

2019-2020 AVIAN SURVEY REPORT

For the Catoosa Volunteer Training Site (VTS-C) within Catoosa County, Georgia

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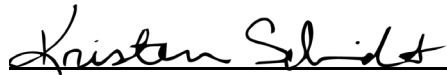
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TABLE OF CONTENTS

EXECUTIVE SUMMARY	III
1.0 INTRODUCTION	1
2.0 PREVIOUS SURVEYS	2
3.0 METHODS	2
3.1 Point Count Surveys	3
3.2 Transect Surveys	4
3.3 Nocturnal Broadcast Surveys	5
3.4 Area Searches	6
4.0 RESULTS AND DISCUSSION	7
4.1 Point Count Survey Results	8
4.2 Transect Survey Results	10
4.3 Nocturnal Broadcast Survey Results	11
4.4 Area Searches and Incidental Results	11
4.5 Species of Interest Results	12
4.6 Special Habitats	16
5.0 RECOMMENDATIONS	18
5.1 Recommendations for Future Surveys	18
5.2 Recommendations for Habitat Management	18
6.0 REFERENCES	20

List of Tables

Table 3.1 Point Count Survey Locations	4
Table 3.2 Transect Survey Locations	5
Table 3.3 Nocturnal Survey Locations	6
Table 4.1 Most Abundant Species During Spring Migration Surveys at VTS-Catoosa	8
Table 4.2 Most Abundant Species During Summer Breeding Surveys at VTS-Catoosa	9
Table 4.3 Most Abundant Species During Fall Migration Surveys at VTS-Catoosa	9
Table 4.4 Most Abundant Species During Winter Surveys at VTS-Catoosa	10
Table 4.5 Additional Bird Species Detected During Transect Surveys	10
Table 4.6 Bird Species Detected Only During Area Searches or Incidentally	11
Table 4.7 Possible Avian Species of Interest at VTS-C	12
Table 4.8 Summary of Avian Species of Interest Observed at VTS-C (2019-2020)	14

List of Appendices

Appendix A: Figures

Appendix B: Photographs

Appendix C: Comprehensive List of Bird Species at VTS-C During the 2019-2020 Surveys

Appendix D: Summary of Point Count Survey Results

Appendix E: Review of Potential Rare, Threatened, or Endangered Species

EXECUTIVE SUMMARY

EnviroScience, Inc. conducted avian surveys for the Tennessee Army National Guard at the Catoosa Volunteer Training Site in 2019 and 2020. Survey results will be used to inform the Integrated Natural Resources Management Plan for the site and allow for effective management and compliance with the Migratory Bird Treaty Act.

The objectives of the survey were to document the avian community onsite throughout the year; identify any avian species considered rare, threatened, or endangered or any other species of interest; identify any special habitats located onsite; and recommend management actions to support species and habitats of interest. Survey methods consisted of point count surveys, nocturnal broadcast surveys, transect surveys, and qualitative area searches. Surveys were conducted in the spring, summer, and fall of 2019 and the winter of 2020.

A total of 119 species were identified during the 2019-2020 surveys at the Catoosa Volunteer Training Site. Of this total, it was determined that 17 species were confirmed breeders, 26 species were probable breeders, 47 species were possible breeders, and 29 species were transient. No federal or state-listed endangered or threatened species were observed during the 2019-2020 survey period. Nine species designated as Birds of Conservation Concern by the U.S. Fish and Wildlife Service (2008), were observed. Additionally, six special habitats were identified at the Catoosa Volunteer Training Site.

It is recommended that future survey efforts place a greater emphasis on point count surveys, as they are a quantitative survey method that is easy to replicate. Overall, species richness was lower than in previous surveys, which has been attributed to several factors, including range-wide population decline of certain species, low detectability of previously observed species, and timing of surveys in conjunction with species' use of the site. If capturing species use data for the 22 species previously observed in the 2008 and 2012 surveys, multiple site visits during migratory seasons are recommended to capture early and late migrants as well as visitor species.

Recommendations for habitat management include limiting fragmentation to large forest tracts, maintaining grassland and woodland habitats with a 2-3 year burning or mowing schedule that eliminates or minimizes impacts during the nesting season, and conserving wetlands, streams, ponds, and other special habitats. Additionally, we recommend invasive species management using herbicide to control small carpetgrass (*Arthraxon hispidus*) within the central wet meadow (Special Habitat 1) and Chinese privet (*Ligustrum sinense*) within the riparian habitat along Tiger Creek (including Special Habitat 2) and Broom Branch.

1.0 INTRODUCTION

EnviroScience, Inc. was contracted by the Tennessee Army National Guard (TNARNG) on August 1, 2018, to conduct biological surveys for birds on the Catoosa Volunteer Training Site (VTS-C). The work conducted was performed under contract number 59744, which extends until July 31, 2020.

The Tennessee Army National Guard, as an agent of the National Guard Bureau (NGB), is responsible for the prudent management of natural resources on all its properties. The largest of these properties, the volunteer training sites (VTS), are managed in accordance with the Sikes Act and the Sikes Act Improvement Amendments, through Integrated Natural Resources Management Plans (INRMP) which guide all activities that may impact natural resources onsite. Up to date baseline information on flora, fauna, and abiotic characteristics of the training site is essential to informed natural resources management.

Birds are very mobile, and as such their populations can change substantially in a short period of time. In order to ensure accurate information for effective management and compliance with the Migratory Bird Treaty Act, planning level surveys (PLS) for birds should be conducted at five-year intervals. The most recent bird survey on the TNARNG training sites was conducted in 2013.

For this reason, the TNARNG requires a PLS of the avian species which utilize the Catoosa training site for all or part of the year. Of the particular concern are neotropical migrants, migratory community, or populations changed from previous survey, which may call for special management (TNARNG, 2018).

VTS-C is approximately 1,628 acres and is located within Catoosa County, Georgia. The property is primarily forested, with a diverse mosaic of forest, woodland, scrub-shrub, grassland, and wetland habitats within the center of the property. Tiger Creek and Broom Branch are the two largest perennial streams that flow through the property. The surrounding land use is a mosaic of forest and rural agricultural properties. Site Maps are included in Appendix A; site photographs are included in Appendix B.

This report presents the methods, results, discussion, and recommendations of avian surveys conducted by EnviroScience at VTS-C. Surveys were conducted in April, June, and October 2019 and February 2020. The objectives of the survey effort were to:

1. Determine which bird species utilize VTS-C throughout the year, including the breeding season, winter, and spring and fall migration.
2. Identify any species considered rare, threatened, or endangered by federal or state governments.
3. Identify special avian habitats onsite.
4. Recommend management actions to support species or habitats of interest.

Survey methods consisted of conducting point count surveys, nocturnal surveys, area searches, and transect surveys. A detailed description of survey methods is provided in Section 3.0.

2.0 PREVIOUS SURVEYS

Biological surveys for birds were conducted at VTS-C in 2007-2008 (AMEC, 2008) and 2012 (URS, 2013). A total of 134 bird species were identified during the 2007-2008 surveys (AMEC, 2008). Evidence of breeding activity was documented for 87 of these species. Seven species documented at VTS-C in 2007-2008 had a state conservation status of “vulnerable,” “imperiled,” or “critically imperiled,” and no federally or state-listed species were observed.

A total of 130 bird species were identified during the 2012 surveys (URS, 2013). Of these, 99 species are classified as neotropical migrants. Twelve of the observed species had a state conservation status of “vulnerable,” “imperiled,” or “critically imperiled.” The U.S. Fish and Wildlife Service (USFWS) lists seven of these species as Birds of Conservation Concern in the Appalachian Mountains physiographic province (USFWS, 2008) where VTS-C is located.

Due to the varying methodologies used between survey years, comparison between survey years is difficult. In the 2007-2008 surveys, five-minute point counts were conducted in May (spring) and June (summer) only, and the remaining survey effort was focused on collecting qualitative data via transect surveys and area searches (including nocturnal searches). Although it is difficult to statistically compare qualitative data, surveys that collect qualitative data are useful for meeting project objectives (i.e., targeting specific habitats/species, capturing diversity across the site, etc.).

In 2012, the surveyors performed ten-minute point counts during the winter, spring migration, and summer breeding season at the same locations as the 2007 surveys. Qualitative transect surveys and area searches were conducted in spring, summer, and fall, with additional concentrated searches targeting rare, threatened, and endangered (RTE) species. Nocturnal counts along walking and driving routes were also employed in spring and summer, with owl vocalization broadcasts. Statistical comparisons between the two surveys and with the 2019-2020 data are not possible because the 2007-2008 transect surveys and area searches were not timed and/or did not cover a specific distance/area, and the 2012 point count surveys were of longer duration than the 2007 point counts without being broken into shorter intervals.

3.0 METHODS

The sections below outline the methodology used for the 2019-2020 avian surveys for VTS-C. These methods were developed to capture avian diversity, estimate relative abundance, and to allow for statistical comparison with past and future surveys. All sampling utilized visual and auditory methods to identify birds to species and was therefore non-destructive. Species identification was performed by EnviroScience personnel trained in bird identification.

Similar to previous surveys, the information collected during all survey methods informed determinations of breeding status onsite. The following terminology will be used for breeding status determination (for further review see Nicholson, 1997):

- **Possible Breeding (PB):** Species observed in breeding habitat during the breeding season.
- **Probable Breeding (PRB):** Pair observed in suitable breeding habitat during the breeding season or territorial male singing at the same site for two weeks or chasing the same species.
- **Confirmed Breeding (CB):** Adult carrying food for young, dependent recently fledged or downy young, or nest with young seen or heard.
- **Transient (T):** Non-breeding species most likely to be found at the site during migration.
- **Visitor (V):** Species observed onsite but are unlikely to be breeding on the property.

3.1 POINT COUNT SURVEYS

Avian point counts are the most widely used quantitative methodology for recording bird populations (Ralph, 1995). Point count data can be used to estimate relative abundance with a standardized methodology such that data can be compared among sampling locations and over time (Ralph et al., 1995; Hamel et al., 1996). Twenty-six point count locations were previously established at least 250 meters apart from each other at VTS-C (AMEC, 2008; URS, 2013). These point count locations were utilized for the 2019-2020 surveys and are depicted in Figure 2 (Appendix A); coordinates for each of these point count locations are included in Table 3.1. Although the established point counts along roads could result in a bias toward edge habitat, surveying the established point count locations allows for some level of comparison of the avian community utilizing VTS-C over time. Such data can inform how land management practices (i.e., changes to land use cover at a specific location) affect a particular bird community. Furthermore, because the roads at VTS-C are infrequently traveled, and consist primarily of narrow, gravel roads without mowed edges where they cut through forest, edge effects are generally minimal.

The point count surveys followed widely accepted protocols (Ralph et al., 1993) and were conducted in the morning hours during peak bird activity. Point count surveys were generally conducted from within a half-hour before sunrise to about five hours after sunrise, or until bird activity significantly dropped off. This range was adjusted in summer and winter at the discretion of the surveyors. In the summer, point counts were terminated early if bird activity diminished significantly due to high ambient temperatures. Similarly, winter point count surveys commenced later in the morning as bird activity was observed to be slower in the early morning when it was colder, and tended to pick up later in the morning through the early afternoon as ambient temperatures increased. Point count surveys were conducted during optimal weather conditions, which include little wind (0-3 on the Beaufort scale) with little to no precipitation or heavy fog, and seasonally average temperatures. Surveys were terminated, and conducted later, if noise from wind or rain appeared to cause a loss of observations greater than 10 percent (Ralph et al., 1995). Wind, cloud cover, temperature, and the presence of any precipitation or other sources of noise (i.e., road noise) were recorded at each point count.

Point count surveys were conducted for ten minutes at each point count location. The survey period was divided into three intervals: 0-3 minutes, 3-5 minutes, and 5-10 minutes. These intervals allow for the greatest amount of comparison with past and future surveys, as the most common point count survey lengths are three-minute, five-minute, and ten-minute surveys (Ralph et al., 1995). Previous surveys employed five-minute point counts in 2007-2008 (AMEC, 2008) and ten-minute point counts in 2012 (URS, 2013).

Upon arrival at the point count location, observers allowed for a two-minute cool-down period to record relevant location and environmental information and allow the birds to acclimate to the observer's presence. During the survey, all species heard and/or seen by the observer were recorded within the time interval when they were first detected. Any applicable detection types were recorded, including songs, calls, visual detections, aural detections (non-vocal sounds such as wing whirs or drumming), and flyovers. Distances from the point location were estimated by placing the bird into one of four range bands: 0-25 meters, 25-50 meters, 50-100 meters, and greater than 100 meters. If a bird moved to a different range band between survey intervals, the new location was recorded on the same line of the data sheet in the later interval. The number of individuals for each species, the sex and age (if they could be determined), and any behavioral notes (i.e., nest building, agitation, food carrying, fledged young) were also recorded.

Table 3.1 Point Count Survey Locations

TA*	Survey Route	Point Count Location	Latitude	Longitude	Habitat
C-10	1	1	34.948041	-85.047419	Forest
C-10	1	2	34.945712	-85.047859	Forest
C-10	1	3	34.942586	-85.050132	Forest
C-4/C-9	1	4	34.940880	-85.052407	Forest/open woodland
C-4/C-7	1	5	34.939944	-85.055040	Forest/open woodland
C-4/C-7	1	6	34.938084	-85.056253	Successional forest/open woodland
C-4/C-7	1	7	34.935464	-85.058374	Open woodland/open field
C-4/C-5/C-7	1	8	34.933574	-85.060477	Open field
C-4/C-5	1	9	34.930703	-85.062437	Forest/open woodland/open field
C-2/C-5	1	10	34.928779	-85.064867	Forest/open field
C-2/C-5	1	11	34.928425	-85.067641	Forest/successional forest/wetland
C-2	1	12	34.926478	-85.067098	Forest
C-2	1	13	34.924059	-85.064853	Forest
C-2	1	14	34.920422	-85.064907	Forest (partially riparian)
C-2	1	15	34.918083	-85.065277	Forest (partially wetland and riparian)
C-2	1	16	34.913652	-85.067428	Forest (partially riparian)
C-1/C-2	1	17	34.911807	-85.067119	Forest/open field
C-1	1	18	34.908347	-85.066051	Forest/open field
C-10	2	1	34.940339	-85.048438	Forest
C-10	2	2	34.938272	-85.049487	Forest
C-4/C-10	2	3	34.936240	-85.051399	Forest
C-4	2	4	34.933846	-85.052477	Forest
C-3/C-4	2	5	34.931419	-85.053090	Forest (riparian)
C-3	2	6	34.929702	-85.055864	Forest
C-3	2	7	34.927166	-85.056226	Forest
C-3	2	8	34.924652	-85.056696	Forest

*TA = Training Areas; correspond to mapped training areas provided by TNARNG GIS and included in site mapping. All training areas within a 100-meter radius of the point count location are listed.

