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2015 OTTER AND BEAVER HARVEST SURVEY

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ABSTRACT

A survey was completed to determine the number of otter harvest tag holders that set traps for otter and beaver, the number of animals caught, the types of traps used, and the number of days they trapped. In 2015, 5,236 furtakers obtained a harvest tag to take otter, which was nearly unchanged from last year (5,256 trappers in 2014). About 18% of the tag holders set traps for otter (965 trappers) and 33% set traps for beaver (1,715). Trappers that targeted otter spent nearly 20,403 days trapping otter (\bar{x} = 21 days/trapper), captured 825 otter (included animals released alive), and registered 765 otter. An additional 220 otter were registered by trappers that were not targeting otter. The total number of otter registered by all trappers combined did not significantly change between 2014 and 2015. About 52% of trappers targeting otter captured at least one otter. The number of trappers that attempted to catch otter and their trapping effort (days afield) were not significantly different between 2014 and 2015. The mean number of days of effort per registered otter in 2014 (26.7 days) was not significantly different from 2014 (24.1 days). Beaver trappers spent 38,283 days trapping beaver (\bar{x} = 22 days/trapper) and captured 15,068 beaver. About 86% of active beaver trappers captured at least one beaver. The number of people trapping beavers and the number of days these trappers spent trapping were not significantly different between 2014 and 2015. In addition, the number of beaver harvested did not change significantly between 2014 and 2015.



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INTRODUCTION

The Michigan Natural Resources Commission and the 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 a management tool used to help accomplish this statutory responsibility. The main objectives of this harvest survey were to determine the number of trappers who set traps for otter (*Lontra canadensis*), the types of traps used, the number of days they trapped, and the number of animals captured. Because otter trappers frequently seek to catch beaver (*Castor canadensis*), they also were asked whether they attempted to trap beaver. If they trapped beaver, they were asked to report the number of days they trapped and the number of beaver caught.

While the primary objectives of this survey were estimating harvest, trapper numbers, and trapping 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 snares in open water for beaver and how often trappers attempted to capture beaver during April.

In 2015, the state was divided into three management zones (Figure 1), and the otter and beaver trapping seasons were different for each zone (Table 1). Seasons also differed for residents and nonresidents of Michigan. Nonresidents were not permitted to harvest otter. Resident trappers were required to obtain a free otter harvest tag in addition to a fur harvesters license to trap otter. Resident and nonresident beaver trappers were required to purchase a fur harvesters license but did not need a harvest tag. Trappers were limited to three otter, except no more than two otter could be taken in Zone 2 and one otter from Zone 3. No maximum limit was set for the number of beaver that could be harvested. Successful trappers were required to register all otter taken by May 4, 2016, but trappers were not required to register beaver. Trappers were not allowed to keep otters that were beyond the legal limit of otters per person and otters taken outside the area open for harvest (incidental catches). However, trappers were required to bring these incidentally caught otter to a registration station if they could not be released alive. Trappers could use body-gripping (conibear type) traps and foothold traps to capture otter and beaver. In addition, snares could be set in the water or under ice to take beaver. Snares had to be made of 1/16-inch or larger cable. If a snare was not set under ice, at least half of the snare had to be under water, and it had to be set so it would hold a captured beaver completely under the water.

METHODS

A questionnaire (Appendix A) was sent to everyone who obtained an otter harvest tag in 2015 (5,236 harvest tag holders). Trappers receiving the questionnaire were asked to report if they trapped otter or beaver, number of days spent afield, number of otter and beaver caught, number of otter released alive, and number of otter registered (registration estimates included incidentally caught animals that were not returned to the trapper). Trappers were also asked to indicate their impression of the status of the otter and beaver populations in the county where they primarily trapped (i.e., absent, stable, increasing, or decreasing).

Questionnaires were mailed initially during early May 2016, and nonrespondents were mailed

up to two follow-up questionnaires. Although 5,236 people were sent the questionnaire, 215 surveys were undeliverable, resulting in an adjusted sample size of 5,021. Questionnaires were returned by 2,546 people, yielding a 51% adjusted response rate.

Although all harvest tag holders were sent a questionnaire, not all questionnaires were returned. To extrapolate from the tag holders that returned their questionnaire to all people obtaining harvest tags, estimates were calculated using a simple random sampling design (Cochran 1977) and were presented along with their 95% confidence limit (CL). This CL 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. Estimates were not adjusted for possible response or nonresponse bias. The estimate of otter registered included incidental animals that trappers were not allowed to keep (i.e., harvest exceeding the bag limit); however, it did not include animals taken by trappers as part of a nuisance control business or harvest by tribal members.

Furtakers trapping beaver were not required to obtain an otter harvest tag; thus, estimates associated with beaver trapping do not include all furtaker participation, effort, or harvest. Rather, these estimates only represent the participation, effort, or harvest of trappers that obtained an otter harvest tag.

Statistical tests are used routinely to determine the likelihood the 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 ($P < 0.005$), if the study had been repeated (Payton et al. 2003).

RESULTS AND DISCUSSION

Otter

In 2015, 5,236 trappers obtained harvest tags to trap otter, which was nearly unchanged from the previous year (5,256 trappers in 2014). In 2015, most of the harvest tags (5,040) were obtained by men. Harvest tags were obtained by 195 women, and the sex of 1 tag holder was unknown. About 18% of the otter tag holders set traps targeting otter (965 trappers, Table 2). These trappers spent 20,403 days trapping otter ($\bar{x} = 21.2 \pm 1.4$ days/trapper), captured 825 otter, and registered 765 otter (Table 3). About 52% of trappers successfully captured at least one otter.

The estimated number of otter registered by trappers that targeted otter did not significantly change between 2014 and 2015 (827 versus 765 otter, Table 3). An additional 220 otter were registered by trappers that were not targeting otter. The estimated total number of otter registered by all did not significantly change between 2014 and 2015 (1,037 versus 985 otter, Table 3). Among the management zones, the largest number of otters was taken in the Upper Peninsula Zone (Table 4). Among counties, Mecosta (56), Marquette (56), Chippewa (51), and Iron (47) counties had the highest harvest estimates (Table 5).

The actual number of otter registered (including incidental take but excluding harvest by tribal members) by trappers at registration stations did not significantly change between 2014 and 2015 (841 versus 867 otter, Figure 2). In addition, the number of trappers that attempted to catch otter and their effort was not significantly different (Table 3, Figure 2). Among trappers targeting otter, the mean number of days of effort per registered otter was 26.7 days in 2015, which was not significantly different than the 24.1 days in 2014 (Tables 3 and 6, Figure 3).

The number of otter registered in 2015 was 2% below the long-term yearly average since 1950 (\bar{x} = 885 during 1950-2015, Figure 4). Changes in otter harvest during recent years have generally tracked changes in trapping effort (Figure 2) and changes in otter pelt prices (Figures 5 and 6). Effort per registered otter was not significantly different between 2014 and 2015, the 2015 estimate was near the average during 1997-2015 (Figure 3); suggesting otter numbers were stable statewide (Figure 3).

The number of otter registered was correlated with the mean value of otter pelts during 1989-2015 (Pearson product moment correlation coefficient [r] = 0.80, probability of obtaining this result [P] < 0.01) (Figure 6). The correlation between mean days of effort per registered otter and pelt prices during 1997-2015 (r = 0.73, P < 0.01) was also significant.

Most otter trappers used conibear-type traps to capture otter ($93 \pm 2\%$), although foothold traps also were used frequently ($36 \pm 3\%$). Among trappers using conibear traps, the mean number of conibear traps set was 4.5 ± 0.3 traps. Among trappers using foothold traps, the mean number of foothold traps set was 3.9 ± 0.5 traps.

Thirty percent of otter trappers ($\pm 3\%$) believed otter numbers were increasing in the county where they trapped most often, while $56 \pm 3\%$ thought otter numbers were stable, $7 \pm 2\%$ thought otter were declining, $3 \pm 1\%$ indicated otter were not present, and $4 \pm 1\%$ did not comment on the status of otter.

