

**PENNSYLVANIA GAME COMMISSION  
BUREAU OF WILDLIFE MANAGEMENT  
PROJECT ANNUAL JOB REPORT**

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**TITLE:** Furbearer Research/Management

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**TITLE:** Furbearer Population and Harvest Monitoring

**PERIOD COVERED:** 1 July 2010 to 30 June 2011

**WORK LOCATION(S):** Statewide

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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 1990. Furtaker license sales have increased steadily since 1999. During the 2010-2011 harvest season 35,267 furtaker licenses were sold, the highest number recorded since 1988. Harvest levels increased slightly for all species except muskrat, opossum, beaver and weasel. Pelt values and market demand for wild furs were comparable to previous seasons. Reports of bobcat sightings and incidental bobcat captures were comparable to previous years suggesting stabilization or slight declines in bobcat populations. Reports of fisher observations were similar to the previous year and continue to suggest that fisher populations are expanding rapidly proximal to initial release sites, and throughout areas of the southcentral, southwest, and central regions. Otter populations have expanded throughout the state. In 2010, river otters occupied 90% of Wildlife Conservation Officer (WCO) districts. Coyote complaints and damage to livestock remained stable. Beaver damage and nuisance complaints were relatively low. With 80% of WCO districts reporting increasing or stable populations, the overall status of beavers appears secure in most areas. WCOs provided baseline information on porcupine populations and estimated mortalities found along roadways at 2,370 statewide. We collected age and sex data from 8,924 Pennsylvania muskrat pelts to help identify whether reproduction and/or recruitment have changed over the past 20-30 years and whether these factors have contributed to the widespread muskrat decline. The muskrat population was composed of about 11% adults and 89% juveniles. The number of juveniles/adult was 8.3. When compared to data collected approximately 20-30 years ago, we observed a slight decrease in the proportion of adults (15% in 1984-91) and an increase in juveniles/adult (5.6 in 1984-91). It appears that mortality factors not related to reproduction or recruitment are affecting muskrat populations.

**OBJECTIVES**

1. Determine trends in the annual harvest of furbearing animals and numbers of trappers.
2. Monitor changes in furbearer population distribution and abundance.

## **METHODS**

### **Fur Harvest**

The annual fur harvest is estimated from the Furtaker Survey conducted each April. Due to budget constraints, this survey was not conducted during 2004, but has been implemented in subsequent years. Harvest estimates were presented by species and Wildlife Management Unit (WMU). Combination license holders have been extended furtaker privileges since 1999, but harvest totals for each species do not include them representing a sampling bias during subsequent years (Boyd and Weaver 2010).

Average pelt prices of furbearers sold at the Pennsylvania Trappers Association's District fur sales were obtained to monitor trends in pelt value. Pelt values were averaged among several districts reporting fur sale results. Approximately 5% of all furbearers harvested in Pennsylvania are sold at these fur sales. Pelt value trends during 1986-2011 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. Boyd and Weaver (2010) provided the combined harvest totals. Prior analyses of the beaver harvests results were included in the beaver management plan report (see Job No. 64001). Current harvest levels and pelt prices are reported herein.

### **WCO Furbearer Questionnaire**

Questionnaires were mailed annually to all Wildlife Conservation Officers (WCOs) to collect information on captures and sightings of otter and fisher, and to record numbers and types of coyote damage complaints during the previous calendar year. Numbers of beaver complaints received and assessments of beaver, otter, fisher, bobcat, and porcupine populations were also queried. In an effort to monitor the frequency of nuisance complaints of other furbearers, WCOs were asked to record numbers of bobcat, fisher, fox, weasel, river otter, mink, muskrat, raccoon, opossum, and skunk complaints. The 2011 WCO Furbearer Questionnaire (Fig. 1) was distributed electronically on 25 May 2011. Survey data were scheduled for return from the regional Wildlife Management Supervisors on 24 June 2011.

Vehicle-caused mortalities and incidental trapping mortalities for bobcat, otter, and fisher were recorded annually by WCOs using standardized kill report forms. Mandatory WCO reporting of these mortalities was a year-round activity.

Although not considered a furbearer in Pennsylvania, porcupine status and distribution was assessed using the WCO Furbearer Questionnaire. Interest in monitoring porcupine populations stemmed from a recent regulation change allowing limited take of this species. A pre-harvest population assessment may be valuable in future harvest management for this

species.

### **Muskrat Monitoring**

In an effort to revive muskrat status monitoring in the northeast-region of North America, the Northeast Furbearer Resources Technical Committee member jurisdictions agreed to collect basic reproductive and recruitment data as resources permitted. Differences in muskrat abundance may be related to changes in population structure. Decreasing trends in fecundity or juvenile survival to adulthood may provide evidence needed to identify the cause or causes of the muskrat decline. A regional approach to detecting changes in muskrat population age and gender structure was prudent, since the muskrat decline was suspected throughout the northeastern United States and Canada. Our intent was not to identify the causes of the apparent muskrat decline, but to detect possible changes in recruitment and reproduction resulting from the causes of population decrease. Knowing how muskrat populations were being affected will help identify the root causes of decline.

During 1980-1991, the Pennsylvania Game Commission (PGC) monitored gender and age ratios of harvested muskrats in Pennsylvania based on pelt primness patterns and characteristics of dried pelts. Hayden (1994) found that age ratios changed after 1983 in response to decreased trapping pressure. The immature:adult female ratio increased suggesting high productivity and recruitment. He also monitored fecundity and found that adult females averaged 12.1 young from 2 litters per year. By comparing the current muskrat population structure and productivity to that of the 1980s, we could determine the direction of change in these parameters, if any.

Prepared muskrat pelts (stretched and dried) at Pennsylvania Trappers Association fur sales and at a North American Fur Auction collection depot were examined and separated into gender and age classes. If possible, pelt origin information was recorded to the WMU level within Pennsylvania. Adult and immature muskrats were differentiated using pelt primeness patterns of the flesh side of the prepared skin (Shanks 1948, Moses and Boutin 1986). Gender was determined from the presence or absence of nipples visible on the pelt (Fig. 2).

The proportion of juveniles to adults in the harvest was used as a measure of reproductive performance and recruitment. This ratio was a function of both natality and survival of juveniles and adults over the summer and fall.

To monitor fecundity, female carcasses were collected from cooperating muskrat trappers. Reproductive tracts were extracted from female carcasses and frozen until examination. Placental scars were counted by placing female reproductive tracts on a light table and examining the uterine horns. Each tract was split and spread over the lighted table. Blood-stained spots on the uterus depicted placental scars. Placental scars were counted, each representing one young produced by the female.

## **RESULTS**

### **Fur Harvest**

In 1985 a furtaker license was created, and since then furtaker license sales have

generally declined ( $r = -0.495$ ,  $P < 0.05$ ) (Table 1). Since 1999, combination license holders were extended furtaking privileges, which resulted in reduced furtaker license sales. However, the numbers of furtaker licenses sold has been increasing steadily since 1999 (Table 1). During the 2010-2011 harvest season, 35,267 furtaker licenses were sold, the highest number recorded since 1988. Variable pelt values, continued trapping device regulation, and international changes in fur demand will continue to affect the number of furtakers in Pennsylvania. Estimated statewide harvest numbers were similar to those during previous years. Harvest levels declined for all species except coyote (Table 2). Most populations of terrestrial furbearers remain underutilized. Species harvest totals by WMU are provided for regional comparison of relative species abundance and harvest intensity (Table 3).

During December 2010, the PGC implemented its first regulated fisher trapping season. This season was limited to four WMUs, 2C, 2D, 2E, and 2F. Furtakers were required to purchase a fisher permit prior to participating in the season and to report their harvest within 48 hours of trapping a fisher. A total of 2,886 fisher permits were purchased and 152 harvest reports were received. The harvest consisted of 82 males, 62 females and 8 of unknown sex. The harvest totals by WMU were 45 fisher from 2C, 24 from 2D, 49 from 2E, and 24 from 2F.

