



Landbird Community Monitoring 2022: Data Summary

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Overview

Birds play several critical roles in park ecosystems, where they occupy and interact with multiple levels of the food web. Predatory birds regulate prey species populations, notably helping to control rodents and insects. Scavenging species remove dead animals from the environment. Many other bird species act as important pollinators or seed dispersers. Because many avian species are associated with specific habitat types and ecosystem services, we can gain insights about the condition of specific habitat components in a park by monitoring what birds are present and where in the landscape they occur.

Many active members of the recreational birding community enjoy opportunities to engage in bird and wildlife watching in protected park settings. Birds contribute beauty and song to the natural setting and provide great appeal to the public. Birding has become one of the most popular outdoor recreational activities pursued by Americans. Birders substantially contribute to local economies while pursuing their hobby.

The Southeast Coast Network (SECN) parks in Alabama, Florida, Georgia, South Carolina, and North Carolina are mainly located within the Atlantic Flyway, and host high bird diversity. More than 400 avian species use SECN parks while breeding, wintering, or stopping over during migration (NPS 2023). Surrounded by human-altered landscapes in a region of increasing urbanization and land conversion, the inland and coastal parks of the Southeast Coast Network represent important, ecologically-intact areas that contain a multitude of habitat types important to the conservation of wildlife diversity.

Bird communities respond quickly to environmental stressors. Changes in avian species composition, richness, and distribution on the landscape may indicate changes in the underlying ecological condition of park resources. Shifting species distributions alter species interactions and the food-web structure, thereby producing cascading effects on ecosystem processes (Montoya and Raffaelli 2010). Long-term monitoring projects can potentially detect trends in breeding bird populations and use them to assess ecosystem integrity and sustainability. Park managers can use monitoring data as a tool to inform land management decisions.



A tufted titmouse (*Baeolophus bicolor*), one of many species detected during monitoring in 2022. NPS photo (NPgallery).

Objectives

This report summarizes data collected with the SECN landbird community monitoring protocol (Byrne et al. 2014) to address the following Vital Signs Monitoring Program objectives:

1. Evaluate landbird community species richness in the park during the breeding season.
2. Assess landbird occupancy and spatial distribution in the park during the breeding season.

We use the term “community” herein to refer to an assemblage of species populations occurring together in time and space (Begon et al. 1986). We consider the landbird species assemblage within the park as a *de facto* community (Byrne et al. 2014).

Significant Results

This brief summarizes data collected in 2022 at Ocmulgee Mounds National Historical Park during implementation of the Southeast Coast Network’s Landbird Community Monitoring Protocol (Byrne et al. 2014).

- Automated recording devices (ARDs) captured landbird vocalizations from March 14 to June 14 at 22 spatially-balanced random sampling locations.
- A subset of 1,320 minutes of audio derived from 110 recordings was analyzed and all discernable bird vocalizations were reviewed and classified to species.
- We detected 71 species of native landbirds. We detected one non-indigenous species, house finch (*Haemorrhous mexicanus*).

Significant Results (continued)

- The most frequently-detected species were tufted titmouse (*Baeolophus bicolor*), blue-gray gnatcatcher (*Poliophtila caerulea*), Carolina wren (*Thryothorus ludovicianus*), northern cardinal (*Cardinalis cardinalis*), white-eyed vireo (*Vireo griseus*), Carolina chickadee (*Poecile carolinensis*), and red-bellied woodpecker (*Melanerpes carolinus*), which were detected at greater than or equal to 86% ($n \geq 19$) of sampling locations.
- Landbird communities at this park will be resampled in 2025

Visit the NPS data store at the Integrated Resource Management Application portal for:

- [Data Summary Brief](https://irma.nps.gov/DataStore/Reference/Profile/2305702) (<https://irma.nps.gov/DataStore/Reference/Profile/2305702>)
- [Species Distribution Maps](https://irma.nps.gov/DataStore/Reference/Profile/2305470) (<https://irma.nps.gov/DataStore/Reference/Profile/2305470>)
- [Full Dataset and Metadata](https://doi.org/10.57830/2305163) (<https://doi.org/10.57830/2305163>)

Study Area

Ocmulgee Mounds National Historical Park is in central Georgia, along the Fall Line, the biogeophysical transition zone between the Piedmont and Southeastern Plains ecoregions. Parts of the park lie within the city limits of Macon, Georgia, and the Ocmulgee River borders the park on the southern edge. A greenway corridor along the river connects the park with natural areas to the south.