Beaver

Furtakers trapping beaver were not required to obtain an otter harvest tag; thus, estimates associated with beaver trapping did not include all furtaker participation, effort, or harvest. Rather, these estimates only represent the participation, effort, or harvest of trappers that obtained an otter harvest tag. Furthermore, trappers taking beaver as part of a nuisance control business were asked to exclude nuisance animals from their reported harvest on annual harvest surveys beginning in 2003. Thus, estimates associated with beaver may not be directly comparable among all years.

About 33% of the otter harvest tag holders set traps for beaver (1,715 trappers, Table 2). Trappers spent 38,283 days trapping (22.3 ± 1.2 days/trapper) and captured 15,068 beaver, which was not significantly different from the number of beavers captured in 2014 (Table 7). About 86% of active trappers successfully captured at least one beaver. Among the management zones, the largest number of beaver was taken in the Upper Peninsula Zone (Table 8). Among counties, Chippewa (1,076), Marquette (1,030), and Ontonagon (821) counties had the highest harvest estimates (Table 9).

The number of people trapping beavers and the number of days spent afield were not significantly different between 2014 and 2015 (Table 7). In addition, the number of beaver harvested did not change significantly between 2014 and 2015 (Table 7, Figure 7).

Most beaver trappers used conibear-type traps to capture beaver ($91 \pm 1\%$), although $59 \pm 2\%$ of trappers used foothold traps and $9 \pm 1\%$ used snares. Among trappers using conibear traps, the mean number of conibear traps set was 6.6 ± 0.4 traps. Among trappers using foothold traps, the mean number of foothold traps set was 5.0 ± 0.4 traps, and among trappers using snares, the mean number of snares set was 5.0 ± 0.8 .

Thirty-three percent of beaver trappers ($\pm 2\%$) believed beaver numbers were increasing in the county where they trapped most often, while $51 \pm 2\%$ thought beaver numbers were stable, $13 \pm 2\%$ thought they were declining, and about 4% of trappers either indicated beaver were absent in the area they trapped or did not comment on the status of beaver.

An estimated 101 trappers caught 142 beaver with snares in open water during the 2015 season (Table 7). About 469 trappers caught 3,918 beaver during April 2015. Beaver harvested with snares in open water and taken during April represented about 1% and 26% of the estimated total beaver harvest, respectively. Among trappers that set traps for beaver, $13 \pm 2\%$ caught otter in their beaver sets. These trappers caught 358 ± 54 otter.

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Table 1. Otter and beaver trapping seasons in Michigan, 2015.

Zone	Season	
	Resident	Nonresident ^a
1	October 25 – April 16 ^b	November 15 – April 16
2	November 1 – April 16	November 24 – April 16
3	November 10 – March 31	December 15 – March 31

^aNonresident season applies to beaver only because nonresidents were not permitted to harvest otter.

^bThe season extended through April 30, 2016, in Zone 1 on designated trout streams for residents.

Table 2. Estimated number of otter harvest tag holders that attempted to trap otter or beaver in Michigan during 2015 season.

Harvest tag holders	%	95% CL ^a	Total	95% CL ^a
Trapped only for otter	4	1	220	29
Trapped only for beaver	19	1	971	57
Trapped for both otter and beaver	14	1	744	51
Trapped for either otter or beaver	37	1	1,935	70
Trapped for otter ^b	18	1	965	57
Trapped for beaver ^c	33	1	1,715	68

^a95% confidence limits.

^bSum of trappers that trapped only otter and trappers that trapped both otter and beaver.

^cSum of trappers that trapped only beaver and trappers that trapped both otter and beaver.

Table 3. Estimated number of otter trappers, their trapping effort (days), number of otter captured, mean days required to harvest an otter, and trapping success in Michigan during 2013-2015. Estimates presented separately for trappers targeting otter and for trappers that were not targeting otter.

Variable	Year						Change ^a (%)
	2013		2014		2015		
	Estimate	95% CL	Estimate	95% CL	Estimate	95% CL	
Among trappers targeting otter							
Trappers (No)	1,030	53	1,066	60	965	57	-10
Effort (Days)	19,504	1,506	19,890	1,729	20,403	1,804	3
Otters captured (No.)	820	73	878	83	825	80	-6
Otters released alive (No.)	52	18	51	21	60	21	17
Otters registered (No.)	768	67	827	77	765	73	-7
Trappers that captured an otter (%)	49%	3%	52%	3%	53	3	0
Trappers that released an otter (%)	3%	1%	3%	1%	4	1	1
Trappers that registered an otter (%)	49%	3%	52%	3%	52	3	0
Mean days required to harvest an otter	25.4	2.2	24.1	2.3	26.7	2.5	11
Among trappers that did not target otter							
Trappers (No.)	122	20	144	25	146	24	1
Otters captured (No.)	182	39	229	49	241	45	5
Otters registered (No.)	162	33	210	41	220	43	5
Among all trappers^b							
Trappers (No.)	1,141	55	1,187	63	1,100	59	-7
Otters captured (No.)	1,001	82	1,107	97	1,065	92	-4
Otters registered (No.)	930	73	1,037	87	985	84	-5
Mean days required to harvest an otter	21.0	1.8	19.2	1.8	20.7	1.9	8

^aThe change between 2014 and 2015 for proportion of trappers catching otters and registering otters is reported as the difference between years rather than the proportional change.

^bTotals among all trappers may equal to sum of trappers targeting otter and trappers that did not target otter because of rounding error.

*P<0.005.

Table 4. Estimated number of trappers, trapping effort, otter captured, otter released alive, otter registered, and success among otter trappers during the 2015 Michigan trapping season, summarized by area.

Area	Trappers		Trapping effort (days)		Otter captured ^a		Otter released alive		Otter registered ^b		Trapper success	
	Total	95% CL ^c	Total	95% CL ^c	Total	95% CL ^c	Total	95% CL ^c	Total	95% CL ^c	%	95% CL ^c
		CL ^c		CL ^c		CL ^c		CL ^c		CL ^c		
Among trappers targeting otter												
Upper Peninsula	341	36	7,367	1,136	339	57	27	16	313	52	52	5
Lower Peninsula	638	48	12,837	1,406	481	58	33	14	448	53	50	4
Zone 2	378	38	7,233	1,054	276	42	8	6	267	42	50	5
Zone 3	271	32	5,604	937	206	41	25	13	181	34	50	6
Unknown	12	7	199	195	4	4	0	0	4	4	33	27
Statewide	965	57	20,403	1,804	825	80	60	21	765	73	52	3
Among trappers that did not target otter												
Upper Peninsula	47	14	NA	NA	90	30	2	3	88	30	NA	NA
Lower Peninsula	101	20	NA	NA	148	33	16	12	132	31	NA	NA
Zone 2	53	15	NA	NA	90	27	16	12	74	24	NA	NA
Zone 3	47	14	NA	NA	58	19	0	0	58	19	NA	NA
Unknown	2	3	NA	NA	2	3	2	3	0	0	NA	NA
Statewide	146	24	NA	NA	241	45	21	13	220	43	NA	NA
Among all trappers combined												
Upper Peninsula	389	38	7,367	1,136	430	64	29	16	401	59	55	5
Lower Peninsula	732	51	12,837	1,406	629	67	49	19	580	61	55	4
Zone 2	428	40	7,233	1,054	366	50	25	14	341	48	53	5
Zone 3	317	35	5,604	937	263	45	25	13	239	39	56	6
Unknown	14	8	199	195	6	5	2	3	4	4	29	24
Statewide	1,100	59	20,403	1,804	1,065	92	80	28	985	84	56	3

^aAll otter removed from traps, including all incidental catches and releases.

^bIncluded incidentally caught otter that were not returned to the trapper.

^c95% confidence limits.

