



Michigan Department of Natural Resources
Wildlife Division Report No. 3685
January 2020

2018 OTTER AND BEAVER HARVEST SURVEY

Brian J. Frawley

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 2018, 7,894 furtakers obtained a harvest tag to take otter, which was a 4% increase from the previous year (7,574 trappers in 2017). About 12% of the tag holders set traps for otter (949 trappers) and 26% set traps for beaver (2,041). Trappers that targeted otter spent nearly 16,841 days trapping otter ($\bar{x} = 17.7$ days/trapper), captured 653 otters (included animals released alive), and registered 614 otters. An additional 250 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 2017 and 2018. About 46% of trappers targeting otter captured at least one otter. The number of trappers that attempted to catch otter in 2018 increased significantly by 19% from 2017; however, the number of days that these trappers spent afield was not significantly different. The mean number of days of effort per registered otter in 2018 (27.4 days) was not significantly different from the 2017 estimate (24.3 days). Beaver trappers spent 38,324 days trapping beaver ($\bar{x} = 18.8$ days/trapper) and captured 16,830 beaver. About 84% of active beaver trappers captured at least one beaver. The number of people trapping beavers increased significantly by 27% between 2017 and 2018; however, the number of days spent afield was not significantly different. The number of beaver caught increased significantly by 47% between 2017 and 2018 (11,428 versus 16,830 in 2018).



A contribution of Federal Aid in Wildlife Restoration, Michigan Project W-147-R

Equal Rights for Natural Resource Users

The Michigan Department of Natural Resources provides equal opportunities for employment and access to Michigan's natural resources. Both State and Federal laws prohibit discrimination on the basis of race, color, national origin, religion, disability, age, sex, height, weight or marital status under the U.S. Civil Rights Acts of 1964 as amended, 1976 MI PA 453, 1976 MI PA 220, Title V of the Rehabilitation Act of 1973 as amended, and the 1990 Americans with Disabilities Act, as amended.

If you believe that you have been discriminated against in any program, activity, or facility, or if you desire additional information, please write:
Human Resources, Michigan Department of Natural Resources, PO Box 30473, Lansing MI 48909-7973, or
Michigan Department of Civil Rights, Cadillac Place, 3054 West Grand Blvd, Suite 3-600, Detroit, MI 48202, or
Division of Federal Assistance, U.S. Fish & Wildlife Service, 4401 North Fairfax Drive, Mail Stop MBSP-4020, Arlington, VA 22203.

For information or assistance on this publication, contact Michigan Department of Natural Resources, Wildlife Division, P.O. Box 30444, Lansing MI 48909.
This publication is available in alternative formats upon request.

IC2578-200 (10/03/2019)

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 2018, 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. Otter harvest tags were available from May 1 through April 30. 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 otters, except no more than two otters 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 3, 2019, 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 the 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 underwater, 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 5,000 randomly selected people who obtained an otter harvest tag in 2018 (7,894 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 otters released alive, and number of otters 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). In addition, successful otter trappers were asked to report what they did with their otter pelts (e.g., sold to a fur buyer).

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 significantly. Non-overlapping 95% confidence intervals were equivalent to stating the difference between the means was larger than would be expected 95 out of 100 times ($P < 0.05$), if the study had been repeated (Payton et al. 2003).

RESULTS AND DISCUSSION

Questionnaires were mailed initially during early May 2019, and nonrespondents were mailed up to two follow-up questionnaires. Although 5,000 people were sent the questionnaire, 89 surveys were undeliverable, resulting in an adjusted sample size of 4,911. Questionnaires were returned by 2,212 people, yielding a 45% adjusted response rate.

In previous years, questionnaires were sent to all tag holders (i.e., 7,574 people in 2017); however, only 5,000 tag holders were sent a questionnaire in 2018. Only a subset of tag holders was selected in 2018 because the number of tag holders has increased substantially in recent years (i.e., increased 71% since 2013), and it was cheaper to conduct a smaller survey. However, smaller sample sizes generate wider confidence intervals (i.e., less precise estimates). The width of the confidence interval decreases in proportion to the square root of the sample size. Because questionnaires were only sent to 5,000 people in 2018, rather than 7,894 people, we expected the confidence intervals of estimates to be about 20% greater than if all tag holders had been sent a questionnaire (e.g., a confidence limit equal to 5% would increase to 6% because of the reduced sample size).

Otter

In 2018, 7,894 trappers obtained harvest tags to trap otter, which was an increase of 4% from the previous year (7,574 trappers in 2017). In 2018, most of the harvest tags (7,528) were obtained by men. Harvest tags were obtained by 354 women, and the sex of 12 tag holders was unknown. About 12% of the otter tag holders set traps targeting otter (949 trappers, Table 2). These trappers spent 16,841 days trapping otter ($\bar{x} = 17.7 \pm 1.8$ days/trapper), captured 653 otters, and registered 614 otters (Table 3). About 46% of active trappers successfully captured at least one otter.

The estimated number of otter registered by trappers that targeted otter in 2018 did not significantly change from last year (659 in 2017 versus 614 in 2018, Table 3). An additional 250 otter were registered by trappers that were not targeting otter. The estimated total number of otter registered by all trappers did not significantly change between 2017 and 2018 (893 versus 864 in 2018, Table 3). Among the three management zones, the largest number of otters was taken in the northern Lower Peninsula (Zone 2, Table 4). Among counties, Iosco (54), Mecosta (50), Presque Isle (39), and Manistee (36) counties had the highest number of otters registered (Table 5).

The actual number of otter registered (including incidental take but excluding harvest by tribal members) by trappers at registration stations increased 7% between 2017 and 2018 (678 versus 725, Figure 2). The number of trappers that attempted to catch otter in 2018 increased significantly by 19% from 2017; however, the number of days that these trappers spent afield was not significantly different from 2017 (Table 3, Figure 2). Among trappers targeting otter, the mean number of days of effort per registered otter was 27.4 days in 2018, which was not significantly different than the 24.3 days in 2017 (Tables 3 and 6, Figure 3).

About 51% of otter pelts taken in 2018 (Table 7, Figure 4) were sold to either a local fur buyer (26%) or sold at a fur auction action (25%). About 39% of otter pelts were kept for personal use (e.g., tanned or used for a taxidermist mount). In addition, about 10% of pelts were either sold to a private individual, sold to a taxidermist, or used for some other purpose.

The number of otters registered in 2018 was 17% below the long-term average since 1950 ($\bar{x} = 877$ during 1950-2018, Figure 5). Changes in otter harvest during recent years have generally tracked changes in trapping effort (Figure 2) and changes in otter pelt prices (Figures 6 and 7). Effort per registered otter was not significantly different between 2017 and 2018. The 2018 estimate was near the average during 1997-2018 (Figure 3), suggesting otter numbers were stable statewide.

