

Highlights of Pennsylvania's Second Breeding Bird Atlas for the Piedmont

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Populations of birds are better known than most other wild animals because of the large participation in surveys often referred to as “citizen science” projects. Every year, thousands of people contribute their observations to such projects as the Christmas Bird Count and backyard bird surveys for the sheer love of birds. Chief among these projects are breeding bird atlases (BBAs) in which the objective is to document the breeding distribution of all species within a political jurisdiction — often a state. This paper provides a summary of highlights from Pennsylvania's Second BBA (hereafter referred to as Second Atlas) with a focus on the state's southeastern physiographic region known as the Piedmont. Fieldwork for the Second Atlas was conducted from 2004 through 2009, and the results were published in 2012 (Wilson, Brauning, & Mulvihill, 2012). This project updated a similarly-designed BBA in the 1980s (Brauning, 1992), which will be referred to as the First Atlas.

Pennsylvania's Second Atlas project was based at the Powdermill Nature Reserve of the Carnegie Museum of Natural History. Like the First Atlas, the basic survey unit was the “block,” defined as one-sixth of a standard U.S. Geological Survey (USGS) 7.5-minute topographic map (Brauning, 1992), representing a survey unit of about 9.6 square miles. Project participants documented all breeding birds as guided by instructions covering bird seasons and behavior and entered that into an on-line data management system. An explanation of Pennsylvania's bird atlas methods is available in the Second Atlas, which closely followed the procedures of the North American Ornithological Atlas Committee (2004). Most atlas blocks were covered well by volunteers, and the results provided a reasonable representation of the distribution of most birds breeding in the state during the first decade of the 21st century at that scale. Notably, comparisons with the First Atlas provided the opportunity to observe changes in the bird distributions that occurred in the

20 intervening years. A novel feature of the Second Atlas was the completion of point counts from which an unprecedented depiction of density distributions and abundance estimates were produced for 115 of the 190 nesting species. The point count maps provided insights into the variable patterns in distributions based on density and are particularly useful for species found widely across the state. Broad habitat-based guilds used in this paper generally follow the groups described in the Second Atlas.

The focus of this paper is the distribution, abundance, and population trends of birds of the Piedmont and Atlantic Coastal Plain Physiographic Provinces of southeastern Pennsylvania, with particular attention to Philadelphia and adjoining counties. These provinces were covered by 531 atlas blocks. This region will be referred herein as “southeastern Pennsylvania” or just as the “Piedmont.”

Southeastern Pennsylvania has experienced a longer influence of Europeans than almost anywhere in North America, certainly anywhere in Pennsylvania. Accounts by early European settlers have suggested that the state was predominately forested in the 17th century. These settlers began to spread across the landscape with the confirmation of King Charles II's charter to William Penn in the 1680s that founded the Commonwealth of Pennsylvania (Miller, 1989). As a result, much of the Piedmont was deforested before even casual inventories of wildlife populations were being documented in the mid-19th century. While deforestation provided resources and established agricultural land for the new settlers, it greatly altered the landscape. The point for us is that since the original forests were cut, forests returned in scattered and variable patches across the Piedmont within a larger matrix of agricultural areas and human settlements over the centuries. The resulting mosaic provides

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a diverse set of habitats, but one with substantial human influences.

In Pennsylvania, agriculture is still a dominant land use in the fertile lowlands of the Piedmont Province, particularly in the western counties. During the brief period between the two atlas projects, there was a net reduction in forest cover due to exurban sprawl in the Philadelphia metropolitan area as well as a loss of agricultural lands to suburban development (Wilson, Bishop & Brittingham, 2012). With extensive human activities come associated threats and pests, including increased predation by house cats, mortality from window-strikes, and invasive pests such as the hemlock wooly adelgid (*Adelges tsuga canadensis*), once a predominant member of the Piedmont flora. The adelgid was first detected in Pennsylvania during the 1960s, with defoliation and mortality of natural stands first noted in the southeastern corner of the state during the 1980s, with anticipated impact on birds that benefit from hemlock (Allen & Sheehan, 2010). These diverse anthropogenic influences set the stage for the breeding bird populations that remain within this landscape. Of course, the larger human population also has resulted in a higher block survey effort in the southeastern corner of the state, producing higher detection rates of rare species.

