

PENNSYLVANIA
2016 Grouse and Woodcock Status Report

Prepared by: Lisa M. Williams, Wildlife Biologist 2 (Grouse and Webless
Migratory Game Birds Specialist)
Pennsylvania Game Commission
Bureau of Wildlife Management, Game Bird Section

Ben C. Jones, Pennsylvania Game Commission
Bureau of Wildlife Habitat Management, Public Lands Section

RUFFED GROUSE

Population Status

For the 2015 grouse Summer Sighting Survey (i.e. brood survey), 49 Pennsylvania Game Commission foresters and surveyors recorded grouse seen while working in the woods during 2,057 observer days. Observers averaged seeing 3.7 broods/100 days and 27.1 total grouse/100 days. Brood observations were well below 2014 figures (down 28%) and also 43% below long term (1981-2014) average. Total grouse observations also fell below 2014 figures (down 12%) and were 35% below long term average. Based upon these decreased observations, the forecast for the 2015-16 hunting season was for a below-average grouse season.

Nesting and brooding weather in 2016 was largely hot and dry (i.e. amenable to high production). But when compared to long term averages, the PGC summer grouse sighting survey population index indicates worrisome declines; June 2016 brood sightings were down 28% and July brood sightings were down 88%. Total grouse sightings in June 2016 were down 26% compared to long term average and down 68% in July. July sightings of both broods and total grouse were the lowest recorded in 36 years of monitoring.

Analysis of Summer Grouse Sighting brood observations has revealed 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. July broods are important for grouse populations in that they represent second breeding attempts when hens lose the first clutch. Thus, there are typically fewer broods seen in July than in June, but they help mitigate reproductive losses for the year. In July 2016, with a total of 547 observer days in the Summer Sighting Survey, just 3 grouse broods were observed – a four-fold decrease compared to July 2015. The underlying cause of decreasing brood observations in June, and more significantly in July, is unknown.

In 2015, the summer sighting survey was re-designed to provide an index of productivity. Productivity was 3.6 chicks/hen for 54 unique broods observed on State Game Lands. Productivity in the relatively small sample provided by Allegheny National Forest (n=15 broods) was 4.2 chicks/hen. Productivity in 21 broods observed in Elk State Forest was also 4.2 chicks/hen.

For the 2015-16 Grouse Cooperator Survey, 637 grouse cooperators were sent a grouse hunting diary to complete. Useable replies were received from 248 (39%) cooperators. Respondents submitted data on 2,292 hunts, which represented 7,019 hours of active grouse hunting. Statewide, cooperators hunted 7,019 hours and recorded 7,182 flushes for an average rate of 1.02 flushes per hour. Individual cooperators averaged 28 hours hunted, 29 grouse flushed, and 1.8 grouse bagged during the 2015-2016 hunting season.

The 2015-2016 flush rate of 1.02 flushes per hour represents a 9% increase in flush rate compared to 2014-15 but is 27% below the long term (50-year) average of 1.39 flushes per hour (Fig. 1). The rate of 1.02 flushes/hour is the third-lowest flush rate recorded in 50 years of monitoring, with 2014-15 being the lowest rate ever recorded (Table 1). Compared with 2014-15, 4 of 6 regions exhibited increased flush rates (Southcentral +65%; Southeast +51%; Northcentral +15%; Northwest +13%) (Table 2). Flush rates in the remaining two regions were below the 2014-15 season (Southwest -10%; Northeast -8%) (Table 2). The Northeast and southern regions are most depressed when compared to region 35-year long-term averages (Southcentral -54%; Southwest -49%; Northeast -28%; Southeast -25%) (Table 2). The Northwest and Northcentral regions, comprising the core of the PA grouse range, are faring better, but still well below their respective 35-year averages (Northwest -23%; Northcentral -14%).

Without the annual contribution of the Northwest and Northcentral regions the statewide flush rate would be precipitously lower. In these regions, the mix of northern hardwoods and oak forests provides optimum nutrition, while active forest management inside a largely forested landscape provides abundant habitat. In portions 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.

We conduct annual drumming surveys on select State Game Lands (SGL) in the Northwest (SGL 266), Southwest (SGLs 82, 108, 111, 228, and 285), Northcentral (SGL 176), Southcentral (SGLs 41, 73, and 107), and Northeast (SGLs 55 and 187) to assess grouse response to habitat management. Due to the loss of contract biologists and bio aides, drumming surveys were conducted at just 3 of these 12 SGLs in 2016. Most sites have been surveyed for fewer than 5 years, so data is not yet adequate to determine population trends.

The preliminary outlook for the 2016-2017 grouse season is guarded. Statewide, winter conditions were fairly mild and incubation/brood weather was perhaps the best we've had in four years, with dry conditions in May and June. 2016 brood observations are still being compiled, but early indications are below average. Further, in recent years (2002 to present) brood observations have not been as reliable a predictor of the fall harvest as they were previously. Thus, forecasting the fall harvest has become more difficult.

Restoration

No within-state restoration activities are planned at this time. Restoration of significant acreage of early-succession habitat is the central goal of Pennsylvania's Ruffed Grouse Management Plan as we attempt to increase populations to 1980's levels.

Habitat Management

Pennsylvania's forest age classes are unbalanced and heavily weighted toward the 80-125-year age range due to widespread cutting in the early 1900s; certainly not optimal grouse habitat. When such poor habitat conditions abound, grouse are less resilient and more likely to succumb to predation and various stressors like disease.

As such, the Game Commission is focused on creating a greater mix of forest ages through active management on State Game Lands (SGL), other public holdings, and private lands. Such management will benefit a long list of wildlife including grouse. There are several primary ways this is done.

