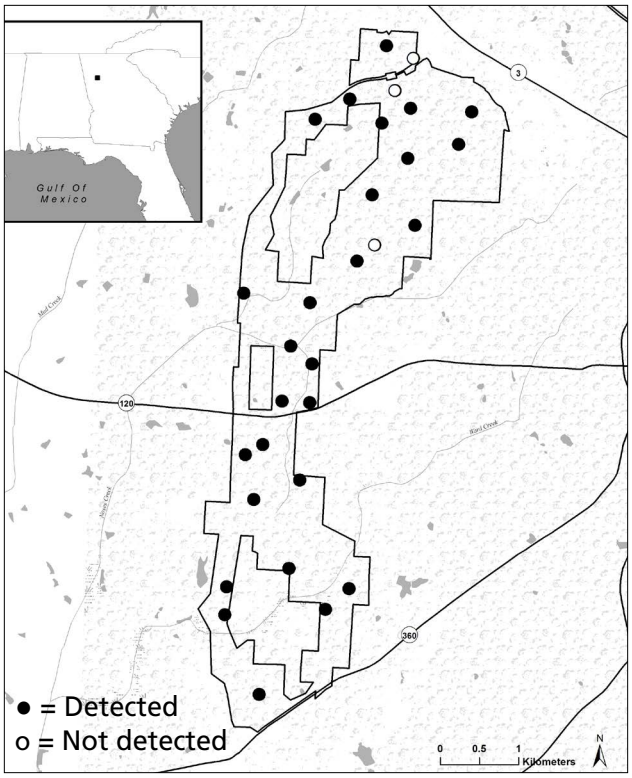

Figure C-38. Sampling locations where northern cardinal (*Cardinalis cardinalis*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

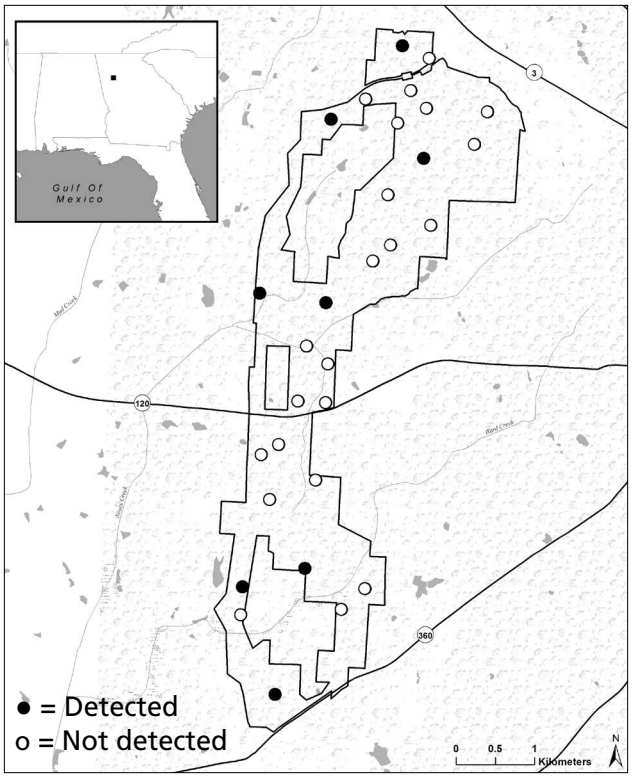

Figure C-39. Sampling locations where northern flicker (*Colaptes auratus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

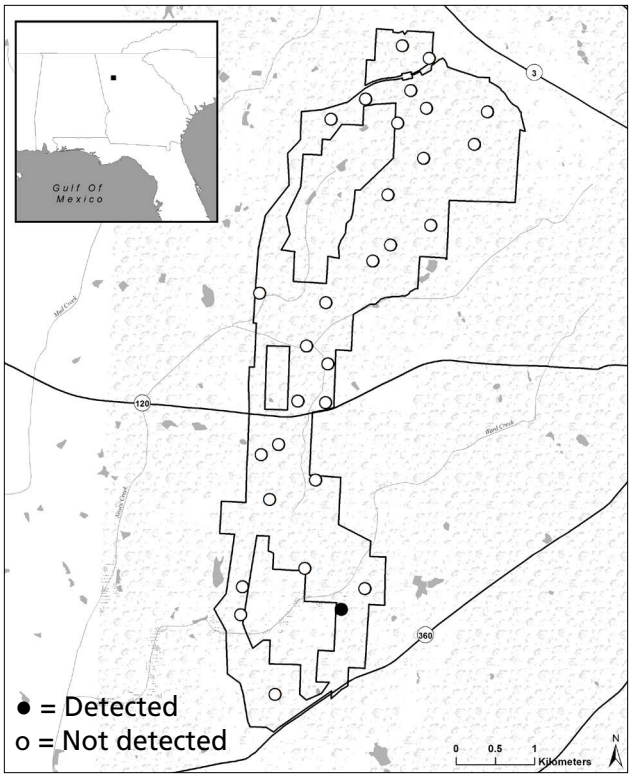

Figure C-40. Sampling locations where northern mockingbird (*Mimus polyglottos*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

