# PENNSYLVANIA GAME COMMISSION BUREAU OF WILDLIFE MANAGEMENT ANNUAL PROJECT REPORT 

PROJECT CODE NO.: 06110
TITLE: Survey and Statistical Support
PROJECT JOB NO.: 11101
TITLE: Game Take and Furtaker Surveys
PERIOD COVERED: 1 July 2007 to 30 June 2008
COOPERATING AGENCIES: Bureau of Automated Technology Services (BATS), Bureau of Administrative Services

WORK LOCATION(S): Harrisburg, Pennsylvania
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DATE: 1 August 2008


#### Abstract

A questionnaire was mailed to a random sample of 2007-08 general hunting license purchasers ( 18,287 questionnaires mailed) to estimate number of hunters, harvest, and hunter-days for small game species during the 2007-08 hunting season. After 3 mailings, $59.8 \%$ of the questionnaires were returned. Overall, between the 2006-07 and 2007-08 hunting seasons, harvests and hunter numbers decreased. Twenty-five year trends in harvest and hunter participation indicate a decline for nearly all small game species. A separate questionnaire was mailed to a random sample of furtaker license purchasers ( 4,562 mailed) to estimate harvest of furbearer species and trapper-days. After 2 mailings, $74.3 \%$ of the questionnaires were returned. Overall, the harvest of furbearer species, and the number of hunters/trappers increased between the 2006-07 and 2007-08 seasons. Twenty-five year trends for harvests of furbearers indicate harvests have declined dramatically for most species. Junior and senior combination license holders are not included in the furtaker sample, thus some furtakers are not included in survey estimates. An estimated 51,141 adult hunters mentored 58,883 youth less than 12 years old in the second year of Pennsylvania's Mentored Youth Hunting Program. Mentored youth woodchuck, squirrel, antlered deer and spring gobbler harvests and hunter days are provided. An estimated 10,674 junior license buyers participated in youth hunts. Number of participants and harvests for waterfowl, spring gobbler, pheasant and squirrel youth hunts are provided.


## OBJECTIVES

1. To annually estimate the numbers of animals harvested, participants, and days spent hunting (hunter-days) for small 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, hunters and trappers numbers, hunter-days, and harvest per 100 hunter-days.

## METHODS

In March 2008, following the close of trapping and small game hunting seasons, the names and addresses of general hunting license holders and licensed furtakers were selected to receive questionnaires based on their license number. General Hunting License numbers ending in either 01 or 51 were chosen for the Game Take Survey, and Furtaker License numbers ending in either 1 or 6 were selected for the Furtaker Survey. These licenses were obtained from the duplicate licenses on file in the License Division of the Bureau of Administrative Services, and from the electronic file of over the counter (OTC) sales. Photocopies of the duplicates and the OTC file were used by the Bureau of Automated Technology Services (BATS) to prepare the mailing list. BATS and Bureau of Administrative Services addressed and mailed 18,287 Game Take questionnaires and 4,562 Furtaker questionnaires. In addition to the initial mailing, 2 follow-up mailings were sent to nonrespondents of the Game Take Survey, and 1 follow-up mailing was sent to nonrespondents of the Furtaker Survey.

These surveys reflect major changes of information requested from hunters and trappers from pre-1990 surveys. First, information about small game and furbearer species were separated into Game Take and Furtaker surveys, respectively. Second, the Game Take questionnaire was expanded to include more game species, and the number of days of hunting per species per Wildlife Management Unit (WMU). Third, harvest and hunting effort on shooting preserves were requested separately for ringnecked pheasant, quail, and ducks. Fourth, estimates of coyote harvest included those shot by hunters (Game Take Survey excluding furtaker license buyers) and those trapped or shot by furtakers (Furtaker Survey). Fifth, a cover letter to encourage response was included in all mailings.

During 1990-2000, methods used to survey small game hunters and furtakers remained the same with the following exceptions. The Game Take Survey for 1992 consisted of $2 / 3$ the usual sample size (i.e., every third 01 or 51 license was skipped) and only 2 mailings were conducted, but a telephone survey of nonrespondents was carried out to estimate nonresponse bias. Estimates using the standard estimation techniques (Shope 1985) were similar to those obtained when incorporating nonresponse bias (Diefenbach 1993). Therefore, estimates from the 1992 survey should be comparable to results from other years. In 1996 hunters were asked to report their Canada goose harvest by season (early, regular, late), and their snow goose harvest. This change was implemented to assess the effect of special goose seasons, since the regular season was closed for most of the state, and to compare Pennsylvania Game Commission (PGC) estimates to those obtained by the newly implemented Migratory Bird Harvest Information Program. Since the 1998 Game Take Survey, turkey hunters have been asked to report the management unit in which they hunted instead of the county. In 2000, landowner, resident senior lifetime upgrades, and resident senior lifetime renewals were included in the total licenses sold for calculating harvests and participation. This resulted in the addition of licenses to our survey population that otherwise would not have been included. The added senior licenses have existed since 1996 for lifetime renewals and 1999 for lifetime upgrades. Therefore, estimates of Game Take Surveys from 1996-99 likely underestimated harvests by about 2-3\%. Landowner licenses represent less than $0.5 \%$ of license sales and would have had minimal effect on previous survey estimates.

