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BUREAU OF WILDLIFE MANAGEMENT  
RESEARCH DIVISION  
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TITLE: Furbearer Population and Harvest Monitoring

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PREPARED BY: Matthew J. Lovallo

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**Abstract:** Information from annual Furtaker Surveys has been used to determine trends in the number of furtakers and furbearer harvests since the early 1990s. As during previous years, combination license holders were extended furtaking privileges, which resulted in reduced furtaker license sales (23,941 furtaker licenses were sold in 2005). Average pelt values for most furbearers were slightly higher than observed during previous years. Despite moderately increasing pelt value and market demand for wild furs, most furbearer populations in Pennsylvania remain underutilized. Reports of vehicle-caused bobcat mortalities have been steadily increasing and suggest continued numeric and geographic expansion of bobcat populations. Otter populations are expanding throughout the northeast region and some portions of the Susquehanna drainage. Reports of fisher observations suggest that fisher populations are expanding proximal to initial release sites and are naturally expanding into areas of the southcentral and southwest regions.

**OBJECTIVES**

1. To determine trends in the annual harvest of furbearing animals and numbers of trappers.
2. To monitor changes in furbearer population distribution and abundance.

**METHODS**

The annual fur harvest is usually estimated from the Furtaker Survey conducted in March. Due to budget constraints, this survey was not conducted during 2004 but was reinitiated during 2005. Whereas previous reports have provided harvest information based on furbearer management zones, harvest estimates are now based on newly adopted wildlife management units (WMU). Harvest data from previous years is provided for comparison to the most recent estimates (Appendix I). Because combination license holders were extended furtaker privileges during 1999, annual harvest totals for each species were corrected to account for sampling bias during subsequent years. A description of these corrections is provided by Rosenberry (2000).

Average pelt prices of furbearers sold at the Pennsylvania Trapper's Association's (PTA) District fur sales were obtained to monitor trends in pelt value. Pelt values were averaged among several districts reporting fur sale results. Approximately 2% of all furbearers harvested in Pennsylvania are sold at this fur sale. Pelt value trends during 1986-2006 were assessed for each furbearer species.

The reported estimates of coyote harvest include only those animals recorded by furtakers and does not account for the incidental harvest recorded in the Game Take Survey. Combined harvest totals are provided by Librandi Mumma (2006). Analyses of the beaver harvests results are included in the beaver management plan report (see Job No. 64001).

Annual questionnaires were mailed to all Wildlife Conservation Officers (WCOs) to collect information on annual captures and sightings of otter and fisher and to record numbers and types of coyote damage complaints during the previous calendar year. These surveys were mailed during April and returned by June. Vehicle-caused mortalities and incidental trapping mortalities for bobcat, otter, and fisher were recorded annually by WCOs using standardized kill report forms.

## **RESULTS**

### **Fur Harvest**

As during previous years, combination license holders were extended furtaking privileges, which resulted in reduced furtaker license sales (Table 1). During 1985-2005, furtaker license sales declined ( $r = -0.64$ ,  $P < 0.05$ ) (Table 1). However, the numbers of furtaker licenses sold has been stable to increasing during recent years. Future pelt prices, continued trapping device regulation, and international changes in fur demand will continue to affect the number of furtakers in Pennsylvania. Although harvests have increased for many terrestrial furbearer species, most populations remain underutilized.

In general, the demand and prices paid for furs has declined since historic high values of the early 1980s. Historic low pelt values occurred during the 1989 and 1990 trapping seasons. Fur prices during the 1990s were relatively stable with the lowest values observed during the 1998-1999 season. Average pelt values during 2005-2005 were slightly higher than observed during previous seasons; no significant shifts in values were observed (Table 2).

Although harvest estimates are not available for the 2004-2005 season, there was no indication that significant changes in regional harvest levels occurred during that period. Harvest estimates for most species during the 2005-2006 season were comparable to levels observed during 2003. Red fox harvests increased significantly, primarily within WMU's 5B and 5C (Table 3). The estimated muskrat harvest was the lowest observed since the furtaker survey was implemented.

### **Population Monitoring**

The number of incidental bobcat captures, as estimated from the annual Furtaker Survey, has been steadily increasing since 1990. Greater than 500 incidental captures have been reported annually since 1995. The 3-year moving average of incidental captures has increased significantly during 1990-2005 ( $r = 0.70$ ,  $P < 0.05$ ) (Table 4). The number of incidental bobcat captures during 2005 was higher than reported during previous years. Annual numbers of statewide vehicle-caused bobcat mortalities (i.e., roadkills) have also increased significantly ( $r = 0.98$ ,  $P < 0.01$ ); the greatest number of vehicle-caused bobcat mortalities ( $N = 119$ ) was recorded during 2000 (Table 5). These indices suggest continued numeric and geographic expansion of bobcat counties. The greatest

numbers of vehicle-caused mortalities have been reported from high-density populations in the northcentral and southwestern counties.

Since 2001, the Pennsylvania Game Commission (PGC) included questions concerning bobcat sightings on the annual Game Take Survey, which is sent to approximately 2% of general hunting license buyers each year (Rosenberry 2001). An annual sighting index (number of observations divided by effort \* 100) has been developed to detect changes in observation rates (Table 6). Several years of data will be required to detect changes in observation rates for these species.

The annual number of fisher observations and incidental captures reported to WCOs has been increasing steadily since fishers were reintroduced in 1996. (Table 7). WCOs received 49 reports of fishers that were captured and released by licensed trappers and 341 reports of fisher observations. The geographic distribution of these reports suggests that fisher populations are slowly expanding from the reintroduction areas in northern regions and are naturally expanding into regions of southwestern and southcentral Pennsylvania.