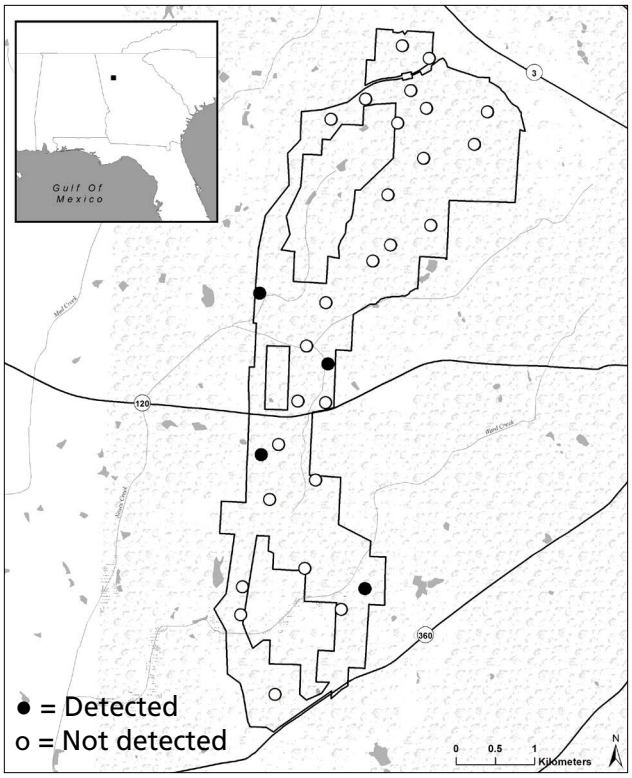

Figure C-41. Sampling locations where pileated woodpecker (*Dryocopus pileatus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

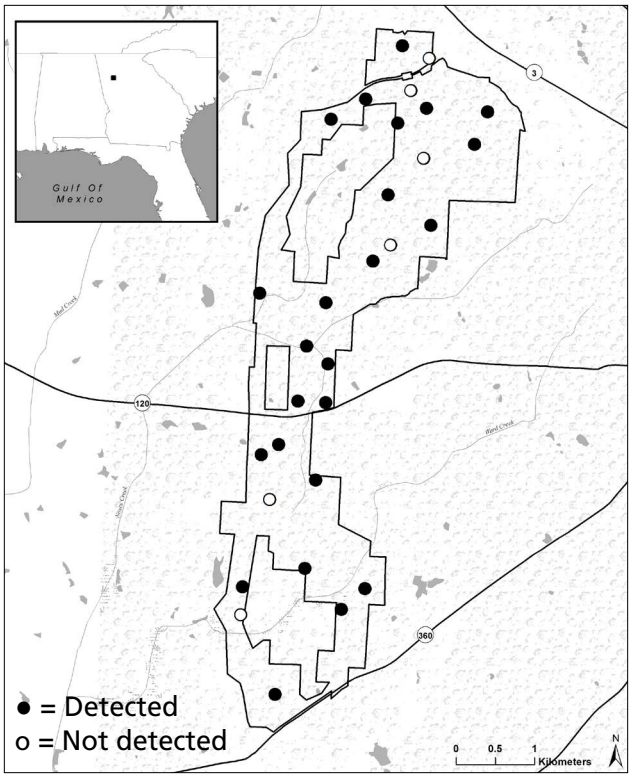

Figure C-42. Sampling locations where pine warbler (*Dendroica pinus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

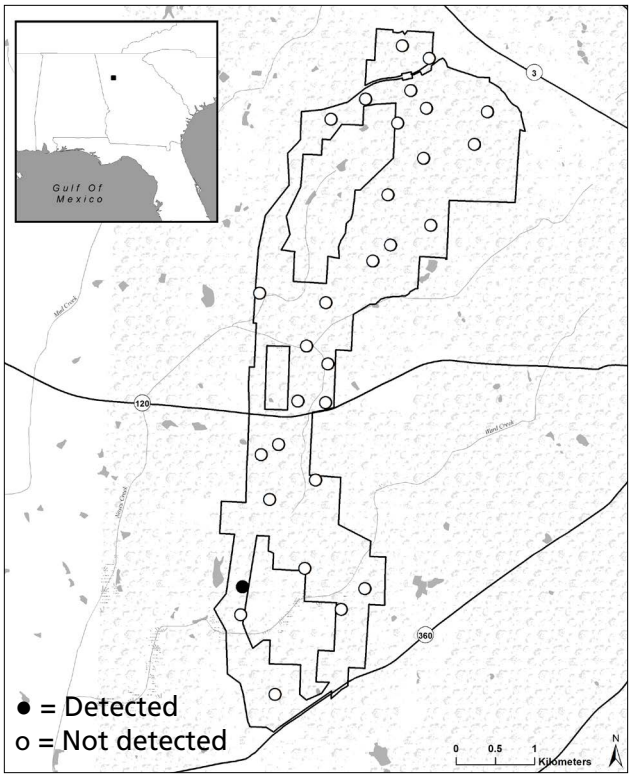

Figure C-43. Sampling locations where prairie warbler (*Dendroica discolor*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

