

## **Ruffed Grouse Population Declines in the Eastern United States**

*Prepared by the Eastern Grouse Working Group – December 2020*

### **Executive Summary**

Ruffed grouse populations have declined by at least 50% throughout the Eastern U.S. over the last 20 years. Loss of young forests across the landscape is the primary driver of this decline. Shifts in climate, predator regimes, changing land use, and mortality from West Nile Virus (WNV) are also contributing factors. Ruffed grouse abundance indices have declined by an average of 84% in the Mid-Atlantic region, 69% in the New England, and 71% in the Southeast since 1989(CBC data).

The most recent Partners in Flight Conservation Assessment identifies Bird Conservation Region (BCR) 28, the Appalachian Mountain stronghold for ruffed grouse south of New England, as having a threat level score of 4, indicating that “Severe deterioration in the future suitability of . . . conditions is expected to significantly affect a majority of the population.”<sup>1</sup> New England populations (BCR 14) were identified as being of “Regional Concern” and “Regional Importance” in need of “Management Attention”, and BCRs 22, 24, 29, 30 as currently “Peripheral” or near peripheral, with grouse populations in the foothills east of the Appalachian Mountains (BCR 29) “Nearing Extirpation.” Moderate to severe threats and moderate to significant population declines were identified in all Eastern and Lower Midwestern BCRs containing ruffed grouse.

In Eastern states where two Breeding Bird Atlases have been completed, the number of atlas blocks with grouse detections declined an average of 25% between the two time periods, with the most severe declines in Pennsylvania (30%), Maryland (32%), and West Virginia (46%). Hunter flush rates have also declined by an average of 4.6% per year in the Mid-Atlantic region and 8.5% per year in the Southeast. Because hunters tend to focus effort in the highest quality habitat (i.e., known to hold grouse), declines observed in hunter flush rates are likely conservative, reflecting minimum rates of decline.

Loss of young forests impact not only grouse but also forest health, forest resilience, and the entire suite of Species of Greatest Conservation Need that rely upon young forests. Declining grouse populations are an urgent indicator of the plight of other species which use young forests during critical life stages, including many we class as ‘mature forest’ species.

Urgent action is needed at the landscape scale, above and beyond localized habitat improvement efforts, to halt the decline in ruffed grouse and other young forest species. To fulfill our public trust responsibilities, natural resource agencies must re-double their efforts in habitat restoration, partner collaborations, and landowner outreach to stop range contractions and slow population declines. To do otherwise compromises our collective mission of ensuring sustainable populations of ruffed grouse and other young forest species for present and future generations.

## Population Status Assessment

Ruffed grouse are a cryptic and difficult to survey species, so it is a challenge to assess the magnitude of declines with high precision. No region-wide, ruffed grouse-specific monitoring has been conducted in the East. For this population analysis, the Eastern Grouse Working Group compiled relevant data from the Christmas Bird Count (CBC), the USGS Breeding Bird Survey (BBS), state Breeding Bird Atlas projects (BBA), and grouse hunter-cooperator surveys to better understand grouse population status in the East.

Christmas Bird Count. The Audubon Christmas Bird Count (CBC) provides a robust harvest-independent index of trends in grouse abundance in the region. CBC data clearly demonstrate precipitous grouse population declines in all regions of the Eastern grouse range (Figs. 1-3). State-level data is more variable, but population declines are evident (Figs. 4-6). In the last 20 years, grouse abundance indices have declined by an average of 84% in the Mid-Atlantic region, 69% in the New England region, and 71% in the Southeast region. Abundance remains significantly higher in New England than the Mid-Atlantic and Southeast regions, which may be masking the severity of regionwide population declines.

Ruffed grouse declines across the Eastern US are exacerbated by habitat fragmentation, ongoing deleterious impacts to population dynamics that occur with small and isolated habitats, and low population densities. As a result, Mid-Atlantic states have experienced rapid population decreases and the number of grouse detected in the Southeast region is exceptionally low.

Comparing CBC data with Hunter-Cooperator data further indicates that CBC can serve as a valid harvest-independent metric of population change. In the five Eastern states with reasonably robust sample sizes for both CBC and hunter cooperator surveys (NC, NY, OH, PA, VA), the mean annual CBC grouse index is highly correlated with the mean annual flush rate ( $r^2 = 0.90$ ,  $P < 0.001$ ), lending strong credence to the suggestion that grouse declines can be tracked by CBC data when grouse-specific surveys are not available and CBC routes occur within a state's grouse range.

Breeding Bird Survey. The USGS Breeding Bird Survey methodology is not conducive to detecting changes in ruffed grouse abundance, particularly in areas with low grouse densities. BBS Trend estimates have poor reliability measures in most states due to low sample sizes. Nonetheless, available BBS data do indicate negative annual trend estimates since 1985 in 10 of 12 Eastern states with data available (Fig. 7).

Breeding Bird Atlas. Breeding Bird Atlas projects have been completed twice in five Eastern states (Maryland, Massachusetts, New York, Pennsylvania, and West Virginia), allowing for direct comparisons of presence between the two time periods. All five states completed BBAs prior to 1989 and again in 2005 or later. Coincidentally, these time periods represent pre- and post- snapshots of the arrival and spread of WNV in the Eastern U.S, which began in 1999. The number of survey blocks with grouse detections declined an average of 25% between the two time periods, with the most severe declines in Pennsylvania (30%), Maryland (32%), and West Virginia (46%) (Fig. 8).