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 2010-2011 were comparable to recent years for most furbearers (Table 4).

### **Population Monitoring**

*Bobcats.*--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 1990-2010 ( $r = 0.86$ ,  $P < 0.05$ ) (Table 5). The number of incidental bobcat captures during 2010 was comparable to the previous two years. Annual numbers of statewide vehicle-caused bobcat mortalities (i.e., roadkills) was also comparable to previous years ( $r = 0.97$ ,  $P < 0.01$ ) (Table 6). These indices suggest stabilization or slight declines in bobcat populations.

Since 2001, the 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 (Boyd and Weaver 2010). An annual sighting index (number of observations divided by effort X 100) has been developed to detect changes in observation rates (Table 7). The 2008 bobcat sighting index was similar to previous years. Recent inconsistencies in methods used to calculate effort for this index will result in a review of the methodology used. No index was calculated for 2009.

Based on results from the WCO furbearer questionnaire, bobcat populations continue to be well established. WCOs reported increasing or stable bobcat populations in 71% of districts (Fig. 3). Poorly- or non-established populations comprised 27% of WCO districts.

*Fishers.*--The number of incidental fisher captures reported on the furtakers survey has been increasing steadily during the past decade (Table 8). We estimate that 933 fishers were captured and released by Pennsylvania trappers during the 2009-2010 season. The annual number of fisher observations and incidental captures reported to WCOs has also been increasing since fishers were reintroduced in 1996 (Table 9). WCOs received 101 reports of fishers that were captured and released by licensed trappers and 653 reports of fisher observations. The geographic distribution of these reports suggests that fisher populations are rapidly expanding from the reintroduction areas in northern regions and naturally expanding into regions of southwestern and southcentral Pennsylvania. In addition, 85% of WCOs surveyed during 2010-2011 reported fisher populations existing within their districts (Fig. 4).

*River Otters.*--River otter populations have expanded throughout the commonwealth. Numbers of incidental otter captures, primarily by beaver trappers, have increased during recent years with greater than 25 incidental captures reported annually since 1996 (Table 9). The majority of these captures occur in the Northeast Region, but recent reports indicate continued population expansion throughout the Susquehanna River drainage. Based on results of the 1995 WCO furbearer questionnaire, otters occurred in 51% of WCO districts. In 2010, otters occupied 91% of WCO districts (Figure 5).

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 were using these techniques to avoid otter captures. Incidental otter capture reports remained stable at 50 during the 2010-2011 season. The average number of incidental otter captures during the previous five years was 47. As otter populations continue to expand, more intensive monitoring will be required.

*Coyotes.*--Reports of coyote-caused damage to livestock and domestic pets have been relatively stable since 1993. Numbers of complaints and losses due to coyotes during 2010 were similar to reports from previous years. Complaints related to concerns for human safety increased significantly. Losses of calves, sheep and poultry increased during recent years (Table 10). Reports of coyotes killing domestic dogs and cats are increasing, particularly in the southwest and southeast regions. WCOs in 62 districts (53%) 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.

*Beavers.*--The overall status of beaver populations appears secure in most areas, with 84% of WCO districts reporting increasing or stable populations (Fig. 6). WCOs observed decreases in established populations within 8% of districts. Non-established populations comprised 8% of WCO districts. Areas of suitable habitat with decreasing or non-established beaver populations may need trapping regulation changes to allow for population growth and expansion.

In 2010, beaver damage and nuisance complaints remained relatively low. Since 1996, when beaver complaints peaked at 1,140, reports of problem beavers gradually decreased. WCOs received 517 beaver complaints during 2010-2011. Although the northwest and northeast corners of Pennsylvania have always been beaver nuisance hotspots, WCOs reported a more scattered

distribution of complaints (Fig. 7). Few complaints were reported in central and southeastern Pennsylvania. As the human population grows and beaver populations expand into more urban areas, the public may be less tolerant of beaver activity.

*Other furbearers.*--WCOs recorded the number of nuisance complaints received involving furbearer species other than coyotes and beavers. Raccoon complaints increased by nearly 200 incidences during 2010-2011 (Table 11). All other furbearer complaint levels remain relatively stable. We will continue to monitor nuisance complaint levels of these furbearers in subsequent years.

*Porcupines.*--WCO survey responses established baseline information on porcupine population status and distribution. Porcupines were absent from the southwestern and southeastern portions of Pennsylvania (Fig. 8). Officers responded to 76 nuisance porcupine complaints and estimated mortalities found along highways at 2,370 statewide.

*Muskrats.*--We collected age and sex data from 8,924 muskrat pelts at fur sales, collection points, and fur dealers across Pennsylvania. Age structure data showed little variability among WMUs or broad regions of the state. So, the data were pooled into one statewide measure. From muskrat pelts sold, the population was composed of about 11% adults and 89% juveniles (Table 12). The number of juveniles/adult was 8.3 and juveniles/adult female was 20.2. When compared to data collected approximately 20-30 years ago (Table 12), we observed a slight decrease in the proportion of adults (15% in 1984-91; 11% in 2011), an increase in juveniles/adult (5.6 in 1984-91; 8.3 in 2011), and an increase in juveniles/adult female (12.7 in 1984-91; 20.2 in 2011). These results suggest that recruitment appears to be occurring at normal rates.

We also extracted reproductive tracts from adult females to determine litter size from placental scar counts. With the assistance of our wildlife veterinarian, we examined approximately 40 adult and subadult muskrat reproductive tracts collected for presence of placental scars. Only 5 of 40 tracts showed evidence of any reproductive activity. Our sample size was too small to estimate litter size. Two reproductive tracts clearly showed 6 placental scars. However, necrosis of many reproductive tracts prevented accurate placental scar counts. In northern United States, adult female muskrats average 2 litters of 5-7 young each year (Perry 1982). Embryo resorption in muskrats is extremely rare, occurring once in 15,000 female carcasses examined in one study (Dozier 1947). Tissue necrosis, rather than embryo resorption, likely accounted for lack of visible placental scars on some reproductive tracts.

If adults comprised an increased proportion of the age ratio, production and/or recruitment would likely be inadequate, causing the population to decrease. If a specific age or gender group was decreased by some mortality factor, we would have seen this difference. Muskrat reproduction and recruitment appear normal or slightly elevated. It appears that mortality factors not related to reproduction or recruitment are affecting muskrat populations. This information will help direct our efforts in identifying the causes of the muskrat decline. Annual monitoring of reproduction and recruitment is not necessary. Monitoring at 5-year intervals is probably adequate unless population numbers noticeably change.

## RECOMMENDATIONS

1. The fur harvest should continue to be reported by species and WMU to monitor area-specific harvest trends.
2. Pelt price information should be collected annually to monitor trends in fur value relative to regional harvest trends.
3. 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.
4. The Game Take Survey should continue to query general license buyers regarding bobcat, fisher, and coyote observations. Effects of geographic sampling bias should be assessed now that the Pennsylvania Automated License System is fully implemented.
5. The PGC should continue educational efforts concerning techniques for avoiding otter captures.
6. Increased numbers of coyote-related complaints should be addressed through educational programs in rural and suburban communities.
7. Muskrat age ratio and reproductive information should be collected every 5 years to monitor fecundity and recruitment unless noticeable changes in population numbers occur.

## LITERATURE CITED

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Table 1. Number of furtaker licenses sold in Pennsylvania.

<b>Year</b>	<b>Licenses sold</b>
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 <sup>a</sup>
2000	18,551 <sup>a</sup>
2001	19,410 <sup>a</sup>
2002	20,676 <sup>a</sup>
2003	22,454 <sup>a</sup>
2004	24,094 <sup>a</sup>
2005	23,941 <sup>a</sup>
2006	26,589 <sup>a</sup>
2007	28,032 <sup>a</sup>
2008	29,707 <sup>a</sup>
2009	31,110 <sup>a</sup>
2010	35,267 <sup>a</sup>

<sup>a</sup> Combination license holders were extended furtaker privileges since 1999, but the number who pursue furbearers has not been determined. Therefore, these numbers misrepresent to an unknown degree the number of furtakers in Pennsylvania.