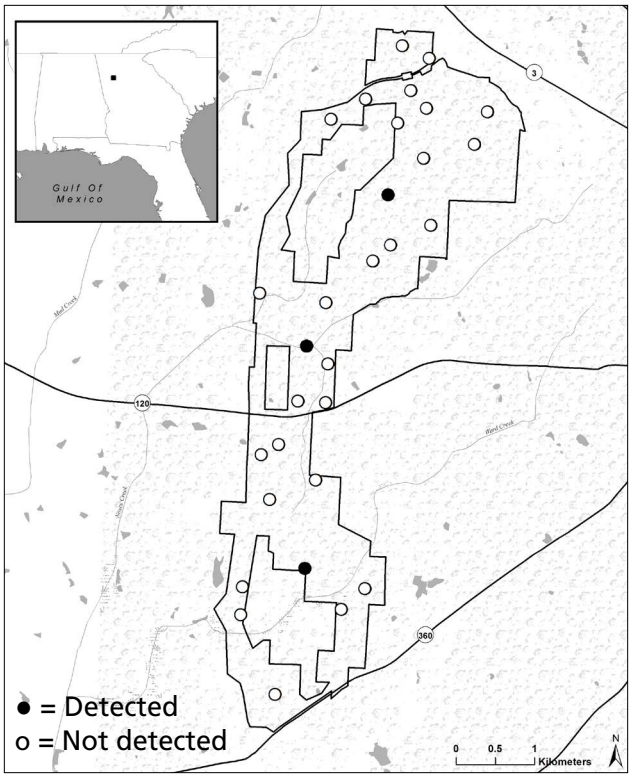

Figure C-44. Sampling locations where purple martin (*Progne subis*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

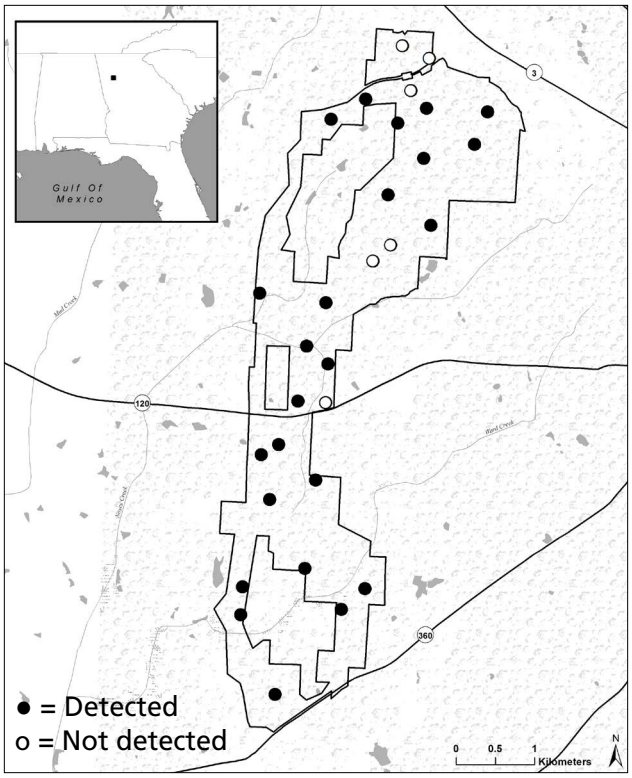

Figure C-45. Sampling locations where red-bellied woodpecker (*Melanerpes carolius*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

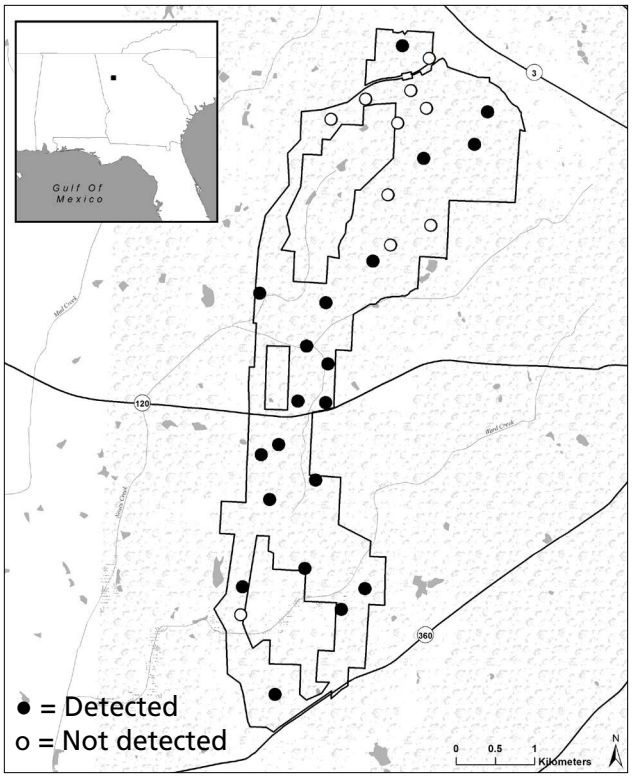

Figure C-46. Sampling locations where red-eyed vireo (*Vireo olivaceus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