Since 1999, Furtaker Surveys sampled those who purchased a furtaker license but not those who purchased junior and senior combination licenses, which include furtaker privileges. As a result of this licensing change, furtaker harvest and participation estimates beginning in 1999 are biased low compared to pre-1999 estimates. To reduce this bias, a correction factor was used to adjust harvest and participation estimates in the 1999 and 2000 Furtaker Surveys (Rosenberry 2000); however, this correction was discontinued in 2001, (Rosenberry 2001), and furtaker harvest estimates since 1999 are minimum estimates that do not include junior and senior combination licenses.

Beginning in 2003-04, respondents reported harvests by WMUs rather than counties. In addition, the survey form was simplified by reducing the number of possible hunting areas from 4 counties to 2 WMUs. This was done because less than $5 \%$ of hunters hunted in the $3^{\text {rd }}$ or $4^{\text {th }}$ county on previous surveys and there are fewer WMUs ( 22 WMUs vs. 67 counties).

Beginning in 2005-06, respondents reported Canada goose and duck harvests by Canada goose and duck zones, respectively. This change was implemented because Canada goose and duck populations are harvested and managed by zone, not WMU. Respondents also reported dove harvest by seasons (early, mid, and late) instead of just total harvest.

Respondents to the Game Take Survey were post-stratified on the basis of whether or not they had purchased special licenses or stamps, to reduce the effect of nonresponse bias on estimates (see Shope 1985). In 2001, combination license holders were added to those purchasing additional stamps. Response rates for combination license holders were calculated by identifying combination license holders based on license stamp letters from the survey file, and their response or nonresponse to the survey. Nonresponse bias for the Furtaker Survey was not corrected.

Beginning with the 2006-07 Game Take Survey Special Turkey License and bear archery season information was requested. The Special Turkey License database was compared to the results of the Game Take Survey to confirm that those who had purchased a Special Turkey License reported so on the survey. This is the only electronic license database currently available to compare with Game Take results. Due to concerns identified during last year's survey that many Special Turkey License buyers were recording license purchase and hunting information for the wrong spring turkey season, changes were made to the Game Take Survey cover letter and survey instrument to improve accuracy of this information.

Due to concerns about falling response rates for Game Take and Furtaker surveys, several procedures were modified. Cover letters were modified, a post card reminder was mailed to all survey participants 1 week after the first mailing and all addresses in the mailer files were run through address correction software to delete undeliverable addresses.

We estimated (by species) total harvest, number of participants, hunter-days, and harvest per 100 hunter-days based on 919,214 General Hunting Licenses sold for the Game Take Survey, and 28,033 Furtaker Licenses sold for the Furtaker Survey. We estimated trends over time using Pearson product-moment correlation coefficients.

In addition to the harvest and participation estimates, bobcat and fisher sightings by archery and firearms deer hunters and spring turkey hunters were added in 2001-02 to the Game Take Survey, to monitor distribution and range of these species. In 2005-06, bobcat and fisher sightings by bear hunters
during the regular season were also added. These results are presented in furtaker and bobcat population and management reports. In 2006-07, a section was added for hunters to report how many, and in which WMUs, they saw wild pheasants and bobwhite quail during all hunting seasons. This section was added to help monitor distribution and range of these species.

On the 2007-08 Game Take Survey, questions were asked pertaining to wildlife protection activities, mentored youth program, and youth hunt participation. Questions pertaining to the mentored youth hunt asked the mentors if they mentored youth and how many youth they mentored. Harvests and days of hunting effort by mentored youth were also requested. Surveys from junior hunters were excluded from analysis because only adults are allowed to mentor a youth. If respondents indicated they participated in the mentored youth program, and they did not provide information on the number of youth mentored, their results were not used.

Participation and harvests for each species were assessed for youth hunts. Participation in the youth pheasant hunt has been assessed since the 2003-04 Game Take Survey, youth waterfowl and spring gobbler hunts have been assessed since 2005-06, and youth squirrel hunts have been assessed since 2006-07. Only junior resident hunter participation is assessed because there is currently no way to distinguish between non-resident junior, adult, and senior licenses. Estimates for youth hunt participation and harvests have been expanded to statewide estimates using the purchaser/nonpurchaser adjustment since 2006-07. Previous reports just summarized raw numbers from respondents.

## RESULTS

For the Game Take and Furtaker surveys, 9,415 and 2,994 useable returned questionnaires were processed, respectively. The response rates, after adjusting for undeliverable questionnaires, were 59.8\% for the Game Take Survey and $74.3 \%$ for the Furtaker Survey, which were 9.9 and 10.0 percentage points higher than in 2006-07, respectively. We were encouraged by improved response rates, but cannot be sure of the contribution of each survey procedure change. Improved cover letters probably played a role, and the post card reminder definitely improved response to the first mailing, which reduced costs of later mailings. We suspect that cleansing the mailer file of undeliverables may have played the greatest role, because we have learned that post offices do not return all undeliverables. Undeliverables that end up discarded or placed in dead letter files by the U.S. Postal Service would serve to artificially depress response rates.

By comparing Game Take Survey responses to the 2007 Special Turkey License database, we saw improved accuracy this year. Of the 304 hunters surveyed that had checked yes to indicate they bought a 2007 Special Turkey License, 64 were correct (compared to 4 of 269 last year). Of the survey respondents that indicated they hunted in the spring 2007 season, 95 should have reported buying a Special Turkey License. This means that 31 respondents, who did purchase a Special Turkey License, did not report that it had been obtained. Although improvements in accurate reporting by spring turkey hunters were seen, results indicate that the Game Take Survey is not a reliable procedure for estimating harvests and hunter days of hunters pursuing a $2^{\text {nd }}$ gobbler. Hence, these data are not included in this report. A more reliable technique and results are provided in the wild turkey productivity and harvest trends report.