During the years 2004 through 2009, all 4,937 of the state's atlas blocks were surveyed. In achieving this feat, 854,773 bird records were submitted. This massive undertaking documented 218 species (plus two hybrids) statewide, of which 190 were considered breeding during this period; 168 of these were found in the Piedmont and Coastal Plain provinces. The Piedmont region on which this paper focuses is made up of 495 blocks, and the Atlantic Coastal Plain is comprised of an additional 36 blocks, most of which are bounded by the Delaware River, and together they comprise less than 10% of the state's total blocks. Survey effort in the Piedmont blocks was slightly above the statewide average 20 hours per block because of the larger human presence in this area. On average, effort was slightly higher than the First Atlas. Documentation of the changes in habitat condition and resulting breeding bird populations is an important result of the Second Atlas, which replicated the block structure and basic methodologies of the First Atlas

after 20 years. The reference to increased survey effort, however, would suggest that modest expansions in detections of some species during the Second Atlas need to be weighed against the greater success at finding species, whereas even modest reductions in block occurrence would imply notable declines!

The only breeding species unique to the southeastern counties during the Second Atlas introduced a distinctly marine element to Pennsylvania's breeding avifauna along the freshwater tidal waters of the Delaware River — the Great Black-backed Gull. In May 2006, an employee at the Sunoco fuel terminal, near the Philadelphia International Airport, discovered a Great Black-backed Gull nest on a pier at the facility. On May 26, John C. Miller (DVOC Fellow) found the nest which was constructed primarily of grasses and contained three eggs. Three chicks hatched on June 16, but one soon disappeared. The remaining two were banded on June 30 and fledged in early July (Malosh 2012; McGovern 2006). This was the state's first and only confirmed nesting for the species.

Besides the anomaly of a one-time nesting gull, an interesting array of species have occurred uniquely in the Piedmont region or sustained their strongest populations within that region. Four species of *Ardeidae* (herons and bitterns) are now found only in the lower Susquehanna River valley around Harrisburg, although some from this group formerly nested in Philadelphia County. Great Egret, Black-crowned Night-Heron, and Double-crested Cormorant occur together on Wade Island, while the Yellow-crowned Night-Heron now is only known from Harrisburg. This is not apparently due to limitations in the species' ranges, since several of these occur to Pennsylvania's north and west. Black-crowned Night-Herons formerly nested more widely, but declined severely between atlases and now remain in a small number of colonies in Berks, Dauphin, Lancaster, Lebanon, and York counties. Several other species historically nested in this region (Snowy Egret, Cattle Egret), but only until the First Atlas (Schutsky, 1992).

Several other species similarly have made their stronghold in the Piedmont. Fish Crow, Black Vulture and Blue Grosbeak were historically contained within this region, but each has experienced long-term range

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expansions north and westward into the Ridge and Valley Province between the two Atlas periods. A newcomer to Pennsylvania has its foothold in the Piedmont — the Eurasian Collared-Dove was confirmed breeding for the first time in Pennsylvania in Lebanon and Franklin counties during the Second Atlas and appears to be strengthening its hold there.

Not surprisingly, the guild of birds best described as generalist/urban species were found in highest abundance in the densely settled southeastern corner of the state; from here, they have been expanding their distribution. This includes not only the species directly related to human activity (like the House Sparrow), but also a diverse assemblage of species that have responded well to human-fragmented habitats, such as the Warbling Vireo and Black Vulture — both of which nearly doubled in block tallies in the Second Atlas. Twice as many of this odd assortment of species had significant increases in distribution as had declines. The anthropogenic association also is well-illustrated by the Second Atlas's density maps of species with statewide distributions. Though some species occur nearly statewide, the strong association with human activity results in the highest densities across the landscape within the Piedmont for Common Grackle, Brown-headed Cowbird, and House Finch. Clearly, many bird distributions and densities reflect the human-altered landscape.

