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WORK LOCATION(S): Harrisburg, Pennsylvania

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ABSTRACT: For the Game Take Survey, we mailed a questionnaire to a random sample of 2011-12 general hunting license purchasers (18,000 questionnaires mailed) stratified by license type to estimate numbers of hunters, harvests, and hunter-days for game species during the 2011-12 hunting seasons. After 3 mailings, 60.5% of the questionnaires were returned. Overall, between the 2010-11 and 2011-12 hunting seasons, harvests increased for squirrel, pheasant, quail, woodchuck, and crow; harvests decreased during spring (2011) and fall turkey seasons, and for rabbits, grouse, and snowshoe hare. However, long-term trends in harvest and hunter participation indicate a decline for nearly all small game species. We conducted an inaugural mixed-mode (Internet and mail) Spring Turkey Hunter Survey to estimate spring 2012 turkey season participation, effort and harvest. We received 2,422 Internet responses (22.8%) and 5,681 mail responses (53.5%) from 10,613 surveys mailed to respondents of the 2011-12 Game Take Survey. Between 2011 and 2012, spring turkey harvest and participation decreased, whereas overall effort increased. For the Furtaker Survey, we mailed a questionnaire to a random sample of furtaker license purchasers and junior combination license holders (6,945 mailed) stratified by license type to estimate harvest of furbearer species and trapper effort. After 2 mailings, 59.3% of the questionnaires were returned. Overall, the number of hunters and trappers increased for all but weasel between the 2010-11 and 2011-12 seasons, and harvest of all species increased, likely due to continued increase in furtaker license sales and inclusion of junior combination license holders in the sample. Twenty-nine year trends for harvests of furbearers indicate harvests have declined for most species except coyote.

OBJECTIVES

1. To annually estimate the numbers of animals harvested, participants, and days spent hunting (hunter-days) for game species.

2. To annually estimate the numbers of furbearers harvested and trappers/hunters during the furbearer seasons.

3. To monitor long-term trends in harvests, numbers of hunters and trappers, hunter-days, and harvest per 100 hunter-days.

METHODS

The Game Take Survey has been formally conducted by Pennsylvania Game Commission (PGC) since the 1971-72 hunting season, and has experienced many changes over the years (Boyd and Weaver 2011). The Furtaker Survey has been conducted since the 1990-91 season. We made substantial changes to the Game Take and Furtaker surveys for the 2011-12 survey year, in content and methodology. In the Game Take Survey, we discontinued collecting data on migratory game birds, law enforcement, mentored youth, and bobwhite quail and pheasant sightings. We condensed bobcat and fisher sightings to the whole hunting season, rather than separated into various big game seasons. We added junior hunt days where appropriate, and included porcupine to the list of harvestable species. For the Furtaker Survey, all recipients were asked to report numbers of days trapped or hunted, average number of traps set for each species, in addition to the Wildlife Management Units (WMUs) in which they trapped or hunted, and numbers of each species harvested. We reduced the number of WMUs that respondents could report activity from 4 to 3; in past surveys <1% of respondents indicated trapping or hunting in a 4th WMU. We increased the number of WMUs respondents reported trapped and released bobcat, fisher, and otter from 2 to 3. Questions regarding cable restraints were removed.

Historically, Game Take and Furtaker survey sample frames were established from a simple random sample of licensed hunters and furtakers. Starting in 2011-12, we used Pennsylvania Automated Licensing System (PALS) data to pre-stratify Game Take and Furtaker survey sample frames based on license type, e.g, junior, adult, senior, and nonresident. We used optimal allocation methods to estimate number of recipients of each license type. We used 3-year running average of harvest variances estimated by historic Game Take and Furtaker survey results. For a fixed sample size, variance is minimized within each stratum (n_h) by the equation:

$$n_h = n \frac{N_h S_h}{\sum N_h S_h}$$

Where N_h is the number of respondents in each stratum and S_h is the 3-year average in harvest variance (Cochran 1977). Further, survey response rates typically vary among license types, e.g., junior license holders respond at lower rates than senior license holders. Therefore, we adjusted our sampling allocation to account for 3-year average Game Take and Furtaker survey response rates among the license type strata:

$$\left(\frac{1}{\text{3 year average response rate}_h}\right) * n_h$$

For the Furtaker Survey, we included 1,000 junior combination license holders in the sample

frame to estimate participation. Historic data indicate approximately 2–3% of junior hunting license holders purchased junior furtaker licenses prior to the combination license implementation in1999.

Acquiring results for spring turkey harvest, participation, and effort has evolved over the past several years through changes in survey instruments, survey timing, and introduction of the PALS system. Because the Game Take Survey is mailed out in spring, there apparently has been some confusion among respondents as to which spring turkey season to report, leading to less reliable results. Starting with 2011-12, a mixed-mode Internet-mail survey was implemented to collect data on 2012 spring turkey season. Our sample frame consisted of all 2011-12 Game Take Survey respondents. The Internet component of the Spring Turkey Hunter Survey was largely administered by Bureau of Automated Technology Services (BATS).