The number of otters registered was correlated with the mean value of otter pelts during 1989-2018 (Pearson product-moment correlation coefficient [r] = 0.84, the probability of obtaining this result [P] < 0.01) (Figure 7). The correlation between mean days of effort per registered otter and pelt prices during 1997-2018 ($r = 0.73$, $P < 0.01$) was also significant.

Most otter trappers used conibear-type traps to capture otter ($91 \pm 3\%$), although foothold traps also were used frequently ($34 \pm 3\%$). Among trappers using conibear traps, the mean number of conibear traps set was 4.3 ± 0.4 traps. Among trappers using foothold traps, the mean number of foothold traps set was 3.6 ± 0.7 traps.

Twenty-five percent of otter trappers ($\pm 4\%$) believed otter numbers were increasing in the county where they trapped most often, while $61 \pm 5\%$ thought otter numbers were stable, $7 \pm 3\%$ thought otter were declining, $4 \pm 2\%$ indicated otter were not present, and $3 \pm 2\%$ 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 26% of the otter harvest tag holders set traps for beaver in 2018 (2,041 trappers, Table 2). Trappers spent 38,324 days trapping (18.8 ± 1.6 days/trapper) and captured 16,830 beaver. The number of people trapping beavers increased significantly by 27% between 2017 and 2018; however, the number of days these trappers spent afield was not significantly different (Table 8). The number of beaver caught increased significantly by 47% between 2017 and 2018 (11,428 versus 16,830 in 2018, Table 8, Figure 8). Harvest in 2018 was 10% greater than the average harvest during 2006-2018 ($\bar{x} = 15,239$).

About 84% of active trappers successfully captured at least one beaver. Among the three management zones, the largest number of beaver was taken in the northern Lower Peninsula zone (Table 9). Among counties, Marquette (1,085), St. Joseph (782), Schoolcraft (771), Cass (764), and Iron (628) counties had the highest harvest estimates (Table 10).

Most beaver trappers used conibear-type traps to capture beaver ($93 \pm 2\%$), although $54 \pm 3\%$ of trappers used foothold traps and $6 \pm 2\%$ used snares. Among trappers using conibear traps, the mean number of conibear traps set was 6.2 ± 0.5 traps. Among trappers using foothold traps, the mean number of foothold traps set was 4.6 ± 0.5 traps, and among trappers using snares, the mean number of snares set was 7.0 ± 2.3 .

Forty-five percent of beaver trappers ($\pm 3\%$) believed beaver numbers were increasing in the county where they trapped most often, while $45 \pm 3\%$ thought beaver numbers were stable, $6 \pm 2\%$ 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. The percentage of trappers indicating that beaver numbers had increased since last year was significantly greater in 2018 than in 2017 (37% versus 45% in 2018).

An estimated 100 trappers caught 278 beaver with snares in open water during the 2018 season (Table 8). About 482 trappers caught 4,015 beaver during April 2019. The number of trappers pursuing beaver in April and the number of beaver taken in April were not significantly different from last year (Table 8). Beaver harvested with snares in open water and taken during April represented about 2% and 24% of the estimated total beaver harvest, respectively. Among trappers that set traps for beaver, $11 \pm 2\%$ caught otter in their beaver sets. These

trappers caught 328 ± 77 otters.

ACKNOWLEDGEMENTS

I thank all the trappers that provided information. Theresa Riebow completed data entry, and Marshall Strong prepared Figure 1. Adam Bump, Mike Donovan, and Dwayne Etter reviewed a draft version of this report.

LITERATURE CITED

Abraham, J. and M.H. Dexter. 2019. Minnesota fur buyers survey for the 2015-2016 hunting and trapping season. Unpublished report, Division of Fish and Wildlife, Minnesota Department of Natural Resources, St. Paul, USA.

Bureau of Labor Statistics. 2018. Consumer Price Index-All Urban Consumers, United States Department of Labor. <http://www.bls.gov>. Accessed 10 January 2019.

Cochran, W. G. 1977. Sampling techniques. John Wiley & Sons, New York. USA.

Dhuey, B. 2019. Wisconsin fur buyers report, 2018-19. Wisconsin Wildlife Surveys, Wisconsin Department of Natural Resources, Madison, Wisconsin, USA.

Payton, M. E., M. H. Greenstone, and N. Schenker. 2003. Overlapping confidence intervals or standard error intervals: what do they mean in terms of statistical significance? *Journal of Insect Science* 3:34.

Table 1. Otter and beaver trapping seasons in Michigan, 2018.

Zone	Season	
	Resident	Nonresident ^a
1	October 25 – April 14 ^b	November 15 – April 14
2	November 1 – April 14	November 24 – April 14
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, 2019, 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 2018 season.

Harvest tag holders	%	95% CL ^a	Total	95% CL ^a
Trapped only for otter	3	1	214	45
Trapped only for beaver	17	1	1,306	104
Trapped for both otter and beaver	9	1	735	81
Trapped for either otter or beaver	29	2	2,255	126
Trapped for otter ^b	12	1	949	91
Trapped for beaver ^c	26	2	2,041	122

^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), the number of otters captured, mean days required to harvest an otter, and trapping success in Michigan during 2016-2018. Estimates presented separately for trappers targeting otter and for trappers that were not targeting otter.

Variable	Year						Change ^a (%)
	2016		2017		2018		
	Estimate	95% CL	Estimate	95% CL	Estimate	95% CL	
Among trappers targeting otter							
Trappers (No)	839	56	797	56	949	91	19*
Effort (Days)	17,425	1,732	16,003	1,705	16,841	2,383	5
Otters captured (No.)	729	82	721	78	653	108	-9
Otters released alive (No.)	40	21	62	21	39	27	-36
Otters registered (No.)	688	76	659	70	614	98	-7
Trappers that captured an otter (%)	49	4	55	4	46	5	-9*
Trappers that released an otter (%)	3	1	5	2	3	2	-3
Trappers that registered an otter (%)	49	4	54	4	45	5	-9*
Mean days required to harvest an otter	25.3	2.5	24.3	2.5	27.4	4.3	13
Among trappers that did not target otter							
Trappers (No.)	144	25	151	25	178	41	18
Otters captured (No.)	244	49	255	51	257	67	1
Otters registered (No.)	221	44	234	43	250	66	7
Among all trappers^b							
Trappers (No.)	979	60	942	60	1,117	97	19*
Otters captured (No.)	973	94	976	92	910	127	-7
Otters registered (No.)	909	86	893	82	864	117	-3
Mean days required to harvest an otter	19.2	1.9	17.9	1.9	19.5	3.0	9

