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2005 MICHIGAN FURBEARER HARVEST SURVEY

Brian J. Frawley

ABSTRACT

A sample of furtakers was contacted after the 2005 hunting and trapping seasons to estimate the number of participants, days afield (effort), and furbearer harvests. In 2005, about 13,200 furtakers pursued furbearers; a decrease of 3% from 2004. About 33% of the license buyers trapped (6,959 trappers), 44% hunted (9,333 hunters) and 14% both trapped and hunted (3,058 furtakers) during 2005. The species most frequently pursued by trappers were raccoons, coyotes, and muskrats. Hunters most commonly sought coyotes, raccoons, and red fox. Harvest levels of most furbearers in 2005 were within historical ranges, except for coyotes. The number of coyotes taken by hunters was the highest recorded since 1980. Trends in harvest are affected by both changes in furtaker and furbearer numbers; thus, harvest per furtaker was also examined for trends. The mean number of raccoon and opossum taken per furtaker has increased since the 1980s. The mean harvest of coyotes per hunter has increased since the mid-1980s, while the mean harvest of red fox by both hunters and trappers has declined during this same period. These trends suggest raccoon, opossum, and coyote may have been increasing in abundance during the last 20 years, while red fox numbers may have been declining. An estimated 770 trappers caught 4,468 beaver through the ice during the 2005 season. Furthermore, about 894 trappers caught 2,746 beaver during April 2006. An estimated 91% of trappers that tried to catch coyote or fox used foothold traps. About 29% of coyote and fox trappers used snares in their attempt to catch coyote or fox.



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INTRODUCTION

The Natural Resources Commission and Michigan Department of Natural Resources (DNR) have the authority and responsibility to protect and manage the wildlife resources of the State of Michigan. Harvest surveys are one of the management tools used by the DNR to accomplish its statutory responsibility. Estimating harvests and hunter participation are primary objectives of these surveys. Information from harvest surveys, mandatory registration, and other indices are used to monitor furbearer populations and establish harvest regulations.

The primary furbearing animals harvested for their pelts in Michigan during recent years have been badger (*Taxidea taxus*), beaver (*Castor canadensis*), bobcat (*Felis rufus*), coyote (*Canis latrans*), fisher (*Martes pennanti*), gray fox (*Urocyon cinereoargenteus*), marten (*Martes americana*), mink (*Mustela vison*), muskrat (*Ondatra zibethica*), opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), river otter (*Lutra canadensis*), striped skunk (*Mephitis mephitis*), and weasels (*Mustela* spp.) (Frawley 2006). Opossum, weasels, and skunks could be taken year-round with any hunting or trapping license. The remaining furbearers could be harvested in 2005 during late fall through mid-winter by a person possessing a fur harvesters license (included Fur Harvester, Junior Fur Harvester, Senior Fur Harvester, Non-resident Fur Harvester, Military Fur Harvester, Resident Fur [trap only], and Junior Fur [trap only]) (Table 1). Landowners or their designees could take raccoons and coyotes throughout the year on their property without a license if these animals were causing damage. Coyotes could also be harvested by resident hunters with a valid small game hunting license. Harvest of coyotes by hunters possessing a small game license but not a fur harvesters license are not included in this study.

METHODS

Following the 2005 hunting and trapping seasons, a questionnaire was sent to a random sample of people (3,998) who had purchased a fur harvester license (Table 2). All licensees had an equal chance of being included in the random sample. After the sample was selected, licensees were grouped into one of four strata on the basis of their residence. These strata included residents of the Upper Peninsula (UP), northern Lower Peninsula (NLP), southern Lower Peninsula (SLP), and nonresidents (Figure 1). People receiving the questionnaire were asked to report whether they pursued furbearers, number of days spent afield, and whether they harvested any furbearing animals. Estimates were calculated using a stratified random sampling design (Cochran 1977). The primary reason for using a stratified sampling design was to produce more precise estimates. Improved precision means similar estimates should be obtained if this survey was repeated.

Estimates were calculated along with their 95% confidence limit (CL). In theory, this confidence limit can be added and subtracted from the estimate to calculate the 95% confidence interval. The confidence interval is a measure of the precision associated with the estimate and implies the true value would be within this interval 95 times out of 100. Unfortunately, there are several other possible sources of error in surveys that are probably more serious than theoretical calculations of sampling error. They include failure of

participants to provide answers (nonresponse bias), question wording, and question order. It is very difficult to measure these biases. Furthermore, harvest estimates did not include nuisance animals legally taken out of season or illegal take.

Statistical tests are used routinely to determine the likelihood differences among estimates are larger than expected by chance alone. The overlap of 95% confidence intervals was used to determine whether estimates differed. Non-overlapping 95% confidence intervals was equivalent to stating the difference between the means was larger than would be expected 995 out of 1,000 times, if the study had been repeated (Payton et al. 2003).

Questionnaires were mailed initially during mid-April 2005, and up to two follow-up questionnaires were mailed to nonrespondents. About 2% of the questionnaires were undeliverable (Table 2). Of the questionnaires that were delivered, 67% of the questionnaires were completed and returned (2,637).

Estimates of events that occur infrequently are difficult to estimate precisely using common sampling designs (Cochran 1977). Relatively few furtakers harvest river otter, bobcat, badger, fisher, and marten; thus, estimates associated with these species should be viewed cautiously. More precise harvest estimates were probably obtained for these species through tallying registration reports. All furtakers harvesting a river otter, bobcat, fisher, or marten were required to present these animals at a DNR office for registration. Prior to 2003, furtakers were also required to register badger; however, this requirement was eliminated in 2003. In this report, marten harvest was determined only by registration. Separate surveys also were conducted to estimate hunting and trapping participation, harvest, and effort for bobcat (Frawley et al. 2006) and marten seasons (Frawley 2006).

While the primary objectives of the fur harvester's survey were estimating harvest, trapper and hunter numbers, and trapping and hunting effort, this survey also provided an opportunity to collect information about management issues. Questions were added to the questionnaire to determine how often trappers set beaver traps under the ice and how often trappers attempted to capture beaver during April. In addition, trappers were asked to summarize their take of fox and coyotes with foothold traps and snares separately.

RESULTS AND DISCUSSION

In 2005, 21,680 licenses were purchased by 21,406 people (Figure 2, Table 2). The number of license buyers in 2005 was 5% higher than the preceding three-year average of 20,403 (2002-2004). Most license buyers were men (98%), with an average age of 44 years (Figure 3). About 5% of the license buyers (1,149) were younger than 17 years of age.

Mail Harvest Survey Overall, approximately 62% of license buyers either hunted or trapped furbearers during 2005 (Table 3). The number of active furtakers decreased about 3% from 2004. About 33% of the license buyers trapped and 44% hunted furbearers during 2005. Trappers most often pursued raccoons, coyote, and muskrat (Table 4). Hunters most commonly sought coyotes, raccoon, and red fox. Coyotes and raccoons ranked as the most frequently sought furbearers when trappers and hunters were combined.

The estimated number of trappers was unchanged statistically between 2004 and 2005. However, the estimated number of people trapping during recent years is well below the record highs of nearly 16,000 in the early 1980s (Figure 4). The peaks in furtaker numbers corresponded closely to periods when pelt values peaked for many species such as muskrat, raccoon, and red fox (Iowa Department of Natural Resources 2002).

The number of trappers during recent years has been comparable to the numbers active during the 1960s, prior to the peak in fur prices. The estimated number of people hunting furbearers was unchanged statistically between 2004 and 2005, yet hunter numbers increased by 15% between 2002 and 2005. Furthermore, the number of people hunting furbearers has surpassed the number trapping since 1998 (Figure 4).

Harvest levels of most furbearers in 2005 were within historical ranges (Figures 5-7). The number of coyotes taken by hunters possessing a fur harvesters license was the highest recorded since 1980, while the number of raccoons taken by hunters was the lowest recorded since 1980. Estimated harvest of bobcats by hunters and red fox by both hunters and trappers were near their lowest reported levels in 2005 (Figures 5-7).

Many factors influence harvest trends. Hunter and trapper numbers, wildlife population size, hunting regulations, habitat conditions, and fur prices are among these factors. Thus, any interpretations of trends should be viewed cautiously. Trends in harvest per furtaker were examined because this measure may eliminate some of the effects of changing furtaker and furbearer numbers over time, although many other factors may still complicate interpretations of these trends (Poole and Mowat 2001).

The mean number of raccoon and opossum taken per furtaker has increased since the early 1980s (Figures 8 and 9). The mean harvest of coyotes per hunter has increased since the mid-1980s, while the mean harvest of red fox by both hunters and trappers has declined during this same period. These trends suggest raccoon, opossum, and coyote may have been increasing in abundance during the last 20 years, while red fox numbers may have been declining.

These trends in furbearer numbers are not unique to Michigan. Increasing raccoon numbers have also been reported in Illinois since the 1980s (Gehrt et al. 2002). Furthermore, declining red fox numbers and increasing coyote numbers also have been reported in portions of the northern Great Plains since the 1980s (Sovada et al. 1995). The decline in red fox numbers in the northern Great Plains during recent years has been attributed largely to competition from increased coyote numbers (Sovada et al. 1995).

The mean number of bobcats taken per trapper declined from 2003 to 2005 (Figure 8). The seasonal harvest limit for bobcats was lowered from three to two bobcats in 2004 and 2005, and this reduction probably contributed to the decline of bobcats taken per trapper (Frawley et al. 2006). The mean number of weasel taken per trapper increased in 2005 (Figure 8); however, the trend for weasel should be viewed cautiously because of limited data.

Registration Data Compared to 2004, more otter (12% increase) were registered in 2005; however, fewer bobcat (15% decline), fisher (13%), and marten (11%) were registered (Figure 10, Table 5).

Additional Questions Related to Trapping An estimated 770 ± 143 trappers caught $4,468 \pm 1,643$ beaver through the ice during the 2005 season (traps were set under the ice). About 894 ± 152 trappers caught $2,746 \pm 1,398$ beaver during April 2006. Beaver harvested through the ice and taken during April represented about 16% and 10% of the estimated total beaver harvest, respectively.

An estimated 91% of trappers that tried to catch coyote or fox used foothold traps (Table 6, 3,270 trappers). About 29% of coyote and fox trappers used snares in their attempt to catch coyote or fox (1,046 trappers).

An estimated 2,913 trappers caught 8,853 coyotes with foothold traps, while 2,569 trappers caught 7,407 fox with foothold traps (Table 7). These trappers also reported 2,339 coyotes and 1,266 fox escaping from foothold traps. Among trappers using snares, 1,005 trappers caught 2,117 coyotes, and 556 trappers caught 583 fox. In addition, trappers reported 1,531 coyotes and 509 fox escaping from snares.

ACKNOWLEDGEMENTS

I thank all the furtakers that provided information. Jaclyn Mapes, Theresa Riebow and Becky Walker completed data entry. Mike Bailey, Dave Bostick, Dwayne Etter, Cheryl Flierman, and William Moritz reviewed a draft version of this report.