Survey Implementation

Same as last year, we conducted three mailings (an initial mailing and two follow-up mailings to nonrespondents) of the Game Take Survey and two mailings (an initial mailing and one follow-up mailing to nonrespondents) of the Furtaker Survey. An announcement postcard was sent to all recipients one week before the initial mailings of both surveys. Initial mailing of the Game Take Survey was February 24, and the initial mailing of the Furtaker Survey was April 6. Second mailings were conducted four weeks after the initial mailings. The third mailing of the Game Take Survey was conducted 4 weeks after the second mailing. Data entry closed on May 22 for both surveys. We mailed 18,000 Game Take questionnaires and 6,945 Furtaker questionnaires.

For the Spring Turkey Hunter Survey, we mailed an invitation cover letter on June 6 detailing Internet survey log-on instructions with user name and password to 10,613 respondents of the Game Take Survey. A postcard reminder was mailed to all recipients 1 week after the initial mailing. A standard mail questionnaire was sent to nonrespondents 2.5 weeks after the initial mailing. A follow-up mailing of a standard mail questionnaire was conducted 4 weeks after the second mailing. Data entry closed on August 17.

Data Analysis

For each species, we estimated total harvest, number of participants, hunter-days, and harvest per 100 hunter-days based on 897,286 general hunting licenses sold for the Game Take Survey and Spring Turkey Hunter Survey, and 36,187 furtaker licenses and 49,539 junior combination licenses sold for the Furtaker Survey. We calculated percent change in harvest, participation, and harvest rate between 2010 and 2011. We estimated trends over time (1983–2011 or 1990–2011, depending on data availability) using Pearson product-moment and Spearman rho correlation coefficients, depending on sample size.

We assessed effects of optimizing sample allocation for each species by comparing 2011-12 harvest results to 3-year averages. Specifically, we examined coefficient of variation (CV), calculated as standard deviation of harvest divided by mean harvest. A small CV indicates a more precise estimate.

RESULTS

For the Game Take and Furtaker surveys, 10,722 and 4,080 useable returned questionnaires were processed, respectively. The response rates, after adjusting for undeliverable questionnaires, were 60.5% for the Game Take Survey and 59.3% for the Furtaker Survey, The Game Take Survey response rate was 3.0 percentage points higher than in 2010-11. The Furtaker Survey response rate was 4.8 percentage points lower than the 2010-11 survey. Decline in Furtaker Survey response rate likely was due to addition of effort measures in the survey instrument and inclusion of junior combination license holders in the sample frame; response rate excluding junior combination license holders would be 61.2%, still below the 64.1% response rate in 2010-11. Of the 471 junior combination license holders that responded to the Furtaker Survey, 69 (14.6%) indicated hunting or trapping for furbearers.

For the Spring Turkey Hunter Survey, 2,422 useable surveys were completed via Internet; and 5,681 useable returned mail questionnaires were processed. Overall response rate after adjusting for undeliverable questionnaires was 76.8 %.

Annual Changes

Compared to the 2010-11 season, harvests of 5 of 10 seasons or species of small game increased, including squirrel, pheasant, quail, woodchuck, and crow, and decreased for spring turkey, fall turkey, rabbit, grouse, and snowshoe hare (Table 1).

The number of hunters increased for 5 of 10 seasons or species, including squirrel, pheasant, snowshoe hare, woodchuck, and crow, and decreased for spring turkey, fall turkey, rabbit, grouse, and quail (Table 2).

Number of hunter-days increased for 6 of 10 seasons or species, including spring turkey, squirrel, pheasant, snowshoe hare, woodchuck, and crow, and decreased for fall turkey, rabbit, grouse, and quail (Table 3).

Harvest per 100 hunter-days (a standardized measure of hunter success) increased for 5 of 10 seasons or species, including rabbit, squirrel, quail, woodchuck, and crow, and decreased for spring turkey, fall turkey, grouse, pheasant, and snowshoe hare (Table 4).

The number of hunters/trappers of furbearers increased for all species except weasel (Table 5), and harvests increased for all species (Table 6). Increases likely can be attributed to inclusion of junior combination license holders in the Furtaker Survey sample. We estimated trapper and hunter effort, including number of days (Table 7), number of trapnights (number of days × average number of traps set; Table 8), harvest per 100 hunter and trapper days (Table 9), and harvest per 100 trapnights (Table 10).