Numbers of incidental otter captures, primarily by beaver trappers, have also increased during recent years with greater than 25 incidental captures reported annually since 1996 (Table 7). The majority of these captures occur in the Northeast Region, but recent reports indicate continued population expansion throughout the Susquehanna drainage. Since 2000, the annual hunting and trapping digest has provided trappers with additional information regarding the avoidance of otter while trapping beaver. Preliminary reports from WCOs indicate that trappers in high-density otter areas are using these techniques to avoid otter captures. Despite these efforts, during the 2005-2006 season, 50 incidental otter captures were reported. As otter populations continue to expand, more intensive monitoring will be required.

Reports of coyote-caused damage to livestock and domestic pets have been relatively stable since 1993. During the past several years, the PGC received increased numbers of complaints and losses due to coyotes. Complaints related to concerns for human safety have increased significantly. Sheep and poultry operations continue to report the greatest losses annually (Table 8). Reports of coyotes killing domestic dogs and cats are increasing, particularly in the southwest and southeast regions. The number of WCOs receiving coyote complaints has been steadily increasing during recent years; 80 districts reported complaints during the most recent survey period. The majority of coyote complaints received by WCOs are people expressing concern for pets, livestock, wildlife, or human safety issues.

#### **RECOMMENDATIONS**

1. The fur harvest should continue to be reported by species and WMU to monitor area-specific harvest trends. Pelt price information should also be collected annually to monitor trends in fur value relative to regional harvest trends.

2. Current methods for monitoring changes in density and distribution of bobcat, otter, and fisher should be continued, and for otter, intensified to better understand population trends.

3. The Game Take Survey should continue to query general license buyers regarding bobcat, fisher, and coyote observations.

4. The PGC should continue educational efforts concerning techniques for avoiding otter captures.

5. Increased numbers of coyote-related complaints should be addressed through educational programs in rural and suburban communities.

**LITERATURE CITED**

- Librandi Mumma, T. M. 2006. Game Take and Furtaker Surveys. Annual Job Report 11101. Pennsylvania Game Commission. Harrisburg, Pennsylvania, USA.
- Rosenberry, C. S. 2000. Game Take and Furtaker Surveys. Annual Job Report 11101. Pennsylvania Game Commission. Harrisburg, Pennsylvania, USA.
- Rosenberry, C. S. 2003. Game Take and Furtaker Surveys. Annual Job Report 11101. Pennsylvania Game Commission. Harrisburg, Pennsylvania, USA.

Table 1. Number of furtaker licenses sold in Pennsylvania.

| Year | Licenses sold |
|------|---------------|
| 1985 | 64,000        |
| 1986 | 44,087        |
| 1987 | 42,000        |
| 1988 | 36,000        |
| 1989 | 29,000        |
| 1990 | 20,377        |
| 1991 | 20,251        |
| 1992 | 20,345        |
| 1993 | 19,458        |
| 1994 | 22,376        |
| 1995 | 21,376        |
| 1996 | 25,636        |
| 1997 | 27,413        |
| 1998 | 25,877        |
| 1999 | 17,591        |
| 2000 | 18,551        |
| 2001 | 19,410        |
| 2002 | 20,676        |
| 2003 | 22,454        |
| 2004 | 24,094        |
| 2005 | 23,941        |

Table 2. Average pelt prices in dollars of furbearers sold at the annual Pennsylvania Trapper's Association District fur sales. Sample sizes are in parentheses.

| Season    | Red Fox |         | Gray Fox |         | Raccoon |         | Muskrat |         | Opossum |       |
|-----------|---------|---------|----------|---------|---------|---------|---------|---------|---------|-------|
| 1991-1992 | 13.55   | (150)   | 12.78    | (565)   | 7.12    | (743)   | 2.95    | (6,487) | 2.17    | (273) |
| 1992-1993 | 12.96   | (217)   | 11.32    | (662)   | 6.77    | (813)   | 2.25    | (4,789) | 1.71    | (279) |
| 1993-1994 | 15.44   | (204)   | 11.02    | (643)   | 8.54    | (948)   | 2.88    | (4,817) | 1.88    | (260) |
| 1994-1995 | 18.73   | (514)   | 11.47    | (1,699) | 9.15    | (1,801) | 3.09    | (7,827) | 1.51    | (204) |
| 1995-1996 | 16.30   | (401)   | 9.40     | (1,218) | 10.27   | (1,314) | 3.15    | (3,911) | 1.74    | (283) |
| 1996-1997 | 18.05   | (512)   | 11.94    | (1,117) | 15.34   | (2,031) | 6.03    | (4,473) | 1.83    | (488) |
| 1997-1998 | 13.18   | (321)   | 9.65     | (803)   | 12.07   | (1,622) | 3.44    | (7,006) | 1.41    | (423) |
| 1998-1999 | 9.73    | (259)   | 4.84     | (738)   | 6.87    | (1,361) | 1.87    | (6,261) | 0.49    | (83)  |
| 1999-2000 | 10.72   | (334)   | 6.19     | (764)   | 4.94    | (930)   | 3.16    | (3,045) | 1.47    | (28)  |
| 2000-2001 | 16.58   | (405)   | 8.61     | (573)   | 7.42    | (848)   | 3.40    | (2,498) | 2.47    | (35)  |
| 2001-2002 | 20.14   | (499)   | 10.05    | (316)   | 8.34    | (1,689) | 3.85    | (4,035) | 1.54    | (27)  |
| 2002-2003 | 22.84   | (401)   | 12.81    | (362)   | 9.39    | (973)   | 3.81    | (2,039) | 2.12    | (90)  |
| 2003-2004 | 19.92   | (371)   | 18.74    | (233)   | 10.15   | (1,004) | 3.33    | (2,042) | 2.03    | (105) |
| 2004-2005 | 16.48   | (1,970) | 18.04    | (218)   | 10.11   | (2,990) | 2.89    | (3,262) | 2.51    | (632) |
| 2005-2006 | 20.36   | (1,764) | 26.00    | (44)    | 17.50   | (987)   | 6.10    | (2,201) | 5.00    | (251) |

