

## **PENNSYLVANIA 2018 Grouse and Woodcock Status Report**

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### **RUFFED GROUSE**

#### **Hunter Cooperator Survey**

For the fall and winter hunting survey, avid grouse hunters (i.e. cooperators) were sent survey forms in October 2017. Forty-four percent of 595 Cooperators submitted hunt information. Useable replies were received from 206 of 262 responding cooperators; the remaining 56 submitted 'did not hunt' responses. Grouse Cooperators submitted data on 1,456 hunts, representing 4,135 hours of active grouse hunting. Grouse hunters averaged 20 hours hunted, 18 grouse flushed, and 0.87 grouse bagged during the 2017-2018 hunting season. Daily effort was greatest during the October (95.7 hours/available day) and November (83.7 hours/available day), followed by the December segment (71.3 hours/available day). December participation increased dramatically (up 96% compared to 2016) with the loss of the post-Christmas "Late Season" in 2017. The November portion of the season accounted for 52% of the statewide cooperator harvest, followed equally by December (24%) and October segments (24%).

Statewide, cooperators hunted 4,135 hours and recorded 3,641 flushes for an average rate of 0.88 flushes per hour. This flush rate of 0.88 represents a 6% decrease compared to the previous season and is the lowest flush rate observed in 53 years of population monitoring (G&W Fig 1; G&W Table 1). It is 36% below the long term (52-year) average of 1.37 flushes per hour. Compared with the previous year, all regions exhibited decreased flush rates except the NW which ticked up (5%) slightly. All regions are greatly below their respective 35-year long-term averages (Northwest -41%; Northcentral -22%; Northeast -38%; Southwest -51%; Southcentral -66%; Southeast -32%) (G&W Table 2). Even compared to 10-year short-term averages, all regions except the Southeast are currently very depressed (Northwest -41%; Northcentral -24%; Northeast -22%; Southwest -25%; Southcentral -44%; Southeast -6%) (G&W Table 2).

Without the relatively high annual abundance in the Northwest and Northcentral regions the statewide flush rate falls precipitously lower. In these regions, the mix of northern hardwoods and oak forests provides optimum nutrition, while active forest management within a largely forested landscape provides abundant habitat. Unfortunately, it is becoming evident that after years of high West Nile Virus (WNV) prevalence, these regions cannot be counted on to produce an abundance of grouse, which drops the statewide average below 1 bird/hour to a record-low 0.88 flushes/hour in 2017-18 license year. In other areas of the state, the Southcentral and Northeast regions retain relatively large-scale forested landscapes with suitable forest types, yet they seem to be under-producing grouse. Aggressive and focused grouse habitat management and continued investigation into non-habitat factors contributing to declines must be prioritized if we are to protect dwindling grouse populations and a grouse hunting tradition.

### Summer Sighting Survey

For the 2018 summer sighting survey, 45 Pennsylvania Game Commission foresters and surveyors recorded grouse seen while working in the woods during 1,507 observer days (June and July data only; August not yet available). Observers averaged seeing 3 broods/100 days and 21.8 total grouse/100 days. Productivity in 2018 was 3.6 chicks/hen for 26 unique broods observed in June and 1.8 chicks/hen for 5 unique broods observed in July. It is unlikely that August sightings will improve these data relative to past years, making the hunting season forecast for 2018-19 quite guarded.

Nesting and brooding weather in 2018 was quite wet, with record-high rainfall occurring in much of Pennsylvania during June, July and August. Annual weather patterns are expected to influence annual production, but even *when* examined over the long term, the summer grouse sighting population index reveals worrisome declines. With 26 individual broods observed, June 2018 brood sightings were down 2% while total grouse sightings were up 25% from 2017. In July, total grouse observations were relatively stable since 2017 (down a modest 5%), but the number of broods seen was down by 42% compared to 2017. Repeat observations, when foresters were working together, are always an issue and serve to somewhat inflate brood observations. Only 31 of 45 brood observations in June and July represented unique sightings. August sightings have not yet been analyzed, but it is unlikely that those observations will bring the 2018 production season up to satisfactory levels.

Until the early 2000s, June and July brood observations tracked well together, with July observations serving as a rough index of survival. Analysis of Summer Grouse Sighting brood observations reveals a statistically significant ( $P < 0.001$ ) divergence in June versus July grouse production trends (data based on 1000+ observer days per year). Though June brood observations have been slowly declining since the 1980s, declines in July brood observations are more severe and more recent. In July 2018, with a total of 613 observer days in the Summer Sighting Survey, just 5 unique grouse broods were observed, compared to 26 unique broods in June. The underlying cause(s) of decreasing brood observations in late summer is unknown – though WNV is increasingly suspected as a downward driver on juvenile grouse survival [2003-2016 correlation of July broods:WNV Index max  $r = -0.49$ ;  $P = 0.08$ ; August broods:WNV Index max  $r = -0.50$ ;  $P = 0.07$ ; Summer broods:WNV Index max  $r = -0.51$ ;  $P = 0.06$ ].

Productivity in 2018 was 3.6 chicks/hen for 26 unique broods observed in June, and 2 chicks/hen for 5 unique broods observed in July. June productivity was equivalent to June 2017 while July productivity was 31% lower than 2017 values.

Grouse season forecasts have become more difficult to make in recent years. Since 2002, brood observations have not been as reliable a predictor of the fall harvest as they were previously. However, the preliminary outlook for the 2018-2019 grouse season is clearly guarded. Statewide, incubation and brooding weather was extremely wet. June and July 2018 brood observations are below both 36-year long-term average and 10-year short-term average (June broods down 38% from 10-yr average; July down 71%). Total grouse observations are also well-below the 10-year short-term average (June total grouse down 33% from short-term average; July observations down 49%).