Long-term Trends

Harvests have significantly declined ($P < 0.05$) for nearly all species except for spring turkey, which has increased, and fall turkey and quail, which have remained stable (Table 1). Numbers of hunters have declined for nearly all seasons and species ($P < 0.05$) except spring turkey and quail, which have not changed significantly (Table 2). Hunter-days have declined significantly for all species and seasons except quail and spring turkey which have not changed

significantly (Table 3). Harvest per 100 hunter days, has decreased significantly for rabbit, grouse, squirrel, pheasant, and snowshoe hare; increased significantly for spring turkey; and has not changed significantly for fall turkey, quail, woodchuck, and crow (Table 4).

Junior license buyers' participation in rabbit and pheasant junior hunts decreased from the 2010-2011 season, but increased in spring turkey and squirrel junior hunts (Table 11). However, between 2011 and 2012, participation in junior hunt for spring turkey decreased. Between 2011 and 2012, estimated harvests increased during junior spring turkey hunt, but decreased for pheasant, squirrel, and rabbit (Table 12). Long-term trends in participation and harvest numbers during junior hunts are not increasing or decreasing significantly, but we have been collecting data on junior hunts for only 6 years.

Since 1983, numbers of hunters/trappers have increased for 5 of 10 furbearer species, including red fox, coyote, muskrat, weasel, and opossum; the remainder have remained stable (Table 5). The harvests of 6 of 10 furbearer species ($P \leq 0.05$) decreased significantly since 1983; coyote harvests are the only trend increasing ($P < 0.01$) (Table 6).

Optimizing sample allocation based on historic harvest variances resulted in an improved precision of harvest estimate for 3 of 10 species in the Game Take Survey, including woodchuck, crow, and coyote (Table 13). There were relatively large decreases in harvest estimate precision for quail and snowshoe hare; these species have fewer hunters reporting harvests, resulting in less precise harvest estimates. Similar to the Game Take Survey, optimizing sample allocation for the Furtaker Survey resulted in improved precision of harvest estimate for 3 of 10 species, including mink, beaver, and weasel (Table 14). We were unable to optimize sample allocation for the Game Take Survey based on whether a recipient was a purchaser or non-purchaser. This factor has been shown to affect harvest, participation, and effort estimates (e.g., purchasers are more avid hunters than nonpurchasers; Shope 1985). This technical advancement should be available for the 2012-13 Game Take Survey, and optimized allocations for next year's Game Take and Furtaker surveys will be based on 3-year averages from 2009-10 survey year to 2011-12 survey year. Continued updating of harvest variances used in optimized allocation calculations should result in improved precision of harvest estimates over time.

RECOMMENDATIONS

1. The Game Take, Furtaker, and Spring Turkey Hunter surveys are the best source for harvest and participant data of many species; thus, we recommend continuing these surveys.

2. Explore possibility of conducting mixed-mode (Internet and mail) Game Take and Furtaker surveys.

3. Continue to evaluate cover letters, survey instruments, and methodologies to improve response rates.

4. Revisit issue of nonresponse bias by evaluating possibility of conducting phone survey of a sample of nonrespondents.

5. Explore possibility of including Mentored Youth in Game Take Survey and Senior combination license holders in Furtaker Survey.

LITERATURE CITED

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Table 1. Harvest, by species, 1990-2011, Pennsylvania. Survey was not conducted in 2004.

Year	Spring Turkey	Fall Turkey	Rabbit	Grouse	Squirrel	Pheasant[a]	Quail[a]	Hare	Woodchuck	Crow	Porcupine
1990	17,472	25,527	1,672,360	353,647	2,044,264	302,276	7,879	3,615	1,299,647	355,492	–
1991	16,606	31,979	1,462,270	293,891	1,632,108	269,065	3,005	3,579	1,304,020	257,009	–
1992	18,180	21,468	1,488,850	254,539	1,761,285	261,541	1,236	3,961	1,157,090	185,192	–
1993	24,068	30,477	1,160,939	272,690	1,585,368	250,149	4,837	2,114	1,274,166	191,639	–
1994	28,558	39,094	1,025,319	304,162	1,826,618	236,698	2,902	3,352	1,284,819	247,219	–
1995	36,401	49,748	1,010,938	315,197	1,599,104	250,930	1,204	2,997	1,225,101	295,962	–
1996	33,726	35,787	807,072	218,256	1,442,560	215,502	3,387	1,582	1,149,995	275,541	–
1997	30,956	37,398	827,520	187,770	1,352,038	219,864	1,766	1,432	1,251,145	184,944	–
1998	32,661	33,628	911,003	183,468	1,331,051	216,669	241	2,507	1,204,582	247,047	–
1999	37,806	40,718	715,862	177,355	1,236,108	211,257	3,938	2,412	1,117,970	209,273	–
2000	43,815	44,865	770,841	145,525	1,276,009	233,537	4,373	1,747	1,191,114	219,773	–
2001	49,186	48,008	701,551	159,610	1,276,603	244,282	4,276	4,584	1,187,114	195,273	–
2002	41,147	37,346	602,234	118,577	1,002,309	205,696	1,064	1,369	1,267,265	217,068	–
2003	42,876	31,100	588,310	106,587	1,063,996	234,196	2,059	1,908	1,171,888	207,707	–
2005	32,593	25,171	428,414	58,596	646,033	175,676	2,891	1,522	892,391	188,460	–
2006	37,845[b]	24,481	409,350	89,145	784,741	141,775	1,228	1,310	910,654	222,382	–
2007	36,294[b]	25,369	418,139	82,020	674,991	168,094	4,507	685	840,523	182,320	–
2008	40,483[b]	24,288	463,935	108,693	708,898	110,331	1,097	783	993,207	183,203	–
2009	42,478[b]	20,934	419,721	75,997	635,193	151,737	3,452	1,525	710,411	268,711	–
2010	31,908[b]	15,884	341,288	66,385	530,125	103,366	311	1,030	684,927	96,831	–
2011	31,769[b]	14,300	289,547	52,243	690,141	116,828	2,260	510	821,965	182,659	10,096
2012	30,928[b]	–	–	–	–	–	–	–	–	–	–
% change[c]	-2.6	-10.0	-15.2	-21.3	30.2	13.0	626.7	-50.5	20.0	88.6	–
r^d	0.797	0.045	-0.964	-0.951	-0.965	-0.918	-0.337	-0.812	-0.866	-0.551	–
P	<0.001	0.821	<0.001	<0.001	<0.001	<0.001	0.136	<0.001	<0.001	0.010	–