## Annual Changes

Harvests of 5 of 12 small game species increased (Table 1). The number of hunters and hunter-
days decreased for 10 small game species and increased for 2 (Tables 2 and 3). Spring turkey harvest, hunters, and hunter-days decreased. Fall turkey harvest increased, whereas hunter-days and hunters decreased.

Harvest per 100 hunter-days increased for 5 of 12 small game species (Table 4).
The number of hunters/trappers of furbearers increased for 2 species (Table 5). Harvests increased for 3 of 9 species (Table 6).

## Twenty-five Year Trends

Harvests have declined ( $P<0.05$ ) for nearly all species except turkey (spring and fall), geese and ducks. Trends for quail ( $P=0.37$ ) were not significant (Table 1). Number of hunters has declined for nearly all seasons/species ( $P<0.01$ ) except spring turkey and quail (Table 2).

Number of hunters/trappers of nearly all furbearer species has remained stable since 1990, although the number of hunter/trappers pursuing raccoons has declined $(P<0.01)$ since 1983. The number of hunters and trappers pursuing coyotes continues to increase ( $P<0.01$ ) (Table 5). The harvest of almost all furbearers for which we have 1983-2007 data has declined ( $P \leq 0.01$ ). Since 1990, coyote harvests have increased $(P<0.01)$ and weasel harvests have varied with no consistent change ( $P=0.77$ ) (Table 6).

## Survey Questions

Three questions were asked pertaining to wildlife protection activities, mentored youth program, and youth hunts. The sampling error for these questions is a maximum of $\pm 1 \%$.

Nine percent of hunters reported being checked by a WCO during the 2007-08 hunting seasons.
The mentored youth program question asked hunters if they mentored any youth, how many youth they mentored, and how many squirrels, woodchucks, antlered deer, and spring gobblers the youth harvested. Results expanded statewide indicated 51,141 hunters mentored 58,883 youth. Mentored youth harvested 52,114 woodchucks during 64,188 days hunting, 61,160 squirrels during 89,085 days hunting, 5,199 antlered deer during 138,011 days hunting, and 3,496 spring gobblers during 52,032 days hunting.

The final question assessed resident junior hunters participation in the Youth Waterfowl, Spring Gobbler, Pheasant, and Squirrel hunts. Overall, 10,674 resident junior license buyers participated in youth hunts. Participation and harvest results by species are provided in Table 7.

## RECOMMENDATIONS

1. The Game Take and Furtaker surveys are the best source for harvest and participant data; thus, we recommend continuing these surveys.
2. Inability to sample sufficient numbers of combination license holders reduces reliability of furtaker estimates. A computerized license database would increase our ability to improve sampling of furtakers.
3. The special Spring Turkey license database has allowed a comparison of results from the Game Take Survey to a known complete database. The timing of the survey appears to have an effect on the accuracy of spring turkey data. Conducting a separate spring turkey hunter survey immediately after the close of spring turkey season should be considered.
4. Consider adding a postcard announcement to be mailed out 1 week before the first mailings to try to improve response rates of both the Game Take and Furtaker surveys.
5. Continue to evaluate cover letters, survey instruments and methodologies to improve response rates.
6. Major changes to the Game Take and Furtaker surveys will need to be addressed when a Point of Sale system goes into effect. A computerized licensing system will allow samples to be stratified by license type and location of residence, and will allow more efficient sampling. This system will allow us to survey hunters much sooner after hunting seasons end, which has been shown to result in more accurate estimates of harvest and hunter participation (e.g., Barker 1991). Moreover, a computerized license system will provide greater flexibility in adapting sampling methods to future licensing changes that may reduce the reliability of estimates.

## LITERATURE CITED

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Table 1. Harvest, by species, 1983-2007, Pennsylvania. Survey was not conducted in 2004.