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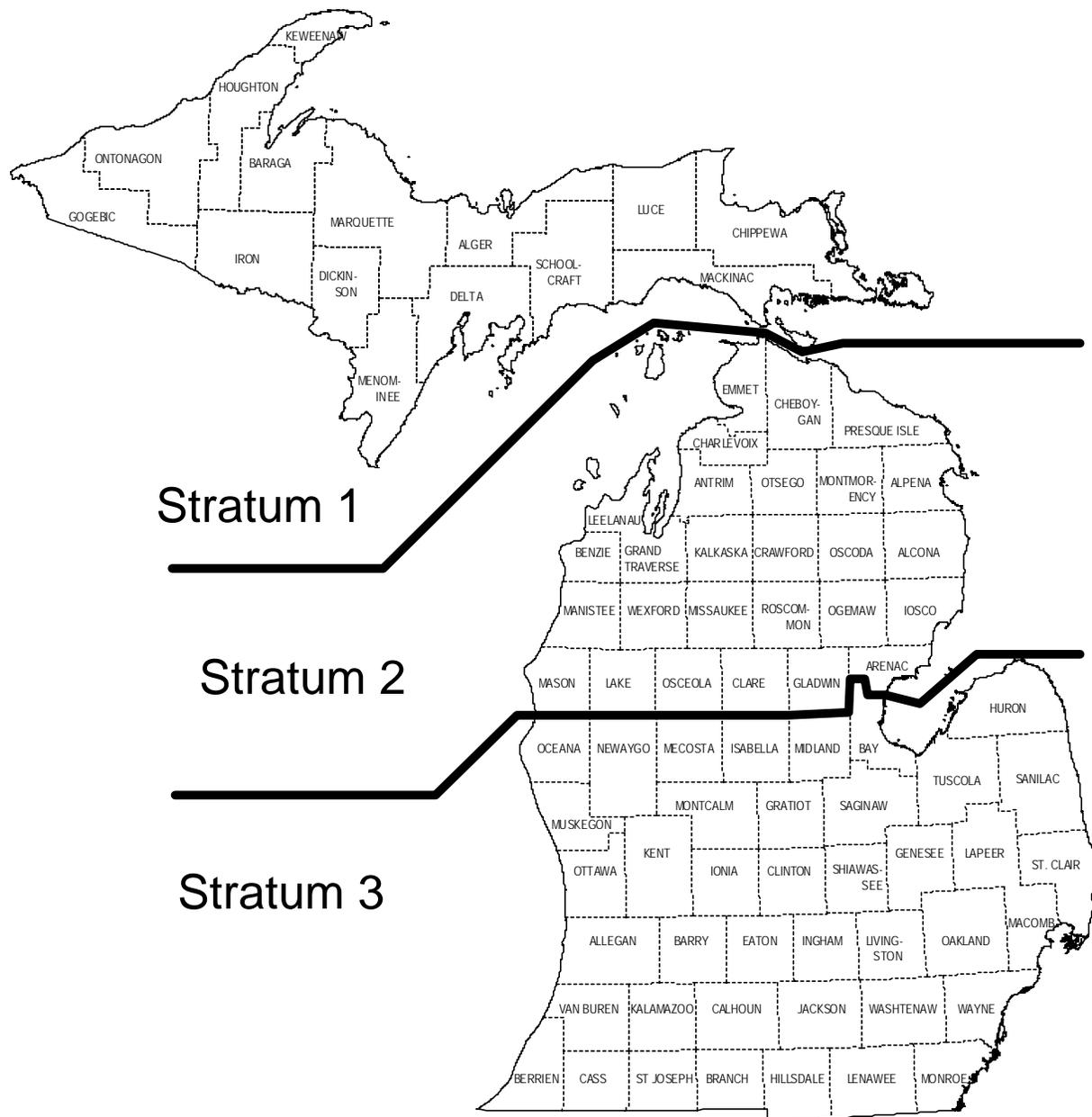


Figure 1. Strata boundaries used for the analysis of the Michigan furbearer harvest survey. Nonresidents were included as a fourth stratum.

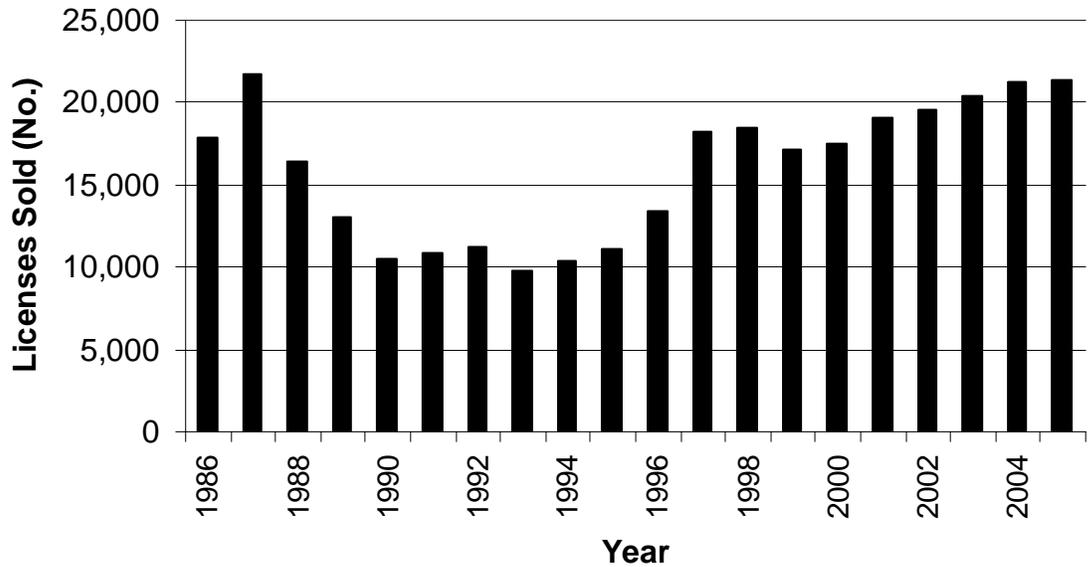


Figure 2. Number of fur harvester licenses sold in Michigan, 1986-2005. Fur harvester licenses included Resident Fur Harvester, Senior Fur Harvester, Junior Fur Harvester, Military Fur Harvester, and Nonresident Fur Harvester licenses. During 1996-2005, totals also included Resident Fur Harvester (trap only) and Junior Fur Harvester (trap only) licenses.

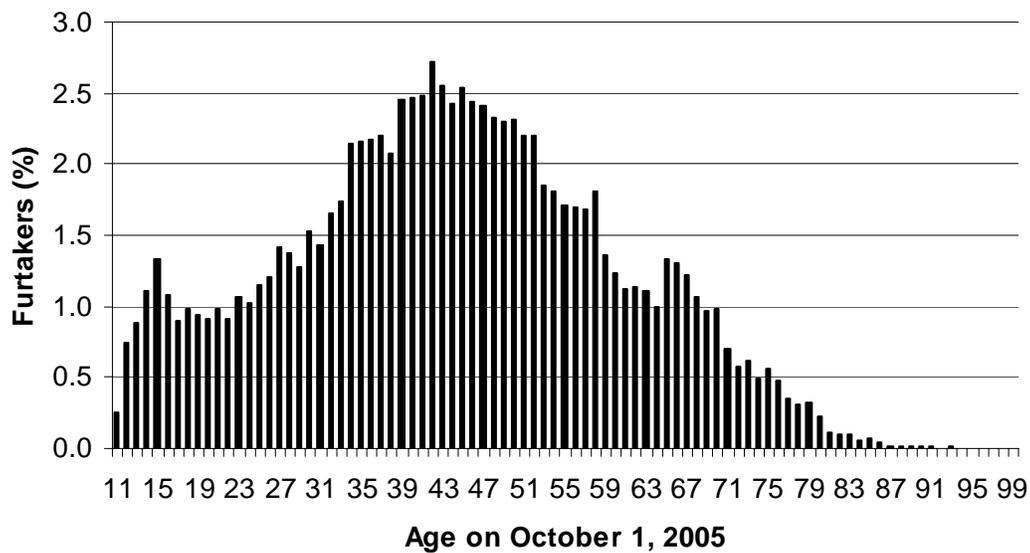


Figure 3. Ages of people that purchased a license to hunt or trap furbearers in Michigan for the 2005 hunting and trapping seasons (\bar{x} = 44 years).

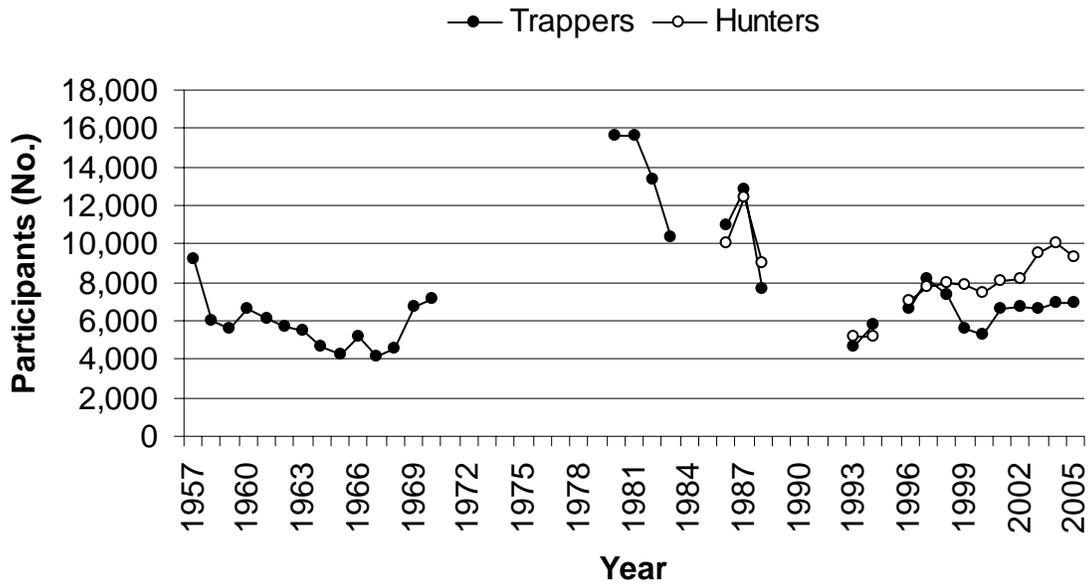


Figure 4. Estimated number of furbearer trappers and hunters in Michigan, 1957-2005. Estimates included only license buyers that actually trapped or hunted furbearers (any species). Data were not available for all years.