^aThe change between 2017 and 2018 for the 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 the 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 2018 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
Among trappers targeting otter												
Upper Peninsula	275	51	4,286	1,138	189	60	7	8	182	57	44	9
Lower Peninsula	714	80	12,555	2,097	464	89	32	26	432	79	46	6
Zone 2	407	62	7,062	1,480	278	73	25	23	253	62	44	8
Zone 3	318	55	5,492	1,352	186	49	7	8	178	48	48	9
Unknown	4	6	0	0	0	0	0	0	0	0	0	0
Statewide	949	91	16,841	2,383	653	108	39	27	614	98	45	5
Among trappers that did not target otter												
Upper Peninsula	57	24	NA	NA	79	36	4	6	75	36	NA	NA
Lower Peninsula	132	36	NA	NA	178	53	4	6	175	52	NA	NA
Zone 2	71	26	NA	NA	100	39	0	0	100	39	NA	NA
Zone 3	68	26	NA	NA	79	32	4	6	75	31	NA	NA
Unknown	0	0	NA	NA	0	0	0	0	0	0	NA	NA
Statewide	178	41	NA	NA	257	67	7	8	250	66	NA	NA
Among all trappers combined												
Upper Peninsula	328	56	4,286	1,138	268	72	11	13	257	67	51	9
Lower Peninsula	839	86	12,555	2,097	642	103	36	27	607	94	52	6
Zone 2	475	66	7,062	1,480	378	83	25	23	353	74	50	7
Zone 3	382	60	5,492	1,352	264	59	11	10	253	57	57	8
Unknown	4	6	0	0	0	0	0	0	0	0	0	0
Statewide	1,117	97	16,841	2,383	910	127	46	30	864	117	52	5

^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 2018 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	18	13	314	280	7	12	4	6	4
Alger	21	15	339	280	14	15	0	0	14	15
Allegan	11	10	61	90	7	8	0	0	7	8
Alpena	21	15	368	401	11	13	0	0	11	13
Antrim	4	6	214	356	4	6	0	0	4	6
Arenac	7	8	11	18	7	8	0	0	7	8
Baraga	18	13	93	78	21	22	0	0	21	22
Barry	7	8	178	245	0	0	0	0	0	0
Bay	14	12	193	205	4	6	0	0	4	6
Benzie	7	8	143	168	0	0	0	0	0	0
Berrien	0	0	0	0	0	0	0	0	0	0
Branch	4	6	11	18	4	6	0	0	4	6
Calhoun	14	12	196	204	4	6	0	0	4	6
Cass	18	13	186	173	18	16	7	8	11	10
Charlevoix	7	8	107	178	7	12	0	0	7	12
Cheboygan	32	18	443	393	11	10	0	0	11	10
Chippewa	25	16	118	104	25	20	0	0	25	20
Clare	29	17	214	172	11	10	0	0	11	10
Clinton	7	8	118	169	0	0	0	0	0	0
Crawford	11	10	68	70	0	0	0	0	0	0
Delta	21	15	150	115	7	12	4	6	4	6
Dickinson	18	13	346	297	39	37	7	12	32	28
Eaton	11	10	150	168	4	6	0	0	4	6
Emmet	14	12	171	144	11	13	0	0	11	13
Genesee	0	0	0	0	0	0	0	0	0	0
Gladwin	14	12	107	178	18	16	0	0	18	16
Gogebic	11	10	178	176	18	21	0	0	18	21
Gd. Traverse	11	10	182	214	4	6	0	0	4	6
Gratiot	18	13	150	139	11	10	0	0	11	10

^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 2018 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	7	8	11	18	7	8	0	0	7	8
Houghton	25	16	136	113	11	10	0	0	11	10
Huron	0	0	0	0	0	0	0	0	0	0
Ingham	0	0	0	0	0	0	0	0	0	0
Ionia	11	10	164	197	0	0	0	0	0	0
Iosco	36	19	507	321	54	31	0	0	54	31
Iron	39	20	864	672	18	13	0	0	18	13
Isabella	21	15	96	104	11	10	0	0	11	10
Jackson	7	8	36	42	4	6	0	0	4	6
Kalamazoo	18	13	357	328	11	10	0	0	11	10
Kalkaska	25	16	507	339	7	12	0	0	7	12
Kent	7	8	146	172	0	0	0	0	0	0
Keweenaw	7	8	193	251	0	0	0	0	0	0
Lake ^d	36	19	564	414	18	16	4	6	14	12
Lapeer	4	6	0	0	4	6	0	0	4	6
Leelanau	0	0	0	0	0	0	0	0	0	0
Lenawee	0	0	0	0	0	0	0	0	0	0
Livingston	4	6	36	59	0	0	0	0	0	0
Luce	14	12	71	90	7	8	0	0	7	8
Mackinac	32	18	639	525	32	27	0	0	32	27
Macomb	7	8	36	45	4	6	0	0	4	6
Manistee	36	19	492	397	43	32	7	12	36	25
Marquette	46	21	650	384	25	21	0	0	25	21
Mason	21	15	321	297	11	13	0	0	11	13
Mecosta	46	21	464	317	50	31	0	0	50	31
Menominee	4	6	54	89	4	6	0	0	4	6
Midland	18	13	268	267	18	18	0	0	18	18
Missaukee	32	18	253	177	39	35	11	18	29	22
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 2018 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	32	18	642	485	25	16	0	0	25	16
Montmorency	29	17	300	235	4	6	0	0	4	6
Muskegon	7	8	43	61	11	13	0	0	11	13
Newaygo	43	21	1,067	704	36	24	4	6	32	21
Oakland	0	0	0	0	0	0	0	0	0	0
Oceana	7	8	82	120	7	12	0	0	7	12
Ogemaw	21	15	257	318	18	13	0	0	18	13
Ontonagon	21	15	68	58	21	17	0	0	21	17
Osceola	11	10	68	88	7	8	0	0	7	8
Oscoda	4	6	14	24	4	6	0	0	4	6
Otsego	25	16	285	223	11	13	0	0	11	13
Ottawa	0	0	0	0	0	0	0	0	0	0
Presque Isle	39	20	553	349	39	26	0	0	39	26
Roscommon	21	15	296	211	21	17	0	0	21	17
Saginaw	14	12	96	98	4	6	0	0	4	6
St. Clair	0	0	0	0	0	0	0	0	0	0
St. Joseph	36	19	485	349	25	16	0	0	25	16
Sanilac	4	6	25	42	0	0	0	0	0	0
Schoolcraft	43	21	389	239	25	18	0	0	25	18
Shiawassee	4	6	7	12	4	6	0	0	4	6
Tuscola	14	12	196	216	4	6	0	0	4	6
Van Buren	4	6	75	125	0	0	0	0	0	0
Washtenaw	0	0	0	0	0	0	0	0	0	0
Wayne	0	0	0	0	0	0	0	0	0	0
Wexford	21	15	221	170	7	8	0	0	7	8
Unknown	4	6	0	0	0	0	0	0	0	0
Statewide ^e	1,117	97	16,841	2,383	910	127	46	30	864	117

^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, 1997-2018.

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
2016	16.8	2.0	31.7	6.1	38.2	7.1	25.3	2.5
2017	18.8	3.4	24.8	3.9	30.0	6.1	24.3	2.5
2018	23.5	7.0	27.9	6.5	30.8	8.3	27.4	4.3
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
2016	13.5	1.7	20.7	3.9	30.3	5.6	19.2	1.9
2017	14.0	2.5	18.1	2.9	22.3	4.6	17.9	1.9
2018	16.7	4.8	20.0	4.6	21.7	5.8	19.5	3.0

^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. The fate of otter pelts registered by trappers in Michigan during 2017 and 2018.