Each year we plan, tally, map, mark, and put out for competitive bid, thousands of acres of forest management projects via commercial timber sales. From 2007 to 2013 the number ranged from 5,500 – 6,500 acres (Figure 5). In 2014 and 2015 this number increased from about 8,000 to over 9,000 acres. The increased forest management was due to hiring of 9 forest technicians on a limited, temporary basis. These timber acres "offered" for bid are bought by Pennsylvania sawmills to be cut within a three-year contract period. Therefore, the projects don't result in instant young forest habitat. The slight time lag between acres "offered for bid" and acres "harvested" is reflected in Figure 5.

Of course, commercial timber sales are subject to market conditions that can fluctuate greatly. The general value of saw timber has decreased since a peak in 2003 affecting revenue inputs. Nonetheless, we've taken advantage of new markets for traditionally low value wood (i.e., pulp and chips) to keep growing the number of forest acres improved, despite a decrease in the bottom line for revenue (Figure 6).

In addition to commercial timber sales, PGC also does many forest and shrub land habitat improvements with our in-house Habitat Crews (formerly known as Food & Cover Crews). From 2010 – 2014, our crews turned back the

successional clock by cutting 14,394 acres. Done by PGC crews with some help from local contractors, these “non-commercial” cuts cost the agency \$5,439,087. Of this \$1,359,771 was paid from the Game Fund while the remainder was reimbursed by federal Pittman-Robertson funds available through the U.S. Fish & Wildlife Service. Our ability to continue non-commercial projects of this magnitude is dependent on agency revenue and availability of Pittman-Robertson funds.

Since 2006, PGC has been developing Comprehensive Management Plans for SGLs. These plans are written for a 15-year horizon, but are reviewed and updated every 5 years. They are not designed to be dust collectors on the shelf, but rather documents that drive active habitat management. A clear result of plan writing is that our SGL forests are skewed toward older aged forest (similar to the state as a whole). Even with offering 9,000 acres per year in forest management projects plus our Habitat Crew work, we won’t remedy the inequality. We’ve got to nearly double the forest acres improved annually to at least 15,000 acres.

The way to get there is through more foresters in the woods. The technicians mentioned earlier as the cause for recent acreage increases can add over 300 acres per technician to the annual forest management tally. A crew of 15 seasonal forest technicians would go a long way in correcting our unbalanced forest age structure. These technicians could also increase revenue, paying for themselves and additional non-commercial forest habitat improvements.

Before increasing forest acres harvested, we’ve got to make sure we’re doing so sustainably. This can be especially challenging in oak and oak-pine habitats. But decades of research has shown the ability to use prescribed fire can successfully foster young oak forest and other early successional habitats. We’re committed to the judicious use of controlled burning as a management tool and have been since 2009. In calendar year 2016 we improved 10,560 habitat acres through controlled burning (Figure 7). Not only is prescribed fire important to regenerate oaks in harvest areas, but it’s a valuable tool to restore and maintain early successional habitats where timber harvesting is not feasible due to accessibility and/or lack of commercial value (note the “dry oak/pine” category in Figure 8).

The PGC Game Bird Section also regularly collaborates with the Bureau of Forestry in the Department of Conservation of Natural Resources (DCNR BOF - a separate agency in Pennsylvania) to develop site planning for grouse, woodcock and other species that require young forest habitats. In 2015-16, the DCNR Bureau of Forestry implemented projects specifically targeting young forest wildlife (i.e. creating early succession habitat) on 85 projects covering 1300 acres. This is in addition to the 17,000+ acres of routine commercial forestry conducted by the BOF in 2016.

In addition to public lands, PGC has several very active private lands programs. Our Hunter Access Program enrolls 2.36 million acres of private lands, including

many managed forest lands open to grouse hunters and public hunting in general. In 2012, PGC applied for the first Voluntary Public Access and Habitat Improvement Grant (VPA-HIP) and we've since been awarded \$9M to improve the Hunter Access Program and implement over 5,000 acres of habitat projects on cooperator lands. The grant runs through 2018 with many more acres to be treated.

We also stay active promoting wildlife habitat conservation in other federal Farm Bill areas. Among these are Pennsylvania's Working Lands for Wildlife (WLFW) initiative. This effort, focused on young forest, has improved 4,366 acres on private lands since 2012 with another 8,076 acres under contract to be treated within the next few years. The most common WLFW activities include non-commercial cutting and invasive species treatments in forest habitats. Our active involvement with various partners including the Natural Resources Conservation Service (NRCS) has brought \$7,760,584 of WLFW funding to the table for this private lands, young forest habitat work.

Another Farm Bill program focused on improving forest habitat is the Regional Conservation Partnerships Program (RCPP). Similar to WLFW, this program is utilized for non-commercial cutting and other forest stand improvements on private lands. To date 1,355 acres have been completed or are under contract. The effort has leveraged \$954,053 of Farm Bill funding for this work.

Over the past few years, PGC efforts have resulted in over 85,000 acres of young forest habitat creation and improvement at a cost of over \$8,000,000 to PGC and other partners. We're committed to this habitat work, and there's a lot more that can and needs to be done.

Harvest

PGC Game Take Survey results, which compile statewide hunter harvest and participation, were not yet available for license year 2015-16 at the time of preparation of this report. Thus, statewide harvest figures are not available for 2015-16. In 2014-15, an estimated 34,848 grouse were harvested by 50,925 hunters over a total of 257,353 hunting days, for an average of 0.13 harvest/day ratio.