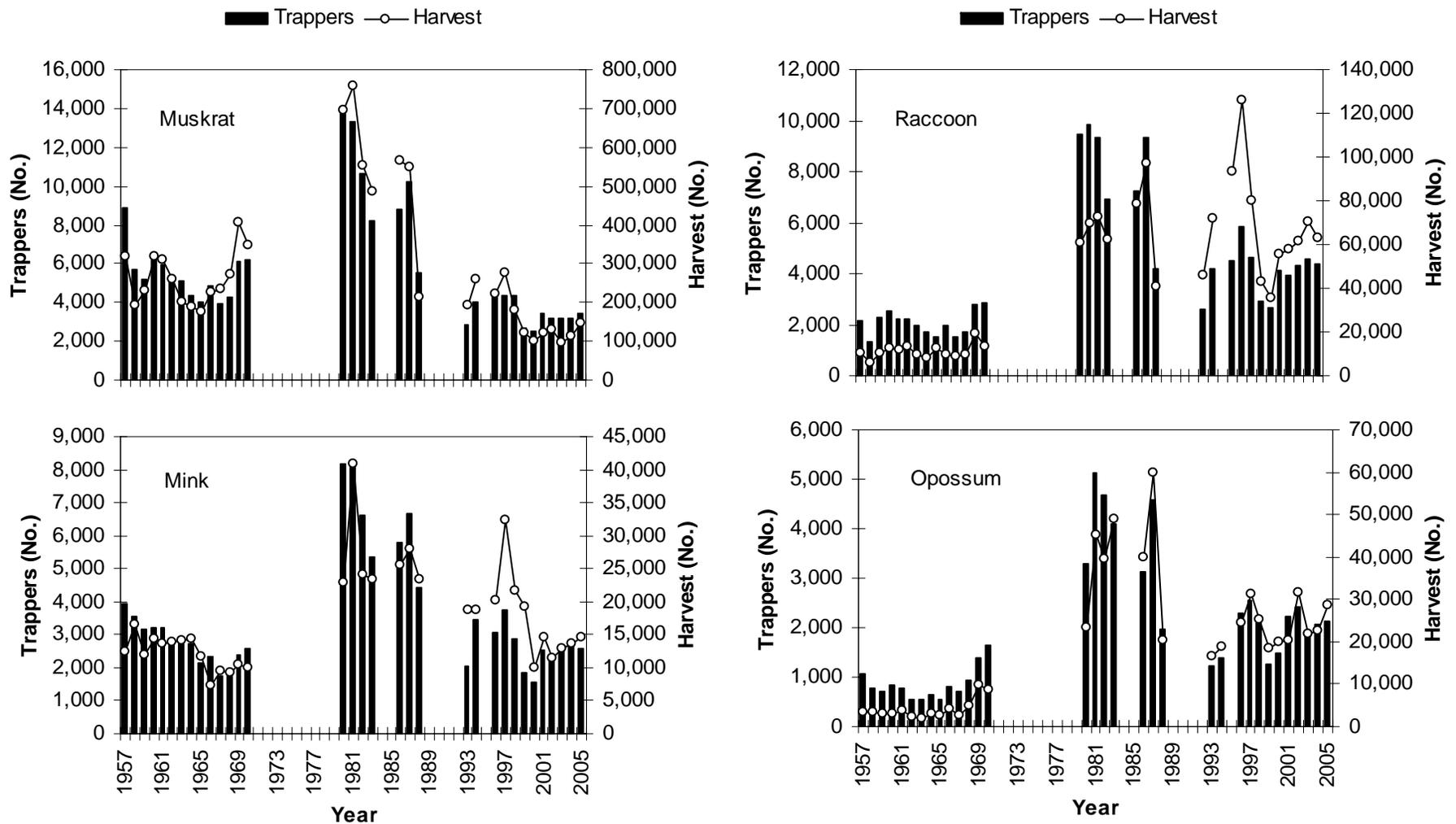


Figure 5. Estimated furbearer harvest by trappers and the number of trappers in Michigan estimated from mail harvest surveys, 1957-2005. Mail survey questionnaires were sent to a random sample of Trapping license buyers during 1957-1969. The sample also included Sportsman's license buyers in 1970-1972. During 1980-1983, the sample included Trapping and Senior Hunting license buyers. During 1986-2005, the sample was selected from people buying either Resident Fur Harvester, Senior Fur Harvester, Junior Fur Harvester, Military Fur Harvester, or Nonresident Fur Harvester licenses. The sample also included Senior Hunting license buyers during 1986-1988. Starting in 1996, samples also included people buying Resident Fur Harvester (trap only) and Junior Fur Harvester (trap only) licenses. Data were not available for all years.

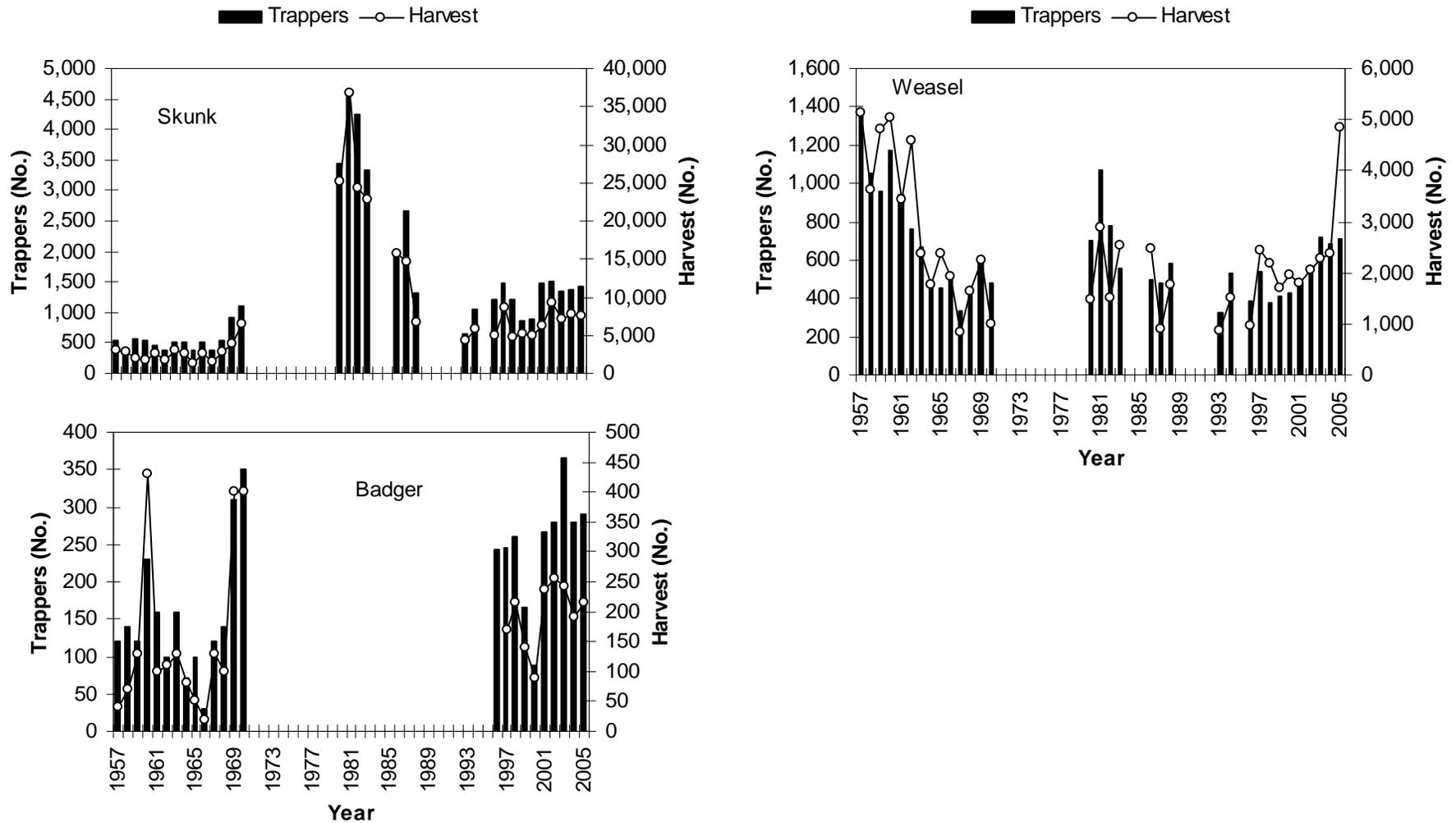


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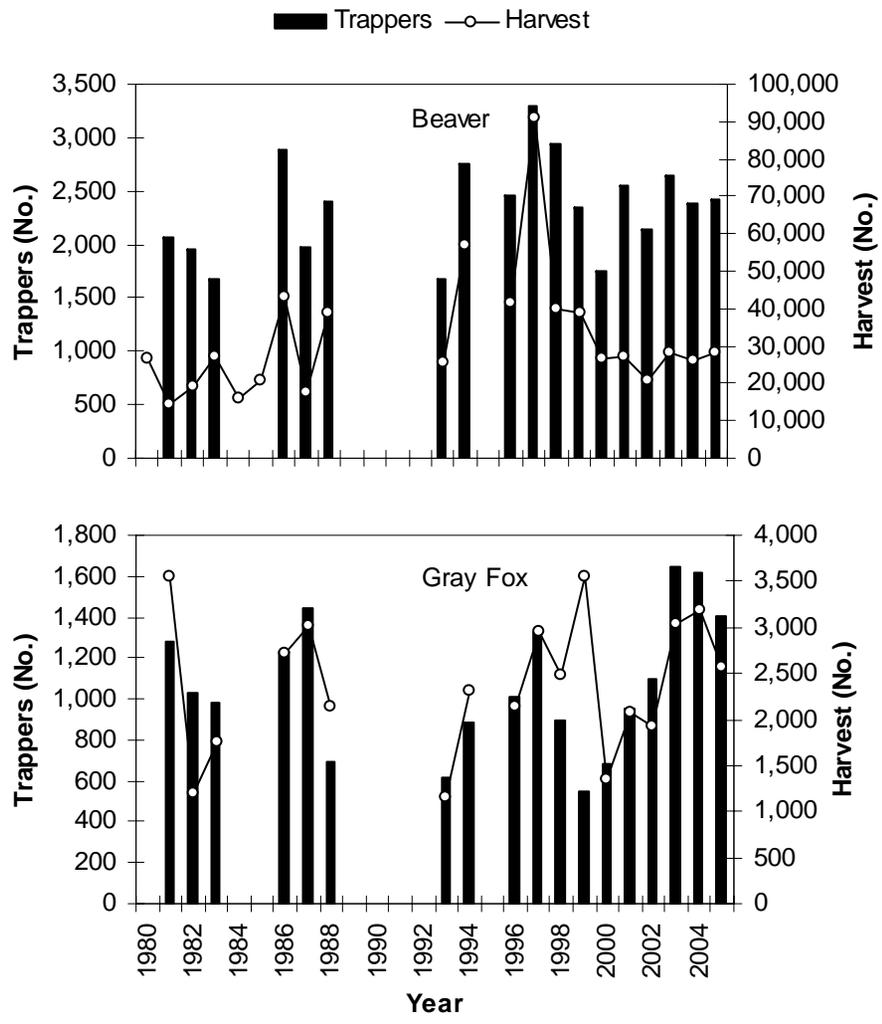
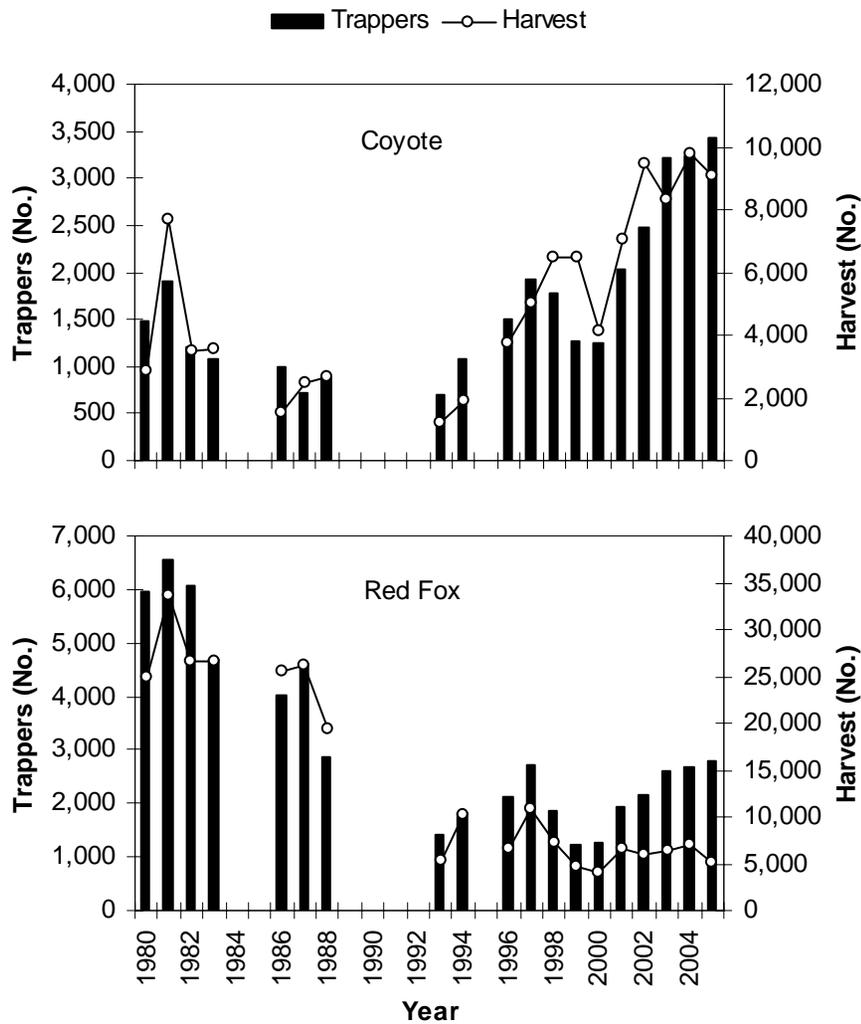