Table 2 (cont). Average pelt prices in dollars of furbearers sold at the annual Pennsylvania Trapper's Association District 9 fur sales. Sample sizes are in parentheses.

| Season    | Skunk             |      | Mink  |       | Coyote |       | Beaver |         |
|-----------|-------------------|------|-------|-------|--------|-------|--------|---------|
| 1991-1992 | N.S. <sup>a</sup> |      | 26.23 | (721) | 18.37  | (22)  | 13.14  | (548)   |
| 1992-1993 | N.S.              |      | 19.95 | (722) | 25.40  | (38)  | 10.63  | (628)   |
| 1993-1994 | 2.66              | (6)  | 18.35 | (616) | 24.15  | (41)  | 19.03  | (333)   |
| 1994-1995 | 2.21              | (19) | 14.08 | (930) | 24.70  | (75)  | 19.94  | (1,230) |
| 1995-1996 | 3.00              | (8)  | 11.88 | (898) | 13.36  | (57)  | 19.65  | (594)   |
| 1996-1997 | 3.92              | (37) | 19.06 | (754) | 20.68  | (94)  | 29.37  | (1,138) |
| 1997-1998 | N.S.              |      | 11.66 | (904) | 9.72   | (57)  | 21.73  | (1,386) |
| 1998-1999 | N.S.              |      | 9.48  | (493) | 6.40   | (48)  | 15.29  | (517)   |
| 1999-2000 | N.S.              |      | 9.75  | (483) | 15.43  | (76)  | 16.08  | (667)   |
| 2000-2001 | N.S.              |      | 9.64  | (369) | 16.07  | (125) | 20.00  | (376)   |
| 2001-2002 | N.S.              |      | 8.47  | (459) | 17.16  | (137) | 15.86  | (448)   |
| 2002-2003 | N.S.              |      | 9.69  | (250) | 22.57  | (115) | 14.33  | (248)   |
| 2003-2004 | N.S.              |      | 10.50 | (146) | 25.29  | (101) | 15.84  | (351)   |
| 2004-2005 | 3.14              | (65) | 12.84 | (270) | 9.37   | (19)  | 16.11  | (55)    |
| 2005-2006 | 4.50              | (59) | 17.42 | (214) | 24.50  | (28)  | 17.18  | (23)    |

<sup>a</sup>N.S. = No Sale

Table 3. Estimated harvests of furbearers during the 2005-2006 hunting and trapping seasons.

| WMU          | Raccoon        | Red Fox       | Gray Fox      | Coyote       | Muskrat       | Mink         | Skunk        | Opossum       | Weasels    |
|--------------|----------------|---------------|---------------|--------------|---------------|--------------|--------------|---------------|------------|
| 1A           | 10,245         | 847           | 138           | 602          | 7,784         | 386          | 402          | 4,174         | 10         |
| 1B           | 7,699          | 975           | 167           | 701          | 6,058         | 742          | 353          | 2,473         | 0          |
| 2A           | 5,674          | 1,369         | 443           | 967          | 4,759         | 663          | 304          | 1,682         | 29         |
| 2B           | 2,446          | 591           | 197           | 276          | 1,487         | 40           | 157          | 831           | 137        |
| 2C           | 7,970          | 2,078         | 2,185         | 553          | 4,869         | 574          | 481          | 2,819         | 0          |
| 2D           | 10,135         | 1,290         | 1,378         | 424          | 4,640         | 455          | 451          | 2,958         | 127        |
| 2E           | 2,426          | 236           | 1,201         | 217          | 714           | 109          | 569          | 1,533         | 10         |
| 2F           | 3,920          | 384           | 344           | 484          | 367           | 0            | 343          | 1,583         | 10         |
| 2G           | 3,258          | 384           | 1,496         | 928          | 952           | 198          | 608          | 2,216         | 10         |
| 3A           | 4,040          | 532           | 423           | 405          | 1,230         | 346          | 206          | 584           | 117        |
| 3B           | 2,296          | 620           | 709           | 493          | 922           | 267          | 540          | 1,662         | 10         |
| 3C           | 2,697          | 748           | 1,142         | 839          | 1,795         | 425          | 216          | 673           | 0          |
| 3D           | 702            | 325           | 394           | 296          | 109           | 247          | 206          | 613           | 0          |
| 4A           | 2,647          | 709           | 1,033         | 217          | 2,092         | 188          | 451          | 910           | 0          |
| 4B           | 2,987          | 807           | 266           | 118          | 4,264         | 366          | 441          | 2,077         | 10         |
| 4C           | 4,431          | 1,487         | 384           | 89           | 1,765         | 781          | 549          | 2,324         | 0          |
| 4D           | 5,654          | 2,560         | 1,516         | 493          | 4,640         | 959          | 441          | 3,709         | 10         |
| 4E           | 3,268          | 935           | 837           | 464          | 5,573         | 583          | 314          | 1,187         | 10         |
| 5A           | 3,128          | 5,042         | 955           | 257          | 3,907         | 257          | 461          | 2,008         | 39         |
| 5B           | 12,230         | 13,530        | 728           | 335          | 8,835         | 1,127        | 1,697        | 4,362         | 20         |
| 5C           | 2,757          | 3,634         | 108           | 217          | 1,477         | 336          | 275          | 900           | 10         |
| 5D           | 90             | 325           | 0             | 0            | 119           | 0            | 29           | 30            | 0          |
| Unknown      | 5,383          | 1,142         | 1,575         | 296          | 2,638         | 287          | 481          | 2,414         | 10         |
| <b>Total</b> | <b>106,082</b> | <b>40,551</b> | <b>17,616</b> | <b>9,670</b> | <b>70,995</b> | <b>9,335</b> | <b>9,977</b> | <b>43,720</b> | <b>567</b> |