As small and as isolated by intensive industry as it is, the wetlands of John Heinz National Wildlife Refuge at Tinicum provide a diminutive but true refuge for several wetland species. This is a holdout for rare birds and, as such, constitutes an important component of the region's breeding bird populations. This treasured remnant of wetlands remains an anchor for wetland-dependent species in the state including Least Bittern and Marsh Wren, although they are still found elsewhere and probably in greater numbers. But the story of wetland birds is mixed. Common Moorhen, Virginia Rail, and Sora barely remain at John Heinz Refuge, and some species were not detected again during the Second Atlas. An anecdote for this was the most-unlikely breeding bird in the state — the Black-necked Stilt. Found by John C. Miller at the Philadelphia sewage treatment plant as a result of diligent searches during the First Atlas (Fingerhood 1989;

Santner 1992), only hints of its presence have been suggested since. However, a number of wetland birds and familiar migratory waterfowl previously reported were not detected again in this Second Atlas. The accidental-breeding Northern Shoveler and even the Blue-winged Teal, which had multiple nesting events at Heinz in the 1980s, was not reported there and was reduced to a single confirmation in the Piedmont — in York County. Changes in the grassy fields adjoining wetlands probably are a contributing factor in the decline of these prairie ducks, which reflect the intense pressure on wetland birds in this urbanized landscape.

The substantial expansion of both Hooded and Common Mergansers demonstrated in the Second Atlas in the Piedmont region is in contrast to what's happened at the Heinz refuge, but is in keeping with the national recovery of wetland-associated birds in response to improved water quality and reduced pesticide levels nationwide. Neither merganser was established there in the 1980s, but the Common Merganser is now a fixture along the Delaware River south at least to Bucks County and has nested inland in various locations such as Green Lane Reservoir (A. Mirabella, personal communication October 2013) more recently. This expansion parallels the expansion of Osprey and Bald Eagles which benefited not only from state-listing but also from reintroduction programs to the point that they are now routine components of summer birds lists. This is a great triumph of conservation.

Also highly dependent on human activities in much of the eastern United States, farm- and grassland-associated species once had a stronghold in the Piedmont with its extensive agricultural activities for several centuries, although that is in constant flux. The outright conversion of grassland habitat to residential and industrial uses, as well as significant changes in agricultural practices, has resulted in grassland and farmland birds showing the greatest declines of any species group. Within the Piedmont, this trend is most pronounced in counties east of the Susquehanna River. This change is most dramatically demonstrated in the 42% decline in blocks occupied by Eastern Meadowlarks within the Piedmont. Vesper Sparrow also lost ground, but notably several other grassland-associated species held their own during this period, and the majority did not decline. Bobolink and Savannah

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Sparrow were found in sufficiently more blocks not to be an artifact of better coverage, despite a declining pattern on Breeding Bird Survey routes across the Piedmont region. Inexplicably the Horned Lark shifted its distribution between the two atlases from previously occurring primarily in western Pennsylvania, to increasing 3-fold in the Piedmont and now having a predominately eastern distribution. During the Second Atlas, almost all Dickcissel reports came from the Piedmont, in contrast to irruption-driven populations during the First Atlas which resulted in statewide distribution. For complex reasons, formerly widespread Northern Bobwhite were recently declared 'extirpated' as a breeding birds in the whole state (Aver, Brittingham, & Kliner, in press), and Ring-necked Pheasants are largely gone.



Ring-necked Pheasant
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Birds associated with shrubby habitats, edges, and young forests may have relied on a variety of environmental events to create these habitats historically, but now most of these forest alterations are induced by humans. Species of edges and shrubs are declining broadly and, similarly to many habitat guilds, the Second Atlas shows a mix of expansions and retractions. Nearly two-thirds more blocks reported Willow Flycatcher in the Second Atlas, but generally species of shrublands either held on or were trending downward. Density patterns for many of these edge species (Eastern Kingbird, House Wren, Gray Catbird, and Northern Cardinal) are higher in the Piedmont than the rest of the state. However, long-term BBS trends for these and other widespread shrubland birds like Field Sparrow and Common Yellowthroat were negative.