Grouse Hunter-Cooperator Surveys. Hunter data provide further evidence that grouse numbers have declined. Nine states in the East have used a grouse cooperator survey as an index of populations annually for at least 10 years since 1995 (Figs. 9 and 10). All states except West Virginia (with a very low number of cooperators) have recorded a substantially declining trend in number of grouse flushed per hour (Fig. 11). Flush rates have declined by an average of 4.6% per year in the Mid-Atlantic region and 8.5% per year in the Southeast. Because hunters are likely to focus efforts in the most productive habitats with the highest densities of grouse, these data, again, are likely conservative, reflecting minimum rates of decline.

Partners in Flight Conservation Assessment. The most recent Partners in Flight (PIF) Conservation Assessment identifies BCR 28, the Appalachian Mountain stronghold for ruffed grouse south of New England, as having a Threat Level score of 4, indicating that “Severe deterioration in the future suitability of . . . conditions is expected to significantly affect a majority of the population”<sup>1</sup> (Fig. 12). Grouse populations in the foothills east of the Appalachian Mountains (BCR 29) were identified as “Nearing Extirpation”. In New England (BCR 14) grouse were identified as a species of “Regional Importance” of “Regional Concern” and needing “Management Attention.” The PIF Assessment identifies BCRs 22, 24, 29, 30 as currently “Peripheral” or near peripheral, with reviewers expressing concern over “some”, “a handful”, “maybe hanging on”, and “steep decline” in BCR 22; “still being detected/not yet extirpated” in BCR 24, and “becoming rare/hard to find” in BCR 29. Regional threats are identified as “decline in young oak systems”, “uncertain markets/potential decline in oak harvests”, and “loss of habitat.” Eastern ruffed grouse, in a majority of the BCRs where they occur, are expected to face Moderate to Severe threat levels in future (Fig. 12).

### **Drivers of Decline**

Early successional forests have been declining in North America for decades because of changing land use, changes in forest management practices, lack of natural disturbance, and widespread forest maturation, resulting in reduced habitat quantity and quality for ruffed grouse<sup>2, 3, 4, 5</sup>. High-quality grouse habitat in lower New England, the Mid-Atlantic, the southern Appalachians, and the Lower Midwest has become increasingly fragmented and isolated. In some areas, suitable habitat remains unoccupied because it is too isolated to be re-colonized. In many areas that continue to hold grouse, population persistence is severely compromised because reproduction and immigration do not outpace mortality. In areas of high-quality habitat, grouse may still occur at high densities, and habitat remains the key to population recovery. Monitoring in Pennsylvania suggests that populations in regions of high-quality habitat experience WNV-related declines but recover more quickly than those in regions of marginal and fragmented habitat<sup>6</sup>.

## **Urgent Action is Needed**

Ruffed grouse populations have declined more than 50% throughout the East over the past two decades. Local extinctions and range contraction may be hastened by the double threats of young forest habitat loss and West Nile Virus mortality. Increased predation pressure and changing weather conditions that reduce brood survival may also contribute to declines. Loss of high-quality habitat at landscape scale renders grouse less capable of coping with all stressors.

Ruffed grouse seem destined for extirpation in several areas unless immediate habitat restoration is initiated. Efforts to restore habitats should be focused near areas where grouse already occur due to their limited dispersal distance. Restoration in high elevation sites may help buffer grouse from WNV impacts. Population restoration efforts must be planned at the scale and intensity necessary to create well-connected patches of high-quality young forest comprising 10-15% of restoration landscapes. Young forests at this scale will benefit not only young forest species but also many others that are considered 'mature forest' obligates<sup>7</sup>.

**Site-specific habitat management efforts are the simplest to plan and implement, but the scope and scale of declines call for a different approach. Large-scale strategic planning and carefully prioritized implementation is needed to accomplish the goal of sustaining ruffed grouse and other young forest species.**

### Citations:

<sup>1</sup> Panjabi, A.O., W.E. Easton, P.J. Blancher, A.E. Shaw, B.A. Andres, C.J. Beardmore, A.F. Camfield, D.W. Demarest, R. Dettmers, R.H. Keller, K.V. Rosenberg, T. Will, and M.A. Gahbauer. 2020. Avian Conservation Assessment Database Handbook, Version 2020. Partners in Flight Technical Series No. 8.1.  
<http://pif.birdconservancy.org/acad.handbook.pdf>.

<sup>2</sup> Butcher, G.S. and D.K. Niven. 2007. Combining data from the Christmas Bird Count and the Breeding Bird Survey to determine the continental status and trends of North America birds. National Audubon Society. Ivyland, PA.