Landforms at the park consist primarily of a sizeable floodplain and associated herbaceous wetlands and adjacent uplands. A large, maintained utility right-of-way and railroad track crosses the park in the northeast. The natural resources of the park have been heavily impacted by human influence. Notably, Interstate 16 essentially disconnects the river from its floodplain and alters the natural hydrologic patterns of the area. Threats to biological resources at the park are primarily anthropogenic in origin, and include non-native species, air and water pollution, development, and other issues arising from the park's proximity to Macon.

Ocmulgee Mounds National Historical Park had 175 previously documented landbird species when sampling occurred in 2022 (NPS 2023). A table listing all avian species documented on NPSpecies (NPS 2023), as well as avian species documented during SECN's 2022 monitoring, is available from the NPS data store at the [Full dataset and metadata](https://doi.org/10.57830/2305163) (<https://doi.org/10.57830/2305163>).

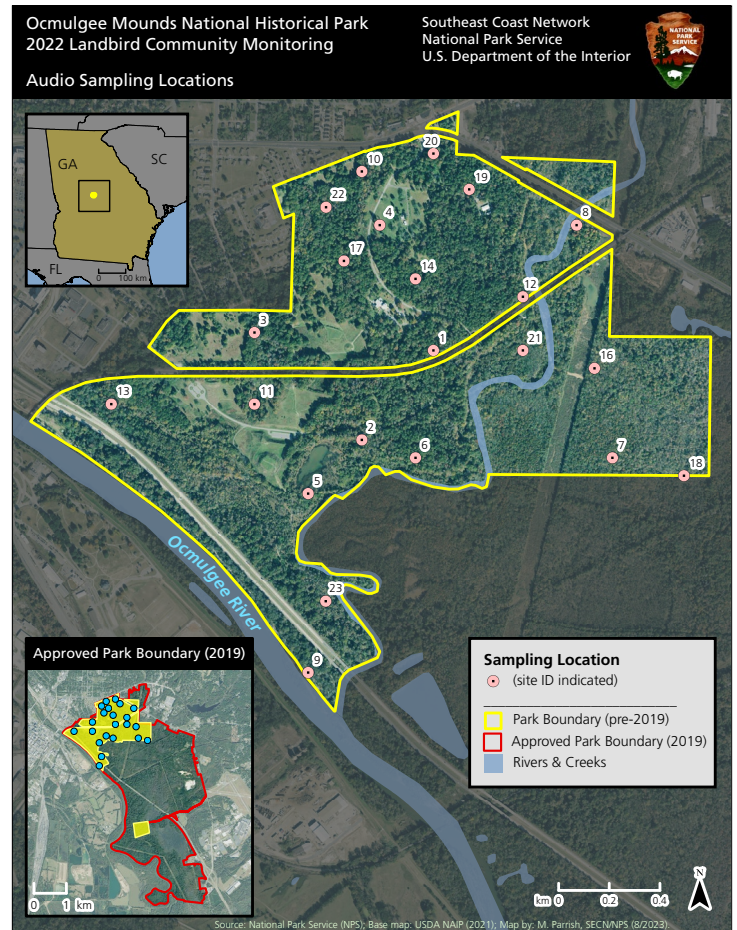


Figure 1. Permanent audio sampling locations within Ocmulgee Mounds National Historical Park ($n = 22$). Sampling location ID numbers are indicated at each point.

Methods

Sampling Design

We established a randomly-selected, spatially-balanced set of sample locations ($n = 22$) during an initial field season in 2014 (Figure 1). Our sample size was chosen based on considerations including park size, hypothesized variability in wildlife populations, and logistics. Sample locations are permanent and are revisited on a three-year rotation. More comprehensive details regarding study design, data collection, and data analyses can be found in the SECN Landbird Community Monitoring Protocol (Byrne et al. 2014). This report pertains to 2022 sampling only.