Fate of pelt	Year				Change ^a (%)
	2017		2018		
	Total	95% CL	Total	95% CL	
Sold to fur buyer	236	44	225	59	-5
Sold at fur auction	196	39	214	62	9
Sold to taxidermist	19	12	7	8	-63
Sold to a private individual	36	15	11	13	-70
Kept for personal use	332	45	335	68	1
Other ^a	55	20	43	25	-23
Unknown	19	12	29	21	49

^aExamples included animals held for future sales, animals given away, and incidental animals turned over to the DNR.

Table 8. Estimated number of beaver trappers, their trapping effort (days), the number of beaver captured, and trapping success in Michigan during 2016-2018.^a

Variable	Year						Change ^c (%)
	2016		2017		2018		
	Estimate	95% CL ^b	Estimate	95% CL ^b	Estimate	95% CL ^b	
Trappers (No.)	1,686	73	1,611	74	2,041	122	27*
Trapping effort (Days)	36,214	2,507	33,066	2,761	38,324	3,966	16
Beavers captured (No.)	15,197	1,531	11,428	1,127	16,830	2,380	47*
Trappers that captured a beaver (%)	86	2	84	2	84	3	0
Trappers using snares in open water (No.)	117	22	98	20	100	31	2
Beaver caught with snares in open water (No.)	193	67	219	121	278	238	27
Trapped beaver in April (Trappers)	580	48	470	44	482	67	3
Beaver caught in April (No.)	4,996	837	2,865	600	4,015	1,222	40

^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 2017 and 2018 for the proportion of trappers catching beaver is reported as the difference between years rather than the proportional change.

*P<0.005.

Table 9. Estimated number of beaver trappers, trapping effort, and beaver captured by otter harvest tag holders during the 2018 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	646	77	8,701	1,533	5,674	1,580	86	4
Lower Peninsula	1,417	107	29,306	3,704	10,588	1,697	84	3
Zone 2	817	85	15,531	2,757	5,931	1,257	81	4
Zone 3	657	77	13,775	2,424	4,657	1,133	86	4
Unknown	32	18	318	284	567	569	NA	NA
Statewide	2,041	122	38,324	3,966	16,830	2,380	84	3

^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 10. Estimated number of beaver trappers, trapping effort, and beaver captured by otter harvest tag holders during the 2018 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	32	18	625	562	282	308
Alger	46	21	600	357	150	124
Allegan	11	10	96	126	57	83
Alpena	39	20	974	840	325	242
Antrim	11	10	300	308	82	90
Arenac	25	16	264	211	143	117
Baraga	32	18	268	174	136	142
Barry	39	20	892	519	161	100
Bay	32	18	557	432	139	90
Benzie	11	10	193	187	14	19
Berrien	14	12	189	195	57	60
Branch	7	8	100	149	89	148
Calhoun	32	18	749	440	82	54
Cass	32	18	821	740	764	569
Charlevoix	11	10	211	230	39	51
Cheboygan	46	21	782	502	307	199
Chippewa	71	26	703	369	517	351
Clare	54	23	421	223	243	165
Clinton	14	12	171	181	18	21
Crawford	36	19	385	279	278	332
Delta	39	20	407	278	243	296
Dickinson	39	20	653	369	485	387
Eaton	4	6	125	208	0	0
Emmet	29	17	278	178	153	117
Genesee	21	15	353	265	82	78
Gladwin	39	20	517	289	564	472
Gogebic	11	10	118	124	407	529
Gd. Traverse	29	17	468	419	79	62
Gratiot	11	10	125	134	57	65

^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 10 (continued). Estimated number of beaver trappers, trapping effort, and beaver captured by otter harvest tag holders during the 2018 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	7	8	25	42	36	43
Houghton	64	25	528	264	182	96
Huron	0	0	0	0	0	0
Ingham	0	0	0	0	0	0
Ionia	18	13	300	272	75	68
Iosco	57	24	1,049	681	293	157
Iron	64	25	1,299	813	628	434
Isabella	21	15	171	148	64	77
Jackson	18	13	389	540	57	56
Kalamazoo	32	18	542	351	200	156
Kalkaska	43	21	1,042	692	261	169
Kent	25	16	457	430	36	27
Keweenaw	18	13	335	290	128	129
Lake	57	24	1,313	804	157	116
Lapeer	25	16	303	241	118	105
Leelanau	0	0	0	0	0	0
Lenawee	11	10	171	198	82	82
Livingston	18	13	364	284	161	131
Luce	25	16	250	182	303	231
Mackinac	36	19	193	118	79	60
Macomb	11	10	439	563	50	64
Manistee	43	21	335	186	175	109
Marquette	103	32	1,681	643	1,085	925
Mason	11	10	285	366	14	17
Mecosta	61	24	1,103	550	435	321
Menominee	25	16	150	100	50	41
Midland	32	18	443	332	96	76
Missaukee	32	18	307	190	178	184
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.