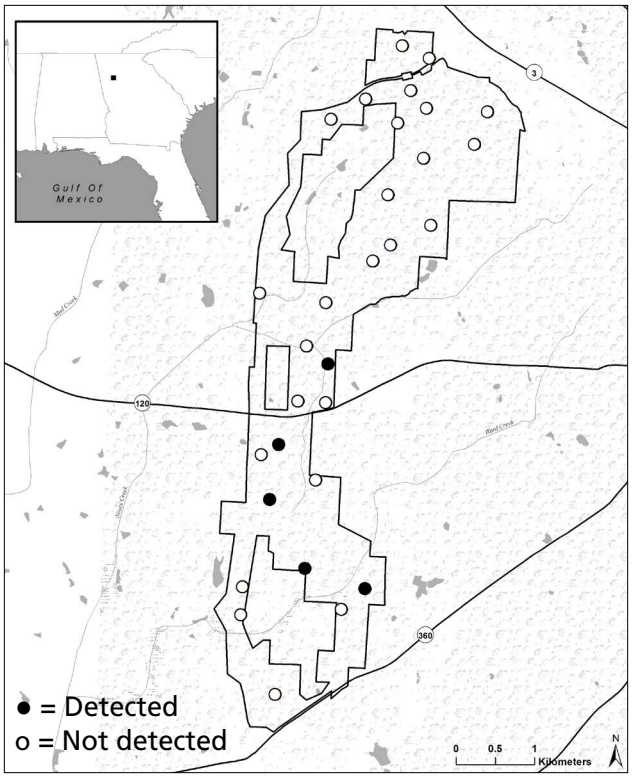

Figure C-47. Sampling locations where red-headed woodpecker (*Melanerpes erythrocephalus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

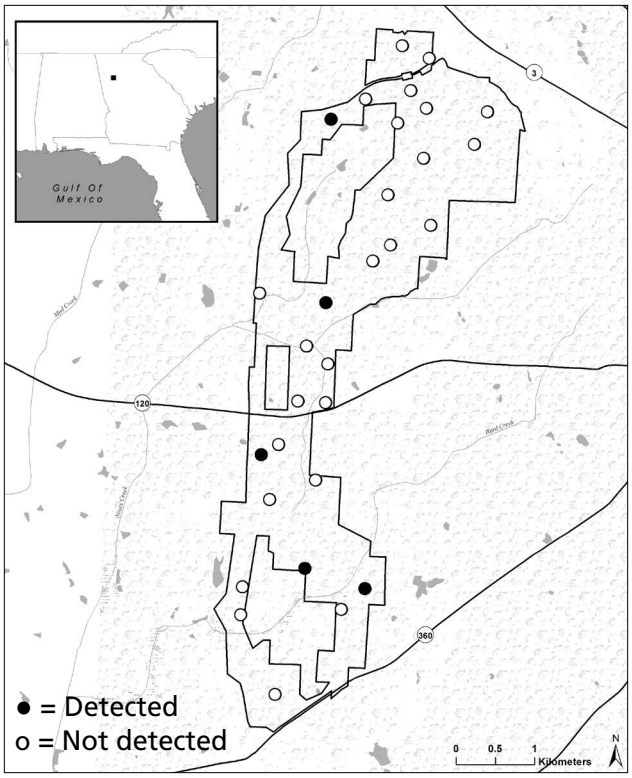

Figure C-48. Sampling locations where red-shouldered hawk (*Buteo lineatus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

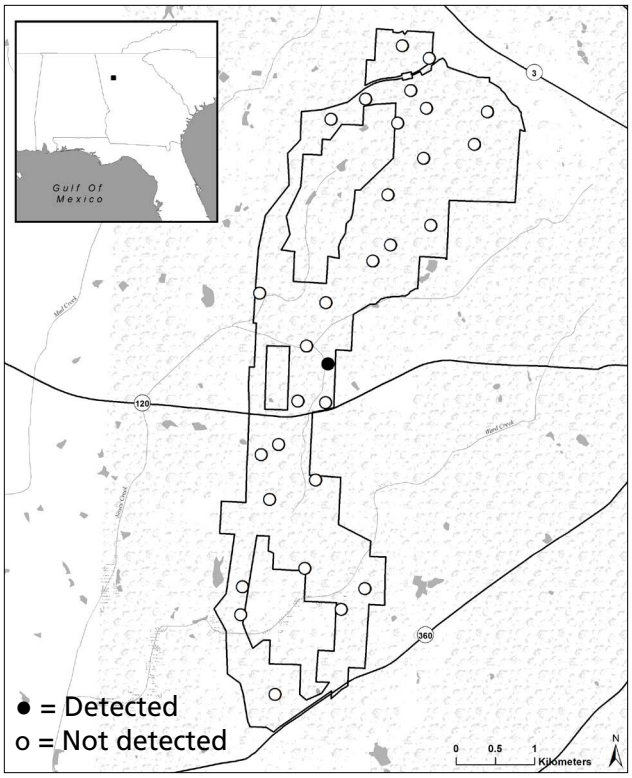

Figure C-49. Sampling locations where red-tailed hawk (*Buteo jamaicensis*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

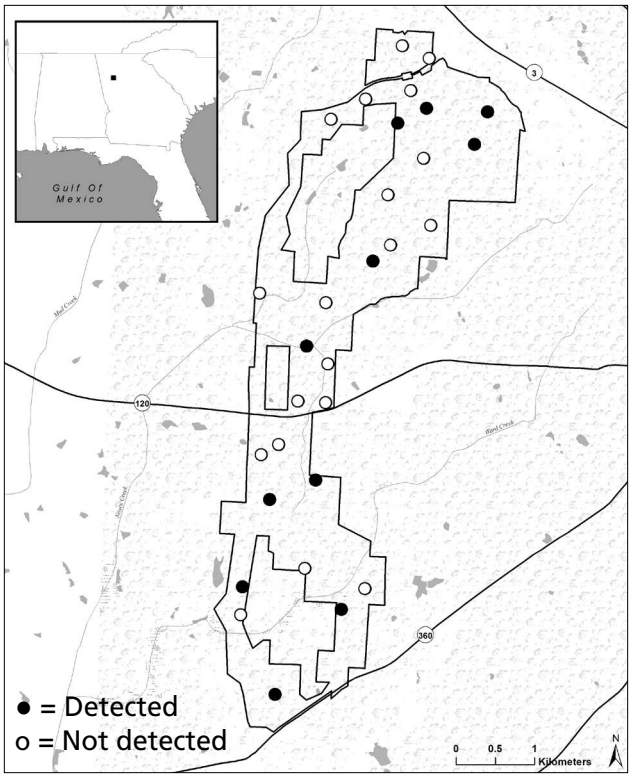

Figure C-50. Sampling locations where scarlet tanager (*Piranga olivacea*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