Data Collection

In 2022, we deployed automated recording devices (ARDs) at 22 permanent sampling locations (Figure 1) from March 14 to June 14. We programmed each ARD to record audio from 08:00 to 08:12, every other day, for a period of 92 days. Forty-six recordings were captured on each unit during the sampling period. The ARDs were collected from the field after recordings were completed and recordings were downloaded to a computer for classification and analyses.

Methods (continued)

Manual Classification of Recordings

We systematically selected recordings from the following dates: April 1, April 15, April 30, May 15, and May 30. Loud ambient noise (e.g., traffic, surf, insect droning, or wind) in recordings negatively affects discernment of wildlife vocalizations. Thus, recordings made on the above dates were initially screened using the software package Kaleidoscope Pro (Wildlife Acoustics, Inc. 2023) to assess clarity and determine whether background noise was disruptive to the listener's ability to interpret bird sounds. If recording quality was poor on a given date, we systematically evaluated and selected for analysis alternate recordings from proximate dates.

Selected recordings were methodically reviewed by an experienced technician with strong familiarity with the vocalizations of birds of the southeastern US. The technician evaluated recordings using Kaleidoscope Pro, which allowed them to view spectrograms (graphical representations of vocalizations) and to manipulate playback on the fly to maximize acoustical clarity. The technician classified all vocalizations identifiable to the species level, a process requiring from one-half to two hours per 12-minute recording depending on the complexity of the captured soundscape. A wildlife biologist later reviewed the technician's classifications for data quality assurance and control.

Taxonomic Standards

Our use of taxonomic nomenclature followed the Integrated Taxonomic Information System (ITIS 2023). The National Park Service maintains the online database NPSpecies (NPS 2023), which documents the occurrence and status of species found in parks.

Data Analysis

Our focus for this effort was limited to the analysis of species richness and related characteristics, including occupancy and spatial distribution of the park's breeding-season landbird community. We derived results from our manual evaluation of 1,320 minutes of audio from 110 recordings across 22 sample locations. We only included in analyses detections of birds identified to the species level. We calculated metrics separately for native versus non-native species, as managers may extend the latter special consideration.

Species Richness and Composition

Using the SpadeR package (Chao et al. 2016) in program R, we calculated species richness for the park as well as mean species richness per sample location at the sample location scale, as well as at the park scale. Species richness was defined as the number of unique species detected at the scale of interest.

Field methods for sampling species richness (e.g., point-counts or audio sampling) inherently produce incomplete counts, due to imperfect detection of cryptic species that may be present but are difficult to record during surveys. Observed species richness, therefore, is expected to be an underestimate of true species richness, though it offers utility as an index of the true diversity of a sample unit. Various

methods exist to adjust incidence data to provide an estimated species richness that may be closer to the true value. We used the SpadeR package in R to calculate the *iChao2* estimator of species richness with an associated 95% confidence interval (Chiu et al. 2014). The *iChao2* estimator uses the detection frequencies of rarely-detected species to adjust the observed richness upward to account for species that may be present but not detected. The *iChao2* estimator is expected to perform well for communities that are highly heterogeneous with regard to species incidence or occupancy (Chiu et al. 2014).

Occupancy

We calculated naïve occupancy (i.e., frequency of occurrence) as the percent of sampling locations where a species was detected in one or more reviewed recordings. We did not adjust occupancy estimates for probability of detection (i.e., detectability). Species with greater naïve occupancy occur at more locations than those with low values.

Spatial Distribution

We mapped species detections in the park to provide a means of visually assessing spatial distributions of vocal birds. An understanding of landbird distribution is crucial for informed management of species and their requisite habitats. Following future park visits, we plan to examine species records across time to identify trends in community makeup and species distribution. This has potential to provide insights into influences on park diversity (e.g., land use change and habitat condition, climate issues, and hydrological processes).