Table 5. Estimated number of trappers, trapping effort, otter captured (including all incidental catches and releases), otter released alive, and otter registered (including incidental catches) among otter trappers during the 2015 Michigan trapping season, summarized by county.^a

County	Trappers		Trapping effort (days)		Otter captured ^b		Otter released alive		Otter registered ^c	
	Total	95% CL ^d	Total	95% CL ^d	Total	95% CL ^d	Total	95% CL ^d	Total	95% CL ^d
Alcona	23	10	138	100	21	13	6	9	14	10
Alger	16	8	173	109	19	13	6	9	12	10
Allegan	14	8	454	325	6	6	2	3	4	4
Alpena	27	10	557	273	16	9	0	0	16	9
Antrim	6	5	101	98	2	3	0	0	2	3
Arenac	6	5	93	85	8	8	0	0	8	8
Baraga	19	9	265	143	27	16	0	0	27	16
Barry	19	9	444	247	8	6	0	0	8	6
Bay	2	3	62	87	0	0	0	0	0	0
Benzie	10	6	128	111	12	9	0	0	12	9
Berrien	0	0	0	0	0	0	0	0	0	0
Branch	0	0	0	0	0	0	0	0	0	0
Calhoun	4	4	62	87	4	4	0	0	4	4
Cass	4	4	66	87	2	3	0	0	2	3
Charlevoix	8	6	144	175	8	8	0	0	8	8
Cheboygan	27	10	397	304	25	12	0	0	25	12
Chippewa	35	12	792	493	51	22	0	0	51	22
Clare	25	10	341	170	21	12	0	0	21	12
Clinton	2	3	6	9	0	0	0	0	0	0
Crawford	19	9	195	116	0	0	0	0	0	0
Delta	25	10	259	144	29	17	0	0	29	17
Dickinson	27	10	613	327	25	11	0	0	25	11
Eaton	10	6	88	116	16	13	4	6	12	8
Emmet	4	4	41	58	8	8	0	0	8	8
Genesee	2	3	14	20	0	0	0	0	0	0
Gladwin	12	7	160	137	6	6	0	0	6	6
Gogebic	25	10	428	289	43	24	6	9	37	19
Gd. Traverse	23	10	413	200	10	6	0	0	10	6
Gratiot	6	5	86	97	6	5	0	0	6	5

^aIncluded activity of trappers targeting otter and trappers not targeting otter combined.

^bAll otter removed from traps, including all incidental catches and releases.

^cIncluded incidentally caught otter that were not returned to the trapper.

^d95% confidence limits.

Table 5 (continued). Estimated number of trappers, trapping effort, otter captured (including all incidental catches and releases), otter released alive, and otter registered (including incidental catches) among otter trappers during the 2015 Michigan trapping season, summarized by county.^a

County	Trappers		Trapping effort (days)		Otter captured ^b		Otter released alive		Otter registered ^c	
	Total	95% CL ^d	Total	95% CL ^d	Total	95% CL ^d	Total	95% CL ^d	Total	95% CL ^d
Hillsdale	0	0	0	0	0	0	0	0	0	0
Houghton	33	12	726	362	31	16	2	3	29	15
Huron	0	0	0	0	0	0	0	0	0	0
Ingham	0	0	0	0	0	0	0	0	0	0
Ionia	16	8	218	139	4	4	0	0	4	4
Iosco	10	6	230	191	6	6	0	0	6	6
Iron	56	15	864	381	49	22	2	3	47	21
Isabella	12	7	267	185	12	9	2	3	10	8
Jackson	6	5	80	70	4	4	0	0	4	4
Kalamazoo	2	3	123	173	0	0	0	0	0	0
Kalkaska	25	10	434	213	23	15	0	0	23	15
Kent	29	11	444	226	6	5	0	0	6	5
Keweenaw	10	6	199	140	8	9	0	0	8	9
Lake ^d	21	9	378	232	14	9	2	3	12	8
Lapeer	0	0	0	0	0	0	0	0	0	0
Leelanau	2	3	4	6	2	3	0	0	2	3
Lenawee	0	0	0	0	0	0	0	0	0	0
Livingston	2	3	12	17	0	0	0	0	0	0
Luce	19	9	232	156	16	15	4	6	12	11
Mackinac	27	10	409	188	29	18	4	6	25	15
Macomb	0	0	0	0	0	0	0	0	0	0
Manistee	21	9	598	453	12	8	4	4	8	7
Marquette	60	15	1,197	385	58	21	2	3	56	21
Mason	19	9	216	113	8	7	0	0	8	7
Mecosta	51	14	909	364	62	27	6	9	56	22
Menominee	19	9	350	244	14	10	0	0	14	10
Midland	25	10	269	142	27	14	0	0	27	14
Missaukee	27	10	323	184	16	10	6	6	10	8
Monroe	0	0	0	0	0	0	0	0	0	0

^aIncluded activity of trappers targeting otter and trappers not targeting otter combined.

^bAll otter removed from traps, including all incidental catches and releases.

^cIncluded incidentally caught otter that were not returned to the trapper.

^d95% confidence limits.

Table 5 (continued). Estimated number of trappers, trapping effort, otter captured (including all incidental catches and releases), otter released alive, and otter registered (including incidental catches) among otter trappers during the 2015 Michigan trapping season, summarized by county.^a

County	Trappers		Trapping effort (days)		Otter captured ^b		Otter released alive		Otter registered ^c	
	Total	95% CL ^d	Total	95% CL ^d	Total	95% CL ^d	Total	95% CL ^d	Total	95% CL ^d
Montcalm	21	9	134	104	21	11	2	3	19	10
Montmorency	27	10	276	145	31	15	0	0	31	15
Muskegon	12	7	315	281	12	8	2	3	10	6
Newaygo	31	11	586	307	29	15	2	3	27	14
Oakland	2	3	31	43	0	0	0	0	0	0
Oceana	10	6	185	138	6	5	0	0	6	5
Ogemaw	14	8	237	186	10	8	0	0	10	8
Ontonagon	33	12	473	324	23	14	0	0	23	14
Osceola	21	9	202	123	8	6	0	0	8	6
Oscoda	14	8	162	135	12	7	0	0	12	7
Otsego	23	10	430	251	14	9	0	0	14	9
Ottawa	10	6	343	301	2	3	0	0	2	3
Presque Isle	21	9	360	236	21	12	2	3	19	11
Roscommon	23	10	239	137	29	15	2	3	27	14
Saginaw	19	9	179	122	14	11	2	3	12	10
St. Clair	2	3	0	0	2	3	0	0	2	3
St. Joseph	27	10	292	186	23	11	2	3	21	10
Sanilac	0	0	0	0	0	0	0	0	0	0
Schoolcraft	19	9	387	262	8	7	2	3	6	5
Shiawassee	2	3	62	87	0	0	0	0	0	0
Tuscola	4	4	41	46	0	0	0	0	0	0
Van Buren	4	4	14	20	2	3	0	0	2	3
Washtenaw	0	0	0	0	0	0	0	0	0	0
Wayne	0	0	0	0	0	0	0	0	0	0
Wexford	23	10	251	139	14	10	2	3	12	9
Unknown	14	8	199	195	6	5	2	3	4	4
Statewide ^e	1,100	59	20,403	1,804	1,065	92	80	28	985	84

^aIncluded activity of trappers targeting otter and trappers not targeting otter combined.

^bAll otter removed from traps, including all incidental catches and releases.

^cIncluded incidentally caught otter that were not returned to the trapper.

^d95% confidence limits.

^eNumber of trappers does not add up to statewide total because trappers could trap in more than one county. Column totals for trapping effort and capture may not equal statewide totals because of rounding errors.

Table 6. Mean days required to harvest an otter among trappers, 1997-2015.

