Pennsylvania

2025-26 Deer Harvest Estimates

Introduction

The Pennsylvania Game Commission (PGC) uses a report card registration system for hunters to report the harvest of each white-tailed deer in combination with field-checked deer to estimate reporting rates by type of deer (antlered versus antlerless), and wildlife management unit (WMU). Reporting rates and report card counts are used to estimate harvest by WMU for antlered and antlerless deer. Traditionally, the PGC has field-checked harvested deer only during the regular rifle seasons when most deer are harvested and has used these reporting rates to estimate harvest in all other seasons (e.g., early and late archery and muzzleloader seasons). Harvests were calculated as:

$$H = \frac{N_{RC}}{r_{3-year}} ; \qquad (1)$$

where H is the calculated harvest, N_{RC} is the number of report cards, and r is the reporting rate based on a 3-year running average. Harvests are calculated for antlered and antlerless deer by deer management unit, but no measure of precision was determined.

An evaluation of this method validated the science behind the PGC's method of sampling harvested deer and estimating reporting rates (Rosenberry et al. 2004). Based on results of this evaluation, a new method of estimating deer harvests was implemented starting in the 2004-05 hunting seasons. The new method no longer calculates a harvest estimate based on a 3-year running average. Rather, it estimates an annual harvest based on year-specific data. In addition, the new method provides a harvest estimate (as compared to calculated) with appropriate measures of precision (e.g., variance, standard error, coefficient of variation). This additional information permits an evaluation of the reliability of deer harvest estimates that was not possible in the past.

Methods

Beginning in 2004-05, deer harvests were estimated using a mark-recapture technique that is similar to the method used to estimate bear populations. As a result of their widespread use over a long time period, much work has been done on application of mark-recapture techniques under many different scenarios. When estimating deer harvests, a closed, two-sample Lincoln-Petersen estimator is used. Deer are considered marked when they are checked in the field by deer aging teams. The recapture occurs when marked deer are reported on report cards sent in by hunters.

Assumption of the Lincoln-Petersen estimator include:

1. The sampled population is closed.
2. All animals are equally likely to be captured in each sample
3. Data are recorded correctly.

Assumption 1. Closed Population. The sampled population is the annual deer harvest. Additions to this population occur throughout the hunting seasons; however, once deer aging activities are completed, the marked sample will not change. Additions only occur as unmarked animals that

continue to be reported throughout the deer hunting seasons. As a result, the closure assumption can be relaxed and the Lincoln-Petersen estimator remains valid for estimating the harvest once all report cards are tallied (Pollock et al. 1990).

Assumption 2. Equal catchability. This assumption is difficult to meet in most wildlife situations (Pollock et al. 1990, Thompson et al. 1998). For estimating deer harvests, the assumption that all animals are equally likely to be included in each sample refers to a harvested deer's chance being in both the marked sample and reported sample. Our marking procedures at processors and other specific locations do not provide an equal chance of being marked because some deer will not be taken to a processor. One method of relaxing this assumption is to use different methods for marking and reporting. In the case of deer harvest estimates, if the probabilities of a deer being marked and being reported are independent, Lincoln-Petersen estimates will be unbiased (Seber 1982). Available evidence indicates that our marked sample is representative of the harvest and therefore should not bias our results (Rosenberry et al. 2004).

One known problem with reporting rates is they differ by seasons (Rosenberry et al. 2004). As a result, early seasons such as archery and October muzzleloader and rifle season estimates would be biased high. This is an issue that warrants further investigation; however, the effect on the overall harvest estimate is minimal because most deer are harvested during the regular firearms season (Rosenberry et al. 2004).

Assumption 3. Data recorded correctly. This assumption is met through accurate recording and entering of data into databases. Validation programs are used to check data for accuracy.

Based on the assumptions of the Lincoln-Petersen estimator and the characteristics of our samples, the Lincoln-Petersen estimator is an appropriate method for estimating deer harvests.

Because reporting rates in Pennsylvania vary by year, antlered and antlerless deer, and WMU (Rosenberry et al. 2004), annual deer harvest estimates are calculated for antlered and antlerless deer in each WMU using Chapman's (1951) modified Lincoln-Petersen estimator;

$$\hat{H} = \frac{(n_1 + 1)(n_2 + 1)}{(m_2 + 1)} - 1; \qquad (2)$$

where $\hat{H}$ is the harvest estimate, n_1 is the number of deer marked by deer aging teams, n_2 is the number of deer reported via report cards by hunters, and m_2 is the number of deer marked by deer aging teams and reported via report cards by hunters. This estimator is recommended (Nichols and Dickman 1996) because it has less bias than the original Lincoln-Petersen estimator (Chapman 1951).