Although Grouse Cooperator hunting patterns may not be directly related to statewide hunting participants, Cooperator hunt effort was greatest during the October (143 hours/available day) and November (107 hours/available day) portions of the early season, followed by the post-Christmas "late season" (81 hours/available day). The pre-Christmas December segment ranked lowest in hunter effort among grouse cooperators (58 hours/available day).

When corrected for the number of useable returns each year, Cooperator participation during the late season (i.e. post-Christmas) continues to show a

steady increase over time (Fig. 2). Late season effort was 6% higher than in 2014-2015 and 14% higher than in 2013-2014. The late season accounts for a relatively small proportion of overall grouse hunter effort (29% of hunter hours; 30% of harvest). However, popularity of the Late Season is increasing over time among statewide grouse hunters, according to PGC Game Take Survey data. Among Cooperators in the southern regions, Late Season effort exceeded 30% of hunting hours (range 30-40%) and was responsible for well over 30% of the harvest (range 37-57%) in those regions. This season segment may represent additive mortality in southern regions, where forest fragmentation produces isolated coverts and may produce high harvest rates. Given the potential impacts of extended late winter hunting on grouse populations, it is important to monitor late season participation trends over time.

Thirty-six percent of 445 grouse harvested by cooperators were bagged during November, followed by the late season segment which accounted for nearly one-third (30%) of the statewide harvest. Together, the remaining season segments accounted for roughly one-third of the total grouse harvested by Cooperators [22% in the October segment; 13% in the pre-Christmas December segment].

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.

Assessing the effects of forest community type, habitat quality and quantity, and non-habitat variables that are driving grouse population trends is an important objective of the Plan. Currently, we do not know if the disparate population trends in Pennsylvania's northern and southern regions reflect differences in underlying population dynamics in different areas of the state. If population dynamics vary widely between regions of Pennsylvania this may affect the ability of northern and southern grouse population segments to sustain harvest rates resulting from a uniform statewide season structure.

2015-16 represented the third year of a Grouse Parts Collection survey. Patterned after a large-scale study during the 1970's and 1980's, this new survey provides insight into whether grouse recruitment has changed over time, reflect sex and age ratio of the current harvest, and may reveal how habitat quality and quantity on the local landscape can affect these parameters.

In 2014-15, 479 useable samples were received. Of these, 208 were juvenile (43%), and 260 were adult (54%). Eleven of 479 were classified as 'unknown' for age (2%). Age ratio of this sample was 0.85 juveniles per adult. The 2014-15 sample contained 2.12 juveniles per adult female, very similar to 2.25 juveniles/adult female observed in the 2013-14 sample (Table 3).

2015-16 wings are still being assessed, though a sub-sample of 283 has been completed. Of known age samples, 151 were juveniles (53%) and 125 were adults (44%). Seven of 283 were classified as 'unknown' for age (2%). Age ratio of this sub-sample is 1.2 juveniles per adult. Values for juvenile/adult hen will not be calculated until all wings are processed.

Compared to the same information collected in the late 1970s and early 1980s, recruitment values of the past two years are extremely low. In the historic grouse population, juvenile/adult hen values ranged from a statewide low of 2.75 in the lowest production year of 1983 to a high of 4.55 in 1978 (Table 3). The 11-year historic average was 3.7 juveniles per adult hen. At the region scale, 11-yr historic averages were 3.42 in the northwest region, 3.46 in the southwest, 5.06 in the northcentral, 3.77 in the southcentral, 4.76 in northeastern counties, and 3.45 in southeastern Pennsylvania. At the PGC Region scale, no regions had historic juvenile-to-hen values as low as we observed in the 2013-14 and 2014-15 license years.

Authors of the historic research felt strongly that survival of adult breeding birds was the primary factor driving grouse populations. They cautioned that the grouse harvest should weigh heavily toward juveniles for a sustainable population. They advised that the proportion of adults in the fall/winter harvest should not exceed 50% (and ideally 40%). Statewide, percent juveniles in the fall population averaged 59% during the historic 11-year study period (ranging from a low of 54% in the low-production year of 1983 to a high of 64% in 1977). Thus, the indication that just 53% of the current harvest are juveniles (based on the 2015-16 sub-sample), and 43% in 2014-15, places current harvest demographics well below that of historic years when grouse populations were robust.

In July 2016, PGC and VDGIF convened a meeting of grouse biologists from New England and the Mid-Atlantic. Participants in this meeting presented important grouse research conducted since the Appalachian Study, discussed the feasibility of developing a multi-state initiative focused on grouse population recovery and identified information gaps.

In 2014 we initiated an investigation into the impact that West Nile Virus (WNV) may be having on grouse abundance and population trends over time. As a starting point in addressing these questions, we conducted a Challenge Study involving PA ruffed grouse and WNV in 2014-15. Results indicate that WNV damages multiple critical organ systems, resulting in death in 40% of the sample and uncertain survival in an additional 40% of grouse infected with the virus. Hunter-harvested blood sampling in 2015-16 revealed that grouse are exposed to WNV in all regions of PA, with 14% (28 of 202) of harvested grouse presenting WNV antibodies via Nobuto strip sampling. Hunter-harvested blood sampling will continue in the 2016-17 license year.

Season Dates

2016-17: Oct. 15–Nov. 26, Dec. 12-24, and Dec. 26-Jan. 21 (2-bird daily bag limit, 6-bird possession limit). As with other small game, closed intervals occur during the regular firearms deer season and on Christmas Day.

AMERICAN WOODCOCK

Population Status

The 2016 USFWS Woodcock Status Report is not yet available, so population analyses based upon USFWS Singing Ground Survey results cannot yet be reported.

The 2016 USFWS Woodcock Status Report is not yet available, so population analyses based upon USFWS Parts Collection Survey results cannot yet be reported.