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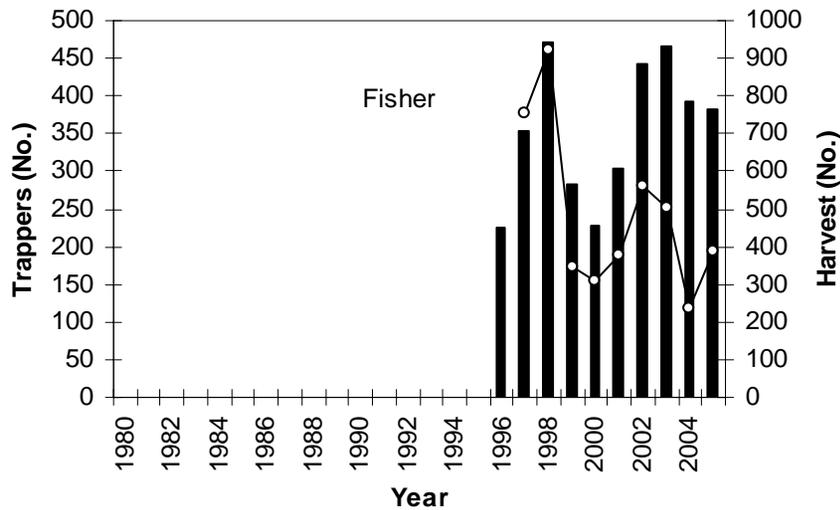
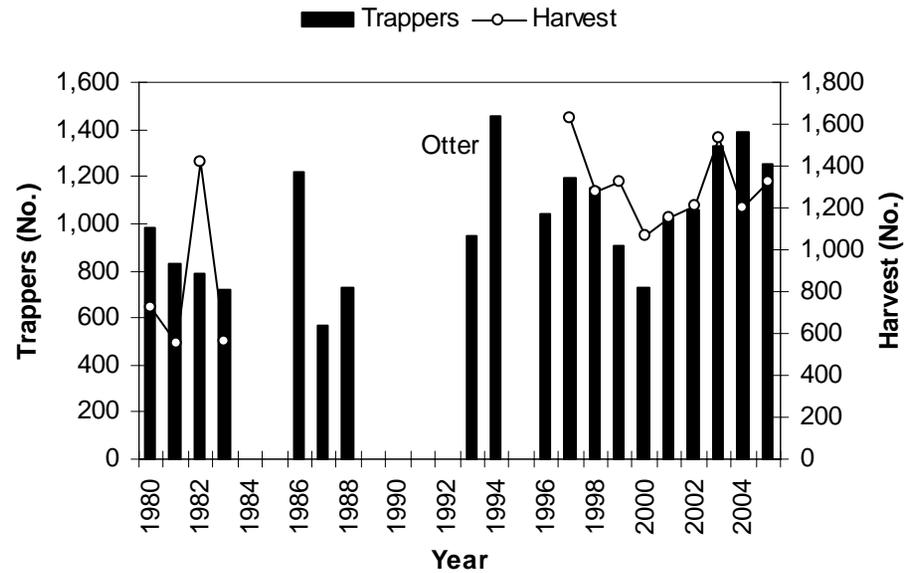
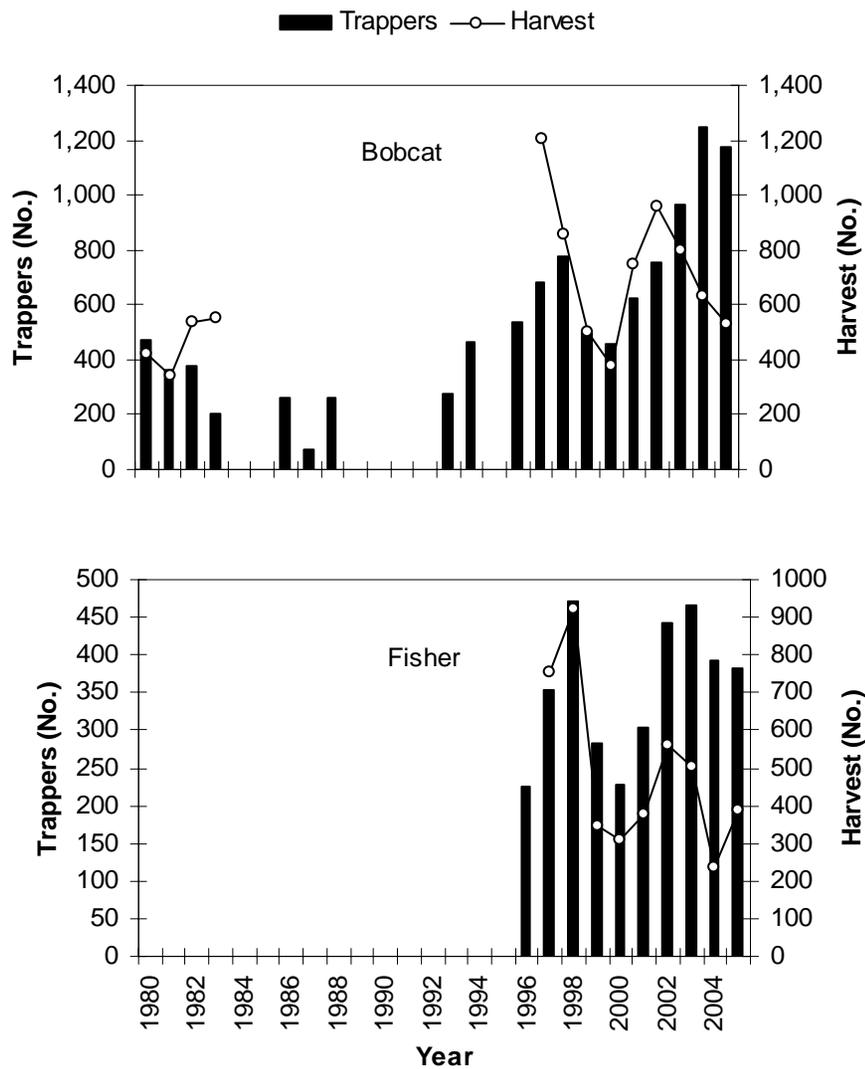