3.2 TRANSECT SURVEYS

Transects were established to capture avian activity within broader habitat types (i.e., forest, grassland, etc.) at VTS-C. Transect locations from the previous surveys were unknown; therefore, new transects were established, and start/stop locations were recorded with GPS (sub-meter accuracy). Transects were placed within areas of VTS-C that were not adequately covered by existing point count locations and were located at least 250 meters from any point count locations to avoid double counting individual birds. Transect locations are described in Table 3.2 below and depicted in Figure 2, Appendix A.

Similar to the point count protocol, transect surveys were conducted between a half-hour before sunrise to about five hours after sunrise, or until bird activity significantly dropped off. Each transect was approximately 250 meters long, and observers walked each transect for 25 minutes at a consistent pace from one end to the other. Observers recorded all birds seen and heard within 100 meters on each side of the transect. Any applicable detection types were recorded, including songs, calls, visual detections, aural detections (non-vocal sounds such as wing whirs or drumming), and flyovers. The number of individuals for each species, the sex and age (if they could be determined), and any behavioral notes (i.e., nest building, agitation, food carrying, fledged young) were also recorded.

Table 3.2 Transect Survey Locations

TA	Transect	Endpoint	Latitude	Longitude	Habitat
C-9/C-10	1	start	34.948032	-85.049294	Forest (riparian)
		stop	34.949759	-85.048577	
C-7/C-9	2	start	34.943003	-85.053284	Forest
		stop	34.944799	-85.054101	
C-7	3	start	34.942101	-85.056637	Forest (successional)
		stop	34.94326	-85.054915	
C-5	4	start	34.935561	-85.066408	Forest/open woodland
		stop	34.936576	-85.064488	
C-4/C-7	5	start	34.937385	-85.056853	Forest (successional)
		stop	34.939193	-85.056648	
C-3/C-4	6	start	34.929958	-85.061577	Emergent wetland/open field
		stop	34.931212	-85.060118	
C-3	7	start	34.925957	-85.058010	Forest
		stop	34.923872	-85.058143	
C-2/C-5	8	start	34.927780	-85.070463	Forest
		stop	34.928141	-85.068324	
C-3	9	start	34.918872	-85.060118	Forest
		stop	34.917044	-85.059980	
C-2	10	start	34.919850	-85.064459	Forest (riparian)
		stop	34.917940	-85.064140	
C-1	11	start	34.909016	-85.068207	Forest (wetland)/open field
		stop	34.907216	-85.067953	

3.3 NOCTURNAL BROADCAST SURVEYS

Surveys for nocturnal species such as owls (*Strigiformes* spp.), American woodcocks (*Scolopax minor*), and nightjars (e.g., eastern whip-poor-will [*Caprimulgus vociferus*], common nighthawk [*Chordeiles minor*], and Chuck-will's-widow [*Antrostomus carolinensis*]) were conducted between dusk (a half-hour after sunset) and midnight. Nocturnal surveys included a broadcast component to survey for owls. Broadcast surveys (i.e., call-playback) are one of the most commonly used techniques to survey owls (Takats et al., 2001). Since owls use vocalizations to communicate and defend territories, broadcast surveys of owl recordings can elicit vocal responses from many owl species (Mosher and Fuller, 1996). Call-playback methods can be used to determine the presence of an owl species, residency status (i.e., transient, unpaired owl, resident, etc.), and breeding status (Haustleitner, 2006).

Owls are most vocal and easier to locate during the breeding season, which extends from the onset of courtship in late winter/early spring through juvenile dispersal in fall (Haustleitner, 2006). The optimal timing of surveys for VTS-C is between late January through June (Nicholson, 1997; Sibley, 2000). EnviroScience biologists conducted nocturnal surveys in April and June 2019 and in February 2020 at VTS-C. Fall surveys did not include owl playback surveys. Eight of the eleven nocturnal survey locations correspond with locations from the point count surveys, while the remaining three were established in new locations within suitable habitat. Broadcast survey locations were located at least 500 meters from each other to reduce replication during data collection, with the exception of Nocturnal (NOC) point 11. This point was established in the field during surveys, and once mapped, is approximately 367 meters from NOC-5 and 403 meters from NOC-6. Nocturnal survey locations are described in Table 3.3 and depicted in Figure 2, Appendix A.

Nocturnal surveys were conducted in optimal weather conditions, which include little wind (0-3 on the Beaufort scale) with no precipitation or heavy fog, and seasonally average temperatures. Surveys were conducted for ten minutes, with the first two minutes consisting of a silent listening period. All bird species detected during the silent listening period were recorded, including an estimated distance from the survey location and the number of individuals. The remaining eight minutes of the survey consisted of alternating periods of broadcasting owl vocalizations for one minute, followed by silent listening for one minute. Vocalizations were broadcast through vehicle speakers; therefore, all nocturnal survey locations are accessible by vehicle. The general progression of owl calls was as follows: Eastern Screech-Owl (*Megascops asio*) were played first followed by a one minute silent listening period, Great Horned Owl (*Bubo virginianus*) were played second followed by a one minute silent listening period, then Barred Owl (*Strix varia*) were played third followed by a one minute silent listening period. One of these three vocalizations was then repeated in the ninth minute of the survey, chosen at the discretion of observers and depending on owl response during the previous playbacks. Call broadcasts were adjusted in some circumstances to prevent stress or predation. For example, Eastern Screech-Owl calls were not broadcast if Great Horned Owls or Barred Owls were detected near the survey location, since the larger owls will prey on Eastern Screech-Owls if they were called in by the playback. In addition, during the nesting period, if owls responded to broadcast vocalizations and could still be heard at the next survey location, calls for that species were not broadcast again to minimize stress on the birds during nesting. All responses by owls to the broadcast vocalizations were recorded, as well as any behavioral observations, number of individuals, and distances from the survey location.

Table 3.3 Nocturnal Survey Locations

TA	Survey Location	Associated Point Count	Latitude	Longitude	Habitat
C-10	1	Route 1, PC-2	34.945712	-85.047859	Forest
C-4/C-7	2	Route 1, PC-5	34.939944	-85.055040	Forest/open woodland
C-4/C-7	3	Route 1, PC-7	34.935464	-85.058374	Open woodland/open field
C-2/C-5	4	Route 1, PC-11	34.928425	-85.067641	Forest/successional forest/wetland
C-2	5	Route 1, PC-13	34.924059	-85.064853	Forest
C-2	6	Route 1, PC-15	34.918083	-85.065277	Forest (partially wetland and riparian)
C-10	7	Route 2, PC-2	34.938272	-85.049487	Forest
C-4	8	Route 2, PC-4	34.933846	-85.052477	Forest
C-3	9	N/A	34.923201	-85.057253	Forest
C-3/ Cantonment	10	N/A	34.913562	-85.061220	Forest (wetland/riparian)
C-2/C-3	11	N/A	34.921159	-85.062976	forest (partially riparian)

3.4 AREA SEARCHES

Area searches in all habitat types were conducted throughout VTS-C at the discretion of EnviroScience biologists. The purpose of the area searches was to target any areas that required further survey effort beyond the quantitative surveys. These searches included areas that were not covered by any point count or transect locations, areas of special habitat, areas likely to provide habitat for RTE species and other species of interest, and areas of heightened bird activity, particularly during migration. As these area searches were not quantitative surveys, they were conducted throughout the day, including past the typical five hours after sunrise when point

counts are terminated. Thus, targeted area searching was often conducted when bird activity was decreased; however, surveys were generally terminated around noon during spring and summer surveys when bird activity had diminished. These surveys were not intended to be comprehensive; therefore, data on more common species were not always recorded during area searches. The intent of area searching was to provide a snapshot of the bird community utilizing a particular habitat type and to allow for more time to search for RTE species, migrants, secretive species, and other species of interest that are less likely to be observed during the quantitative surveys. Call playback was utilized at the discretion of observers to confirm the presence of lesser-known and/or confusing species, if observed. During the summer surveys, the area searches were largely focused on observing nests and other evidence of breeding activity. Incidental observations while traveling between points and otherwise traversing the site were also recorded.

4.0 RESULTS AND DISCUSSION

A total of 119 species were identified during the 2019-2020 surveys at VTS-C. Of this total, it was determined that 17 species were confirmed breeders, 26 species were probable breeders, 47 species were possible breeders, and 29 species were transient.

Of the 119 species identified during the 2019-2020 surveys at VTS-C, 93 species were observed during point count surveys (approximately 78% of species observed onsite). Two additional species were observed during nocturnal surveys, and two additional species were observed during transect surveys. Finally, 22 species were observed during qualitative area searches or incidentally without being detected in any of the quantitative surveys. A comprehensive list of all species observed at VTS-C during the 2019-2020 surveys is located in Appendix C. The sections below summarize the results of the quantitative and qualitative surveys conducted at VTS-C.

A total of 22 species previously recorded at VTS-C were not captured during the 2019-2020 surveys, which included 11 species from the 2007 surveys and 11 species from the 2012 surveys. Of the 22 species not observed during the 2019-2020 survey effort, approximately half were previously considered migratory at VTS-C. Several of the previously-documented species our field staff expected to find but did not detect in 2019-2020 include: solitary sandpiper (*Tringa solitaria*), broad-winged hawk (*Buteo platypterus*), chestnut-sided warbler (*Setophaga pensylvanica*), American kestrel (*Falco sparverius*), and orchard oriole (*Icterus spurius*). Of these, only the broad-winged hawk has been increasing across its range; all other species have been experiencing annual declines in population numbers range-wide.

We attribute the lack of data for the previously-detected species to changes in regional population numbers, the timing of migration, or random chance due to the limited time on site. Additionally, several species with inherently low detectability and previously low numbers of observations were not detected in 2019-2020 despite considerable effort spent in suitable habitat searching for these species. These species included American bittern (*Botaurus lentiginosus*), grasshopper sparrow (*Ammodramus savannarum*), and Henslow's sparrow (*Ammodramus henslowii*). Of these three species, population numbers of American bitterns and Henslow's sparrows are generally decreasing across their range.

In general, we attribute the missing species data to extraneous factors, and not a result of land management practices over the course of the past 13 years. These non-detections are likely a result of one or a combination of the following factors: timing of site visits, seasonal weather

conditions determining migration patterns of certain species, climate change conditions that could be causing differences in migratory patterns of species, population dynamics, and generally low population numbers of the previously-detected species migrating through the site. Site visits were planned to capture the peak of migration and breeding activity at VTS-C while accommodating the site's training schedule and project budget. Future surveys should increase survey effort and or time onsite, over the course of the migratory season, to capture both early and late migrants when possible.

4.1 POINT COUNT SURVEY RESULTS

A full summary of the point count survey results (including nocturnal survey results) is included in Appendix D. This summary lists the breeding status for each species observed, as well as the number of individuals detected across the site during each season. Details of the most abundant species at VTS-C by season are also summarized in the tables below. Species numbers presented in the tables below reflect point count data given that this survey method was the most standardized.

Due to the migratory nature of most bird species, abundance data are presented by season because bird community composition varies seasonally. In addition to intrinsic differences in detectability between species, detectability for most species varies between seasons as well. In general, detectability is high during the breeding season when birds are vocalizing to attract mates and defend territories, and because foraging activity is elevated when adults are caring for young. Conversely, birds are typically less active during the winter months, and thus the number of individuals observed is typically lower. The composition of the bird community can vary greatly during the spring and fall migrations depending on the timing of the surveys and whether favorable weather conditions are present. Furthermore, splitting abundance up by season reduces the likelihood that an individual will be counted multiple times throughout the year and provides a better estimate for the total number of individuals, particularly of year-round residents.

Table 4.1 Most Abundant Species During Spring Migration Surveys at VTS-Catoosa

Rank	Common Name	Scientific Name	No. of Individuals	Breeding Status
1	Tufted Titmouse	<i>Baeolophus bicolor</i>	60	CB
2	Red-eyed Vireo	<i>Vireo olivaceus</i>	51	CB
3	Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	47	CB
4	Blue Jay*	<i>Cyanocitta cristata</i>	41	PRB
5	Northern Cardinal	<i>Cardinalis cardinalis</i>	39	CB
6	American Crow*	<i>Corvus brachyrhynchos</i>	32	PRB
7	Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	30	PRB
8	Carolina Chickadee	<i>Poecile carolinensis</i>	29	PRB
9**	Brown-headed Cowbird	<i>Molothrus ater</i>	23	CB
10	Carolina Wren	<i>Thryothorus ludovicianus</i>	22	CB

*Number of individuals possibly inflated due to high detectability at long distances.

**One flock of 25 Double-Crested Cormorants (*Phalacrocorax auritus*) was observed in the spring. Since this was a flyover observation, and this species was not observed utilizing onsite habitat, it was not included among the most abundant species rankings.

Table 4.2 Most Abundant Species During Summer Breeding Surveys at VTS-Catoosa

Rank	Common Name	Scientific Name	No. of Individuals	Breeding Status
1	Tufted Titmouse	<i>Baeolophus bicolor</i>	64	CB
2	Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	57	CB
3	American Crow*	<i>Corvus brachyrhynchos</i>	50	PRB
4	Northern Cardinal	<i>Cardinalis cardinalis</i>	43	CB
5	Carolina Chickadee	<i>Poecile carolinensis</i>	42	PRB
6	Red-eyed Vireo	<i>Vireo olivaceus</i>	39	CB
7	Carolina Wren	<i>Thryothorus ludovicianus</i>	26	CB
	Yellow-billed Cuckoo	<i>Coccyzus americanus</i>		CB
8	Indigo Bunting	<i>Passerina cyanea</i>	24	CB
	Mourning Dove	<i>Zenaida macroura</i>		CB
	Red-bellied Woodpecker	<i>Melanerpes carolinus</i>		PRB
9	Brown-headed Cowbird	<i>Molothrus ater</i>	23	CB
	Downy Woodpecker	<i>Dryobates pubescens</i>		PRB
10	Blue Jay*	<i>Cyanocitta cristata</i>	19	PRB

*Number of individuals possibly inflated due to high detectability at long distances.