### **Habitat Restoration**

Restoration of significant acreage of early-succession habitat (ESH) remains the central goal of Pennsylvania's Ruffed Grouse Management Plan, which outlines best methods to increase populations to 1980's levels. That Plan identified a PGC goal of creating 8,000 acres of young forest habitat per year on SGL. Currently, the SGL system has very little young forest (roughly

7% of PGC acreage is less than 20 years old), and a significant amount of old forest (62% of Pennsylvania forests are older than 80 years). This is not an optimum distribution of age classes to meet Grouse and Woodcock Plan goals, which were labeled as “too ambitious” when written.

To achieve a more balanced distribution of age classes on SGL forests, the agency now recognizes that harvests must be increased to about 13,500 acres per year. This is a significant increase from harvesting levels of the last 20+ years when average timber harvests hovered around 6,000 acres per year. It is also more ambitious than the Grouse and Woodcock Management Plan prescriptions. In recognition of this, the PGC forestry program has increased outputs and are now over 10,000 acres harvested in 2017 (G&W Fig 2).

Plans are in motion to grow outputs even more toward the 13,500-acre annual goal. To accelerate our outputs, the PGC hired 12 additional seasonal forestry staff in early 2018 and has revived our summer intern program, hiring an additional 14 summer interns to assist with forestry efforts. Our goal is to achieve the target of 17 percent of forests in the 0 to 20-year age class within the next 50 years.

Integration with other early-succession initiatives, and with SGL planning, remains an important element of these efforts. Non-commercial habitat creation is increasingly being used on SGL (G&W Fig 2). During 2017, prescribed fire was used to manage 14,500 acres, including 200 acres on properties enrolled in the Hunter Access Program. This is an exciting first step in an initiative to increase the use of prescribed fire on private lands.

Active and focused grouse-specific management, as called for in the Ruffed Grouse Management Plan, is necessary to improve grouse populations. For best effect, habitat restoration projects should be sited near grouse production areas to provide high-quality habitat for dispersing juveniles. As populations respond, habitat efforts should be expanded outward in an ‘expanding bullseye’ fashion. Every effort should be made to ensure that dispersing juveniles have appropriate habitat available. Five years of grouse wing collection and three years of WNV antibody-testing has now revealed where huntable (i.e. abundant) grouse populations occur (G&W Figure 3) as well as where WNV-survivor populations are located (G&W Figure 4). Targeted grouse habitat efforts in the Northeast and Southcentral regions, in particular, may help these areas live up to their grouse production potential. The Southeast region has an area of high-WNV survival (based on hunter-harvested blood serology). This area should also be the focus of grouse-enhanced management to encourage expansion of that robust population.

## **Harvest**

PGC Game Take Survey results, which compile statewide hunter harvest and participation, estimated that 18,393 grouse were harvested statewide in 2017-18. Across all season segments, 18,393 grouse were harvested by 32,693 hunters over a total of 138,806 hunting days, for an average of 0.13 harvest/day ratio. All hunt activity occurred prior to Christmas, as the Late Season was closed in 2017-18 license year.

## **Research and Management**

Implementation of the PGC’s Ruffed Grouse Management Plan is well underway, with progress made on 19 of 23 management objectives (83%) to date. The plan summarizes the current state of ruffed grouse populations in Pennsylvania and provides guidance on research and management priorities.

### *Research*

Hunter-harvested blood sampling in 2015-17 revealed that 13% of harvested birds in 2015-16 had West Nile Virus+ antibodies, 24% of harvested grouse had WNV+ antibodies in 2016-17, and just 4% exhibited WNV antibodies during the severe WNV year of 2017. These WNV-positive birds represent WNV survivors in the fall population. The 3-year pattern in antibody prevalence suggests that fewer antibody-positive survivors occur in the harvested population, as a proportion of total, during severe WNV years (G&W Figure 5). Additional years of serology sampling will shed more light on this issue. Intriguing findings also suggest that forest type and/or habitat quality may be impacting the resilience of populations, with northern regions (northern hardwoods/mixed oak) forest types exhibiting higher WNV antibody prevalence (i.e. exposed survivors) than southern regions (oak-hickory forest types) (G&W Figure 6). Furthermore, the northern hardwoods regions exhibit rapid population recovery after WNV losses and higher incidence of survivorship (G&W Figure 7). Southern regions exhibit relatively low proportions of WNV survivors and show only weak population recovery after bad WNV years, followed by continued declines (G&W Figure 7). Ongoing research into mosquito/WNV cycling in woodland habitats may help reveal management options either in terms of where to focus habitat restoration or in direct control of mosquito production areas.

### *Management*

Given the ongoing declines in grouse population indices, a new harvest management framework was implemented in 2018 for setting seasons and bag limit recommendations. This responsive harvest framework will dictate season setting in future years by triggering the expansion or contraction of the post-Christmas grouse season segment. While harvest management alone will not reverse these trends, limiting direct (harvest) and indirect (disturbance-induced) late-winter mortality of grouse through restricted or closed winter hunting seasons may be an important conservation tool. Reducing late winter harvest may allow for carry-over of more birds into the spring breeding population.

Under the Responsive Harvest Framework, the length of the post-Christmas grouse season will vary between Closed, 1-week, or 4 weeks, based on grouse population indices of abundance and productivity. If and when differences in population indices guide the recommendation toward different season recommendations, then WNV severity indices will be used to make a final season length recommendation. Under this framework, Pennsylvania is split into two management zones. [Refer to the 2017 PA State Report for additional details on the framework.]