Table 4. Numbers of incidental bobcat captures as estimated from the annual Furtaker Survey. Furtaker Survey was not conducted during 2004-2005.

| Trapping  | No. Survey Respondents | No. Furtaker Licenses | No. Bobcats <sup>a</sup> Captured and Released | Extrapolated No. Bobcat Captures | 3-year moving Average <sup>b</sup> (No. Bobcat Captures) |
|-----------|------------------------|-----------------------|--|----------------------------------|--|
| 1990-1991 | 2,302                  | 20,377                | 40   | 354                              |  |
| 1991-1992 | 2,361                  | 20,215                | 24   | 205                              | 293  |
| 1992-1993 | 1,652                  | 20,345                | 26   | 320                              | 222  |
| 1993-1994 | 2,175                  | 19,246                | 16   | 142                              | 513  |
| 1994-1995 | 2,056                  | 21,905                | 101  | 1076                             | 559  |
| 1995-1996 | 2,181                  | 21,840                | 46   | 460                              | 736  |
| 1996-1997 | 2,363                  | 25,636                | 62   | 673                              | 566  |
| 1997-1998 | 2,233                  | 27,413                | 46   | 565                              | 790  |
| 1998-1999 | 2,466                  | 25,877                | 108  | 1133                             | 797  |
| 1999-2000 | 1,557                  | 17,414                | 62   | 693                              | 991  |
| 2000-2001 | 1,681                  | 18,551                | 52   | 574                              | 656  |
| 2001-2002 | 1,553                  | 19,410                | 56   | 700                              | 599  |
| 2002-2003 | 1,779                  | 20,676                | 45   | 523                              | 639  |
| 2003-2004 | 2,204                  | 22,454                | 68   | 693                              | 951  |
| 2005-2006 | 2,412                  | 23,941                | 165  | 1,638                            |  |

<sup>a</sup> Does not include bobcats legally harvested by permit holders.

<sup>b</sup>  $r = 0.64, P < 0.05$

Table 5. Numbers and geographic distribution of vehicle-caused bobcat mortalities during 1985-2005.

| Year | No. Reported<br>Bobcat<br>Roadkills | No. Counties with<br>Roadkills | No. New<br>County<br>Records | 3-Year Moving<br>Average |
|------|-------------------------------------|--------------------------------|------------------------------|--------------------------|
| 1985 | 2                                   | 2                              | 0                            |                          |
| 1986 | 15                                  | 2                              | 7                            | 12.0                     |
| 1987 | 19                                  | 8                              | 3                            | 15.3                     |
| 1988 | 12                                  | 5                              | 4                            | 15.7                     |
| 1989 | 16                                  | 6                              | 1                            | 18.7                     |
| 1990 | 28                                  | 7                              | 5                            | 26.3                     |
| 1991 | 35                                  | 11                             | 1                            | 34.0                     |
| 1992 | 39                                  | 13                             | 5                            | 44.0                     |
| 1993 | 58                                  | 19                             | 1                            | 42.7                     |
| 1994 | 31                                  | 14                             | 1                            | 48.7                     |
| 1995 | 57                                  | 17                             | 2                            | 45.7                     |
| 1996 | 49                                  | 15                             | 0                            | 59.0                     |
| 1997 | 71                                  | 19                             | 5                            | 59.0                     |
| 1998 | 57                                  | 18                             | 3                            | 71.3                     |
| 1999 | 86                                  | 24                             | 3                            | 87.3                     |
| 2000 | 119                                 | 29                             | 3                            | 102.7                    |
| 2001 | 103                                 | 28                             | 0                            | 109.7                    |
| 2002 | 107                                 | 28                             | 0                            | 107.0                    |
| 2003 | 111                                 | 27                             | 0                            | 108.7                    |
| 2004 | 108                                 | 27                             | 0                            | 106.7                    |
| 2005 | 101                                 | 28                             | 0                            |                          |

Table 6. Reports of bobcat and fisher sightings by county from the annual Game Take Survey, 2001-2005. Furtaker Survey was not conducted in 2004.