Approximately unbiased variance of the harvest estimate Var($\hat{H}$) is estimated as;

$$Var(\hat{H}) = \frac{(n_1 + 1)(n_2 + 1)(n_1 - m_2)(n_2 - m_2)}{(m_2 + 1)^2 (m_2 + 2)}; \qquad (3)$$

from Seber (1970).

Results

By using mark-recapture estimators, more information is now available on precision of harvest estimates. Prior to 2003-04, calculated harvests were provided to the public with implied precision of a single deer (e.g., 517,529). In 2003-04, precision of calculated deer harvests was reported to the nearest ten deer (e.g., 464,890). In each case, implied precision of deer harvests overestimated the actual precision, but no methods of estimating precision were utilized. This is no longer the case and measures of precision are available for each harvest estimate. Consequently, more information can now be conveyed to the public regarding deer harvest estimates.

There are a number of options for presenting deer harvest results to the public. From a statistical viewpoint, the most appropriate presentation might include point estimates plus or minus standard errors or with confidence intervals. From a public relations standpoint, the most appropriate presentation may be point estimates. A concern with the statistical presentation is that all the numbers could be confusing to the general public and a concern with point estimates is the implied precision because point estimates are calculated to the single deer. An alternative, to both of these extreme cases, is to provide point estimates rounded to an appropriate number of figures. For example, if the precision of the harvest estimate is less than 1,000 based on the standard error, the harvest estimate would be rounded to the nearest 100. If the precision of the harvests estimate is greater than 1,000 based on the standard error, the harvest estimate would be rounded to the nearest 1,000. In the wildlife management literature, standard errors are commonly presented with point estimates as a measure of precision.

Season Harvests

Overall harvests are broken down into archery, regular firearms, and muzzleloader harvests, not because these numbers are used for deer management purposes, but because the public requests them. The overall removal of deer from a population during all hunting seasons is the parameter of greatest management interest. Whether a deer was harvested with a bow, muzzleloader, or rifle has limited value for management recommendations. Based on an evaluation of Pennsylvania's harvest estimates, attempting to calculate archery and muzzleloader harvests based on report cards and reporting rates results in biased numbers (Rosenberry et al. 2004), because hunters during the October seasons (archery, early muzzleloader, and October rifle) report deer harvests at a higher rate than hunters during the regular firearms season. This is a known problem with presenting archery and muzzleloader harvests, but it has minimal effect on total harvests (Rosenberry et al. 2004) that are used for management purposes. Since season harvest estimates are expected by the public, we modified our method of calculating season harvests in 2007-08. Prior to 2007-08, we simply divided the overall harvest into season harvests using the proportion of report cards received during each type of season. For example, if 20% of the report cards were from archery season, then 20% of the harvest was identified as archery harvest. In 2007-08, we modified this slightly. First, we estimated the total deer harvests for all seasons. Second, we estimated the firearms season harvest using the animals we checked in the field, the number of those animals reported by hunters, and the number of report cards from the firearms season. We then subtracted the firearms season harvest from the overall harvest leaving only those deer killed during the archery and muzzleloader seasons. These remaining deer were

divided into archery and muzzleloader harvests using the proportion of report cards similar to previous years. The primary difference between the current method and the previous method is that it should reduce bias in archery and muzzleloader harvests because the firearms harvest is estimated based on field data and not proportion of report cards.

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HARVEST ESTIMATES, 2025-26

Overall Harvest Estimates

WMU	ANTLERED	ANTLERLESS	TOTAL
1A	10,000	15,800	25,800
1B	11,100	17,600	28,700
2A	8,400	13,600	22,000
2B	9,000	15,000	24,000
2C	11,400	23,000	34,400
2D	15,000	27,300	42,300
2E	7,700	12,500	20,200
2F	10,800	15,700	26,500
2G	7,600	12,300	19,900
3A	7,600	6,900	14,500
3B	7,900	14,100	22,000
3C	8,000	14,700	22,700
3D	6,000	9,600	15,600
4A	5,000	8,500	13,500
4B	6,700	14,400	21,100
4C	9,400	13,900	23,300
4D	9,400	15,400	24,800
4E	7,500	17,500	25,000
5A	4,800	7,300	12,100
5B	10,300	19,800	30,100
5C	8,100	18,000	26,100
5D	3,000	7,100	10,100
UNK	610	290	900
TOTAL	**185,310**	**320,290**	**505,600**

Archery Harvest Estimates

(Includes harvests taken with archery methods, outside of the general firearms season)