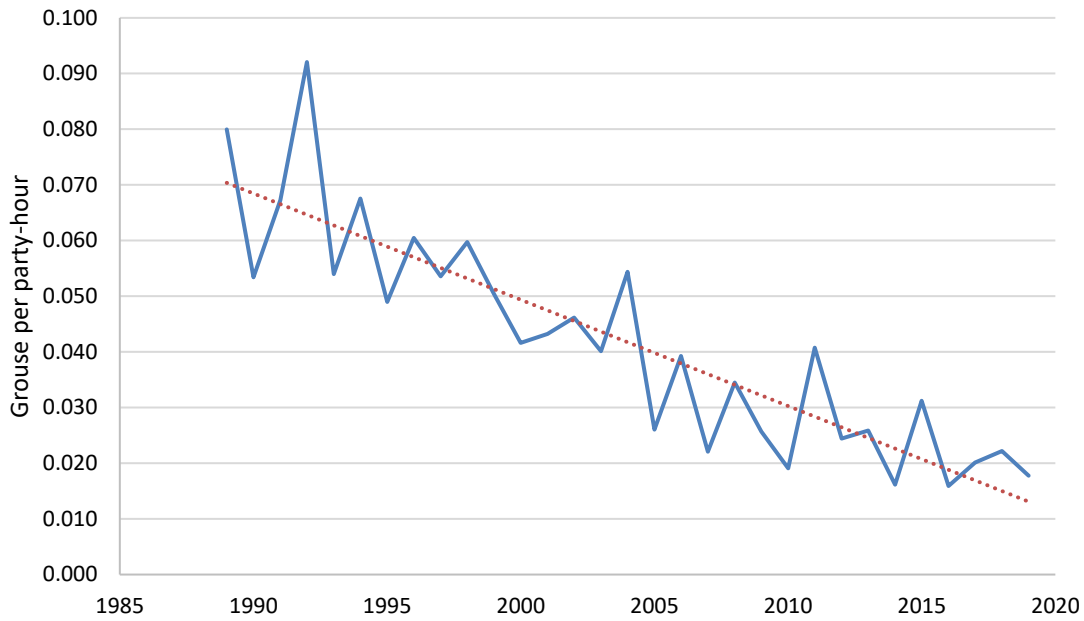
<sup>3</sup> Dessecker, D.R. and D.G. McAuley. 2001. Importance of early successional habitat for forest game birds. Wildlife Society Bulletin 29: 456-465.

<sup>4</sup> Dessecker, D.R., G.W. Norman, and S.J. Williamson. 2006. Ruffed Grouse Conservation Plan. AFWA Resident Game Bird Working Group.

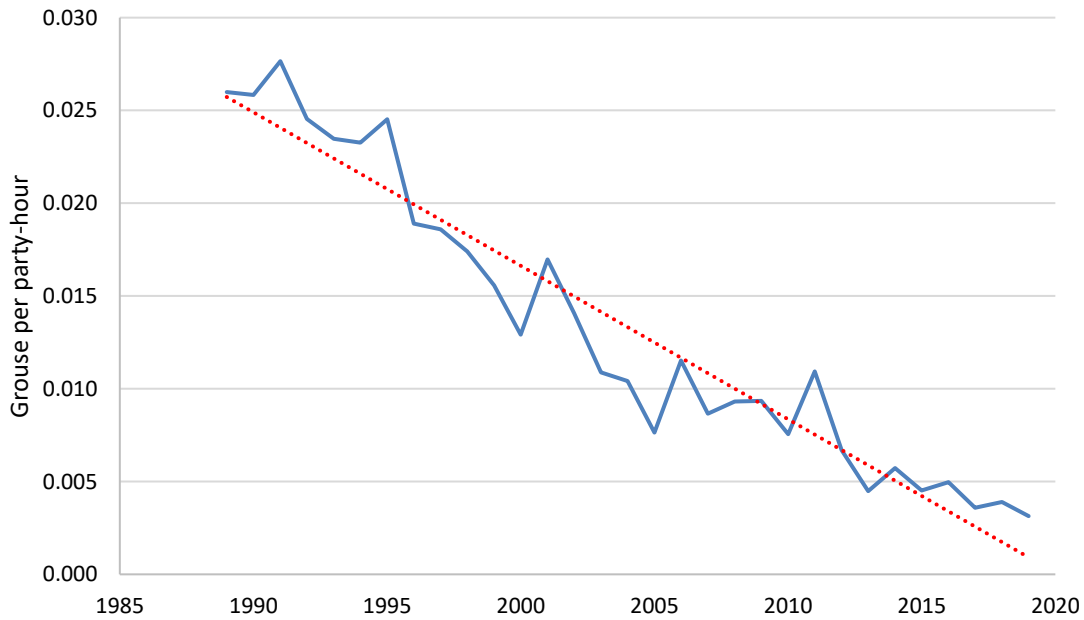
<sup>5</sup> Trani, M. K. R. T. Brooks, T. L. Schmidt, V. A. Rudis and C. M. Gabbard 2001. Patterns and trends of early successional forests in the Eastern United States. Wildlife Society Bulletin 29:413-424.

<sup>6</sup> Williams LM. 2019. Statewide grouse hunting survey. Annual Job Report 06290. Bureau of Wildlife Management, Pennsylvania Game Commission. Harrisburg, Pennsylvania, 16 pp.