| Year              | Season                 | N (%)          | Effort<br>days | Bobcats         |                 |                 | Fishers         |                 |                 |
|-------------------|------------------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                   |                        |                |                | No.<br>observed | No.<br>counties | SI <sup>a</sup> | No.<br>observed | No.<br>counties | SI <sup>a</sup> |
| 2001              | Spring Gobbler Hunters | 2,785 (24.8)   | 12,735         | 200             | 38              | 1.57            | 90              | 17              | 0.71            |
|                   | Firearms Deer Hunters  | 8,628 (76.9)   | 40,254         | 585             | 56              | 1.45            | 152             | 38              | 0.38            |
|                   | Archery Deer Hunters   | 3,237 (28.8)   | 36,439         | 407             | 54              | 1.12            | 134             | 37              | 0.37            |
|                   | All Hunters            | 11,221 (100.0) | 89,428         | 1,192           | 63              | 1.33            | 376             | 42              | 0.42            |
| 2002              | Spring Gobbler Hunters | 2,423 (24.8)   | 10,952         | 205             | 37              | 1.87            | 43              | 19              | 0.39            |
|                   | Firearms Deer Hunters  | 7,176 (73.3)   | 33,412         | 465             | 57              | 1.39            | 170             | 38              | 0.51            |
|                   | Archery Deer Hunters   | 2,816 (28.8)   | 31,396         | 266             | 49              | 0.85            | 95              | 29              | 0.30            |
|                   | All Hunters            | 9,777 (100.0)  | 75,760         | 936             | 61              | 1.24            | 308             | 43              | 0.41            |
| 2003 <sup>b</sup> | Spring Gobbler Hunters | 2,728 (27.3)   | 12,147         | 131             |                 | 1.08            | 49              |                 | 0.40            |
|                   | Firearms Deer Hunters  | 7,388 (73.8)   | 34,133         | 367             |                 | 1.08            | 95              |                 | 0.28            |
|                   | Archery Deer Hunters   | 2,923 (29.2)   | 27,137         | 265             |                 | 0.97            | 63              |                 | 0.23            |
|                   | All Hunters            | 10,005 (100.0) | 73,417         | 763             |                 | 1.04            | 207             |                 | 0.28            |
| 2005              | Spring Gobbler Hunters | 2,845 (21.7)   | 12,327         | 163             |                 | 1.32            | 104             |                 | 0.84            |
|                   | Firearms Deer Hunters  | 7,213 (55.0)   | 35,011         | 316             |                 | 0.90            | 107             |                 | 0.31            |
|                   | Archery Deer Hunters   | 3,065 (23.4)   | 28,674         | 442             |                 | 1.54            | 125             |                 | 0.44            |
|                   | All Hunters            | 13,123 (100.0) | 76,012         | 921             |                 | 1.21            | 336             |                 | 0.44            |

<sup>a</sup> SI = Sighting Index = Observations/Effort \* 100

<sup>b</sup> Sighting are reported by WMU, not county beginning in 2003.

Table 7. Reports of otter and fisher captures and fisher observations estimated from annual questionnaires of WCOs, 1994-2005.

| Survey Season | No. Districts Reporting | No. Incidental Otter Captures | No. Incidental Fisher Captures | No. Reported Fisher Observations |
|---------------|-------------------------|-------------------------------|--------------------------------|----------------------------------|
| 1995          | 123                     | 15                            |                                |                                  |
| 1996          | 123                     | 15                            |                                |                                  |
| 1997          | 123                     | 31                            | 10                             | 60                               |
| 1998          | 123                     | 26                            | 9                              | 67                               |
| 1999          | 127                     | 30                            | 6                              | 94                               |
| 2000          | 123                     | 35                            | 8                              | 82                               |
| 2001          | 137                     | 25                            | 6                              | 105                              |
| 2002          | 122                     | 27                            | 9                              | 106                              |
| 2003          | 133                     | 26                            | 20                             | 206                              |
| 2004          | 122                     | 42                            | 31                             | 303                              |
| 2005          | 123                     | 50                            | 49                             | 341                              |

Table 8. Types and numbers of coyote-related complaints reported to WCOs, 1993-2005.

| Survey Results                | Survey Period |      |      |      |      |      |      |      |      |      |      |
|-------------------------------|---------------|------|------|------|------|------|------|------|------|------|------|
|                               | 1914          | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
| No. districts with complaints | 42            | 44   | 60   | 47   | 63   | 61   | 58   | 58   | 58   | 64   | 80   |
| Nature of Complaints          |               |      |      |      |      |      |      |      |      |      |      |
| Concern for Cattle            | 8             | 19   | 27   | 8    | 12   | 11   | 11   | 11   | 11   | 16   | 18   |
| Concern for Sheep             | 37            | 24   | 43   | 22   | 23   | 26   | 17   | 15   | 30   | 23   | 43   |
| Concern for Goats             | 3             | 5    | 8    | 3    | 4    | 1    | 1    | 1    | 4    | 3    | 5    |
| Concern for Poultry           | 16            | 5    | 13   | 12   | 17   | 14   | 15   | 15   | 15   | 25   | 24   |
| Concern for Dogs              | 7             | 9    | 17   | 12   | 11   | 22   | 12   | 12   | 10   | 19   | 12   |
| Concern for Cats              | 13            | 7    | 15   | 19   | 13   | 29   | 23   | 22   | 24   | 77   | 25   |
| Afraid of Coyotes             | 71            | 86   | 114  | 69   | 114  | 126  | 114  | 115  | 98   | 316  | 263  |
| Concern for Deer              | 89            | 52   | 41   | 49   | 47   | 57   | 29   | 28   | 50   | 87   | 73   |
| Concern for Turkeys           | 23            | 13   | 10   | 14   | 10   | 18   | 6    | 5    | 13   | 37   | 31   |
| Other                         | 4             | 1    | 15   | 31   | 0    | 0    | 7    | 8    | 26   | 0    | 32   |
| Total                         | 271           | 221  | 303  | 239  | 251  | 304  | 235  | 232  | 281  | 603  | 526  |
| Coyote-caused Mortalities     |               |      |      |      |      |      |      |      |      |      |      |
| Cows                          | 0             | 3    | 1    | 0    | 0    | 1    | 0    | 0    | 0    | 0    | 2    |
| Calves                        | 2             | 8    | 9    | 3    | 7    | 8    | 5    | 5    | 4    | 13   | 10   |
| Sheep                         | 82            | 100  | 251  | 60   | 81   | 91   | 21   | 21   | 31   | 37   | 30   |
| Goats                         | 3             | 0    | 9    | 6    | 3    | 0    | 1    | 1    | 6    | 0    | 0    |
| Poultry                       | 112           | 27   | 51   | 43   | 52   | 44   | 49   | 48   | 66   | 85   | 51   |
| Dogs                          | 0             | 6    | 6    | 3    | 6    | 17   | 5    | 6    | 3    | 4    | 3    |
| Cats                          | 24            | 11   | 14   | 14   | 5    | 30   | 21   | 21   | 14   | 73   | 16   |
| Rabbits                       | 12            | 9    | 4    | 2    | 2    | 3    | 2    | 2    | 8    | 5    | 8    |
| Deer                          |               | 10   | 3    | 5    | 5    | 9    | 10   | 10   | 12   | 17   | 13   |
| Other                         | 17            | 1    | 0    | 0    | 3    | 3    | 0    | 0    | 0    | 2    | 2    |
| Total                         | 252           | 175  | 348  | 136  | 164  | 206  | 114  | 114  | 140  | 236  | 135  |