| Year | Spring <br> Turkey | Fall Turkey | Rabbits | Grouse | Squirrel | Pheasant ${ }^{\text {a }}$ | Woodcock | Quail ${ }^{\text {a }}$ | Dove | Geese | Ducks ${ }^{\text {a }}$ | Hare | Woodchuck | Crow |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1983 | 10,852 | 20,494 | 2,156,565 | 493,737 | 2,259,320 |  | 186,319 |  | 1,690,158 | 68,333 |  | 10,867 |  |  |
| 1984 | 9,723 | 15,844 | 1,939,399 | 475,960 | 2,256,311 |  | 170,296 |  | 1,402,180 | 64,452 |  | 13,989 |  |  |
| 1985 | 14,197 | 18,217 | 2,137,737 | 511,271 | 2,428,683 |  | 137,183 |  | 1,443,109 | 56,233 |  | 14,749 |  |  |
| 1986 | 16,155 | 26,763 | 2,092,910 | 536,553 | 2,833,061 |  | 165,685 |  | 1,531,868 | 69,748 |  | 13,189 |  |  |
| 1987 | 14,674 | 28,346 | 1,764,744 | 484,016 | 2,364,596 |  | 175,124 |  | 1,374,110 | 68,541 |  | 14,412 |  |  |
| 1988 | 14,659 | 22,515 | 1,930,737 | 523,271 | 2,313,153 |  | 165,590 |  | 1,520,322 | 49,573 |  | 8,488 |  |  |
| 1989 | 17,154 | 21,669 | 1,696,712 | 410,371 | 2,206,719 |  | 143,502 |  | 1,209,438 | 78,821 |  | 7,595 |  |  |
| 1990 | 17,472 | 25,527 | 1,672,360 | 353,647 | 2,044,264 | 302,276 | 50,918 | 7,879 | 1,022,402 | 72,901 | 98,026 | 3,615 | 1,299,647 | 355,492 |
| 1991 | 16,606 | 31,979 | 1,462,270 | 293,891 | 1,632,108 | 269,065 | 53,183 | 3,005 | 968,421 | 69,127 | 87,478 | 3,579 | 1,304,020 | 257,009 |
| 1992 | 18,180 | 21,468 | 1,488,850 | 254,539 | 1,761,285 | 261,541 | 51,246 | 1,236 | 734,707 | 78,883 | 93,687 | 3,961 | 1,157,090 | 185,192 |
| 1993 | 24,068 | 30,477 | 1,160,939 | 272,690 | 1,585,368 | 250,149 | 52,959 | 4,837 | 735,089 | 84,251 | 133,354 | 2,114 | 1,274,166 | 191,639 |
| 1994 | 28,558 | 39,094 | 1,025,319 | 304,162 | 1,826,618 | 236,698 | 29,654 | 2,902 | 669,459 | 102,979 | 128,164 | 3,352 | 1,284,819 | 247,219 |
| 1995 | 36,401 | 49,748 | 1,010,938 | 315,197 | 1,599,104 | 250,930 | 28,624 | 1,204 | 670,791 | 64,382 | 156,511 | 2,997 | 1,225,101 | 295,962 |
| 1996 | 33,726 | 35,787 | 807,072 | 218,256 | 1,442,560 | 215,502 | 26,846 | 3,387 | 603,114 | 96,910 | 151,142 | 1,582 | 1,149,995 | 275,541 |
| 1997 | 30,956 | 37,398 | 827,520 | 187,770 | 1,352,038 | 219,864 | 23,878 | 1,766 | 506,677 | 115,506 | 188,034 | 1,432 | 1,251,145 | 184,944 |
| 1998 | 32,661 | 33,628 | 911,003 | 183,468 | 1,331,051 | 216,669 | 31,602 | 241 | 562,348 | 131,831 | 146,050 | 2,507 | 1,204,582 | 247,047 |
| 1999 | 37,806 | 40,718 | 715,862 | 177,355 | 1,236,108 | 211,257 | 25,704 | 3,938 | 519,116 | 128,385 | 164,328 | 2,412 | 1,117,970 | 209,273 |
| 2000 | 43,815 | 44,865 | 770,841 | 145,525 | 1,276,009 | 233,537 | 31,199 | 4,373 | 478,602 | 194,480 | 185,185 | 1,747 | 1,191,114 | 219,773 |
| 2001 | 49,186 | 48,008 | 701,551 | 159,610 | 1,276,603 | 244,282 | 32,504 | 4,276 | 460,971 | 197,767 | 143,907 | 4,584 | 1,187,114 | 195,273 |
| 2002 | 41,147 | 37,346 | 602,234 | 118,577 | 1,002,309 | 205,696 | 31,167 | 1,064 | 462,538 | 173,391 | 169,828 | 1,369 | 1,267,265 | 217,068 |
| 2003 | 42,876 | 31,100 | 588,310 | 106,587 | 1,063,996 | 234,196 | 42,434 | 2,059 | 500,980 | 228,310 | 191,132 | 1,908 | 1,171,888 | 207,707 |
| 2005 | 32,593 | 25,171 | 428,414 | 58,596 | 646,033 | 175,676 | 37,792 | 2,891 | 409,769 | 208,704 | 163,065 | 1,522 | 892,391 | 188,460 |
| 2006 | $37,845^{\text {b }}$ | 24,481 | 409,350 | 89,145 | 784,741 | 141,775 | 39,782 | 1,228 | 384,625 | 181,708 | 159,388 | 1,310 | 910,654 | 222,382 |
| 2007 | 36,294 ${ }^{\text {b }}$ | 25,369 | 418,139 | 82,020 | 674,991 | 168,094 | 26,924 | 4,507 | 416,844 | 188,266 | 138,860 | 685 | 840,523 | 182,320 |
| $r^{\text {c }}$ | 0.892 | 0.460 | -0.973 | -0.959 | -0.958 | -0.860 | -0.810 | -0.234 | -0.928 | 0.895 | 0.646 | -0.825 | -0.780 | -0.532 |
| $P$ | $<0.01$ | <0.05 | $<0.01$ | $<0.01$ | <0.01 | <0.01 | <0.01 | 0.37 | <0.01 | <0.01 | <0.01 | <0.01 | $<0.01$ | $<0.03$ |

[^0]Table 2. Hunters, by species, 1983-2007, Pennsylvania. Survey was not conducted in 2004.