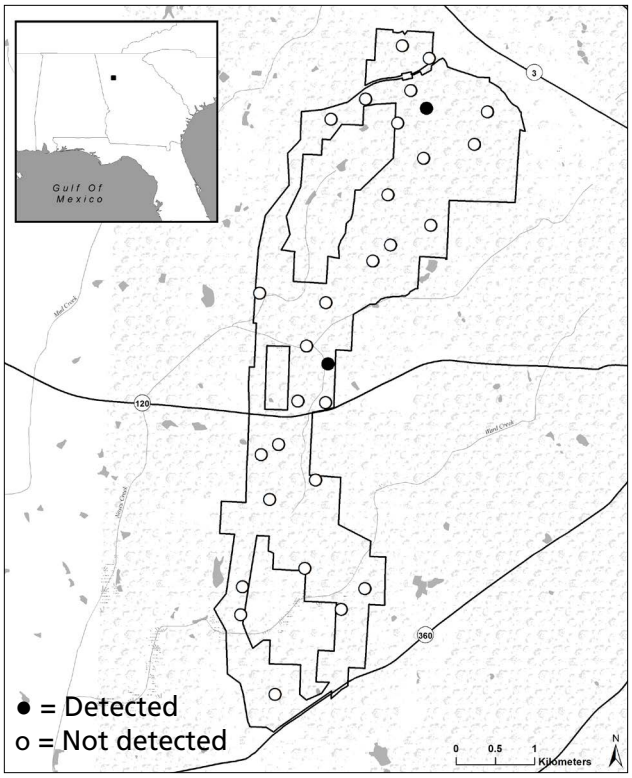

Figure C-51. Sampling locations where sharp-shinned hawk (*Accipiter striatus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

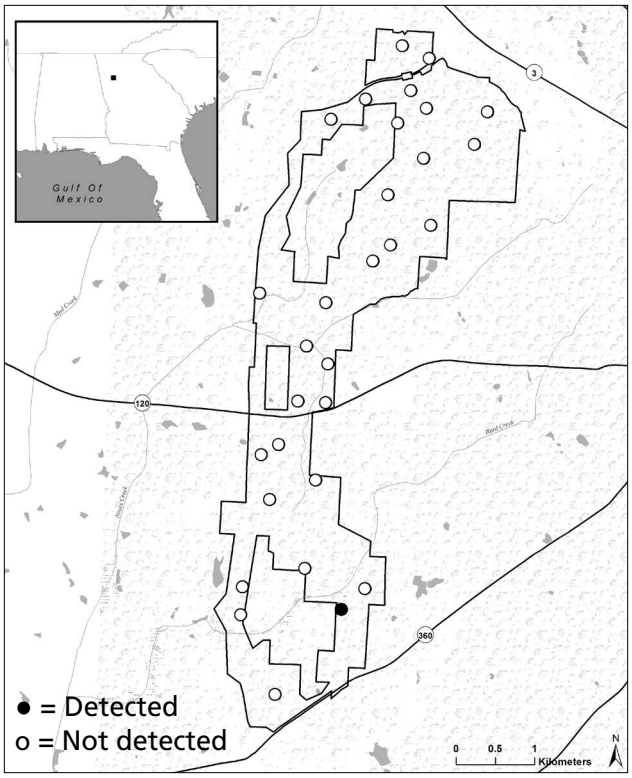

Figure C-52. Sampling locations where song sparrow (*Melospiza melodia*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

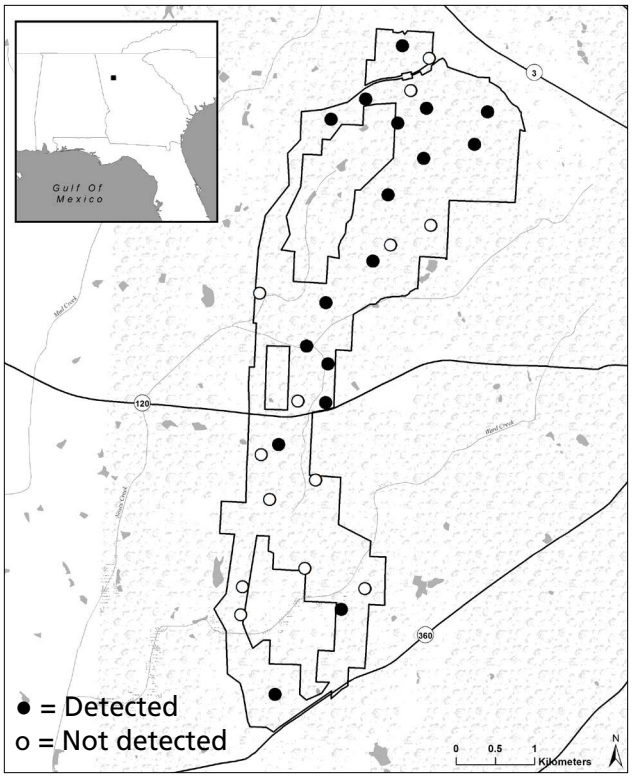

Figure C-53. Sampling locations where summer tanager (*Piranga rubra*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