Table 4.3 Most Abundant Species During Fall Migration Surveys at VTS-Catoosa

Rank	Common Name	Scientific Name	No. of Individuals	Breeding Status
1	American Crow*	<i>Corvus brachyrhynchos</i>	64	PRB
	Blue Jay*	<i>Cyanocitta cristata</i>		PRB
2	Carolina Wren	<i>Thryothorus ludovicianus</i>	42	CB
3	Carolina Chickadee	<i>Poecile carolinensis</i>	39	PRB
4	Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	37	PRB
	Tufted Titmouse	<i>Baeolophus bicolor</i>		CB
5	American Robin	<i>Turdus migratorius</i>	30	PB
6	Downy Woodpecker	<i>Dryobates pubescens</i>	23	PRB
7	Northern Cardinal	<i>Cardinalis cardinalis</i>	18	CB
8	Eastern Bluebird	<i>Sialia sialis</i>	17	PB
9	Northern Flicker	<i>Colaptes auratus</i>	15	PB
10	White-breasted Nuthatch	<i>Sitta carolinensis</i>	13	PRB

*Number of individuals possibly inflated due to high detectability at long distances.

Table 4.4 Most Abundant Species During Winter Surveys at VTS-Catoosa

Rank	Common Name	Scientific Name	No. of Individuals	Breeding Status
1	American Crow*	<i>Corvus brachyrhynchos</i>	88	PRB
2	Carolina Chickadee	<i>Poecile carolinensis</i>	48	PRB
3	Tufted Titmouse	<i>Baeolophus bicolor</i>	40	CB
4	Pine Warbler	<i>Setophaga pinus</i>	39	CB
5	Carolina Wren	<i>Thryothorus ludovicianus</i>	38	CB
6	Northern Cardinal	<i>Cardinalis cardinalis</i>	31	CB
7	Blue Jay*	<i>Cyanocitta cristata</i>	25	PRB
8	Downy Woodpecker	<i>Dryobates pubescens</i>	24	PRB
9	Yellow-rumped Warbler	<i>Setophaga coronata</i>	18	T
10**	Eastern Bluebird	<i>Sialia sialis</i>	15	PB

*Number of individuals possibly inflated due to high detectability at long distances.

**One flock of 15 Sandhill Cranes (*Antigone canadensis*) was observed in the winter. Since this was a flyover observation, and this species was not observed utilizing onsite habitat, it was not included among the most abundant species rankings.

A few trends are worth noting with regard to the most abundant species observed at VTS-C. Six species occur within the top ten most abundant species in each season during the survey period. These species include Tufted Titmouse, Northern Cardinal, Carolina Chickadee, Carolina Wren, Blue Jay, and American Crow. Red-bellied Woodpecker occurs within the top ten most abundant species in all seasons except winter, where it was the eleventh most abundant species. These seven species are all year-round residents and are generally very vocal, and therefore likely have a very high detectability. The numbers of individual American Crows and, to a lesser degree, Blue Jays could be artificially inflated compared with many other species due to their high detectability and loud calls that can be heard well beyond 100 meters. Individuals of these species were likely counted at multiple point count locations to a greater degree than other more secretive species. This detectability bias was particularly evident during the fall when these species are highly active and vocal. None of the top ten most abundant species in any season are listed by the USFWS as Birds of Conservation Concern for the Appalachian Mountains Region (2008; see Section 4.2 below). However, the Kentucky Warbler and the Wood Thrush, both listed as species of conservation concern by USFWS, were the twelfth and thirteenth most abundant species, respectively, during the spring surveys at VTS-C. During the fall surveys, the Wood Thrush was the eleventh most abundant species at VTS-C.

4.2 TRANSECT SURVEY RESULTS

Two bird species were detected during transect surveys that were not detected during point count surveys. Details of these species are summarized in Table 4.5.

Table 4.5 Additional Bird Species Detected During Transect Surveys

Common Name	Scientific Name	Transect No.	No. During Spring	No. During Summer	Breeding Status
Sedge Wren	<i>Cistothorus platensis</i>	6	1	0	T
Tennessee Warbler	<i>Leiothlypis peregrina</i>	4	1	0	T

Both of the species listed in Table 4.5 were determined to be transient at VTS-C due to their low numbers and occurrence only during spring migration. The Sedge Wren was observed along Transect 6, which was specifically placed within the emergent portion of the wetland located in the center of VTS-C (Special Habitat 1, see Section 4.6 below). This habitat is unique to the site and was, therefore, also targeted heavily during area searches. Sedge Wrens were not observed

at any other time during the 2019-2020 surveys. The Tennessee Warbler was observed along Transect 4, which is located within open woodland habitat on Sand Mountain (Special Habitat 6, see Section 4.6 below). Additionally, Tennessee Warblers were observed during the fall surveys at the same location and within Special Habitat 1 (Section 4.6). This species could be expected within any habitats attractive to neotropical migrants during the spring and fall migration seasons.

4.3 NOCTURNAL BROADCAST SURVEY RESULTS

The nocturnal broadcast surveys are modified point count surveys, and as such, the results are summarized along with the point count survey data in Appendix D. Two species detected during the nocturnal surveys were not detected during point count surveys: Chuck-will's-widow and Eastern Screech-Owl. Other species detected during both nocturnal surveys and point count surveys include Eastern Whip-poor-will, Barred Owl, and Great Horned Owl. Nocturnal surveys likely underestimate abundance of Eastern Whip-poor-will and Chuck-will's-widow relative to diurnal species due to the lower number of nocturnal point count locations as compared with diurnal point count locations. However, the lower number of nocturnal survey locations was necessitated by the large territories of resident owl species. Even with the nocturnal points spaced as widely as they were, individual owls would occasionally respond to call/playback at multiple nocturnal survey locations within the same night (particularly Barred Owls). When this occurred during the surveys, it was noted to avoid double-counting individuals and overestimating owl abundance onsite.

4.4 AREA SEARCHES AND INCIDENTAL RESULTS

Twenty-two species were observed during area searches or incidentally without being observed during the quantitative surveys. These species are summarized in Table 4.6.

Table 4.6 Bird Species Detected Only During Area Searches or Incidentally

Common Name	Scientific Name	Breeding Status
American Redstart	<i>Setophaga ruticilla</i>	T
Bank Swallow	<i>Riparia riparia</i>	PB
Blue-headed Vireo	<i>Vireo solitarius</i>	T
Blue Grosbeak	<i>Passerina caerulea</i>	PB
Brown Creeper	<i>Certhia americana</i>	T
Blue-winged Warbler	<i>Vermivora cyanoptera</i>	T
Golden-crowned Kinglet	<i>Regulus satrapa</i>	T
Green Heron	<i>Butorides virescens</i>	PB
Hermit Thrush	<i>Catharus guttatus</i>	T
House Finch	<i>Haemorhous mexicanus</i>	PB
House Sparrow	<i>Passer domesticus</i>	PB
House Wren	<i>Troglodytes aedon</i>	PRB
Mallard	<i>Anas platyrhynchos</i>	T
Northern Harrier	<i>Circus hudsonius</i>	T
Purple Martin	<i>Progne subis</i>	PB
Red-breasted Nuthatch	<i>Sitta canadensis</i>	T
Savannah Sparrow	<i>Passerculus sandwichensis</i>	T
Swainson's Thrush	<i>Catharus ustulatus</i>	T
Tree Swallow	<i>Tachycineta bicolor</i>	PB
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	T
Wilson's Snipe	<i>Gallinago delicata</i>	T
Yellow Warbler	<i>Setophaga petechia</i>	PB

Thirteen of the species listed in Table 4.6 were determined to be transient at VTS-C and were observed in low numbers during the migration or overwintering. The Bank Swallow, Tree Swallow, and Yellow Warbler were determined to be possible breeders at VTS-C, and the low numbers of these species observed during the 2019-2020 surveys may be due to the site's proximity to the edge of their known ranges. The House Finch and House Sparrow were observed within or near the cantonment area, as these species are more commonly found in human-influenced landscapes and are more tolerant of developed habitat. No quantitative survey locations were established within the cantonment area, and minimal effort was spent searching there due to the low number and commonality of bird species utilizing this habitat. Despite the small number of House Wrens detected during the 2019-2020 surveys, this species was classified as a probable breeding species at VTS-C because at least one pair was observed singing within suitable habitat. The remaining species listed in Table 4.6, Blue Grosbeak, Green Heron, and Purple Martin, were classified as possibly breeding, and low numbers of these species were observed onsite.

4.5 SPECIES OF INTEREST RESULTS

Information regarding federally and state listed species that could occur within the site or a five-mile radius was requested from the USFWS Georgia Regional Field Office and Georgia Department of Natural Resources – Wildlife Resources Division in October 2018. This information is included in Appendix E. Species that are also considered Birds of Conservation Concern (BCC) whose range includes the USFWS Appalachian Mountains Region (USFWS, 2008) and/or were identified in the Information for Planning and Consultation (IPaC) review (USFWS, 2018) were also considered as species of interest. Table 4.7 provides a list of possible avian species of interest, including RTE species, that may be utilizing VTS-C during some part of the year.

Table 4.7 Possible Avian Species of Interest at VTS-C

Species	Status	Habitat	Updated Status
Red-cockaded Woodpecker (<i>Picoides borealis</i>)	Federally Endangered, State Endangered	Mature open pine forests	Unlikely transient; suitable habitat not present onsite
Wood Stork (<i>Mycteria americana</i>)	Federally Threatened, State "rare"	Brackish wetlands, cypress swamps	Unlikely transient; suitable habitat not present onsite
Piping Plover (<i>Charadrius melodus</i>)	Federally Threatened, range-wide	Shorelines with sand, gravel, or cobble beaches or mudflats	Unlikely transient; suitable habitat not present onsite
Eastern Black Rail (<i>Laterallus jamaicensis jamaicensis</i>)	Proposed Federally Threatened	Emergent wetlands and marshes	Unlikely transient; Special Habitat 1 provides potential habitat
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Federally protected, BCC	Large lakes and surrounding habitats	Likely visitor, present regionally, nesting habitat not present onsite
Eastern Whip-poor-will (<i>Antrostomus vociferous</i>)	BCC, historical record	Open forests	Likely breeding; observed onsite and designated as probable breeding
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)	BCC, historical record	Forest edges and disturbed areas with dead/dying trees	Likely breeding; observed onsite and designated as possibly breeding
Yellow-bellied Sapsucker (<i>Sphyrapicus varius</i>)	BCC, historical record	Forests	Likely overwintering; observed onsite and designated as transient

Species	Status	Habitat	Updated Status
Sedge Wren (<i>Cistothorus platensis</i>)	BCC, historical record	Wet meadows, marshes, and hayfields	Possible transient; observed onsite during spring migration and designated as transient
Wood Thrush (<i>Hylocichla mustelina</i>)	BCC, historical record	Forests	Likely breeding; observed onsite and designated as probable breeding
Cerulean Warbler (<i>Setophaga cerulea</i>)	BCC, historical record	Forest interiors	Possible transient, unlikely breeding; not observed onsite
Prairie Warbler (<i>Dendroica discolor</i>)	BCC	Scrub-shrub, regenerating forests, and open fields	Likely breeding; observed onsite and designated as probable breeding
Blue-winged Warbler (<i>Vermivora cyanoptera</i>)	BCC, historical record	Scrub-shrub, forest edges, and open woodlands	Likely transient and possible breeding; observed onsite and designated as transient
Golden-winged Warbler (<i>Vermivora chrysoptera</i>)	BCC	Thick scrub-shrub or regenerating forests and shrubby wetlands.	Possible transient, unlikely breeding; not observed onsite
Canada Warbler (<i>Cardellina canadensis</i>)	BCC	Mixed deciduous and coniferous forests with shrubby understory	Possible transient, unlikely breeding; not observed onsite
Worm-eating Warbler (<i>Helmitheros vermiorum</i>)	BCC, historical record	Mature forest, often with patches of dense understory and on slopes	Likely breeding; observed onsite and designated as possible breeding
Swainson's Warbler (<i>Limnithlypis swainsonii</i>)	BCC, historical record	Moist woodlands and mature bottomland forest	Possible breeding; not observed onsite in 2019-2020
Louisiana Waterthrush (<i>Parkesia motacilla</i>)	BCC, historical record	Clear perennial streams in mature forest	Likely breeding; observed onsite and designated as probable breeding
Kentucky Warbler (<i>Geothlypis formosa</i>)	BCC, historical record	Forests	Likely breeding; observed onsite and designated as probable breeding
Henslow's Sparrow (<i>Centronyx henslowii</i>)	BCC, historical record	Grasslands, prairies, and wet meadows	Possible transient; not observed onsite during 2019-2020 surveys.
Bobolink (<i>Dolichonyx oryzivorus</i>)	BCC	Open grasslands, prairies, and meadows	Possible transient; not observed onsite during 2019-2020 surveys.
Rusty Blackbird (<i>Euphagus carolinus</i>)	BCC	Swamps, wet forests and woodlands, pond edges	Possible overwintering; not observed onsite during 2019-2020 surveys.

*Status adjusted from 'Likelihood' in Study Plan per 2019-2020 survey results.

No federally-listed or state-listed endangered or threatened species were observed during the 2019-2020 survey period. Ten Birds of Conservation Concern were observed. Information on the species of interest from the current survey data (2019-2020) is summarized in Table 4.8. Observation locations from 2019-2020 are depicted in Figure 3 (Appendix A).