Table 2. Annual harvest and percent change, calculated using a 3-year moving average, by species in Pennsylvania during 1985-2008.

Year <sup>a</sup>	Raccoon	% Δ	Red Fox	% Δ	Gray Fox	% Δ	Coyote <sup>b</sup>	% Δ	Muskrat	% Δ	Mink	% Δ	Skunk	% Δ	Opossum	% Δ	Beaver <sup>c</sup>	% Δ	Weasel	% Δ
1985-86	532,898		72,957		44,907				387,857				52,498		255,334		5,980			
1986-87	426,625		95,330		46,387				440,880				39,064		210,953		6,690			
1987-88	443,534	-22.0	74,590	-8.3	56,944	-14.7			346,558	-13.4	18,513		39,632	-27.6	217,552	-21.9	6,490	-6.6		
1988-89	224,514	-24.7	52,737	-23.3	23,072	-13.9			229,958	-29.4	12,896		16,351	-19.6	105,812	-24.4	4,721	-11.2		
1989-90	155,761	-39.7	43,525	-24.5	28,818	-32.4			141,577	-32.6	9,669	-27.9	20,409	-39.7	80,660	-44.8	4,678	-19.3		
1990-91	116,443	-18.9	32,699	-18.8	21,683	10.0	1,810		112,358	-15.3	7,053	-8.6	9,298	-16.2	36,574	-30.8	3,431	-4.8	798	
1991-92	130,608	-7.8	28,495	-15.2	30,409	-4.2	3,719		156,014	-1.5	10,355	-1.9	8,907	-34.2	37,177	-34.3	4,107	-1.4	481	
1992-93	124,404	0.7	27,611	-7.7	25,395	2.8	4,402	43.8	135,533	2.3	9,157	2.8	7,221	-5.4	27,754	-10.6	4,506	1.5	343	-16.8
1993-94	118,964	15.0	25,862	2.6	23,839	3.7	6,161	17.7	121,657	5.4	7,808	-0.5	7,920	15.4	25,807	-8.3	3,606	43.0	526	17.9
1994-95	186,551	-0.9	30,649	4.2	33,387	-2.3	6,240	13.4	178,145	-1.2	10,208	-2.0	12,620	10.0	29,621	2.3	9,360	11.1	723	21.6
1995-96	120,462	22.5	31,110	4.3	23,518	-0.7	6,662	9.4	130,442	5.7	8,602	5.7	9,995	12.0	29,688	26.7	6,454	31.8	687	3.3
1996-97	214,958	1.6	29,623	6.9	23,307	-9.2	7,959	2.1	146,013	8.3	9,315	13.7	11,571	-0.8	48,549	28.8	9,789	12.8	589	22.5
1997-98	194,696	14.1	36,923	16.5	26,043	12.9	6,685	23.4	216,066	3.6	14,063	11.4	12,344	3.5	60,717	19.1	12,628	7.9	1,172	-1.0
1998-99	195,110	-17.8	47,202	6.4	32,922	4.2	11,652	6.2	148,205	-10.2	12,238	12.5	11,190	-13.8	56,287	-9.0	8,727	-4.5	662	-11.1
1999-00	107,407	-17.3	36,860	-3.2	26,794	-1.9	9,586	13.2	94,215	-29.7	13,774	-13.6	6,723	-15.9	33,723	-21.0	8,377	-14.2	319	-38.6
2000-01	108,890	-17.8	33,060	-12.1	24,452	-11.5	10,383	2.2	79,880	-8.1	8,614	2.8	7,534	-7.6	29,093	-24.4	8,408	8.7	340	-0.4
2001-02	121,810	-0.3	33,003	-3.7	23,275	-10.7	12,363	5.7	121,994	-6.4	13,214	-10.4	9,245	2.1	27,192	1.2	10,934	-13.8	657	6.6
2002-03	106,485	-1.2	33,007	-1.5	18,805	-12.8	11,444	3.8	75,340	-3.1	10,069	-6.6	7,207	7.4	34,787	5.1	4,538	-2.2	406	1.4
2003-04	104,781	-4.7	31,592	7.7	15,956	-9.8	11,697	-7.6	71,368	-19.0	6,494	-13.0	9,319	2.9	33,760	17.3	6,772	9.6	359	-6.3
2005-06	106,082	10.1	40,551	11.9	17,616	3.7	9,670	1.3	70,995	21.1	9,335	10.1	9,997	13.1	43,770	11.9	14,283	37.8	567	6.1
2006-07	138,640	4.8	45,512	17.3	20,754	4.9	11,879	5.0	121,167	0.3	12,680	12.3	10,687	1.7	48,102	5.9	14,210	13.5	487	32.1
2007-08	121,446	10.0	52,000	3.0	18,613	5.7	13,360	8.9	72,174	1.2	10,004	-2.2	9,818	7.7	41,168	7.9	11,542	-10.8	813	-3.3
2008-09	142,808	-6.5	44,745	-5.7	20,845	-11.6	12,776	4.1	74,059	-21.4	8,632	-17.3	12,331	-7.2	54,273	-28.4	9,942	-12.6	504	-1.1
2009-10	112,550	1.1	37,418	2.0	13,793	-5.5	13,438	3.5	63,988	-6.6	7,261	-7.0	8,314	-2.9	37,270	-3.8	9,704	-7.3	468	-21.1
2010-11	125,423		54,661		15,691		14,732		58,296		8,204		8,935		36,188		9,254		436	

<sup>a</sup> Furtaker survey was not conducted for the 2004-2005 season.

<sup>b</sup> Coyote harvest is calculated from only the Furtaker Survey and does not include coyote harvests from the Game Take Survey.

<sup>c</sup> Beaver harvest was based on mandatory pelt tagging totals until the 2004-05 season. Harvest was estimated from furtaker surveys from the 2005-06 trapping season to present.

Table 3. Estimated harvests of furbearers by WMU during the 2010-2011 hunting and trapping seasons.

WMU	Raccoon	Red Fox	Gray Fox	Coyote <sup>a</sup>	Muskrat	Mink	Skunk	Opossum	Beaver	Weasels
1A	9,507	519	136	312	3,856	246	128	1,326	1,271	8
1B	9,387	894	112	601	6,741	660	240	1,479	2,437	16
2A	10,465	1110	407	2,419	482	143	216	2,387	112	8
2B	7,143	838	495	248	723	32	80	563	128	0
2C	8,904	3,153	1,460	985	5,359	636	567	1,840	416	16
2D	12,596	1,860	1,755	489	4,652	413	336	3,142	527	16
2E	3,821	742	917	256	2,539	119	296	1,101	216	0
2F	3,805	814	558	1,033	1,502	199	176	1101	543	40
2G	5,108	1,102	1,564	1,234	1,157	310	575	2,114	535	63
3A	1,866	567	511	465	884	143	232	852	168	8
3B	3,523	774	917	849	1,808	278	543	1,913	392	40
3C	2,325	854	917	1,378	996	477	344	1,013	863	24
3D	949	495	327	497	257	199	160	675	719	0
4A	4,601	806	1,276	344	2,547	238	296	1165	64	0
4B	4,738	2,347	614	377	3,905	708	256	1,929	96	0
4C	3,756	1,948	471	385	2,113	429	775	1,985	80	16
4D	7,271	1,708	1,627	681	6,942	612	1,127	3,785	120	0
4E	5,454	1173	447	457	2,820	517	440	2,154	56	166
5A	3,290	4,949	375	216	2,009	326	400	932	32	0
5B	7,070	11,989	391	240	3,696	795	935	2,379	88	16
5C	4,778	8,820	136	457	1,173	413	472	1,447	64	0
5D	917	5260	0	80	161	0	32	24	0	0
Unknown	4,150	1940	279	729	1,976	310	312	884	328	0
Total	125,423	54661	15,691	14,732	58,296	8,204	8,935	36188	9,254	436

<sup>b</sup> Coyote harvest is calculated from only the Furtaker Survey and does not include coyote harvests from the Game Take Survey.