### **Season Dates**

**2018-19:** Oct. 13–Nov. 24, Dec 10-24; (no post-Christmas season); (2-bird daily bag limit, 6-bird possession limit). As with other small game, closed intervals occur during the regular firearms deer season.

## **AMERICAN WOODCOCK**

### **Population Status**

2018 federal Singing Ground Surveys were conducted on 32 routes in Pennsylvania. 2018 results were 1.17 males per route in Pennsylvania and 2.24 males per route in the Eastern Region. These values are slight decreases from 2016 results. Despite recent stability, the 10-year trend in both Pennsylvania and the Eastern Region indicate ongoing declines.

For the USFWS Parts Collection Survey, 51 Pennsylvania hunters submitted 275 wings from birds harvested in Pennsylvania in 2017. The PA recruitment index was 1.3 juvenile per adult hen (a slight increase above previous year), while the index for the EMR was 1.34 juveniles per adult female. The PA value is up 30% compared to prior year, while the EMR was comparable to prior year (down 6%). Both values remain below their respective long-term averages. It is important to note that these values are obtained from wings harvested in PA, but there is no way to tell if these birds were produced in PA. Thus, recruitment figures should be interpreted with caution.

### **Restoration**

A central objective of Pennsylvania's 2008-2017 Woodcock Management Plan is restoring populations to 1970's levels by increasing the amount of young forest habitat on Pennsylvania's landscape. Efforts to increase young forest habitat have included incorporating young forest management into comprehensive management plans for individual SGLs and coordinating with the 6 PGC regional diversity biologists who provide technical assistance to private landowners on practices to benefit special concern species. Game Commission acreage summaries are included in the habitat narrative and figures presented previously for grouse habitat (G&W Figure 2). Portions of the PGC non-commercial work, in particular, are directed to moist sites that have potential to support woodcock.

Habitat restoration is also being accomplished through collaboration with Wildlife Management Institute (WMI), the Appalachian Mountains Woodcock Initiative, the Golden-Winged Warbler Initiative, US Fish and Wildlife, PA Department of Conservation and Natural Resources and other agencies.

### **Harvest**

Estimates from the 2017 USFWS Harvest Information Program (HIP) once again indicated that Pennsylvania ranked first in the number of active woodcock hunters among states in the Eastern Management Region, with 5,200 active hunters in 2017-18 (down 17% from prior year). Pennsylvania ranked second among Eastern Management Region states in woodcock hunter effort (20,700 days afield; up 14% from prior year). Estimated woodcock harvest was 8,200 birds, up 110% from 2016.

Based on 2017 diary data from 508 woodcock hunts and 1,439 hours of active hunting, PA Woodcock Cooperators experienced 1,168 flushes, for a statewide average of 0.81 flushes/hour. This flush rate is down 41% from prior year, and

the lowest PA hunters have seen since 1985 and 1991, the previous record-low years (G&W Figure 8).

### **Research and Management**

We continue to follow the Woodcock Management Plan, with implementation occurring on 90% (18 of 20) strategies. To evaluate the effectiveness of our early-succession habitat management efforts, singing male woodcock surveys are conducted at Appalachian Mountains Young Forest Initiative Demonstration Areas, SGLs emphasizing woodcock management, long term monitoring sites and other high-priority habitat sites. These surveys, monitoring local-level population response to habitat work, supplement the landscape-level USFWS Woodcock Singing Ground Survey routes. Where possible, data is collected prior to habitat treatments to provide baseline information for assessing treatment effects in future years.

In Spring 2018, PGC staff and volunteers conducted surveys at 38 habitat management areas (87 individual SGS routes) to assess the population response to management. Average singing male index among all surveyed sites was 6.5 singing males per route, a decline of 10% from 2017. Though weather and the timing of migration affects spring surveys, managed sites still supported nearly six times the number of singing males that occur on random USFWS Singing Ground routes (G&W Figure 9).

This demonstrates the dramatic benefits of habitat improvement. We will continue monitoring treatment sites, as field staffing allows, to assess trends over time. This information has been used by WMI in performance auditing and in developing partnerships with funding agencies to manage new sites – thus, this type of Management Response monitoring should be prioritized and adequate staffing allocated.

### **Season Dates**

**2018:** Oct. 13–Nov. 24, closed Sundays (3-bird daily bag limit).

Figure G & W 1. Average annual grouse cooperator hunting season flushes/hour and summer grouse sightings, Pennsylvania, 1965-2017.