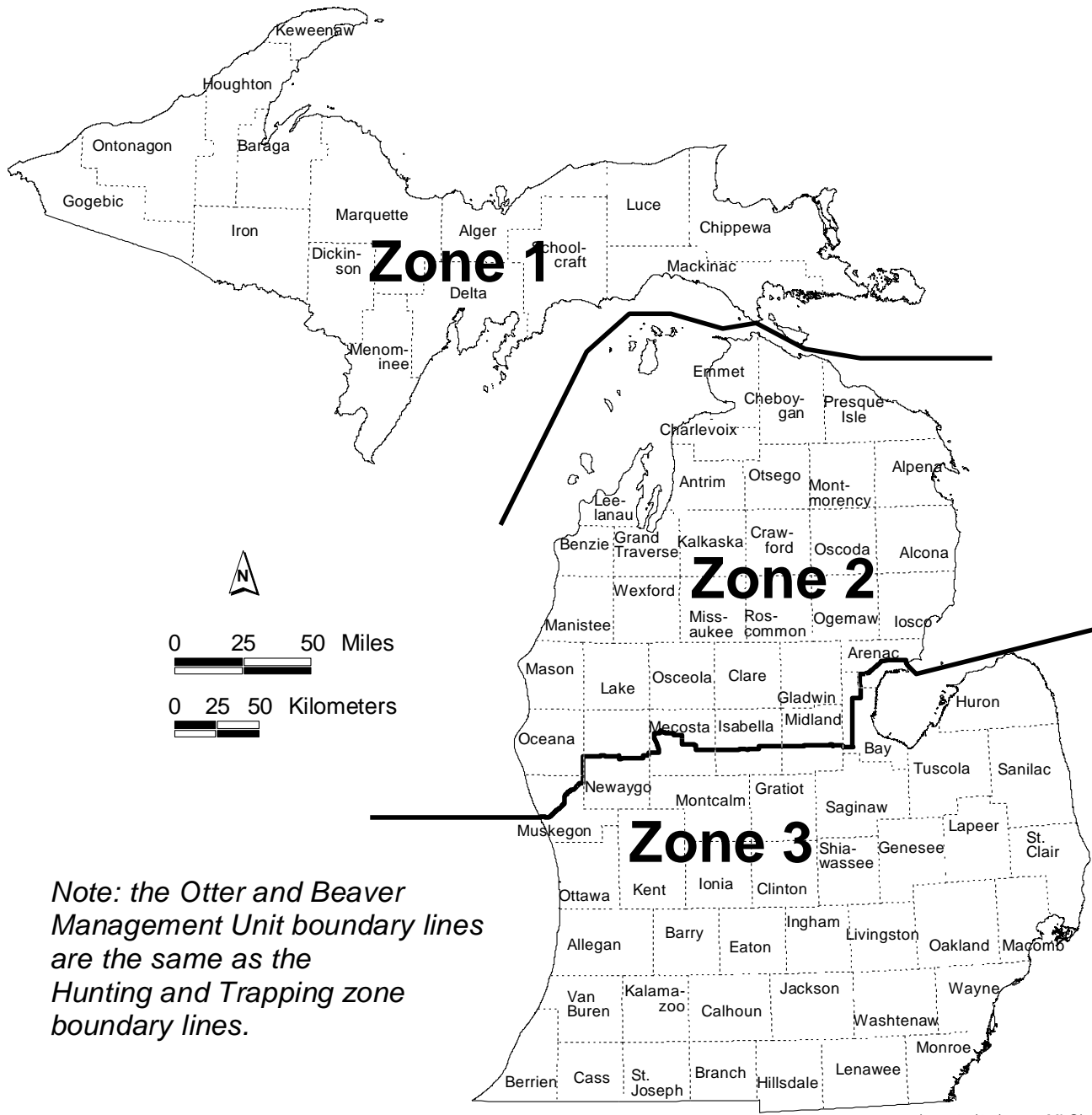
Table 10 (continued). Estimated number of beaver trappers, trapping effort, and beaver captured by otter harvest tag holders during the 2018 Michigan trapping season, summarized by county.^a

County	Trappers		Trapping effort (days)		Beaver captured	
	Total	95% CL ^b	Total	95% CL ^b	Total	95% CL ^b
Montcalm	43	21	564	323	146	101
Montmorency	61	24	1,124	629	421	301
Muskegon	18	13	139	121	86	90
Newaygo	64	25	1,196	595	171	84
Oakland	29	17	582	446	214	135
Oceana	18	13	118	131	36	38
Ogemaw	36	19	742	610	325	236
Ontonagon	54	23	525	303	510	464
Osceola	43	21	592	457	207	140
Oscoda	21	15	146	128	64	49
Otsego	39	20	517	313	114	74
Ottawa	18	13	93	75	36	31
Presque Isle	50	22	1,078	576	514	322
Roscommon	57	24	799	438	353	214
Saginaw	18	13	200	168	32	33
St. Clair	11	10	261	292	43	47
St. Joseph	61	24	864	454	782	593
Sanilac	4	6	36	59	7	12
Schoolcraft	68	26	992	529	771	387
Shiawassee	7	8	86	102	46	55
Tuscola	25	16	650	496	68	50
Van Buren	18	13	214	204	103	101
Washtenaw	4	6	7	12	7	12
Wayne	0	0	0	0	0	0
Wexford	36	19	664	408	310	233
Unknown	32	18	318	284	567	569
Statewide ^c	2,041	122	38,324	3,966	16,830	2,380

^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.



(rev. 10/15/2007 -MLS)

Figure 1. Otter and beaver management zones in Michigan, 2018.

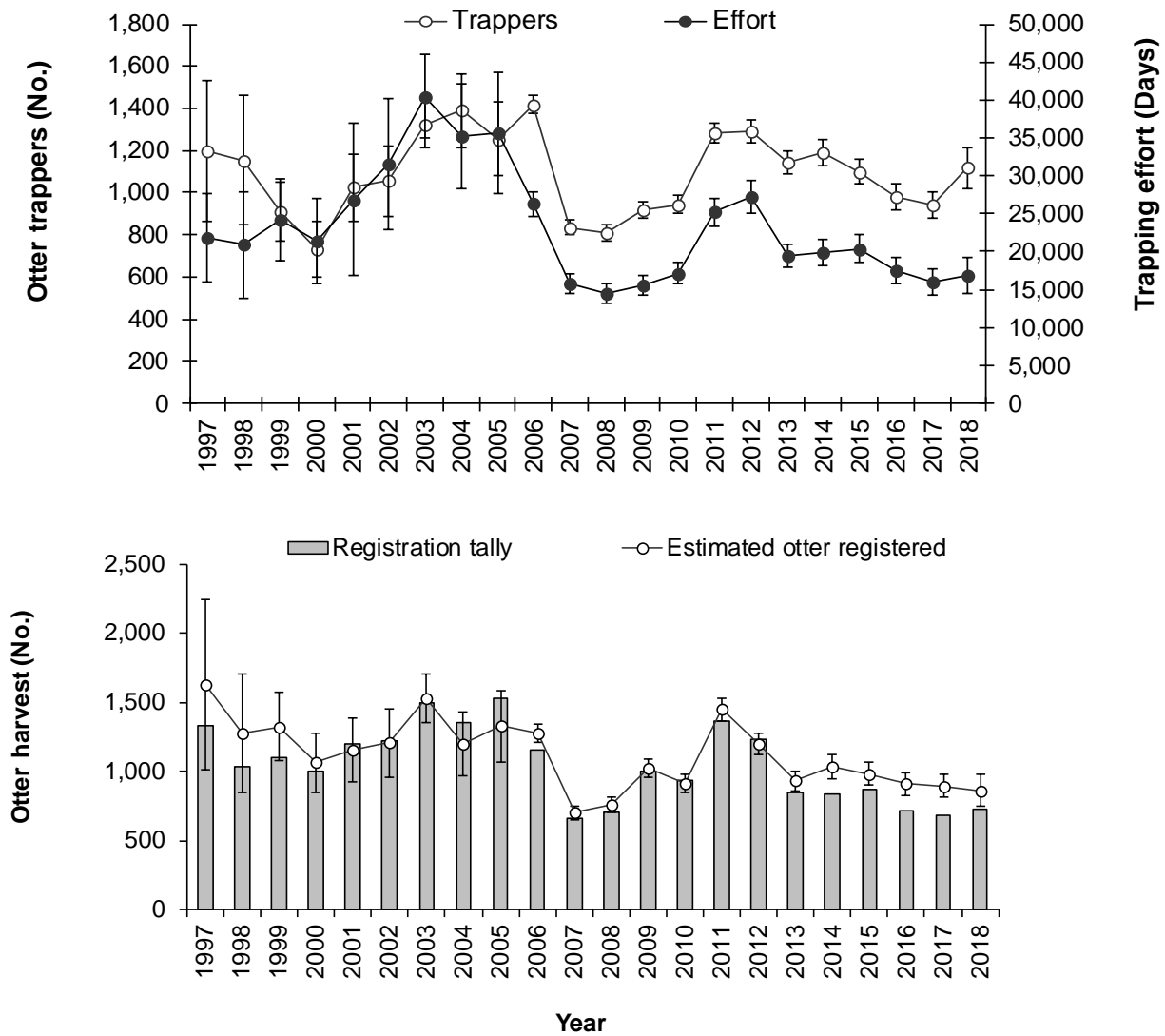


Figure 2. Estimated number of trappers, trapping effort (days), and number of otter captured and registered in Michigan, 1997-2018. Estimates of trapper numbers, trapping effort, and harvest were derived from harvest survey, while registration total was a tally of animals registered by trappers at registration 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.