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. Much of the activity in support of this objective is being accomplished through collaboration with Wildlife Management Institute (WMI), the Appalachian Mountains Woodcock Initiative and the Golden-Winged Warbler Initiative.

We continue our active collaboration with multiple partners to further ESH management in Pennsylvania. The partnership with Pennsylvania's Department of Conservation and Natural Resources' Bureau of Forestry (DCNR BOF) continues to grow. PGC's Woodcock Program Specialist and Public Lands Chief began providing on-site assistance in developing woodcock/ESH project plans for interested BOF Districts in 2011. Beginning with one District, this effort has now expanded to include 17 of 19 Districts. In 2015-16, the DCNR Bureau of Forestry implemented projects specifically targeting young forest wildlife (i.e. early succession habitat) on 77 projects covering roughly 1200 acres. This is in addition to routine commercial forestry conducted by the Bureau. Collaborative efforts are expected to continue to grow as more foresters identify priority sites for management.

Additional efforts to increase woodcock 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.

Harvest

The 2016 USFWS Woodcock Status Report is not yet available, so harvest, hunter and days afield estimates based upon USFWS Harvest Information Program (HIP) cannot be reported.

Based on diary data from 715 days of hunting, 124 PGC Woodcock Cooperators averaged 16.3 hours hunting, 16.6 woodcock flushed, and 2.6 woodcock bagged in 2015. The overall statewide flush rate of 1.01 was just slightly lower (-3%) than in 2014 (Figure 3).

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.

PGC staff and volunteers annually conduct surveys at 48 habitat management areas to assess the population response to management. Unfortunately, due to the loss of limited term biologists and biologist aides, 16 of these long-term monitoring sites (including some WMI Demonstration Areas) were not surveyed in 2016. Average singing male index among all surveyed sites was 9.9 singing males per route, or roughly eight times the number of singing males that occur on random USFWS Singing Ground routes (Figure 4). Also, unlike populations along standard SGS routes, the populations on managed sites (as indexed by singing males) is growing steadily (Figure 4). 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 monitoring should be prioritized and adequate staffing allocated.

Season Dates

2016: October 15 – November 26, closed Sundays (3-bird daily bag limit).

Figure G & W 1. Average annual grouse cooperator hunting season flushes/hour in Pennsylvania, 1965-2015.

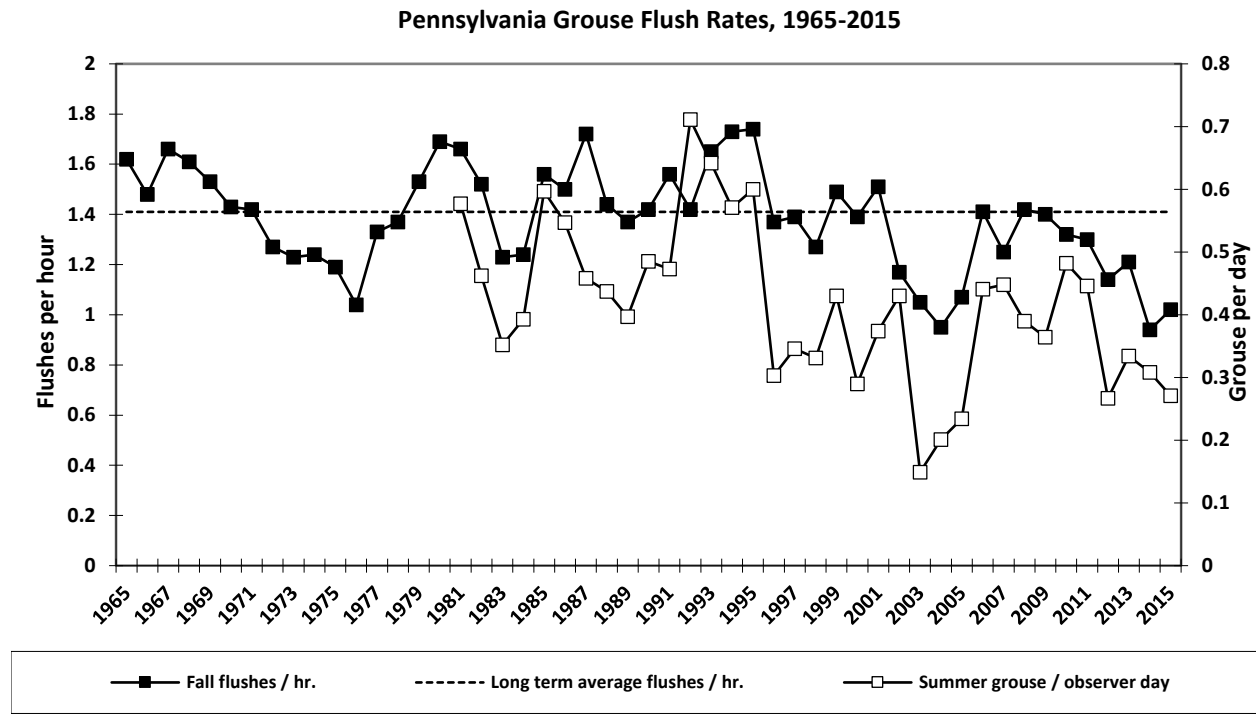


Figure G&W 2. Grouse Cooperator participation trends in grouse hunting season segments during the 2010 – 2015 license years. Index is hours hunted per available day, corrected for useable flush returns received each year.