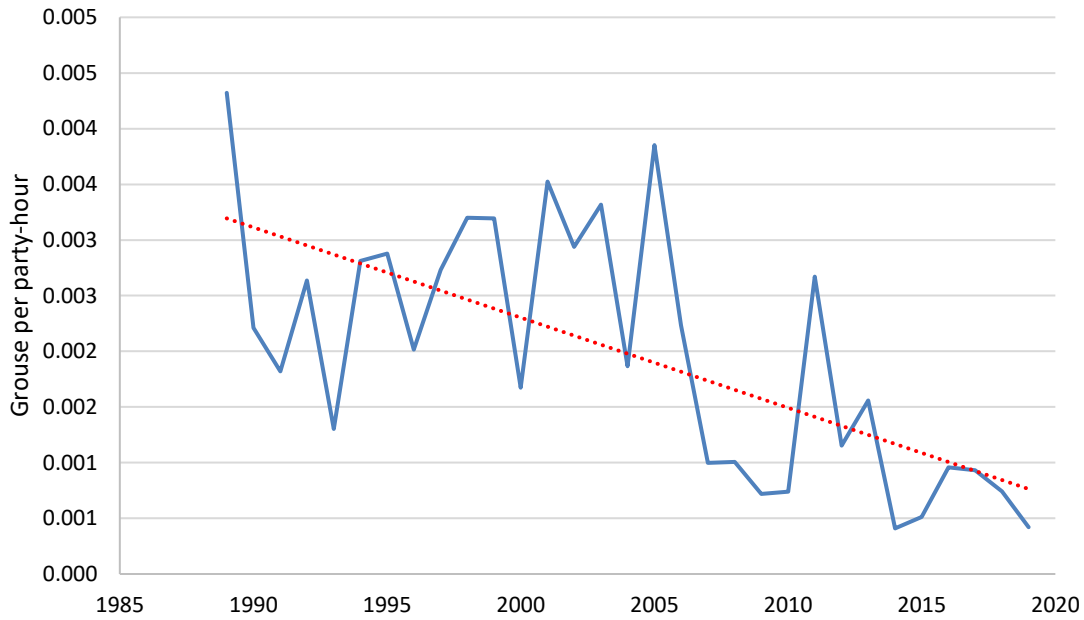
<sup>7</sup> P. J. Ruhl, C. D. Delancey, and J. B. Dunning Jr. 2018. Roost preference, post-fledging habitat use, and breeding phenology of adult female Worm-eating Warblers (*Helminthos vermivorum*) on the breeding grounds. The Wilson Journal of Ornithology 130(2):397-409.



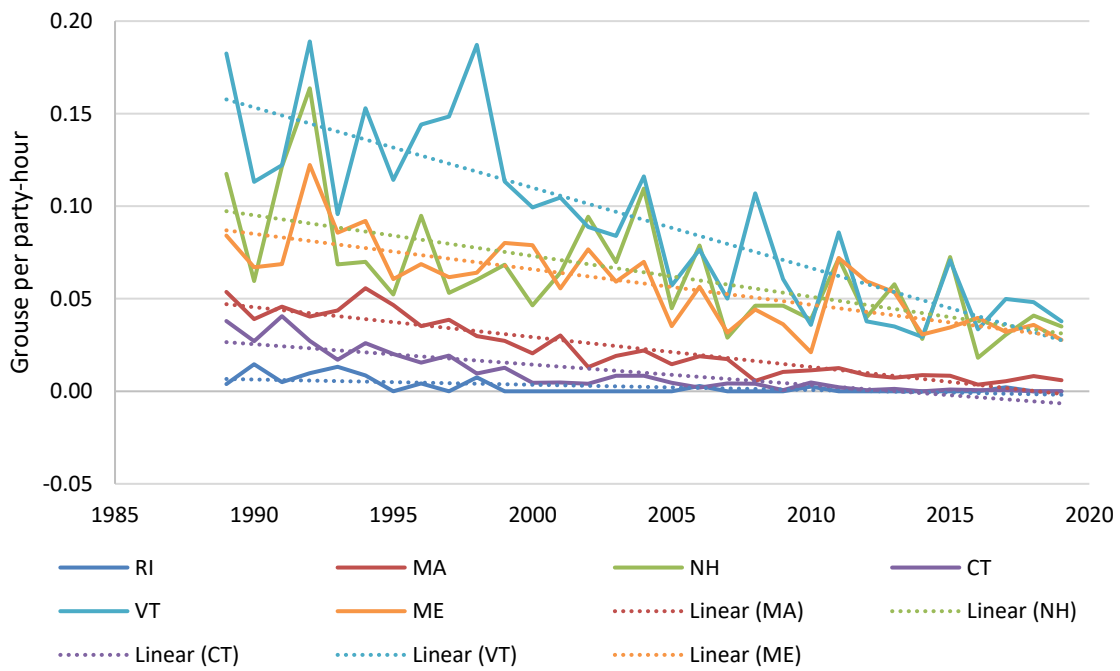
**Figure 1.** Mean Christmas Bird Count Index for ruffed grouse in New England states (1989-2019). “New England” includes Maine, New Hampshire, Vermont, Rhode Island, Connecticut, and Massachusetts.