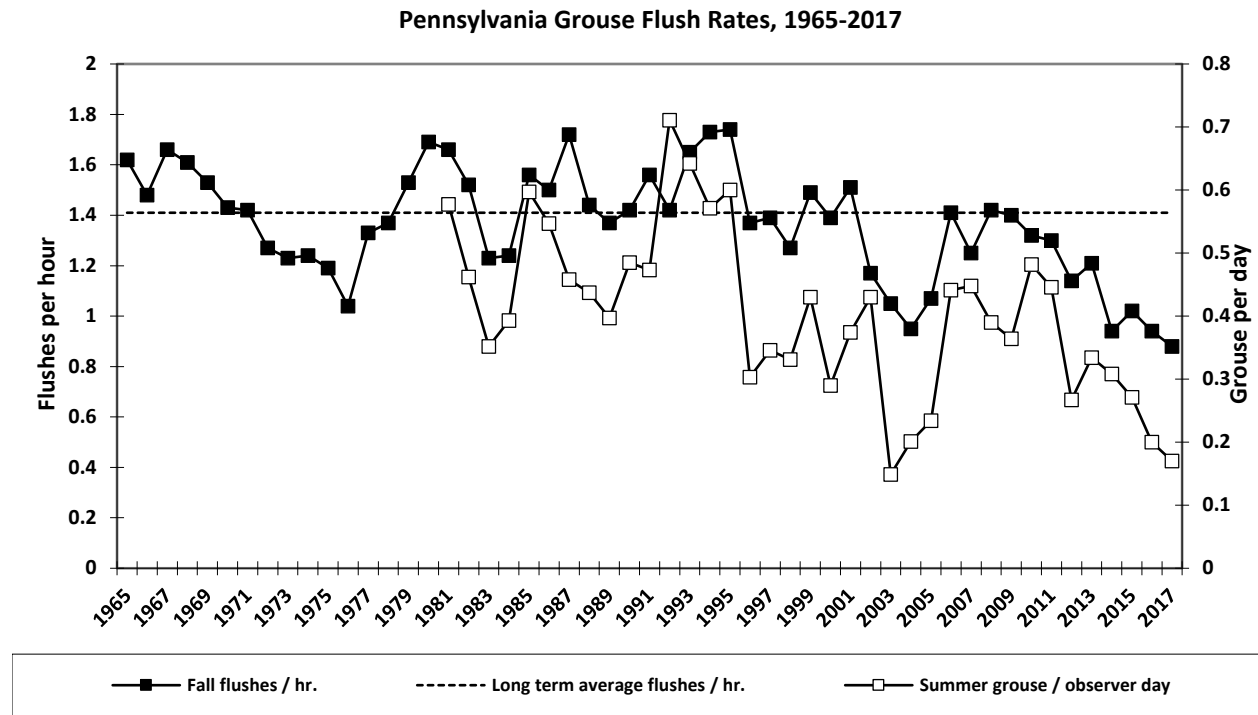


Figure G & W 2. Pennsylvania State Game Lands acreage harvested, 2008-2017.

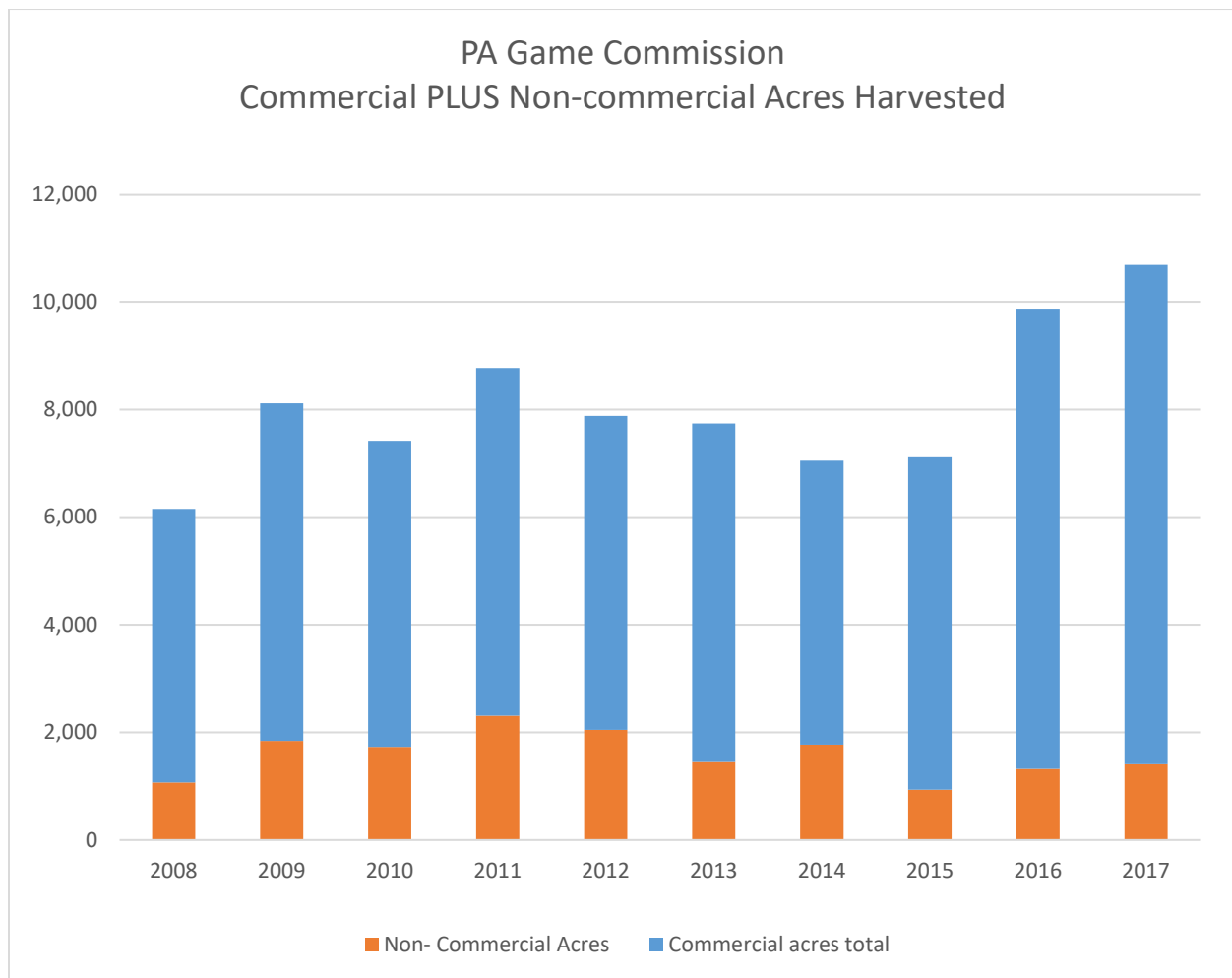
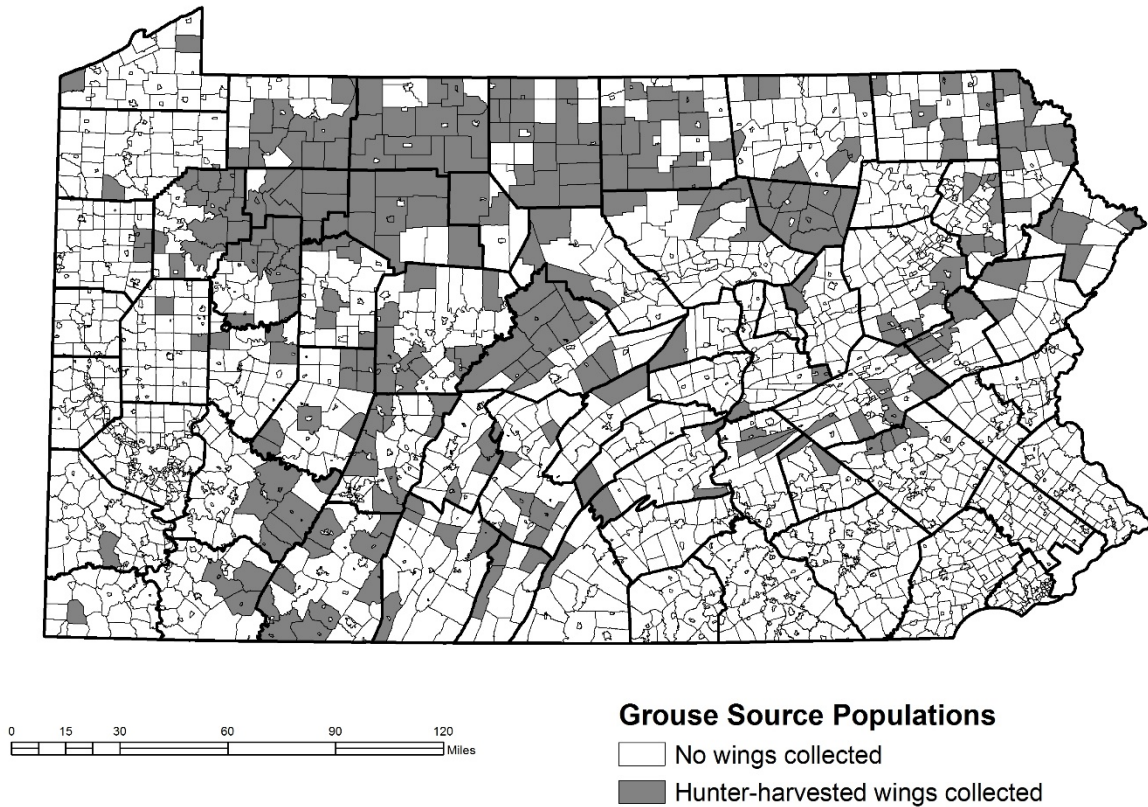