Year	Region							
	Upper Peninsula		Northern Lower Peninsula		Southern Lower Peninsula		Statewide	
	Mean	95% CL ^a	Mean	95% CL ^a	Mean	95% CL ^a	Mean	95% CL ^a
1997	17.2	13.3	33.0	19.1	16.7	21.6	22.5	10.2
1998	13.6	5.6	21.5	11.2	34.0	28.0	16.2	5.2
1999	12.9	2.7	25.8	7.4	23.3	20.2	17.2	3.1
2000	15.3	5.4	31.2	10.9	23.0	15.7	19.9	4.9
2001	13.5	3.5	25.5	6.7	32.7	26.1	19.2	3.8
2002	27.0	9.0	25.6	9.5	26.5	14.8	26.2	6.3
2003	21.8	3.4	42.5	9.3	28.8	8.5	26.3	3.2
2004	23.1	5.8	36.7	11.1	62.5	29.1	29.3	5.5
2005	19.6	5.3	38.5	14.1	35.1	21.1	26.9	6.1
Among trappers targeting otter ^b								
2006	21.5	1.7	37.9	4.5	43.6	7.2	27.7	1.8
2007	23.7	2.6	42.8	6.5	33.5	7.2	28.7	2.4
2008	19.3	2.2	33.4	5.4	35.5	8.6	25.6	2.4
2009	14.1	1.5	31.2	4.3	34.7	6.7	20.6	1.7
2010	17.7	1.8	32.7	4.5	41.0	7.5	24.2	1.9
2011	15.9	1.6	24.5	2.5	35.5	5.5	21.6	1.5
2012	19.6	2.5	32.6	4.8	33.5	5.2	26.7	2.2
2013	18.9	2.4	27.6	3.7	41.1	8.7	25.4	2.2
2014	18.8	2.7	23.6	3.1	40.8	10.3	24.1	2.3
2015	23.6	3.5	27.1	4.1	31.0	5.7	26.7	2.5
Among all trappers ^b								
2006	17.8	1.5	26.5	3.4	29.6	4.9	20.6	1.4
2007	20.7	2.3	31.7	5.0	24.8	5.1	22.8	1.9
2008	15.4	1.8	27.4	4.4	28.3	6.7	18.9	1.7
2009	11.0	1.2	20.7	2.9	23.6	4.6	15.2	1.3
2010	14.6	1.6	23.1	3.3	29.7	5.4	18.8	1.5
2011	13.3	1.4	18.8	2.0	27.2	4.1	17.4	1.2
2012	16.7	2.1	27.0	3.9	29.1	4.4	22.6	1.9
2013	15.3	2.0	23.3	3.2	34.1	6.9	21.0	1.8
2014	15.3	2.2	18.3	2.5	32.6	7.7	19.2	1.8
2015	18.4	2.8	21.2	3.3	23.5	4.3	20.7	1.9

^a95% confidence limits.

^bBeginning in 2006, two separate estimates were calculated: (1) an estimate excluding the activity of trappers that did not target otter and (2) an estimate of all trappers combined. The latter estimates are more comparable to estimates from previous years.

Table 7. Estimated number of beaver trappers, their trapping effort (days), number of beaver captured, and trapping success in Michigan during 2013-2015.^a

Variable	Year						Change ^c (%)
	2013		2014		2015		
	Estimate	95% CL ^b	Estimate	95% CL ^b	Estimate	95% CL ^b	
Trappers (No.)	1,706	61	1,832	72	1,715	68	-6
Trapping effort (Days)	31,222	1,884	34,307	2,262	38,283	2,526	12
Beavers captured (No.)	12,179	976	15,321	1,436	15,068	1,388	-2
Trappers that captured a beaver (%)	81	2	83	2	86	2	3
Trappers using snares in open water (No.)	90	18	91	20	101	20	11
Beaver caught with snares in open water (No.)	153	49	246	120	142	55	-42
Trapped beaver in April (Trappers)	369	34	515	45	469	42	-9
Beaver caught in April (No.)	2,600	473	4,558	840	3,918	755	-14

^aFurtakers trapping beaver were not required to obtain an otter harvest tag; thus, estimates associated with beaver trapping do not include all furtaker participation, effort, or harvest. These estimates only represent the participation, effort, or harvest of trappers that obtained an otter harvest tag.

^b95% confidence limits.

^cThe change between 2014 and 2015 for proportion of trappers catching beaver is reported as the difference between years rather than the proportional change.

*P<0.005.

Table 8. Estimated number of beaver trappers, trapping effort, and beaver captured by otter harvest tag holders during the 2015 Michigan trapping season, summarized by area.^a

Area	Trappers		Trapping effort (days)		Beaver captured ^a		Trapper success	
	Total	95% CL ^b	Total	95% CL ^b	Total	95% CL ^b	%	95% CL ^b
Upper Peninsula	683	49	13,526	1,510	6,560	1,022	87	3
Lower Peninsula	1,055	58	24,609	2,135	8,448	949	86	2
Zone 2	656	48	13,931	1,610	5,740	837	87	3
Zone 3	440	40	10,678	1,433	2,708	439	83	4
Unknown	27	10	148	114	60	36	NA	NA
Statewide	1,715	68	38,283	2,526	15,068	1,388	86	2

^aFurtakers trapping beaver were not required to obtain an otter harvest tag; thus, estimates associated with beaver trapping do not include all furtaker participation, effort, or harvest. These estimates only represent the participation, effort, or harvest of trappers that obtained an otter harvest tag.

^b95% confidence limits.

Table 9. Estimated number of beaver trappers, trapping effort, and beaver captured by otter harvest tag holders during the 2015 Michigan trapping season, summarized by county.^a

County	Trappers		Trapping effort (days)		Beaver captured	
	Total	95% CL ^b	Total	95% CL ^b	Total	95% CL ^b
Alcona	41	13	726	346	280	167
Alger	29	11	576	277	93	44
Allegan	23	10	446	319	33	20
Alpena	23	10	561	324	169	97
Antrim	16	8	261	174	68	53
Arenac	14	8	199	150	241	159
Baraga	39	13	689	264	362	166
Barry	35	12	781	326	167	64
Bay	6	5	195	197	19	19
Benzie	14	8	234	154	82	73
Berrien	6	5	103	97	41	52
Branch	2	3	41	58	21	29
Calhoun	12	7	572	375	78	57
Cass	8	6	313	345	156	151
Charlevoix	19	9	329	222	97	60
Cheboygan	43	13	654	228	259	113
Chippewa	95	19	1,900	630	1,076	400
Clare	41	13	1,318	591	574	264
Clinton	8	6	31	26	12	11
Crawford	16	8	191	129	93	63
Delta	47	14	516	178	286	157
Dickinson	47	14	1,082	472	440	228
Eaton	14	8	187	134	60	39
Emmet	25	10	370	223	76	38
Genesee	12	7	80	48	88	74
Gladwin	19	9	397	206	142	93
Gogebic	43	13	707	332	358	194
Gd. Traverse	29	11	362	177	76	41
Gratiot	4	4	45	58	6	6

^aFurtakers trapping beaver were not required to obtain an otter harvest tag; thus, estimates associated with beaver trapping do not include all furtaker participation, effort, or harvest. These estimates only represent the participation, effort, or harvest of trappers that obtained an otter harvest tag.

^b95% confidence limits.

Table 9 (continued). Estimated number of beaver trappers, trapping effort, and beaver captured by otter harvest tag holders during the 2015 Michigan trapping season, summarized by county.^a

County	Trappers		Trapping effort (days)		Beaver captured	
	Total	95% CL ^b	Total	95% CL ^b	Total	95% CL ^b
Hillsdale	4	4	123	173	39	39
Houghton	51	14	1,187	440	269	133
Huron	0	0	0	0	0	0
Ingham	0	0	0	0	0	0
Ionia	14	8	162	109	68	54
Iosco	29	11	413	231	99	48
Iron	68	16	1,137	414	360	156
Isabella	10	6	239	195	31	27
Jackson	12	7	146	102	43	29
Kalamazoo	14	8	566	345	90	60
Kalkaska	31	11	576	278	239	120
Kent	21	9	417	224	39	27
Keweenaw	12	7	282	208	37	37
Lake	29	11	378	203	117	86
Lapeer	12	7	123	81	88	74
Leelanau	6	5	47	45	12	12
Lenawee	0	0	0	0	0	0
Livingston	8	6	103	93	41	32
Luce	45	13	619	246	469	212
Mackinac	56	15	1,008	354	590	255
Macomb	4	4	78	90	6	9
Manistee	29	11	502	281	76	43
Marquette	113	21	1,816	435	1,030	471
Mason	21	9	267	141	70	38
Mecosta	43	13	1,269	541	426	245
Menominee	25	10	531	287	82	48
Midland	31	11	843	368	239	113
Missaukee	39	13	541	212	448	319
Monroe	0	0	0	0	0	0

^aFurtakers trapping beaver were not required to obtain an otter harvest tag; thus, estimates associated with beaver trapping do not include all furtaker participation, effort, or harvest. These estimates only represent the participation, effort, or harvest of trappers that obtained an otter harvest tag.