[a] Estimates exclude harvest on shooting preserves.
[b] Spring turkey harvest estimate does not include 2nd spring turkey harvests from special turkey license holders.
[c] Percent change from 2010 to 2011 except spring turkey percent change is from 2011 to 2012.
[d] Pearson product-moment correlation coefficient from data collected from 1983-2011, and 1983-2012 for spring turkey.

Table 2. Hunters, by species, 1990-2011, Pennsylvania. Survey was not conducted in 2004.

Year	Spring Turkey	Fall Turkey	Rabbit	Grouse	Squirrel	Pheasant[a]	Quail[a]	Hare	Woodchuck	Crow	Porcupine
1990	191,442	234,911	436,961	299,534	369,848	274,957	5,378	7,831	123,204	39,579	–
1991	179,202	252,210	405,004	292,418	348,868	254,051	3,279	7,601	118,257	39,014	–
1992	186,738	212,104	373,800	254,724	329,726	217,189	1,444	6,156	114,515	34,442	–
1993	201,060	222,780	347,129	242,398	311,103	198,657	2,657	5,801	109,576	34,648	–
1994	224,405	244,095	335,715	259,727	326,271	205,384	1,323	7,236	117,251	37,841	–
1995	239,521	261,395	297,570	239,014	293,852	182,224	1,451	5,949	113,127	36,782	–
1996	241,613	250,377	280,351	214,272	279,259	171,275	1,184	5,011	101,576	30,087	–
1997	233,287	249,934	261,115	197,994	267,051	148,900	1,009	3,723	104,561	30,696	–
1998	194,819[b]	199,696[b]	242,509	183,511	252,738	158,497	1,116	5,506	92,517	31,390	–
1999	237,984	244,638	221,179	174,576	238,887	142,142	1,550	4,379	90,853	29,131	–
2000	231,860	230,448	229,906	162,073	238,540	149,260	1,870	3,666	99,294	29,371	–
2001	230,115	228,564	213,295	161,186	231,436	146,751	2,029	4,930	99,787	33,343	–
2002	218,931	217,099	195,078	149,106	201,694	123,879	1,342	3,818	91,149	28,470	–
2003	246,820	211,967	181,426	134,115	199,922	130,676	3,518	5,091	92,986	27,591	–
2005	247,304	203,982	149,647	112,210	166,476	105,508	3,222	5,033	71,682	23,380	–
2006	245,024	182,233	145,712	105,282	174,151	96,590	3,322	5,211	80,522	26,880	–
2007	223,808	162,323	135,956	96,429	154,653	90,548	3,112	3,030	75,554	23,228	–
2008	216,551	152,294	137,842	102,139	171,786	86,052	2,396	2,890	80,116	25,706	–
2009	228,903	156,752	139,772	104,228	157,907	91,549	4,412	4,703	69,407	31,519	–
2010	237,037	163,433	125,537	91,003	150,309	71,579	3,499	2,756	71,618	20,835	–
2011	221,321	144,734	109,369	79,687	165,927	88,307	2,578	4,039	87,549	25,290	7,775
2012	206,384	–	–	–	–	–	–	–	–	–	–
% change[c]	-6.7	-11.4	-12.9	-12.4	10.4	23.4	-26.3	46.6	22.2	21.4	–
r^d	0.179	-0.918	-0.958	-0.969	-0.952	-0.959	0.240	-0.808	-0.923	-0.858	–
P	0.352	<0.001	<0.001	<0.001	<0.001	<0.001	0.294	<0.001	<0.001	<0.001	–

[a] Estimates exclude number of hunters on shooting preserves.