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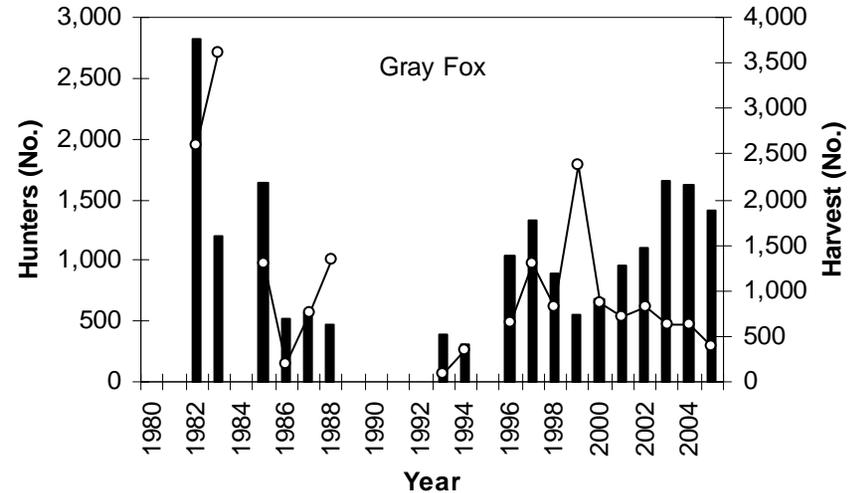
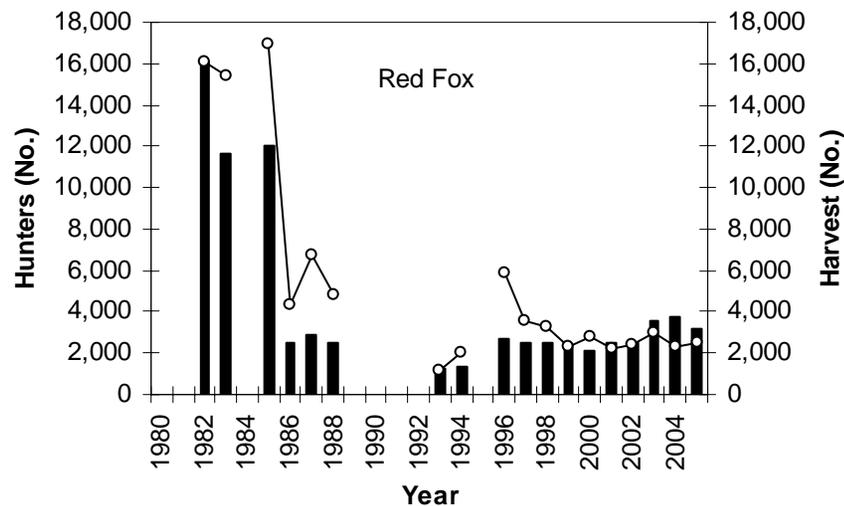
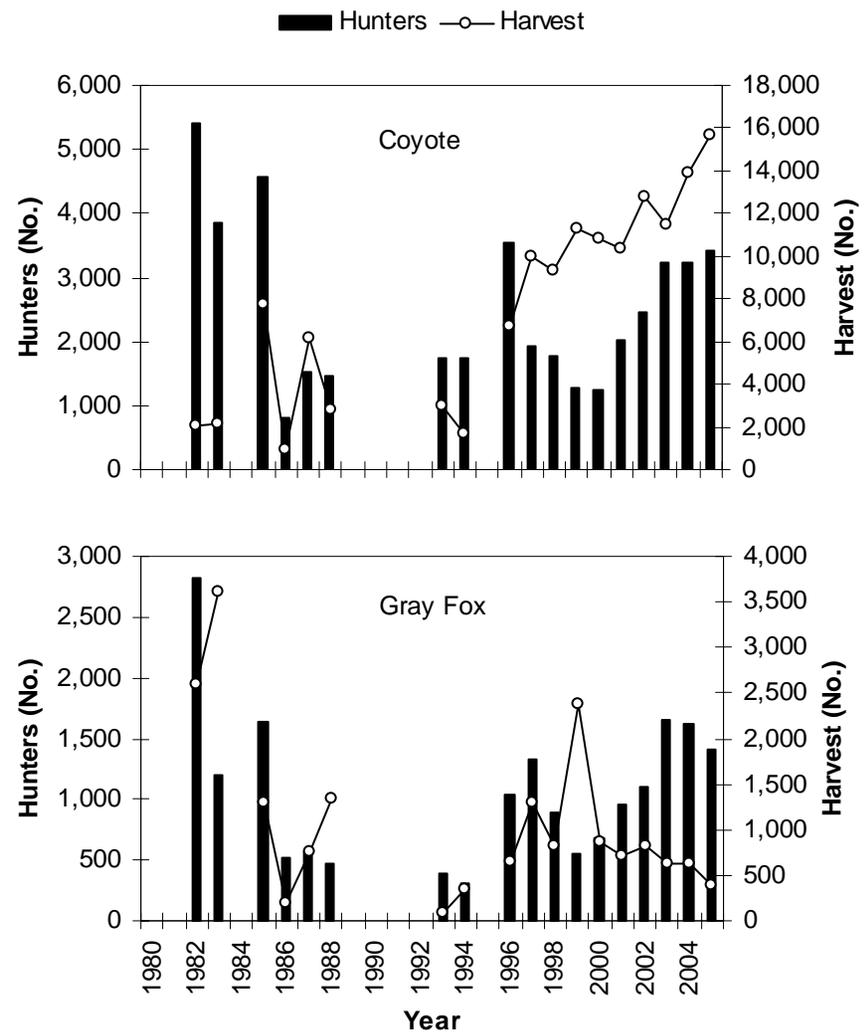
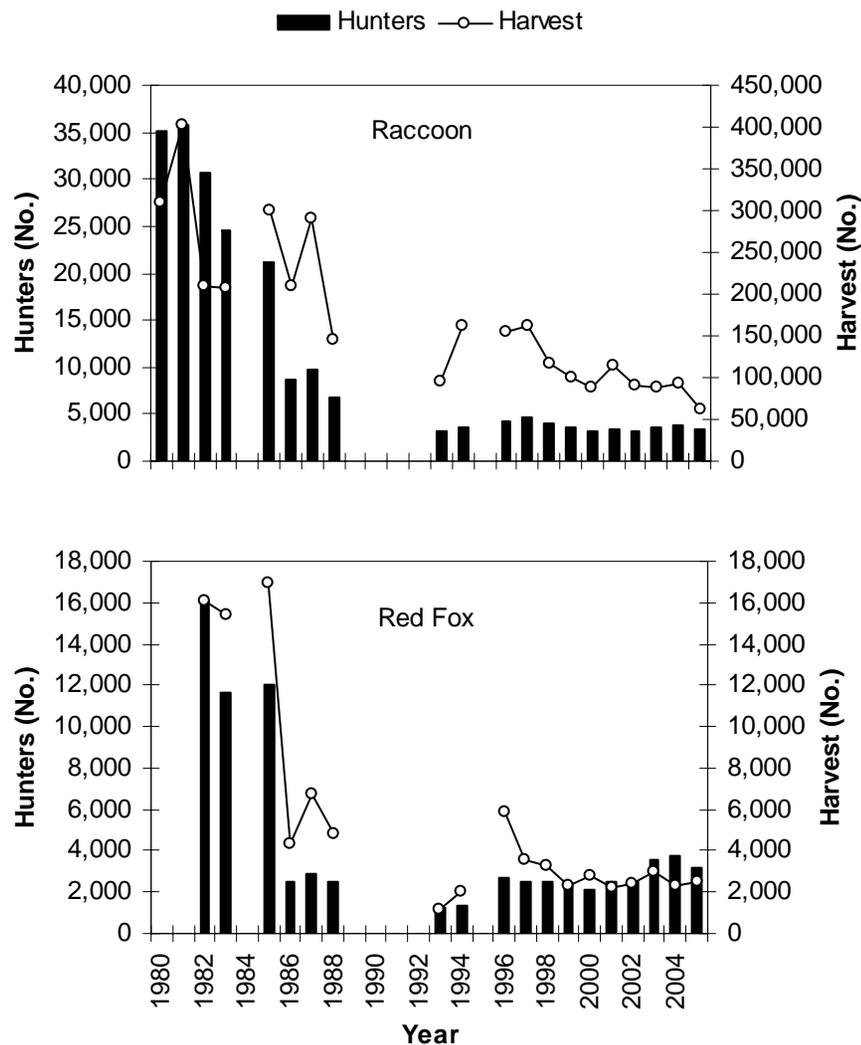


Figure 7. Estimated furbearer harvest by hunters and the number of hunters in Michigan estimated from mail harvest surveys, 1980-2005. The mail survey was sent to a random sample of people buying either small game licenses, Senior Hunting licenses, or Sportsman's licenses during 1980-1985. During 1986-2005, the sample was selected from people buying either Resident Fur Harvester, Senior Fur Harvester, Junior Fur Harvester, Military Fur Harvester, or Nonresident Fur Harvester licenses. The sample also included Senior Hunting license buyers during 1986-1988. Starting in 1996, samples also included people buying Resident Fur Harvester (trap only) and Junior Fur Harvester (trap only) licenses. Data were not available for all years.

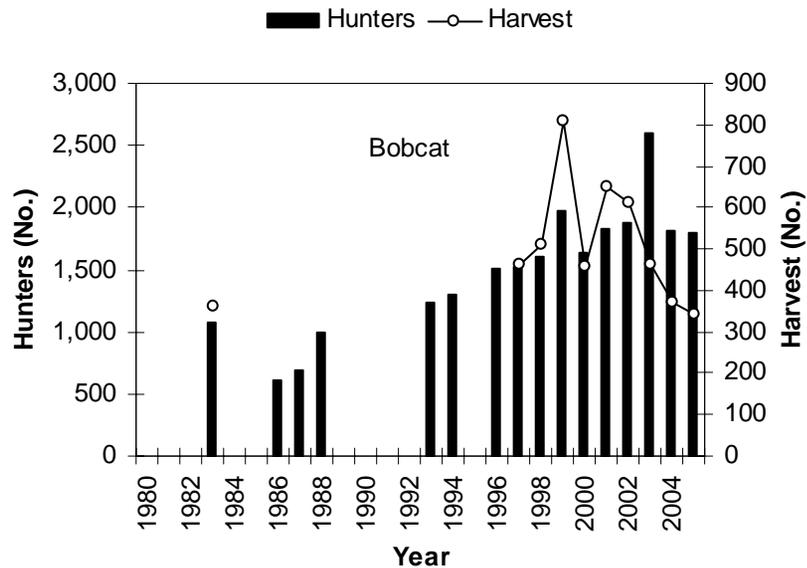


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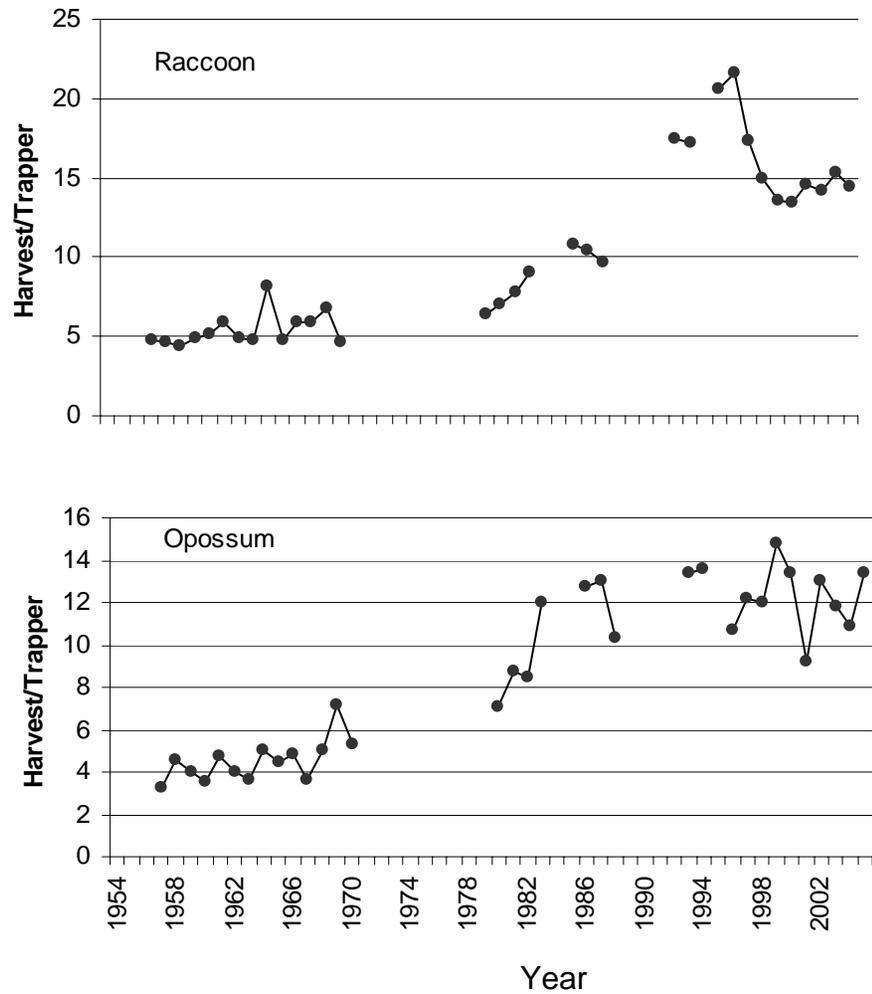
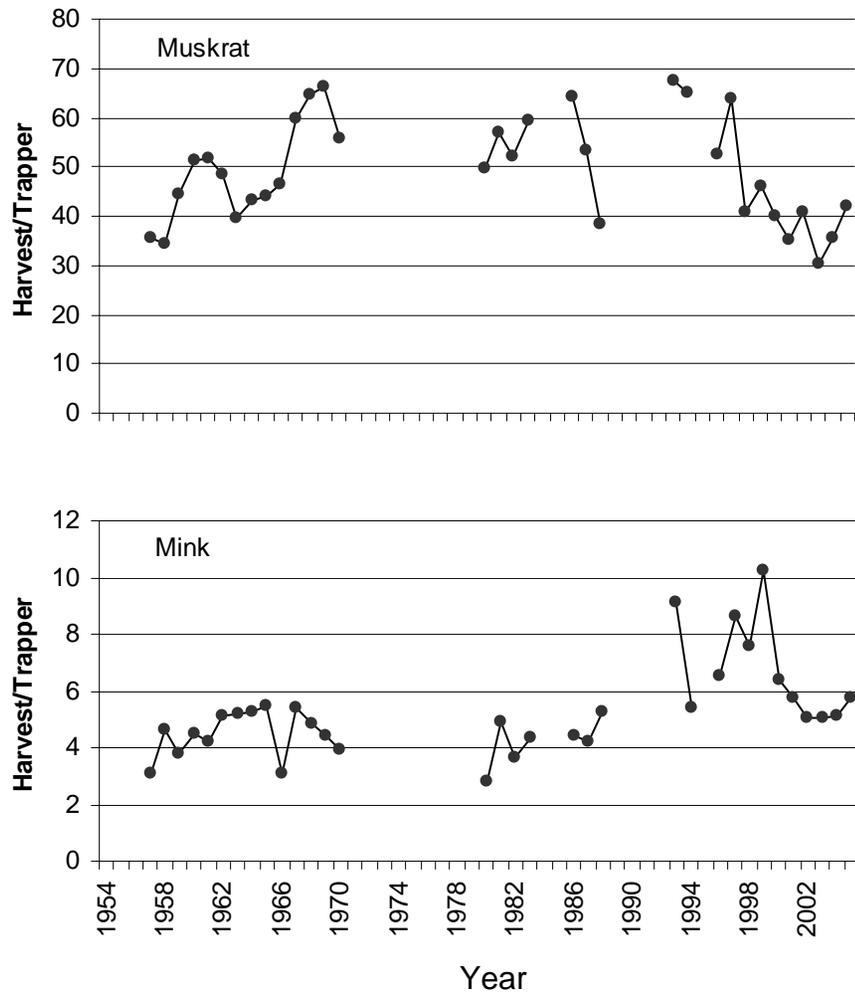