^b95% confidence limits.

Table 9 (continued). Estimated number of beaver trappers, trapping effort, and beaver captured by otter harvest tag holders during the 2015 Michigan trapping season, summarized by county.^a

County	Trappers		Trapping effort (days)		Beaver captured	
	Total	95% CL ^b	Total	95% CL ^b	Total	95% CL ^b
Montcalm	39	13	471	181	121	57
Montmorency	37	12	609	293	352	166
Muskegon	19	9	325	184	123	91
Newaygo	31	11	954	446	158	79
Oakland	16	8	243	187	101	80
Oceana	23	10	551	344	115	65
Ogemaw	27	10	563	332	202	120
Ontonagon	68	16	952	379	821	326
Osceola	51	14	864	314	376	218
Oscoda	27	10	545	319	206	132
Otsego	33	12	705	319	282	140
Ottawa	16	8	368	236	35	22
Presque Isle	39	13	755	361	288	183
Roscommon	27	10	566	278	479	253
Saginaw	14	8	271	188	76	48
St. Clair	10	6	125	90	19	18
St. Joseph	29	11	675	379	128	73
Sanilac	4	4	27	27	8	12
Schoolcraft	39	13	524	210	288	155
Shiawassee	4	4	82	91	31	31
Tuscola	10	6	125	82	43	32
Van Buren	12	7	140	108	66	61
Washtenaw	2	3	6	9	8	12
Wayne	0	0	0	0	0	0
Wexford	31	11	444	225	224	189
Unknown	27	10	148	114	60	36
Statewide ^c	1,715	68	38,283	2,526	15,068	1,388

^aFurtakers trapping beaver were not required to obtain an otter harvest tag; thus, estimates associated with beaver trapping do not include all furtaker participation, effort, or harvest. These estimates only represent the participation, effort, or harvest of trappers that obtained an otter harvest tag.

^b95% confidence limits.

^cNumber of trappers does not add up to statewide total because trappers could trap in more than one county. Column totals for trapping effort and capture may not equal statewide totals because of rounding errors.

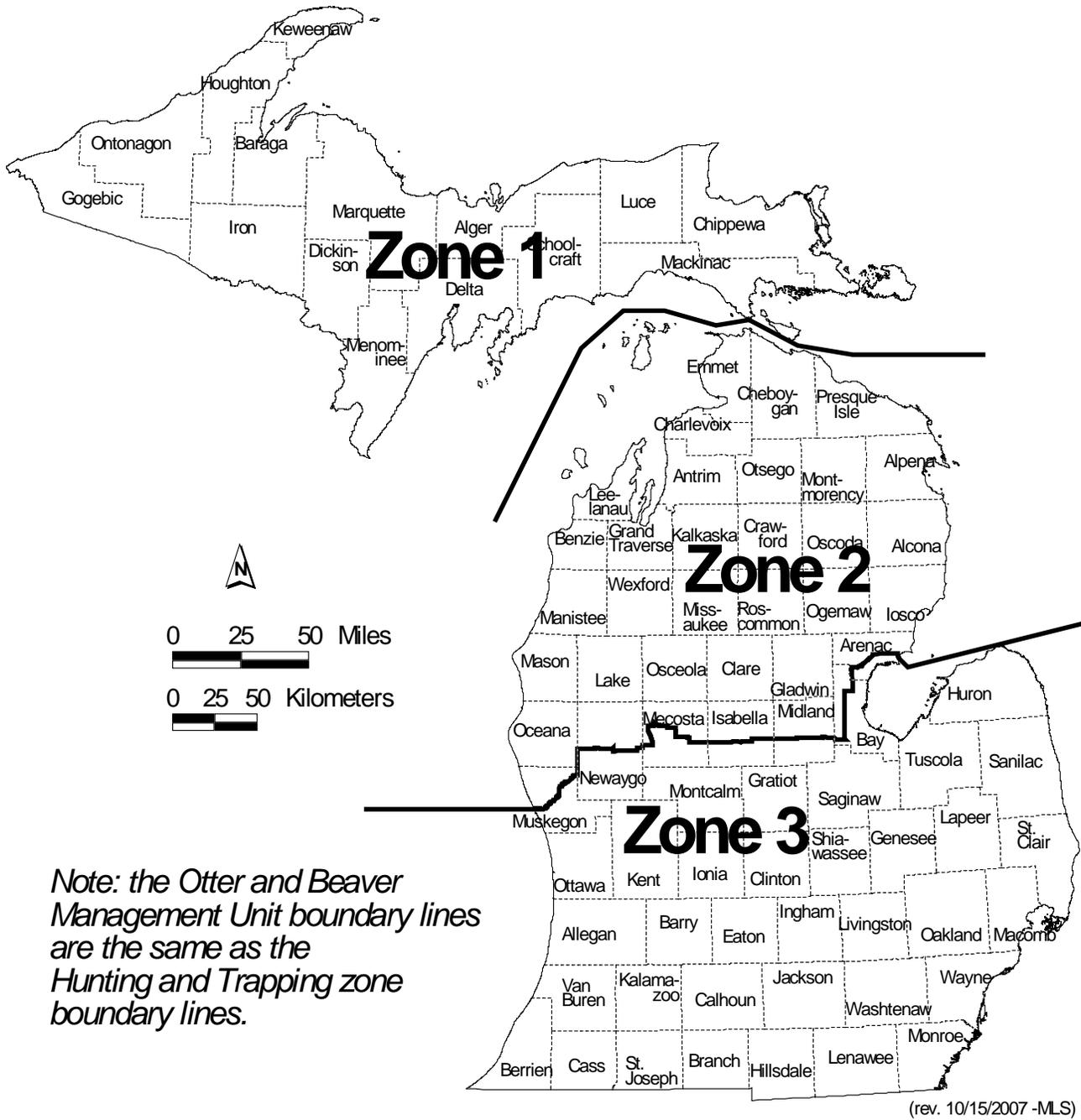


Figure 1. Otter and beaver management zones in Michigan, 2015.