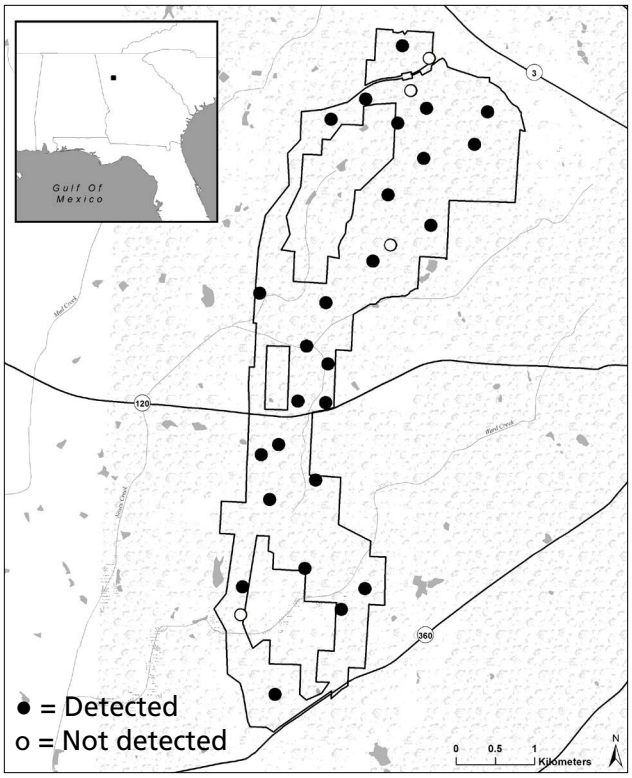

Figure C-54. Sampling locations where tufted titmouse (*Baeolophus bicolor*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

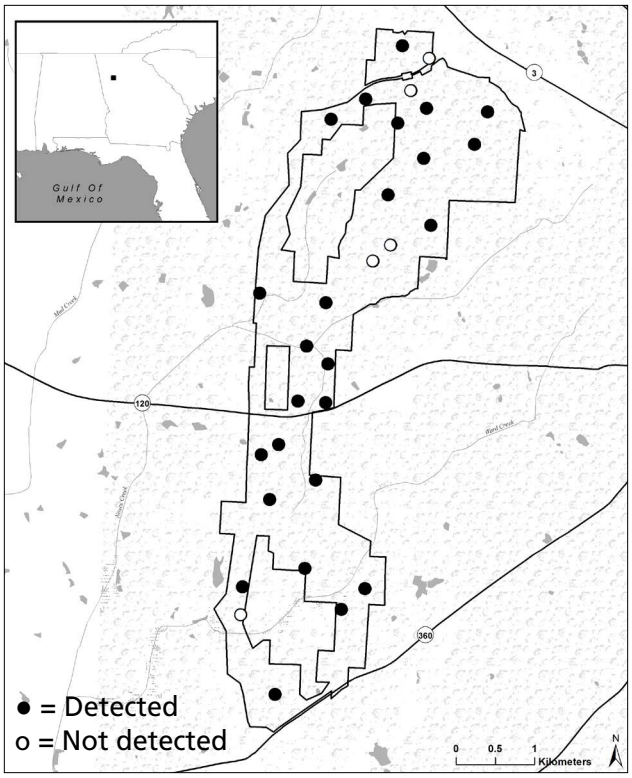

Figure C-55. Sampling locations where white-breasted nuthatch (*Sitta carolinensis*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

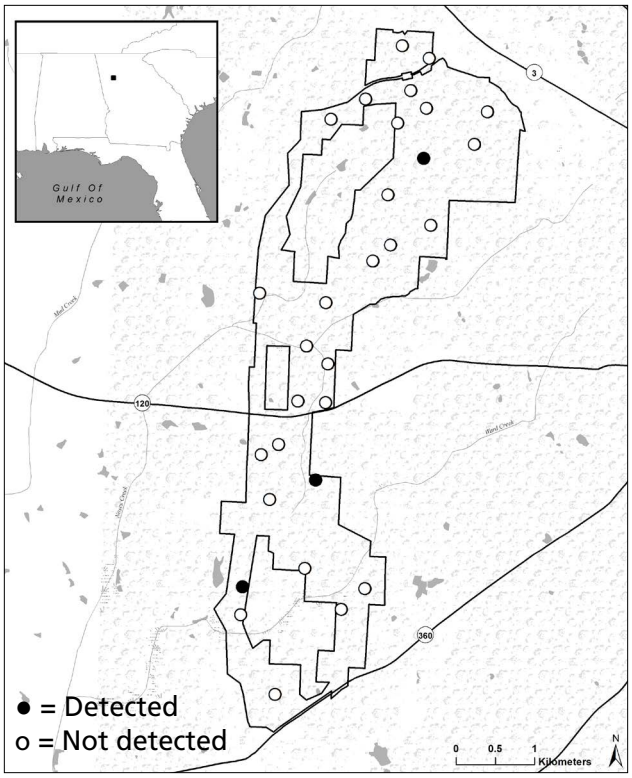

Figure C-56. Sampling locations where white-eyed vireo (*Vireo griseus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