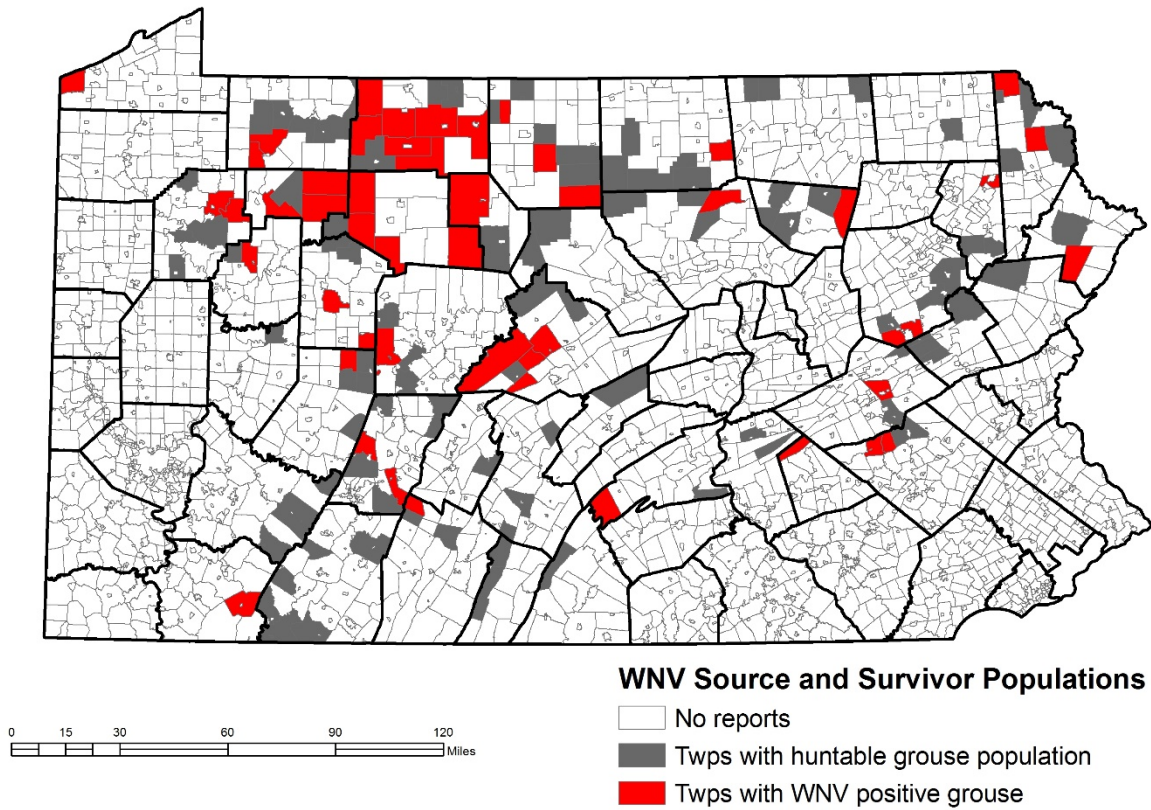
Figure 3: Townships with huntable grouse populations (i.e. produced grouse wing samples) during four years of parts collection survey, Pennsylvania 2013-2017.