Table 4.8 Summary of Avian Species of Interest Observed at VTS-C (2019-2020)

Common Name	Scientific Name	State/Federal Designation	Breeding Status	Location
Eastern Whip-poor-will	<i>Antrostomus vociferous</i>	BCC, historical record	PRB	Survey Route 1 PC-2 (NOC-1), 5 (NOC-2), 9, and 13 (NOC-5); Survey Route 2 PC-2 (NOC-7) and 4 (NOC-8)
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	BCC, historical record	PB	Survey Route 2 PC-4 and 6; Transect 3; Special Habitat 4 (Fire Tower Ridge), Special Habitat 6 (Sand Mountain Woodland); riparian forest northwest of Route 1 PC-3.
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	BCC, historical record	T	Survey Route 1 PC-6, 11, 12, and 17; Survey Route 2 PC-8; Special Habitat 6 (Sand Mountain Woodland); southern slope of Sand Mountain
Sedge Wren	<i>Cistothorus platensis</i>	BCC, historical record	T	Transect 6
Wood Thrush	<i>Hylocichla mustelina</i>	BCC, historical record	PRB	Survey Route 1 PC-1, 2, 3, 8, 9, 11, 12, and 16; Survey Route 2 PC-1, 2, 3, 4, 5, 7, and 8; Transects 1, 2, 3, 7, 8, 9, and 10; Special Habitat 2 (Tiger Creek Riparian Area and Wetlands); forest habitat south of the northern gate, along the southern slope of Sand Mountain, along the Sand Mountain ridge top, and within the riparian forest along Broom Branch
Prairie Warbler	<i>Dendroica discolor</i>	BCC	PRB	Survey Route 1 PC-5, 6, 7, 8, and 9; Transects 3, 4, 5, and 6; Special Habitat 1 (Central Wetland) and Special Habitat 5 (Prairie and Open Woodland)
Blue-winged Warbler	<i>Vermivora cyanoptera</i>	BCC, historical record	T	Special Habitat 6 (Sand Mountain Woodland)
Worm-eating Warbler	<i>Helmitheros vermiorum</i>	BCC, historical record	PB	Survey Route 1 PC-4; Survey Route 2 PC-7; Transect 7; forested slope east of Special Habitat 2
Louisiana Waterthrush	<i>Parkesia motacilla</i>	BCC, historical record	PRB	Survey Route 1 PC-4; Transects 1, 8, and 10; Special Habitat 1 (Central Wetland), Special Habitat 2 (Tiger Creek Riparian Area and Wetlands), and Special Habitat 3 (Wetland and Successional Forest)
Kentucky Warbler	<i>Geothlypis formosa</i>	BCC, historical record	PRB	Survey Route 1 PC-1, 3, 4, 5, 6, 9, 10, 12, 13, 15, 17, and 18; Survey Route 2 PC-1, 4, 5, and 8; Transects 1, 3, 4, 5, 7, 8, and 10; Special Habitat 1 (Central Wetland), Special Habitat 2 (Tiger Creek Riparian Area and Wetlands); forest along the southeastern slope and on the ridge top of Sand Mountain.

Eastern Whip-poor-will: Eastern Whip-poor-wills were observed during point count surveys in the spring and fall, and during nocturnal surveys in the spring and summer. This species was determined to be a probable breeder at VTS-C since individuals were singing consistently at Nocturnal Survey Points 1, 7, and 8 on different dates during the breeding season. No nests or nesting activity was observed during area searches; however, this species is secretive and creates discrete nests on the forest floor that are camouflaged easily.

Red-headed Woodpecker: Red-headed woodpeckers were observed in the spring, summer, and fall at VTS-C, particularly within Special Habitats 4 (Fire Tower Ridge) and 6 (Sand Mountain Woodland); see Section 4.6 below for details on these Special Habitats. Individuals were also observed at Route 2, Point Count Location 4, and within the riparian forest along Broom Branch. The locations where this species was observed onsite are characterized by the presence of ample standing dead or dying trees and gaps within the forest canopy. Red-headed woodpeckers were determined to be possible breeders at VTS-C.

Yellow-bellied Sapsucker: Yellow-bellied Sapsuckers were relatively common at VTS-C during the winter months, including six individuals observed during winter point count surveys. This species breeds further north in the Great Lakes region, the boreal forest, and at higher elevations within the Appalachian Mountains. VTS-C is within the overwintering range of this species, and it was classified as transient (non-breeding) onsite.

Sedge Wren: One Sedge Wren was observed in the spring along Transect 6. Transect 6 is located partially within Special Habitat 1 (see Section 4.6 below), which provides a nominal amount of suitable nesting habitat. VTS-C is within the Sedge Wren's migratory range, and Special Habitat 1 provides ideal migratory stopover habitat for this species. This species was not observed at any other time at VTS-C.

Wood Thrush: Wood Thrush were fairly ubiquitous across the property during the 2019 spring, summer, and fall surveys. Seventeen individuals were observed during spring point count surveys, seven individuals during summer point count surveys, and twelve individuals during fall point count surveys. An additional nine individuals were observed during spring transect surveys, three individuals during summer transect surveys, and this species was frequently observed during area searches within forested habitat. This species was classified as a probable breeder at VTS-C due to the prevalence of singing and territorial males. At Survey Route 2, Point Count Location 2, a territorial male was consistently observed singing on multiple dates.

Prairie Warbler: Prairie Warblers were primarily observed within the shrubby portions of the central wetland (Special Habitat 1), the open prairie and woodland area east of Sand Mountain (Special Habitat 5), and the open woodland on top of Sand Mountain (Special Habitat 6, along Transect 4). Seven individuals were observed during spring point count surveys and five individuals during summer point count surveys. An additional six individuals were observed during spring transect surveys and an additional four individuals during summer transect surveys. This species is considered a probable breeder at VTS-C. Territorial males were observed consistently singing in the same location on different dates at Route 1, Point Count Locations 6, 7, and 8 and along Transects 4, 5, and 6.

Blue-winged Warbler: One Blue-winged Warbler was observed in the fall on Sand Mountain. Northern Georgia is at the edge of this species' breeding range, and due to the lack of observations within the summer breeding season, this species is unlikely to be breeding at VTS-C and was classified as transient onsite.

Worm-eating Warbler: Worm-eating Warblers were observed in small numbers at VTS-C. One individual was observed during spring point count surveys, two individuals during summer point count surveys, and one individual during summer transect surveys. This species was designated at possibly breeding at VTS-C due to the presence of singing males in suitable habitat during the breeding season, albeit in low numbers.

Louisiana Waterthrush: Louisiana Waterthrushes were consistently observed along Tiger Creek, Broom Branch, and other perennial tributaries at VTS-C. While only one individual was observed during point count surveys (in the spring), three individuals were observed during spring transect surveys and four individuals during summer transect surveys. This species was designated as a probable breeder at VTS-C. A pair was observed along Transect 10 in the summer, and a probable family group (including a pair and possible juvenile) were observed within the riparian wetlands along Tiger Creek (Special Habitat 2) during area searches in the summer.

Kentucky Warbler: This species was fairly ubiquitous across the property during the spring and summer surveys. Eighteen individuals were observed during spring point count surveys and eleven individuals during the summer breeding season point count surveys. An additional eighteen individuals were observed during spring transect surveys and thirteen individuals during summer transect surveys. This species was commonly observed during area searches in the spring and summer surveys as well, particularly within Special Habitat 2 (see Section 4.6 below) and along the southeastern slopes of Sand Mountain. This species was designated as a probable breeder at VTS-C, with territorial males consistently singing on multiple dates at several locations.

4.6 SPECIAL HABITATS

The following areas are considered special avian habitats at VTS-C. Special habitats were designated based on avian species richness, quality habitat for migratory species, uniqueness within the property, and the presence of RTE species or other species of interest. Special habitats are depicted in Figure 4, Appendix A.

Special Habitat 1: The wetland complex near the center of the property receives groundwater from Sand Mountain and floodwaters from Tiger Creek. This wetland has a high degree of habitat heterogeneity and includes some open water, palustrine aquatic bed, emergent, scrub-shrub, and forested communities. The emergent communities are particularly unique for the site and vary based on the dominant hydrologic regime. In the eastern portion of the wetland, the emergent community is characterized by deeper pools and seasonal to semi-permanent inundation that is strongly influenced by flooding from Tiger Creek and beaver activity. Further west, the emergent community transitions into a wet meadow dominated by groundwater, with disturbance from heavy equipment use resulting in increased microtopography and pool depth variation. The deeper pools within this wet meadow were attractive to Wilson's Snipe (*Gallinago delicata*) as winter and migratory stopover habitat, and provide potential habitat for other marsh-dwelling birds that would not otherwise utilize VTS-C. This wet meadow was also the only location where Sedge Wren, a Bird of Conservation Concern, was observed. The eastern portion of the wetland with open water, aquatic bed, and scrub-shrub was a bird-rich habitat in all seasons during the 2019-2020 surveys.

Special Habitat 2: The riparian forest and associated wetlands along Tiger Creek provide some of the best migratory stopover habitats at VTS-C. A beaver dam on the east side to Tiger Creek has increased the amount of wetland habitat in this area. Large numbers of neotropical migrants were observed within this riparian habitat in the spring and fall. Several of the Birds of Conservation Concern observed onsite also utilized this habitat or the surrounding upland forests, including Eastern Whip-poor-will, Yellow-bellied Sapsucker, Wood Thrush, Worm-eating Warbler, Louisiana Waterthrush, and Kentucky Warbler.

Special Habitat 3: This habitat consists of a palustrine scrub-shrub wetland that receives groundwater from the southern slope of Sand Mountain and the successional forest surrounding it. This area is more or less contiguous with Special Habitat 2 and is located along a perennial tributary to Tiger Creek. The stream provides habitat for Louisiana Waterthrush, a Bird of Conservation Concern, and the successional forest and wetland were attractive to neotropical migrants in the spring and fall.

Special Habitat 4: This dry ridge has an old fire tower at its northern end, and the access road along the ridge top is kept relatively clear. The western slope of this ridge is characterized by large canopy gaps and standing dead or dying trees that provide good habitat for woodpeckers and other cavity-nesting species, including the Red-headed Woodpecker, a Bird of Conservation Concern. This habitat occasionally contained high concentrations of neotropical migrants as well.

Special Habitat 5: This habitat consists of a mix of small patches of prairie habitat, open woodland, and successional forest along the bottom of the slope to Sand Mountain and is bound to the southeast by the road north of the central field and Special Habitat 1. The southern portion of this habitat contains the best prairie community onsite, but the entire area is attractive to birds. This habitat is the best at VTS-C for the Prairie Warbler, one of the Birds of Conservation Concern observed onsite, and habitat for Yellow-breasted Chats (*Icteria virens*). This area also provides displaying habitat for American woodcock (*Scolopax minor*) and was utilized by many neotropical migrants. This habitat appears to have been previously maintained by intermittent burning, and this method is recommended as a continued management practice.

Special Habitat 6: The southern portion of the top of Sand Mountain contains an open, dry oak woodland. This community is characterized by a somewhat open canopy with frequent gaps, and an understory containing many grassland species with few shrubs. Because it is south-facing and also contains a lot of exposed bedrock, this habitat seems to be attractive to migrants and overwintering birds during cold, sunny weather. A large amount of standing dead or dying trees also provides good habitat for woodpeckers, including Red-headed Woodpeckers and Yellow-bellied Sapsuckers, both Birds of Conservation Concern that were observed utilizing this habitat. This habitat was also the only area where Blue-winged Warbler, a Bird of Conservation Concern, was observed along with many other warbler species during migration.

5.0 RECOMMENDATIONS

The following sections describe recommendations for future avian surveys at VTS-C and recommendations for habitat management to sustain the onsite avian community.

5.1 RECOMMENDATIONS FOR FUTURE SURVEYS

In the 2007-2008 surveys at VTS-C, the majority of the survey data were from area searches along transects as opposed to point counts. Area searches along transects were also employed during the 2012 surveys. However, a greater survey effort was conducted at point count locations in 2012, compared with 2007-2008. These previous transect surveys collected qualitative data without a timed interval or designated search area; thus, statistical analysis and quantitative comparisons between years are not feasible.

New transects were established during the 2019-2020 surveys to replicate the methodology of past surveys more quantitatively. Transects were all given a consistent length of 250 meters and surveyed for a standardized length of time (25 minutes). These transects were established in areas to fill spatial gaps not adequately covered by the existing point count survey routes. In practice, however, these transects were less efficient than point count surveys and yielded very little additional species observations. Considering that data collected via different survey methodologies are inherently difficult to compare, it is recommended that transects should not be employed in future surveys. Instead, we recommend expanding the existing set of point count locations to include habitat that is less accessible from roads. We recommend establishing single point count stations at the locations of the 2019-2020 transects, and in several other locations to improve survey coverage of the property. Specifically, at least one point count station should be placed within the cantonment area, and several more should be placed within interior forest habitat. Many roads through forest habitat at VTS-C are infrequently traveled, narrow gravel roads without mowed edges, and therefore edge effects are generally minimal. However, minor edge effects may exist within these areas, and adding interior forest point count locations would reduce any edge bias. Despite being less easily accessible than the rest of the property, Sand Mountain, in particular, would be an ideal location for additional point count locations, as Training Area C-6 is currently devoid of quantitative survey locations.

Future avian survey efforts should focus on capturing quantitative data using point count surveys across as much of the property as is feasible, sampling different habitat types proportionally to their occurrence onsite. Incorporating existing vegetative surveys to guide point count location distribution would assist in establishing sufficient data sampling locations by habitat type. Point count surveys offer ease of replicability, and data can, therefore, be appropriately compared across survey years. Area searches should still be employed to supplement the quantitative data for the reasons outlined in Section 3.4 of this report. We also recommend that during study plan development, future surveys should schedule multiple site visits, when possible, during spring and fall migration periods to capture early and late migrants utilizing the site.

Finally, removal of nocturnal (NOC) playback point 11 is recommended as it is less than 500 meters from NOC-5 and NOC-6 and we suspect that barred owls that may have been observed at these points (NOC 5 and 6) were called in to NOC-11 during subsequent survey nights.

5.2 RECOMMENDATIONS FOR HABITAT MANAGEMENT

VTS-C is primarily comprised of forest habitat, including riparian forest along Tiger Creek and Broom Branch. The center of the property consists of a diverse mosaic of mature forest,

successional forest, woodland, scrub-shrub, grassland, and wetland habitats. This area provides abundant habitat for a diverse avian community, and this habitat diversity should be maintained to the greatest extent practicable. Continued site management, such as periodic prescribed burns, is recommended to maintain this habitat heterogeneity.

For the large forest tracts, we recommend their preservation, especially within the southern portion of the property, including the riparian forest and associated wetlands along Tiger Creek (Special Habitat 2). The northern portion of the property, including the riparian forest along Broom Branch, also provides abundant interior forest habitat preferred by many bird species, including several Birds of Conservation Concern (e.g., Wood Thrush, Worm-eating Warbler, Louisiana Waterthrush, and Kentucky Warbler). If forested areas must be cleared, areas of clearing should be selected that minimize fragmentation of larger forest tracts and avoid impacts to the special habitats identified in this report. Tree and shrub clearing should be avoided from April through July to prevent impacts to nesting birds, as well as other protected species. Portions of the riparian habitat along Tiger Creek and Broom Branch have become infested with the invasive Chinese privet (*Ligustrum sinense*), and control of this species using herbicide is recommended.