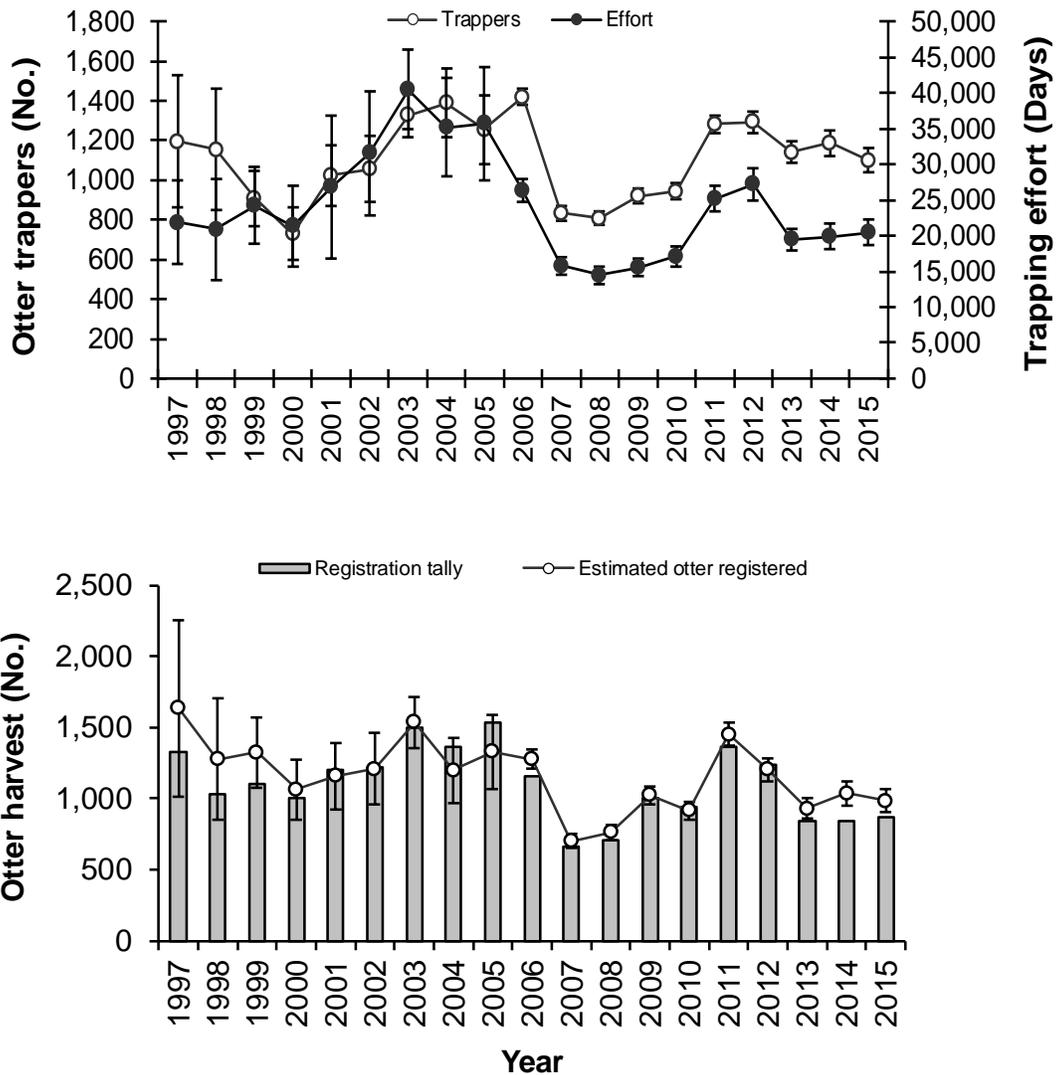


Figure 2. Estimated number of trappers, trapping effort (days), and number of otter captured and registered in Michigan, 1997-2015. Estimates of trapper numbers, trapping effort, and harvest were derived from harvest survey, while registration total was a tally of animals registered by trappers at registration stations (registration total included incidental catches not returned to trappers but excluded non-trapping mortality, and excluded harvest by tribal members). Vertical bars represent the 95% confidence interval.

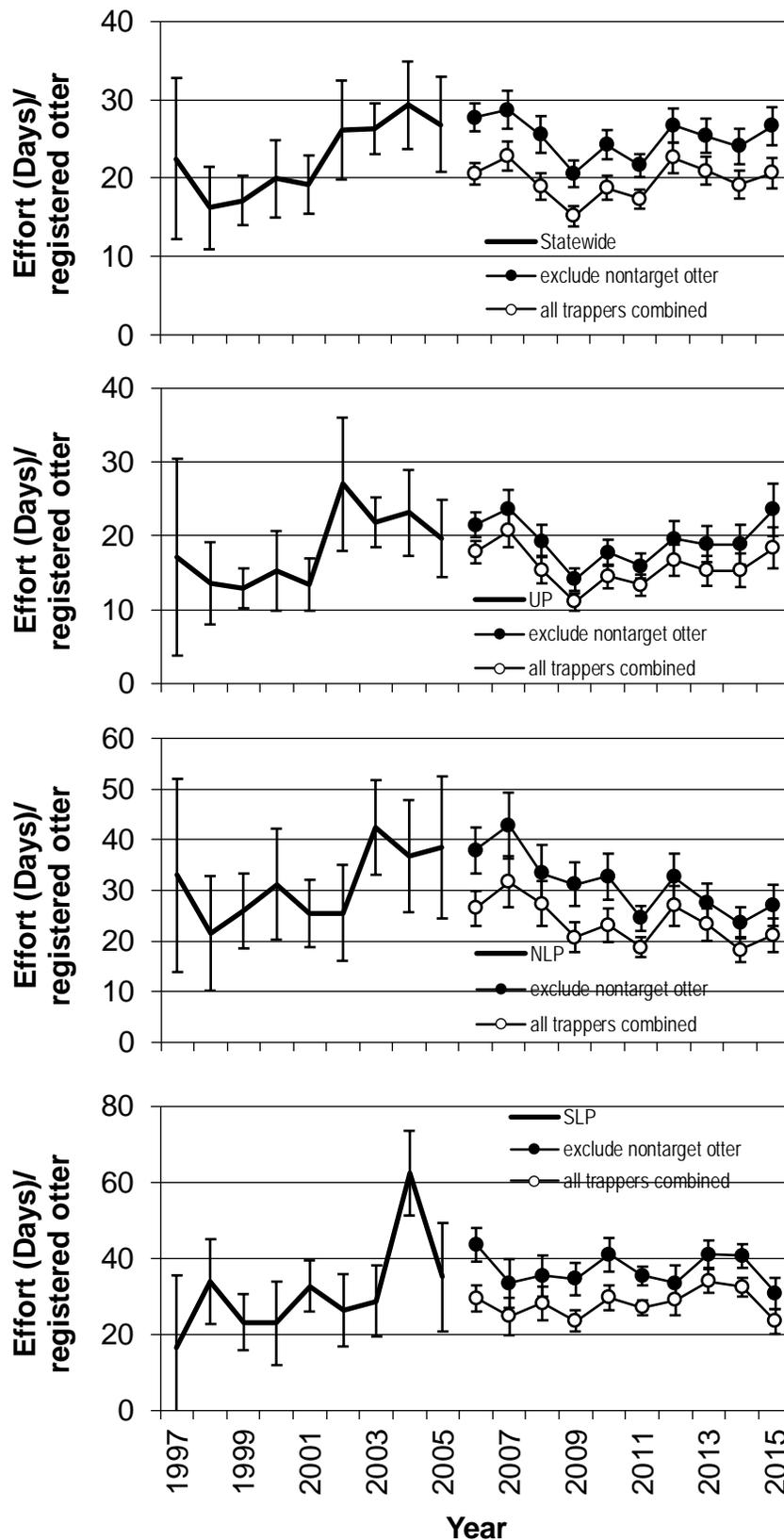


Figure 3. Estimated mean number of days required to harvest an otter in Michigan during 1997-2015, summarized by management zone. Beginning in 2006, two separate estimates were calculated: (1) an estimate excluding the activity of trappers that did not target otter and (2) an estimate of all trappers combined. The latter estimates are more comparable to estimates from previous years.

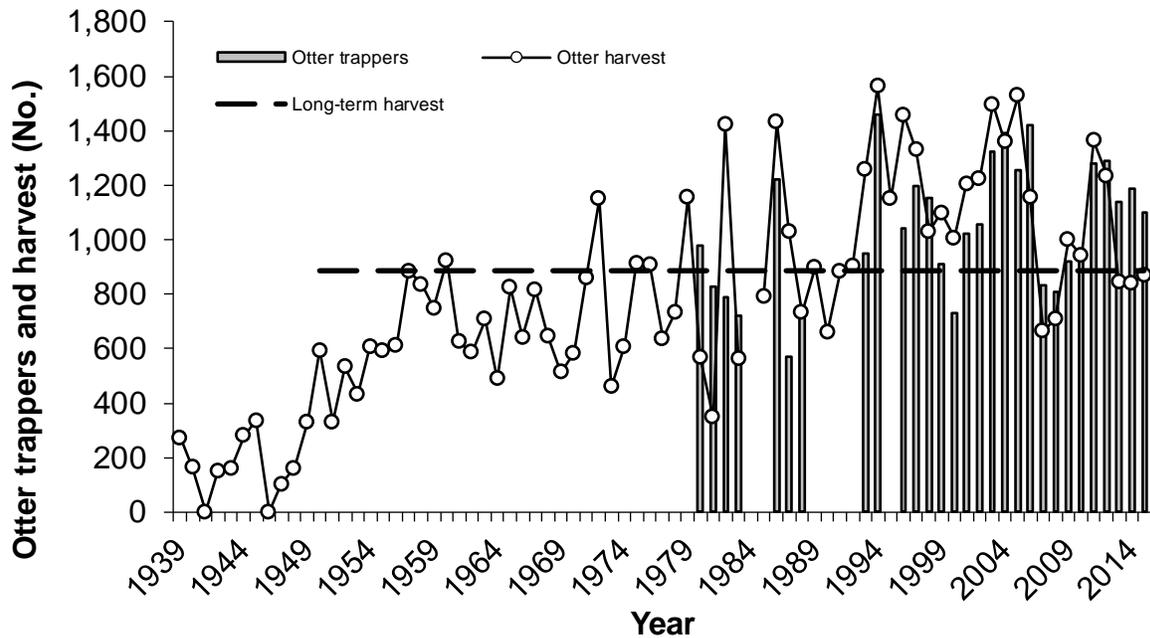


Figure 4. Otter harvest (sealing or registration tally, unpublished data) and estimated number of otter trappers (estimates from harvest survey) in Michigan, 1939-2015. Long-term (1950-2015) average harvest was 886 otter. Estimates were not available for years when values were not plotted.

