

Bird Inventory of the Blue Ridge Parkway 2003-2004
Report to the Appalachian Highlands Inventory and Monitoring Program

Scott M. Pearson and Alan B. Smith

Dept. of Natural Sciences, Mars Hill College

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INTRODUCTION

Information on the status and trends of natural resources is necessary for effective conservation and management of national parks. Birds represent a diverse taxon that includes habitat specialists and generalists and can provide information on the abundance and variety of habitats in a managed land unit. The southern Appalachian Mountains have a particularly diverse bird fauna and the Blue Ridge Parkway includes a sample of many natural ecosystem types in this region (Simpson 1992). The ecosystems of this mountainous landscape have not remained static (Wear and Bolstad 1998, Turner et al. 2003), and landscape change likewise affects bird populations (Pearson et al. 1999, Haney et al. 2001, Rodewald and Abrams 2002). A systematic inventory of the diversity and abundance of birds in this park provides an up-to-date assessment of avian populations that will serve as a baseline of comparison for future changes in this park and could inform management decisions (e.g., Klaus et al. 2005, Twedt et al. 2006).

This document reports on the results of an inventory of breeding and winter birds of the Blue Ridge Parkway conducted in the period of May 2003 – February 2005 by the authors. The purpose of this inventory was to document bird species found in this park during these two seasons as part of the National Park Service Inventory and Monitoring program. Breeding season surveys were conducted using a point count method at many locations also used for separate inventories of vascular plants and other vertebrate taxa. The winter surveys were designed to record as many wintering species as possible by visiting selected habitat types of the park in day-long efforts. This report provides a brief summary of the resulting data which are provided in an electronic database along with the original hard-copy field datasheets.

METHODS

Breeding birds were censused using point count methodology (Ralph et al. 1993). Point counts were centered on established vegetation inventory plots within the park. Additional point

count locations were added by the authors to target particular bird habitats or to increase the representation of certain habitat types within a park district. Each point count was 10 min in duration, and the first detection of each species was noted as occurring within 0-3 min, 3-5 min, or 5-10 min segments of the count period. Estimated distance from the observer to the detected bird was recorded as being 0-25 m, 25-50 m, 50-100 m or >100 m. Detections of territorial, singing males as opposed to non-singing individuals detected by call or sight were noted. Species observed flying over (i.e., “flyovers”) the point location or detected immediately before or after the formal 10-min count were recorded separately. Counts at each location were conducted twice per year during 2003 and 2004 between the dates of May 10 – June 30; consecutive counts at a point were at least two weeks apart. While most plots were censused during both years, some plots were censused during only one year in order to increase the sample size of locations within the time and logistical constraints of the breeding season (Appendix 1). Counts were conducted in acceptable weather (no precipitation and light or no wind) between dawn and 10:15 am. Data were recorded in the field on datasheets provided by National Park Service Inventory and Monitoring program (Appendix 4). If the point count was not co-located with a vegetation plot, a habitat inventory sheet was completed for that location and included with the hard copy datasheets.

The data analysis was conducted separately for the four districts of the Blue Ridge Parkway: Ridge (mileposts MP 0-104), Plateau (MP 104-217), Highland (MP 217-305), and Pisgah (MP 305-469) Districts. The goals of this analysis were to document the similarities and differences in the bird abundances and diversity among these districts. Species abundances at individual census points were calculated by taking the maximum number of individuals for a given species recorded within 100 m of the census point in a given breeding season. Total detections for each species were calculated by summing the species abundances, as defined above, over all census points. The metric of total detections is intended as a rough indicator of the relative abundance of each species in the park district. Records from flyovers or detections before or after the 10-min count were not included in this analysis. Species abundances were used to identify the 10 most common species in each district and species that were unique to a single district.

Wintering birds were surveyed using transect sampling and timed area searches in the primary habitats of the park. Twenty-four person-days of effort over the two winters were devoted to these surveys. These inventories focused on woodland, grassland, shrub, and wetland habitats. Certain areas having a mixture of these habitats received special emphasis. These areas, listed from north to south, included: Otter Creek/James River, Peaks of Otter, Roanoke, Rocky Knob, Doughton

Park, Moses Cone Park, Julian Price Park, Asheville Basin, and Oconoluftee. These areas were chosen because they include large amounts of open, shrub, or wetland habitats or were found at low elevations where wintering birds were more abundant. Day-long inventories were conducted early- and mid-winter in each of the 2003-04 and 2004-05 winter seasons. Transects were oriented along trails, park roadways, across open habitats such as pastures or through woodlands between 8:00 am and 4:30 pm when birds were most active on cold days. Inventories were conducted on days with no precipitation and light to no wind. The beginning and ending time and location coordinates were recorded on the datasheet (Appendix 5) and using a Garmin 12 global positioning system (GPS). While the detection distances varied with the density of vegetation along a given transect, detection probabilities of active individuals were typically high within 30 m of the observer in open habitats, 20 m in woodlands, and 10-15 m in shrubby habitats. Care was taken not to double count an individual on multiple transects. Each area of the park was surveyed only once during a single day-long inventory.

Habitats encountered along each winter transect were recorded on the winter datasheet. Habitat characteristics included the percent coverage of canopy deciduous forest, coniferous forest, sapling trees, heath shrubs, blackberry shrubs. The primary purpose of these categories was to provide information on the amount and type of vegetation and vertical complexity of the habitat structure. In open habitats, we recorded the percent coverage of grasses that were <20 cm, 20-50 cm, 50-100 cm, and >100 cm tall. The coverage of fescue (*Festuca* spp.), as opposed to other grass species, was also estimated.

RESULTS and DISCUSSION

The breeding season inventory detected over 8100 individuals of 121 species at 239 locations (Figure 1) during the breeding season point counts (Tables 1-3, Appendix 1), and 3383 individuals of 60 species during the winter surveys (Table 4). There were only minor differences in breeding bird diversity among the four districts (Table 5), but there were notable differences in the species composition of those bird assemblages that might be explained by differences in elevation and landscape setting.

Between 75 and 85 breeding species were recorded in each park district (Table 1). Species that prefer forest and forest-edge habitats were the most common species in the park. There was a great deal of overlap in the list of the most common species in each district (Table 2). While their

ranks changed among districts, four species, Red-eyed Vireo, Eastern Towhee, Hooded Warbler, and Tufted Titmouse, ranked among the top ten most common species in all of the districts. The Pisgah District had more species characteristic of high elevation habitats than the other districts (Tables 1-3). The Ridge and Pisgah districts, which include river valleys as well as high mountains, had the greatest species richness (Table 1). These districts also had the greatest number of species that were unique to those respective districts (Table 3). In contrast, the Plateau district had the smallest range of elevations and the lowest species richness. The Plateau and Highland districts had the greatest amount of non-forest habitats and supported the highest numbers of open country birds such as Grasshopper Sparrow, Killdeer, and Blue Grosbeak. The surrounding landscapes of these districts contain more agricultural and developed lands as compared to the Ridge and Pisgah districts.

The winter season inventories were conducted over 24 person-days (Table 4, Figure 2). The most common wintering species were American Crow, Dark-eyed Junco, Song Sparrow, White-throated Sparrow, European Starling, Carolina Chickadee, Golden-crowned Kinglet, Tufted Titmouse, and Northern Cardinal (Table 4). Crows and starlings were observed in large flocks in the Plateau and Highland districts. Carolina Wrens and American Robins were notably more abundant in the two southern districts. We did not observe obvious differences in the set of wintering species found in the most northern Ridge district as compared to the southern districts.

Local habitat diversity had a strong influence on wintering species observed in this park. The greatest species diversity was found in areas consisting of a mosaic of woodland, edge, shrub, grassland, and wetland habitats. Waterfowl, including grebes and ducks, were observed on the large water bodies found at James River and Otter Lake, Peaks of Otter (Abbott Lake), Cone and Price Parks (Price Lake, Bass Lake, Trout Lake, and Sims Pond), and French Broad River. The greatest densities of wintering birds were found in edge and shrub habitats in areas such as James River, Moses Cone Park, and the French Broad River valley. These assemblages usually included sparrows, thrushes, flycatchers, corvids as well as woodland species at forest edges. Species diversity in heavily forested areas was usually limited to parids, woodpeckers, kinglets, and juncos.

The diversity and abundance of wintering birds was strongly related to elevation. We observed few birds at elevations above 4000 ft in mid-winter beyond juncos and resident woodland species. Surveys of high-elevation open areas such as Rocky Knob and Doughton Park revealed relatively few birds. Moreover, high elevation grassy areas, such as the mown fields at Doughton Park and the Moses Cone Park, harbored few if any birds. In most cases, the high elevation habitats along the Blue Ridge Parkway are located a short distance away from more temperate and

productive habitats located in adjacent valleys. Therefore, one would not expect individual birds to endure the harsh winter conditions at higher elevations when milder locations exist nearby unless there is a strong fitness benefit (e.g., maintaining a territory) for remaining up high. Likewise, elevation was correlated with the distribution of breeding birds.

The effect of elevation on climatic gradients and plant communities in the southern mountains is well known. The Blue Ridge Parkway traverses elevations of below 1000 ft to nearly 7000 ft above sea level creating a range of climatic conditions that supports plant communities representative of a latitudinal gradient from the mid-Atlantic States to New England and Canada. Likewise, these vegetative communities support a diverse assemblage of breeding bird species that segregate with respect to elevation (Figure 3). While most species occur over a range of elevations, it is possible to classify some species as low, middle, or high elevation specialists. Elevation affects local species composition as well as local diversity. Survey plots at mid-elevations (i.e., 2500-3500 ft) had the highest species richness (Figure 4). Species diversity at higher elevations was reduced by the loss of low elevation specialists. Habitat diversity is also reduced at the highest elevations. At elevations above 4500 ft, the principal habitat types include northern hardwoods, boreal coniferous forests, and heath shrubs. The landscape at lower elevations is a mosaic of mesic hardwoods, conifers, xeric oak-pine forests and early successional habitats. Therefore, avian diversity reflects habitat diversity.

The Blue Ridge Parkway provides a transect that crosses nearly 3 degrees of latitude (35.3 to 38.0 degree North). A given climatic zone is expected to occur at lower elevations at more northern latitudes. Therefore, the range of elevations occupied by a given bird species may decrease with increasing latitude. This trend is evident in the distributions of the most widespread and common species recorded on the breeding bird counts (Figure 5). While the most southern Pisgah District holds the highest elevations along the parkway, this trend is also apparent in the lowest range of elevations occupied by each species (see low point of I-bars in Figure 5 cf. elevations listed in Table 5).

Finally, there were biogeographic trends among breeding birds that were not easily explained by elevation or latitudinal gradients or by habitat composition. Several species including American Redstart, Cerulean Warbler, and Black-billed Cuckoo were more abundant in the most northern Ridge District than in other regions (Table 1), despite the presence of similar habitats and similar elevations in the other districts. Potential causes of these trends include the influence of geology and

ecosystem productivity (e.g., Wood et al. 2006), broader landscape context of habitats, and the influence of continent-wide trends in abundance.

Important Bird Areas along the Blue Ridge Parkway and Management Recommendations

This text provides some impressions by the authors based on field experience gained during the data collection about some of the most significant areas of avian diversity in this park. The information is organized by district from north to south. The majority of park lands are covered with eastern deciduous forest and the bird species characteristic of this biome are common in all park districts (Tables 1-2). The discussion below will focus on habitats and species that are relatively uncommon but make a significant contribution to the avian diversity of this park.

In the Ridge District, the James River and surrounding areas have the lowest elevations in the park and harbor bird species associated with the riparian corridor in both breeding and wintering seasons. Habitats at James River are uncommon for Parkway lands. There is high avian diversity at the river due to the combination of riparian and upland forests, open water, open fields, forest edge, and the bridge structure. Notable birds include: a Cliff Swallow colony, waterbirds in all seasons, Great Blue Heron, Green Heron, Canada Goose, Northern Oriole, Orchard Oriole, Warbling Vireo, Yellow-throated Vireo, and Yellow-throated Warbler. Summer Tanager and Prothonotary Warbler were not recorded but may occur there occasionally. Management recommendations include maintaining open areas, edges, and shallow water habitats.

Apple Orchard Mountain (Mileposts 70-83) had an unusually high diversity of neotropical migrant species during the breeding season. This area has the highest elevations for this district characterized by northern hardwood and high-elevation red oak forests. American Redstarts and Cerulean Warblers were common along with a unique mix of other species that occur at middle to high elevations. These species include Blackburnian Warbler, Black-throated Blue Warbler, Canada Warbler, Black-billed Cuckoo, and Rose-breasted Grosbeak. Veery and Wood Thrush were sympatric there.