WMU	ANTLERED	ANTLERLESS	TOTAL
1A	5,740	4,250	9,990
1B	5,560	3,460	9,020
2A	4,140	2,850	6,990
2B	6,860	7,870	14,730
2C	5,710	5,610	11,320
2D	8,010	5,670	13,680
2E	3,530	2,380	5,910
2F	4,340	2,430	6,770
2G	2,750	2,210	4,960
3A	2,980	1,160	4,140
3B	3,570	3,080	6,650
3C	3,170	2,950	6,120
3D	2,780	2,680	5,460
4A	1,670	1,570	3,240
4B	3,250	3,950	7,200
4C	4,850	3,690	8,540
4D	3,830	3,460	7,290
4E	3,550	4,180	7,730
5A	2,480	2,320	4,800
5B	6,960	8,230	15,190
5C	5,850	8,690	14,540
5D	2,580	5,180	7,760
UNK	130	30	160
TOTAL	**94,290**	**87,900**	**182,190**

Regular Firearms Season Harvest Estimates

(Includes all harvests taken during the general firearms season, regardless of hunting implement)

WMU	ANTLERED	ANTLERLESS	TOTAL
1A	4,200	10,400	14,600
1B	5,500	13,000	18,500
2A	4,200	9,400	13,600
2B	2,100	6,400	8,500
2C	5,600	15,600	21,200
2D	6,900	19,400	26,300
2E	4,100	9,200	13,300
2F	6,400	12,000	18,400
2G	4,800	8,700	13,500
3A	4,600	5,100	9,700
3B	4,300	9,800	14,100
3C	4,800	10,500	15,300
3D	3,200	6,300	9,500
4A	3,300	6,300	9,600
4B	3,400	9,400	12,800
4C	4,500	9,300	13,800
4D	5,500	11,000	16,500
4E	3,900	11,900	15,800
5A	2,300	4,500	6,800
5B	3,300	10,300	13,600
5C	2,200	8,700	10,900
5D	400	1,800	2,200
UNK	480	250	730
TOTAL	**89,980**	**209,250**	**299,230**

Muzzleloader Harvest Estimates

(Includes harvests taken with a muzzleloader, outside of the general firearms season)
(The October inline antlerless season accounts for approximately half of the antlerless muzzleloader harvest)

WMU	ANTLERED	ANTLERLESS	TOTAL
1A	60	1,150	1,210
1B	40	1,140	1,180
2A	60	1,350	1,410
2B	40	730	770
2C	90	1,790	1,880
2D	90	2,230	2,320
2E	70	920	990
2F	60	1,270	1,330
2G	50	1,390	1,440
3A	20	640	660
3B	30	1,220	1,250
3C	30	1,250	1,280
3D	20	620	640
4A	30	630	660
4B	50	1,050	1,100
4C	50	910	960
4D	70	940	1,010
4E	50	1,420	1,470
5A	20	480	500
5B	40	1,270	1,310
5C	50	610	660
5D	20	120	140
UNK	0	10	10
TOTAL	**1,040**	**23,140**	**24,180**

ANNUAL CHANGES

Overall Harvest Estimates

	Total Harvest Estimate				Percent Change	
WMU	2022-23	2023-24	2024-25	2025-26	Previous Year	Previous 3-Year Average
1A	22,800	21,800	25,500	25,800	1%	10%
1B	24,400	23,900	23,300	28,700	23%	20%
2A	19,700	23,300	22,600	22,000	-3%	1%
2B	21,600	23,000	22,300	24,000	8%	8%
2C	26,600	31,200	32,100	34,400	7%	15%
2D	37,000	33,200	42,200	42,300	0%	13%
2E	17,300	19,700	21,700	20,200	-7%	3%
2F	20,600	23,000	28,800	26,500	-8%	10%
2G	15,500	14,600	17,500	19,900	14%	25%
3A	11,300	11,200	12,900	14,500	12%	23%
3B	16,200	15,300	15,600	22,000	41%	40%
3C	20,000	19,500	22,800	22,700	0%	9%
3D	12,900	13,500	13,300	15,600	17%	18%
4A	14,900	15,000	13,700	13,500	-1%	-7%
4B	13,200	14,500	18,800	21,100	12%	36%
4C	15,100	14,900	20,000	23,300	17%	40%
4D	20,100	21,900	24,400	24,800	2%	12%
4E	20,400	21,800	23,300	25,000	7%	15%
5A	10,500	11,900	12,200	12,100	-1%	5%
5B	27,200	24,000	28,400	30,100	6%	13%
5C	23,900	22,200	24,700	26,100	6%	11%
5D	9,200	9,600	10,000	10,100	1%	5%
UNK	2,560	1,010	780	900		
TOTAL	**422,960**	**430,010**	**476,880**	**505,600**	**6%**	**14%**