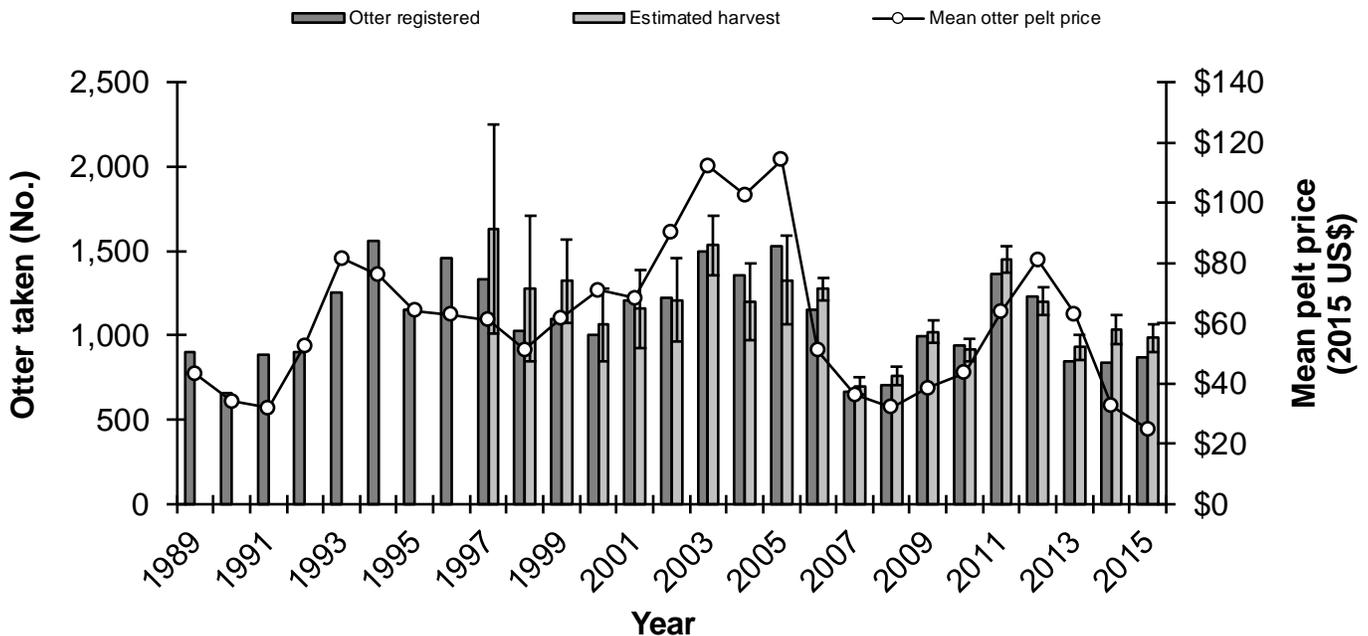


Figure 5. Otter registration totals, estimated otter harvest, and mean otter pelt prices in Michigan during 1989-2015. Mean pelt prices were the average paid in Minnesota and Wisconsin (Abraham and Dexter 2016, Lohr 2016). Pelt prices were reported in 2015 dollars by adjusting for inflation using the Consumer Price Index (Bureau of Labor Statistics 2014). Vertical bars represent the 95% confidence interval. Estimates were not available for years when values were not plotted.

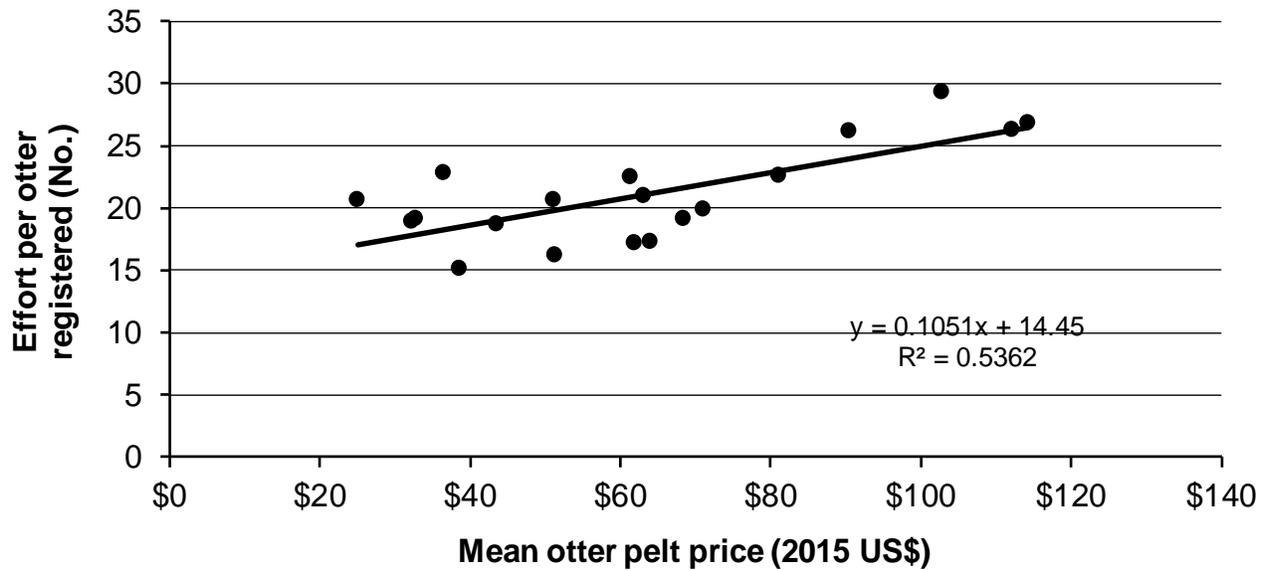
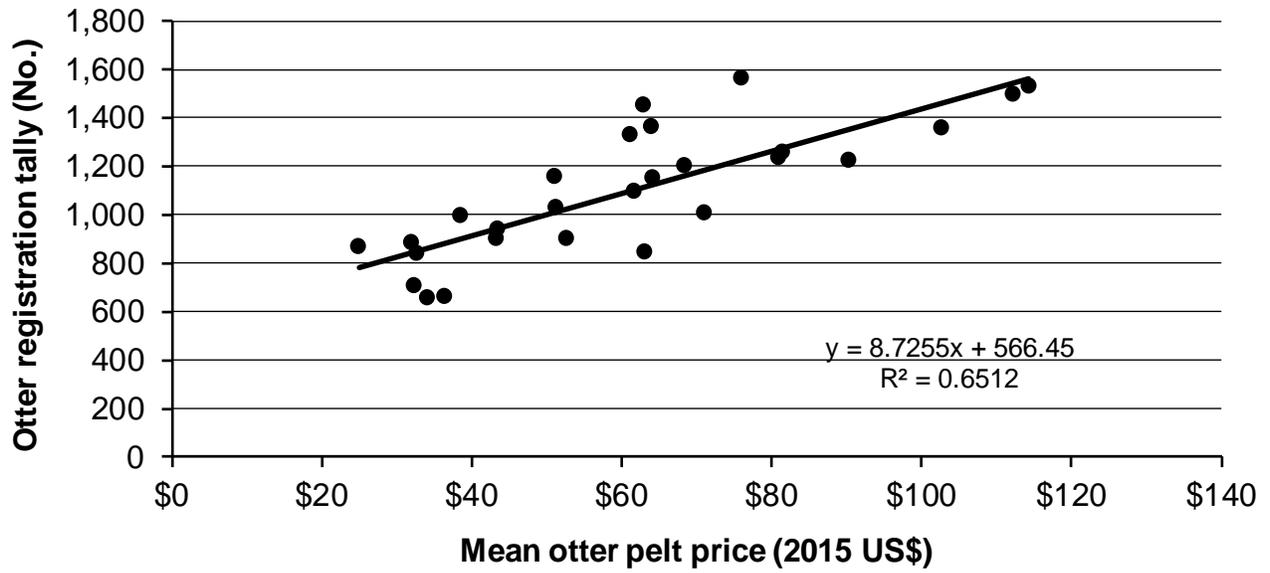


Figure 6. The relationship between the number of otter registered and mean otter pelt prices in Michigan during 1989-2015 (top), and the relationship between trapping effort per otter registered and mean otter pelt prices in Michigan during 1997-2015 (bottom).