The nearby Peaks of Otter area also had a high diversity of breeding and wintering birds. Cerulean Warblers were especially abundant in north-facing coves and slopes. American Woodcock were observed conducting courtship flights in the open field north of Abbott Lake. Common Ravens were recorded year-round. During winter, there was a large number of wintering sparrows and thrushes in the overgrown fields and wet meadows south of Abbot Lake and in streamside shrubs. Management concerns would be maintaining some of the open habitats with an

alternate year mowing cycle to provide food and cover for wintering birds. Deer browse is particularly heavy in these forests and is likely affecting habitat suitability for shrub and ground-nesting birds.

The Plateau District includes open habitat on park property that is surrounded by agricultural lands. This type of landscape is largely absent from the other three districts. Therefore, this district supports the highest number of open-country birds. Notable areas include Smart View and Rocky Knob. Both locations include steep forest coves near the Blue Ridge Escarpment. These coves supported Cerulean Warbler in summer and Red-headed Woodpecker in winter. Breeding Swainson's Warbler was detected in two rhododendron flats in this district. Rocky Knob has fields dominated by non-fescue grasses. Notable grassland species include Grasshopper Sparrow and Vesper Sparrow. Surveys for Golden-winged Warbler were conducted in 2004, but none were found. Management recommendations for these open habitats include less-frequent mowing of small openings, mowing later in the breeding season to allow grassland birds to complete their breeding cycle, reduction of cattle grazing pressure in managed fields, active encouragement of brushy edges and brushy incursions into the openings, and conversion of fescue fields to native grasses. The effects of deer on forest habitat structure should be evaluated.

Fisher Peak and Blue Ridge Music Center also contain open areas including large wet, boggy meadows. These meadows may support several wetland species not detected there: Willow Flycatcher and Virginia Rail, etc. However, these wetlands are being invaded by red maple (*Acer rubrum*) and alder (*Alnus* spp.). Unless managed, these open wetlands will convert to woody vegetation less suitable for these species. Upland openings supported Killdeer and other grassland species. The mosaic of forests, upland grasslands, and wetlands around the Music Center creates high habitat diversity, and therefore, high avian diversity. Other marshes and bogs are found at Milepost (MP)150, MP 159-160, Rakes Millpond (MP 162), near MP 245 near Doughton Park, Boone Fork, Cold Prong (and others in the Highlands District). These locations have similar potential to support wetland birds and face similar threats of habitat degradation. These wetlands and their surrounding landscapes need to be managed to maintain non-woody vegetation (e.g., sedge and rushes) and the hydrology that supports it.

In the Highlands District, important bird areas include Doughton Park (MP 238-246), Cone and Price Parks (MP 292-300), and Grandfather Mountain (MP 303-305). Doughton Park, Moses Cone Park and Price Park have habitats that can support grassland birds. Grasshopper Sparrow, Horned Lark, Vesper Sparrow, and a number of raptors were recorded at Doughton Park. Bobolinks

have been encountered at Bamboo Gap near Blowing Rock, NC (R. Cherry and C. Smalling personal communication); however, our attempts to document this species on park property in 2004 were unsuccessful. Price and Cone Parks also hold important shrub habitats, ponds and shrub/sedge wetlands. Notable species in these areas include: Alder Flycatcher, Virginia Rail, Tree Swallow, Wood Duck, and Mallard. Moses Cone Park had the largest population of breeding Yellow-bellied Sapsuckers detected along the Blue Ridge Parkway as well as Red Crossbills in both breeding and wintering seasons. These parks are important because they hold a variety of habitats including forest, old orchards, open fields, old hemlock stands, bogs and marshes, and beaver ponds. Management initiatives for birds should focus on maintaining the variety and quality of these habitats. The mown fields around the Cone Memorial supported very few birds during the winter largely because the grass was too short. An altered mowing schedule that would allow seed production and longer grass for cover could enhance this habitat for wintering birds and small mammals. Grandfather Mountain provides the best boreal forest and hemlock forest habitats in this district. Notable species from this location include Veery, Pine Siskin, Red-breasted Nuthatch, and Winter Wren. Hermit Thrush and Magnolia Warbler are likely breeders in this area.

The Pisgah District is the largest along the Parkway and includes high mountains and two river valleys. Areas of high bird diversity in this district include Chestoa View – Gillespie Gap (MP 320-331), Crabtree Meadows, Green Knob-Balsam Gap (MP 350-360), Bull Gap area (MP 372-378), Soco Gap (MP 454-458), and Heintooga/Balsam Mountain Spur Road. These locations have a high diversity of deciduous forest birds including warblers, thrushes, and finches. Bull Gap in the Craggy Mountains is notable for its population of Cerulean Warblers which are rare in the two southern districts.

The Black Mountains and Balsam Mountains support birds of the boreal and northern hardwood forests mentioned above. In the Black Mountains, boreal and northern hardwood forests are found approximately from MP 350-370 with the section from Black Mountain Gap to Balsam Gap (MP 355-360) holding the most spruce and fir. Balsam Gap in the Black Mountains (MP 359-360) is on the ecotone of the northern hardwoods and boreal forest. It is a good area for Hermit Thrush, Pine Siskin, Red Crossbill, Winter Wren, Brown Creeper, and Saw-whet Owl. Magnolia Warbler and Alder Flycatcher have been observed on other public lands in this vicinity and may invade park property if tree mortality creates more openings. Saw-whet Owls were recorded in both Black and Balsam mountain ranges, and an irruption of Red Crossbills was documented in 2004. High elevations in the Craggy Mountains (MP 362-370) had a collection of birds representative of

northern hardwood forests, high elevation heath balds, and open habitats. These species included Veery, Black-throated Blue Warbler, Blackburnian Warbler, Canada Warbler, Chestnut-sided Warbler, Golden-crowned Kinglet, Blue-headed Vireo, Hairy Woodpecker, Dark-eyed Junco, Winter Wren, Common Raven, Eastern Towhee, and Gray Catbird. Yellow-bellied Sapsuckers have been recorded in the Craggy Mountains (S. Pearson, unpublished data) but were not detected on our surveys.

The Balsam Mountains also provide a large section of boreal forest along the parkway (approx. MP 415-440). Chickadees singing the Black-capped Chickadee song were recorded between Graveyard Fields and Devils Courthouse. These individuals are noted as Black-capped Chickadees (BCCH) in the database. Alder Flycatcher was recorded at Richland Balsam in boreal forest openings, and Least Flycatcher was recorded in the high elevation red oak forests. Peregrine Falcons were recorded at Devils Courthouse. The Waterrock Knob area had birds characteristic of boreal forest (e.g., Black-capped Chickadee and Winter Wren), successional forest, and heath balds in the vicinity of the parking lot and trails.

The French Broad and Oconaluftee River valleys provide low elevation (2000-2500 ft) habitats. Carolina Wren, Red-eyed Vireo, Blue-gray Gnatcatcher, Carolina Chickadee, Black-and-white Warbler, Wood Thrush, and Acadian Flycatcher were common breeding birds in these valleys. The French Broad River is flanked by degraded riparian forest that supports species such as Orchard Oriole, Great Crested Flycatcher, Indigo Bunting, Yellow-billed Cuckoo, and Yellow-throated Warbler. The open water of the river corridor provided habitat for Canada Goose, Wood Duck, Mallard, and Eastern Kingbird during the breeding season. The Oconaluftee River (MP 469) supported similar forest birds but no waterbirds because this stream is much smaller. Suburban development is encroaching on park habitats in the French Broad Valley near Asheville, NC. Breeding species that may be favorably influenced by these changes in the surrounding landscape include Northern Cardinal, Song Sparrow, Blue Jay, and parids that tolerate suburban development or even benefit from the presence of feeders. House Finch was a common bird in the Asheville area but surprisingly was not recorded on our breeding season counts; it was recorded in winter (Table 4). Notable breeding birds in the French Broad Valley were Red-shouldered Hawk nesting near MP 385, Yellow-throated Warblers throughout, and Whip-poor-will around MP 404. The French Broad Valley had more wintering birds than almost any other area of the park in North Carolina likely due to its mild climate (compared to higher elevations) and variety of habitats. Areas with the highest diversity and abundance of wintering species had a mixture of forest, edge, shrub, and open habitats,

such as near the Swannanoa River (MP 382-383). Stands of fruiting shrubs, such as the exotic privet (*Ligustrum sinense*), were heavily used by wintering birds.

Our general management recommendations include maintaining the health of forest and wetland ecosystems and altering the management of open grassland habitats. Grassland habitats could be enhanced for birds by converting from fescue to native grasses; softening the forest edge to create a shrubby transition between forest and grassland; allowing some shrub incursion into upland fields; and adjusting mowing regimes to avoid mowing during the breeding season, allowing grasses to produce seed, and providing tall grass for winter cover. The Blue Ridge Parkway is covered largely by forest ecosystems occupied by forest bird species. Therefore, the overall health, structure, and function of these forests will have greatest impact on parkwide bird abundance and diversity. Natural (or semi-natural) dynamics of forest disturbance and recovery at the landscape level should be recognized as essential to the overall health of the system, and these dynamics provide habitat diversity which supports avian diversity. At present, the greatest threats to forest health are exotic pests (e.g., the wooly adelgids affecting hemlock and firs), environmental pollutants (e.g., tropospheric ozone and acid deposition), and invasive plants [e.g., oriental bittersweet (*Celastrus orbiculatus*) and garlic mustard (*Alliaria petiolata*)]. Any changes in forest structure as a consequence of these threats will likewise affect bird populations. The boreal forest deserves attention because of its relative rarity, the fact that NPS manages a significant fraction of the habitat in this region, and its unique complement of bird species.

Finally, the geographic layout of the Blue Ridge Parkway, as a linear park traversing many different landscapes in the region, means that ecological dynamics on park lands function within the context of broader landscapes often under private ownership and control. The Pisgah District of the park crosses an extensively forested landscape mostly protected by public ownership, but the other districts are more vulnerable to change on adjacent lands. Evidence from the Breeding Bird Survey database suggests that the population dynamics of “area-sensitive” bird species are affected by regional trends in forest cover and fragmentation (Boulinier et al. 2001). This relationship also means that park officials must manage the Parkway as a “protected island” within a regional and local context. Data on the status and trends of bird populations can serve as an indicator of this landscape-level influence on park ecosystems.

Documenting Avian Diversity

The stated goal of these park-wide inventory efforts was to document at least 90% of the species present in a given park. How does one determine whether this goal has been met for species that remain undocumented? Peterson (1980) and Sibley (2003) list 126 species whose breeding ranges overlap the geographic area of the park (This list does not include Hermit Thrush). Our inventory efforts documented 118 or 94% of these species (Blackpoll Warbler and Swainson's Thrush were not included because they were probable migrants and not resident breeders). Breeding species that were not recorded but could potentially breed in the park, based on the field guides, include Spotted Sandpiper, Cooper's Hawk, Black Vulture, Red-headed Woodpecker, Prairie Warbler, Golden-winged Warbler, Summer Tanager, House Sparrow, and House Finch. If the first three species were present but unrecorded, their rarity likely explains why they were not documented in this effort. Prairie Warbler, House Sparrow, and House Finch require habitats (e.g., low elevation shrublands and buildings) that are largely absent from this park. Nevertheless, our efforts did detect many rare and uncommon breeding species in this park. For example, 18 species were recorded at two or fewer locations including Baltimore Oriole, Alder Flycatcher, Warbling Vireo, Swainson's Warbler, American Woodcock, Horned Lark, and Hermit Thrush (Table 1). This analysis suggests that our data documented at least 90% of the species that have a plausible possibility of breeding in this national park.

Database Description

The data are provided in a MS Access (2003) database which holds the results from the breeding season point counts and winter bird surveys. In addition to the information provided below, see comments provided in the field descriptions visible in Access' table Design View. Original hard copy datasheets containing bird survey and vegetation data were provided along with the digital database and a copy of this report.