The Piedmont region is bounded on the north by the Kittatinny Ridge, which provides a clear line of demarcation for many forest bird distributions. To the north

of that ridge, "Canadian" fauna, such as Blackburnian Warbler, are characteristic, while the Piedmont region has been considered the "Carolinian" region for years (Poole, 1964), with species of more southern distribution. As a result, forest birds such as the appropriately-named Carolina Chickadee and Carolina Wren make their state strongholds in the southeastern and southwestern corners. Some of these southeastern specialties, such as the Red-bellied Woodpecker and, going way back into history, the Northern Cardinal and Tufted Titmouse, were historically limited in Pennsylvania to the Piedmont (or corresponding Pittsburgh Plateaus), although most of these southern associates have long since expanded northward above the ridge to now occur nearly statewide. That increase continued through the Second Atlas for many Carolinian forest birds, although area-sensitive species, such as the Kentucky Warbler, declined notably.

It appears that distributions of many Carolinian forest birds are sustaining themselves in the Piedmont, even with the loss of forest cover; however, density distributions provide a telling story of the Piedmont's woodland and shrubby-edge bird patterns. A number of these species occur nearly statewide, finding sufficient woodlots and brushy edges within many of the Piedmont's blocks, as well as more forested regions. The randomly placed point counts tell the more detailed story. Scarlet Tanager was still found within 69% of blocks in the Piedmont (dropping out of very few between atlases), but its density across the Piedmont was typically only a fifth of that in most of the rest of the state. This difference is notable also for Pileated Woodpecker, Red-eyed Vireo, and Ovenbird; while still widespread, they are strikingly less common in this landscape largely due to less habitat being available. The opposite is true for the Wood Thrush; although its long-term population trend statewide is strikingly negative, it is still most common in the Piedmont.

The story of forest-associated species is a mixed one. On a positive note, the Wild Turkey expanded nearly 4-fold, and Cooper's Hawk was reported 10 times the number of block records in the Second Atlas in the southeast compared to the First Atlas. More forest birds, such as Yellow-throated Vireo and Hairy Woodpecker, significantly expanded their ranges

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than declined (e.g., Broad-winged Hawk); although the improved survey effort may be a factor here. A notable decrease was seen in the Ruffed Grouse and Eastern Whip-poor-will, although affiliation with young forests puts these trends in line with shrubby-edge and young-forest obligates. Some of these species have declined in abundance to a point that suggests future changes in distribution are likely if additional habitat losses occur. Primary among these prospective declines is the Kentucky Warbler.

The Piedmont region extends beyond Pennsylvania's border, north into New Jersey, and south through the Mid-Atlantic states into Georgia and Alabama. Some of the environmental changes affected the Piedmont of south eastern Pennsylvania (e.g., suburban sprawl, agricultural intensification, and further fragmentation of forests) have occurred throughout the wider Piedmont region. Interestingly, comparing atlas results for the Pennsylvania Piedmont with those from similarly timed atlases covering the adjoining Maryland Piedmont (Ellison, 2010) have shown that many of the patterns highlighted above are replicated south of the Mason-Dixon Line. The correlation between atlas changes in the Pennsylvania and Maryland Piedmont regions is very high (Pearson correlation coefficient = 0.80), with very few species showing an exception (Figure 1).