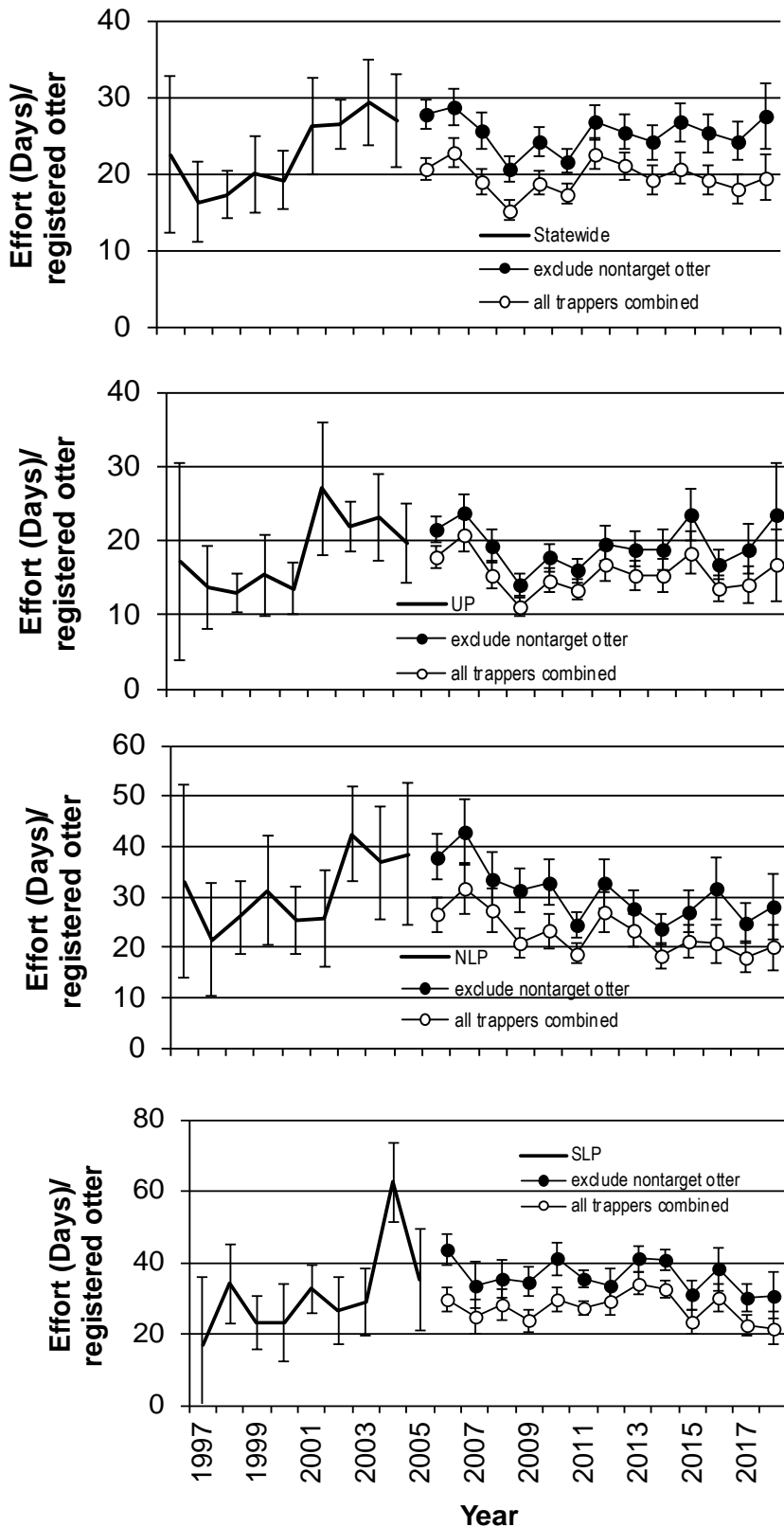


Figure 3. Estimated mean number of days required to harvest an otter in Michigan during 1997-2018, summarized by management zone. Beginning in 2006, two separate estimates were calculated: (1) an estimate excluding the activity of trappers that did not target otter and (2) an estimate of all trappers combined. The latter estimates are more comparable to estimates from previous years.

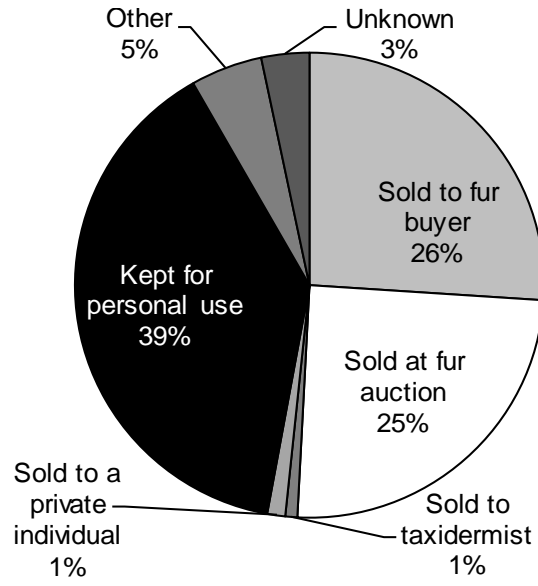


Figure 4. The proportion of otter pelts used for various purposes in Michigan, 2018.