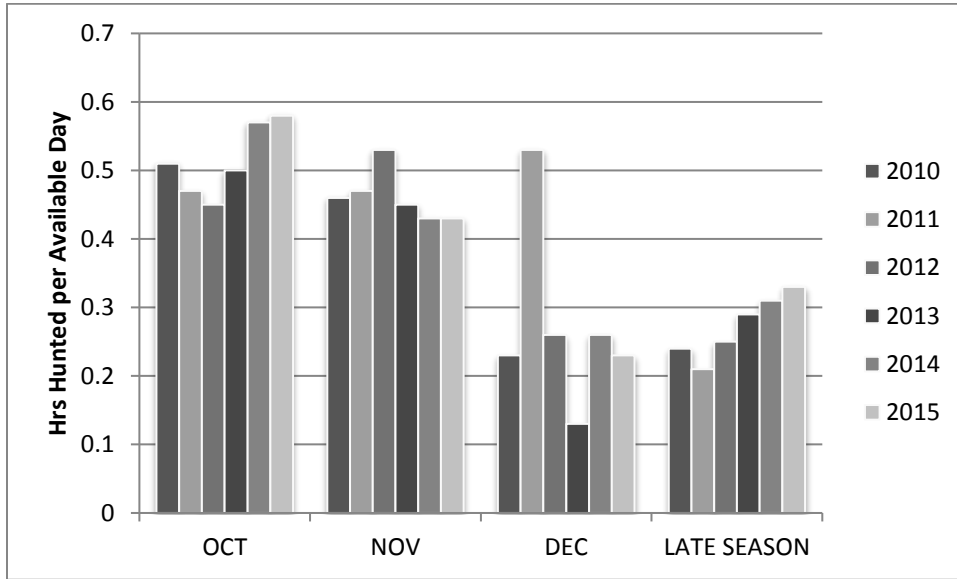


Figure G & W 3. Average annual woodcock cooperator hunting season flushes/hour in Pennsylvania, 1984-2015

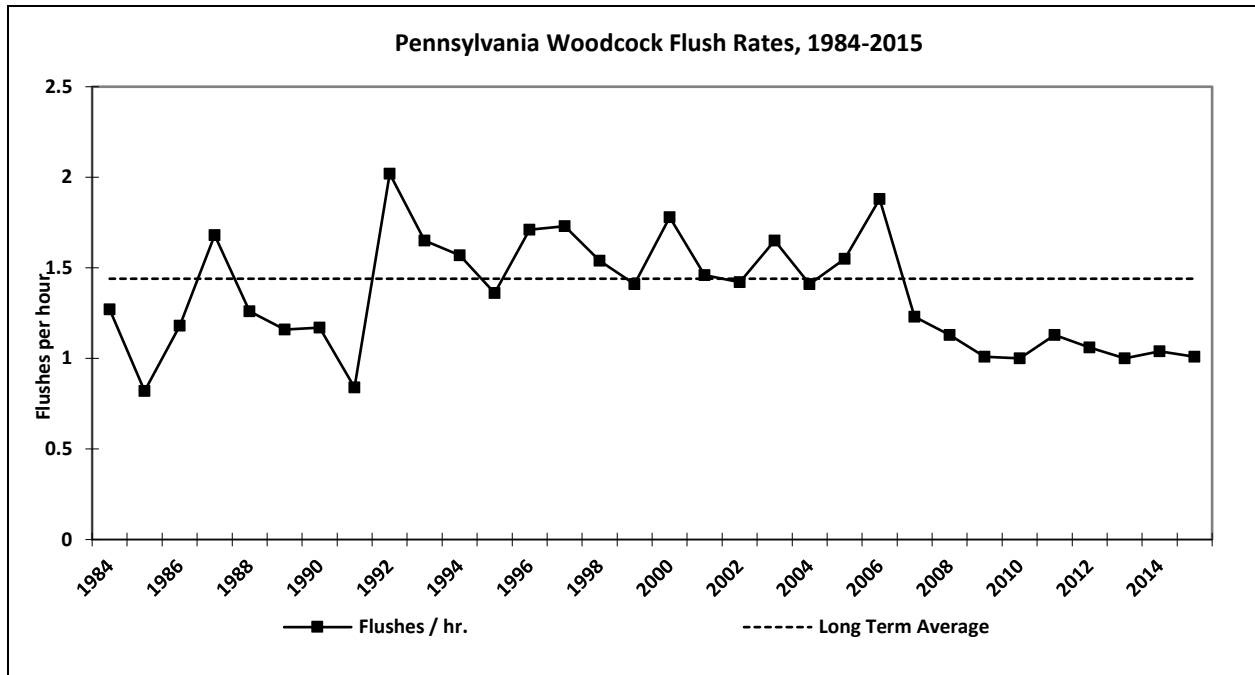


Figure G & W 4. Woodcock abundance (as indexed by number of singing male woodcock/10 stops) on sites receiving targeted management (n = 32 to 48 sites) versus sites left largely unmanaged (n = 33-36 random USFWS Singing Ground Routes*), Pennsylvania. *USFWS SGS values not yet available for 2016