Table 3. Average pelt prices paid for furbearer species in Pennsylvania.

Trapping season	Average pelt price (\$) <sup>a</sup>										
	Raccoon	Red Fox	Gray Fox	Coyote	Muskrat	Mink	Skunk	Opossum	Beaver	Bobcat	Fisher
1992-93	6.77	12.96	11.32	25.40	2.25	19.95		1.71	10.63		
1993-94	8.54	15.44	11.02	24.15	2.88	18.35	2.66	1.88	19.03		
1994-95	9.15	18.73	11.47	24.70	3.09	14.08	2.21	1.51	19.94		
1995-96	10.27	16.30	9.40	13.36	3.15	11.88	3.00	1.74	19.65		
1996-97	15.34	18.05	11.94	20.68	6.03	19.06	3.92	1.83	29.37		
1997-98	12.07	13.18	9.65	9.72	3.44	11.66		1.41	21.73		
1998-99	6.87	9.73	4.84	6.40	1.87	9.48		0.49	15.29		
1999-00	4.94	10.72	6.19	15.43	3.16	9.75		1.47	16.08		
2000-01	7.42	16.58	8.61	16.07	3.40	9.64		2.47	20.00		
2001-02	8.34	20.14	10.05	17.16	3.85	8.47		1.54	15.86		
2002-03	9.39	22.84	12.81	22.57	3.81	9.69		2.12	14.33		
2003-04	10.15	19.92	18.74	25.29	3.33	10.50		2.03	15.84		
2005-06	10.11	16.48	18.04	9.37	2.89	12.84	3.14	2.51	16.11		
2006-07	17.50	20.36	26.54	24.50	6.10	17.42	4.50	5.05	17.18		
2007-08	12.88	20.84	43.84	20.02	3.20	12.88	4.04	2.45	22.14		
2008-09	9.79	11.58	25.11	12.37	3.96	10.06	4.42	3.45	18.05	26.36	
2009-10	11.58	10.48	20.76	17.27	7.35	11.02	4.62	2.62	18.29	43.50	
2010-11	12.38	14.63	19.59	18.40	6.92	13.95	3.62	1.99	14.90	36.83	41.60

<sup>a</sup>Average pelt prices paid at PA Trappers Association fur sales.

Table 5. Numbers of incidental bobcat captures as estimated from the annual Furtaker Survey. This survey was not conducted during 2004-2005.

<b>Trapping season</b>	<b>No. survey respondents</b>	<b>No. furtaker licenses</b>	<b>No. bobcats<sup>a</sup> captured and released</b>	<b>Extrapolated no. bobcat captures</b>	<b>3-year moving average<sup>b</sup> (no. bobcat captures)</b>
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	1,076	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	1,133	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	1,414
2006-2007	2,436	26,589	175	1,910	1,916
2007-2008	2,994	28,032	235	2,200	2,405
2008-2009	2,622	29,717	274	3,105	2,533
2009-2010	3,186	31,110	235	2,295	2,388
2010-2011	4,421	35,267	221	1,763	

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

<sup>b</sup>  $r = 0.86$ ,  $P < 0.05$

Table 6. Numbers and geographic distribution of vehicle-caused bobcat mortalities during 1985-2009.

<b>Year</b>	<b>No. reported bobcat roadkills</b>	<b>No. counties with roadkills</b>	<b>No. new county records</b>	<b>3-year moving average</b>
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	106.0
2006	109	27	0	106.0
2007	108	28	0	112.7
2008	121	28	0	112.3
2009	108	26	0	114.3
2010	114	27	0	

Table 7. Reports of bobcat and fisher sightings by county from the annual Game Take Survey, 2001-2009. Furtaker Survey was not conducted in 2004. Estimate was not conducted during 2009.

Year	Season	N (%)	Effort days	Bobcat		Fisher	
				Number	SI <sup>a</sup>	Number	SI <sup>a</sup>
2001	Spring Turkey Hunters	2,785 (24.8)	12,735	200	1.57	90	0.71
	Firearms Deer Hunters	8,628 (76.9)	40,254	585	1.45	152	0.38
	Archery Deer Hunters	3,237 (28.8)	36,439	407	1.12	134	0.37
	All Hunters	11,221 (100.0)	89,428	1,192	1.33	376	0.42
2002	Spring Turkey Hunters	2,423 (24.8)	10,952	205	1.87	43	0.39
	Firearms Deer Hunters	7,176 (73.3)	33,412	465	1.39	170	0.51
	Archery Deer Hunters	2,816 (28.8)	31,396	266	0.85	95	0.3
	All Hunters	9,777 (100.0)	75,760	936	1.24	308	0.41
2003 <sup>b</sup>	Spring Turkey Hunters	2,728 (27.3)	12,147	131	1.08	49	0.4
	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 Turkey Hunters	2,845 (21.7)	12,327	163	1.32	104	0.84
	Firearms Deer Hunters	7,213 (55.0)	35,011	316	0.9	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
2006	Spring Turkey Hunters	2,580 (20.7)	10,243	481	4.7	121	1.18
	Firearms Deer Hunters	6,865 (55.0)	32,609	707	2.17	230	0.71
	Archery Deer Hunters	3,025 (24.3)	32,065	109	0.34	109	0.34
	All Hunters	12,470 (100.0)	74,917	1,297	1.73	460	0.61
2007	Spring Turkey Hunters	2,369 (25.2)	9,467	316	3.33	70	0.73
	Firearms Deer Hunters	5,736 (60.9)	57,500	784	1.36	270	0.46
	Archery Deer Hunters	2,832 (30.0)	13,445	385	2.86	171	1.27
	All Hunters	9,415 (100.0)	80,412	1,485	1.84	511	0.63
2008	Spring Turkey Hunters	4,498 (20.2)	9,676	270	2.79	111	1.15
	Firearms Deer Hunters	12,350 (55.5)	29,739	502	1.69	224	0.75
	Archery Deer Hunters	5,412 (24.3)	29,478	348	1.18	116	0.39
	All Hunters	8,478 (100.0)	68,893	1,120	1.63	451	0.65

<sup>a</sup> SI = Sighting Index = observations/effort \* 100

Table 8. Numbers of incidental fisher captures as estimated from the annual Furtaker Survey. This survey was not conducted during 2004-2005.

<b>Trapping season</b>	<b>No. survey respondents</b>	<b>No. furtaker licenses</b>	<b>No. fisher captured and released</b>	<b>Extrapolated no. fisher captures</b>	<b>3-year moving average (no. fisher captures)<sup>a</sup></b>
1999-2000	1,557	17,414	5	56	
2000-2001	1,681	18,551	1	11	47
2001-2002	1,553	19,410	6	75	71
2002-2003	1,779	20,676	11	128	102
2003-2004	2,204	22,454	10	102	351
2005-2006	2,412	23,941	83	824	625
2006-2007	2,436	26,589	87	950	919
2007-2008	2,994	28,033	105	983	1,275
2008-2009	2,622	29,717	167	1,893	1,349
2009-2010	3,186	31,110	120	1,171	1,332
2010-2011	4,421	35,267	117	933	

<sup>a</sup>  $r = 0.97$ ,  $P < 0.001$

Table 9. Reports of otter and fisher captures and fisher observations estimated from annual WCO questionnaires, 1995-2009.