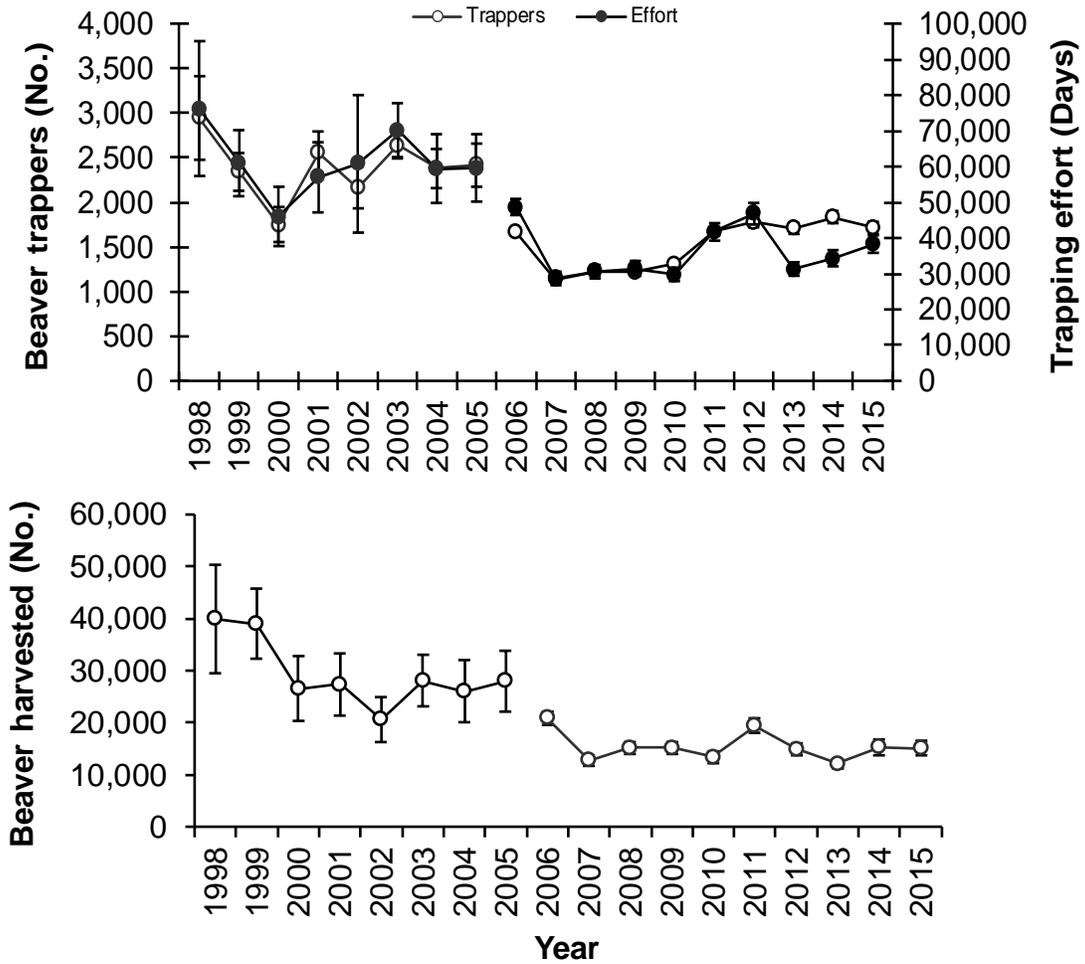


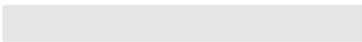
Figure 7. Estimated number of trappers, trapping effort (days), and number of beaver captured in Michigan, 1998-2015. Vertical bars represent the 95% confidence interval. The 2006-2015 estimates were not directly comparable to estimates from previous years because the 2006-2015 estimates only represent the participation, effort, and harvest of trappers that obtained an otter harvest tag. Also beginning in 2004, trappers taking beaver as part of a nuisance control business were asked to exclude nuisance animals from their reported harvest on annual harvest surveys.

Appendix A. Questionnaire used to collect data for 2015 otter and beaver harvest survey in Michigan.



MICHIGAN DEPARTMENT OF NATURAL RESOURCES, WILDLIFE DIVISION
2015-16 OTTER AND BEAVER HARVEST REPORT

PO BOX 30030 LANSING MI 48909-7530
 This information is requested under authority of Part 435, 1994 PA 451, M.C.L. 324.43539.



It is important that you complete and return this questionnaire even if you did not trap or capture any otter or beaver.

1. Did you place traps specifically for otter during the 2015-16 season?

¹ Yes ² No, Skip to question number 5.

2. If you trapped during the 2015-16 otter season, please complete the following table.
(Do not report trapping done as part of a nuisance control business.)

COUNTY TRAPPED (List each county that you trapped for otter.)	NUMBER OF DAYS TRAPPED FOR OTTER	NUMBER OF OTTER CAUGHT AND RELEASED (Count only otters you released alive from your traps.)	NUMBER OF OTTER CAUGHT AND REGISTERED (Count all otter that were registered including incidental catches that were not returned to you.)

3. How many of the following traps did you set for otter in 2015-16?
(For each type, record the average number used per day.)

_____ Foothold
 _____ Conibear

4. What is the status of otter in the county you trapped most often in 2015-16?

¹ Increasing ² Decreasing ³ Stable ⁴ Not present

5. Did you incidentally catch any otter while trapping for other species that you have not already reported in Question #2.

¹ Yes ² No, Skip to question number 7.

6. If you answered yes in the previous question, please report the location and number of incidental otters you captured. Please do not report otter already reported in question #2.

COUNTY WHERE INCIDENTAL OTTER CAUGHT (List each county that you caught an incidental otter.)	NUMBER OF INCIDENTAL OTTER CAUGHT AND RELEASED (Count only incidental otters you released alive from your traps.)	NUMBER OF INCIDENTAL OTTER CAUGHT AND REGISTERED (Count incidental otter that were registered including catches that were not returned to you.)

7. Did you place traps for beaver during the 2015-16 season?

¹ Yes ² No, skip to question 14.

8. If you trapped during the 2015-16 beaver season, please complete the following table.
(Do not report trapping done as part of a nuisance control business.)

COUNTY TRAPPED (List each county that you trapped for beaver.)	NUMBER OF DAYS TRAPPED FOR BEAVER	NUMBER OF BEAVER CAUGHT

9. How many of the following traps did you set for beaver in 2015-16?
(For each type, record the average number used per day.)

_____ Foothold
 _____ Conibear
 _____ Snares

10. Did you attempt to trap beavers with snares in open water during the 2015-16 seasons?

¹ Yes ² No (Skip to Question 11)

10a. If you attempted to trap beavers with snares in open water, how many beavers did you harvest with these sets during the 2015-16 seasons? _____ BEAVER TAKEN

11. Did you attempt to trap beavers during April 2016?

¹ Yes ² No (Skip to Question 12)

11a. If you attempted to trap beavers during April 2016, how many beavers did you harvest in April? _____ BEAVER TAKEN

12. What is the status of beaver in the county you trapped most often in 2015-16?

¹ Increasing ² Decreasing ³ Stable ⁴ Not present

13. Did you catch any otter in traps that were set for beaver in 2015-16?

¹ Yes ² No (Skip to Question 14)

13a. If you answered yes, report number of otter caught in your beaver sets.
 _____ otter caught in beaver sets

14. Do you have any comments or suggestions about otter or beaver management in Michigan?

Please return questionnaire in the enclosed postage-paid envelope.
 Thank you for your help!