Results

Species Richness

Observed species richness of native breeding landbirds at the park in 2023 was 71 (Table 1). Mean $\pm$ SD observed species richness of native birds per sample location was 23.09 ± 4.73 (range: 17–32; Figure 2, Table 1). Additionally, we detected one non-native, introduced species, house finch (*Haemorrhous mexicanus*). The *iChao2* species richness estimate for native species in the park was 81.4 (95% CI: 75.6, 94.8).

Occupancy and Spatial Distribution

Naïve occupancy was greatest for tufted titmouse (*Baeolophus bicolor*), blue-gray gnatcatcher (*Polioptila caerulea*), Carolina wren (*Thryothorus ludovicianus*), northern cardinal (*Cardinalis cardinalis*), white-eyed vireo (*Vireo griseus*), Carolina chickadee (*Poecile carolinensis*), and red-bellied woodpecker (*Melanerpes carolinus*), which occurred at 86% ($n \geq 19$) of sampling locations (Table 1, Table 2). Of the previous species, tufted titmouse, blue-gray gnatcatcher, Carolina wren, and northern cardinal occurred at 100% of sampled locations. Approximately 45.8% of species were infrequently detected; 33 species were detected at less than or equal to 20% ($n \leq 4$) of sample locations (Table 2). Fourteen of those 33 species were detected at only one sample location (Table 2).

Distribution maps for all detected species are available from the NPS data store at the [Integrated Resource Management Applications portal](https://irma.nps.gov/DataStore/Reference/Profile/2305470) (<https://irma.nps.gov/DataStore/Reference/Profile/2305470>).

Table 1. Landbird species detections (indicated with “X”) and observed species richness at each sampled location ($n = 22$) within Ocmulgee Mounds National Historical Park in 2022. Refer to Figure 1 for labeled sampling location ID numbers.

Common Name	01	02	03	04	05	06	07	08	09	10	11	12	13	14	16	17	18	19	20	21	22	23
Mourning dove	X	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–
Yellow-billed cuckoo	X	X	–	–	X	X	–	X	–	–	–	–	–	X	X	–	–	–	–	–	–	–
Chimney swift	–	–	–	–	–	X	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Ruby-throated hummingbird	X	–	–	–	–	–	X	–	–	–	–	–	–	–	–	X	–	–	–	–	X	–
Killdeer	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Green heron	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cooper's hawk	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–
Red-shouldered hawk	–	X	–	–	–	X	–	X	–	–	X	–	–	–	X	–	X	–	–	–	–	–
Barred owl	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Belted kingfisher	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Red-headed woodpecker	X	–	–	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
Downy woodpecker	–	X	–	X	–	X	X	X	–	X	X	X	–	–	–	–	–	X	–	X	X	–
Hairy woodpecker	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–
Northern flicker	–	–	–	–	X	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pileated woodpecker	X	X	–	X	–	X	X	X	–	X	–	–	–	X	X	–	X	X	X	–	–	–
Great crested flycatcher	X	X	X	X	–	X	–	X	–	X	X	X	X	X	X	X	–	X	–	X	X	–
Eastern wood-pewee	X	–	–	X	–	X	–	–	–	–	–	–	–	X	–	X	–	X	X	–	X	–
Acadian flycatcher	X	–	X	–	–	X	–	–	–	–	–	X	–	X	–	X	–	X	–	–	X	X
Eastern phoebe	–	X	–	–	X	–	–	X	X	–	–	X	–	–	–	–	–	–	–	–	–	–
White-eyed vireo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	–	X
Yellow-throated vireo	X	X	X	X	X	–	–	–	X	–	–	X	–	X	–	X	–	X	–	–	X	X
Blue-headed vireo	X	–	–	–	–	–	X	–	–	–	–	–	X	X	–	–	–	–	–	–	–	–
Red-eyed vireo	X	X	–	X	–	X	X	X	X	–	X	X	–	X	–	X	–	X	X	–	X	X
Blue jay	–	–	X	X	X	X	–	X	–	X	–	X	X	X	–	X	–	X	X	X	X	X
American crow	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–
Fish crow	–	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
Tufted titmouse	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Barn swallow	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–	X	–	–	–	–	–
Ruby-crowned kinglet	X	X	X	X	X	–	–	X	X	–	X	X	X	X	–	X	–	X	–	–	X	–
Cedar waxwing	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–