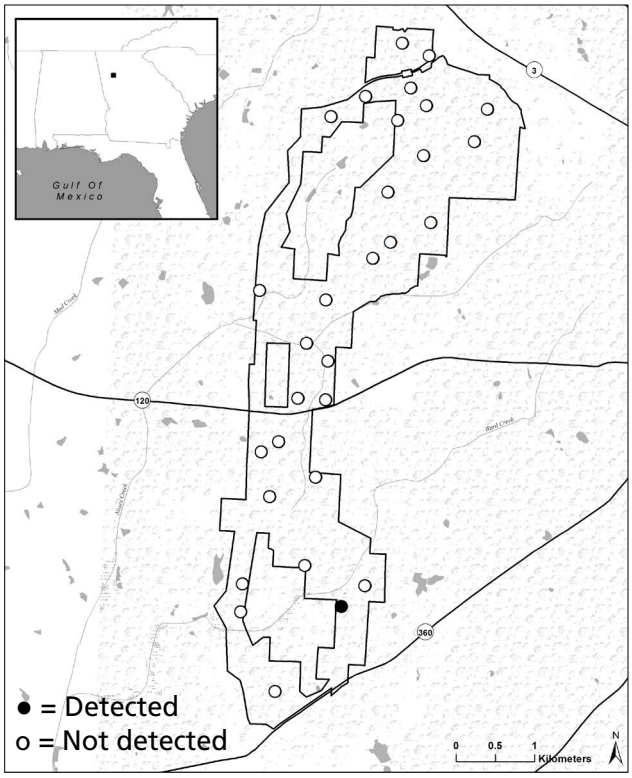

Figure C-57. Sampling locations where white-throated sparrow (*Zonotrichia albicollis*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

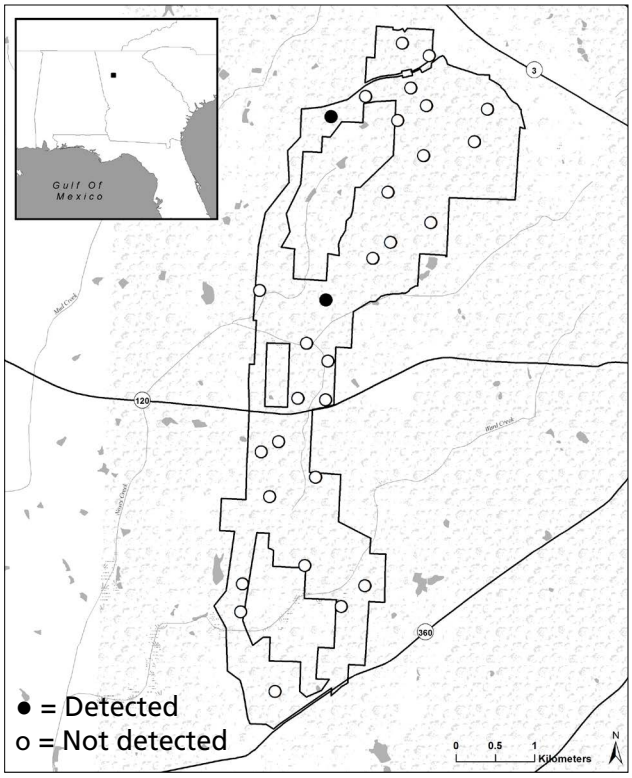

Figure C-58. Sampling locations where wild turkey (*Meleagris gallopavo*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

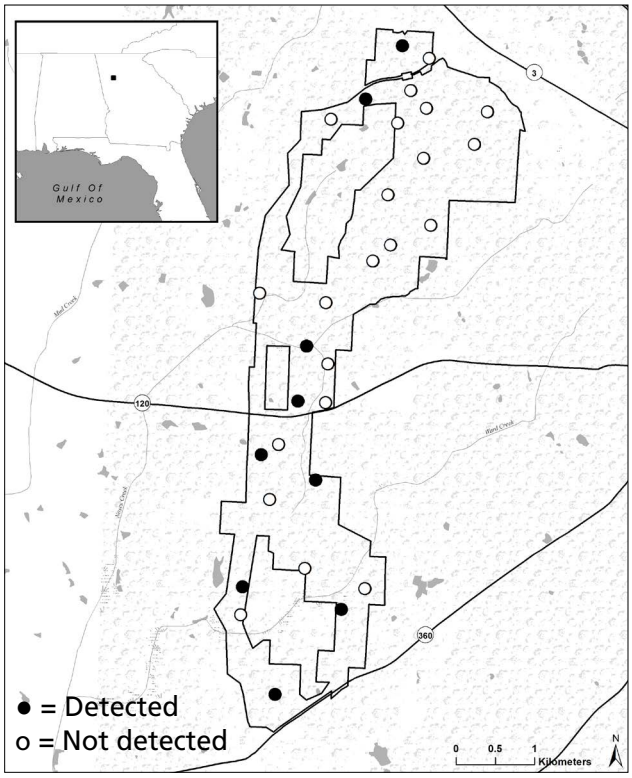

Figure C-59. Sampling locations where wood thrush (*Hylocichla mustelina*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