The breeding bird data are recorded in two tables: **BLRI_GPS** lists the coordinates for the point counts. The "point" field in this table creates a relational database link to "point" in **BLRI_Point_Cnts** to indicate the location of a given count. **BLRI_Point_Cnts** contains the species recorded during each point count and their abundances. Moreover, these data indicate the distance category (i.e., 0-25 m, 25-50 m, 50-100 m, & >100 m) and time period (1-3 min, 3-5 min, 5-10 min) in which individuals were first detected as well as the count time and date. There is one record for each species for each point count. The fields are labeled 0a, 0b, 0c, 25a, 25b, 25c, 50a, 50b, 50c,

100a, 100b, and 100c. The number represents the distance from the observer: “0” indicates $0 \text{ m} < \text{distance} \leq 25 \text{ m}$, “25” indicates $25 \text{ m} < \text{distance} \leq 50 \text{ m}$, “50” indicates $50 \text{ m} < \text{distance} \leq 100 \text{ m}$, and “100” indicates $\text{distance} > 100 \text{ m}$. The letter indicates time: “a” = first detected within 0-3 min from start of 10-min period. A “b” indicates 3-5 min, and “c” indicates 5-10 min. The *Call* field, if checked ‘yes’, indicates that species was not engaged in territorial song and was detected visually or by call notes. The *Flyovers* field lists the number of individuals detected flying over the point and not on the ground or vegetation during the count. The *Bef/Aft* lists individuals detected prior to or after but not during the 10-min count period. The table **BLRI_Weather** holds date, time and weather information for selected point counts. It is linked to the other tables via “point” and “date” fields. In **BLRI_Point_Cnts**, bird species are denoted using standard four-letter codes specified by the US Fish and Wildlife Bird Banding Lab. The table **CodesBBL** lists these codes and species common names; the scientific names for each species are in the table **Codes_sciname**. These four-letter codes are likewise used for the winter data.

Results of the winter surveys are contained in three tables: **BLRI_Wint_plots** provides information on individual surveys. Each record in this table represents a single survey. Each record contains a unique *Plot_ID*, date, beginning and ending time, beginning and ending GPS waypoints, weather conditions, habitat information, and verbal description of areas surveyed within the park. The *Plot_ID* field links records in the three tables. **BLRI_Wint_GPS** contains the geographic coordinates for locations at the beginning, end, and at intermediate locations along the survey route. These coordinates were obtained in the field using a GARMIN 12 global positioning system (GPS), a recreational grade GPS receiver typically accurate within $\pm 20 \text{ m}$. **BLRI_Wint_birds** lists the bird species and their abundances recorded for each survey. The *Flyovers* field, if checked ‘yes’, indicates that these individuals were detected flying over the point and not on the ground or in vegetation during the count.

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Table 1. Number of point counts in which a given species was recorded in each district of the Blue Ridge Parkway during breeding season point counts. First number is number of counts where species was recorded at least once within 100 m of observer. Numbers in parentheses indicate the number of points in which species was present but recorded only as flyovers, >100 m from point, or before or after the standard 10-min count period. Species are listed in taxonomic order based on AOU (2006).

Common Name ¹	Species ¹	BBL code ^{2,3}	District			
			Ridge	Plateau	Highland	Pisgah
Mallard	<i>Anas platyrhynchos</i>	mall	(1)			2
Wood Duck	<i>Aix sponsa</i>	wodu			2 (1)	1
Canada Goose	<i>Branta canadensis</i>	cago	1 (3)			1 (1)
Green Heron	<i>Butorides virescens</i>	grhe	1 (1)	(1)		
Virginia Rail	<i>Rallus limicola</i>	vira			(1)	
American Woodcock	<i>Scolopax minor</i>	amwo	1			
Killdeer	<i>Charadrius vociferus</i>	kill		2 (1)		
Northern Bobwhite	<i>Colinus virginianus</i>	nobo		(2)	(1)	(1)
Ruffed Grouse	<i>Bonasa umbellus</i>	rugr	(2)	1		3
Wild Turkey	<i>Meleagris gallopavo</i>	witu	1 (2)	2 (8)	(4)	2 (3)
Rock Pigeon	<i>Columba livia</i>	rodo	(1)			
Mourning Dove	<i>Zenaida macroura</i>	modo	7 (3)	5 (9)	1 (2)	8 (3)
Turkey Vulture	<i>Cathartes aura</i>	tuvu	(2)	(1)	(5)	(3)
Sharp-shinned Hawk	<i>Accipiter striatus</i>	ssha	(1)		(1)	
Red-tailed Hawk	<i>Buteo jamaicensis</i>	rtha	(1)	1 (1)	(1)	(2)
Red-shouldered Hawk	<i>Buteo lineatus</i>	rsha	(1)			2
Broad-winged Hawk	<i>Buteo platypterus</i>	bwha	2 (3)	1 (2)	(2)	1 (5)
Peregrine Falcon	<i>Falco peregrinus</i>	pefa				(2)
American Kestrel	<i>Falco sparverius</i>	amke			(1)	
Barred Owl	<i>Strix varia</i>	bdow	1 (1)		(1)	1 (1)
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	nswo				(3)
Eastern Screech-Owl	<i>Megascops asio</i>	easo	1	1	1	
Great Horned Owl	<i>Bubo virginianus</i>	ghow		1		1
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	ybcu	6	5 (4)		1 (1)
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	bbcu	4 (3)			
Belted Kingfisher	<i>Ceryle alcyon</i>	beki	(2)		(1)	(1)

Common Name ¹	Species ¹	BBL code ^{2,3}	District			
			Ridge	Plateau	Highland	Pisgah
Hairy Woodpecker	<i>Picoides villosus</i>	hawo	3	1	2 (3)	7 (2)
Downy Woodpecker	<i>Picoides pubescens</i>	dowo	7 (6)	8 (6)	6	4 (4)
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	ybsa			2 (1)	(1)
Pileated Woodpecker	<i>Dryocopus pileatus</i>	piwo	6 (12)	7 (12)	(9)	12 (14)
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	rbwo	5 (1)	7 (9)		4 (1)
Northern Flicker	<i>Colaptes auratus</i>	ysfl	1 (3)	1 (3)	5 (5)	2 (2)
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>	cwwi	(1)	(1)		(1)
Whip-poor-will	<i>Caprimulgus vociferus</i>	wpwi	3 (3)			(1)
Chimney Swift	<i>Chaetura pelagica</i>	chsw	(4)	(4)	(7)	(13)
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	rthu	1 (1)	3 (5)	5 (1)	3 (2)
Eastern Kingbird	<i>Tyrannus tyrannus</i>	eaki	1 (1)	(1)		1 (2)
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	gcfl	13 (6)	6 (4)	4 (2)	1 (3)
Eastern Phoebe	<i>Sayornis phoebe</i>	eaph	4 (3)	5 (6)	3 (3)	3 (3)
Eastern Wood-Pewee	<i>Contopus virens</i>	eawp	18 (14)	10 (12)	4 (10)	3 (6)
Acadian Flycatcher	<i>Empidonax virens</i>	acfl	14 (7)	19 (4)	7 (4)	8 (2)
Willow Flycatcher	<i>Empidonax traillii</i>	wifl		4 (2)	2 (1)	1
Alder Flycatcher	<i>Empidonax alnorum</i>	alfl			1	1
Least Flycatcher	<i>Empidonax minimus</i>	lefl	1			3
Horned Lark	<i>Eremophila alpestris</i>	hola		1		
Blue Jay	<i>Cyanocitta cristata</i>	blja	14 (8)	14 (5)	10 (7)	18 (10)
Common Raven	<i>Corvus corax</i>	cora	(11)	1 (1)	(6)	1 (15)
American Crow	<i>Corvus brachyrhynchos</i>	amcr	7 (14)	7 (30)	1 (27)	8 (34)
European Starling	<i>Sturnus vulgaris</i>	eust	1 (1)	(3)	2 (1)	1
Brown-headed Cowbird	<i>Molothrus ater</i>	bhco	4 (5)	4 (8)	1 (1)	1 (3)
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	rwbl	1 (2)	4 (8)	4 (2)	1 (1)
Eastern Meadowlark	<i>Sturnella magna</i>	eame		3 (6)	2 (4)	
Orchard Oriole	<i>Icterus spurius</i>	oror	1 (1)		1	1 (1)
Baltimore Oriole	<i>Icterus galbula</i>	baor	1 (1)			

Common Name ¹	Species ¹	BBL code ^{2,3}	District			
			Ridge	Plateau	Highland	Pisgah
Common Grackle	<i>Quiscalus quiscula</i>	cogr	2 (4)	1 (7)	3 (1)	(1)
Red Crossbill	<i>Loxia curvirostra</i>	recr			(1)	(4)
American Goldfinch	<i>Carduelis tristis</i>	amgo	2 (8)	2 (12)	3 (8)	2 (10)
Pine Siskin	<i>Carduelis pinus</i>	pisi			(1)	2 (3)
Vesper Sparrow	<i>Pooecetes gramineus</i>	vesp		1	1	
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	grsp		4	3 (1)	
Chipping Sparrow	<i>Spizella passerina</i>	chsp	7 (1)	7 (2)	7 (2)	3 (2)
Field Sparrow	<i>Spizella pusilla</i>	fisp	3	7 (3)	2 (3)	1
Dark-eyed Junco	<i>Junco hyemalis</i>	scju	7 (4)	1	18 (8)	44 (9)
Song Sparrow	<i>Melospiza melodia</i>	sosp	3	12 (7)	7 (2)	8 (5)
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	eato	24 (13)	14 (14)	15 (16)	48 (15)
Northern Cardinal	<i>Cardinalis cardinalis</i>	noca	10 (1)	12 (8)	6 (1)	16 (4)
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	rbgr	5 (3)	1	1 (2)	11 (11)
Blue Grosbeak	<i>Passerina caerulea</i>	blgr		1 (2)		
Indigo Bunting	<i>Passerina cyanea</i>	inbu	15 (21)	15 (15)	13 (18)	19 (15)
Scarlet Tanager	<i>Piranga olivacea</i>	scta	22 (18)	18 (19)	11 (15)	18 (14)
Purple Martin	<i>Progne subis</i>	puma		(2)		(1)
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	clsw	(1)			
Barn Swallow	<i>Hirundo rustica</i>	bars	1 (4)	(5)	1 (8)	1 (2)
Tree Swallow	<i>Tachycineta bicolor</i>	tres	(2)	(1)	1 (2)	
Northern Rough- winged Swallow	<i>Stelgidopteryx serripennis</i>	nrws		1 (1)		(1)
Cedar Waxwing	<i>Bombycilla cedrorum</i>	cedw	1 (1)	(4)	(1)	1 (2)
Red-eyed Vireo	<i>Vireo olivaceus</i>	revi	47 (14)	35 (11)	19 (21)	40 (7)
Warbling Vireo	<i>Vireo gilvus</i>	wavi	1 (1)			
Yellow-throated Vireo	<i>Vireo flavifrons</i>	ytvi	6 (4)	2 (2)	(2)	(2)
Blue-headed Vireo	<i>Vireo solitarius</i>	bhvi	11 (1)	13 (4)	16 (7)	41 (16)
White-eyed Vireo	<i>Vireo griseus</i>	wevi		(2)	2	(2)
Black-and-White Warbler	<i>Mniotilta varia</i>	baww	25 (6)	16 (4)	6 (6)	21 (7)
Swainson's Warbler	<i>Limnothlypis</i>	swwa		2		

Common Name ¹	Species ¹	BBL code ^{2,3}	District			
			Ridge	Plateau	Highland	Pisgah
	<i>swainsonii</i>					
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	wewa	9 (6)	4 (1)	2 (1)	6 (2)
Northern Parula	<i>Parula americana</i>	nopa	4 (1)	7 (2)	7 (2)	10 (5)
Yellow Warbler	<i>Dendroica petechia</i>	ywar	2 (1)	4 (1)	1	(1)
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	btbw	6 (2)	10	12 (8)	31 (8)
Cerulean Warbler	<i>Dendroica cerulea</i>	cerw	6 (13)	(4)	(8)	1 (4)
Chestnut-sided Warbler	<i>Dendroica pennsylvanica</i>	cswa	12 (7)	1 (2)	10 (9)	28 (9)
Blackpoll Warbler	<i>Dendroica striata</i>	blpw	1			
Blackburnian Warbler	<i>Dendroica fusca</i>	blbw	7	1	3	8
Yellow-throated Warbler	<i>Dendroica dominica</i>	ytwa	2 (1)			3 (2)
Black-throated Green Warbler	<i>Dendroica virens</i>	btnw	5 (4)	8 (2)	16 (7)	34 (9)
Pine Warbler	<i>Dendroica pinus</i>	piwa	3 (2)	5 (2)	4 (7)	2 (1)
Ovenbird	<i>Seiurus aurocapilla</i>	oven	37 (16)	28 (18)	14 (20)	23 (14)
Louisiana Waterthrush	<i>Seiurus motacilla</i>	lowa	6 (7)	4 (1)	3 (3)	
Kentucky Warbler	<i>Oporornis formosus</i>	kewa	1 (2)	3 (1)		1
Common Yellowthroat	<i>Geothlypis trichas</i>	coye	3	8 (1)	5 (2)	4 (4)
Yellow-breasted Chat	<i>Icteria virens</i>	ybch		1 (2)	2 (1)	
Hooded Warbler	<i>Wilsonia citrina</i>	howa	17 (11)	25 (4)	12 (9)	25 (5)
Canada Warbler	<i>Wilsonia canadensis</i>	cawa	4 (2)	1	8 (5)	22 (5)
American Redstart	<i>Setophaga ruticilla</i>	amre	28 (5)	8 (1)	3 (2)	3 (3)
Northern Mockingbird	<i>Mimus polyglottos</i>	nomo	(1)	(1)		
Gray Catbird	<i>Dumetella carolinensis</i>	grca	9 (4)	7 (1)	8 (3)	16 (2)
Brown Thrasher	<i>Toxostoma rufum</i>	brth	4 (1)	5 (3)	4 (4)	(1)
Carolina Wren	<i>Thryothorus ludovicianus</i>	carw	6 (2)	6 (11)	3 (3)	18 (5)
House Wren	<i>Troglodytes aedon</i>	howr	3 (1)	(2)	1 (1)	(1)
Winter Wren	<i>Troglodytes troglodytes</i>	wiwr			(3)	11 (11)
Brown Creeper	<i>Certhia americana</i>	brcr			5 (4)	12 (4)
White-breasted Nuthatch	<i>Sitta carolinensis</i>	wbnu	6 (2)	12 (3)	4 (4)	11 (5)