¹ Non-native and invasive species

Table 1 (continued). Landbird species detections (indicated with “X”) and observed species richness (“OSR”) at each sampled location ($n = 22$) within Ocmulgee Mounds National Historical Park in 2022. Refer to Figure 1 for labeled sampling location ID numbers.

Common Name	01	02	03	04	05	06	07	08	09	10	11	12	13	14	16	17	18	19	20	21	22	23
White-breasted nuthatch	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Brown-headed nuthatch	–	X	–	X	–	–	–	–	–	–	–	–	–	X	–	X	–	X	X	–	–	–
Blue-gray gnatcatcher	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
Gray catbird	–	–	X	–	X	X	X	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–
Brown thrasher	–	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–	X	–
Northern mockingbird	–	–	–	X	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–
Eastern bluebird	–	X	–	–	X	–	–	–	–	–	X	–	–	X	X	–	–	–	–	–	–	–
Swainson's thrush	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–
Hermit thrush	–	–	X	–	–	X	–	–	–	X	–	–	–	–	–	X	X	–	–	–	X	–
Wood thrush	–	–	X	–	–	X	–	–	–	–	–	–	–	–	–	X	–	–	X	–	–	–
American robin	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
House finch ¹	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
American goldfinch	–	–	–	–	–	–	–	X	X	–	–	X	–	X	–	X	X	–	–	–	X	–
Chipping sparrow	–	–	–	X	–	–	–	–	–	–	–	X	X	–	–	–	–	–	–	–	–	–
White-throated sparrow	–	–	X	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–
Eastern towhee	X	–	X	–	–	–	–	–	–	–	X	–	–	X	–	X	–	X	X	–	X	–
Yellow-breasted chat	–	–	–	–	–	–	–	–	–	–	X	–	–	–	X	–	–	–	–	–	–	–
Orchard oriole	–	X	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Red-winged blackbird	–	X	–	–	X	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Brown-headed cowbird	–	X	–	X	X	–	–	X	X	X	X	–	X	–	–	X	X	X	X	X	X	X
Common grackle	–	–	–	–	X	X	X	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–
Louisiana waterthrush	X	–	–	–	–	X	X	–	X	–	X	–	–	–	–	–	–	–	–	X	–	X
Black-and-white warbler	X	–	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–	X	–	–	–
Prothonotary warbler	–	–	–	–	X	–	–	X	–	–	–	X	–	–	–	–	X	–	–	–	–	X
Swainson's warbler	–	–	X	–	–	X	–	X	–	–	–	X	–	–	X	–	–	–	–	–	–	–
Orange-crowned warbler	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Kentucky warbler	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Common yellowthroat	–	X	X	–	X	X	X	X	–	–	X	–	X	–	X	–	–	–	–	–	–	–
Hooded warbler	–	–	–	–	–	X	–	–	–	X	–	–	–	–	–	X	X	–	–	–	–	–
American redstart	–	X	–	–	X	X	–	X	X	–	–	X	X	–	–	–	–	–	–	–	–	X
Northern parula	X	X	X	–	–	X	X	–	X	–	–	–	–	–	X	–	X	–	–	X	X	–

¹ Non-native and invasive species

Table 1 (continued). Landbird species detections (indicated with “X”) and observed species richness (“OSR”) at each sampled location (*n* = 22) within Ocmulgee Mounds National Historical Park in 2022. Refer to Figure 1 for labeled sampling location ID numbers.