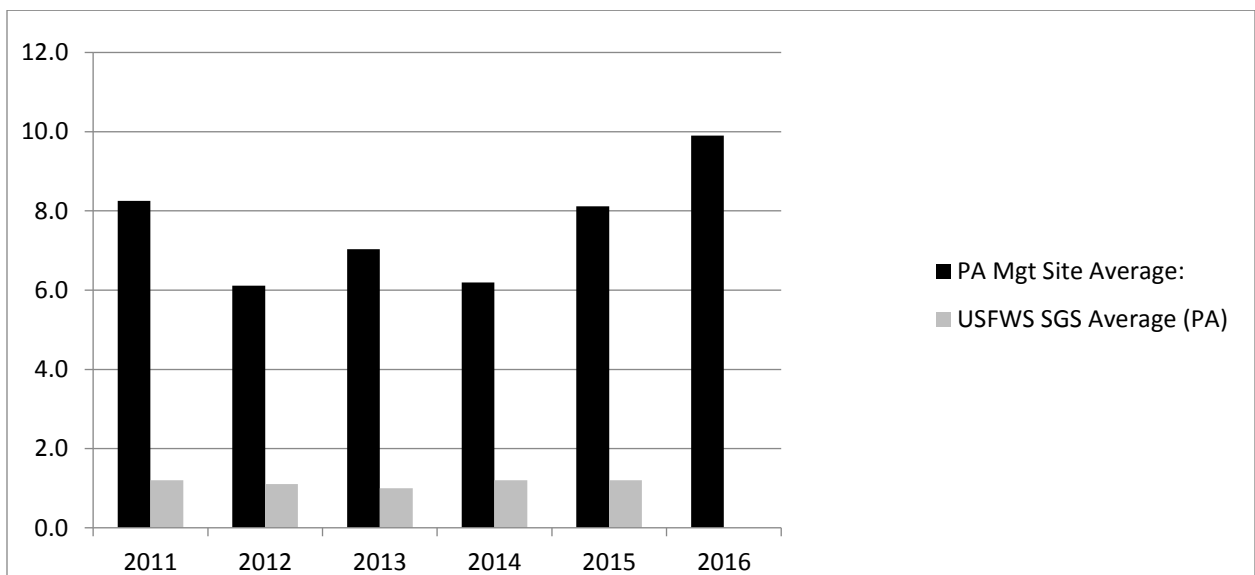


Figure G & W 5. Pennsylvania State Game Lands acreage harvested and offered for commercial timber sale bid, 2007-2015.

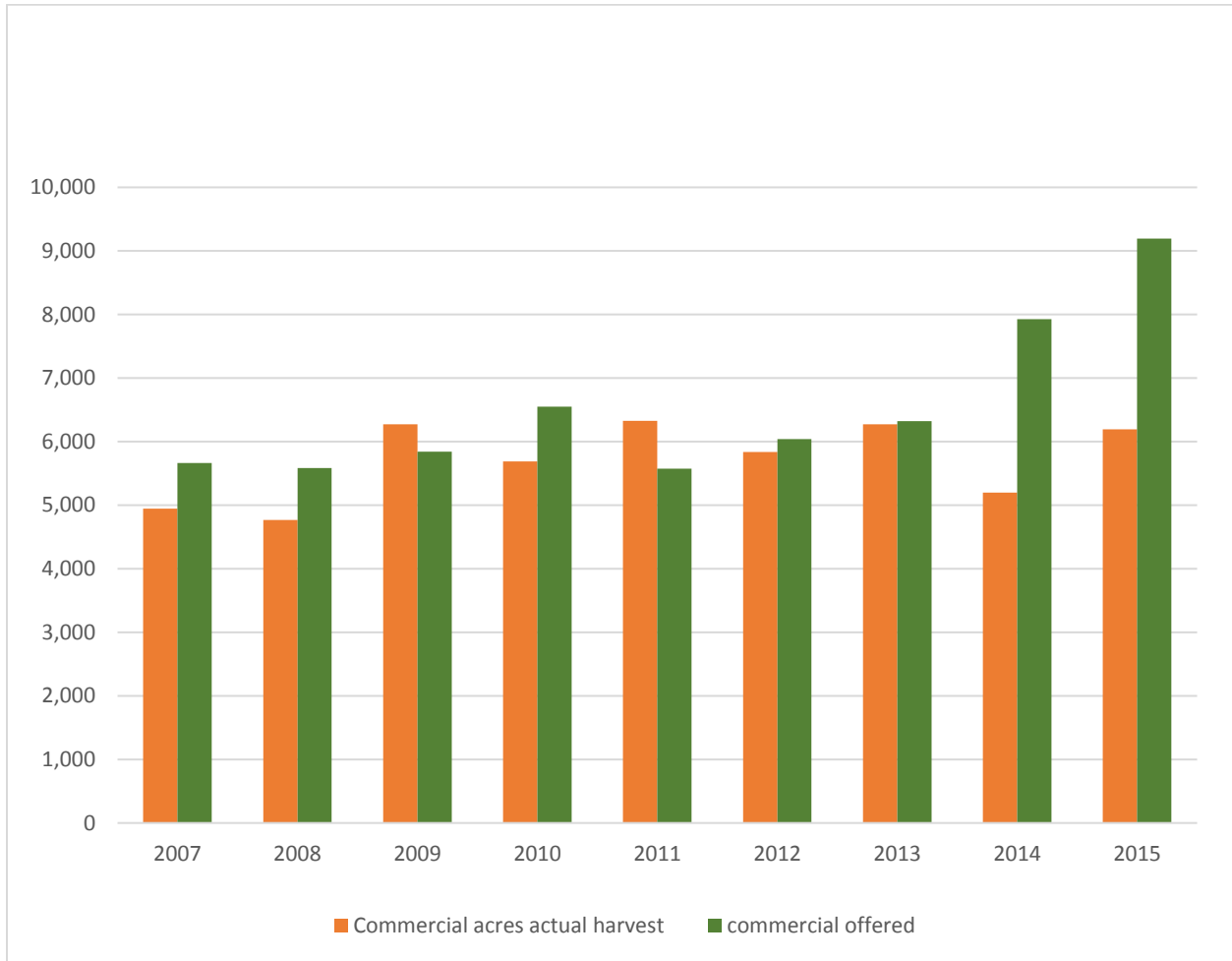


Figure G & W 6: Pennsylvania State Game Lands acreage offered, bid value and total harvested, 2002 – 2015.