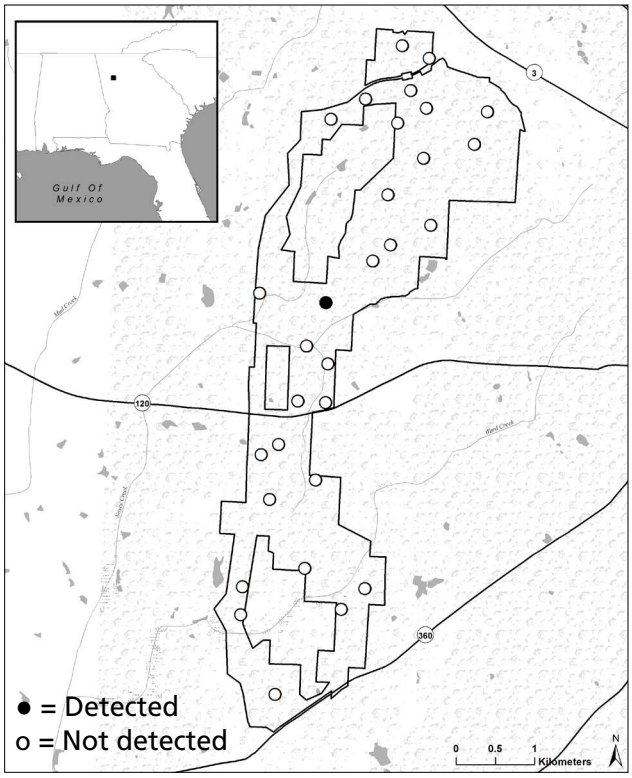

Figure C-60. Sampling locations where yellow-billed cuckoo (*Coccyzus americanus*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

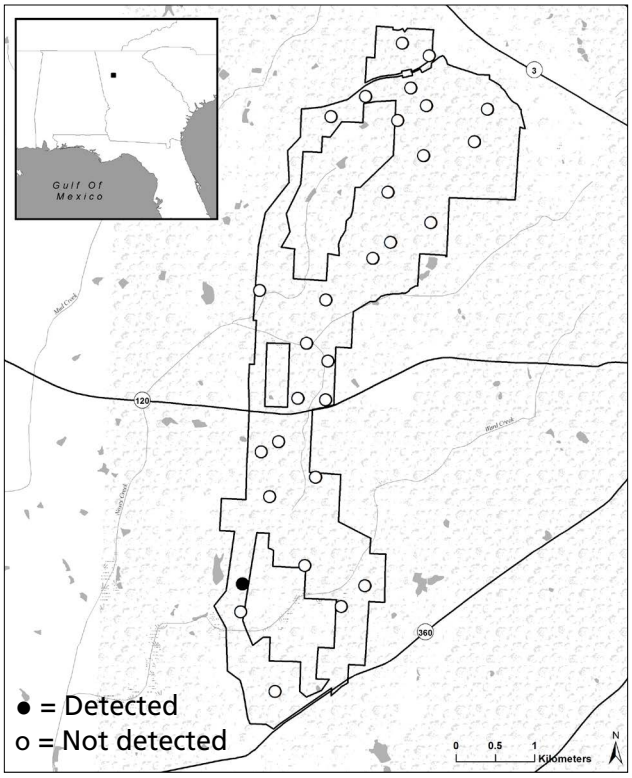

Figure C-61. Sampling locations where yellow-breasted chat (*Icteria virens*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

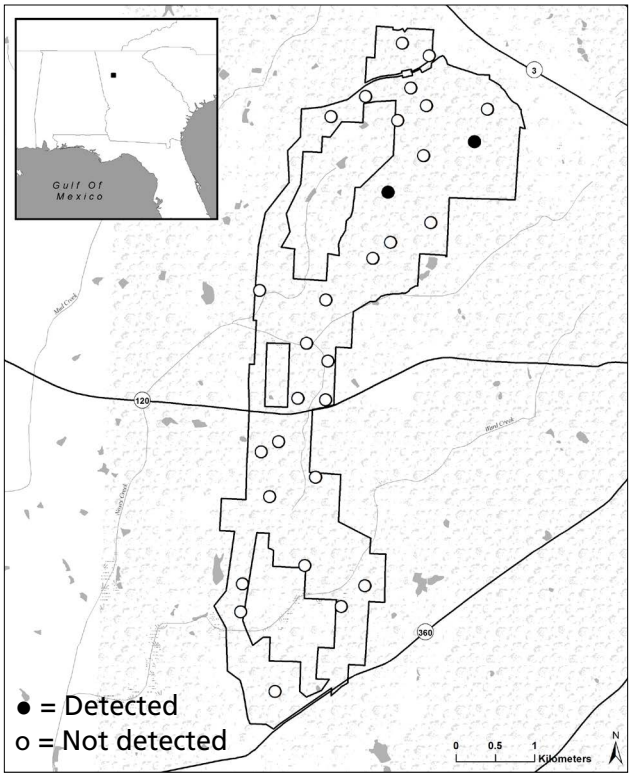

Figure C-62. Sampling locations where yellow-throated vireo (*Vireo flavifrons*) was detected at Kennesaw Mountain National Battlefield Park, 2012.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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National Park Service
U.S. Department of the Interior

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