<b>Survey Season</b>	<b>No. Districts Reporting</b>	<b>No. Incidental Otter Captures</b>	<b>No. Incidental Fisher Captures</b>	<b>No. Reported Fisher Observations</b>
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
2006	118	44	86	385
2007	133	57	132	481
2008	132	47	138	561
2009	125	36	106	615
2010	125	51	101	653

Table 10. Types and numbers of coyote-related complaints reported to WCOs (2000-2010).

	Survey Period										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Proportion of WCO districts reporting coyote complaints (%)	48	45	- -	44	53	66	64	44	54	62	53
<b>Complaint nature/species affected</b>											
Cattle	11	11	11	11	16	18	24	9	12	12	11
Sheep	26	17	15	30	23	43	29	19	22	29	20
Goats	1	1	1	4	3	5	3	4	7	4	5
Poultry	14	15	15	15	25	24	11	19	16	14	21
Dogs	22	12	12	10	19	12	19	8	9	17	8
Cats	29	23	22	24	77	25	38	28	19	25	29
Afraid of Coyotes	126	114	115	98	316	263	199	155	171	219	193
Deer	57	29	28	50	87	73	36	61	74	39	53
Turkeys	18	6	5	13	37	31	12	12	21	17	14
Other	0	7	8	26	0	32	36	36	32	17	31
Total	304	235	232	281	603	526	407	351	383	393	385
<b>Coyote-caused mortalities</b>											
Cows	1	0	0	0	0	2	0	1	1	0	1
Calves	8	5	5	4	13	10	27	7	9	8	7
Sheep	91	21	21	31	37	30	47	28	47	57	25
Goats	0	1	1	6	0	0	2	3	4	3	4
Poultry	44	49	48	66	85	51	71	93	132	76	97
Dogs	17	5	6	3	4	3	3	1	2	1	1
Cats	30	21	21	14	73	16	33	15	34	19	18
Rabbits	3	2	2	8	5	8	12	2	8	16	6
Deer	9	10	10	12	17	13	10	8	10	7	6
Other	3	0	0	0	2	2	1	1	0	1	0
Total	206	114	114	140	236	135	206	159	247	188	165



Table 11. Frequency of furbearer complaints received by Wildlife Conservation Officers for species other than coyotes and beavers during 2009-2010.

<b>Species</b>	<b>2009</b>	<b>2010</b>
Bobcat	50	37
Fisher	23	14
Fox	235	219
Weasel	17	12
River Otter	7	10
Mink	27	10
Muskrat	73	126
Raccoon	763	960
Opossum	139	121
Skunk	488	510

Table 12. Muskrat gender and age structure comparison based on pelt examinations during 1980-1983, 1984-1991, and 2010 in Pennsylvania.

<b>Sampling period</b>	<b>Sample size</b>	<b>Average annual harvest</b>	<b>Gender ratio (male/female)</b>	<b>Age ratio</b>		<b>Percent adults</b>
				<b>(juveniles/adult)</b>	<b>(juveniles/adult female)</b>	
1980-1983	14,559	727,213	1.5	3.4	8.4	23
1984-1991 <sup>a</sup>	29,756	301,329	1.4	5.6	12.7	15
2010	8,924	58,295	1.5	8.3	20.2	11

<sup>a</sup> Period of decreased trapping pressure (Hayden 1994).

## 2010-2011 Furbearer Questionnaire

All questions pertain to furbearer information within your district during May 2010 to April 2011. If you are new to this district or cannot answer these questions, please submit this form anyway (leaving unknown answers blank) or forward it to the WCO who previously occupied or covered your district. Please do not answer "many" or "several" to questions asking "How many?" Give us your best estimates. **Please note that these types of questions will be asked annually.**

**Instructions:** Click on the **blue underline** or table box to enter text. Click on the **check box** (☐) to select or deselect that response. Press **Tab** to advance or click on the next entry field.

District No. \_\_\_\_\_ WCO Name \_\_\_\_\_

### Beavers

1. How many beaver complaints were serviced within each WMU in your district? →

WMU	Number of beaver complaints

2. How many beaver complaints were serviced in your district by the following damage types?

Beaver damage type	Number of beaver complaints
Plugged culvert pipe	
Tree cutting	
Flooded road	
Flooded field	
Flooded woodland	
Pond/Lake invasion	
Giardia problem	
Other _____	

3. How would you describe beaver populations in your district?

Beaver populations are present each year and are ... ☐ *increasing*, ☐ *decreasing*, ☐ *stable*

----- or -----

Beaver populations are not present each year and are ... ☐ *poorly established*, ☐ *nonexistent*

### River Otters

4. How many river otters were accidentally caught by trappers within your district? \_\_\_\_\_

5. How would you describe river otter populations in your district?

Otter populations are present each year and are ... ☐ *increasing*, ☐ *decreasing*, ☐ *stable*

----- or -----

Otter populations are not present each year and are ... ☐ *poorly established*, ☐ *nonexistent*

### Fishers

6. How many reliable reports of fishers have you received in your district? \_\_\_\_\_

7. How many fishers were accidentally caught by trappers in your district? \_\_\_\_\_

8. How would you describe fisher populations in your district?

Fisher populations are present each year and are ... ☐ *increasing*, ☐ *decreasing*, ☐ *stable*

----- or -----

Fisher populations are not present each year and are ... ☐ *poorly established*, ☐ *nonexistent*

Figure 1. Wildlife Conservation Officer furbearer questionnaire used during 2010-2011 (page 1).

**Bobcats**

9. How would you describe bobcat populations in your district?

Bobcat populations are present each year and are ... ☐ increasing, ☐ decreasing, ☐ stable

----- or -----

Bobcat populations are not present each year and are ... ☐ poorly established, ☐ nonexistent

**Coyotes**

10. Did you receive any coyote-related complaints during this period? ☐ Yes ☐ No

If you received coyote complaints, please record the type and number of complaints and animals killed. Omit any complaints that the Bureau of Dog Law Enforcement (PA Dept of Agriculture) serviced.

**Number of Coyote Complaints:**

Cattle  
 Sheep  
 Goats  
 Poultry/Waterfowl  
 Attacked Dogs  
 Attacked Cats  
 Afraid of Coyotes  
 Chased/Attacked Deer  
 Chased/Attacked Wild Turkey  
 Other

**Number of Animals Killed by Coyotes:**

Cows  
 Calves  
 Sheep/Lambs  
 Goats  
 Poultry/Waterfowl  
 Dogs  
 Cats  
 Rabbits  
 Deer  
 Other

**Nuisance Complaints**

11. If you received nuisance complaints concerning other furbearer species, how many occurred in your district?

Number of Complaints:  Bobcat  River Otter  Raccoon  
 Fisher  Mink  Opossum  
 Fox  Muskrat  Skunk  
 Weasel  Other furbearer

**Other Mammals - Porcupines**

12. How many porcupine complaints did you receive in your district during the past year?

13. Approximately how many dead porcupines did you see along roadways within your district?   
 (your best estimate)

14. How would you describe porcupine populations in your district?

Porcupine populations are present each year and are ... ☐ increasing, ☐ decreasing, ☐ stable

----- or -----

Porcupine populations are not present each year and are ... ☐ poorly established, ☐ nonexistent

**Thank you for your cooperation and assistance!**

**Please return this questionnaire to your regional wildlife management supervisor  
and other appropriate supervisors as an e-mail attachment.**

Figure 1. Wildlife Conservation Officer furbearer questionnaire used during 2010-2011 (page 2).