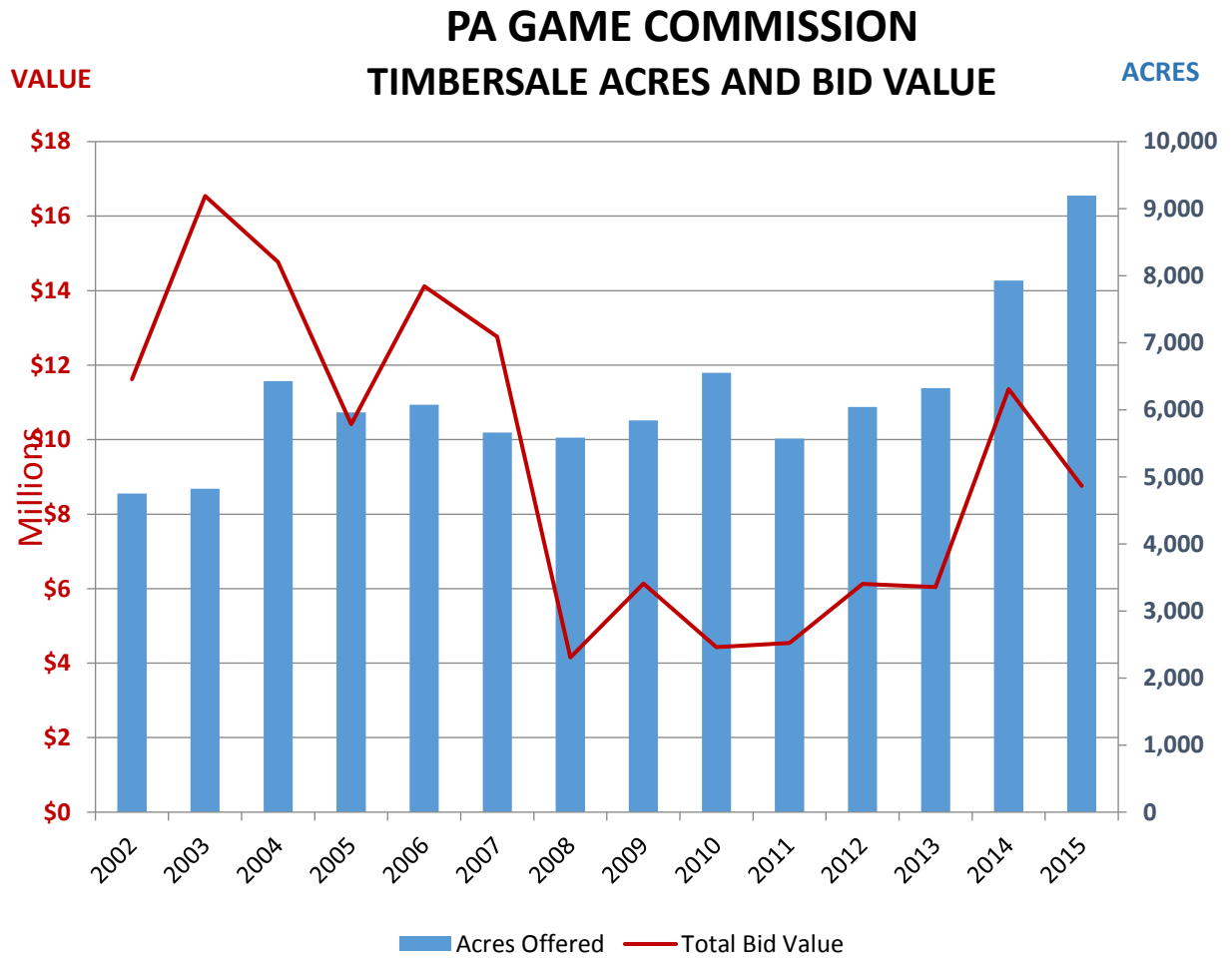


Figure G & W 7: Pennsylvania State Game Lands prescribed burn acres, 2009-2016

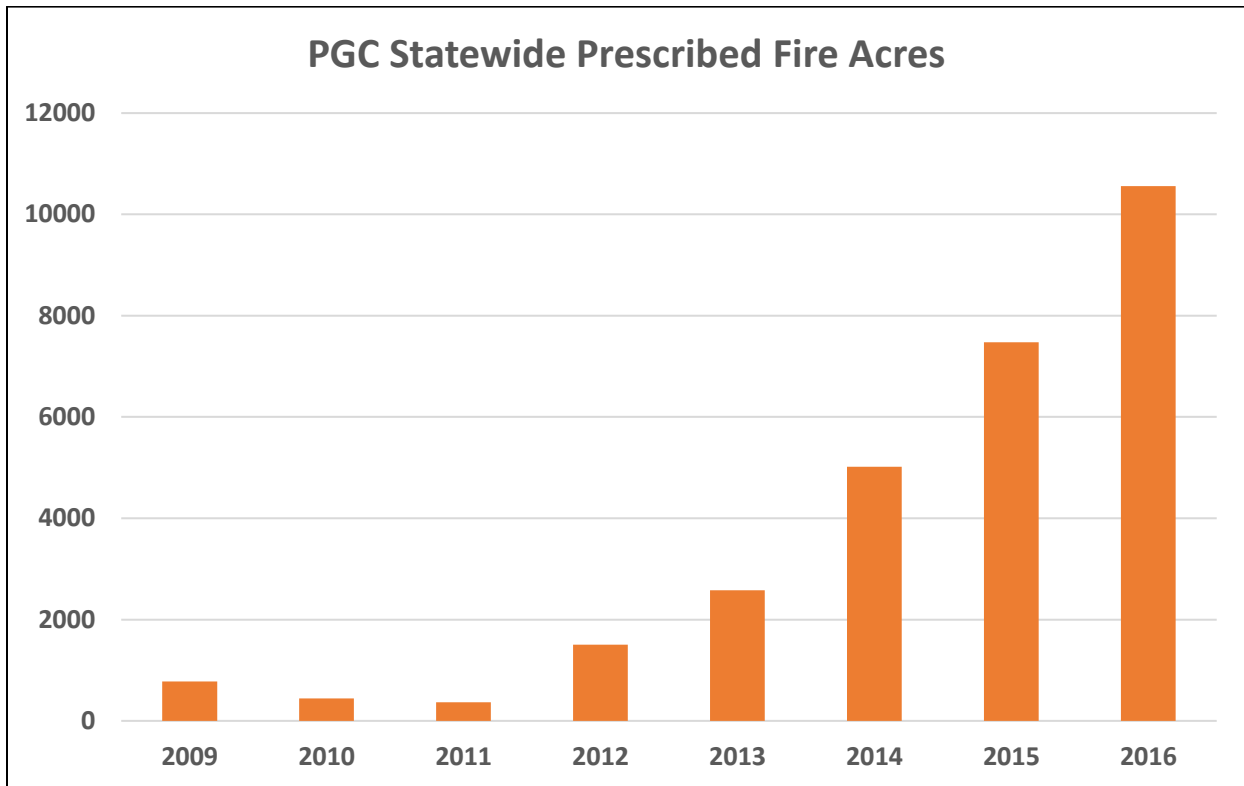


Figure G & W 8: Pennsylvania Game Commission prescribed burn acres by habitat category, 2016

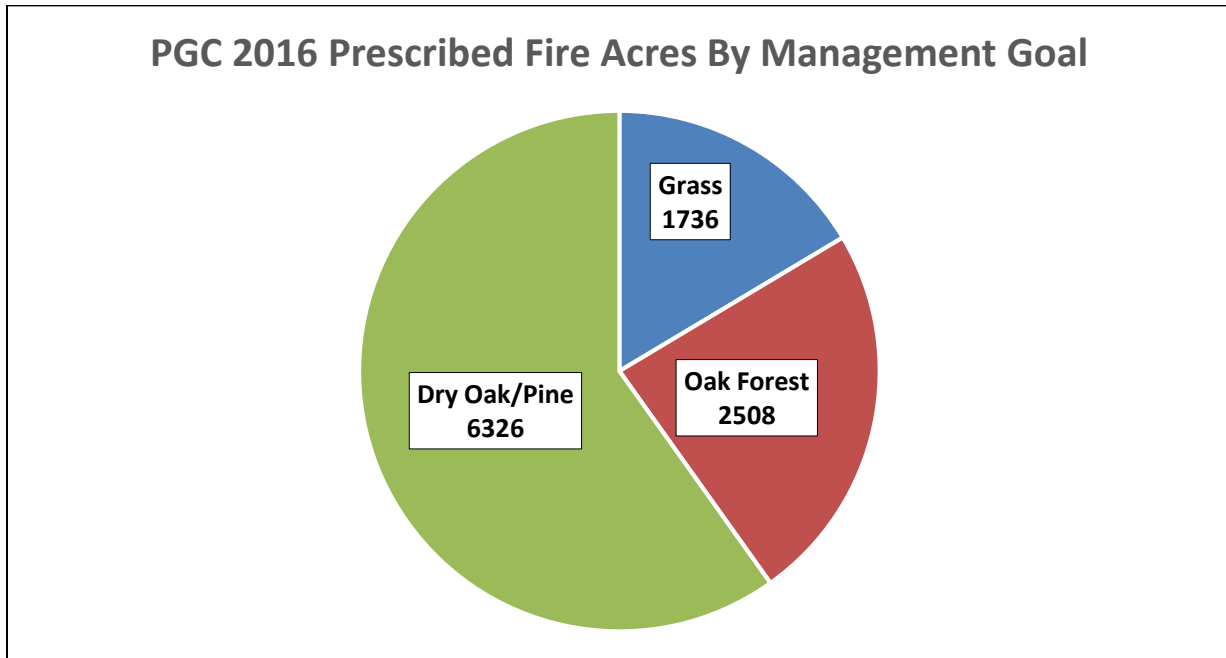


Table G&W 1. Statewide grouse cooperators hunting season flushes rates (grouse flushes/hour) Pennsylvania, 1965-2015.

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

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

Region	Long-term average flushes / hr.	2005-15 average flushes / hr.	2015-16 flushes / hr.
NW	1.66	1.73	1.28
NC	1.52	1.60	1.30
NE	1.16	0.98	0.83
SW	1.39	0.95	0.71
SC	1.22	0.81	0.56
SE	0.86	0.63	0.65

Table G & W 3. Statewide grouse recruitment indices as indicated by Grouse Parts Collection Survey 1977-1987, compared with current Grouse Parts Collection Survey results.

	Flush/Hr	Juv/Adult hen	% Adults in Harvest
1977	1.33	4.24	36
1978	1.37	4.55	38
1979	1.53	3.8	39
1980	1.69	3.39	44
1981	1.66	3.4	41
1982	1.52	3.18	43
1983	1.23	2.75	46
1984	1.24	3.9	40
1985	1.56	4.31	38
1986	1.5	3.18	43
1987	1.72	4	40
HIST. AVG.	1.49	4	41
2013	1.21	2.25	50
2014	0.94	2.12	56
2015**	1.02	Na**	Na**

**Not completed at time of report: based on sub-sample of 283 birds