Appendix 1. Furtaker harvest by prior furbearer management zones in Pennsylvania during 1991-2002.

| Species             | Year  | Zone 1 | Zone 2 | Zone 3 | Zone 4 | Zone 5 | Zone 6 | Unknown | Total  |
|---------------------|-------|--------|--------|--------|--------|--------|--------|---------|--------|
| Red Fox             | 1991  | 1,839  | 2,989  | 1,012  | 5,742  | 3,116  | 13,499 | 298     | 28,495 |
|                     | 1992  | 1,449  | 2,207  | 1,560  | 5,548  | 3,461  | 13,050 | 336     | 27,611 |
|                     | 1993  | 945    | 2,140  | 1,347  | 2,790  | 3,420  | 14,981 | 239     | 25,862 |
|                     | 1994  | 3,339  | 2,583  | 2,124  | 6,061  | 3,642  | 12,450 | 450     | 30,649 |
|                     | 1995  | 1,320  | 2,479  | 1,796  | 4,672  | 2,975  | 17,089 | 779     | 31,110 |
|                     | 1996  | 1,887  | 2,367  | 1,450  | 4,814  | 3,315  | 15,263 | 527     | 29,623 |
|                     | 1997  | 1,666  | 2,624  | 1,208  | 6,716  | 5,330  | 19,115 | 264     | 36,923 |
|                     | 1998  | 886    | 3,198  | 1,167  | 9,044  | 3,387  | 28,655 | 865     | 47,202 |
|                     | 1999  | 1,795  | 2,069  | 1,635  | 5,580  | 2,974  | 18,705 | 4,102   | 36,860 |
|                     | 2000  | 843    | 2,398  | 1,497  | 8,708  | 2,638  | 16,263 | 713     | 33,060 |
|                     | 2001  | 2,059  | 873    | 2,172  | 6,026  | 4,062  | 17,419 | 392     | 33,003 |
|                     | 2002  | 887    | 2,596  | 2,581  | 5,753  | 1,804  | 19,001 | 385     | 33,007 |
|                     | $r^a$ | -0.26  | -0.32  | 0.52   | 0.44   | -0.22  | 0.52   |         |        |
| $P$                 | 0.40  | 0.31   | 0.08   | 0.15   | 0.49   | 0.08   |        |         | 0.08   |
| Gray Fox            | 1991  | 390    | 8,776  | 2,445  | 4,850  | 9,870  | 3,412  | 666     | 30,409 |
|                     | 1992  | 644    | 4,269  | 4,675  | 3,766  | 9,015  | 2,494  | 532     | 25,395 |
|                     | 1993  | 497    | 6,628  | 2,954  | 3,769  | 5,452  | 4,098  | 441     | 23,839 |
|                     | 1994  | 857    | 9,007  | 6,356  | 6,098  | 6,645  | 2,704  | 1720    | 33,387 |
|                     | 1995  | 530    | 5,607  | 5,159  | 3,862  | 4,681  | 3,194  | 485     | 23,518 |
|                     | 1996  | 417    | 5,755  | 4,496  | 3,391  | 4,912  | 3,454  | 882     | 23,307 |
|                     | 1997  | 421    | 5,578  | 4,175  | 3,790  | 8,303  | 3,655  | 121     | 26,043 |
|                     | 1998  | 512    | 9,295  | 5,346  | 7,967  | 5,791  | 3,163  | 848     | 32,922 |
|                     | 1999  | 468    | 4,982  | 6,312  | 6,301  | 4,427  | 3,852  | 453     | 26,794 |
|                     | 2000  | 477    | 6,593  | 2,712  | 4,525  | 5,674  | 3,503  | 968     | 24,452 |
|                     | 2001  | 337    | 2,567  | 2,988  | 6,494  | 6,114  | 4,352  | 423     | 23,275 |
|                     | 2002  | 397    | 3,974  | 2,733  | 5,989  | 2,945  | 2,367  | 400     | 18,805 |
|                     | $r$   | -0.44  | -0.47  | -0.28  | 0.48   | -0.66  | 0.14   |         |        |
| $P$                 | 0.16  | 0.13   | 0.38   | 0.11   | 0.02   | 0.66   |        |         | 0.17   |
| Coyote <sup>b</sup> | 1991  | 83     | 333    | 268    | 83     | 175    | 50     | 590     | 1,582  |
|                     | 1992  | 96     | 564    | 384    | 108    | 324    | 192    | 12      | 1,680  |
|                     | 1993  | 260    | 531    | 524    | 350    | 287    | 97     | 43      | 2,092  |
|                     | 1994  | 238    | 516    | 1,109  | 454    | 269    | 81     | 31      | 2,698  |
|                     | 1995  | 177    | 1,881  | 443    | 356    | 218    | 90     | 8       | 3,173  |
|                     | 1996  | 590    | 1,233  | 1,052  | 461    | 677    | 119    | 61      | 4,193  |
|                     | 1997  | 252    | 746    | 625    | 552    | 671    | 228    | 92      | 3,166  |
|                     | 1998  | 939    | 1,561  | 845    | 1,072  | 796    | 334    | 31      | 5,578  |
|                     | 1999  | 1,392  | 961    | 683    | 436    | 638    | 260    | 87      | 4,456  |
|                     | 2000  | 1,469  | 1,450  | 616    | 1,634  | 481    | 225    | 36      | 5,910  |
|                     | 2001  | 1,179  | 841    | 1,363  | 961    | 918    | 461    | 200     | 5,923  |
|                     | 2002  | 781    | 1,540  | 1,495  | 1,092  | 798    | 534    | 44      | 6,284  |
|                     | $r$   | 0.82   | 0.57   | 0.69   | 0.82   | 0.83   | 0.85   |         |        |
| $P$                 | <0.01 | 0.05   | 0.01   | <0.01  | <0.01  | <0.01  |        |         | <0.01  |