Antlered Harvests

	Antlered Harvest Estimate				Percent Change	
WMU	2022-23	2023-24	2024-25	2025-26	Previous Year	Previous 3-Year Average
1A	9,000	8,000	8,900	10,000	12%	16%
1B	9,100	10,300	9,200	11,100	21%	16%
2A	8,700	10,000	8,800	8,400	-5%	-8%
2B	6,600	7,000	8,000	9,000	13%	25%
2C	10,000	10,600	10,400	11,400	10%	10%
2D	14,000	11,800	13,400	15,000	12%	15%
2E	6,700	6,900	6,800	7,700	13%	13%
2F	8,800	9,100	11,100	10,800	-3%	12%
2G	8,600	8,100	9,300	7,600	-18%	-12%
3A	5,700	5,200	6,300	7,600	21%	33%
3B	7,300	7,700	7,100	7,900	11%	7%
3C	8,000	8,900	10,500	8,000	-24%	-12%
3D	5,500	6,200	5,600	6,000	7%	4%
4A	3,800	5,700	4,000	5,000	25%	11%
4B	4,800	5,000	6,200	6,700	8%	26%
4C	6,900	8,200	8,000	9,400	18%	22%
4D	7,900	8,400	8,600	9,400	9%	13%
4E	8,000	8,100	7,400	7,500	1%	-4%
5A	3,100	4,100	3,900	4,800	23%	30%
5B	10,900	9,700	11,200	10,300	-8%	-3%
5C	7,200	9,100	7,700	8,100	5%	1%
5D	2,500	2,900	2,300	3,000	30%	17%
UNK	1,090	600	580	610		
TOTAL	**164,190**	**171,600**	**175,280**	**185,310**	**6%**	**9%**

Antlerless Harvests

Antlerless Harvest Estimate					Percent Change	
WMU	2022-23	2023-24	2024-25	2025-26	Previous Year	Previous 3-Year Average
1A	13,800	13,800	16,600	15,800	-5%	7%
1B	15,300	13,600	14,100	17,600	25%	23%
2A	11,000	13,300	13,800	13,600	-1%	7%
2B	15,000	16,000	14,300	15,000	5%	-1%
2C	16,600	20,600	21,700	23,000	6%	17%
2D	23,000	21,400	28,800	27,300	-5%	12%
2E	10,600	12,800	14,900	12,500	-16%	-2%
2F	11,800	13,900	17,700	15,700	-11%	9%
2G	6,900	6,500	8,200	12,300	50%	71%
3A	5,600	6,000	6,600	6,900	5%	14%
3B	8,900	7,600	8,500	14,100	66%	69%
3C	12,000	10,600	12,300	14,700	20%	26%
3D	7,400	7,300	7,700	9,600	25%	29%
4A	11,100	9,300	9,700	8,500	-12%	-15%
4B	8,400	9,500	12,600	14,400	14%	42%
4C	8,200	6,700	12,000	13,900	16%	55%
4D	12,200	13,500	15,800	15,400	-3%	11%
4E	12,400	13,700	15,900	17,500	10%	25%
5A	7,400	7,800	8,300	7,300	-12%	-7%
5B	16,300	14,300	17,200	19,800	15%	24%
5C	16,700	13,100	17,000	18,000	6%	15%
5D	6,700	6,700	7,700	7,100	-8%	1%
UNK	1,470	410	200	290		
TOTAL	**258,770**	**258,410**	**301,600**	**320,290**	**6%**	**17%**

DATA USED TO ESTIMATE DEER HARVESTS

Antlered

WMU	No. Checked in Field	Checked & Reported	Total Reported	Reporting Rate	Published Harvest Estimates[1]
1A	222	64	2,905	0.29	10,000
1B	306	96	3,497	0.31	11,100
2A	204	68	2,842	0.33	8,400
2B	94	25	2,489	0.27	9,000
2C	304	103	3,889	0.34	11,400
2D	343	107	4,825	0.31	15,000
2E	228	71	2,423	0.31	7,700
2F	388	139	3,881	0.36	10,800
2G	290	117	3,070	0.40	7,600
3A	266	70	2,029	0.26	7,600
3B	325	103	2,523	0.32	7,900
3C	399	143	2,864	0.36	8,000
3D	332	115	2,091	0.35	6,000
4A	135	36	1,361	0.27	5,000
4B	178	52	1,983	0.29	6,700
4C	304	106	3,292	0.35	9,400
4D	353	106	2,837	0.30	9,400
4E	350	120	2,592	0.34	7,500
5A	94	32	1,674	0.34	4,800
5B	248	95	3,954	0.38	10,300
5C	150	61	3,342	0.41	8,100
5D	37	18	1,497	0.49	3,000
UNK[2]			202		610
TOTAL	**5,550**	**1,847**	**62,062**	**0.33**	**185,310**

[1] - Published harvest estimates are estimated using a Mark-Recapture estimator and are rounded to the nearest 100 or 1,000 depending on precision of the estimate.