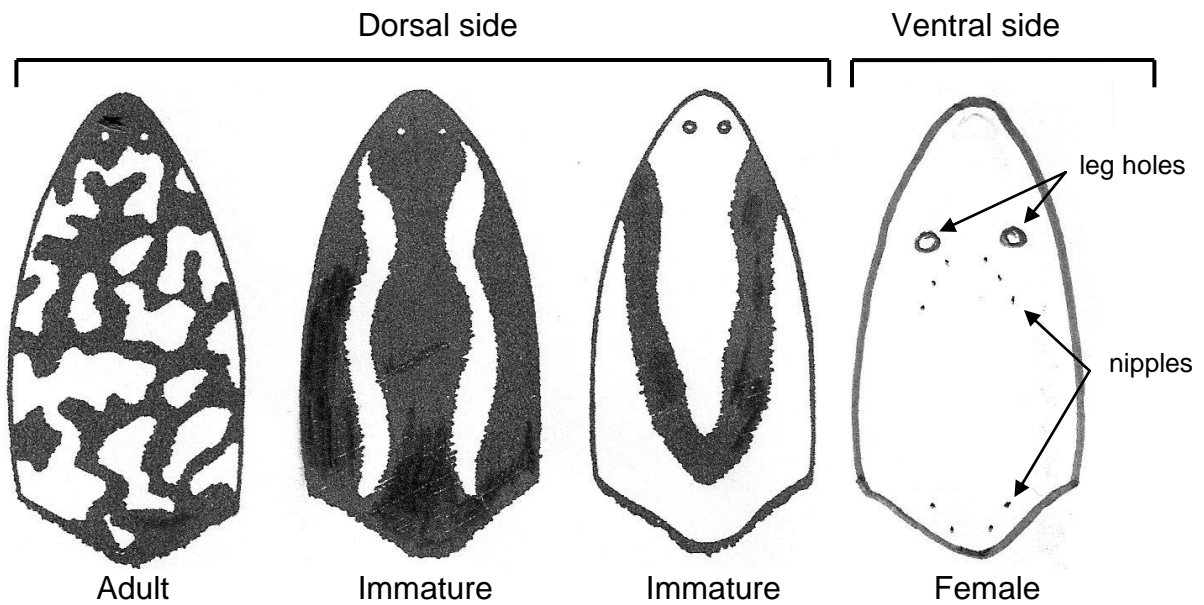


Figure 2. Fall pelt primeness patterns depicting immature and adult age classes and female features on the flesh side of stretched and dried muskrat pelts.

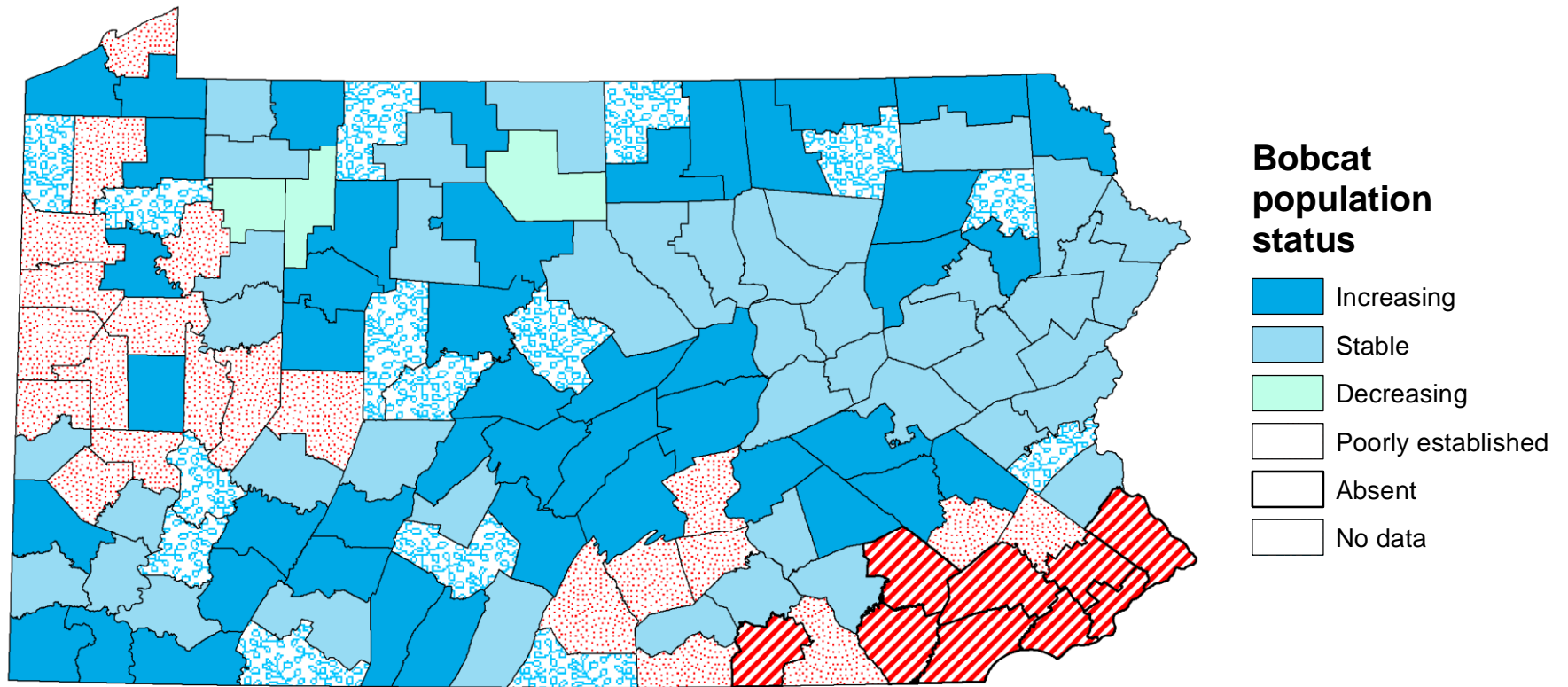


Figure 3. Bobcat population status and distribution based on Wildlife Conservation Officer observations during 2010-2011.

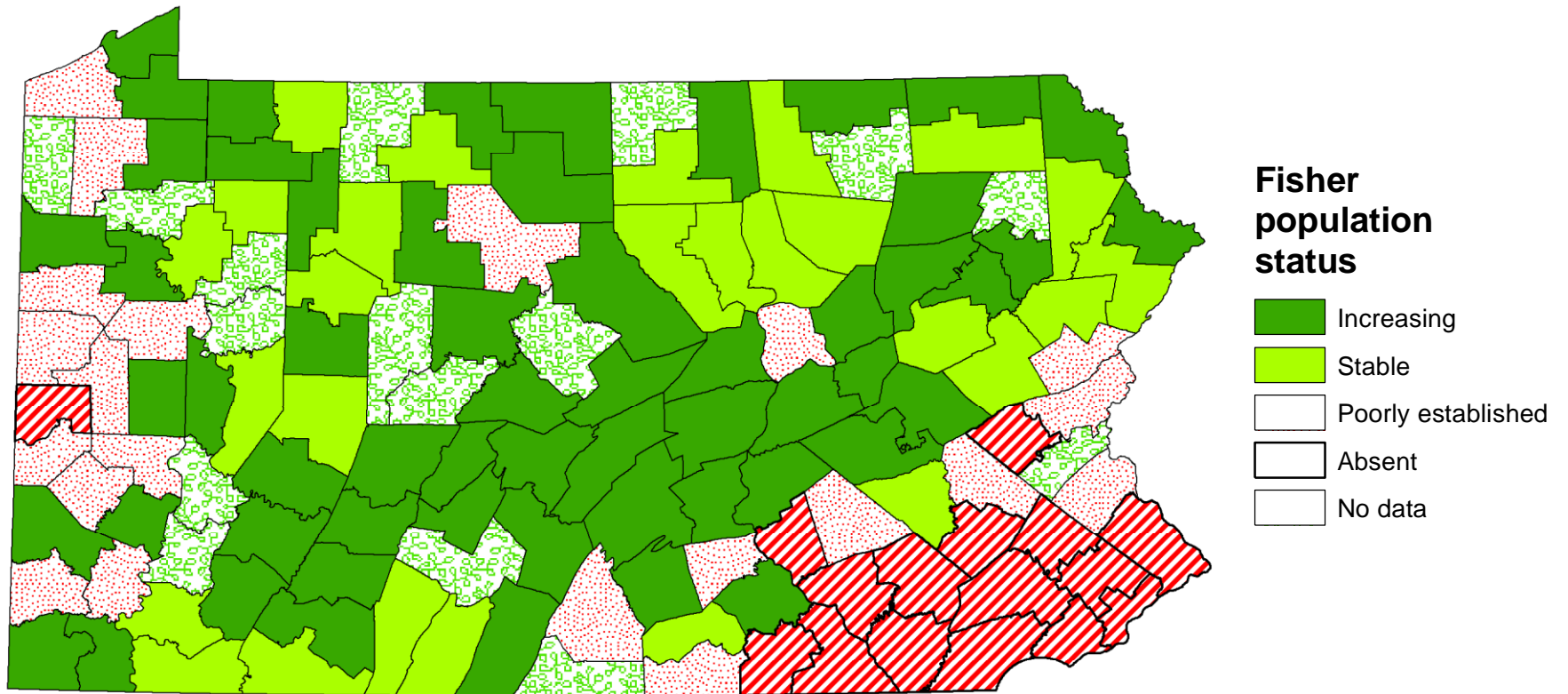


Figure 4. Fisher population status based on Wildlife Conservation Officer observations during 2010-2011.