Common Name ¹	Species ¹	BBL code ^{2,3}	District			
			Ridge	Plateau	Highland	Pisgah
Red-breasted Nuthatch	<i>Sitta canadensis</i>	rbnu		1	8 (3)	11 (7)
Tufted Titmouse	<i>Baeolophus bicolor</i>	etti	22 (7)	23 (14)	21 (10)	31 (4)
Black-capped Chickadee	<i>Poecile atricapillus</i>	bcch				7 (1)
Carolina Chickadee	<i>Poecile carolinensis</i>	cach	14	11 (5)	12 (3)	19 (2)
Golden-crowned Kinglet	<i>Regulus satrapa</i>	gcki			3	16 (1)
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	bggn	10	8 (3)	4 (1)	9 (2)
Wood Thrush	<i>Hylocichla mustelina</i>	woth	28 (8)	26 (10)	7 (6)	7 (6)
Veery	<i>Catharus fuscescens</i>	veer	11 (2)		10 (6)	33 (9)
Swainson's Thrush	<i>Catharus ustulatus</i>	swth	1			
Hermit Thrush	<i>Catharus guttatus</i>	heth				(1)
American Robin	<i>Turdus migratorius</i>	amro	11 (3)	5 (5)	2 (6)	17 (12)
Eastern Bluebird	<i>Sialia sialis</i>	eabl	3 (1)	4 (5)	3 (5)	3
Species Richness			80	75	80	85

¹Common and scientific names based on AOU (2006).

²Four-letter abbreviations for species provided by the USGS Patuxent Wildlife Research Center, Bird Banding Lab (Gustafson et al. 1997).

³Note: There remain some inconsistencies in taxonomy between BBL-Gustafson et al. (1997) and AOU (2006) often due to BBL's attempt to distinguish between eastern and western populations of continent-wide species. For example: Yellow-shafted Flicker (BBL) = Northern Flicker (AOU), Eastern Tufted Titmouse (BBL) = Tufted Titmouse (AOU), and Myrtle Warbler (BBL) = Yellow-rumped Warbler (AOU).

Table 2. Most common breeding species in each district ranked from most common to least common based on number of points where recorded.

Rank	District			
	Ridge	Plateau	Highland	Pisgah
1	Red-eyed Vireo	Red-eyed Vireo	Tufted Titmouse	Dark_eyed Junco
2	Ovenbird	Ovenbird	Red-eyed Vireo	Eastern Towhee
3	American Redstart	Hooded Warbler	Dark_eyed Junco	Red-eyed Vireo
4	Wood Thrush	Wood Thrush	Eastern Towhee	Blue-headed Vireo
5	Eastern Towhee	Tufted Titmouse	Blue-headed Vireo	Veery
6	Black-and-white Warbler	Indigo Bunting	Black-throated Green Warbler	Black-throated Green Warbler
7	Tufted Titmouse	Acadian Flycatcher	Hooded Warbler	Chestnut-sided Warbler
8	Scarlet Tanager	Scarlet Tanager	Indigo Bunting	Black-throated Blue Warbler
9	Eastern Wood-Pee wee	Black-and-white Warbler	Ovenbird	Tufted Titmouse
10	Hooded Warbler	Eastern Towhee	Black-throated Blue Warbler	Hooded Warbler

Table 3. Breeding species unique to a single district.

Ridge	Plateau	Highland	Pisgah
American Woodcock	Horned Lark	Virginia Rail	Black-capped Chickadee
Northern Oriole	Killdeer	Tree Swallow	Mallard
Black-billed Cuckoo	Red-tailed Hawk	White-eyed Vireo	Red-shouldered Hawk
Swainson's Thrush	Swainson's Warbler		Winter Wren
Warbling Vireo			Saw-whet Owl

Table 4. Abundances of wintering species summed over all surveys in a park district. Listed in taxonomic order.

Common Name¹	Species¹	BBL code²	Winter Abundance			
			Ridge	Plateau	Highland	Pisgah
Pied-billed Grebe	<i>Podilymbus podiceps</i>	pbgr	2		1	
Mallard	<i>Anas platyrhynchos</i>	mall	8		6	1
Ring-necked Duck	<i>Aythya collaris</i>	rndu			1	
Canada Goose	<i>Branta canadensis</i>	cago	11		2	2
Great Blue Heron	<i>Ardea herodias</i>	gbhe	1		1	
Ruffed Grouse	<i>Bonasa umbellus</i>	rugr			1	
Wild Turkey	<i>Meleagris gallopavo</i>	witu		41		
Mourning Dove	<i>Zenaida macroura</i>	modo		6		6
Turkey Vulture	<i>Cathartes aura</i>	tuvu	12	4	8	4
Black Vulture	<i>Coragyps atratus</i>	blvu	2			
Cooper's Hawk	<i>Accipiter cooperii</i>	coha		2		1
Red-tailed Hawk	<i>Buteo jamaicensis</i>	rtha		3	1	
Red-shouldered Hawk	<i>Buteo lineatus</i>	rsha			1	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	baea	1			
American Kestrel	<i>Falco sparverius</i>	amke		1		
Eastern Screech-Owl	<i>Megascops asio</i>	easo		1		
Belted Kingfisher	<i>Ceryle alcyon</i>	beki	1		2	
Hairy Woodpecker	<i>Picoides villosus</i>	hawo	7	1	6	5
Downy Woodpecker	<i>Picoides pubescens</i>	dowo	10		6	15
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	ybsa	8	3	1	3
Pileated Woodpecker	<i>Dryocopus pileatus</i>	piwo	7	1	1	8
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	rbwo	5	6		8
Northern Flicker	<i>Colaptes auratus</i>	ysfl	2	1		
Eastern Phoebe	<i>Sayornis phoebe</i>	eaph	4	38	1	4
Blue Jay	<i>Cyanocitta cristata</i>	blja		15	1	4
Common Raven	<i>Corvus corax</i>	cora	8	8	6	

Common Name ¹	Species ¹	BBL code ²	Winter Abundance			
			Ridge	Plateau	Highland	Pisgah
American Crow	<i>Corvus brachyrhynchos</i>	amcr	21	384	306	44
European Starling	<i>Sturnus vulgaris</i>	eust	2	145	19	24
Eastern Meadowlark	<i>Sturnella magna</i>	eame		3		
Purple Finch	<i>Carpodacus purpureus</i>	pufi	5	1		
House Finch	<i>Carpodacus mexicanus</i>	hofi		5		14
Red Crossbill	<i>Loxia curvirostra</i>	recr			19	
American Goldfinch	<i>Carduelis tristis</i>	amgo	2	13	7	8
Pine Siskin	<i>Carduelis pinus</i>	pisi			4	1
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	wesp		2		
White-throated Sparrow	<i>Zonotrichia albicollis</i>	wtsp	25	64	17	90
Field Sparrow	<i>Spizella pusilla</i>	fisp	4	6		
Dark-eyed Junco	<i>Junco hyemalis</i>	scju	178	63	305	47
Song Sparrow	<i>Melospiza melodia</i>	sosp	87	61	120	49
Swamp Sparrow	<i>Melospiza georgiana</i>	swsp		8	12	
Fox Sparrow	<i>Passerella iliaca</i>	fosp			5	
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	eato		15	1	11
Northern Cardinal	<i>Cardinalis cardinalis</i>	noca	45	15	4	32
Cedar Waxwing	<i>Bombycilla cedrorum</i>	cedw		10		
Yellow-throated Warbler	<i>Dendroica dominica</i>	mywa	1	2		6
Northern Mockingbird	<i>Mimus polyglottos</i>	nomo	1	5		6
Brown Thrasher	<i>Toxostoma rufum</i>	brth				4
Carolina Wren	<i>Thryothorus ludovicianus</i>	carw	18	7	2	42
Winter Wren	<i>Troglodytes troglodytes</i>	wiwr	6	1	1	10
Brown Creeper	<i>Certhia americana</i>	brcr	4	1	4	4
White-breasted Nuthatch	<i>Sitta carolinensis</i>	wbnu	15	4	13	25
Red-breasted Nuthatch	<i>Sitta canadensis</i>	rbnu	1		13	
Tufted Titmouse	<i>Baeolophus bicolor</i>	etti	22	20	18	55
Black-capped Chickadee	<i>Poecile atricapillus</i>	bcch				6
Carolina Chickadee	<i>Poecile carolinensis</i>	cach	36	13	48	79
Golden-crowned Kinglet	<i>Regulus satrapa</i>	gcki	58	4	35	36
Ruby-crowned Kinglet	<i>Regulus calendula</i>	rcki	4	3	1	4
Hermit Thrush	<i>Catharus guttatus</i>	heth	2	2		2
American Robin	<i>Turdus migratorius</i>	amro		3	13	45
Eastern Bluebird	<i>Sialia sialis</i>	eabl	12	8	3	25
Species Richness			38	43	40	37
Sampling effort (person days)			4	5	11	4

¹Common and scientific names based on AOU (2006).

²Four-letter abbreviations for species provided by the USGS Patuxent Wildlife Research Center, Bird Banding Lab (Gustafson et al. 1997).

Table 5. Breeding bird diversity and range of elevations by district.

District	Elevation (ft)			Species Richness	Shannon Diversity
	Mean	Minimum	Maximum		
Ridge	2195	698	3786	80	3.867
Plateau	2385	907	3224	75	3.862
Highland	3155	1556	4737	80	3.911
Pisgah	3941	2057	6086	85	3.801