[2] - UNK calculated as total unknown reported divided by statewide reporting rate, rounded to 10s

Antlerless

WMU	No. Checked in Field	Checked & Reported	Total Reported	Reporting Rate	Published Harvest Estimates[1]
1A	920	268	4,611	0.29	15,800
1B	1,423	418	5,186	0.29	17,600
2A	690	198	3,920	0.29	13,600
2B	518	139	3,948	0.27	15,000
2C	1,288	332	5,915	0.26	23,000
2D	1,625	496	8,348	0.31	27,300
2E	769	245	3,985	0.32	12,500
2F	1,060	326	4,823	0.31	15,700
2G	679	189	3,438	0.28	12,300
3A	596	170	1,984	0.29	6,900
3B	1,085	285	3,707	0.26	14,100
3C	1,185	365	4,527	0.31	14,700
3D	866	289	3,224	0.33	9,600
4A	406	103	2,177	0.25	8,500
4B	701	159	3,280	0.23	14,400
4C	1,041	342	4,563	0.33	13,900
4D	993	282	4,395	0.28	15,400
4E	1,534	389	4,443	0.25	17,500
5A	327	125	2,805	0.38	7,300
5B	1,300	426	6,504	0.33	19,800
5C	802	271	6,088	0.34	18,000
5D	329	142	3,064	0.43	7,100
UNK[2]			96		290
TOTAL	**20,137**	**5,959**	**95,031**	**0.30**	**320,290**

[1] - Published harvest estimates are estimated using a Mark-Recapture estimator and are rounded to the nearest 100 or 1,000 depending on precision of the estimate.

[2] - UNK calculated as total unknown reported divided by statewide reporting rate, rounded to 10s

NOTE: DMAP permits not included in 'Total Reported'.

COMMENTS

- Harvest estimates are based on more than 25,000 deer checked by Game Commission personnel and more than 150,000 harvest reports submitted by successful hunters.
- Majority of deer were reported online. 76% of deer harvest reports were online, 17% were on report cards, and 7% were by phone.
- Harvest estimates are calculated using a common wildlife management technique called 'mark-recapture' to estimate reporting rates. Data used to estimate harvests includes 2 data sets; 1) data collected in the field by Game Commission deer aging teams and 2) reports from successful hunters.
- Reporting rates remain low. Antlered average = 33% (range: 33% to 49%), Antlerless average = 30% (range: 23% to 43%). However, sample sizes and reporting rates still allow for confidence intervals on harvest estimates at goal levels.

Antlered Harvests

- Antlered harvest increased an average of 6% from the 2024-25 season.
- Age structure of the antlered deer harvest was 36% 1.5-year-old bucks and 64% 2.5-year-old and older bucks.
- Comparisons between the current year's harvest and historic antlered harvests often do not consider hunter numbers. In 1986, there were 1,000,000 deer hunters in Pennsylvania. Today, there are fewer than 650,000 deer hunters. When corrected by the number of hunters, success rates are higher today than in the past, even with antler-point restrictions.
    - Historic Antlered Deer Hunter Success Rates versus Recent

1987-88	16% of deer hunters harvested an antlered deer
1997-98	19% of deer hunters harvested an antlered deer
2007-08	15% of deer hunters harvested an antlered deer
2017-18	23% of deer hunters harvested an antlered deer
2024-25	28% of deer hunters harvested an antlered deer
2025-26[1]	29% of deer hunters harvested an antlered deer

[1] *Current year deer hunter numbers are not available until later this year, so are based on previous year.*

Antlerless Harvests

- Age structure of the antlerless harvest was 50% 2.5-year-old and older females, 20% 1.5-year-old females, 15% button bucks, and 15% doe fawns, consistent with long-term averages.
- An average of 25% (range: 13-40%) of allocated antlerless licenses were used to harvest an antlerless deer, which is on average with harvest success for recent years.

Detailed deer harvest information since 2009 can be viewed in the harvest dashboard at: https://experience.arcgis.com/experience/7d3ebe86eb4348f1b8ec9d5ada5a5ca7