The grassland and woodland habitat in the center of the property should be maintained as much as feasible. Woody encroachment should be managed by burning, mowing, or a combination of both on a 2-3 year cycle. Burning or mowing should be restricted from April through August to protect nesting grassland bird species. If mowing is necessary between these months to accommodate training activities, impacts to birds may be mitigated by mowing only portions of these fields on a rotational basis, setting the mower six inches or higher from the ground, using a flushing bar, and mowing slowly to give adult birds time to escape. These precautions can also be used while conducting routine roadside mowing in areas contiguous with larger fields. Mowing in the more regularly managed fields and lawns in the cantonment area, west of the cantonment area, and within the firing range to the north of the cantonment area will have minimal impact on birds using the site. Additional habitat enhancement such as native prairie plantings would improve grassland habitats for birds and their prey. Grassland birds, as a group, typically prefer a diversity of native grasses and forbs that provide habitat and structural heterogeneity.

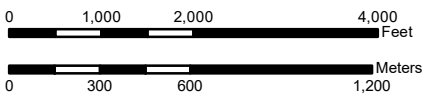
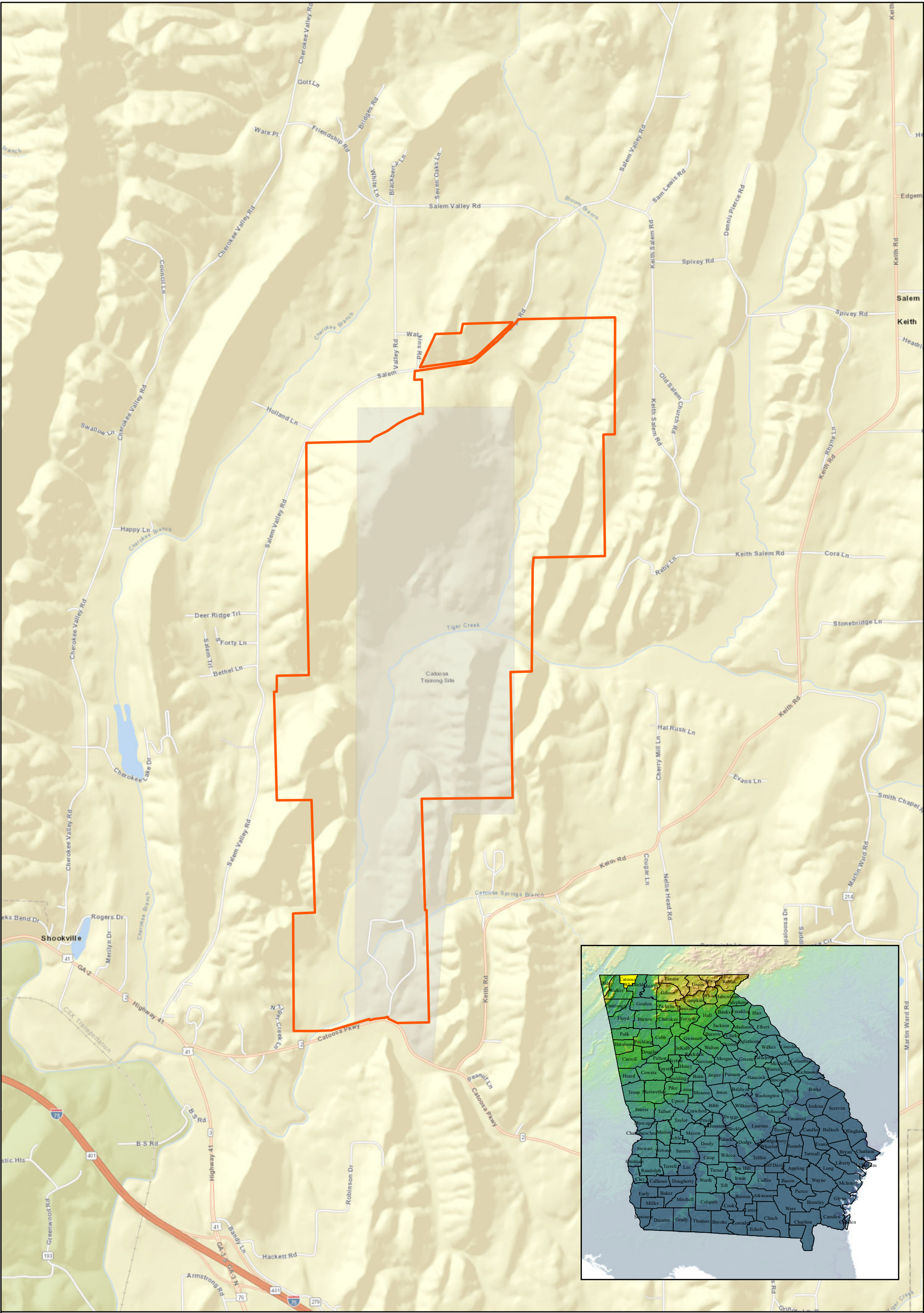
The onsite streams and wetlands should be allowed to remain intact, as these areas provide important habitat for many species, including stopover habitat for many neotropical migrants. These waterbodies should not be filled, and disturbance to the upland habitat buffers around them should be minimized wherever possible. Training activities within the wet meadow (portions of Special Habitat 1) generally do not appear to be reducing its value as migratory stopover habitat. In fact, routine mowing is preventing woody encroachment, and the use of heavy equipment is creating a mosaic of deeper pools across the overall habitat. No evidence of nesting marsh birds was observed during the 2019-2020 surveys, and training activities conducted during the nesting period would likely preclude many species from utilizing the habitat. The major threat to this habitat appears to be the invasive small carpetgrass (*Arthraxon hispidus*), and this species should be controlled using herbicide to prevent the degradation of the wet meadow community.

6.0 REFERENCES

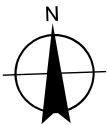
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Appendix A

Figures



**Figure 1. Location Map of Site on Highway
Map of Catoosa County, Georgia.
Volunteer Training Site - Catoosa (VTS-C).**



Prepared for:



 Installation Area

Prepared by:



Date: 5/29/2020 Path: C:\Users\Anna Giordano\Desktop\TNRNG_Birds\Catoosa\Map2_Survey_Catoosa.mxd

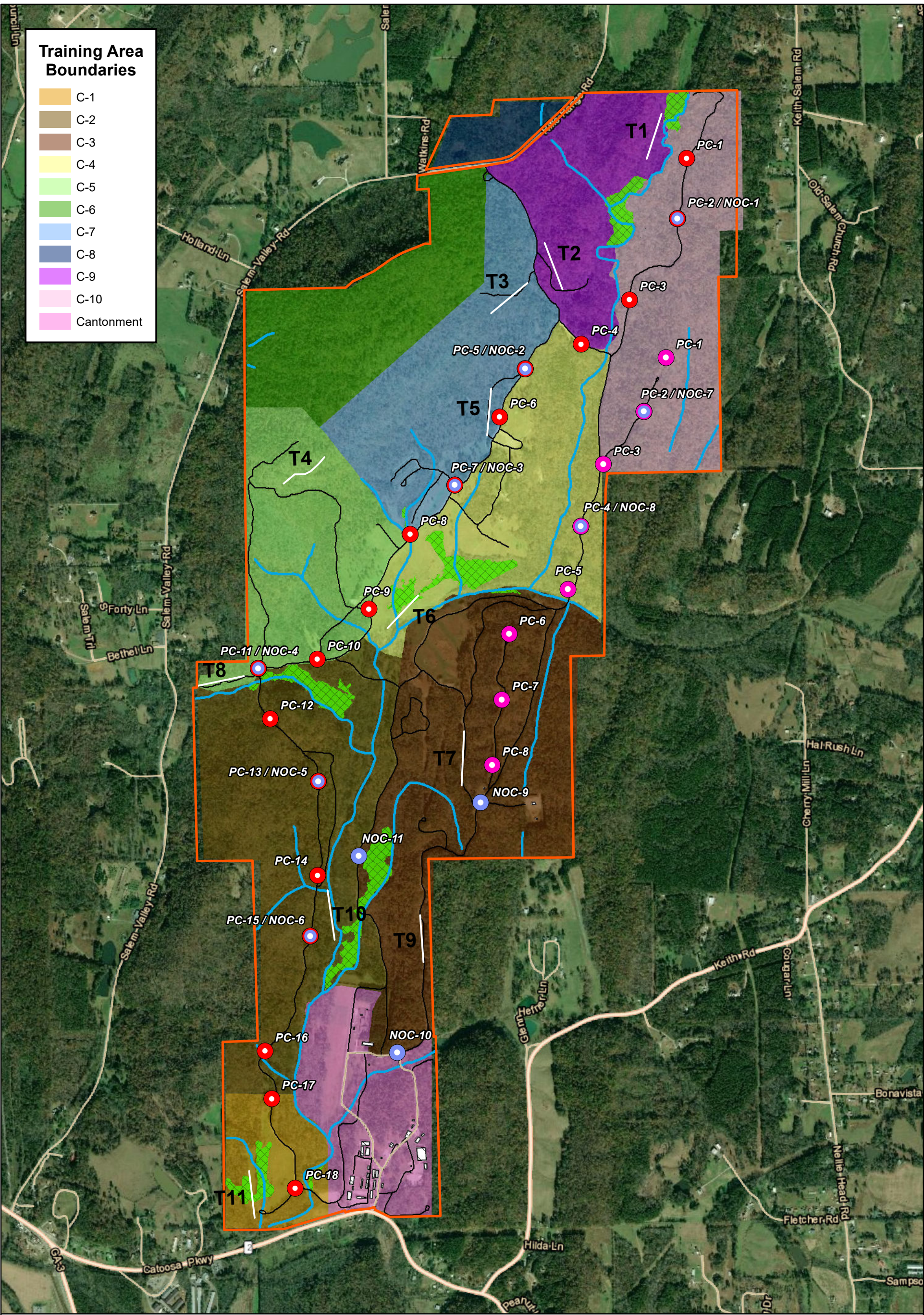
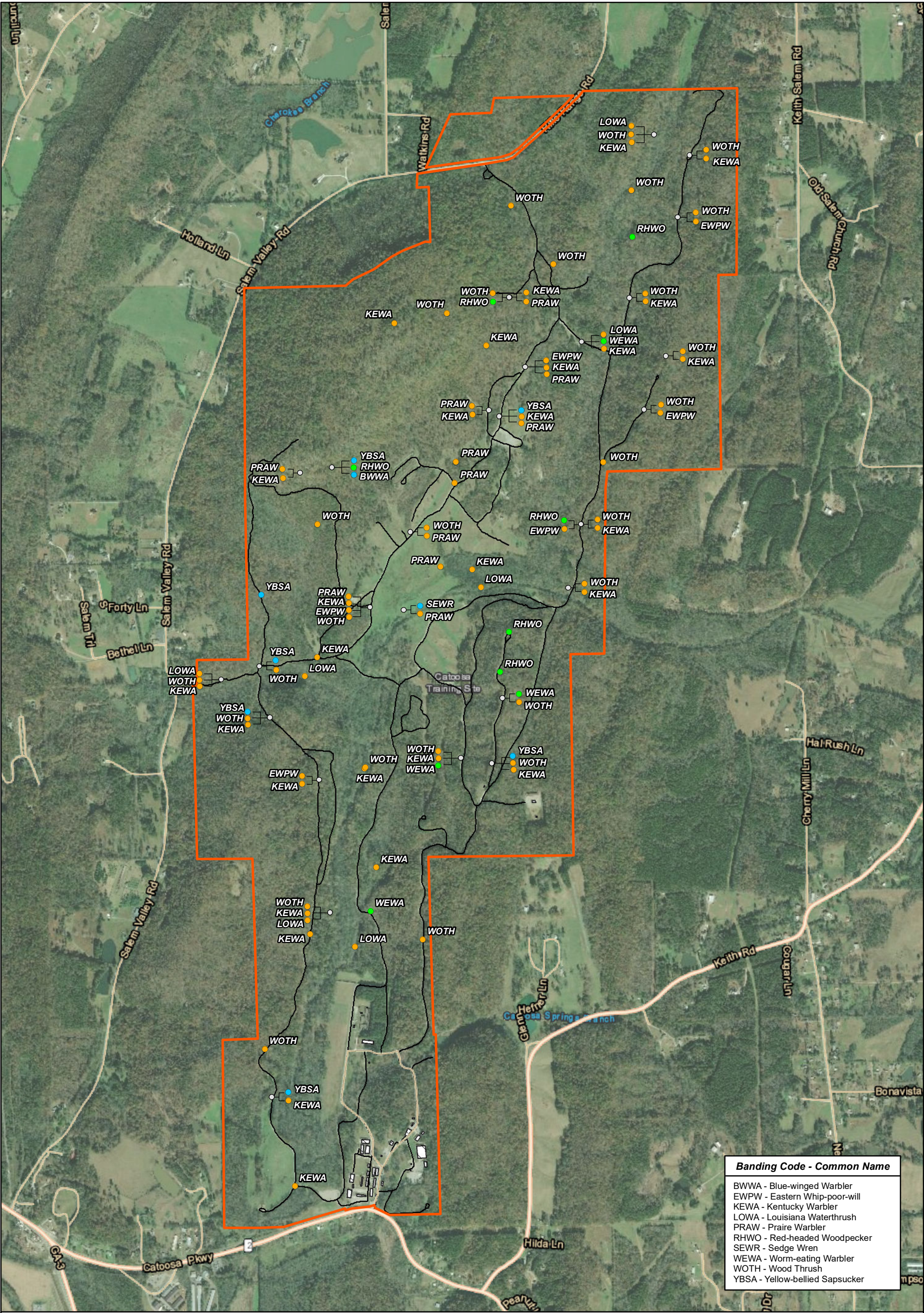


Figure 2. Site Map of
Bird Survey Locations at
Volunteer Training Site - Catoosa (VTS-C).

Prepared for:	● Survey Route 1 ● Survey Route 2 ● Nocturnal Location — Road — Transect — Stream ▢ Buildings ▨ Wetland ▢ Installation Area	Prepared by: EnviroScience Excellence In Any Environment
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Basemap courtesy of Esri.