| Year | Spring <br> Turkey | Fall <br> Turkey | Rabbits | Grouse | Squirrel | Pheasant ${ }^{\text {a }}$ | Woodcock | Quail ${ }^{\text {a }}$ | Dove | Geese | Ducks ${ }^{\text {a }}$ | Hare | Woodchuck | Crow |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1983 | 255,982 | 367,657 | 738,970 | 471,640 | 614,324 |  | 148,887 |  | 188,727 | 70,019 |  | 28,960 |  |  |
| 1984 | 209,717 | 322,347 | 626,892 | 419,367 | 525,670 |  | 120,643 |  | 162,779 | 66,406 |  | 27,133 |  |  |
| 1985 | 214,331 | 298,055 | 619,220 | 423,393 | 528,599 |  | 100,270 |  | 150,904 | 62,742 |  | 25,141 |  |  |
| 1986 | 246,039 | 336,225 | 612,424 | 442,897 | 552,336 |  | 110,886 |  | 166,139 | 65,087 |  | 27,557 |  |  |
| 1987 | 206,039 | 282,761 | 516,281 | 374,741 | 472,250 |  | 96,936 |  | 137,402 | 50,804 |  | 19,573 |  |  |
| 1988 | 226,008 | 300,055 | 528,615 | 390,192 | 472,841 |  | 93,110 |  | 143,981 | 53,475 |  | 21,873 |  |  |
| 1989 | 224,138 | 296,139 | 497,463 | 365,211 | 464,434 |  | 87,053 |  | 131,321 | 43,603 |  | 17,568 |  |  |
| 1990 | 191,442 | 234,911 | 436,961 | 299,534 | 369,848 | 274,957 | 30,045 | 5,378 | 93,532 | 33,509 | 28,443 | 7,831 | 123,204 | 39,579 |
| 1991 | 179,202 | 252,210 | 405,004 | 292,418 | 348,868 | 254,051 | 24,681 | 3,279 | 86,377 | 36,032 | 29,247 | 7,601 | 118,257 | 39,014 |
| 1992 | 186,738 | 212,104 | 373,800 | 254,724 | 329,726 | 217,189 | 25,916 | 1,444 | 76,998 | 38,301 | 29,263 | 6,156 | 114,515 | 34,442 |
| 1993 | 201,060 | 222,780 | 347,129 | 242,398 | 311,103 | 198,657 | 23,452 | 2,657 | 73,462 | 41,577 | 35,782 | 5,801 | 109,576 | 34,648 |
| 1994 | 224,405 | 244,095 | 335,715 | 259,727 | 326,271 | 205,384 | 19,401 | 1,323 | 74,589 | 40,106 | 34,097 | 7,236 | 117,251 | 37,841 |
| 1995 | 239,521 | 261,395 | 297,570 | 239,014 | 293,852 | 182,224 | 15,702 | 1,451 | 67,754 | 28,715 | 30,274 | 5,949 | 113,127 | 36,782 |
| 1996 | 241,613 | 250,377 | 280,351 | 214,272 | 279,259 | 171,275 | 14,464 | 1,184 | 65,808 | 31,119 | 32,434 | 5,011 | 101,576 | 30,087 |
| 1997 | 233,287 | 249,934 | 261,115 | 197,994 | 267,051 | 148,900 | 13,374 | 1,009 | 60,178 | 30,574 | 32,180 | 3,723 | 104,561 | 30,696 |
| 1998 | $194,819^{\text {b }}$ | 199,696 ${ }^{\text {b }}$ | 242,509 | 183,511 | 252,738 | 158,497 | 12,907 | 1,116 | 57,579 | 32,871 | 34,103 | 5,506 | 92,517 | 31,390 |
| 1999 | 237,984 | 244,638 | 221,179 | 174,576 | 238,887 | 142,142 | 12,212 | 1,550 | 49,551 | 33,734 | 31,503 | 4,379 | 90,853 | 29,131 |
| 2000 | 231,860 | 230,448 | 229,906 | 162,073 | 238,540 | 149,260 | 12,977 | 1,870 | 52,496 | 35,628 | 31,998 | 3,666 | 99,294 | 29,371 |
| 2001 | 230,115 | 228,564 | 213,295 | 161,186 | 231,436 | 146,751 | 14,411 | 2,029 | 51,144 | 38,292 | 31,893 | 4,930 | 99,787 | 33,343 |
| 2002 | 218,931 | 217,099 | 195,078 | 149,106 | 201,694 | 123,879 | 12,652 | 1,342 | 50,883 | 41,240 | 32,328 | 3,818 | 91,149 | 28,470 |
| 2003 | 246,820 | 211,967 | 181,426 | 134,115 | 199,922 | 130,676 | 15,321 | 3,518 | 46,580 | 44,467 | 34,173 | 5,091 | 92,986 | 27,591 |
| 2005 | 247,304 | 203,982 | 149,647 | 112,210 | 166,476 | 105,508 | 13,615 | 3,222 | 41,328 | 37,426 | 26,673 | 5,033 | 71,682 | 23,380 |
| 2006 | 245,024 | 182,233 | 145,712 | 105,282 | 174,151 | 96,590 | 11,978 | 3,322 | 40,145 | 35,226 | 27,628 | 5,211 | 80,522 | 26,880 |
| 2007 | 223,808 | 162,323 | 135,956 | 96,429 | 154,653 | 90,548 | 12,574 | 3,112 | 40,166 | 34,803 | 27,136 | 3,030 | 75,554 | 23,228 |
| $r^{c}$ | 0.296 | -0.874 | -0.969 | -0.977 | -0.965 | -0.959 | -0.835 | 0.036 | -0.925 | -0.703 | -0.265 | -0.838 | -0.941 | -0.910 |
| $P$ | 0.19 | $<0.01$ | <0.01 | $<0.01$ | <0.01 | $<0.01$ | $<0.01$ | 0.89 | <0.01 | <0.01 | 0.30 | $<0.01$ | <0.01 | $<0.01$ |