Appendix 1.(cont). Furtaker harvest by management zone in Pennsylvania during 1991-2002.

| Species  | Year                  | Zone 1 | Zone 2 | Zone 3 | Zone 4 | Zone 5 | Zone 6 | Unknown | Total   |
|----------|-----------------------|--------|--------|--------|--------|--------|--------|---------|---------|
| Raccoon  | 1991                  | 26,131 | 12,624 | 6,971  | 41,680 | 12,176 | 17,499 | 13,521  | 130,608 |
|          | 1992                  | 35,418 | 10,829 | 6,545  | 34,717 | 12,617 | 15,636 | 3,640   | 124,404 |
|          | 1993                  | 26,162 | 15,302 | 4,247  | 37,234 | 14,168 | 14,239 | 7,612   | 118,964 |
|          | 1994                  | 56,098 | 21,791 | 12,040 | 54,444 | 17,411 | 17,705 | 7,062   | 186,551 |
|          | 1995                  | 31,642 | 10,201 | 7,129  | 38,366 | 11,643 | 18,170 | 3,311   | 120,462 |
|          | 1996                  | 53,765 | 14,667 | 8,435  | 84,479 | 17,535 | 26,519 | 9,558   | 214,958 |
|          | 1997                  | 48,292 | 19,376 | 10,247 | 64,423 | 26,339 | 20,674 | 5,345   | 194,696 |
|          | 1998                  | 36,600 | 22,783 | 9,683  | 76,925 | 20,716 | 23,399 | 5,004   | 195,110 |
|          | 1999                  | 18,785 | 12,525 | 8,073  | 38,729 | 12,403 | 15,451 | 1,442   | 107,407 |
|          | 2000                  | 15,341 | 11,013 | 6,356  | 41,040 | 10,331 | 23,070 | 1,739   | 108,890 |
|          | 2001                  | 25,060 | 12,424 | 7,029  | 44,710 | 12,586 | 18,370 | 1,631   | 121,810 |
|          | 2002                  | 25,881 | 9,086  | 4,325  | 39,464 | 10,400 | 15,793 | 1,510   | 106,485 |
|          | <i>r</i> <sup>a</sup> | -0.33  | -0.16  | -0.11  | 0.08   | -0.09  | 0.22   |         |         |
| <i>P</i> | 0.29                  | 0.62   | 0.73   | 0.80   | 0.77   | 0.49   |        |         | 0.60    |
| Opossum  | 1991                  | 6,204  | 4,093  | 2,915  | 6,781  | 7,671  | 8,929  | 584     | 37,177  |
|          | 1992                  | 5,644  | 3,369  | 1,631  | 5,011  | 5,009  | 6,857  | 233     | 27,754  |
|          | 1993                  | 3,087  | 3,555  | 3,013  | 5,487  | 5,060  | 5,390  | 215     | 25,807  |
|          | 1994                  | 4,228  | 3,612  | 3,316  | 5,997  | 4,978  | 6,729  | 761     | 29,621  |
|          | 1995                  | 4,998  | 2,573  | 2,942  | 6,358  | 4,424  | 7,228  | 1165    | 29,688  |
|          | 1996                  | 7,012  | 6,064  | 4,553  | 12,217 | 6,423  | 11,458 | 822     | 48,549  |
|          | 1997                  | 6,512  | 7,612  | 8,063  | 13,867 | 12,205 | 11,838 | 620     | 60,717  |
|          | 1998                  | 6,689  | 11,338 | 6,137  | 12,649 | 8,604  | 10,264 | 606     | 56,287  |
|          | 1999                  | 1,441  | 4,734  | 2,948  | 13,976 | 3,919  | 6,543  | 162     | 33,723  |
|          | 2000                  | 980    | 5,051  | 1,608  | 9,972  | 3,522  | 7,450  | 510     | 29,093  |
|          | 2001                  | 2,016  | 2,273  | 2,946  | 6,395  | 5,695  | 7,015  | 852     | 27,192  |
|          | 2002                  | 4,005  | 4,354  | 4,051  | 9,197  | 5,350  | 7,201  | 629     | 34,787  |
|          | <i>r</i>              | -0.48  | 0.19   | -0.01  | 0.48   | -0.09  | 0.03   |         |         |
| <i>P</i> | 0.11                  | 0.56   | 0.99   | 0.11   | 0.78   | 0.92   |        |         | 0.73    |
| Skunk    | 1991                  | 634    | 1,569  | 403    | 1,225  | 1,697  | 3,179  | 200     | 8,907   |
|          | 1992                  | 443    | 1,218  | 123    | 1,254  | 1,356  | 2,763  | 64      | 7,221   |
|          | 1993                  | 608    | 1,314  | 1,444  | 968    | 1,454  | 1,937  | 195     | 7,920   |
|          | 1994                  | 1,091  | 1,781  | 1,573  | 2,213  | 1,886  | 3,892  | 184     | 12,620  |
|          | 1995                  | 1,120  | 1,390  | 720    | 1,410  | 1,430  | 3,720  | 205     | 9,995   |
|          | 1996                  | 958    | 1,704  | 1,141  | 1,455  | 2,000  | 4,176  | 137     | 11,571  |
|          | 1997                  | 867    | 1,662  | 1,281  | 2,296  | 3,003  | 3,124  | 111     | 12,344  |
|          | 1998                  | 940    | 2,197  | 1,157  | 1,427  | 2,134  | 3,110  | 225     | 11,190  |
|          | 1999                  | 42     | 1,178  | 1,085  | 1,110  | 1,032  | 2,103  | 172     | 6,723   |
|          | 2000                  | 280    | 1,272  | 584    | 1,939  | 1,134  | 2,173  | 152     | 7,534   |
|          | 2001                  | 682    | 442    | 1,009  | 1,770  | 2,676  | 5,586  | 79      | 9,245   |
|          | 2002                  | 274    | 1391   | 701    | 1,997  | 1,718  | 1,038  | 89      | 7,207   |
|          | <i>r</i>              | -0.36  | -0.29  | 0.12   | 0.44   | 0.19   | -0.09  |         |         |
| <i>P</i> | 0.25                  | 0.36   | 0.70   | 0.16   | 0.57   | 0.79   |        |         | 0.60    |