Common Name	01	02	03	04	05	06	07	08	09	10	11	12	13	14	16	17	18	19	20	21	22	23
Pine warbler	X	X	X	X	X	X	–	–	–	X	–	X	–	X	–	X	–	X	X	–	X	X
Yellow-rumped warbler	–	X	–	–	X	–	–	–	X	–	–	–	–	–	–	–	–	–	–	X	–	X
Yellow-throated warbler	X	X	–	–	X	–	–	X	–	–	–	X	–	–	–	–	–	X	–	–	X	X
Prairie warbler	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–
Summer tanager	X	X	–	X	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
Blue grosbeak	–	–	–	X	X	–	–	–	X	–	X	–	–	X	–	–	–	–	X	–	–	–
Indigo bunting	–	X	X	–	X	X	X	–	–	–	X	X	X	–	X	–	X	X	–	–	–	X
Observed Species Richness (natives)	27	30	22	25	32	31	20	28	18	18	23	26	17	26	20	25	18	24	18	17	24	19

¹ Non-native and invasive species

Table 2. Landbird naïve occupancy estimates at each sampled location ($n = 22$) within Ocmulgee Mounds National Historical Park in 2022, ranked descending. Refer to Figure 1 for labeled sampling location ID numbers.

Common Name	Scientific Name	Native Occupancy ¹
Tufted titmouse	<i>Baeolophus bicolor</i>	100.0%
Blue-gray gnatcatcher	<i>Poliophtila caerulea</i>	100.0%
Carolina wren	<i>Thryothorus ludovicianus</i>	100.0%
Northern cardinal	<i>Cardinalis cardinalis</i>	100.0%
White-eyed vireo	<i>Vireo griseus</i>	95.5%
Carolina chickadee	<i>Poecile carolinensis</i>	95.5%
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	90.9%
Great crested flycatcher	<i>Myiarchus crinitus</i>	72.7%
Red-eyed vireo	<i>Vireo olivaceus</i>	72.7%
Blue jay	<i>Cyanocitta cristata</i>	68.2%
Brown-headed cowbird	<i>Molothrus ater</i>	68.2%
Ruby-crowned kinglet	<i>Regulus calendula</i>	63.6%
Pine warbler	<i>Setophaga pinus</i>	63.6%
Summer tanager	<i>Piranga rubra</i>	63.6%
Pileated woodpecker	<i>Dryocopus pileatus</i>	54.5%
Yellow-throated vireo	<i>Vireo flavifrons</i>	54.5%
Indigo bunting	<i>Passerina cyanea</i>	54.5%
Downy woodpecker	<i>Dryobates pubescens</i>	50.0%
Northern parula	<i>Setophaga americana</i>	45.5%
Acadian flycatcher	<i>Empidonax virescens</i>	40.9%
Common yellowthroat	<i>Geothlypis trichas</i>	40.9%
Eastern wood-pewee	<i>Contopus virens</i>	36.4%
Eastern towhee	<i>Pipilo erythrophthalmus</i>	36.4%
American redstart	<i>Setophaga ruticilla</i>	36.4%
Yellow-throated warbler	<i>Setophaga dominica</i>	36.4%
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	31.8%
American goldfinch	<i>Spinus tristis</i>	31.8%
Louisiana waterthrush	<i>Parkesia motacilla</i>	31.8%
Red-shouldered hawk	<i>Buteo lineatus</i>	27.3%
Brown-headed nuthatch	<i>Sitta pusilla</i>	27.3%
Hermit thrush	<i>Catharus guttatus</i>	27.3%
Blue grosbeak	<i>Passerina caerulea</i>	27.3%
Eastern phoebe	<i>Sayornis phoebe</i>	22.7%
Fish crow	<i>Corvus ossifragus</i>	22.7%
Gray catbird	<i>Dumetella carolinensis</i>	22.7%
Eastern bluebird	<i>Sialia sialis</i>	22.7%
Prothonotary warbler	<i>Protonotaria citrea</i>	22.7%
Swainson's warbler	<i>Limnithlypis swainsonii</i>	22.7%
Yellow-rumped warbler	<i>Setophaga coronata</i>	22.7%
Ruby-throated hummingbird	<i>Archilochus colubris</i>	18.2%
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	18.2%
Blue-headed vireo	<i>Vireo solitarius</i>	18.2%
Wood thrush	<i>Hylocichla mustelina</i>	18.2%

¹ Proportion of sampling locations where species was observed.