[b] Low values may have been caused by inadvertently excluding TMA map on 1998-99 survey instructions. See 1998-99 annual report.

[c] Percent change from 2010 to 2011 except spring turkey percent change is from 2011 to 2012.

[d] Pearson product-moment correlation coefficient from data collected from 1983-2011, and 1983-2012 for spring turkey.

Table 3. Hunter-days, by species[a], 1990-2011, Pennsylvania. Survey was not conducted in 2004.

Year	Spring Turkey	Fall Turkey	Rabbit	Grouse	Squirrel	Pheasant[a]	Quail	Hare	Woodchuck	Crow	Porcupine
1990	861,086	872,815	2,901,567	1,764,129	2,345,050	1,287,702	24,493	15,632	1,228,548	223,525	–
1991	781,499	851,155	2,474,017	1,580,574	2,004,826	1,115,902	13,630	15,397	1,341,605	227,527	–
1992	799,621	696,705	2,210,784	1,331,444	1,814,807	902,308	3,228	11,650	1,191,725	170,185	–
1993	843,987	753,896	1,926,331	1,246,856	1,721,261	859,018	16,683	11,882	1,338,167	201,412	–
1994	1,003,939	857,959	2,104,454	1,438,808	1,919,013	937,974	4,455	15,208	1,294,150	209,854	–
1995	1,084,725	865,565	1,769,363	1,281,923	1,630,631	844,056	6,022	11,712	1,253,239	193,952	–
1996	1,103,556	867,072	1,641,774	1,130,129	1,568,102	733,806	5,061	9,230	1,246,439	186,781	–
1997	1,019,546	834,253	1,525,740	1,022,603	1,462,230	648,985	2,837	6,849	1,241,112	178,724	–
1998	881,026[b]	691,787[b]	1,517,673	994,150	1,422,957	775,398	6,704	11,805	1,359,595	222,980	–
1999	1,023,988	807,292	1,268,639	882,167	1,306,098	605,034	5,004	6,864	1,151,067	173,186	–
2000	995,472	780,297	1,295,397	817,545	1,254,598	652,602	8,906	5,351	1,196,679	157,828	–
2001	1,025,011	800,113	1,319,445	894,983	1,371,514	714,970	8,355	10,837	1,280,855	250,869	–
2002	964,575	770,899	1,043,657	723,845	1,069,972	520,372	9,638	8,761	1,178,530	164,521	–
2003	1,069,299	757,304	1,058,453	700,729	1,049,995	595,908	13,834	11,206	1,103,755	237,168	–
2005	1,038,280	684,865	896,931	597,139	922,347	465,017	12,086	8,955	903,986	158,723	–
2006	937,023[c]	534,136	860,909	582,271	923,826	445,757	14,696	10,957	986,407	169,039	–
2007	894,393[c]	522,911	825,125	537,558	858,443	405,715	10,625	6,764	958,838	177,617	–
2008	896,165[c]	486,591	791,313	581,668	893,693	369,914	10,047	5,067	1,049,157	169,391	–
2009	1,034,804[c]	529,427	815,945	521,708	855,046	386,842	20,502	9,103	800,482	195,430	–
2010	925,561[c]	457,435	658,703	414,499	726,177	303,398	12,235	5,541	747,656	96,950	–
2011	936,638[c]	443,254	552,686	350,151	791,481	384,125	10,161	7,869	871,846	157,061	31,460
2012	993,564[c]	–	–	–	–	–	–	–	–	–	–
% change[d]	6.1	-3.1	-16.1	-15.5	9.0	26.6	-17.0	42.0	16.6	62.0	–
r[e]	0.251	-0.851	-0.956	-0.968	-0.965	-0.943	0.140	-0.690	-0.861	-0.510	–
P	0.260	<0.001	<0.001	<0.001	<0.001	<0.001	0.544	<0.001	<0.001	0.018	–

[a] Estimates exclude effort on shooting preserves.
[b] These low values may have been caused by excluding the TMA map on the 1998-1999 survey instructions. See 1998-99 annual report.
[c] Spring turkey effort does not include data from special turkey license holders pursuing a 2nd spring turkey.
[d] Percent change from 2010 to 2011 except spring turkey percent change is from 2011 to 2012.
[e] Pearson product-moment correlation coefficient from data collected from 1990-2011, and 1990-2012 for spring turkey.

Table 4. Harvest per 100 hunter-days, by species, 1990-2011, Pennsylvania. Survey was not conducted in 2004.