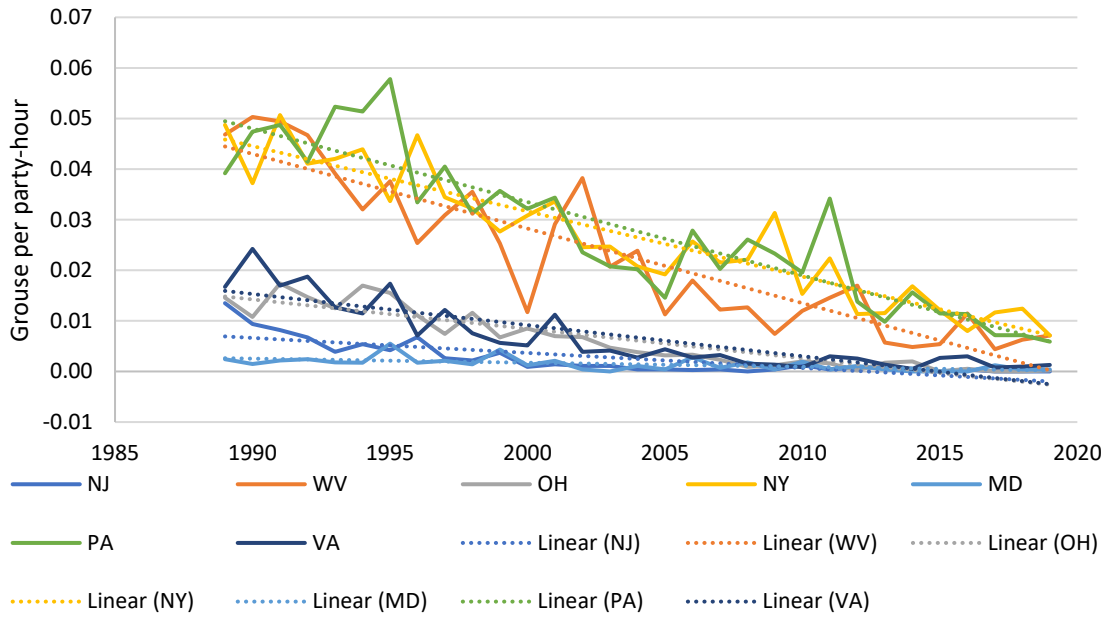
**Figure 2.** Mean Christmas Bird Count Index for ruffed grouse in Mid-Atlantic states (1989-2019). “Mid-Atlantic” includes New York, New Jersey, Pennsylvania, Maryland, Ohio, West Virginia, and Virginia.



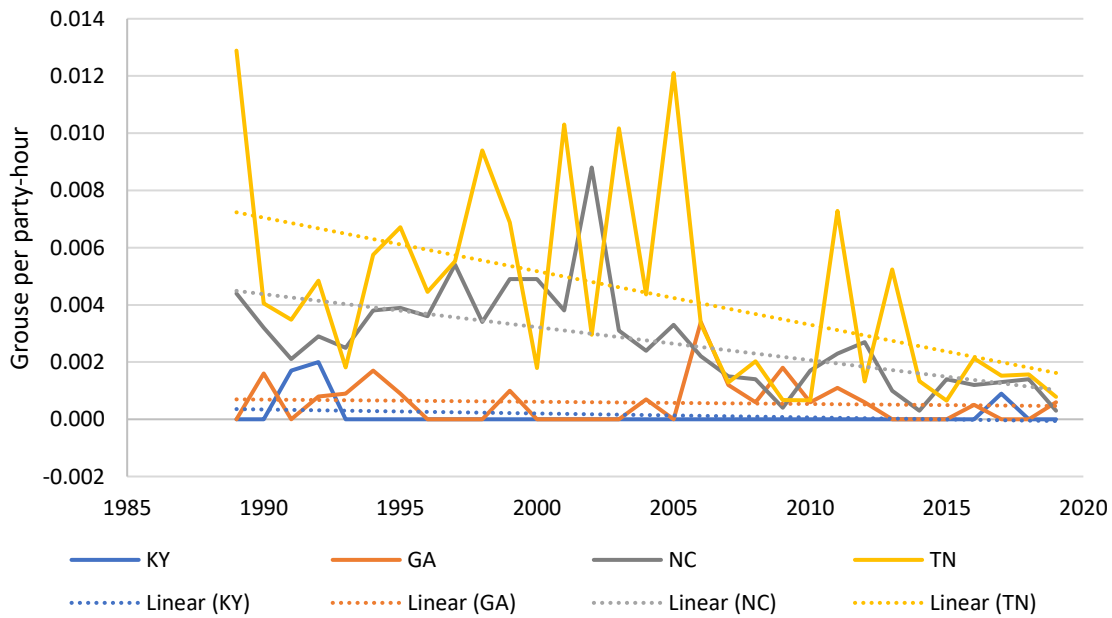
**Figure 3.** Mean Christmas Bird Count Index for ruffed grouse in Southeast states (1989-2019). “Southeast” includes Kentucky, Georgia, North Carolina, and Tennessee. Data not available for South Carolina.