### Ruffed Grouse Source Populations from Wing Collection Data 2013-2017



G&W Figure 4: Townships producing WNV antibody-positive (red) and antibody-negative (gray) grouse in hunter-harvested samples, Pennsylvania 2015-2017.

## Ruffed Grouse Source and Survivor Populations, 2015-2017



G&W Figure 5. West Nile Virus Vector Index (statewide prevalence) and Proportion of Hunter-Harvested Grouse Samples with WNV+ antibodies (%), Pennsylvania 2015-17.

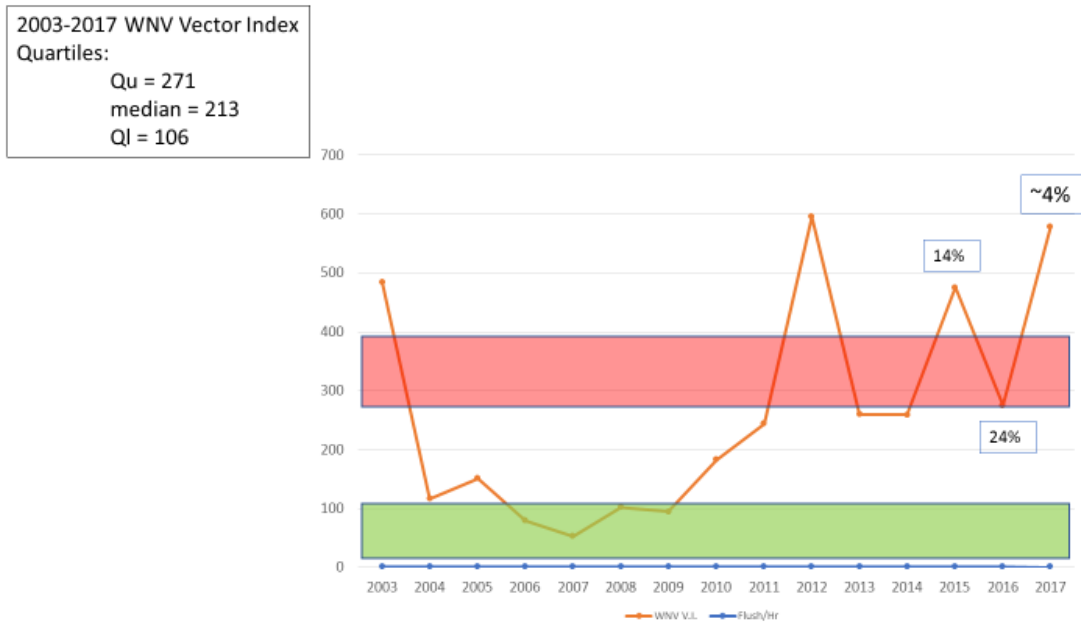


Figure 6 G&W: Prevalence of WNV+ harvested ruffed grouse, Pennsylvania, 2016-17 grouse season.

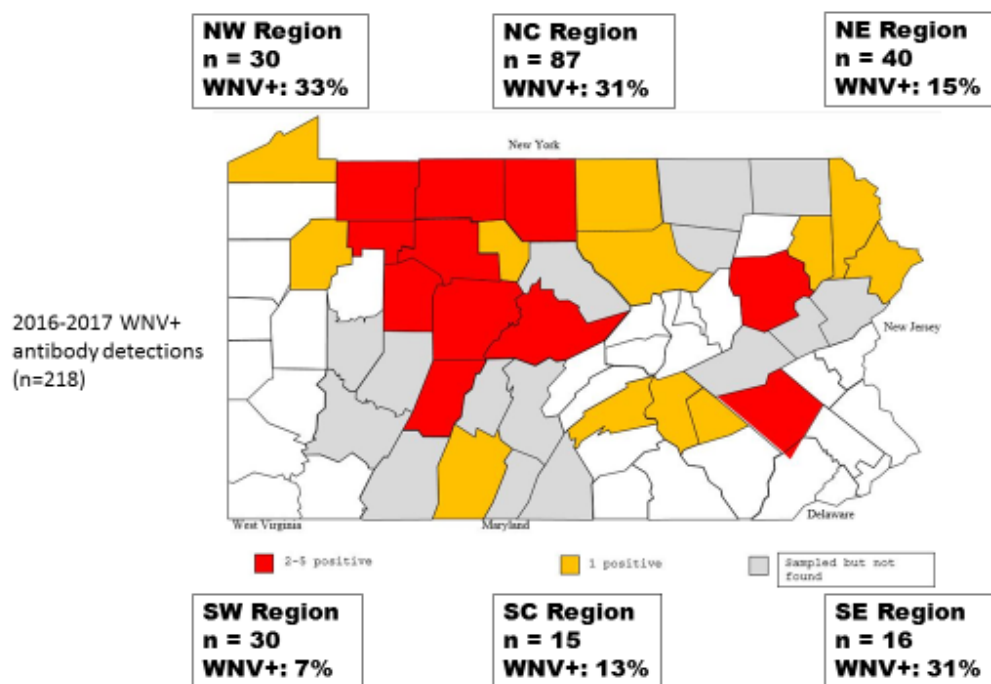


Figure 7 G&W: Grouse population trends in PA, showing robust recovery between WNV peak years in a region with high-quality and abundant habitat (NW region) and weak recovery in a region with less-abundant, fragmented habitat (SW region).