Figure 8. Estimated mean number of furbearers harvested annually by trappers in Michigan estimated from mail harvest surveys, 1954-2005. Data were not available for all years.

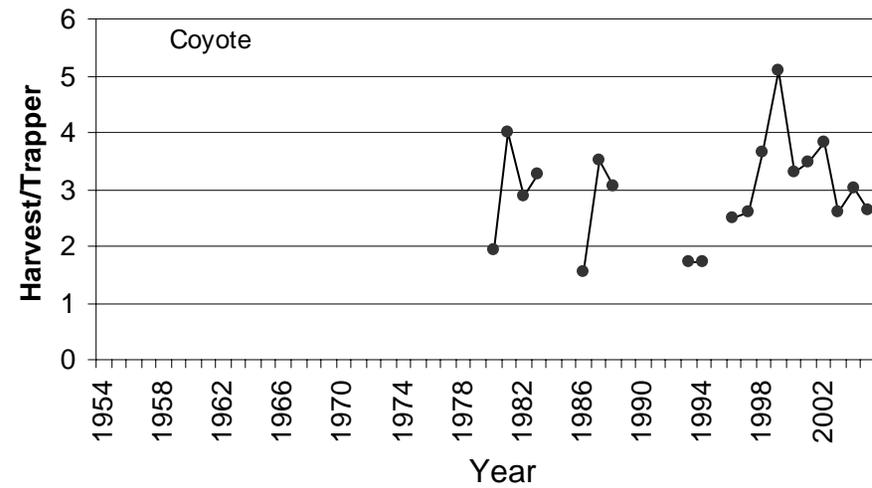
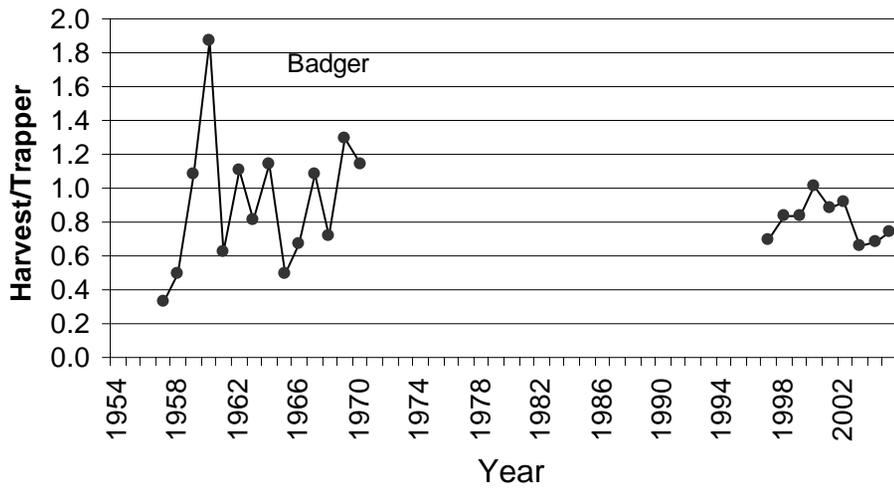
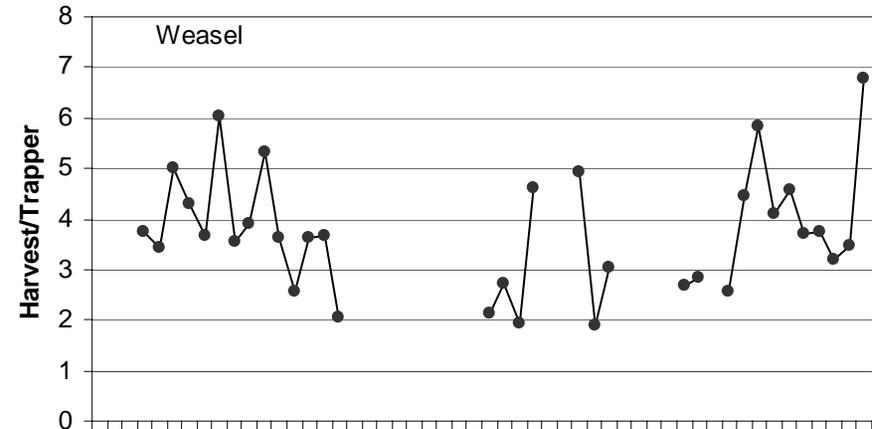
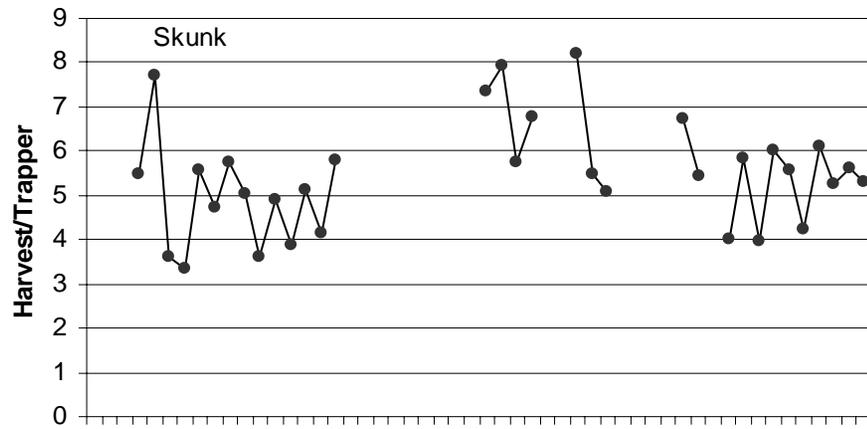


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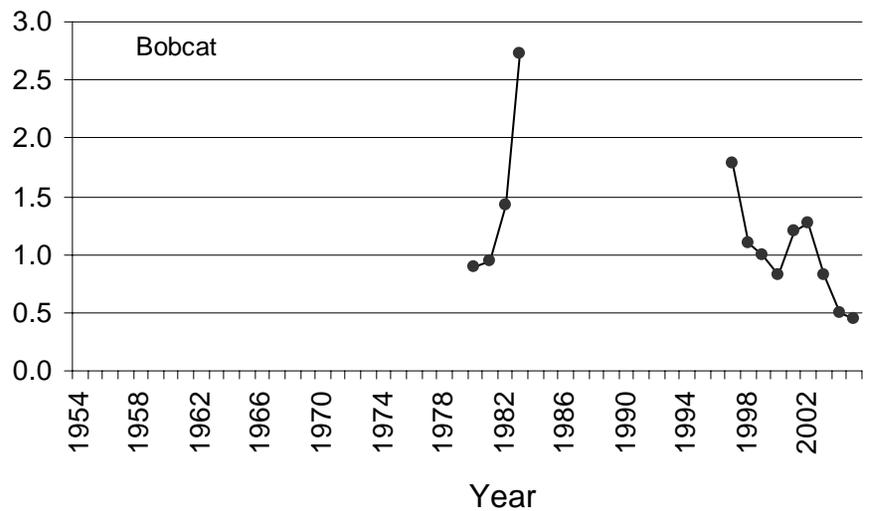
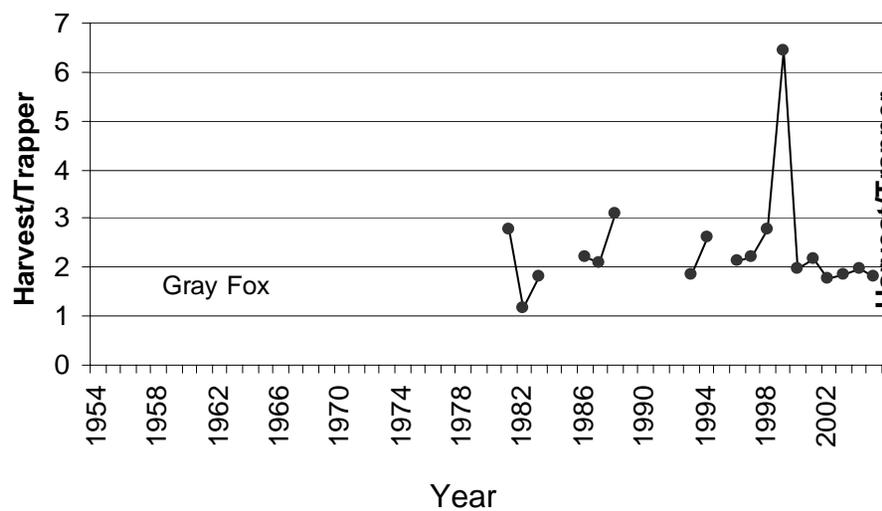
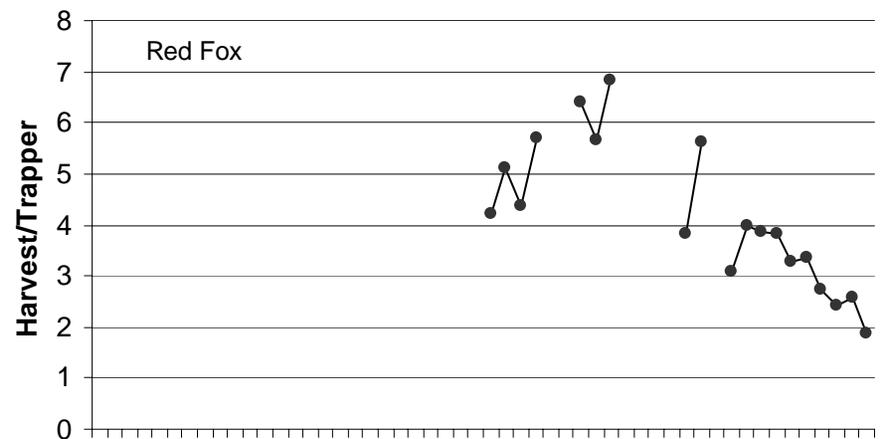
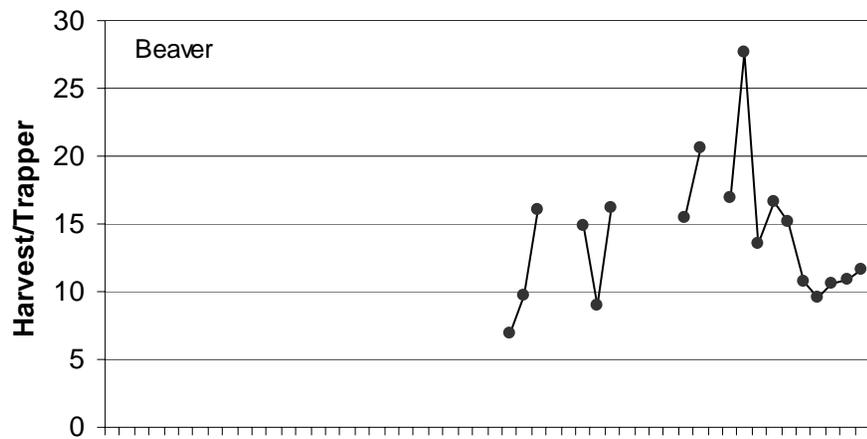