Path: C:\Users\Anna Giordano\Desktop\GIS Catoosa\Map3_SpeciesOfInterest_Catoosa.mxd
Date: 6/1/2020



Banding Code - Common Name	
BWWA	Blue-winged Warbler
EWPW	Eastern Whip-poor-will
KEWA	Kentucky Warbler
LOWA	Louisiana Waterthrush
PRAW	Praire Warbler
RHWO	Red-headed Woodpecker
SEWR	Sedge Wren
WEWA	Worm-eating Warbler
WOTH	Wood Thrush
YBSA	Yellow-bellied Sapsucker

0 495 990 1,980 Feet

0 150 300 600 Meters

Figure 3. Site Map of Avian Species of Interest Locations at Volunteer Training Site - Catoosa (VTS-C).

Possible Breeder

Probable Breeder

Transient

Road

Buildings

Installation Area

Prepared for:

Prepared by:

EnviroScience
Excellence In Any Environment

Basemap courtesy of Esri.

Date: 5/29/2020 Path: C:\Users\Anna Giordano\Desktop\TNARNG_Birds\Catoosa\Map4_SpecialHabitat_Catoosa.mxd

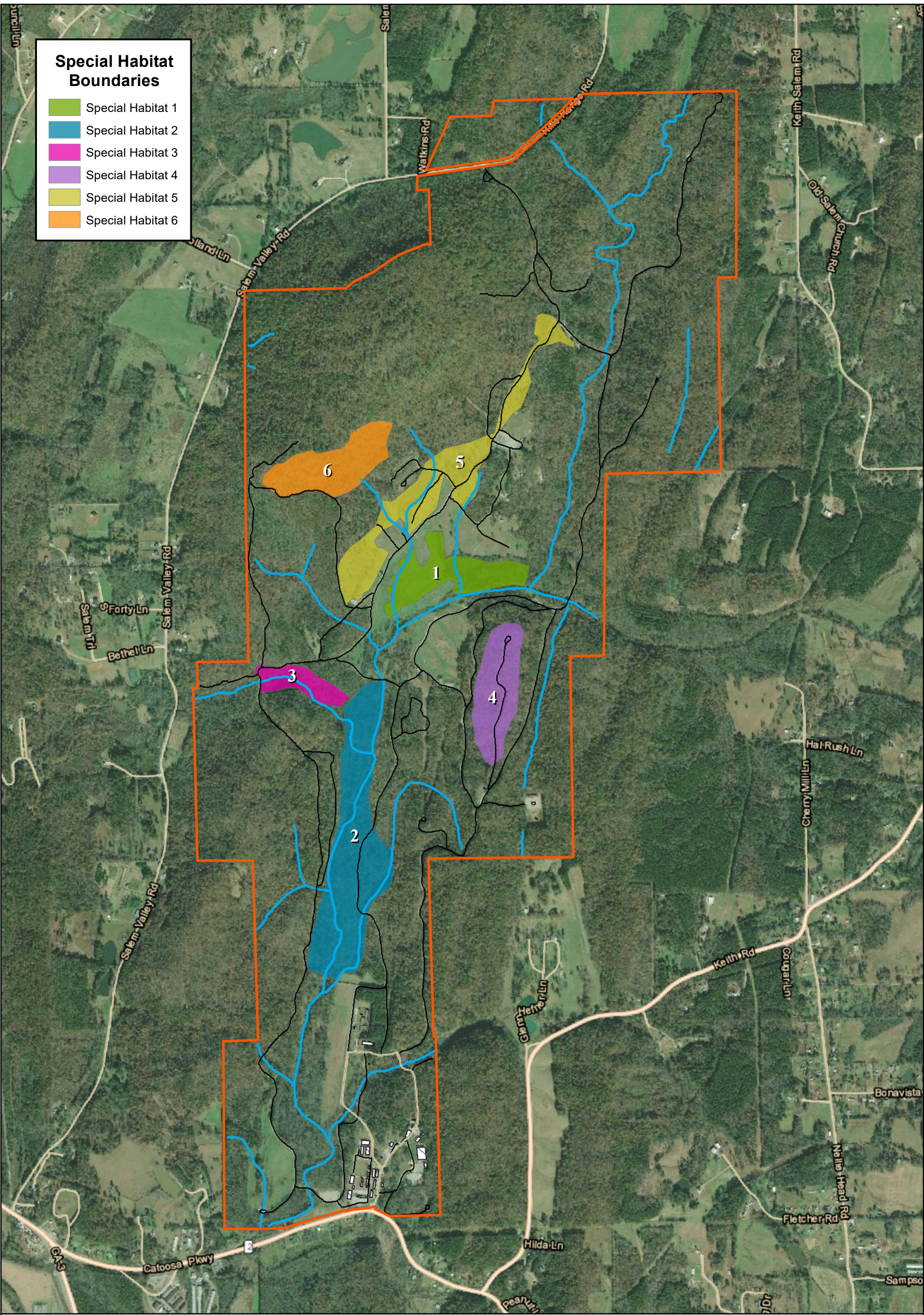


Figure 4.
Site Map of Special Habitats at
Volunteer Training Site - Catoosa (VTS-C).

Prepared for:



— Road
— Stream
□ Buildings
□ Installation Area

Prepared by:



Appendix B

Photographs

2019-2020 Avian Species Survey – VTS-Catoosa
Photographed 2019-2020



Photo 1. Forest habitat in the northern portion of VTS-C (October 4, 2019).



Photo 2. Narrow gravel road through forest habitat at Route 1, PC-14 (April 23, 2019).

2019-2020 Avian Species Survey – VTS-Catoosa
Photographed 2019-2020

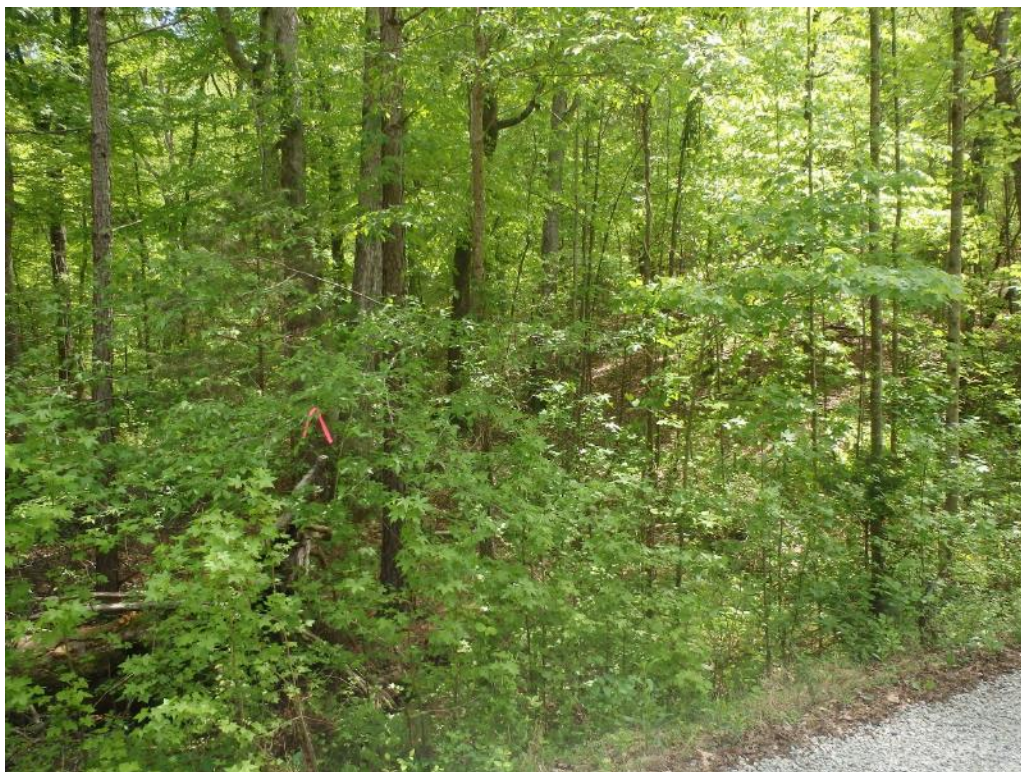


Photo 3. Forest habitat at Route 1, PC-2 (April 23, 2019).



Photo 4. Riparian forest habitat along Broom Branch (April 25, 2019).

2019-2020 Avian Species Survey – VTS-Catoosa
Photographed 2019-2020



Photo 5. Open field habitat near the center of VTS-C (February 25, 2020).



Photo 6. Open field habitat near center of VTS-C (October 5, 2019).

2019-2020 Avian Species Survey – VTS-Catoosa
Photographed 2019-2020



Photo 7. Pine plantation habitat near firing range (October 5, 2019).



Photo 8. Maintained lawn habitat at firing range (October 5, 2019).

2019-2020 Avian Species Survey – VTS-Catoosa
Photographed 2019-2020



Photo 9. Scrub-shrub (regenerating forest) habitat on the southeast slope of Sand Mountain (June 4, 2019).



Photo 10. Tiger Creek flowing through forest habitat (June 5, 2019).

*2019-2020 Avian Species Survey – VTS-Catoosa
Photographed 2019-2020*



Photo 11. Tiger Creek flowing through open field habitat; note eroding banks (April 25, 2019).



Photo 12. Palustrine emergent wetland community within Special Habitat 1 (June 5, 2019).

2019-2020 Avian Species Survey – VTS-Catoosa
Photographed 2019-2020



Photo 13. Beaver lodge within Special Habitat 1 (June 5, 2019).



Photo 14. Palustrine scrub-shrub wetland community within Special Habitat 1 (April 25, 2019).

2019-2020 Avian Species Survey – VTS-Catoosa
Photographed 2019-2020



Photo 15. Wet meadow community within Special Habitat 1 (April 23, 2019).



Photo 16. Tiger Creek flowing through Special Habitat 2, riparian forest (October 6, 2019).

*2019-2020 Avian Species Survey – VTS-Catoosa
Photographed 2019-2020*



Photo 17. Palustrine forested wetland community within Special Habitat 2 (April 26, 2019).



Photo 18. Mixed wetland community within Special Habitat 2 (April 26, 2019).

2019-2020 Avian Species Survey – VTS-Catoosa
Photographed 2019-2020

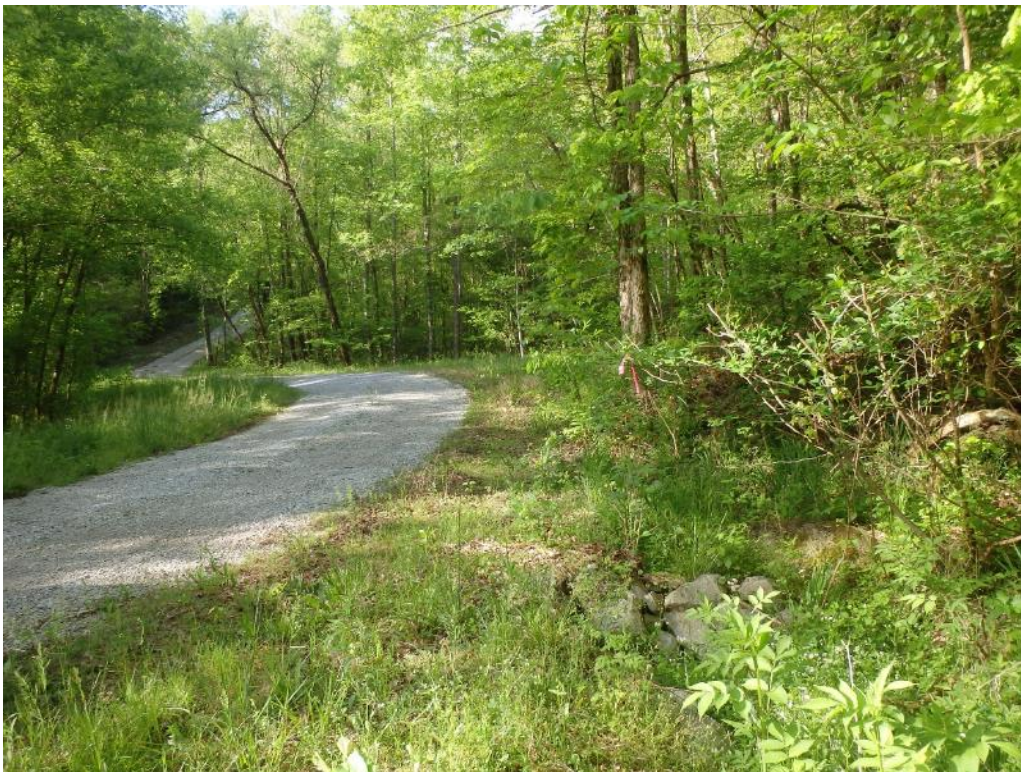


Photo 19. Successional forest community within Special Habitat 3 at Route 1, PC-11 (April 23, 2019).



Photo 20. View from Special Habitat 4, near the fire tower (April 26, 2019).

*2019-2020 Avian Species Survey – VTS-Catoosa
Photographed 2019-2020*



Photo 21. Prairie community within Special Habitat 5 (October 6, 2019).



Photo 22. Open woodland community within Special Habitat 5 at Route 1, PC-7 (April 23, 2019).

*2019-2020 Avian Species Survey – VTS-Catoosa
Photographed 2019-2020*



Photo 23. Open Woodland community within Special Habitat 6 (February 26, 2020).



Photo 24. Open Woodland community within Special Habitat 6 at Transect 4 (April 26, 2019).

*2019-2020 Avian Species Survey – VTS-Catoosa
Photographed 2019-2020*



Photo 25. View from Sand Mountain within Special Habitat 6 (February 26, 2020).



Photo 26. Mourning Dove sitting on a nest, photographed through binoculars (June 4, 2019).