Year	Spring Turkey	Fall Turkey	Rabbit	Grouse	Squirrel	Pheasant[a]	Quail[a]	Hare	Woodchuck	Crow	Porcupine
1990	2.0	2.9	57.6	20.0	87.2	23.5	32.2	23.1	105.8	159.0	–
1991	2.1	3.8	59.1	18.6	81.4	24.1	22.0	23.2	97.2	113.0	–
1992	2.3	3.1	67.3	19.1	97.1	29.0	38.3	34.0	97.1	108.8	–
1993	2.9	4.0	60.3	21.9	92.1	29.1	29.0	17.8	95.2	95.1	–
1994	2.8	4.6	48.7	21.1	85.2	25.2	65.1	22.0	99.3	117.8	–
1995	3.4	5.7	57.1	24.6	98.1	29.7	20.0	25.6	97.8	152.6	–
1996	3.1	4.1	49.2	19.3	92.0	29.4	66.9	17.1	92.3	147.5	–
1997	3.0	4.5	54.2	18.4	92.5	33.9	62.2	20.9	100.8	103.5	–
1998	3.7	4.9	60.0	18.5	93.5	27.9	3.6	21.2	88.6	110.8	–
1999	3.7	5.0	56.4	20.1	94.6	34.9	78.7	35.1	97.1	120.8	–
2000	4.4	5.7	59.5	17.8	101.7	35.8	49.1	32.6	99.5	139.2	–
2001	4.8	6.0	53.2	17.8	93.1	34.2	51.2	42.3	92.7	77.8	–
2002	4.3	4.8	57.7	16.4	93.7	39.5	11.0	15.6	107.5	131.9	–
2003	4.0	4.1	55.6	15.2	101.3	39.3	14.9	17.0	106.2	87.6	–
2005	3.1	3.7	47.8	9.8	70.0	37.8	23.9	17.0	98.7	118.7	–
2006	4.0	4.6	47.5	15.3	84.9	31.8	8.4	12.0	92.3	131.6	–
2007	4.1	4.9	50.7	15.3	78.6	41.4	42.4	10.1	87.7	102.6	–
2008	4.5	5.0	58.6	18.7	79.3	29.8	10.9	15.5	94.7	108.2	–
2009	4.1	4.0	51.4	14.6	74.3	39.2	16.8	16.8	88.7	137.5	–
2010	3.4	3.5	51.8	16.0	73.0	34.1	2.5	18.6	91.6	99.9	–
2011	3.4	3.2	52.4	14.9	87.2	30.4	22.2	6.5	94.3	116.3	32.1
2012	3.1	–	–	–	–	–	–	–	–	–	–
% change[b]	-1.6	-7.1	1.1	-6.8	19.4	-10.7	775.0	-65.1	2.9	16.4	–
r[c]	0.580	0.061	-0.491	-0.694	-0.481	0.640	-0.398	-0.490	-0.385	-0.212	–
P	0.005	0.792	0.024	<0.001	0.027	0.002	0.074	0.024	0.085	0.357	–

[a] Estimates exclude effort on shooting preserves.
[b] Percent change from 2010 to 2011 except spring turkey percent change is from 2011 to 2012.
[c] Pearson product-moment correlation coefficient from data collected from 1990-2011, and 1990-2012 for spring turkey..

Table 5. Number of furbearer hunters and trappers, by species, 1990-2011, Pennsylvania. Survey was not conducted in 2004.

Year	Raccoon	Red Fox	Gray Fox	Coyote[a]	Muskrat	Mink	Beaver[b]	Skunk	Weasel	Opossum
1990	9,676	7,941	6,542	7,782	4,147	2,560	–	1,914	508	3,653
1991	9,921	7,827	6,613	12,184	4,865	2,726	–	2,264	422	3,915
1992	9,525	7,019	6,263	13,643	4,419	2,539	–	2,208	452	3,793
1993	8,195	6,790	6,089	14,260	4,227	2,465	–	1,967	387	3,369
1994	7,066	8,319	7,515	20,597	5,570	3,212	–	3,071	784	4,267
1995	9,718	8,080	6,908	20,413	4,465	2,879	–	2,643	853	3,989
1996	12,951	10,007	8,361	21,937	6,478	3,703	–	3,443	942	6,140
1997	13,750	10,330	8,553	24,526	7,363	4,434	–	3,473	1,125	6,386
1998	12,794	9,982	8,594	30,016	5,900	3,512	–	2,948	733	5,558
1999[c]	7,555	6,996	6,061	28,265	3,230	2,152	–	1,718	392	2,653
2000[c]	6,996	7,280	6,353	28,270	3,121	2,026	–	1,750	509	2,870
2001[c]	7,935	8,234	6,938	36,249	3,997	2,587	–	2,036	619	3,180
2002[c]	7,295	8,022	6,494	28,535	3,287	2,433	–	2,116	676	3,434
2003[c]	7,292	6,998	5,547	29,048	3,362	2,305	–	2,132	453	3,585
2005[c]	8,434	9,583	7,358	35,010	3,815	2,997	2,475	2,813	714	4,479
2006[c]	10,606	11,331	8,264	36,175	5,630	4,194	3,445	3,603	1,325	5,669
2007[c]	10,131	10,628	7,811	37,792	4,272	3,674	3,112	3,484	1,447	5,307
2008[c]	11,498	12,426	9,561	40,982	4,687	3,617	3,090	4,143	1,466	6,344
2009[c]	8,702	6,651	3,953	40,648	3,261	2,147	1,810	2,587	203	4,482
2010[c]	11,609	13,635	9,455	43,162	4,539	4,093	2,943	3,891	1,655	6,012
2011[d]	16,479	17,934	11,360	55,810	6,451	4,925	3,431	4,500	922	7,654
% change[e]	42.0	31.5	20.1	29.3	42.1	20.3	16.6	15.7	-44.3	27.3
r[f]	0.247	0.605	0.363	0.958	0.958	-0.093	0.392	0.075	0.493	0.489
P	0.280	0.004	0.106	<0.001	<0.001	0.690	0.079	0.874	0.023	0.024