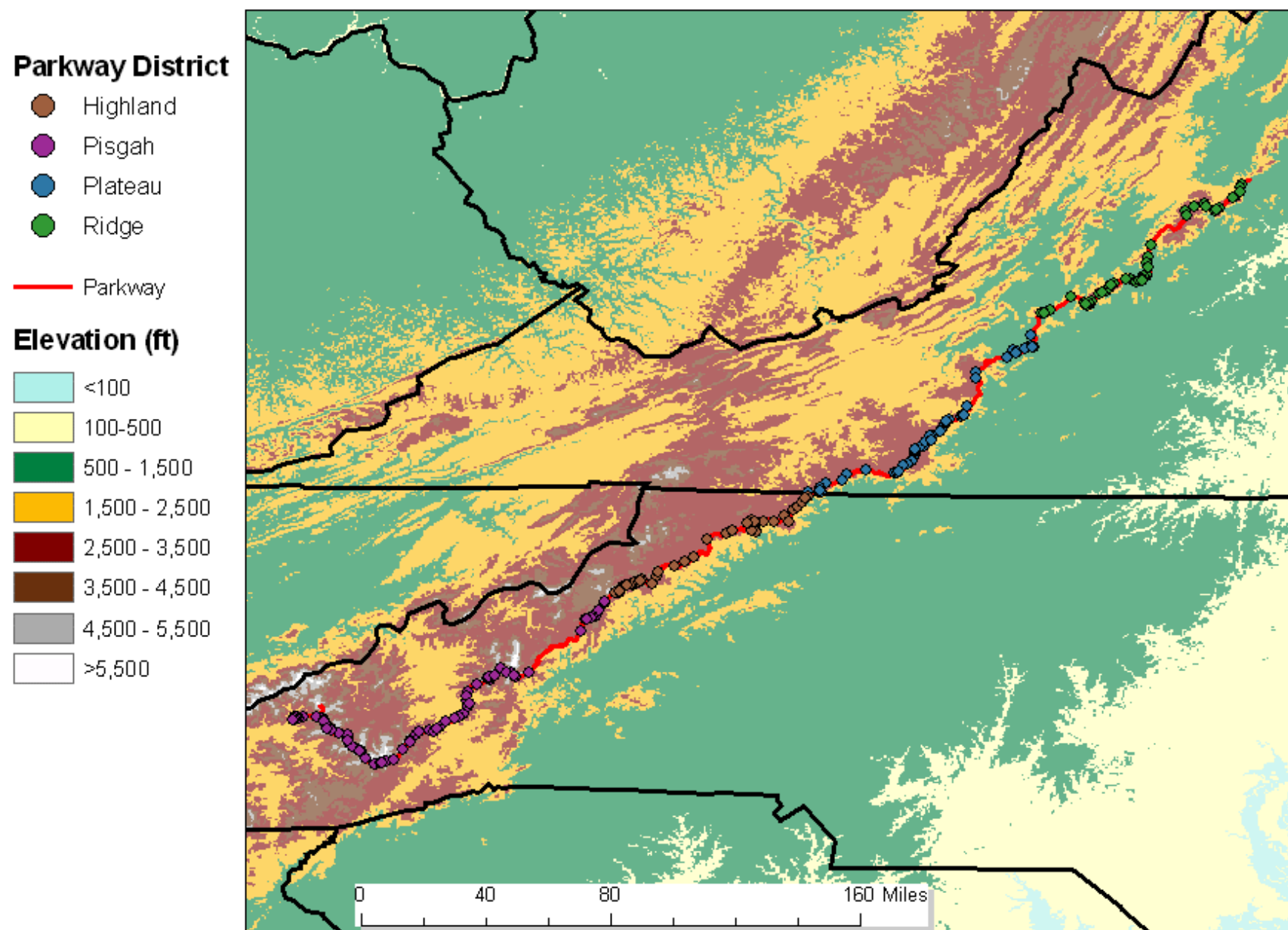


Figure 1. Location of breeding season point counts along Blue Ridge Parkway, NC and VA.

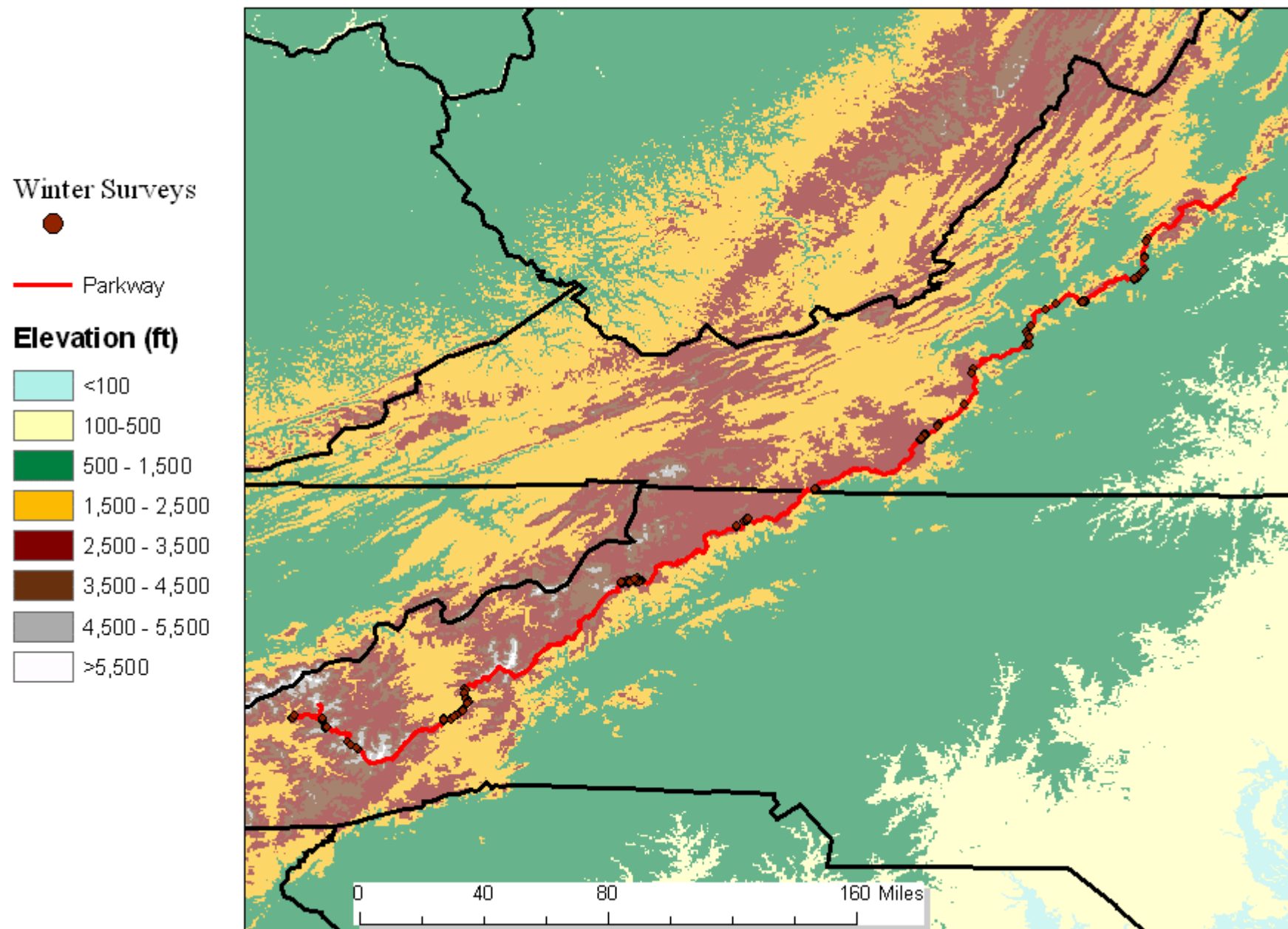


Figure 2. Location of winter season surveys along Blue Ridge Parkway, NC and VA.

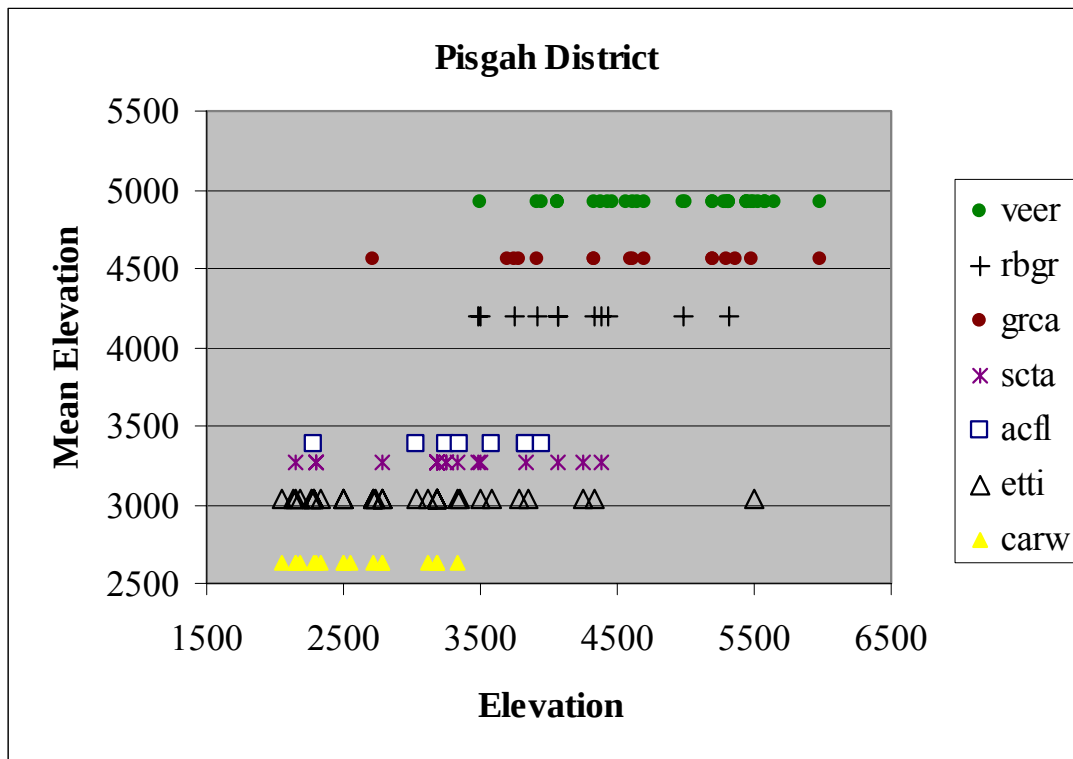


Figure 3. Segregation of selected breeding species by elevation (feet) on the Pisgah District of the Blue Ridge Parkway. Each marker represents the elevation of a single location (X axis) where the species was recorded. Y-axis is mean elevation in which a species was recorded. See Appendix 6 for definitions of four-letter codes used to denote these species.

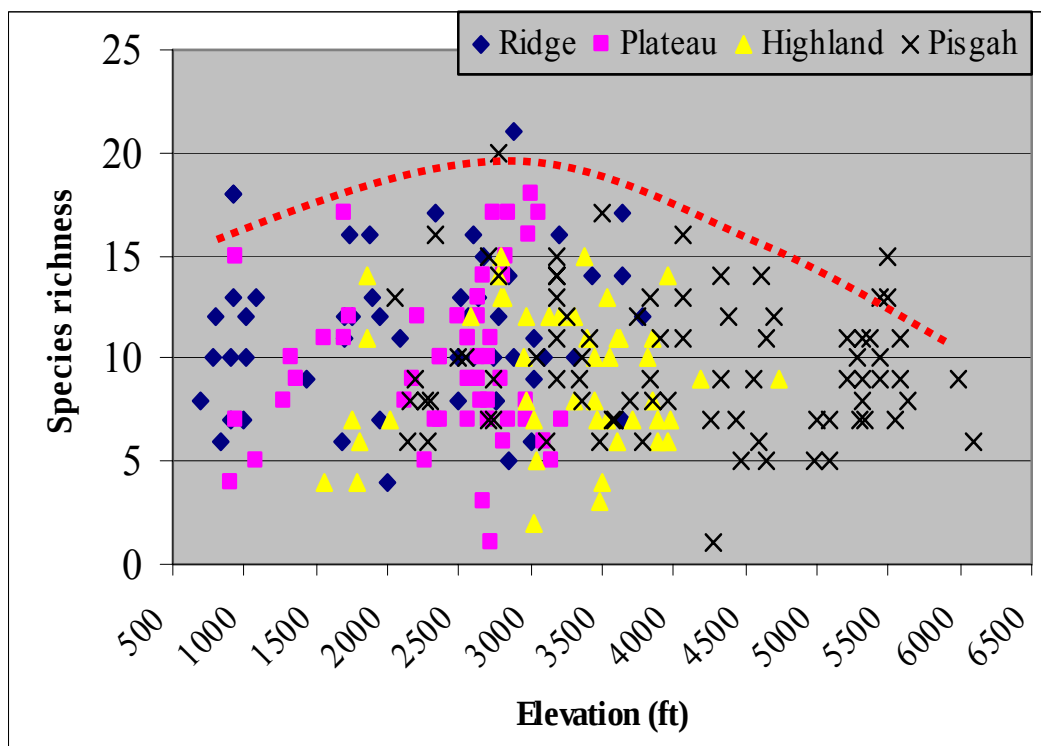
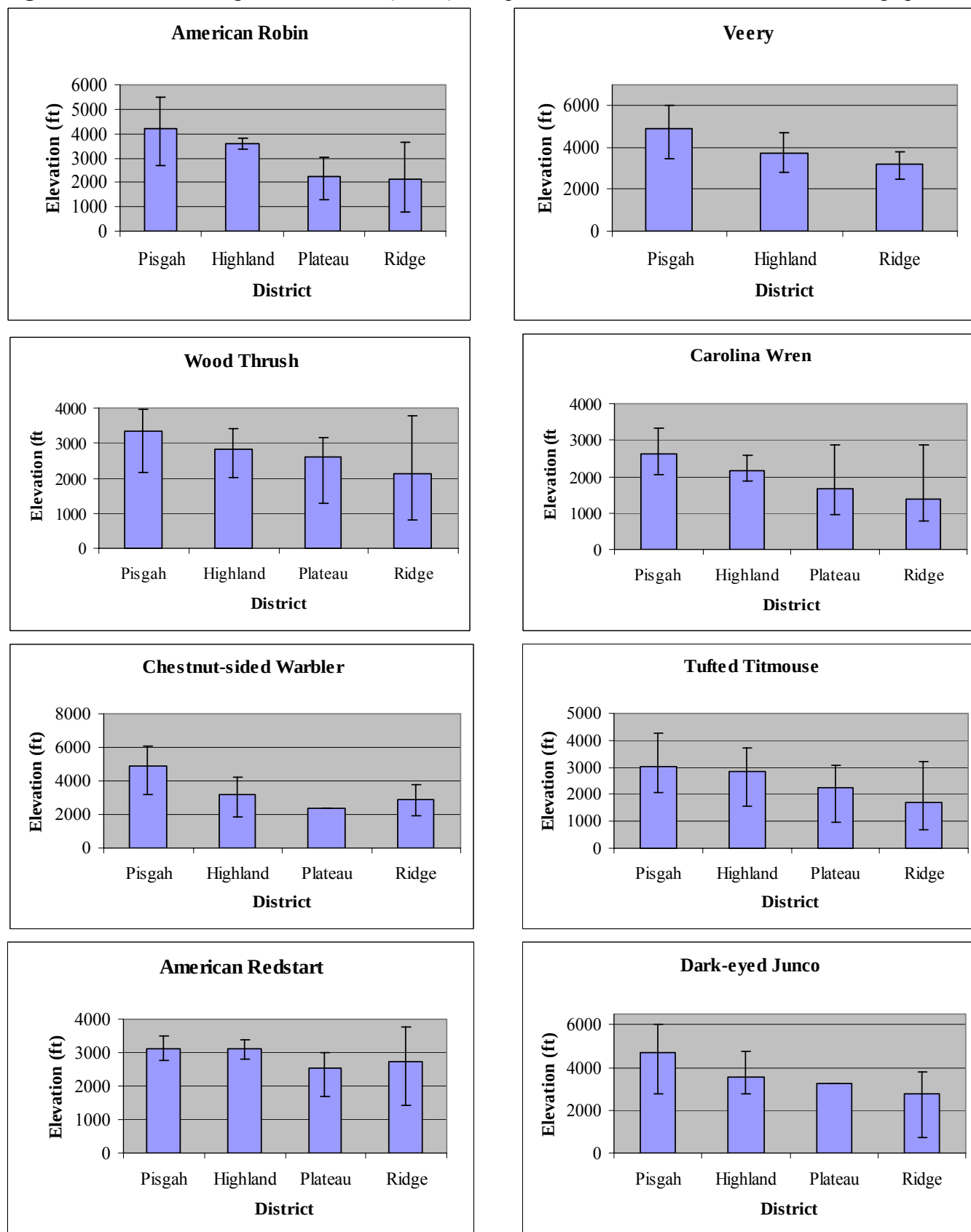