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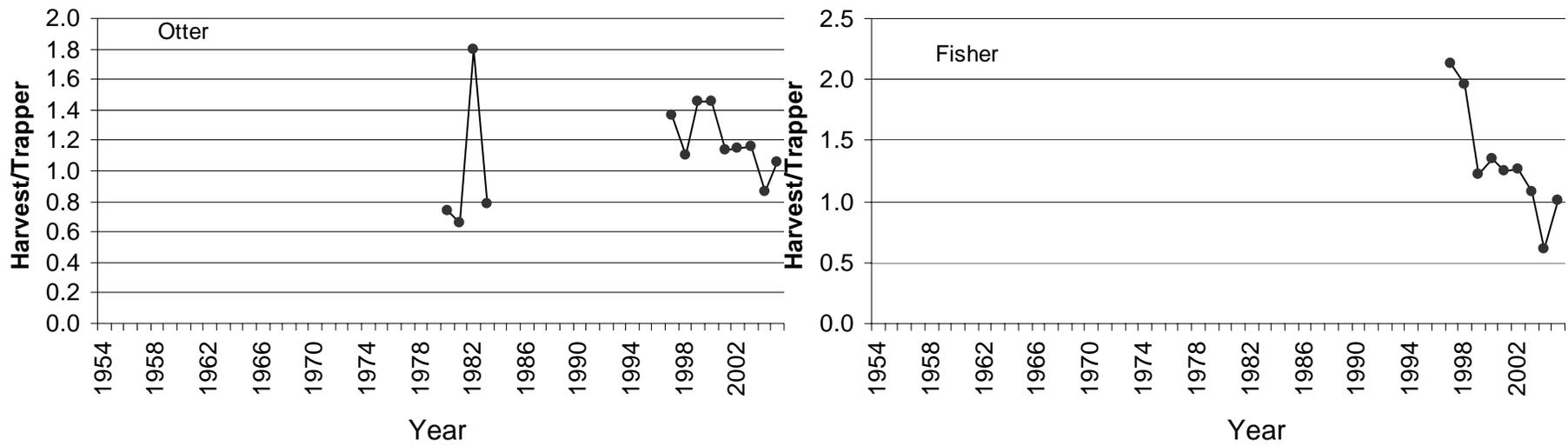


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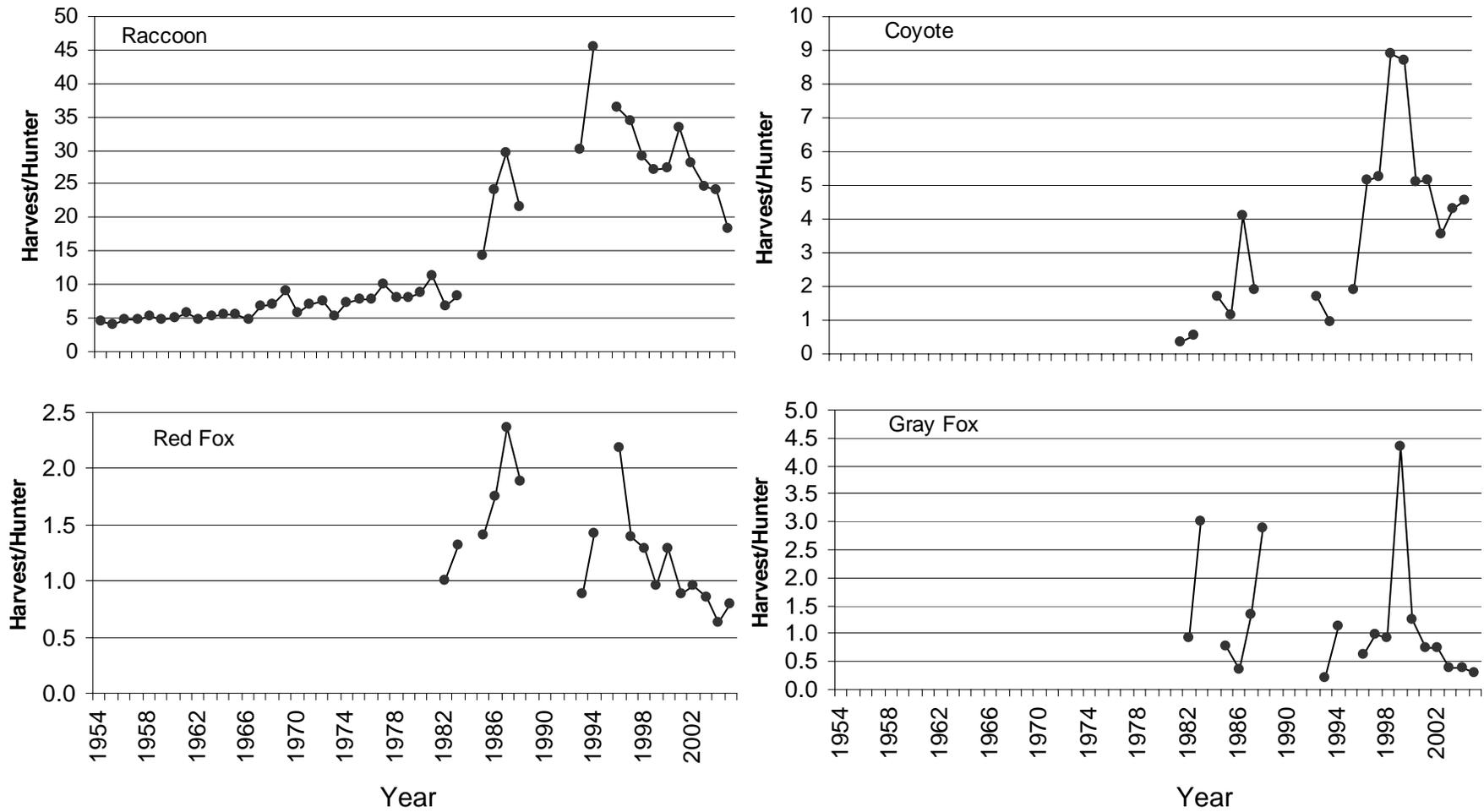


Figure 9. Estimated mean number of furbearers harvested annually by hunters in Michigan estimated from mail harvest surveys, 1954-2005. Data were not available for all years.

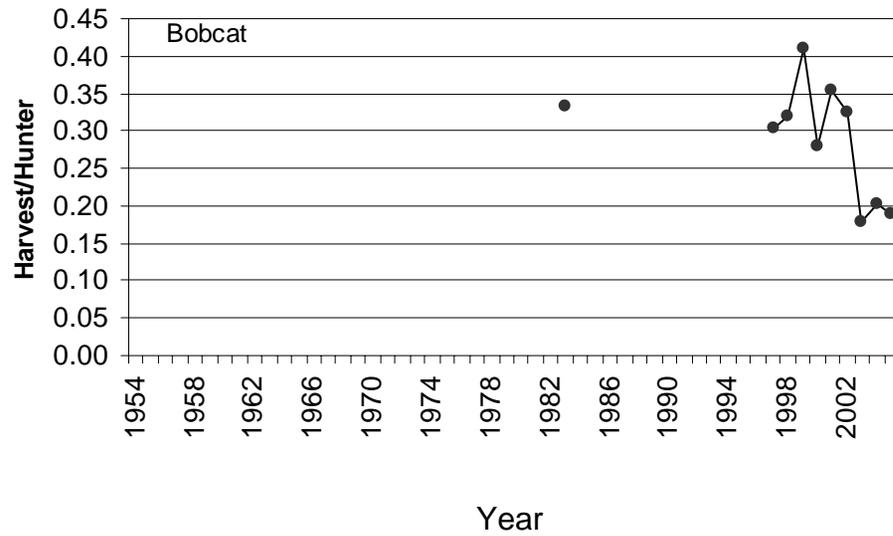


Figure 9 (continued). Estimated mean number of furbearers harvested annually by hunters in Michigan estimated from mail harvest surveys, 1954-2005. Data were not available for all years.