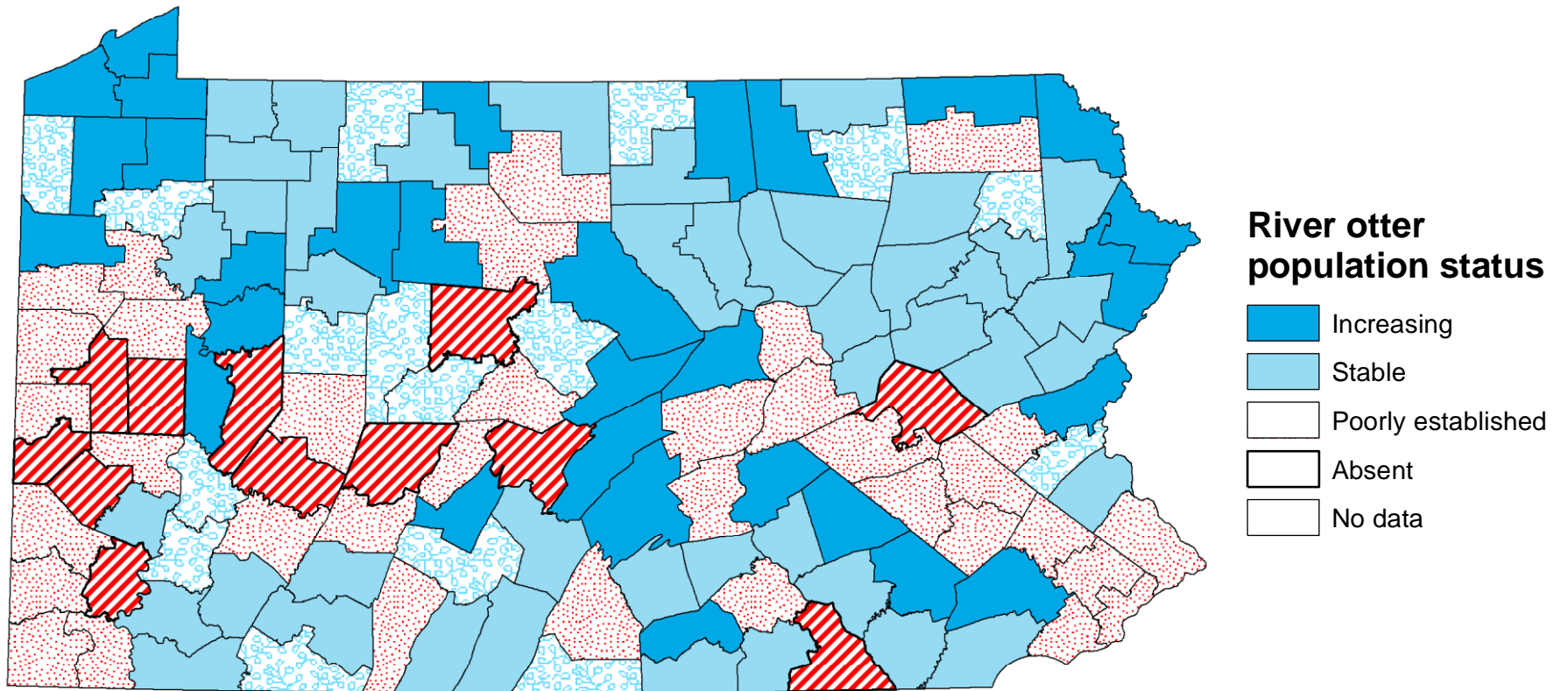


Figure 5. River otter population status based on Wildlife Conservation Officer observations during 2010-11.

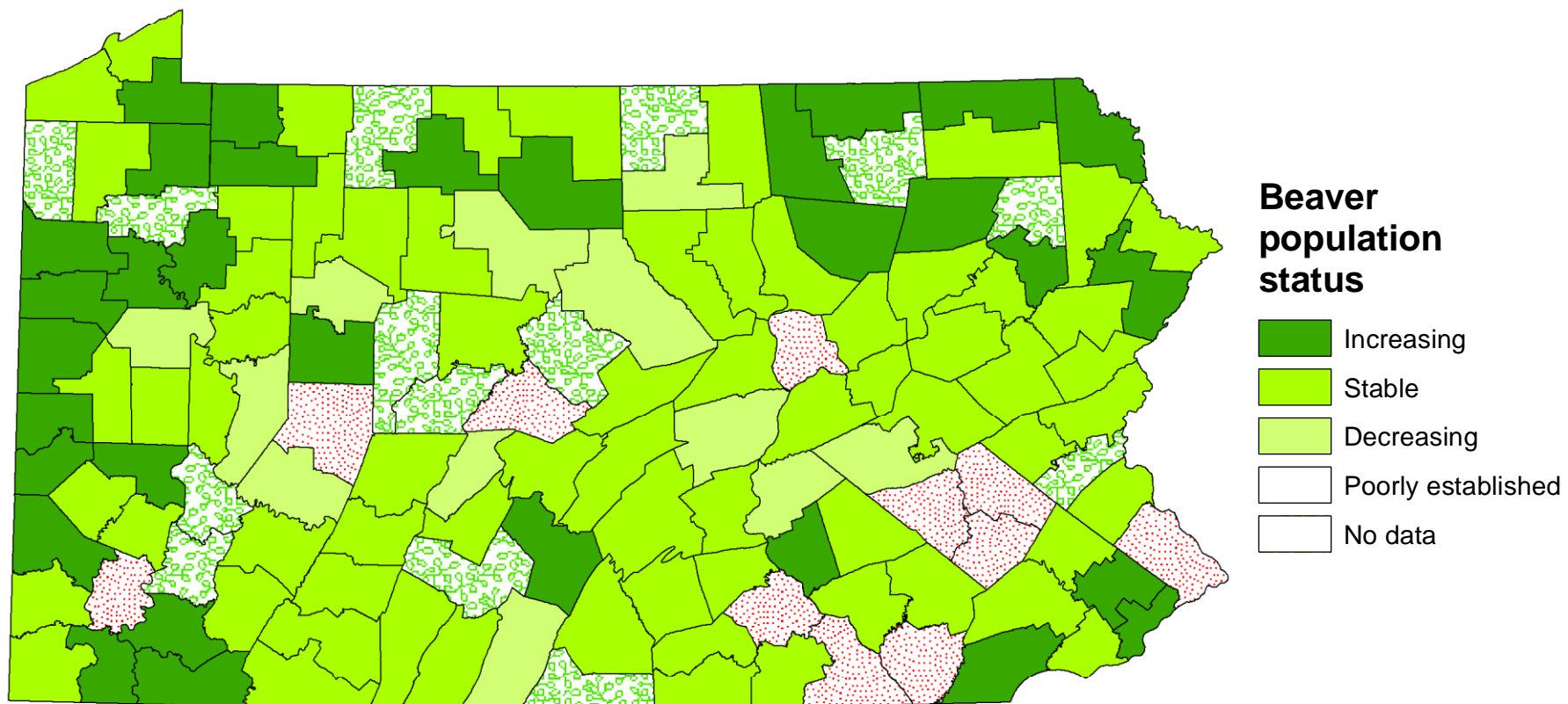


Figure 6. Beaver population status based on Wildlife Conservation Officer observations during 2010-2011.