[^1]Table 3. Hunter-days, by species, 1990-2007, Pennsylvania. Survey was not conducted in 2004.

| Year | Spring Turkey | Fall Turkey | Rabbits | Grouse | Squirrel | Pheasant ${ }^{\text {a }}$ | Woodcock | Quail ${ }^{\text {a }}$ | Dove | Geese | Ducks ${ }^{\text {a }}$ | Hare | Woodchuck | Crow |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1990 | 861,086 | 872,815 | 2,901,567 | 1,764,129 | 2,345,050 | 1,287,702 | 133,947 | 24,493 | 475,402 | 171,436 | 141,441 | 15,632 | 1,228,548 | 223,525 |
| 1991 | 781,499 | 851,155 | 2,474,017 | 1,580,574 | 2,004,826 | 1,115,902 | 119,238 | 13,630 | 409,149 | 167,342 | 132,775 | 15,397 | 1,341,605 | 227,527 |
| 1992 | 799,621 | 696,705 | 2,210,784 | 1,331,444 | 1,814,807 | 902,308 | 97,699 | 3,228 | 329,087 | 188,303 | 135,656 | 11,650 | 1,191,725 | 170,185 |
| 1993 | 843,987 | 753,896 | 1,926,331 | 1,246,856 | 1,721,261 | 859,018 | 94,588 | 16,683 | 326,265 | 202,644 | 174,023 | 11,882 | 1,338,167 | 201,412 |
| 1994 | 1,003,939 | 857,959 | 2,104,454 | 1,438,808 | 1,919,013 | 937, | 73,95 | 4,455 | 340,661 | 217,021 | 163,690 | 15,208 | 1,294,150 | 209,854 |
| 1995 | 1,084,725 | 865,565 | 1,769,363 | 1,281,923 | 1,630,631 | 844,056 | 62,819 | 6,022 | 295,114 | 128,611 | 165,196 | 11,712 | 1,253,239 | 193,952 |
| 1996 | 1,103,556 | 867,072 | 1,641,774 | 1,130,129 | 1,568,102 | 733,806 | 51,493 | 5,061 | 280,603 | 165,523 | 168,834 | 9,230 | 1,246,439 | 186,781 |
| 1997 | 1,019,546 | 834,253 | 1,525,740 | 1,022,603 | 1,462,230 | 648,985 | 48,577 | 2,837 | 237,910 | 214,269 | 199,017 | 6,849 | 1,241,112 | 178,724 |
| 1998 | 881,026 ${ }^{\text {b }}$ | 691,787 ${ }^{\text {b }}$ | 1,517,673 | 994,150 | 1,422,957 | 775,398 | 55,343 | 6,704 | 261,442 | 212,538 | 188,694 | 11,805 | 1,359,595 | 222,980 |
| 1999 | 1,023,988 | 807,292 | 1,268,639 | 882,167 | 1,306,098 | 605,034 | 47,142 | 5,004 | 207,743 | 230,635 | 189,306 | 6,864 | 1,151,067 | 173,186 |
| 2000 | 995,472 | 780,297 | 1,295,397 | 817,545 | 1,254,598 | 652,602 | 56,098 | 8,906 | 230,991 | 259,153 | 202,279 | 5,351 | 1,196,679 | 157,828 |
| 2001 | 1,025,011 | 800,113 | 1,319,445 | 894,983 | 1,371,514 | 714,970 | 66,333 | 8,355 | 217,529 | 284,517 | 183,880 | 10,837 | 1,280,855 | 250,869 |
| 2002 | 964,575 | 770,899 | 1,043,657 | 723,845 | 1,069,972 | 520,372 | 52,222 | 9,638 | 209,960 | 277,528 | 210,663 | 8,761 | 1,178,530 | 164,521 |
| 2003 | 1,069,299 | 757,304 | 1,058,453 | 700,729 | 1,049,995 | 595,908 | 75,627 | 13,834 | 210,869 | 331,784 | 226,495 | 11,206 | 1,103,755 | 237,168 |
| 2005 | 1,038,280 | 684,865 | 896,931 | 597,139 | 922,347 | 465,017 | 66,675 | 12,086 | 215,773 | 255,605 | 176,006 | 8,955 | 903,986 | 158,723 |
| 2006 | 937,023 ${ }^{\text {c }}$ | 534,136 | 860,909 | 582,271 | 923,826 | 445,757 | 69,440 | 14,696 | 197,412 | 238,934 | 173,266 | 10,957 | 986,407 | 169,039 |
| 2007 | 894,393 ${ }^{\text {c }}$ | 522,911 | 825,125 | 537,558 | 858,443 | 405,715 | 69,846 | 10,625 | 185,568 | 231,659 | 166,757 | 6,764 | 958,838 | 177,617 |
| $r^{\text {d }}$ | 0.393 | -0.696 | -0.957 | -0.967 | -0.967 | -0.928 | -0.578 | -0.039 | -0.892 | 0.697 | 0.587 | -0.647 | -0.771 | -0.327 |
| $P$ | 0.12 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | $<0.02$ | 0.88 | <0.01 | <0.01 | <0.02 | <0.01 | $<0.01$ | 0.20 |

[^2]Table 4. Harvest per 100 hunter-days, by species, 1990-2007, Pennsylvania. Survey was not conducted in 2004.