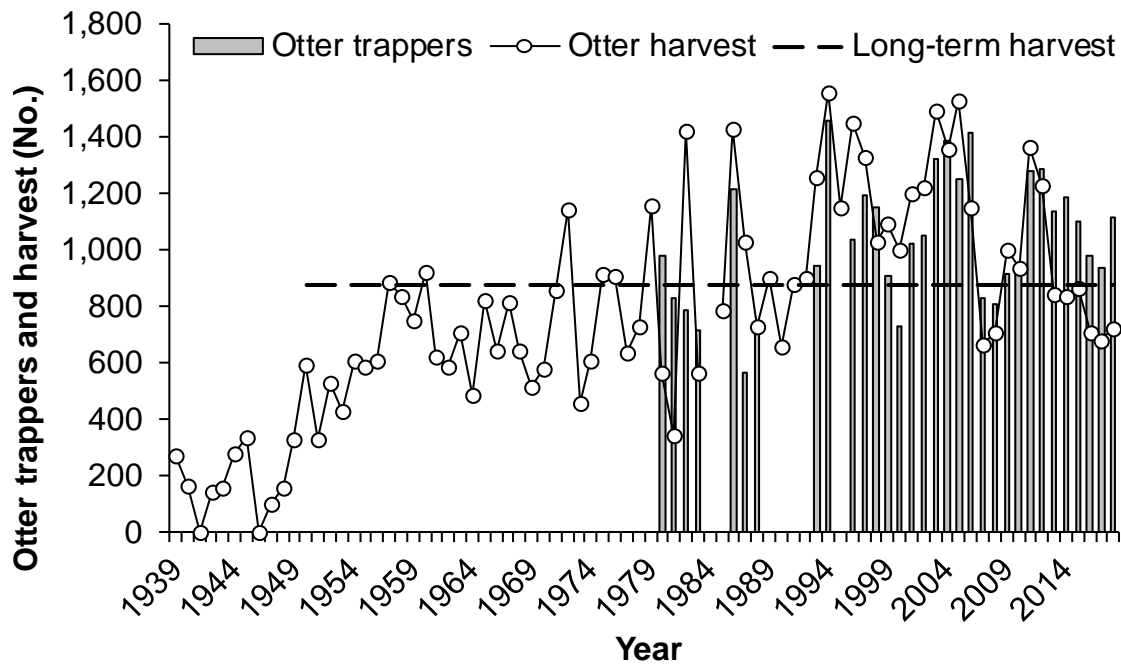


Figure 5. Otter harvest (sealing or registration tally, unpublished data) and estimated number of otter trappers (estimates from harvest survey) in Michigan, 1939-2018. Long-term (1950-2018) average harvest was 879 otter. Estimates were not available for years when values were not plotted.

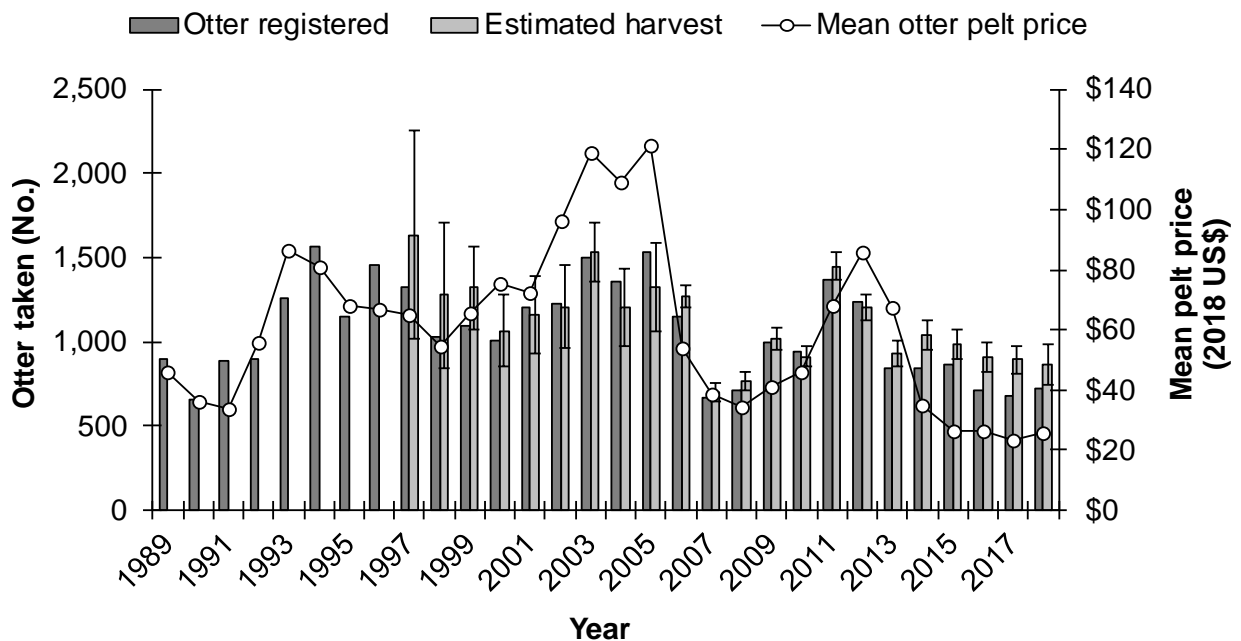


Figure 6. Otter registration totals, estimated otter harvest, and mean otter pelt prices in Michigan during 1989-2018. Mean pelt prices were the average paid in Minnesota and Wisconsin (e.g., Abraham and Dexter 2019, Dhuey 2016). Pelt prices were reported in 2018 dollars by adjusting for inflation using the Consumer Price Index (Bureau of Labor Statistics 2018). Vertical bars represent the 95% confidence interval. Estimates were not available for years when values were not plotted.

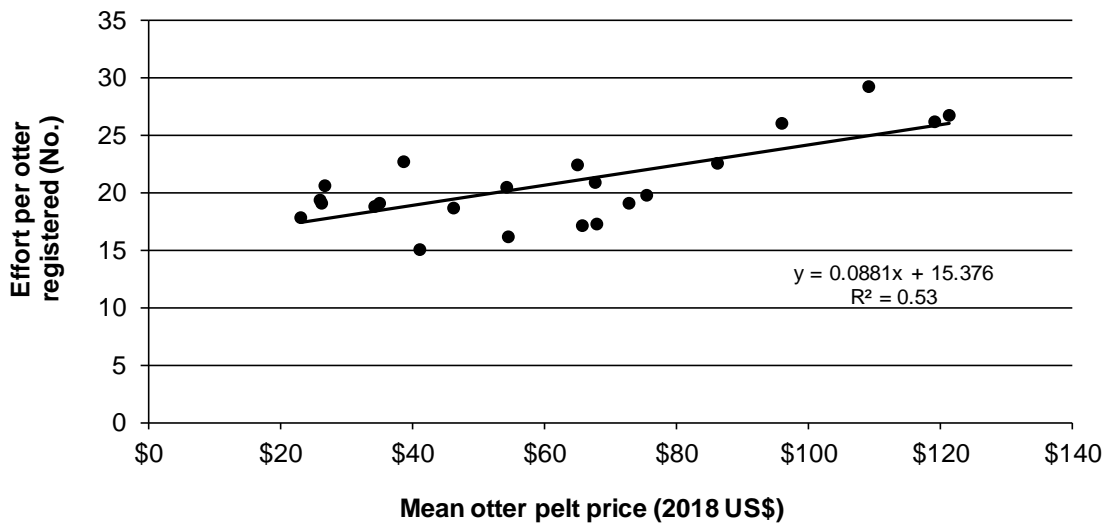
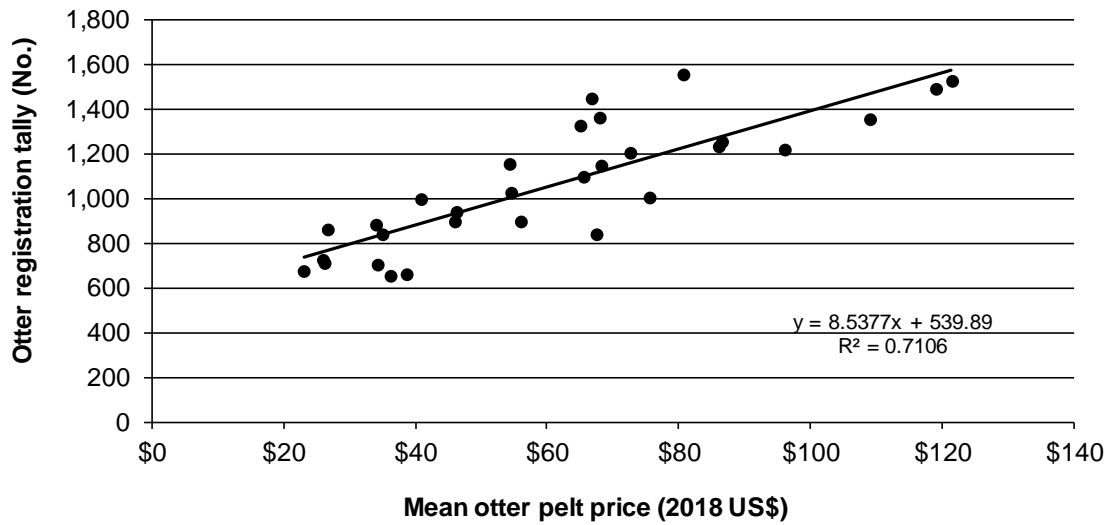