Figure 4. Point-level species richness for breeding species. Each marker shows the number of species recorded at a single location.

Figure 5. Mean and range of elevations (I-bars) occupied in each district for selected breeding species.



The absence of an I-bar indicates that species was observed at only one location in the district.

Appendix 1. List of breeding season point counts by district.

Point	Longitude	Latitude	Vegetation ¹	District	Year censused	
					2003	2004
1	-78.99670	37.89148	xer_oak	Ridge		*
3	-79.05454	37.90323	xer_pine	Ridge	*	*
5	-79.01473	37.88091	mes_oak	Ridge	*	
6	-79.06256	37.91120	cove_acid	Ridge	*	
7	-79.00665	37.88654	cove	Ridge		*
8	-79.51541	37.51031	mes_oak	Ridge	*	*
22	-79.31299	37.71871	mixed_oak	Ridge	*	*
23	-79.32546	37.66448	xer_pine	Ridge	*	*
24	-79.33198	37.64150	mes_oak	Ridge	*	
29	-79.41004	37.56564	cove	Ridge	*	
31	-79.35139	37.56618	mes_oak_pine	Ridge	*	
32	-79.59258	37.44210	mes_oak	Ridge	*	
52	-79.05398	37.90011	xer_pine	Ridge	*	*
54	-78.92051	37.94830	mes_oak	Ridge	*	
59	-79.51602	37.50443	hi_red_oak	Ridge		*
62	-79.60814	37.44132	cove	Ridge	*	
68	-79.82373	37.40485	xer_oak	Ridge		*
70	-78.88980	38.00283	oak_hick	Ridge	*	*
71	-79.48524	37.54281	mes_oak	Ridge		*
73	-78.90062	37.99244	xer_oak	Ridge	*	*
77	-79.33293	37.57860	mes_oak_pine	Ridge	*	
78	-79.32941	37.58367	xer_oak	Ridge		*
79	-79.34505	37.57419	cove_acid	Ridge	*	
80	-79.41122	37.56360	cove	Ridge		*
81	-79.36849	37.55352	alluvial	Ridge		*
92	-79.35101	37.56106	cove_acid	Ridge		*
105	-79.62340	37.44937	cove	Ridge		*
106	-78.93226	37.93914	n_hardwd	Ridge		*
108	-79.15611	37.88249	cove	Ridge		*
109	-79.36503	37.55809	cove_acid	Ridge		*
110	-79.77892	37.41515	mixed_oak	Ridge		*
127	-79.50450	37.52402	hi_red_oak	Ridge		*
128	-79.55363	37.49181	n_hardwd	Ridge		*
135	-79.42955	37.56271	cove	Ridge		*
3006	-79.50782	37.52948	hi_red_oak	Ridge	*	*
3009	-79.59020	37.45787	cove_acid	Ridge	*	*
3312	-78.89846	37.96914	early_shrub	Ridge	*	*
3313	-79.01034	37.88375	bog	Ridge	*	*
3314	-79.10838	37.90329	early_grass	Ridge	*	
3315	-79.60473	37.44964	early_grass	Ridge	*	*
3316	-79.61202	37.44431	bog	Ridge	*	*
3317	-79.68306	37.47939	early_grass	Ridge	*	*
3318	-79.82394	37.40504	xer_oak_pine	Ridge	*	
3401	-79.50425	37.52343	hi_red_oak	Ridge	*	*
3402	-79.50143	37.53374	hi_red_oak	Ridge	*	*
3403	-79.38160	37.55180	mes_oak_pine	Ridge	*	
3405	-79.53667	37.49817	cove_acid	Ridge	*	*
3406	-79.32732	37.61726	mes_oak	Ridge	*	*

Point	Longitude	Latitude	Vegetation ¹	District	Year censused	
					2003	2004
3408	-79.36591	37.55472	alluvial	Ridge	*	*
4002	-83.04509	35.41028	hi_red_oak	Ridge		*
4007	-79.14431	37.85710	early_shrub	Ridge		*
5036	-79.35320	37.55580	alluvial	Ridge	*	
mp101	-79.80963	37.40542	xer_oak	Ridge	*	
15	-80.27696	36.87156	cove	Plateau		*
41	-79.95263	37.22936	oak_hick	Plateau	*	
42	-79.86837	37.25286	xer_oak_pine	Plateau	*	
44	-79.85797	37.24460	xer_oak	Plateau	*	
63	-80.36582	36.78454	cove	Plateau	*	
89	-79.93218	37.22350	xer_oak	Plateau		*
102	-79.87005	37.30013	cove	Plateau		*
107	-80.24787	36.90312	oak_hick	Plateau		*
115	-80.84638	36.57136	mes_oak_pine	Plateau		*
119	-80.90835	36.56997	cove	Plateau		*
120	-80.32932	36.82952	xer_oak	Plateau		*
124	-80.38775	36.77521	cove	Plateau		*
125	-80.63722	36.67232	cove	Plateau		*
131	-80.50600	36.65563	cove_acid	Plateau		*
132	-80.19832	36.92149	xer_oak_pine	Plateau		*
133	-80.19289	36.92284	oak_hick	Plateau		*
136	-80.26110	36.89602	bog_shrub	Plateau		*
3043	-79.86243	37.24659	bog_shrub	Plateau	*	*
3044	-79.98155	37.19677	xer_oak_pine	Plateau	*	*
3046	-80.12324	37.12788	early_grass	Plateau	*	*
3047	-80.16443	36.96888	bog	Plateau	*	*
3048	-80.18834	36.92691	oak_hick	Plateau	*	
3049	-80.18345	36.92902	cove	Plateau	*	*
3050	-80.26181	36.89914	bog_shrub	Plateau	*	*
3051	-80.72544	36.64801	wpine	Plateau	*	*
3051	-80.72544	36.64801	wpine	Plateau	*	*
3052	-80.74788	36.62572	mes_oak_pine	Plateau	*	*
3053	-80.82192	36.60945	early_shrub	Plateau	*	*
3054	-80.84830	36.59233	mes_oak_pine	Plateau	*	*
3055	-80.85256	36.59172	alluvial	Plateau	*	*
3056	-80.85737	36.56949	bog	Plateau	*	*
3057	-80.85154	36.57109	xer_oak_pine	Plateau	*	*
3058	-80.90867	36.56960	wpine	Plateau	*	
3059	-80.90421	36.57005	mes_oak_pine	Plateau	*	*
3060	-80.41101	36.74136	mes_oak_pine	Plateau	*	
3061	-80.41093	36.75655	early_shrub	Plateau	*	*
3062	-80.41156	36.75965	cove_acid	Plateau	*	
3064	-80.40701	36.76567	alluvial	Plateau	*	*
3065	-80.36054	36.80602	early_grass	Plateau	*	*
3066	-80.36245	36.80318	early_grass	Plateau	*	*
3068	-80.33899	36.83056	cove	Plateau	*	*
3069	-80.33376	36.80660	cove	Plateau	*	
3070	-80.29502	36.85374	mes_oak	Plateau	*	*
3071	-79.93938	37.21469	xer_oak_pine	Plateau	*	*
3073	-80.42316	36.71560	mes_oak_pine	Plateau	*	*
3074	-80.44465	36.70188	cove_acid	Plateau	*	*

Point	Longitude	Latitude	Vegetation ¹	District	Year censused	
					2003	2004
3075	-80.46394	36.69482	cove_acid	Plateau	*	
3076	-80.48906	36.65874	mes_oak_pine	Plateau	*	*
4001	-80.84415	36.56972	cove_acid	Plateau		*
4008	-79.89664	37.23759	early_grass	Plateau		*
4010	-80.85250	36.57417	early_shrub	Plateau		*
5033	-80.12596	37.10203	cove	Plateau	*	
3043a	-79.86243	37.24659	early_grass	Plateau		*
mp185	-80.48427	36.66521	early_grass	Plateau		*
156	-81.06273	36.43163	cove_acid	Highland		*
160	-81.69566	36.15508	cove_acid	Highland		*
161	-81.61348	36.17318	cove_acid	Highland		*
195	-81.16365	36.38747	cove_acid	Highland	*	
196	-81.14832	36.39196	xer_oak_pine	Highland	*	
208	-81.80056	36.09921	n_hardwd	Highland	*	*
209	-81.78033	36.10138	hi_red_oak	Highland	*	*
233	-81.47792	36.24244	wpine	Highland		*
235	-81.72077	36.13234	mixed_oak	Highland		*
236	-81.75269	36.13271	cove_acid	Highland	*	*
239	-81.80729	36.10025	n_hardwd	Highland	*	*
269	-81.14709	36.38174	oak_hick	Highland	*	
272	-81.17001	36.38972	cove	Highland	*	
283	-81.67690	36.16259	oak_hick	Highland	*	
292	-81.72979	36.14172	bog_shrub	Highland	*	*
3012	-81.37488	36.34793	wpine	Highland	*	*
3013	-81.28669	36.37412	bog	Highland	*	*
3014	-81.25864	36.38866	wpine	Highland	*	*
3015	-81.18112	36.42419	early_grass	Highland	*	*
3016	-81.17147	36.43488	early_shrub	Highland	*	*
3017	-81.16586	36.43644	bog	Highland	*	*
3018	-81.01578	36.45820	mes_oak_pine	Highland	*	*
3019	-80.97306	36.48869	alluvial	Highland	*	
3020	-80.95634	36.50207	alluvial	Highland	*	*
3021	-80.92343	36.53879	early_shrub	Highland	*	*
3022	-80.93670	36.51742	early_shrub	Highland	*	*
3023	-81.11304	36.42866	xer_oak_pine	Highland	*	*
3024	-81.15833	36.43156	cove	Highland	*	*
3025	-81.18722	36.42025	xer_oak_pine	Highland	*	*
3026	-81.77151	36.12840	cove_acid	Highland	*	*
3027	-81.75653	36.13237	bog	Highland	*	*
3028	-81.72406	36.14000	early_grass	Highland	*	*
3030	-81.78331	36.10379	hemlock	Highland	*	
3031	-81.71267	36.14590	hemlock	Highland	*	*
3032	-81.69313	36.14617	mes_oak_pine	Highland	*	
3033	-81.63444	36.14234	cove	Highland	*	*
3039	-81.68798	36.15400	oak_hick	Highland	*	*
4005	-81.60419	36.19547	early_grass	Highland		*
4012	-81.44055	36.26183	cove	Highland		*
5015	-81.68455	36.15698	early_grass	Highland	*	*
5016	-81.74572	36.13104	bog	Highland	*	*
5031	-80.90758	36.54855	mes_oak_pine	Highland	*	
5032	-80.91714	36.53920	xer_pine	Highland	*	*