| Year | Spring Turkey | $\begin{array}{r} \text { Fall } \\ \text { Turkey } \end{array}$ | Rabbits | Grouse | Squirrel | Pheasant ${ }^{\text {a }}$ | Woodcock | Quail ${ }^{\text {a }}$ | Dove | Geese | Ducks ${ }^{\text {a }}$ | Hare | Woodchuck | Crow |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1990 | 2.0 | 2.9 | 57.6 | 20.0 | 87.2 | 23.5 | 38.0 | 32.2 | 215.1 | 42.5 | 69.3 | 23.1 | 105.8 | 159.0 |
| 1991 | 2.1 | 3.8 | 59.1 | 18.6 | 81.4 | 24.1 | 44.6 | 22.0 | 236.7 | 41.3 | 65.9 | 23.2 | 97.2 | 113.0 |
| 1992 | 2.3 | 3.1 | 67.3 | 19.1 | 97.1 | 29.0 | 52.5 | 38.3 | 223.3 | 41.9 | 69.1 | 34.0 | 97.1 | 108.8 |
| 1993 | 2.9 | 4.0 | 60.3 | 21.9 | 92.1 | 29.1 | 56.0 | 29.0 | 225.3 | 41.6 | 76.6 | 17.8 | 95.2 | 95.1 |
| 1994 | 2.8 | 4.6 | 48.7 | 21.1 | 85.2 | 25.2 | 40.1 | 65.1 | 196.5 | 47.5 | 78.3 | 22.0 | 99.3 | 117.8 |
| 1995 | 3.4 | 5.7 | 57.1 | 24.6 | 98.1 | 29.7 | 45.6 | 20.0 | 227.3 | 50.1 | 96.8 | 25.6 | 97.8 | 152.6 |
| 1996 | 3.1 | 4.1 | 49.2 | 19.3 | 92.0 | 29.4 | 52.1 | 66.9 | 214.9 | 55.3 | 89.5 | 17.1 | 92.3 | 147.5 |
| 1997 | 3.0 | 4.5 | 54.2 | 18.4 | 92.5 | 33.9 | 49.2 | 62.2 | 213.0 | 53.9 | 94.5 | 20.9 | 100.8 | 103.5 |
| 1998 | 3.7 | 4.9 | 60.0 | 18.5 | 93.5 | 27.9 | 57.1 | 3.6 | 215.1 | 66.9 | 77.4 | 21.2 | 88.6 | 110.8 |
| 1999 | 3.7 | 5.0 | 56.4 | 20.1 | 94.6 | 34.9 | 54.5 | 78.7 | 249.9 | 55.7 | 86.8 | 35.1 | 97.1 | 120.8 |
| 2000 | 4.4 | 5.7 | 59.5 | 17.8 | 101.7 | 35.8 | 55.6 | 49.1 | 207.2 | 75.0 | 91.5 | 32.6 | 99.5 | 139.2 |
| 2001 | 4.8 | 6.0 | 53.2 | 17.8 | 93.1 | 34.2 | 49.0 | 51.2 | 211.9 | 67.2 | 78.3 | 42.3 | 92.7 | 77.8 |
| 2002 | 4.3 | 4.8 | 57.7 | 16.4 | 93.7 | 39.5 | 59.7 | 11.0 | 220.3 | 62.5 | 80.6 | 15.6 | 107.5 | 131.9 |
| 2003 | 4.0 | 4.1 | 55.6 | 15.2 | 101.3 | 39.3 | 56.1 | 14.9 | 237.6 | 68.8 | 84.4 | 17.0 | 106.2 | 87.6 |
| 2005 | 3.1 | 3.7 | 47.8 | 9.8 | 70.0 | 37.8 | 56.7 | 23.9 | 189.9 | 81.7 | 92.6 | 17.0 | 98.7 | 118.7 |
| 2006 | 4.0 | 4.6 | 47.5 | 15.3 | 84.9 | 31.8 | 57.3 | 8.4 | 194.8 | 76.0 | 92.0 | 12.0 | 92.3 | 131.6 |
| 2007 | 4.1 | 4.9 | 50.7 | 15.3 | 78.6 | 41.4 | 38.5 | 42.4 | 224.6 | 81.3 | 83.3 | 10.1 | 87.7 | 102.6 |
| $r^{\text {b }}$ | 0.780 | 0.418 | -0.546 | -0.733 | -0.283 | 0.850 | 0.367 | -0.179 | -0.246 | 0.947 | 0.574 | -0.333 | -0.205 | -0.243 |
| $P$ | $<0.01$ | 0.10 | 0.02 | <0.01 | 0.27 | <0.01 | $<0.01$ | 0.49 | 0.34 | <0.01 | $<0.02$ | 0.19 | 0.43 | 0.35 |

[^3]Table 5. Furbearer hunters and trappers, by species, 1990-2007, Pennsylvania. Survey was not conducted in 2004.