² Non-native and invasive species

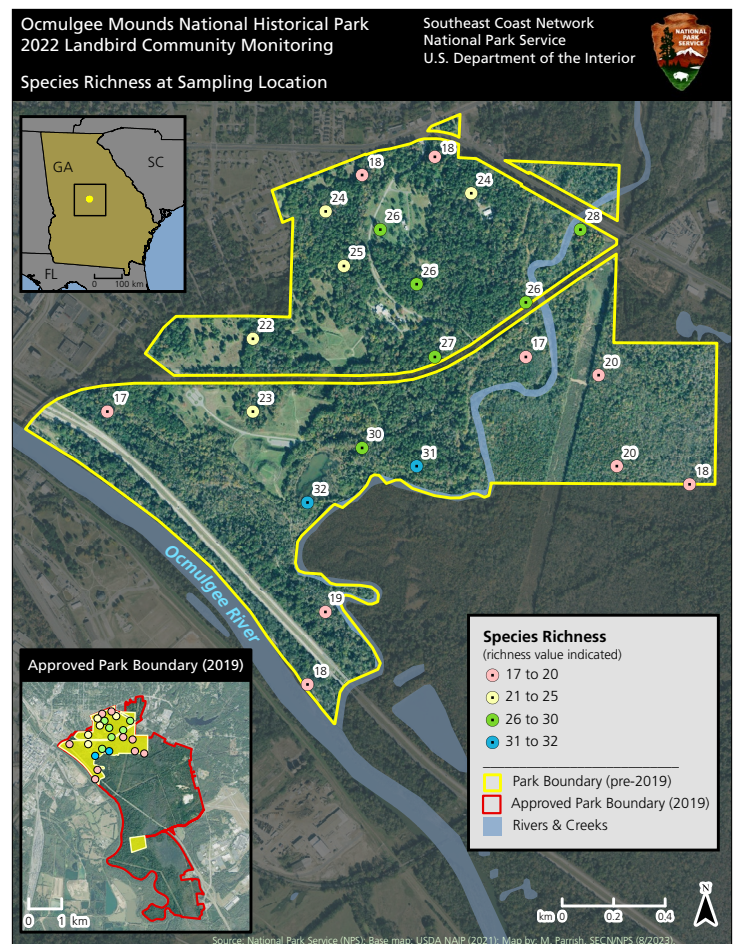


Figure 2. Landbird species richness at sampled locations within Ocmulgee Mounds National Historical Park ($n = 22$), based on audio recording detections in 2022.

Table 2 (continued). Landbird naïve occupancy estimates at each sampled location ($n = 22$) within Ocmulgee Mounds National Historical Park in 2022, ranked descending. Refer to Figure 1 for labeled sampling location ID numbers.

Common Name	Scientific Name	Native Occupancy ¹
Common grackle	<i>Quiscalus quiscula</i>	18.2%
Hooded warbler	<i>Setophaga citrina</i>	18.2%
Mourning dove	<i>Zenaid macroura</i>	13.6%
Chipping sparrow	<i>Spizella passerina</i>	13.6%
Red-winged blackbird	<i>Agelaius phoeniceus</i>	13.6%
Black-and-white warbler	<i>Mniotilta varia</i>	13.6%
Chimney swift	<i>Chaetura pelagica</i>	9.1%
Northern flicker	<i>Colaptes auratus</i>	9.1%
Barn swallow	<i>Hirundo rustica</i>	9.1%
Cedar waxwing	<i>Bombicilla cedrorum</i>	9.1%
Brown thrasher	<i>Toxostoma rufum</i>	9.1%
Northern mockingbird	<i>Mimus polyglottos</i>	9.1%
White-throated sparrow	<i>Zonotrichia albicollis</i>	9.1%
Yellow-breasted chat	<i>Icteria virens</i>	9.1%

¹ Proportion of sampling locations where species was observed.