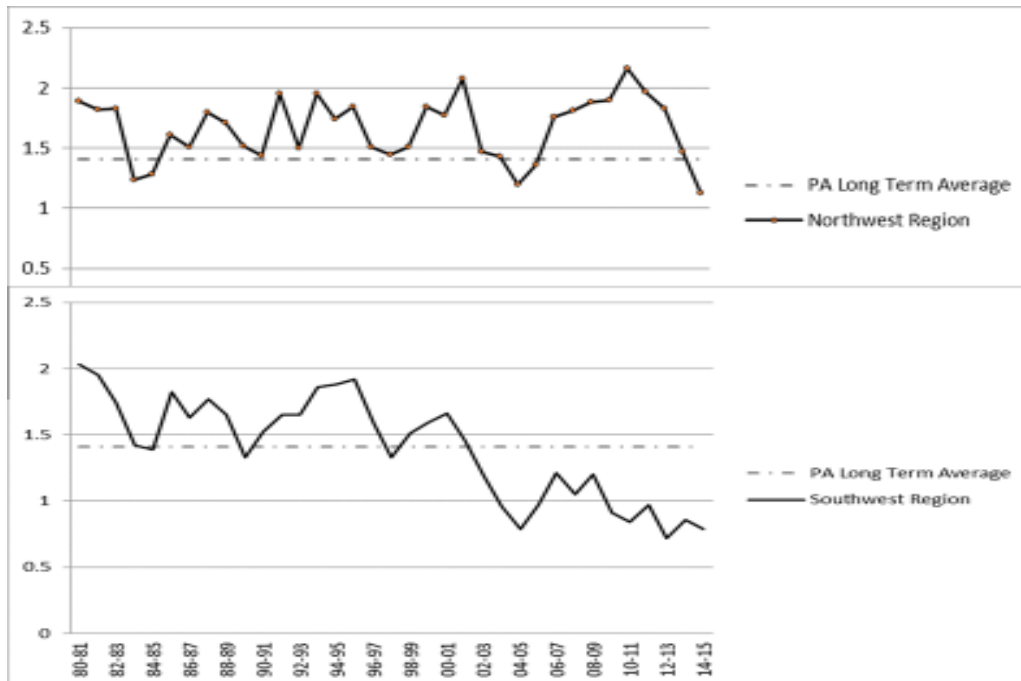


Figure 8 G & W: Average annual woodcock cooperators hunting season flushes/hour in Pennsylvania, 1984-2017.

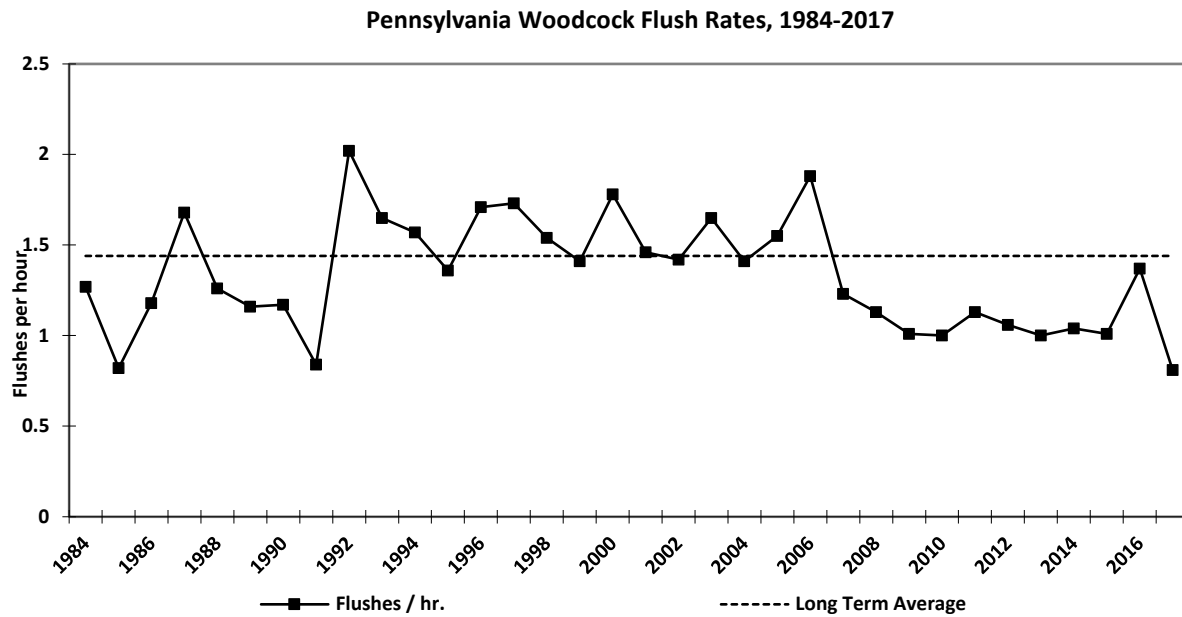


Figure 9 G & W: Woodcock abundance (as indexed by number of singing male woodcock/10 stops) on sites receiving targeted management (n = 32 to 48 sites) versus sites left largely unmanaged (n = 33-36 random USFWS Singing Ground Routes\*), Pennsylvania.