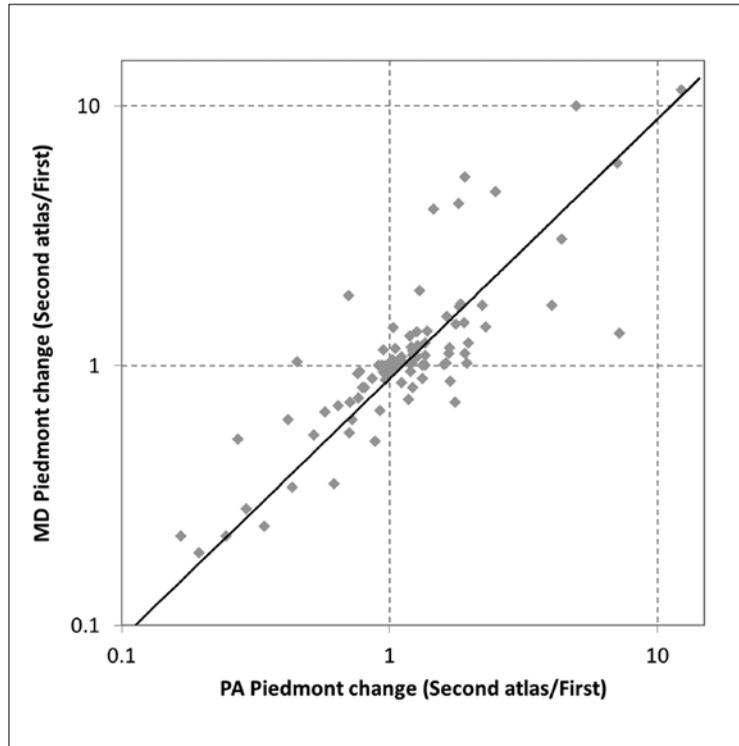


Figure 1. Correlation between changes in atlas block occurrences in the Pennsylvania Piedmont (1983–89 to 2004–09) and Maryland Piedmont (1983–87 to 2002–06) for 118 bird species reported in at least 10 blocks in both regions. Change is shown as (number of blocks in Second atlas) / (number of block in First atlas), hence, 1 = no change, 0.1 = 90% decline in block occurrences, 10 = 900% increase in block occurrences.

The *Second Atlas of Breeding Birds in Pennsylvania* (Wilson, et al, 2012) provided a remarkable snapshot of the distribution and status of all breeding birds across the state and is now the foundation for bird conservation. The results provide a ready reminder that bird distributions are constantly in flux, responding to an array of pressures and factors.

Literature Cited

- Allen, M. C., & Sheehan Jr., J. (2010). Eastern Hemlock decline and its effect on Pennsylvania's birds. In (S. K. Majumdar, T. L. Master, M. C. Brittingham, R. M. Ross, R. S. Mulvihill, and J. E. Huffman, Eds.). *Avian ecology and conservation: A Pennsylvania focus with national implications* (pp. 232-245). Easton, PA: Pennsylvania Academy of Sciences.
- Avery, J., Brittingham, M. & Kliner, S. (in press) *Final report for the northern bobwhite quail in Pennsylvania: Current distribution, status and trends*. State College, PA: Pennsylvania State University.
- Brauning, D. W. (Ed.) (1992). *Atlas of breeding birds in Pennsylvania*. Pittsburgh, PA: University of Pittsburgh Press.

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- Ellison, W. G. (Ed.) (2010). *Second atlas of the breeding birds of Maryland and the District of Columbia*. Baltimore, MD: Johns Hopkins University Press.
- Fingerhood, E. (1989). Philadelphia County. *Pennsylvania Birds* 3, 79.
- Malosh, G. (2012). Great Black-backed Gull, *Larus marinus*. In Wilson, A.M., Brauning, D.W., and Mulvihill, R.S. *Second atlas of breeding birds in Pennsylvania*. (pp.188-189) State College, PA: Pennsylvania State University Press.
- McGovern, D. (2006). Delaware County Local Notes. *Pennsylvania Birds*, 20, 96.
- Miller, E. W. (1989). *A concise historical atlas of Pennsylvania*. Philadelphia, PA: Temple University Press.
- North American Ornithological Atlas Committee. 2004. Web site www.bsc-eoc.org/norac/.
- Poole, E. L. (1964). *Pennsylvania Birds: An Annotated List*. DVOG.
- Santner, S. 1992. Black-necked Stilt. In Brauning, D. W. (Ed.) (1992). *Atlas of breeding birds in Pennsylvania*. (pp. 134-135). Pittsburgh, PA: University of Pittsburgh Press.
- Schutsky, R. M. 1992. Snowy Egret, *Egretta thula*. In Brauning, D. W. (Ed.) (1992). *Atlas of breeding birds in Pennsylvania*. (pp 54-55). Pittsburgh, PA: University of Pittsburgh Press.
- Wilson, A.M., Brauning, D.W., & Mulvihill, R.S. (2012). *Second atlas of breeding birds in Pennsylvania*. State College, PA: Pennsylvania State University Press.
- Wilson, A.M, Bishop, J., & Brittingham, M. (2012). Habitats and habitat change. In Wilson, A.M., Brauning, D.W., & Mulvihill, R.S. (Eds.). *Second Atlas of Breeding Birds in Pennsylvania*. (pp 9-22). State College, PA: Pennsylvania State University Press.

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