² Non-native and invasive species

Results (continued)

Table 2 (continued). Landbird naïve occupancy estimates at each sampled location ($n = 22$) within Ocmulgee Mounds National Historical Park in 2022, ranked descending. Refer to Figure 1 for labeled sampling location ID numbers.

Common Name	Scientific Name	Native Occupancy ¹
Orchard oriole	<i>Icterus spurius</i>	9.1%
Killdeer	<i>Charadrius vociferus</i>	4.5%
Green heron	<i>Butorides virescens</i>	4.5%
Cooper's hawk	<i>Accipiter cooperii</i>	4.5%
Barred owl	<i>Strix varia</i>	4.5%
Belted kingfisher	<i>Megaceryle alcyon</i>	4.5%
Hairy woodpecker	<i>Leuconotopicus villosus</i>	4.5%
American crow	<i>Corvus brachyrhynchos</i>	4.5%
White-breasted nuthatch	<i>Sitta carolinensis</i>	4.5%
Swainson's thrush	<i>Catharus ustulatus</i>	4.5%
American robin	<i>Turdus migratorius</i>	4.5%
House finch ²	<i>Haemorhous mexicanus</i>	4.5%
Orange-crowned warbler	<i>Leiothlypis celata</i>	4.5%
Kentucky warbler	<i>Geothlypis formosa</i>	4.5%
Prairie warbler	<i>Setophaga discolor</i>	4.5%

¹ Proportion of sampling locations where species was observed.
² Non-native and invasive species

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A blue-gray gnatcatcher (*Polioptila caerulea*), one of many species detected during monitoring in 2022. NPS photo (NPgallery).

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About the Southeast Coast Network

In 1999, the National Park Service initiated a long-term ecological monitoring program, known as “Vital Signs Monitoring,” to provide the minimum infrastructure to allow more than 270 national park system units to identify and implement long-term monitoring of their highest-priority measurements of resource condition. Monitoring resources in parks develops scientifically sound information on the current status and long-term trends in the composition, structure, and function of park ecosystems, and determines how well current management practices are sustaining those ecosystems.

The NPS Vital Signs Monitoring Program addresses five goals for all parks with significant natural resources:

- Determine the status and trends in selected indicators of the condition of park ecosystem,
- Provide early warning of abnormal conditions,
- Provide data to better understand the dynamic nature and condition of park ecosystems,
- Provide data to meet certain legal and Congressional mandates, and
- Provide a means of measuring progress towards performance goals.

The Southeast Coast Network (SECN) includes eighteen administrative areas containing twenty park units, fifteen of which contain significant and diverse natural resources. In total, SECN parks encompass more than 184,000 acres of federally-managed land across North Carolina, South Carolina, Georgia, Alabama, and Florida. The parks serve a wide diversity of cultural and natural resource missions and include: five national monuments, four national seashores, three national battlefield parks, two national historic parks, a national memorial, a national recreation area, an ecological and historic preserve, and a single national park. The parks range in size from slightly more than 20 acres to nearly 60,000 acres, and when considered with non-federal lands jointly managed with NPS, the network encompasses more than 253,000 acres.

For More Information

[SECN Home Page](https://www.nps.gov/im/secn/index.htm)

(<https://www.nps.gov/im/secn/index.htm>)

[SECN Reports and Publications](https://www.nps.gov/im/secn/reports-publications.htm)

(<https://www.nps.gov/im/secn/reports-publications.htm>)

[NPS Inventory and Monitoring Program](https://www.nps.gov/im/index.htm)

(<https://www.nps.gov/im/index.htm>)

Data Downloads via the [Natural Resource Information Portal](https://irma.nps.gov/portal/)

(<https://irma.nps.gov/portal/>)



A Carolina wren (*Thryothorus ludovicianus*), one of many species detected during monitoring in 2022. Macaulay Library, CLO, Evan Lipton (NPgallery).



A downy woodpecker (*Dryobates pubescens*), one of several species detected during monitoring in 2022. NPS photo / Neal Lewis (NPgallery).



A hermit thrush (*Catharus guttatus*), one of many species detected during monitoring in 2022. NPS photo (NPgallery).