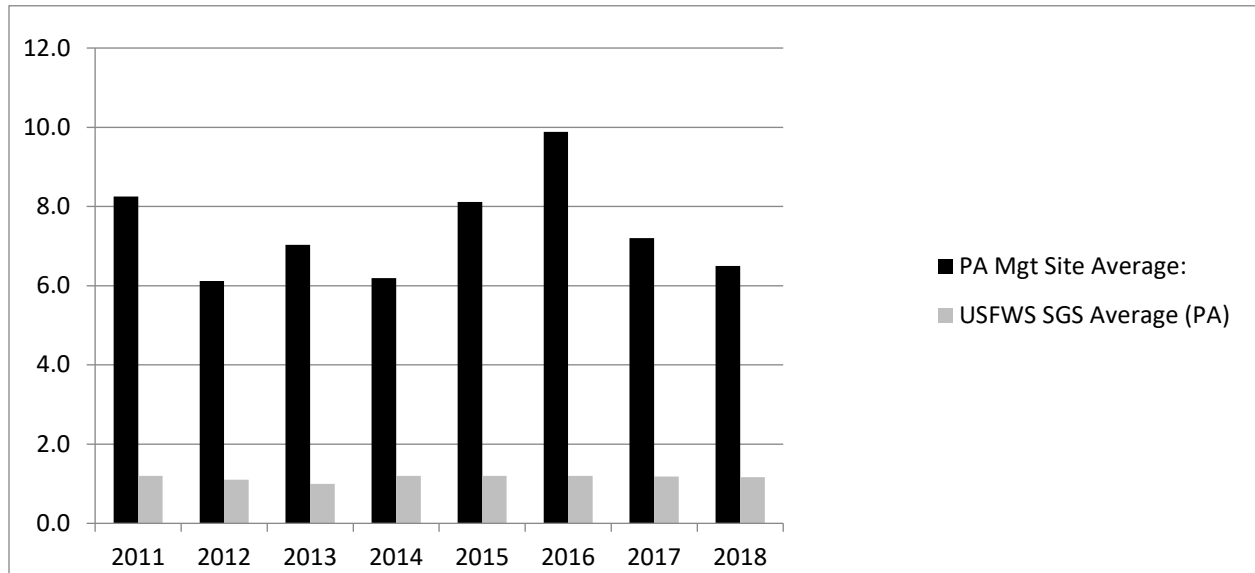


Table 1 G&W: Statewide grouse cooperator hunting season flushes rates (grouse flushes/hour) Pennsylvania, 1965-2016.

| Season       | Rate | Season       | Rate | Season       | Rate | Season       | Rate | Season       | Rate |
|--------------|------|--------------|------|--------------|------|--------------|------|--------------|------|
| <b>65-66</b> | 1.62 | <b>75-76</b> | 1.19 | <b>85-86</b> | 1.56 | <b>95-96</b> | 1.74 | <b>05-06</b> | 1.07 |
| <b>66-67</b> | 1.48 | <b>76-77</b> | 1.04 | <b>86-87</b> | 1.50 | <b>96-97</b> | 1.37 | <b>06-07</b> | 1.41 |
| <b>67-68</b> | 1.66 | <b>77-78</b> | 1.33 | <b>87-88</b> | 1.72 | <b>97-98</b> | 1.39 | <b>07-08</b> | 1.25 |
| <b>68-69</b> | 1.61 | <b>78-79</b> | 1.37 | <b>88-89</b> | 1.44 | <b>98-99</b> | 1.27 | <b>08-09</b> | 1.42 |
| <b>69-70</b> | 1.53 | <b>79-80</b> | 1.53 | <b>89-90</b> | 1.37 | <b>99-00</b> | 1.49 | <b>09-10</b> | 1.40 |
| <b>70-71</b> | 1.43 | <b>80-81</b> | 1.69 | <b>90-91</b> | 1.42 | <b>00-01</b> | 1.39 | <b>10-11</b> | 1.32 |
| <b>71-72</b> | 1.42 | <b>81-82</b> | 1.66 | <b>91-92</b> | 1.56 | <b>01-02</b> | 1.51 | <b>11-12</b> | 1.32 |
| <b>72-73</b> | 1.27 | <b>82-83</b> | 1.52 | <b>92-93</b> | 1.42 | <b>02-03</b> | 1.17 | <b>12-13</b> | 1.14 |
| <b>73-74</b> | 1.23 | <b>83-84</b> | 1.23 | <b>93-94</b> | 1.65 | <b>03-04</b> | 1.05 | <b>13-14</b> | 1.21 |
| <b>74-75</b> | 1.24 | <b>84-85</b> | 1.24 | <b>94-95</b> | 1.73 | <b>04-05</b> | 0.95 | <b>14-15</b> | 0.94 |
| <b>15-16</b> | 1.02 |              |      |              |      |              |      |              |      |
| <b>16-17</b> | 0.94 |              |      |              |      |              |      |              |      |
| <b>17-18</b> | 0.88 |              |      |              |      |              |      |              |      |

Table G & W 2. Long-term, 10-year, and current grouse flush rates by PGC region.

| Region | Long-term avg.<br>flushes / hr. | 10-yr avg.<br>flushes / hr. | 2017-18<br>flushes / hr. |
|--------|---------------------------------|-----------------------------|--------------------------|
| NW     | 1.63                            | 1.64                        | 0.97                     |
| NC     | 1.51                            | 1.55                        | 1.17                     |
| NE     | 1.14                            | 0.92                        | 0.71                     |
| SW     | 1.36                            | 0.88                        | 0.66                     |
| SC     | 1.19                            | 0.73                        | 0.41                     |
| SE     | 0.85                            | 0.62                        | 0.58                     |