Appendix C

Comprehensive List of Bird Species at VTS-C During the 2019-2020 Surveys

Appendix C: Comprehensive List of Bird Species at VTS-C During the 2019-2020 Surveys

BAND CODE	SPECIES	SCIENTIFIC NAME	FAMILY	BREEDING STATUS	RESIDENT STATUS	STATUS
Anseriformes						
CANG	Canada Goose	<i>Branta canadensis</i>	Anatidae	PB	YR	
WODU	Wood Duck	<i>Aix sponsa</i>	Anatidae	PRB	YR	
MALL	Mallard	<i>Anas platyrhynchos</i>	Anatidae	T	W	
Galliformes						
WITU	Wild Turkey	<i>Meleagris gallopavo</i>	Phasianidae	PRB	YR	
Columbiformes						
MODO	Mourning Dove	<i>Zenaida macroura</i>	Columbidae	CB	YR	
Cuculiformes						
YBCU	Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Cuculidae	CB	S	
Caprimulgiformes						
CWWI	Chuck-will's-widow	<i>Antrostomus carolinensis</i>	Caprimulgidae	PB	S	
EWPW	Eastern Whip-poor-will	<i>Antrostomus vociferus</i>	Caprimulgidae	PRB	S	BCC, historical record
RTHU	Ruby-throated Hummingbird	<i>Archilochus colubris</i>	Trochilidae	PB	S	
Gruiformes						
SACR	Sandhill Crane	<i>Antigone canadensis</i>	Gruidae	T	T	
Charadriiformes						
KILL	Killdeer	<i>Charadrius vociferus</i>	Charadriidae	PB	YR	
AMWO	American Woodcock	<i>Scolopax minor</i>	Scolopacidae	PB	YR	
WISN	Wilson's Snipe	<i>Gallinago delicata</i>	Scolopacidae	T	W	
Suliformes						
DCCO	Double-crested Cormorant	<i>Phalacrocorax auritus</i>	Phalacrocoracidae	T	T	
Pelecaniformes						
GBHE	Great Blue Heron	<i>Ardea herodias</i>	Ardeidae	PB	YR	
GRHE	Green Heron	<i>Butorides virescens</i>	Ardeidae	PB	S	
Cathartiformes						
BLVU	Black Vulture	<i>Coragyps atratus</i>	Cathartidae	PB	YR	
TUVU	Turkey Vulture	<i>Cathartes aura</i>	Cathartidae	PB	YR	
Accipitriformes						
NOHA	Northern Harrier	<i>Circus hudsonius</i>	Accipitridae	T	W	
SSHA	Sharp-shinned Hawk	<i>Accipiter striatus</i>	Accipitridae	PB	YR	
COHA	Cooper's Hawk	<i>Accipiter cooperii</i>	Accipitridae	PB	YR	
RSHA	Red-shouldered Hawk	<i>Buteo lineatus</i>	Accipitridae	PB	YR	
RTHA	Red-tailed Hawk	<i>Buteo jamaicensis</i>	Accipitridae	PB	YR	
Strigiformes						
EASO	Eastern Screech-owl	<i>Megascops asio</i>	Strigidae	PB	YR	
GHOW	Great Horned Owl	<i>Bubo virginianus</i>	Strigidae	PRB	YR	
BADO	Barred Owl	<i>Strix varia</i>	Strigidae	PRB	YR	
Coraciiformes						
BEKI	Belted Kingfisher	<i>Megaceryle alcyon</i>	Alcedinidae	PB	YR	
Piciformes						
YBSA	Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Picidae	T	W	BCC, historical record
RHWO	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Picidae	PB	YR	BCC, historical record
RBWO	Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	Picidae	PRB	YR	
DOWO	Downy Woodpecker	<i>Dryobates pubescens</i>	Picidae	PRB	YR	
HAWO	Hairy Woodpecker	<i>Dryobates villosus</i>	Picidae	PRB	YR	
PIWO	Pileated Woodpecker	<i>Dryocopus pileatus</i>	Picidae	PB	YR	
NOFL	Northern Flicker	<i>Colaptes auratus</i>	Picidae	PB	YR	
Passeriformes						
EAWP	Eastern Wood-Pewee	<i>Contopus virens</i>	Tyrannidae	PB	S	
ACFL	Acadian Flycatcher	<i>Empidonax virescens</i>	Tyrannidae	CB	S	
EAPH	Eastern Phoebe	<i>Sayornis phoebe</i>	Tyrannidae	CB	YR	
GCFL	Great Crested Flycatcher	<i>Myiarchus crinitus</i>	Tyrannidae	PB	S	
EAKI	Eastern Kingbird	<i>Tyrannus tyrannus</i>	Tyrannidae	PRB	S	

Appendix C: Comprehensive List of Bird Species at VTS-C During the 2019-2020 Surveys

BAND CODE	SPECIES	SCIENTIFIC NAME	FAMILY	BREEDING STATUS	RESIDENT STATUS	STATUS
WEVI	White-eyed Vireo	<i>Vireo griseus</i>	Vireonidae	PRB	S	
YTVI	Yellow-throated Vireo	<i>Vireo flavifrons</i>	Vireonidae	CB	S	
BHVI	Blue-headed Vireo	<i>Vireo solitarius</i>	Vireonidae	T	T	
REVI	Red-eyed Vireo	<i>Vireo olivaceus</i>	Vireonidae	CB	S	
BLJA	Blue Jay	<i>Cyanocitta cristata</i>	Corvidae	PRB	YR	
AMCR	American Crow	<i>Corvus brachyrhynchos</i>	Corvidae	PRB	YR	
CACH	Carolina Chickadee	<i>Poecile carolinensis</i>	Paridae	PRB	YR	
TUTI	Tufted Titmouse	<i>Baeolophus bicolor</i>	Paridae	CB	YR	
NRWS	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	Hirundinidae	PB	S	
PUMA	Purple Martin	<i>Progne subis</i>	Hirundinidae	PB	S	
TRES	Tree Swallow	<i>Tachycineta bicolor</i>	Hirundinidae	PB	S	
BANS	Bank Swallow	<i>Riparia riparia</i>	Hirundinidae	T	T	
BARS	Barn Swallow	<i>Hirundo rustica</i>	Hirundinidae	PB	S	
GCKI	Golden-crowned Kinglet	<i>Regulus satrapa</i>	Regulidae	T	W	
RCKI	Ruby-crowned Kinglet	<i>Regulus calendula</i>	Regulidae	T	W	
RBNU	Red-breasted Nuthatch	<i>Sitta canadensis</i>	Sittidae	T	W	
WBNU	White-breasted Nuthatch	<i>Sitta carolinensis</i>	Sittidae	PRB	YR	
BHNU	Brown-headed Nuthatch	<i>Sitta pusilla</i>	Sittidae	PB	YR	
BRCR	Brown Creeper	<i>Certhia americana</i>	Certhiidae	T	W	
BGGN	Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	Polioptilidae	CB	S	
HOWR	House Wren	<i>Troglodytes aedon</i>	Troglodytidae	PRB	S	
WIWR	Winter Wren	<i>Troglodytes hiemalis</i>	Troglodytidae	T	W	
SEWR	Sedge Wren	<i>Cistothorus platensis</i>	Troglodytidae	T	T	BCC, historical record
CARW	Carolina Wren	<i>Thryothorus ludovicianus</i>	Troglodytidae	CB	YR	
EUST	European Starling	<i>Sturnus vulgaris</i>	Sturnidae	CB	YR	
GRCA	Gray Catbird	<i>Dumetella carolinensis</i>	Mimidae	PB	S	
BRTH	Brown Thrasher	<i>Toxostoma rufum</i>	Mimidae	PB	YR	
NOMO	Northern Mockingbird	<i>Mimus polyglottos</i>	Mimidae	PB	YR	
EABL	Eastern Bluebird	<i>Sialia sialis</i>	Turdidae	PB	YR	
SWTH	Swainson's Thrush	<i>Catharus ustulatus</i>	Turdidae	T	T	
HETH	Hermit Thrush	<i>Catharus guttatus</i>	Turdidae	T	W	
WOTH	Wood Thrush	<i>Hylocichla mustelina</i>	Turdidae	PRB	S	BCC, historical record
AMRO	American Robin	<i>Turdus migratorius</i>	Turdidae	PB	YR	
CEDW	Cedar Waxwing	<i>Bombycilla cedrorum</i>	Bombycillidae	PB	YR	
HOSP	House Sparrow	<i>Passer domesticus</i>	Passeridae	PB	YR	
HOFI	House Finch	<i>Haemorrhous mexicanus</i>	Fringillidae	PB	YR	
AMGO	American Goldfinch	<i>Spinus tristis</i>	Fringillidae	PB	YR	
CHSP	Chipping Sparrow	<i>Spizella passerina</i>	Passerellidae	CB	YR	
FISP	Field Sparrow	<i>Spizella pusilla</i>	Passerellidae	PRB	YR	
DEJU	Dark-eyed Junco	<i>Junco hyemalis</i>	Passerellidae	T	W	
WCSP	White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	Passerellidae	T	W	
WTSP	White-throated Sparrow	<i>Zonotrichia albicollis</i>	Passerellidae	T	W	
SAVS	Savannah Sparrow	<i>Passerculus sandwichensis</i>	Passerellidae	T	YR	
SOSP	Song Sparrow	<i>Melospiza melodia</i>	Passerellidae	PB	YR	
SWSP	Swamp Sparrow	<i>Melospiza georgiana</i>	Passerellidae	T	W	
EATO	Eastern Towhee	<i>Pipilo erythrophthalmus</i>	Passerellidae	PRB	YR	
YBCH	Yellow-breasted Chat	<i>Icteria virens</i>	Icteridae	PRB	S	
EAME	Eastern Meadowlark	<i>Sturnella magna</i>	Icteridae	PB	YR	
BAOR	Baltimore Oriole	<i>Icterus galbula</i>	Icteridae	PB	S	
RWBL	Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Icteridae	PRB	YR	
BHCO	Brown-headed Cowbird	<i>Molothrus ater</i>	Icteridae	CB	YR	
COGR	Common Grackle	<i>Quiscalus quiscula</i>	Icteridae	PB	YR	
OVEN	Ovenbird	<i>Seiurus aurocapilla</i>	Parulidae	CB	S	
WEWA	Worm-eating Warbler	<i>Helmitheros vermivorum</i>	Parulidae	PB	S	BCC, historical record

Appendix C: Comprehensive List of Bird Species at VTS-C During the 2019-2020 Surveys

BAND CODE	SPECIES	SCIENTIFIC NAME	FAMILY	BREEDING STATUS	RESIDENT STATUS	STATUS
BWWA	Blue-winged Warbler	<i>Vermivora cyanoptera</i>	Parulidae	T	T	BCC, historical record
BAWW	Black-and-white Warbler	<i>Mniotilta varia</i>	Parulidae	PB	S	
PROW	Prothonotary Warbler	<i>Protonotaria citrea</i>	Parulidae	PB	S	
TEWA	Tennessee Warbler	<i>Leiothlypis peregrina</i>	Parulidae	T	T	
KEWA	Kentucky Warbler	<i>Geothlypis formosa</i>	Parulidae	PRB	S	BCC, historical record
COYE	Common Yellowthroat	<i>Geothlypis trichas</i>	Parulidae	PRB	S	
HOWA	Hooded Warbler	<i>Setophaga citrina</i>	Parulidae	PB	S	
AMRE	American Redstart	<i>Setophaga ruticilla</i>	Parulidae	PB	S	
NOPA	Northern Parula	<i>Setophaga americana</i>	Parulidae	PRB	S	
MAWA	Magnolia Warbler	<i>Setophaga magnolia</i>	Parulidae	T	T	
YWAR	Yellow Warbler	<i>Setophaga petechia</i>	Parulidae	PB	S	
CSWA	Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	Parulidae	T	T	
BLPW	Blackpoll Warbler	<i>Setophaga striata</i>	Parulidae	T	T	
PAWA	Palm Warbler	<i>Setophaga palmarum</i>	Parulidae	T	T	
PIWA	Pine Warbler	<i>Setophaga pinus</i>	Parulidae	CB	YR	
YRWA	Yellow-rumped Warbler	<i>Setophaga coronata</i>	Parulidae	T	W	
YTWA	Yellow-throated Warbler	<i>Setophaga dominica</i>	Parulidae	PB	S	
PRAW	Prairie Warbler	<i>Setophaga discolor</i>	Parulidae	PRB	S	BCC
BTNW	Black-throated Green Warbler	<i>Setophaga virens</i>	Parulidae	PB	S	
SUTA	Summer Tanager	<i>Piranga rubra</i>	Cardinalidae	PRB	S	
SCTA	Scarlet Tanager	<i>Piranga olivacea</i>	Cardinalidae	CB	S	
NOCA	Northern Cardinal	<i>Cardinalis cardinalis</i>	Cardinalidae	CB	YR	
RBGR	Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	Cardinalidae	T	T	
BLGR	Blue Grosbeak	<i>Passerina caerulea</i>	Cardinalidae	PB	S	
INBU	Indigo Bunting	<i>Passerina cyanea</i>	Cardinalidae	CB	S	

PB = Possible Breeding
 PRB = Probable Breeding
 CB = Confirmed Breeding
 T = Transient
 V = Visitor

YR = Year round. Species present throughout the year, but population may fluctuate with seasonal migration.
 S = Summer. Species present during the summer. During migration, arrives in spring and departs in fall.
 Typically breeds in the area, usually refers to neotropical migrants.
 W = Winter. Species present during the winter, typically arriving in the fall and migrates further north to breed.
 T = Transient. Species that pass through the area, typically during spring and/or fall migration.