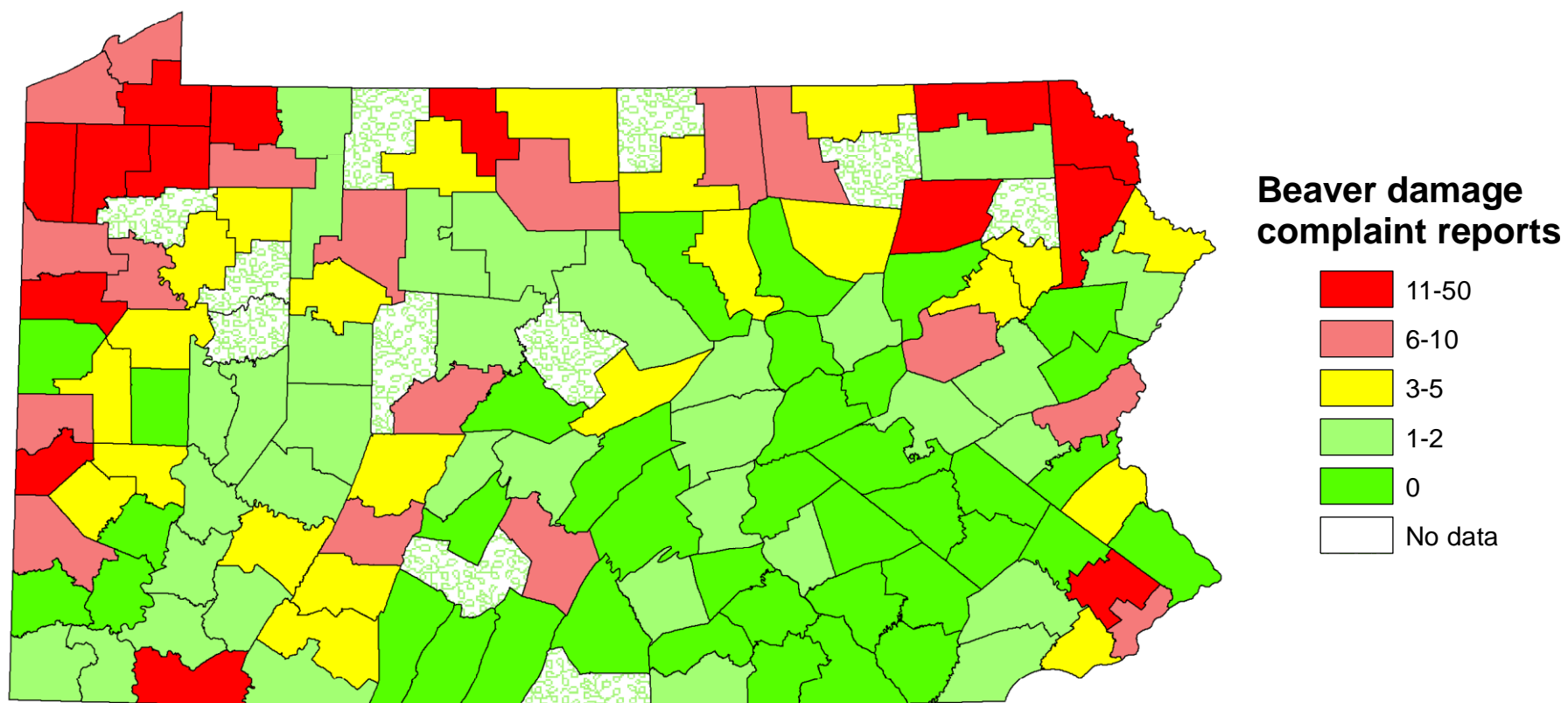


Figure 7. Distribution and frequency of beaver complaints reported by Wildlife Conservation Officers during 2010-2011.

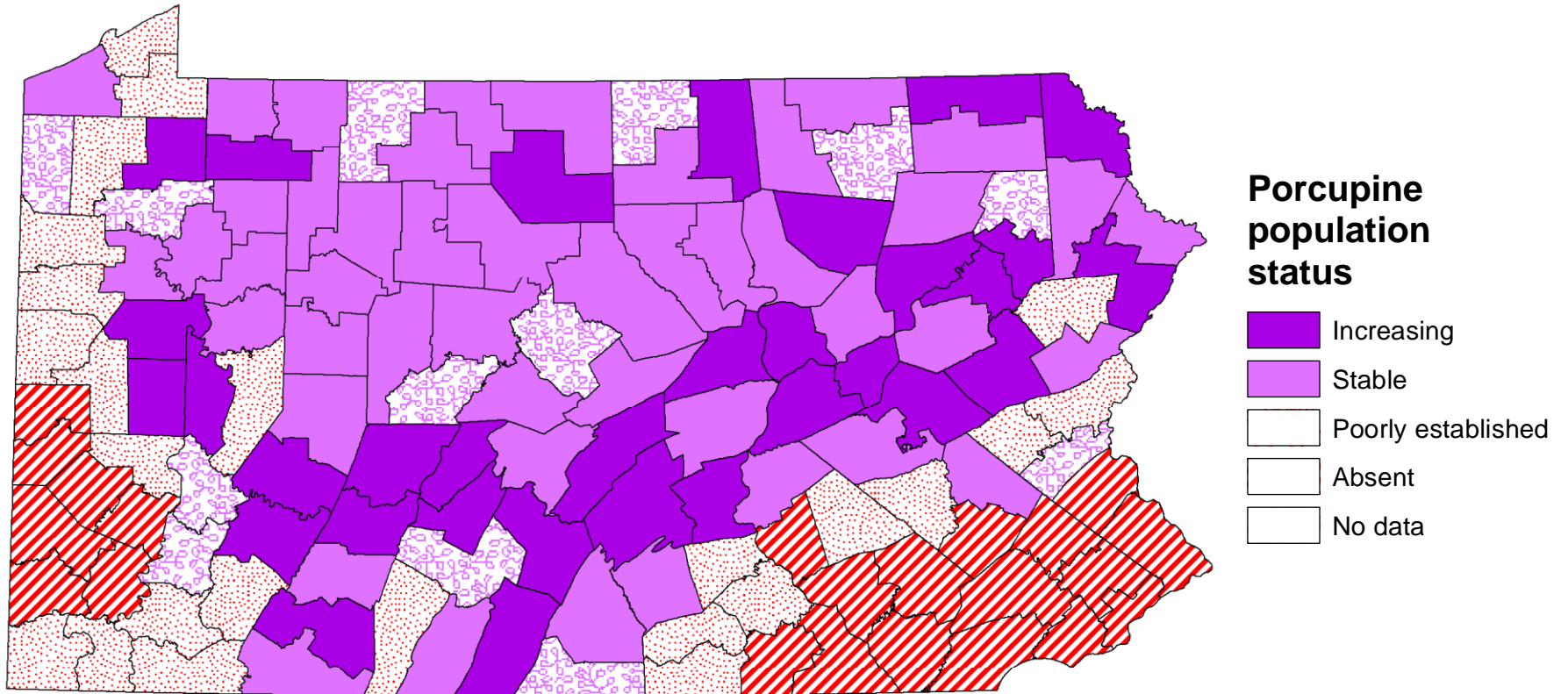


Figure 8. Porcupine population status based on Wildlife Conservation Officer observations during 2010-2011.