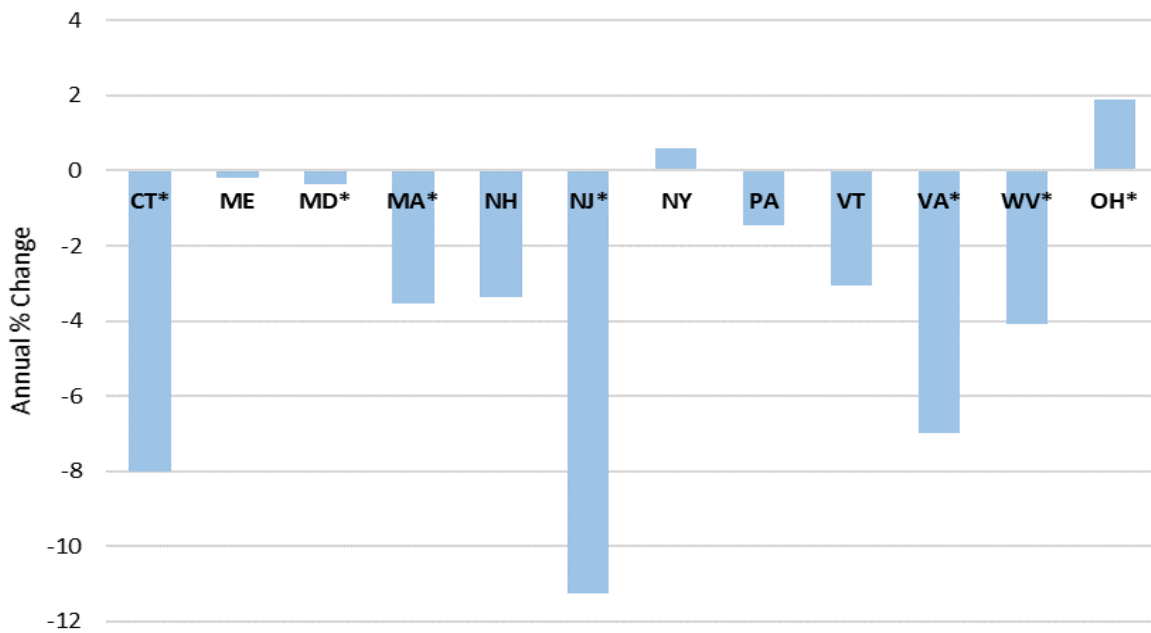
**Figure 4.** Christmas Bird Count Index for ruffed grouse in New England States (1989-2019).



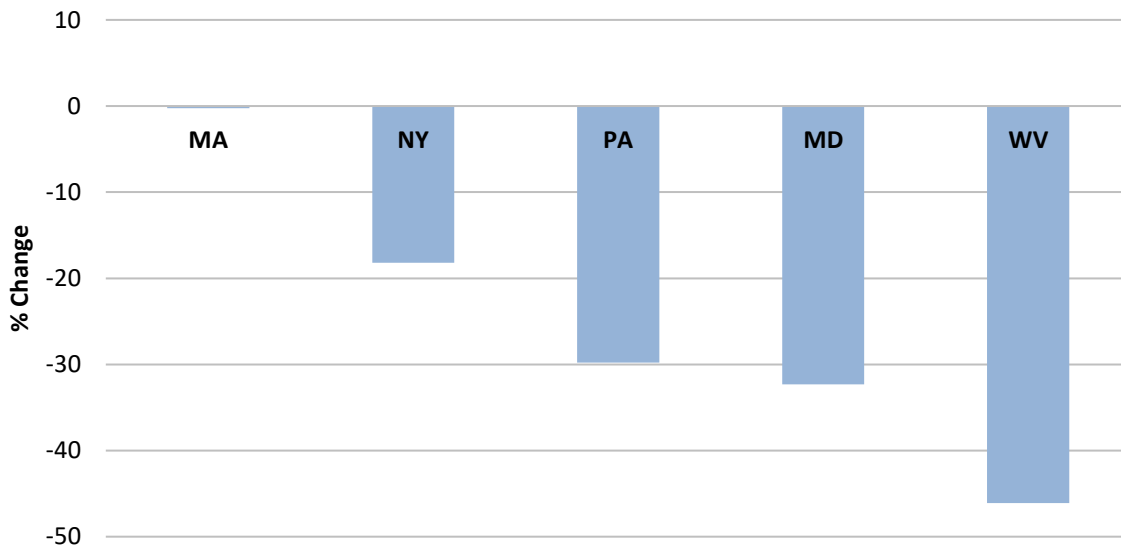
**Figure 5.** Christmas Bird Count Index for ruffed grouse in Mid-Atlantic States (1989-2019).



**Figure 6.** Christmas Bird Count Index for ruffed grouse in Southeast States (1989-2019).



**Figure 7.** USGS Breeding Bird Survey annual trend estimates for ruffed grouse in Eastern states (1985-2015). Asterisk (\*) indicates poor data credibility per USGS. Trend data not available in all states due to low sample sizes.



**Figure 8.** Change in the number of Breeding Bird Atlas blocks with grouse detected between the 1<sup>st</sup> survey period and 2<sup>nd</sup> survey periods. Atlas projects conducted in Massachusetts (1974-79 and 2007-11), New York (1980-85 and 2000-05), Pennsylvania (1983-89 and 2004-09), Maryland (1983-87 and 2002-06), and West Virginia (1984-89 and 2009-14).