Point	Longitude	Latitude	Vegetation ¹	District	Year censused	
					2003	2004
5034	-80.99941	36.43292	bog	Highland	*	
5035	-81.52451	36.22558	wpine	Highland	*	
140	-82.92163	35.29943	spruce_fir	Pisgah	*	*
141	-83.04495	35.42520	hi_red_oak	Pisgah	*	
143	-83.05015	35.42438	hi_red_oak	Pisgah	*	
144	-82.87436	35.31296	early_shrub	Pisgah	*	*
145	-82.96556	35.32596	n_hardwd	Pisgah	*	
146	-83.04060	35.39790	n_hardwd	Pisgah	*	*
148	-83.12384	35.46023	n_hardwd	Pisgah	*	*
149	-83.14214	35.46631	spruce_fir	Pisgah		*
151	-83.16080	35.50940	mes_oak	Pisgah	*	*
168	-82.44718	35.66937	mes_oak	Pisgah		*
179	-83.04759	35.43415	cove	Pisgah		*
181	-82.64600	35.44748	xer_oak	Pisgah	*	*
183	-82.72752	35.43803	hi_red_oak	Pisgah		*
186	-83.25317	35.51537	oak_hick	Pisgah	*	
190	-83.28129	35.51517	n_hardwd	Pisgah		*
191	-83.09049	35.44210	cove	Pisgah		*
198	-82.48489	35.56776	cove	Pisgah		*
200	-82.53804	35.51585	mes_oak_pine	Pisgah		*
204	-83.29328	35.51552	mixed_oak	Pisgah	*	*
205	-83.29864	35.50781	alluvial	Pisgah	*	*
206	-83.28280	35.51708	mixed_oak	Pisgah	*	*
207	-83.29040	35.51644	mixed_oak	Pisgah	*	*
214	-82.39971	35.69869	n_hardwd	Pisgah	*	*
219	-82.99535	35.36867	early_shrub	Pisgah		*
222	-82.87062	35.31441	spruce_fir	Pisgah	*	*
224	-82.91504	35.30060	spruce_fir	Pisgah	*	
228	-83.19413	35.51565	hi_red_oak	Pisgah		*
229	-83.14009	35.48000	early_grass	Pisgah		*
232	-83.16022	35.50751	mes_oak	Pisgah	*	*
254	-82.62199	35.46816	xer_oak_pine	Pisgah		*
256	-82.66778	35.45707	mixed_oak	Pisgah		*
260	-82.79343	35.36740	hi_red_oak	Pisgah		*
263	-83.28460	35.51601	mixed_oak	Pisgah	*	
264	-83.25680	35.51604	cove	Pisgah	*	
265	-83.27776	35.51492	cove	Pisgah	*	*
267	-83.15564	35.50363	hi_red_oak	Pisgah		*
274	-82.50735	35.53358	cove	Pisgah		*
275	-82.49117	35.59661	oak_hick	Pisgah		*
279	-82.48913	35.56545	oak_hick	Pisgah		*
280	-83.28469	35.51876	mixed_oak	Pisgah	*	*
281	-83.29254	35.51408	xer_oak_pine	Pisgah	*	*
282	-83.28911	35.51740	xer_oak_pine	Pisgah	*	
286	-82.38462	35.69197	early_shrub	Pisgah	*	*
294	-82.92578	35.30008	n_hardwd	Pisgah		*
296	-82.89648	35.30447	spruce_fir	Pisgah		*
297	-83.11986	35.45938	early_shrub	Pisgah		*
299	-82.75600	35.40547	bog	Pisgah		*
300	-82.98790	35.36144	spruce_fir	Pisgah		*
302	-83.15652	35.49628	bog	Pisgah		*

Point	Longitude	Latitude	Vegetation ¹	District	Year censused	
					2003	2004
306	-82.39050	35.69787	n_hardwd	Pisgah		*
3301	-82.48985	35.63776	cove	Pisgah	*	
3302	-82.49197	35.61712	early_shrub	Pisgah	*	
3303	-82.53175	35.51719	mes_oak_pine	Pisgah	*	
3304	-82.54885	35.51269	mes_oak_pine	Pisgah	*	
3305	-82.64609	35.44701	xer_oak_pine	Pisgah	*	
3306	-82.59257	35.49522	alluvial	Pisgah	*	*
3307	-82.59293	35.50048	alluvial	Pisgah	*	*
3308	-83.02700	35.38154	early_shrub	Pisgah	*	
3310	-83.29356	35.51306	xer_oak_pine	Pisgah	*	
3311	-83.30043	35.50533	alluvial	Pisgah	*	*
4003	-82.88658	35.30619	spruce_fir	Pisgah		*
4004	-82.47883	35.57772	early_grass	Pisgah		*
4006	-82.99224	35.36291	spruce_fir	Pisgah		*
4011	-83.14032	35.46206	spruce_fir	Pisgah		*
5008	-81.96218	35.91621	cove_acid	Pisgah	*	*
5009	-81.94103	35.97132	cove_acid	Pisgah	*	*
5010	-81.89498	35.98735	wpine	Pisgah	*	*
5011	-81.88104	36.01712	early_grass	Pisgah	*	*
5012	-81.90629	35.98870	wpine	Pisgah	*	
5013	-81.91204	35.98204	bog_shrub	Pisgah	*	*
5014	-81.93797	35.97496	wpine	Pisgah	*	
5020	-82.39164	35.70209	n_hardwd	Pisgah	*	*
5021	-82.36491	35.71223	n_hardwd	Pisgah	*	*
5022	-82.33287	35.74841	spruce_fir	Pisgah	*	
5023	-82.27326	35.71501	spruce_fir	Pisgah	*	
5024	-82.28977	35.72496	early_shrub	Pisgah	*	*
5026	-82.26932	35.70706	spruce_fir	Pisgah		*
5027	-81.85316	36.05377	hemlock	Pisgah		*
5028	-81.85038	36.05754	hemlock	Pisgah		*
5029	-82.63116	35.46284	xer_oak_pine	Pisgah	*	
5030	-82.75643	35.40482	bog	Pisgah	*	
5037	-82.20620	35.72684	xer_pine	Pisgah		*
5038	-82.31141	35.72915	spruce_fir	Pisgah		*
5039	-82.27553	35.71323	spruce_fir	Pisgah		*
5040	-82.71743	35.44759	xer_oak_pine	Pisgah		*
mp418	-82.83513	35.31974	early_shrub	Pisgah	*	
mp437	-83.04407	35.41093	n_hardwd	Pisgah	*	

¹See Appendix 2 for a definition of these vegetation codes.

Appendix 2. Vegetation types used to classify the habitat around each point count location for breeding season counts.

Vegetation code	Definition
alluvial	Riparian forests or habitats adjacent to flowing water; floodplain soils.
bog	Bogs, marshes, fens or similar wetlands dominated by graminoid or shrub species.
bog_shrub	Bog wetland with shrub canopy or surrounded by shrub habitats.
cove	Mesophytic forests in concave landforms; includes rich coves.
cove_acid	Mesophytic forests in concave landforms having understory of rosebay rhododendron (<i>Rhododendron maximum</i>) and significant component of Eastern hemlock (<i>Tsuga canadensis</i>) in overstory.
early_grass	Early successional upland habitats dominated by graminoid plants; includes pastures, hayfields, and lawns.
early_shrub	Early successional upland habitats dominated by shrubs; includes old fields and heath balds.
hemlock	Forests with overstory dominated by Eastern hemlock (<i>Tsuga canadensis</i>).
hi_red_oak	High elevation red oak (<i>Quercus rubra</i>) forests--a special type of northern hardwood forest.
mes_oak	Forests dominated by a mixture of <i>Quercus alba</i> , <i>Q. rubra</i> , and/or <i>Q. velutina</i> with other hardwood species; found on flats, coves, and valley bottoms.
mes_oak_pine	Forests similar to "mes_oak" but having a significant component white pine (<i>Pinus strobus</i>).
mixed_oak	Forests with a mixture of <i>Quercus</i> species along with a component of maple (<i>Acer</i> spp.) and other hardwood species; found in mid-slope positions.
n_hardwd	High elevation forests dominated by yellow birch (<i>Betula alleghaniensis</i>), yellow buckeye (<i>Aescula octandra</i>), and American beech (<i>Fagus grandifolia</i>).
oak_hick	Forest similar to "mes_oak" but dominated by a balance of <i>Quercus</i> and <i>Carya</i> spp.
spruce_fir	High elevation coniferous (boreal) forests dominated by red spruce (<i>Picea rubens</i>) and Fraser fir (<i>Abies fraseri</i>).
wpine	Forests comprising principally of white pine (<i>Pinus strobus</i>); includes pine plantations and successional stands.
xer_oak	Upland forests on convex landforms dominated by scarlet oak (<i>Quercus coccinea</i>), chestnut oak (<i>Q. prinus</i>), and black oak (<i>Q. velutina</i>); often having a heath understory of blueberry (<i>Vaccinium</i> spp., <i>Gaylussacia</i> spp.) and/or mountain laurel (<i>Kalmia latifolia</i>).
xer_oak_pine	Upland forests similar to "xer_oak" except have a significant component of Virginia pine (<i>Pinus virginiana</i>), pitch pine (<i>P. rigida</i>), and/or Table Mountain pine (<i>P. pungens</i>); often with a heath understory.
xer_pine	Upland forests on convex landforms dominated by Virginia pine (<i>Pinus virginiana</i>), pitch pine (<i>P. rigida</i>), and/or Table Mountain pine (<i>P. pungens</i>); often with a heath understory.

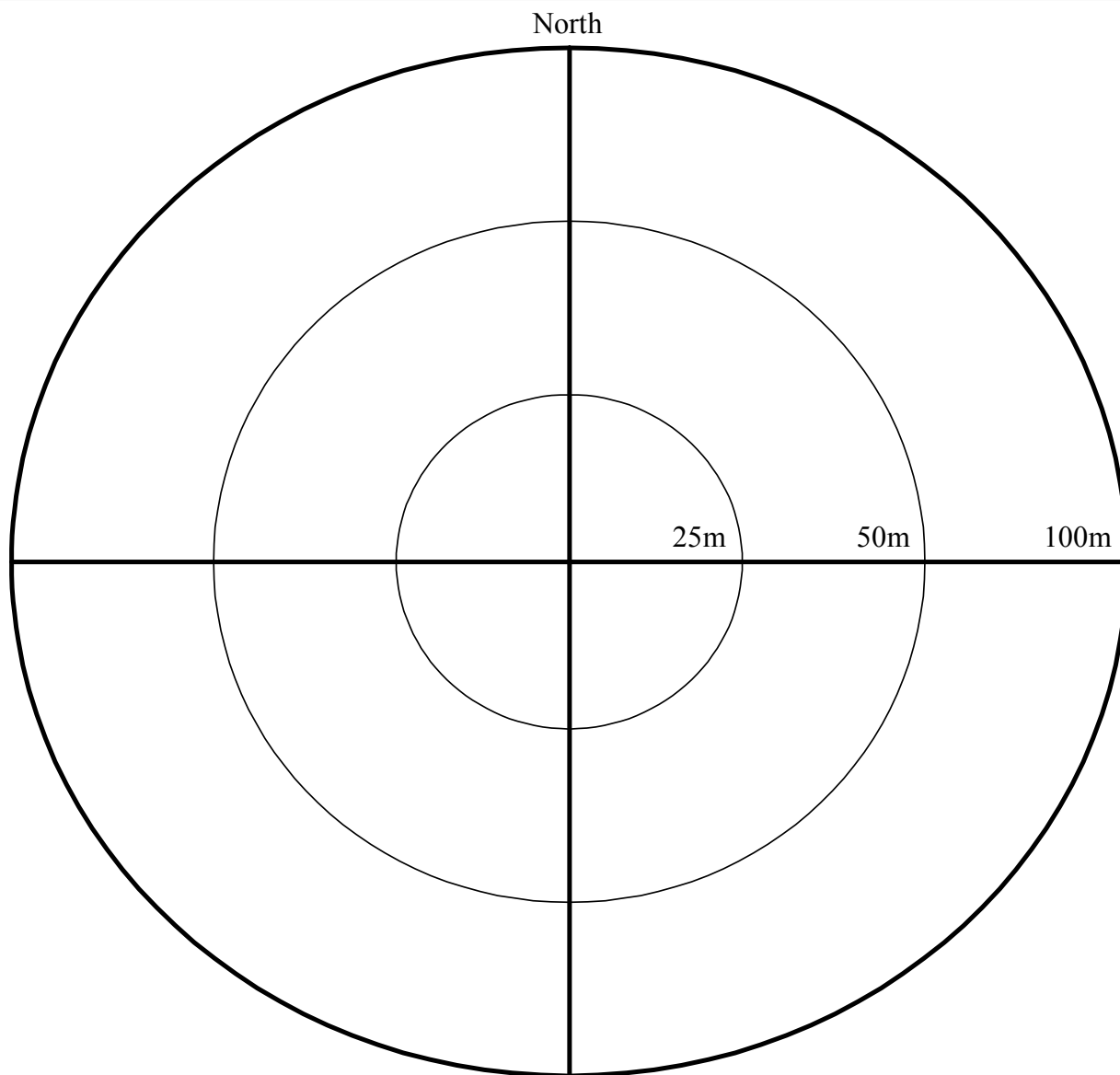
Appendix 3. Number of breeding season point count locations by park district and vegetation type. See Appendix 2 for definition of vegetation types.