| Year | Raccoon | Muskrat | Red Fox | Gray Fox Opossum | Skunk | Mink | Coyote $^{\text {a }}$ | Weasel |  |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 1990 | 9,676 | 4,147 | 7,941 | 6,542 | 3,653 | 1,914 | 2,560 | 7,782 | 508 |
| 1991 | 9,921 | 4,865 | 7,827 | 6,613 | 3,915 | 2,264 | 2,726 | 12,184 | 422 |
| 1992 | 9,525 | 4,419 | 7,019 | 6,263 | 3,793 | 2,208 | 2,539 | 13,643 | 452 |
| 1993 | 8,195 | 4,227 | 6,790 | 6,089 | 3,369 | 1,967 | 2,465 | 14,260 | 387 |
| 1994 | 7,066 | 5,570 | 8,319 | 7,515 | 4,267 | 3,071 | 3,212 | 20,597 | 784 |
| 1995 | 9,718 | 4,465 | 8,080 | 6,908 | 3,989 | 2,643 | 2,879 | 20,413 | 853 |
| 1996 | 12,951 | 6,478 | 10,007 | 8,361 | 6,140 | 3,443 | 3,703 | 21,937 | 942 |
| 1997 | 13,750 | 7,363 | 10,330 | 8,553 | 6,386 | 3,473 | 4,434 | 24,526 | 1,125 |
| 1998 | 12,794 | 5,900 | 9,982 | 8,594 | 5,558 | 2,948 | 3,512 | 30,016 | 733 |
| $1999^{\text {b }}$ | 7,555 | 3,230 | 6,996 | 6,061 | 2,653 | 1,718 | 2,152 | 28,265 | 392 |
| $2000^{\text {b }}$ | 6,996 | 3,121 | 7,280 | 6,353 | 2,870 | 1,750 | 2,026 | 28,270 | 509 |
| $2001^{\text {b }}$ | 7,935 | 3,997 | 8,234 | 6,938 | 3,180 | 2,036 | 2,587 | 36,249 | 619 |
| $2002^{\text {b }}$ | 7,295 | 3,287 | 8,022 | 6,494 | 3,434 | 2,116 | 2,433 | 28,535 | 676 |
| $2003^{\text {b }}$ | 7,292 | 3,362 | 6,998 | 5,547 | 3,585 | 2,132 | 2,305 | 29,048 | 453 |
| $2005^{\text {b }}$ | 8,434 | 3,815 | 9,583 | 7,358 | 4,479 | 2,813 | 2,997 | 35,010 | 714 |
| $2006^{\mathrm{b}}$ | 10,606 | 5,630 | 11,331 | 8,264 | 5,669 | 3,603 | 4,194 | 36,175 | 1,325 |
| 2007 | 10,131 | 4,272 | 10,628 | 7,811 | 5,307 | 3,484 | 3,674 | 37,792 | 1,447 |
| $r^{\mathrm{c}}$ | -0.722 | -0.222 | 0.475 | 0.211 | 0.177 | 0.316 | 0.222 | 0.948 | 0.519 |
| $P$ | $<0.01$ | 0.39 | $<0.06$ | 0.42 | 0.50 | 0.22 | 0.39 | $<0.01$ | $<0.04$ |

[^4]Table 6. Furbearer harvests, by species, 1983-2007, Pennsylvania. Survey was not conducted in 2004.

| Year | Raccoon | Muskrat | Red Fox | Gray Fox | Opossum | Skunk | Mink | Coyote $^{\text {a,b }}$ |
| ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | Weasel $^{\text {a }}$.

[^5]Table 7. Resident junior license holder participation, harvests, and hunter days for Youth Hunts, 2007-08.

| Youth Hunt | No. participated | Harvest |
| :--- | :--- | :--- |
| Waterfowl | 254 | Ducks $=508$ <br> Geese $=888$ |
| Spring Gobbler | 5,911 | 1,650 |
| Pheasant | 3,874 | 5,964 |
| Squirrel | 6,165 | 18,101 |


[^0]:    ${ }^{\text {a }}$ Estimates exclude harvest on shooting preserves.
    ${ }^{\mathrm{b}}$ Spring turkey harvest estimate does not include $2^{\text {nd }}$ gobbler harvests from Special Turkey License holders.
    ${ }^{\text {c }}$ Pearson product-moment correlation coefficient.

[^1]:    ${ }^{a}$ Estimates exclude number of hunters on shooting preserves.
    ${ }^{\mathrm{b}}$ Cautionary note: these low values may have been caused by inadvertently not including the TMA map on the 1998-1999 survey instructions. See 1998-1999 annual report
    ${ }^{\mathrm{c}}$ Pearson product-moment correlation coefficient.

[^2]:    ${ }^{a}$ Estimates exclude effort on shooting preserves.
    ${ }^{\mathrm{b}}$ Cautionary note: these low values may have been caused by inadvertently not including the TMA map on the 1998-1999 survey instructions. See 1998-1999 annual report.
    ${ }^{\text {c }}$ Spring turkey effort does not include data from Special Turkey License holders pursuing a $2^{\text {nd }}$ gobbler.
    ${ }^{\mathrm{d}}$ Pearson product-moment correlation coefficient.

[^3]:    ${ }^{\text {a }}$ Estimates exclude effort on shooting preserves.
    ${ }^{\mathrm{b}}$ Pearson product-moment correlation coefficient.

[^4]:    ${ }^{\text {a }}$ Combines estimates from Game Take Survey and Furtaker Survey.
    ${ }^{\mathrm{b}}$ Cautionary note: Estimates are minimum estimates that do not account for combination licenses.
    ${ }^{\text {c }}$ Pearson product-moment correlation coefficient.

[^5]:    ${ }^{\text {a }}$ No data are available prior to 1990 .
    ${ }^{\mathrm{b}}$ Combines estimates from the Game Take and Furtaker surveys.
    ${ }^{\text {c }}$ Cautionary note: Estimates are minimum estimates that do not account for combination licenses.
    ${ }^{\text {d }}$ Pearson product-moment correlation coefficient.