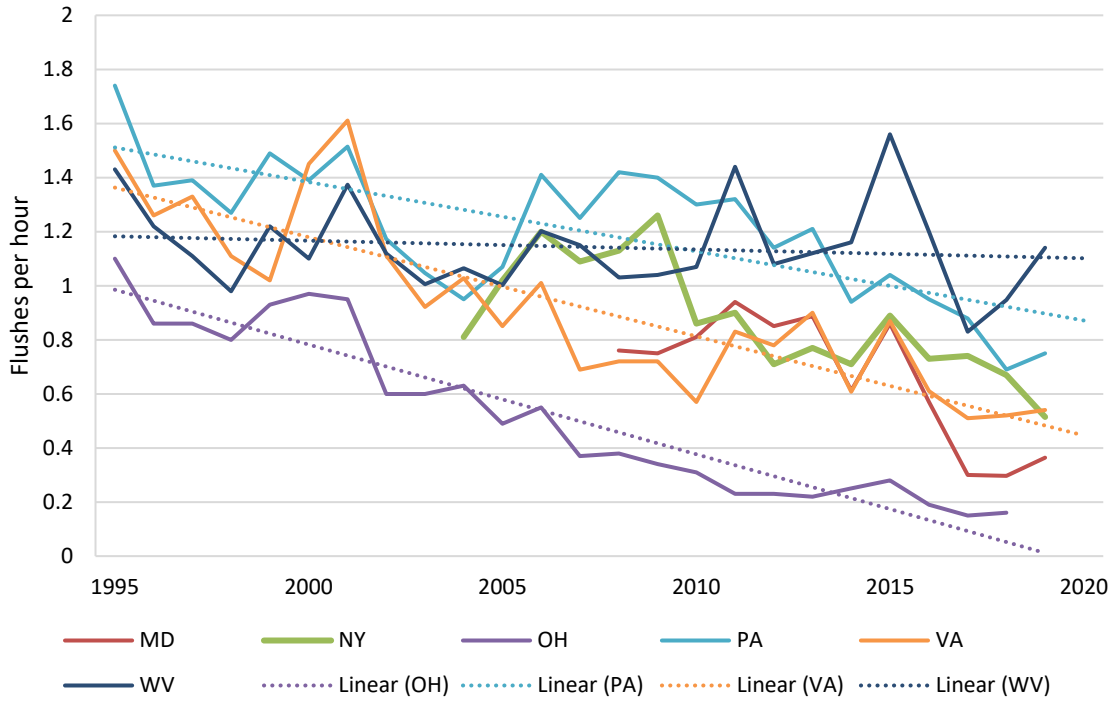


Figure 9. Number of ruffed grouse flushed per hour reported on hunter cooperator surveys, Mid-Atlantic states.