Appendix D

Summary of Point Count Survey Results

Appendix D: Summary of Point Count Survey Results

BAND CODE	SPECIES	SURVEY	BREEDING STATUS	NO. SPRING	NO. SUMMER	NO. FALL	NO. WINTER	STATUS
ACFL	Acadian Flycatcher	PC	CB	1	15	3	0	
AMCR	American Crow	PC	PRB	32	50	64	88	
AMGO	American Goldfinch	PC	PB	7	7	6	11	
AMRO	American Robin	PC	PB	6	1	30	5	
AMWO	American Woodcock	PC	PB	0	0	1	0	
BADO	Barred Owl	PC/NOC	PRB	6	7	0	2	
BAOR	Baltimore Oriole	PC	PB	2	0	0	0	
BARS	Barn Swallow	PC	PB	0	3	0	0	
BAWW	Black-and-white Warbler	PC	PB	1	1	0	0	
BEKI	Belted Kingfisher	PC	PB	0	0	0	3	
BGGN	Blue-gray Gnatcatcher	PC	CB	47	57	0	0	
BHCO	Brown-headed Cowbird	PC	CB	23	23	2	0	
BHNU	Brown-headed Nuthatch	PC	PB	0	0	0	1	
BLJA	Blue Jay	PC	PRB	41	19	64	25	
BLPW	Blackpoll Warbler	PC	T	3	0	0	0	
BLVU	Black Vulture	PC	PB	0	0	0	2	
BRTH	Brown Thrasher	PC	PB	2	0	9	1	
BTNW	Black-throated Green Warbler	PC	PB	3	0	1	0	
CACH	Carolina Chickadee	PC	PRB	29	42	39	48	
CANG	Canada Goose	PC	PB	6	0	1	2	
CARW	Carolina Wren	PC	CB	22	26	42	38	
CEDW	Cedar Waxwing	PC	PB	0	1	1	0	
CHSP	Chipping Sparrow	PC	CB	5	9	3	0	
COGR	Common Grackle	PC	PB	0	1	0	2	
COHA	Cooper's Hawk	PC	PB	1	0	0	0	
COYE	Common Yellowthroat	PC	PRB	6	3	0	0	
CSWA	Chestnut-sided Warbler	PC	T	2	0	1	0	
CWWI	Chuck-will's-widow	NOC	PB	0	1	0	0	
DCCO	Double-crested Cormorant	PC	T	25	0	0	0	
DEJU	Dark-eyed Junco	PC	T	0	0	0	2	
DOWO	Downy Woodpecker	PC	PRB	13	23	23	24	
EABL	Eastern Bluebird	PC	PB	10	2	17	15	

Appendix D: Summary of Point Count Survey Results

BAND CODE	SPECIES	SURVEY	BREEDING STATUS	NO. SPRING	NO. SUMMER	NO. FALL	NO. WINTER	STATUS
EAKI	Eastern Kingbird	PC	PRB	0	2	0	0	
EAME	Eastern Meadowlark	PC	PB	1	6	1	5	
EAPH	Eastern Phoebe	PC	CB	4	3	7	7	
EASO	Eastern Screech-owl	NOC	PB	0	1	0	1	
EATO	Eastern Towhee	PC	PRB	3	7	5	7	
EAWP	Eastern Wood-Pewee	PC	PB	0	2	6	0	
EUST	European Starling	PC	CB	3	0	0	0	
EWPW	Eastern Whip-poor-will	PC/NOC	PRB	3	4	1	0	BCC, historical record
FISP	Field Sparrow	PC	PRB	13	5	0	1	
GBHE	Great Blue Heron	PC	PB	1	4	1	3	
GCFL	Great Crested Flycatcher	PC	PB	6	7	0	0	
GHOW	Great Horned Owl	PC/NOC	PRB	2	1	0	2	
GRCA	Gray Catbird	PC	PB	0	0	3	0	
HAWO	Hairy Woodpecker	PC	PRB	0	0	0	1	
HOWA	Hooded Warbler	PC	PB	1	0	0	0	
INBU	Indigo Bunting	PC	CB	6	24	0	0	
KEWA	Kentucky Warbler	PC	PRB	18	11	0	0	BCC, historical record
KILL	Killdeer	PC	PB	0	0	2	0	
LOWA	Louisiana Waterthrush	PC	PRB	1	0	0	0	BCC, historical record
MAWA	Magnolia Warbler	PC	T	0	0	6	0	
MODO	Mourning Dove	PC	CB	7	24	1	2	
NOCA	Northern Cardinal	PC	CB	39	43	18	31	
NOFL	Northern Flicker	PC	PB	4	2	15	13	
NOMO	Northern Mockingbird	PC	PB	2	0	0	0	
NOPA	Northern Parula	PC	PRB	4	5	0	0	
NRWS	Northern Rough-winged Swallow	PC	PB	0	4	0	0	
OVEN	Ovenbird	PC	CB	4	2	1	0	
PAWA	Palm Warbler	PC	T	4	0	1	0	
PIWA	Pine Warbler	PC	CB	8	11	4	39	
PIWO	Pileated Woodpecker	PC	PB	7	6	7	4	
PRAW	Prairie Warbler	PC	PRB	7	5	0	0	BCC
PROW	Prothonotary Warbler	PC	PB	0	1	0	0	

Appendix D: Summary of Point Count Survey Results

BAND CODE	SPECIES	SURVEY	BREEDING STATUS	NO. SPRING	NO. SUMMER	NO. FALL	NO. WINTER	STATUS
RBGR	Rose-breasted Grosbeak	PC	T	2	0	3	0	
RBWO	Red-bellied Woodpecker	PC	PRB	30	24	37	14	
RCKI	Ruby-crowned Kinglet	PC	T	0	0	0	1	
REVI	Red-eyed Vireo	PC	CB	51	39	0	0	
RHWO	Red-headed Woodpecker	PC	PB	0	2	0	0	BCC, historical record
RSHA	Red-shouldered Hawk	PC	PB	2	4	4	2	
RTHA	Red-tailed Hawk	PC	PB	1	1	2	2	
RTHU	Ruby-throated Hummingbird	PC	PB	0	1	0	0	
RWBL	Red-winged Blackbird	PC	PRB	7	6	0	1	
SACR	Sandhill Crane	PC	T	0	0	0	15	
SCTA	Scarlet Tanager	PC	CB	20	17	2	0	
SOSP	Song Sparrow	PC	PB	0	0	0	4	
SSHA	Sharp-shinned Hawk	PC	PB	0	0	0	1	
SUTA	Summer Tanager	PC	PRB	8	17	3	0	
SWSP	Swamp Sparrow	PC	T	4	0	0	0	
TUTI	Tufted Titmouse	PC	CB	60	64	37	40	
TUVU	Turkey Vulture	PC	PB	0	1	2	9	
*UAHA	Unidentified Accipiter Hawk	PC		0	0	1	0	
*UNBI	Unidentified Bird	PC		11	18	70	23	
*UNDU	Unidentified Duck	PC		4	0	0	0	
*UNFL	Unidentified Flycatcher	PC		0	0	1	0	
*UNHA	Unidentified Hawk	PC		0	0	1	0	
*UNSP	Unidentified Sparrow	PC		0	1	2	2	
*UNVU	Unidentified Vulture	PC		0	1	0	0	
*UNWA	Unidentified Warbler	PC		3	0	0	0	
*UNWO	Unidentified Woodpecker	PC		14	16	10	1	
WBNU	White-breasted Nuthatch	PC	PRB	12	14	13	11	
WEVI	White-eyed Vireo	PC	PRB	8	9	0	0	
WEWA	Worm-eating Warbler	PC	PB	1	2	0	0	BCC, historical record
WITU	Wild Turkey	PC	PRB	5	0	3	0	
WIWR	Winter Wren	PC	T	0	0	0	1	
WODU	Wood Duck	PC	PRB	0	0	0	4	

Appendix D: Summary of Point Count Survey Results

BAND CODE	SPECIES	SURVEY	BREEDING STATUS	NO. SPRING	NO. SUMMER	NO. FALL	NO. WINTER	STATUS
WOTH	Wood Thrush	PC	PRB	17	7	12	0	BCC, historical record
WTSP	White-throated Sparrow	PC	T	2	0	0	1	
YBCH	Yellow-breasted Chat	PC	PRB	0	5	0	0	
YBCU	Yellow-billed Cuckoo	PC	CB	1	26	0	0	
YBSA	Yellow-bellied Sapsucker	PC	T	0	0	0	6	BCC, historical record
YRWA	Yellow-rumped Warbler	PC	T	0	0	3	18	
YTVI	Yellow-throated Vireo	PC	CB	6	12	1	0	
YTWA	Yellow-throated Warbler	PC	PB	1	0	0	0	

*RED text indicates numbers that are likely inflated due to high detectability at large distances

Appendix E

Review of Potential Rare, Threatened, or Endangered Species



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Georgia Ecological Services Field Office
355 East Hancock Avenue
Room 320
Athens, GA 30601
Phone: (706) 613-9493 Fax: (706) 613-6059



In Reply Refer To:

October 08, 2018

Consultation Code: 04EG1000-2019-SLI-0036

Event Code: 04EG1000-2019-E-00068

Project Name: Catoosa VTS - Avian Surveys

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

This list identifies threatened, endangered, proposed and candidate species, as well as critical habitat, that may be affected by your proposed project. This list may change before your project is completed. Under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this list should be verified after 90 days. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation.

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*). Projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html).

Wind energy projects should follow the wind energy guidelines <http://www.fws.gov/windenergy/> for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts of communication towers on migratory birds can be found under the "Bird Hazards" tab at: www.fws.gov/migratorybirds.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Georgia Ecological Services Field Office

355 East Hancock Avenue

Room 320

Athens, GA 30601

(706) 613-9493

Project Summary

Consultation Code: 04EG1000-2019-SLI-0036

Event Code: 04EG1000-2019-E-00068

Project Name: Catoosa VTS - Avian Surveys

Project Type: LAND - MANAGEMENT PLANS

Project Description: 2018-2019 Avian Surveys to update records and management plans.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/34.92517057576235N85.05872044603223W>



Counties: Catoosa, GA

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Bat <i>Myotis grisescens</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat <i>Myotis sodalis</i> There is final critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Flowering Plants

NAME	STATUS
Large-flowered Skullcap <i>Scutellaria montana</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4721	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

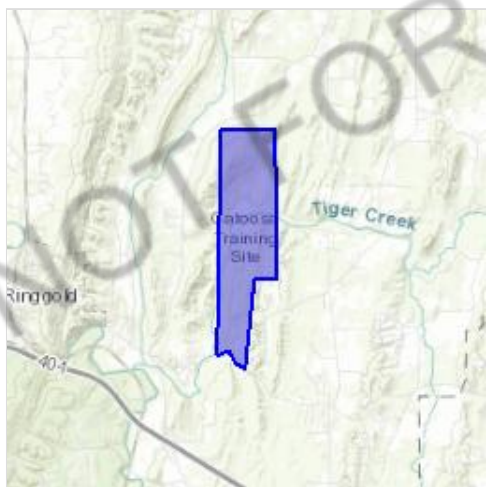
Project information

NAME

Catoosa VTS - Avian Surveys

LOCATION

Catoosa County, Georgia



DESCRIPTION

2018-2019 Avian Surveys to update records and management plans.

Local office

Georgia Ecological Services Field Office

☎ (706) 613-9493

📠 (706) 613-6059

355 East Hancock Avenue
Room 320
Athens, GA 30601

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information.
2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME

STATUS

Gray Bat <i>Myotis grisescens</i>	Endangered
No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6329	
Indiana Bat <i>Myotis sodalis</i>	Endangered
There is final critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/5949	
Northern Long-eared Bat <i>Myotis septentrionalis</i>	Threatened
No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	

Flowering Plants

NAME	STATUS
Large-flowered Skullcap <i>Scutellaria montana</i>	Threatened
No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4721	

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>

- Measures for avoiding and minimizing impacts to birds
<http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds
<http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

BREEDING SEASON (IF A
BREEDING SEASON IS INDICATED
FOR A BIRD ON YOUR LIST, THE
BIRD MAY BREED IN YOUR
PROJECT AREA SOMETIME WITHIN
THE TIMEFRAME SPECIFIED,
WHICH IS A VERY LIBERAL
ESTIMATE OF THE DATES INSIDE
WHICH THE BIRD BREEDS ACROSS
ITS ENTIRE RANGE. "BREEDS
ELSEWHERE" INDICATES THAT THE
BIRD DOES NOT LIKELY BREED IN
YOUR PROJECT AREA.)

Bobolink *Dolichonyx oryzivorus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 20 to Jul 31

Canada Warbler *Cardellina canadensis*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 20 to Aug 10

Cerulean Warbler *Dendroica cerulea*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/2974>

Breeds Apr 27 to Jul 20

Eastern Whip-poor-will *Antrastomus vociferus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 1 to Aug 20

Golden-winged Warbler *Vermivora chrysoptera*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/8745>

Breeds May 1 to Jul 20

Kentucky Warbler *Oporornis formosus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds Apr 20 to Aug 20

Prairie Warbler *Dendroica discolor*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 1 to Jul 31

Red-headed Woodpecker *Melanerpes erythrocephalus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 10 to Sep 10

Rusty Blackbird *Euphagus carolinus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds elsewhere

Wood Thrush *Hylocichla mustelina*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 10 to Aug 31

Yellow-bellied Sapsucker *sphyrapicus varius*

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

<https://ecos.fws.gov/ecp/species/8792>

Breeds May 10 to Jul 15

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used

to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

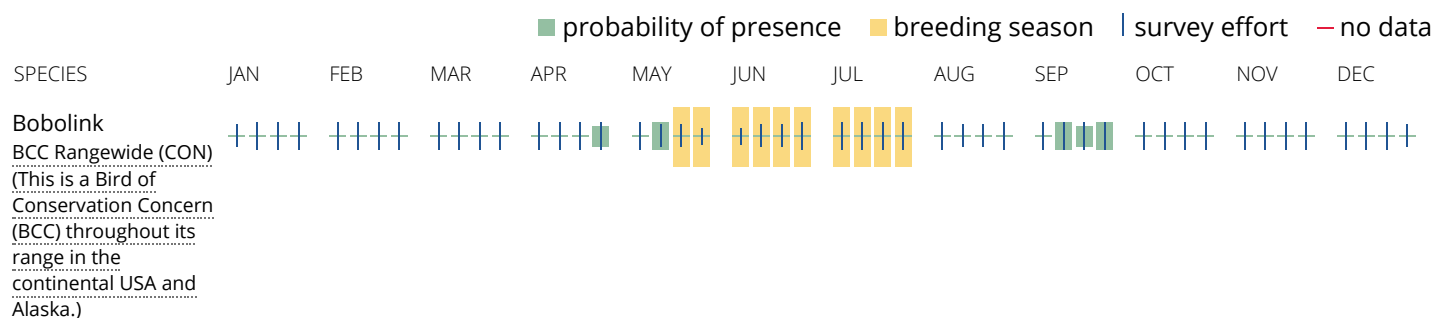
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (—)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.







Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) and/or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [E-bird Explore Data Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal

bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the [NWI map](#) to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Table 26 BCR 28 (Appalachian Mountains) *BCC 2008* list.²⁸

Bald Eagle (b)
Peregrine Falcon (b)
Upland Sandpiper
Northern Saw-whet Owl (S. Appalachian breeding pop.)
Whip-poor-will
Red-headed Woodpecker
Yellow-bellied Sapsucker (S. Appalachian breeding pop.)
Olive-sided Flycatcher
Loggerhead Shrike
Black-capped Chickadee (S. Appalachian pop.)
Bewick's Wren (*bewickii* ssp.)
Sedge Wren (nb)
Wood Thrush
Blue-winged Warbler
Golden-winged Warbler
Prairie Warbler
Cerulean Warbler
Worm-eating Warbler
Swainson's Warbler
Louisiana Waterthrush
Kentucky Warbler
Canada Warbler
Henslow's Sparrow
Rusty Blackbird (nb)
Red Crossbill (S. Appalachian pop.)

28 (a) ESA candidate, (b) ESA delisted, (c) non-listed subspecies or population of Threatened or Endangered species, (d) MBTA protection uncertain or lacking, (nb) non-breeding in this BCR