[a] Combines estimates from Game Take Survey and Furtaker Survey, but does not include mentored youth harvest.
[b] Official estimates using Furtaker Survey data began in 2005-06.
[c] Estimates are minimum estimates that do not account for combination licenses.
[d] Estimates are minimum estimates that do not account for senior combination licenses.
[e] Percent change from 2010-11 to 2011-12.
[f] Pearson product-moment correlation coefficient from data collected from 1990-2011.

Table 6. Furbearer harvests, by species, 1990-2011, Pennsylvania. Survey was not conducted in 2004.

Year	Raccoon	Red Fox	Gray Fox	Coyote[a]	Muskrat	Mink	Beaver[b]	Skunk	Weasel	Opossum
1990	116,443	32,699	21,653	1,810	112,358	7,053	–	9,298	798	36,574
1991	130,608	28,495	30,409	3,719	156,014	10,355	–	8,907	481	37,177
1992	124,404	27,611	25,395	4,402	135,533	9,157	–	7,221	343	27,754
1993	118,964	25,862	23,839	6,161	121,657	7,808	–	7,920	526	25,807
1994	186,551	30,649	34,691	6,240	178,145	10,208	–	12,620	723	29,621
1995	120,462	31,110	23,518	6,662	130,442	8,602	–	9,995	687	29,688
1996	214,958	29,623	23,307	7,957	146,013	9,315	–	11,571	589	48,549
1997	194,696	36,923	26,043	6,685	216,066	14,063	–	12,344	1,172	60,717
1998	195,110	47,202	32,922	11,652	148,202	12,238	–	11,190	662	56,287
1999[c]	96,270	34,297	21,762	8,797	88,426	12,512	–	6,853	336	28,950
2000[c]	97,509	30,893	20,096	10,160	79,933	7,980	–	7,248	313	25,062
2001[c]	121,810	33,003	23,275	12,363	121,994	13,214	–	9,245	815	27,192
2002[c]	106,485	33,007	18,805	11,444	75,340	10,069	–	7,207	406	34,787
2003[c]	104,781	31,592	15,956	11,697	71,368	6,494	–	9,319	359	33,760
2005[c]	106,082	40,551	17,616	20,377	70,995	9,335	14,283	9,977	567	43,720
2006[c]	138,640	45,512	20,754	21,601	121,167	12,680	14,210	10,687	487	48,102
2007[c]	121,446	52,000	18,613	28,974	72,174	10,004	11,542	9,818	813	41,168
2008[c]	142,808	44,745	20,845	23,699	74,059	8,632	9,942	12,331	504	54,273
2009[c]	112,550	37,418	13,793	30,386	63,988	7,261	9,704	8,314	468	37,270
2010[c]	125,423	54,661	15,691	26,658	58,296	8,204	9,254	8,935	436	36,188
2011[d]	174,858	68,214	19,380	32,202	89,274	11,855	18,212	13,057	652	49,626
% change[e]	39.4	24.8	23.5	20.8	53.1	44.5	96.8	46.1	49.5	37.1
r[f]	-0.687	-0.358	-0.761	0.949	-0.763	-0.499	0.001	-0.645	-0.150	-0.668
P	<0.001	0.062	<0.001	<0.001	<0.001	0.007	0.999	<0.001	0.516	<0.001

[a] Combines estimates from the Game Take and Furtaker surveys, but does not include mentored youth harvest.
[b] Official estimates using Furtaker Survey data began in 2005-06.
[c] Estimates are minimum estimates that do not account for combination licenses.
[d] Estimates are minimum estimates that do not account for senior combination licenses.
[e] Percent change from 2010-11 to 2011-12.
[f] Pearson product-moment correlation coefficient from data collected from 1983-2011.