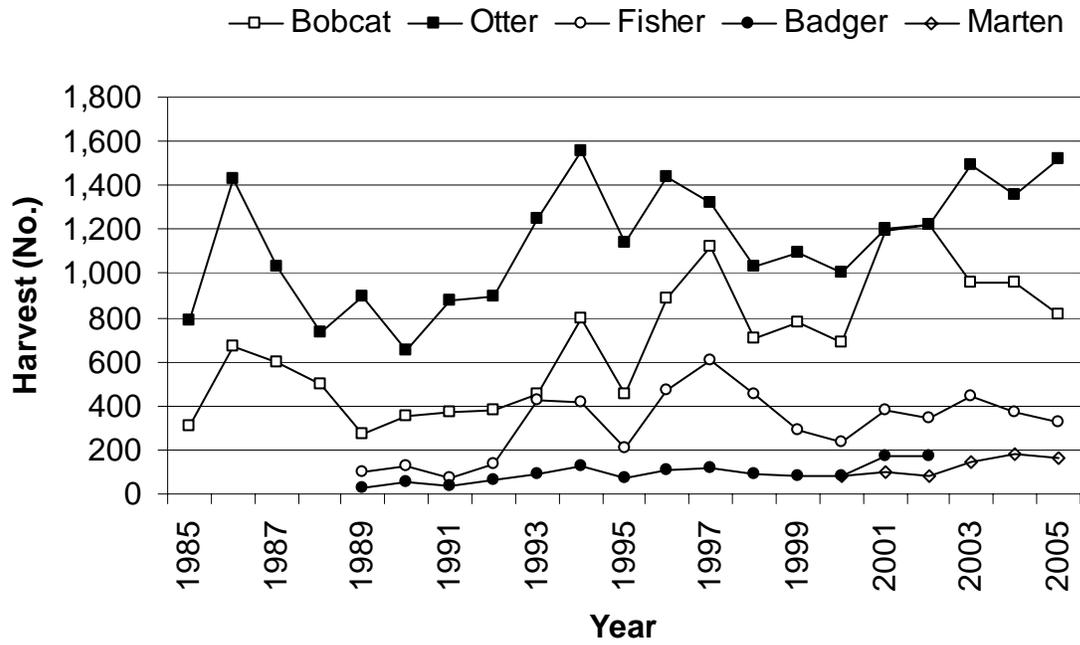


Figure 10. Number of bobcat, otter, fisher, badger, and marten registered by furtakers in Michigan, 1985-2005. Badger and fisher seasons were established in 1989, and marten season started in 2000. Totals for 2005 were preliminary. Beginning in 2003, badger were no longer registered.

Table 1. Trapping and hunting seasons when furbearing animals could be harvested in Michigan during 2005 seasons.^a

Season, species, and area	Season dates
Trapping seasons ^b	
Muskrat and Mink	
UP	October 25 – January 31
NLP	November 1 – January 31
SLP	November 10 – January 31
Raccoon	
UP and NLP	October 15 – January 31
SLP	November 1 – January 31
Fox and Coyote	
Statewide	October 15 – March 1
Bobcat	
UP	October 25 – March 1
Badger	
UP and NLP	October 15 – November 14
SLP	November 1 – March 1
Fisher and Marten	
UP	December 1 – 15
Beaver and Otter ^c	
UP	October 25 – April 15
NLP	November 1 – April 15
SLP	November 10 – March 31
Hunting seasons	
Bobcat	
UP	December 1 – March 1
NLP (northern portion)	January 1 – March 1
NLP (southern portion)	January 1 – February 1
Fox	
Statewide	October 15 – March 1
Raccoon	
Statewide	October 1 – January 31
Coyote	
Statewide ^d	July 15 – April 15

^aNo closed season for opossum, weasel, and skunk.

^bNonresidents may trap from November 15 through the regular season closing date, except for beaver. The opening date for nonresident beaver trapping varied by area.

^cResident seasons only.

^dSeason closed during firearm deer season (November 15-30) in the UP.

Table 2. Number of fur harvester licenses sold and people receiving and returning harvest questionnaire, 2001-2005.

Item	Year			
	2002	2003	2004	2005
Licenses sold	19,577	20,623	21,466	21,680
Individuals buying licenses ^a	19,386	20,405	21,228	21,406
Questionnaires mailed	3,100	8,000	4,000	3,998
Non-deliverable questionnaires	50	145	70	66
Questionnaires returned	2,282	5,575	2,879	2,637
Questionnaires returned (%) ^b	75	71	73	67

^aA person was counted only once, regardless of how many licenses they purchased. License types included Fur Harvester, Junior Fur Harvester, Senior Fur Harvester, Non-resident Fur Harvester, Military Fur Harvester, Resident Fur (trap only), and Junior Fur (trap only).

^bResponse rate adjusted to exclude non-deliverable questionnaires.

Table 3. Estimated number of fur harvester license buyers who trapped or hunted furbearers in Michigan, 2003-2005.

Activity	2003		2004		2005		Change (%)
	Estimate	95% CL	Estimate	95% CL	Estimate	95% CL	
Trapped							
Number	6,632	213	6,923	336	6,959	357	1
%	33	1	33	2	33	2	0
Hunted							
Number	9,534	228	10,071	360	9,333	379	-7
%	47	1	47	2	44	2	-4
Trapped or hunted ^a							
Number	13,068	220	13,638	347	13,234	372	-3
%	64	1	64	2	62	2	-2
Trapped only							
Number	3,534	171	3,567	267	3,902	295	9
%	17	1	17	1	18	1	1
Hunted only							
Number	6,436	212	6,716	335	6,275	348	-7
%	32	1	32	2	29	2	-2
Trapped and hunted							
Number	3,098	165	3,356	264	3,058	267	-9
%	15	1	16	1	14	1	-2

^aA person was counted only once, although they may have both trapped and hunted furbearers.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly (P<0.005).

Table 4. Estimated number of participants, harvest, and days afield during Michigan furbearer seasons, 2004 and 2005.

Species and season	Participants (No.)				Harvest (No.)				Days afield (No.)			
	Year		95% CL ^a	Change (%)	Year		95% CL ^a	Change (%)	Year		95% CL ^a	Change (%)
	2004	2005			2004	2005			2004	2005		
Trapping												
Mink	2,654	2,560	247	-4	13,572	14,660	3,507	8	71,749	70,944	9,790	-1
Raccoon	4,553	4,362	307	-4	70,055	63,117	10,217	-10	121,290	117,469	12,362	-3
Opossum	2,074	2,133	226	3	22,499	28,626	6,307	27	59,998	64,879	9,804	8
Skunk	1,374	1,413	188	3	7,704	7,476	2,212	-3	43,203	45,482	8,916	5
Weasel	687	714	134	4	2,386	4,835	2,201	103	19,339	23,578	5,892	22
Red fox	2,693	2,796	256	4	6,940	5,192	1,331	-25	75,523	71,645	9,360	-5
Gray fox	1,621	1,404	188	-13	3,183	2,567	666	-19	44,180	39,856	7,476	-10
Coyote	3,241	3,430	278	6	9,796	9,086	1,942	-7	95,454	93,249	11,003	-2
Bobcat ^b	1,249	1,177	37	-6	630	528	35	-16	29,567	26,884	1,506	-9
Beaver	2,382	2,417	237	1	26,058	28,049	5,802	8	59,402	59,630	9,432	0
Muskrat	3,144	3,472	281	10	111,392	146,301	40,966	31	80,293	92,967	11,193	16
Otter ^c	1,389	1,256	174	-10	1,200	1,327	262	11	35,158	35,684	7,935	1
Fisher ^c	392	383	98	-2	237	387	152	63	4,213	3,829	1,170	-9
Badger	280	290	88	4	191	214	77	12	4,583	5,890	2,428	29
Hunting												
Raccoon	3,825	3,384	277	-12	91,827	62,376	11,335	-32*	75,292	65,929	9,125	-12
Red fox	3,713	3,213	270	-13	2,311	2,534	644	10	47,572	45,003	6,922	-5
Gray fox	1,853	1,491	194	-20	622	398	157	-36	24,874	18,409	4,147	-26
Coyote	7,583	7,205	360	-5	13,859	15,650	8,938	13	99,556	96,325	9,843	-3
Bobcat ^b	1,816	1,802	39	-1	369	340	25	-8	20,768	20,374	879	-2
Trapping and hunting combined												
Raccoon	7,101	6,733	355	-5	161,883	125,494	15,591	-22	196,582	183,398	15,860	-7
Red fox	5,512	5,275	328	-4	9,251	7,726	1,505	-16*	123,095	116,648	12,192	-5
Gray fox	3,042	2,636	250	-13	3,805	2,965	692	-22	69,054	58,265	8,695	-16
Coyote	9,201	9,084	377	-1	23,656	24,736	9,169	5	195,010	189,573	15,382	-3
Bobcat ^b	2,726	2,677	34	-2	999	868	41	-13	50,335	47,259	1,681	-6

^a95% CL for the 2005 estimate.

^bEstimates from separate mail harvest survey (Frawley et al. 2006). See Table 5 for the number of animals registered.

^cEstimates from mail harvest survey. See Table 5 for the number of animals registered.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly (P<0.005).

Table 5. Number of bobcat, otter, fisher, badger and marten registered by furtakers in Michigan, 1985-2005.

Year	Species							
	Bobcat (by method of capture)				Otter	Fisher ^a	Badger ^{a,b}	Marten ^c
	Hunting	Trapping	Unknown	Total				
1985	193	100	14	307	791			
1986	268	390	11	669	1,431			
1987	315	277	5	597	1,030			
1988	327	170	0	497	731			
1989	178	91	0	269	896	99	28	
1990	266	85	0	351	654	125	52	
1991	292	79	0	371	878	68	35	
1992	276	104	0	380	896	140	63	
1993	285	163	0	448	1,251	425	90	
1994	373	422	0	795	1,552	417	124	
1995	311	138	1	450	1,137	208	75	
1996	463	420	0	883	1,438	471	109	
1997	347	771	0	1,118	1,323	609	117	
1998	331	375	0	706	1,028	455	91	
1999	434	343	0	777	1,097	291	82	
2000	379	307	0	686	1,006	236	85	85
2001	464	728	0	1,192	1,203	381	174	97
2002	482	741	0	1,223	1,219	348	173	85
2003	340	621	0	961	1,496	442		149
2004	321	637	0	958	1,358	368		184
2005 ^d	309	507	0	816	1,519	322		164

^aBadger and fisher seasons were established in 1989.

^bFurtakers no longer were required to register badgers beginning in 2003.

^cMarten season was established in 2000.

^dPreliminary totals.

Table 6. Estimated coyote and fox trappers using foothold traps or snares to capture coyote and fox in Michigan during the 2005 season.

Type of trap used	Furtakers		Proportion of coyote and fox trappers	
	No.	95% CL	%	95% CL
Foothold traps	3,270	275	91	3
Snares	1,046	165	29	4
Either foothold traps or snares	3,596	285	100	0
Foothold traps only	2,550	247	71	4
Snares only	325	94	9	3
Both foothold traps and snares	720	138	20	3

Table 7. Estimated number of trappers using foothold traps and snares to catch coyote and fox, trapping effort, mean number of traps set per day, number of animals captured, and number of animals escaping from traps in Michigan during 2005 season.

Type of trapper	Trappers		Trapping effort (day)		Traps set per day		Animals caught		Animals that escaped	
	No.	95% CL	No.	95% CL	Mean	95% CL	No.	95% CL	No.	95% CL
Using foothold traps to catch coyote	2,913	262	70,147	8,709	10.0	1.5	8,853	2,339	2,999	1,028
Using foothold traps to catch fox	2,569	248	59,530	7,865	9.5	1.2	7,407	1,994	1,266	450
Using snares to catch coyote	1,005	162	22,454	4,584	11.3	2.1	2,117	621	1,531	525
Using snares to catch fox	556	121	12,656	3,591	8.4	1.9	583	320	509	295