Appendix 1 (cont). Furtaker harvest by management zone in Pennsylvania during 1991-2002.

| Species  | Year                  | Zone 1 | Zone 2 | Zone 3 | Zone 4 | Zone 5 | Zone 6 | Unknown | Total   |
|----------|-----------------------|--------|--------|--------|--------|--------|--------|---------|---------|
| Mink     | 1991                  | 1,202  | 2,482  | 1,691  | 983    | 2,396  | 1,143  | 458     | 10,355  |
|          | 1992                  | 834    | 906    | 1,406  | 2,405  | 2,453  | 1,142  | 11      | 9,157   |
|          | 1993                  | 657    | 2,235  | 1,288  | 886    | 1,795  | 823    | 124     | 7,808   |
|          | 1994                  | 1,556  | 2,091  | 2,101  | 950    | 1,536  | 1,681  | 293     | 10,208  |
|          | 1995                  | 889    | 1,219  | 1,675  | 1,199  | 2,016  | 1,438  | 166     | 8,602   |
|          | 1996                  | 1,667  | 957    | 1,754  | 1,002  | 1,768  | 2,066  | 101     | 9,315   |
|          | 1997                  | 1,942  | 1,492  | 3,262  | 1,443  | 4,015  | 1,797  | 112     | 14,063  |
|          | 1998                  | 903    | 2,400  | 2,937  | 1,359  | 2,708  | 1,672  | 259     | 12,238  |
|          | 1999                  | 813    | 1,356  | 5,287  | 1,912  | 1,657  | 2,749  | 0       | 13,774  |
|          | 2000                  | 1,159  | 1,292  | 830    | 1,013  | 1,709  | 2,269  | 342     | 8,614   |
|          | 2001                  | 3,194  | 1,810  | 1,662  | 783    | 3,282  | 2,300  | 184     | 13,214  |
|          | 2002                  | 1,551  | 933    | 704    | 2,457  | 1,334  | 2,960  | 129     | 10,069  |
|          | <i>r</i> <sup>a</sup> | 0.45   | -0.33  | 0.09   | -0.18  | 0.01   | 0.88   |         | 0.42    |
| <i>P</i> | 0.14                  | 0.30   | 0.77   | 0.58   | 0.99   | <0.01  |        | 0.17    |         |
| Muskrat  | 1991                  | 26,817 | 18,896 | 12,674 | 26,108 | 35,548 | 33,285 | 2,686   | 156,014 |
|          | 1992                  | 28,081 | 14,925 | 11,214 | 20,949 | 37,105 | 22,647 | 612     | 135,533 |
|          | 1993                  | 18,296 | 20,680 | 14,174 | 19,281 | 28,837 | 19,192 | 1,197   | 121,657 |
|          | 1994                  | 31,922 | 24,647 | 19,011 | 36,109 | 30,610 | 31,049 | 4,797   | 178,145 |
|          | 1995                  | 22,086 | 6,581  | 11,601 | 24,551 | 25,199 | 35,157 | 5,267   | 130,442 |
|          | 1996                  | 35,999 | 12,066 | 9,767  | 39,072 | 19,858 | 26,705 | 2,546   | 146,013 |
|          | 1997                  | 57,034 | 23,065 | 22,064 | 41,557 | 35,928 | 33,861 | 2,557   | 216,066 |
|          | 1998                  | 20,109 | 17,166 | 13,579 | 37,691 | 32,501 | 23,921 | 3,238   | 148,205 |
|          | 1999                  | 11,314 | 7,386  | 12,326 | 24,033 | 21,309 | 17,378 | 469     | 94,215  |
|          | 2000                  | 12,362 | 6,417  | 6,779  | 20,768 | 14,228 | 16,873 | 2,453   | 79,880  |
|          | 2001                  | 30,241 | 10,592 | 12,139 | 22,112 | 25,597 | 20,613 | 699     | 121,994 |
|          | 2002                  | 12,837 | 4,346  | 4,730  | 26,461 | 18,340 | 8,320  | 306     | 75,340  |
|          | <i>r</i>              | -0.26  | -0.62  | -0.39  | 0.01   | -0.67  | -0.62  |         | -0.50   |
| <i>P</i> | 0.42                  | 0.03   | 0.21   | 0.98   | 0.02   | 0.03   |        | 0.10    |         |

<sup>a</sup> Pearson product-moment correlation coefficient (*r*) and probability (*P*).

<sup>b</sup> Coyote take does not include harvest from Game Take Survey.