Table 7. Trapper and hunter-days, by species[a], 2011.

Year	Raccoon	Red Fox	Gray Fox	Coyote[b]	Muskrat	Mink	Beaver	Skunk	Weasel	Opossum
2011	400,069	341,727	212,973	548,199	99,573	77,945	58,183	126,782	13,607	183,064

[a] First year data was collected.
[b] Combines estimates from Game Take Survey and Furtaker Survey, but does not include mentored youth harvest.

Table 8. Trapper and hunter-trapnights, by species[a], 2011.

Year	Raccoon	Red Fox	Gray Fox	Coyote	Muskrat	Mink	Beaver	Skunk	Weasel	Opossum
2011	4,304,682	3,172,214	2,092,789	2,251,668	1,564,493	900,813	362,569	2,014,271	106,017	2,535,478

[a] First year data was collected.

Table 9. Harvest per 100 trapper and hunter-days, by species[a], 2011.

Year	Raccoon	Red Fox	Gray Fox	Coyote[b]	Muskrat	Mink	Beaver	Skunk	Weasel	Opossum
2011	43.7	20.0	9.1	5.9	89.7	15.2	31.3	10.3	4.8	27.1

[a] First year data was collected.
[b] Combines estimates from Game Take Survey and Furtaker Survey, but does not include mentored youth harvest.

Table 10. Harvest per 100 trapnights (number of days × average number of traps), by species[a], 2011.

Year	Raccoon	Red Fox	Gray Fox	Coyote[b]	Muskrat	Mink	Beaver	Skunk	Weasel	Opossum
2011	4.1	2.2	0.9	0.7	5.7	1.3	5.0	0.6	0.6	2.0

[a] First year data was collected.
[b] Uses data from Furtaker Survey only.

Table 11. Number of resident junior license holders participating in junior hunts, 2006-2012.

Year	Spring Turkey	Pheasant	Squirrel	Rabbit
2006	8,976	5,660	7,652	–
2007	5,911	3,874	6,165	–
2008	7,354	5,272	8,941	–
2009	1,876	2,003	4,713	–
2010	8,096	5,048	7,850	4,371
2011	12,710	4,778	7,873	2,649
2012	9,841	–	–	–
% change[a]	-22.6	-5.3	0.3	-39.4
ρ[b]	0.500	-0.371	0.314	–
P	0.253	0.469	0.544	–

[a] Percent change from 2010 to 2011 except spring turkey percent change is from 2011 to 2012.
[b] Spearman rho correlation coefficient from data collected from 2006-2011, and 2006-2012 for spring turkey

Table 12. Harvests by resident junior license holders during junior hunts, 2006-2012.

Year	Spring Turkey	Pheasant	Squirrel	Rabbit
2006	613	3,218	12,259	–
2007	1,650	5,964	18,101	–
2008	1,638	3,412	29,143	–
2009	1,772	3,671	17,453	–
2010	1,478	4,617	22,625	5,325
2011	1,588	3,201	14,921	1,588
2012	2,638	–	–	–
% change[a]	66.1	-30.7	-34.1	-70.2
ρ[b]	0.429	-0.200	0.143	–
P	0.337	0.704	0.787	–

[a] Percent change from 2010 to 2011 except spring turkey percent change is from 2011 to 2012.
[b] Spearman rho correlation coefficient from data collected from 2006-2011, and 2006-2012 for spring turkey

Table 13. Differences in coefficient of variation (CV) in harvest estimates from Game Take Survey data, 2011-12. Smaller CV indicates a more precise estimate.

Year	Rabbit	Grouse	Squirrel	Pheasant	Quail	Turkey	Woodchuck	Crow	Hare	Coyote
3-year avg [a]	2.09	12.44	1.16	3.23	12.23	19.95	0.73	2.77	139.16	48.61
2011	2.76	13.41	1.18	5.57	62.78	26.06	0.66	2.28	444.47	39.45
% change	32.00	7.79	2.30	72.11	413.52	30.60	-10.23	-17.89	219.40	-18.85

[a] Three-year averages are from 2008–2010 Game Take Survey years.

Table 14. Differences in coefficient of variation (CV) in harvest estimates from Furtaker Survey data, 2011-12. Smaller CV indicates a more precise estimate.

Year	Raccoon	Red Fox	Gray Fox	Coyote	Muskrat	Mink	Beaver	Skunk	Weasel	Opossum
3-year avg [a]	0.44	2.16	3.45	5.58	0.58	4.27	2.75	3.27	66.15	0.91
2011	0.56	4.01	8.46	10.65	0.70	4.18	2.38	5.72	51.23	1.72
% change	26.38	85.77	144.78	90.89	20.06	-2.12	-13.52	74.93	-22.55	89.67

[a] Three-year averages are from 2008–2010 Furtaker Survey years.