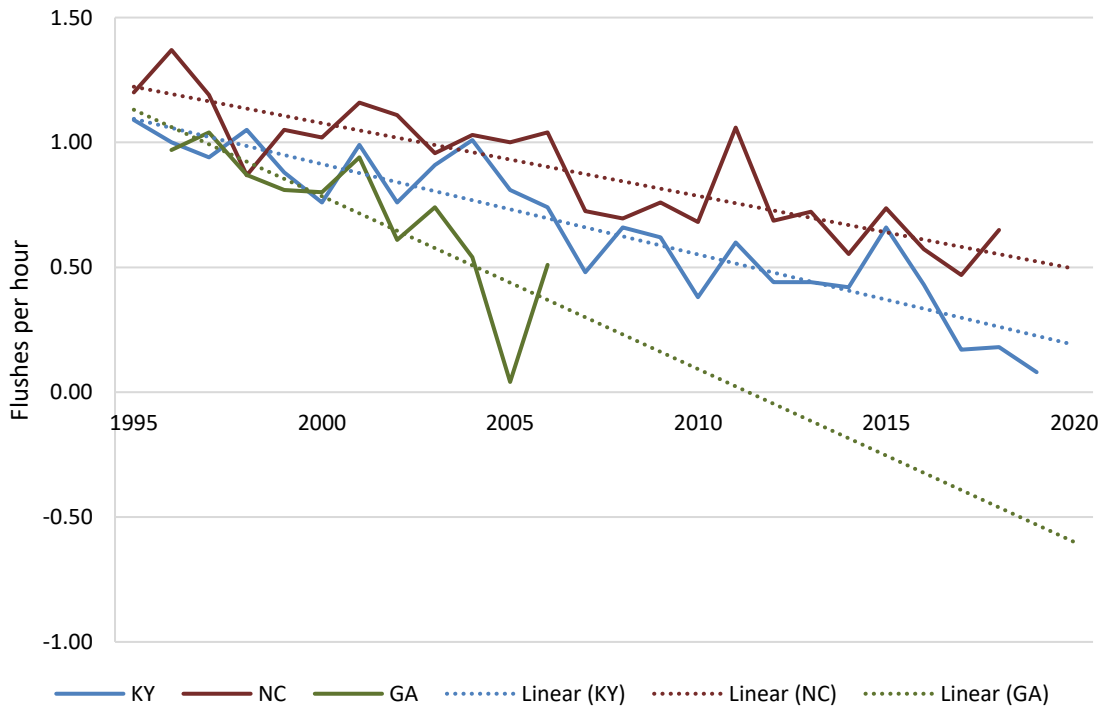
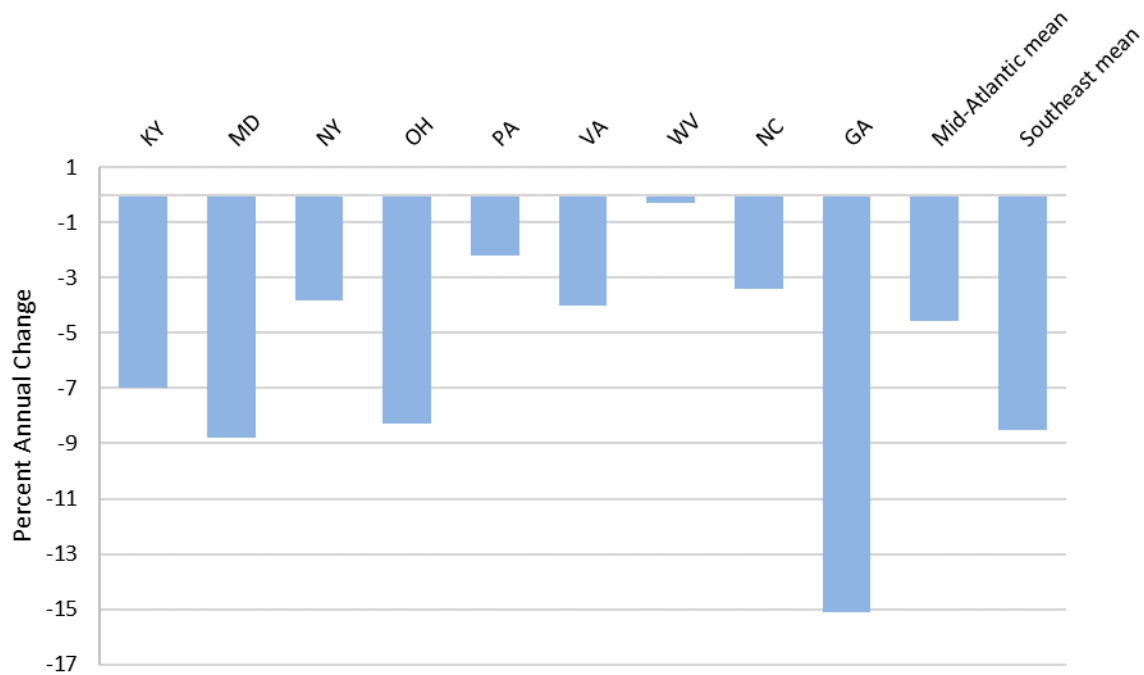
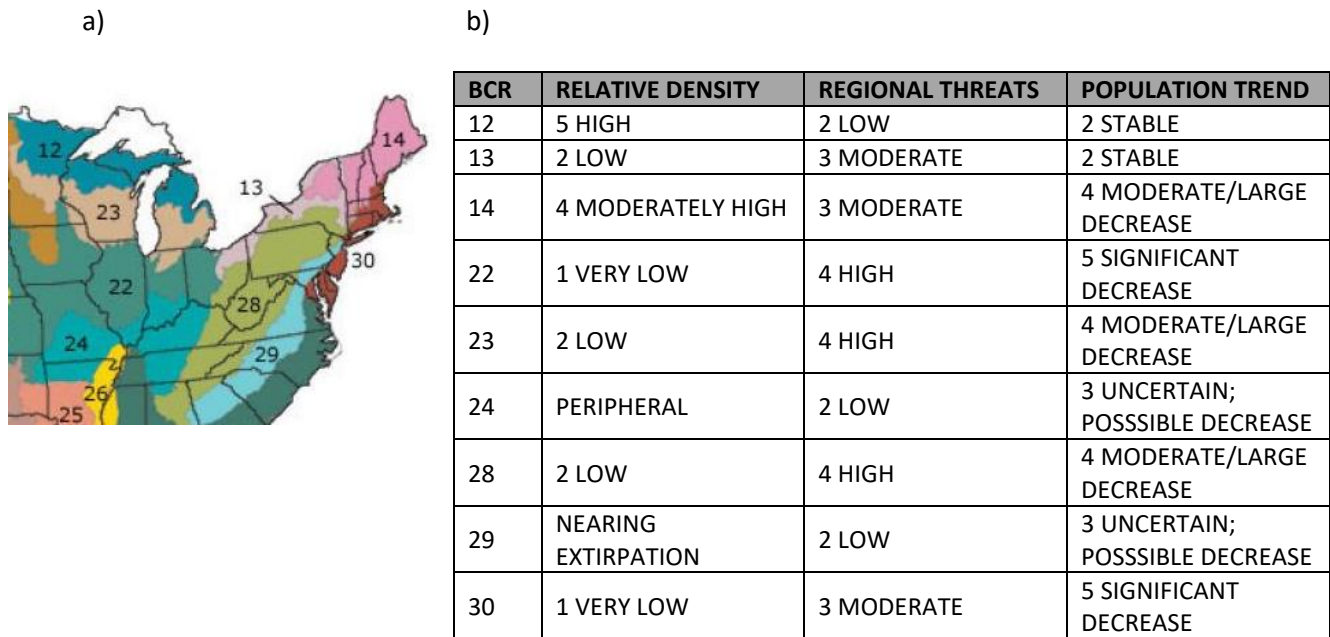


Figure 10. Number of ruffed grouse flushed per hour reported on hunter cooperator surveys, Southeastern states.



**Figure 11.** Percent annual change in flushes per hour reported on hunter cooperators surveys in the Eastern Region, 1995-2019 (if available). “Mid-Atlantic” includes Maryland, New York, Ohio, Pennsylvania, Virginia, and West Virginia. “Southeast” includes Kentucky, North Carolina, and Georgia. No data were available for New England.



**Figure 12.** a) Bird Conservation Regions (BCRs) in the eastern U.S.; b) Partners in Flight Species Conservation Assessment of relative density, regional threat, and population trend for ruffed grouse in the Eastern U.S.