Vegetation	District			
	Ridge	Plateau	Highland	Pisgah
alluvial	3	2	2	4
bog	2	2	5	3
bog_shrub	0	3	1	1
cove	7	10	4	7
cove_acid	6	5	6	2
early_grass	3	6	4	3
early_shrub	2	3	3	8
hemlock	0	0	2	2
hi_red_oak	6	0	1	6
mes_oak	7	1	0	3
mes_oak_pine	3	7	3	3
mixed_oak	2	0	1	6
n_hardwd	2	0	2	10
oak_hick	1	4	3	3
spruce_fir	0	0	0	14
wpine	0	3	4	3
xer_oak	5	3	0	1
xer_oak_pine	1	5	3	7
xer_pine	3	0	1	1
Total	53	54	45	87

Appendix 4. Datasheet used for breeding season point counts.

Variable Circular Plot (Point Count) Field Sheet

State	Station	Unit	Compartment	Road	Route #	Point #	Date	Observer	Time
Temp °C	Wind	Sky	Slope	Aspect	Habitat	Habitat Type	Habitat Quality		



N-S Coordinate: _____ E-W Coordinate: _____ Zone*: _____
(N-S=Latitude; E-W=Longitude) *Zone = 0 for lat-long (geographic); else enter a UTM Zone.

Flyovers: _____

Comments: _____

-- LMVJV March 2003 --

Female Observed	NOCA
Male Observed	NOCA
Pair Together, assumed mated	NOCA
Observed, sex unknown	NOCA 0-3 minutes
	NOCA 4-5 minutes
	<u>NOCA</u> 6-10 minutes

Appendix 5. Datasheet used for winter surveys.

Winter Bird Surveys – NPS – A. B. Smith & S. M. Pearson			
Location: _____		Observer: _____	
Temp: _____		Date: _____	
Wind: _____		Sky: _____	
Habitat(s): _____			
Time	Waypoint	Bird Species (count):	
Begin: _____	Begin: _____		
End: _____	End: _____		
Transect _____			
Time Search _____			
Point Cnt _____			
Trail/Road _____			
Habitat Description:		<u>Percent Cover</u>	Shrub
Notes:		Forest	heath _____
		deciduous _____	tree _____
		conifer _____	blackberry _____
		Other:	Grass (height)
			<20 cm _____
		20-50 cm _____	50-100 cm _____
		>1 m _____	Fescue _____
Time	Waypoint	Bird Species (count):	
Begin: _____	Begin: _____		
End: _____	End: _____		
Transect _____			
Time Search _____			
Point Cnt _____			
Trail/Road _____			
Habitat Description:		<u>Percent Cover</u>	Shrub
Notes:		Forest	heath _____
		deciduous _____	tree _____
		conifer _____	blackberry _____
		Other:	Grass (height)
			<20 cm _____
		20-50 cm _____	50-100 cm _____
		>1 m _____	Fescue _____

Appendix 6. Bird species list alphabetized by four letter code.

BBL code	Common Name	Species
acfl	Acadian Flycatcher	<i>Empidonax virescens</i>
alfl	Alder Flycatcher	<i>Empidonax alnorum</i>
amcr	American Crow	<i>Corvus brachyrhynchos</i>
amgo	American Goldfinch	<i>Carduelis tristis</i>
amke	American Kestrel	<i>Falco sparverius</i>
amre	American Redstart	<i>Setophaga ruticilla</i>
amro	American Robin	<i>Turdus migratorius</i>
amwo	American Woodcock	<i>Scolopax minor</i>
baor	Baltimore Oriole	<i>Icterus galbula</i>
bars	Barn Swallow	<i>Hirundo rustica</i>
baww	Black-and-White Warbler	<i>Mniotilta varia</i>
bbcu	Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>
bcch	Black-capped Chickadee	<i>Poecile atricapillus</i>
bdow	Barred Owl	<i>Strix varia</i>
beki	Belted Kingfisher	<i>Ceryle alcyon</i>
bggn	Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>
bhco	Brown-headed Cowbird	<i>Molothrus ater</i>
bhvi	Blue-headed Vireo	<i>Vireo solitarius</i>
blbw	Blackburnian Warbler	<i>Dendroica fusca</i>
blgr	Blue Grosbeak	<i>Passerina caerulea</i>
blja	Blue Jay	<i>Cyanocitta cristata</i>
blpw	Blackpoll Warbler	<i>Dendroica striata</i>
brcr	Brown Creeper	<i>Certhia americana</i>
brth	Brown Thrasher	<i>Toxostoma rufum</i>
btbw	Black-throated Blue Warbler	<i>Dendroica caerulescens</i>
btnw	Black-throated Green Warbler	<i>Dendroica virens</i>
bwha	Broad-winged Hawk	<i>Buteo platypterus</i>
cach	Carolina Chickadee	<i>Poecile carolinensis</i>
cago	Canada Goose	<i>Branta canadensis</i>
carw	Carolina Wren	<i>Thryothorus ludovicianus</i>
cawa	Canada Warbler	<i>Wilsonia canadensis</i>
cedw	Cedar Waxwing	<i>Bombycilla cedrorum</i>
cerw	Cerulean Warbler	<i>Dendroica cerulea</i>
chsp	Chipping Sparrow	<i>Spizella passerina</i>
chsw	Chimney Swift	<i>Chaetura pelagica</i>
clsw	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
cogr	Common Grackle	<i>Quiscalus quiscula</i>
cora	Common Raven	<i>Corvus corax</i>
coye	Common Yellowthroat	<i>Geothlypis trichas</i>
cswa	Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>

BBL code	Common Name	Species
cwwi	Chuck-will's-widow	<i>Caprimulgus carolinensis</i>
dowo	Downy Woodpecker	<i>Picoides pubescens</i>
eabl	Eastern Bluebird	<i>Sialia sialis</i>
eaki	Eastern Kingbird	<i>Tyrannus tyrannus</i>
eame	Eastern Meadowlark	<i>Sturnella magna</i>
eaph	Eastern Phoebe	<i>Sayornis phoebe</i>
easo	Eastern Screech-Owl	<i>Megascops asio</i>
eato	Eastern Towhee	<i>Pipilo erythrophthalmus</i>
eawp	Eastern Wood-Pewee	<i>Contopus virens</i>
etti	Tufted Titmouse	<i>Baeolophus bicolor</i>
eust	European Starling	<i>Sturnus vulgaris</i>
fisp	Field Sparrow	<i>Spizella pusilla</i>
gcfl	Great Crested Flycatcher	<i>Myiarchus crinitus</i>
gcki	Golden-crowned Kinglet	<i>Regulus satrapa</i>
ghow	Great Horned Owl	<i>Bubo virginianus</i>
grca	Gray Catbird	<i>Dumetella carolinensis</i>
grhe	Green Heron	<i>Butorides virescens</i>
grsp	Grasshopper Sparrow	<i>Ammodramus savannarum</i>
hawo	Hairy Woodpecker	<i>Picoides villosus</i>
heth	Hermit Thrush	<i>Catharus guttatus</i>
hola	Horned Lark	<i>Eremophila alpestris</i>
howa	Hooded Warbler	<i>Wilsonia citrina</i>
howr	House Wren	<i>Troglodytes aedon</i>
inbu	Indigo Bunting	<i>Passerina cyanea</i>
kewa	Kentucky Warbler	<i>Oporornis formosus</i>
kill	Killdeer	<i>Charadrius vociferus</i>
lefl	Least Flycatcher	<i>Empidonax minimus</i>
lowa	Louisiana Waterthrush	<i>Seiurus motacilla</i>
mall	Mallard	<i>Anas platyrhynchos</i>
modo	Mourning Dove	<i>Zenaida macroura</i>
nobo	Northern Bobwhite	<i>Colinus virginianus</i>
noca	Northern Cardinal	<i>Cardinalis cardinalis</i>
nomo	Northern Mockingbird	<i>Mimus polyglottos</i>
nopa	Northern Parula	<i>Parula americana</i>
nrws	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>
nswo	Northern Saw-whet Owl	<i>Aegolius acadicus</i>
oror	Orchard Oriole	<i>Icterus spurius</i>
oven	Ovenbird	<i>Seiurus aurocapilla</i>
pefa	Peregrine Falcon	<i>Falco peregrinus</i>
pisi	Pine Siskin	<i>Carduelis pinus</i>
piwa	Pine Warbler	<i>Dendroica pinus</i>
piwo	Pileated Woodpecker	<i>Dryocopus pileatus</i>

BBL code	Common Name	Species
puma	Purple Martin	<i>Progne subis</i>
rbgr	Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>
rbnu	Red-breasted Nuthatch	<i>Sitta canadensis</i>
rbwo	Red-bellied Woodpecker	<i>Melanerpes carolinus</i>
recr	Red Crossbill	<i>Loxia curvirostra</i>
revi	Red-eyed Vireo	<i>Vireo olivaceus</i>
rodo	Rock Pigeon	<i>Columba livia</i>
rsha	Red-shouldered Hawk	<i>Buteo lineatus</i>
rtha	Red-tailed Hawk	<i>Buteo jamaicensis</i>
rthu	Ruby-throated Hummingbird	<i>Archilochus colubris</i>
rugr	Ruffed Grouse	<i>Bonasa umbellus</i>
rwbl	Red-winged Blackbird	<i>Agelaius phoeniceus</i>
scju	Dark-eyed Junco	<i>Junco hyemalis</i>
scta	Scarlet Tanager	<i>Piranga olivacea</i>
sosp	Song Sparrow	<i>Melospiza melodia</i>
ssha	Sharp-shinned Hawk	<i>Accipiter striatus</i>
swth	Swainson's Thrush	<i>Catharus ustulatus</i>
swwa	Swainson's Warbler	<i>Limnothlypis swainsonii</i>
tres	Tree Swallow	<i>Tachycineta bicolor</i>
tuvu	Turkey Vulture	<i>Cathartes aura</i>
veer	Veery	<i>Catharus fuscescens</i>
vesp	Vesper Sparrow	<i>Poocetes gramineus</i>
vira	Virginia Rail	<i>Rallus limicola</i>
wavi	Warbling Vireo	<i>Vireo gilvus</i>
wbnu	White-breasted Nuthatch	<i>Sitta carolinensis</i>
wevi	White-eyed Vireo	<i>Vireo griseus</i>
wewa	Worm-eating Warbler	<i>Helmitheros vermivorum</i>
wifl	Willow Flycatcher	<i>Empidonax traillii</i>
witu	Wild Turkey	<i>Meleagris gallopavo</i>
wiwr	Winter Wren	<i>Troglodytes troglodytes</i>
wodu	Wood Duck	<i>Aix sponsa</i>
woth	Wood Thrush	<i>Hylocichla mustelina</i>
wpwi	Whip-poor-will	<i>Caprimulgus vociferus</i>
ybch	Yellow-breasted Chat	<i>Icteria virens</i>
ybcu	Yellow-billed Cuckoo	<i>Coccyzus americanus</i>
ybsa	Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>
ysfl	Northern Flicker	<i>Colaptes auratus</i>
ytvi	Yellow-throated Vireo	<i>Vireo flavifrons</i>
ytwa	Yellow-throated Warbler	<i>Dendroica dominica</i>
ywar	Yellow Warbler	<i>Dendroica petechia</i>