Figure 7. The relationship between the number of otter registered and mean otter pelt prices in Michigan during 1989-2018 (top), and the relationship between trapping effort per otter registered and mean otter pelt prices in Michigan during 1997-2018 (bottom).

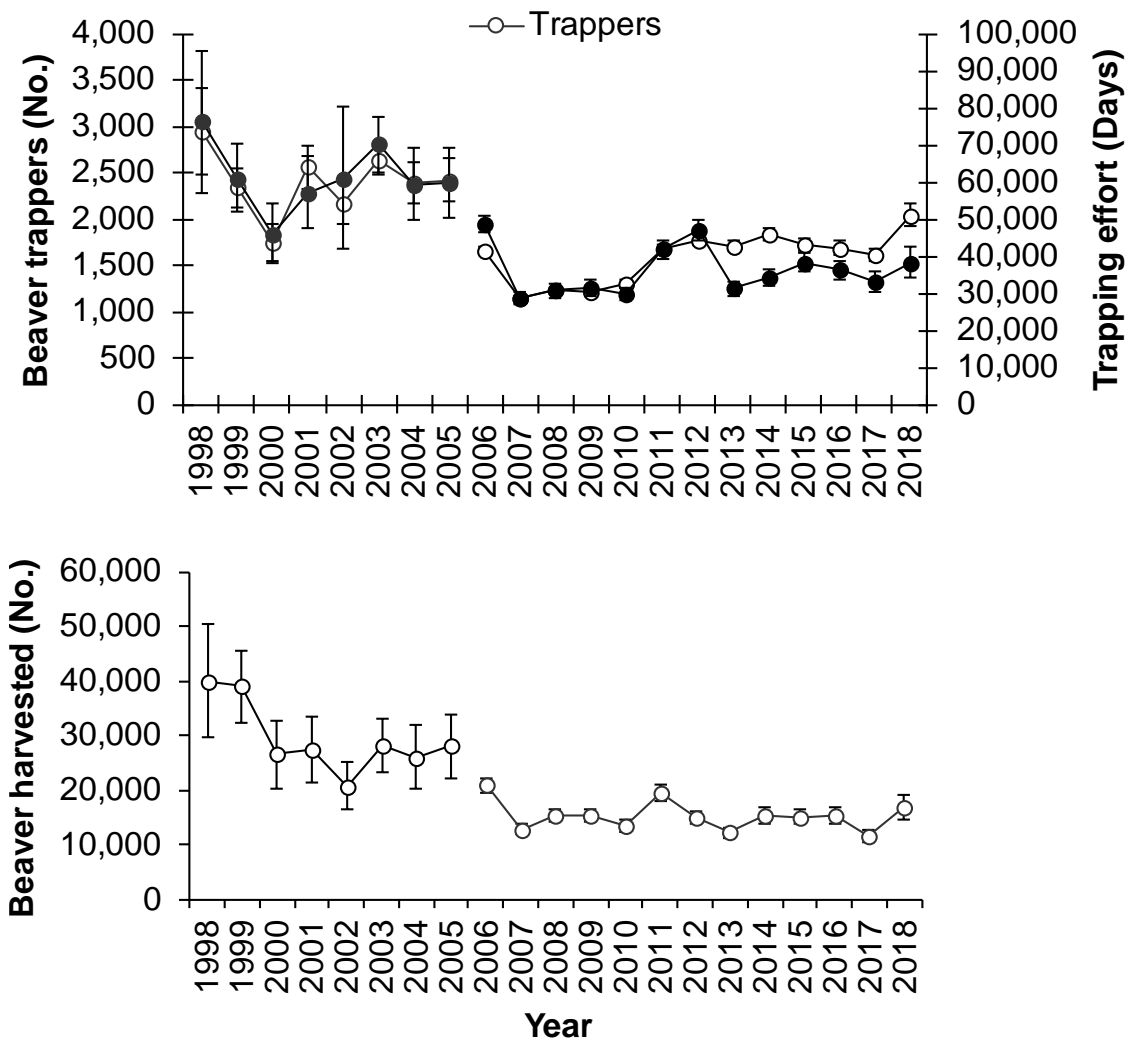


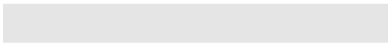
Figure 8. Estimated number of trappers, trapping effort (days), and number of beaver captured in Michigan, 1998-2018. Vertical bars represent the 95% confidence interval. The 2006-2018 estimates were not directly comparable to estimates from previous years because the 2006-2018 estimates only represent 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 2018 otter and beaver harvest survey in Michigan.



MICHIGAN DEPARTMENT OF NATURAL RESOURCES, WILDLIFE DIVISION
2018-19 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 2018-19 season?

¹ Yes ² No, Skip to question number 5.

2. If you trapped during the 2018-19 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 2018-19?

(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 2018-19?

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.)

Questions continued on reverse side.

7. If you captured an otter, please describe how you used (or plan to use) the otter?
Please record the number of otter used for each category.

- _____ Number sold to local fur buyer
- _____ Number sold at fur auction
- _____ Number sold to taxidermist
- _____ Number sold to a private individual
- _____ Number kept for personal use (for example, tanned hide or used for taxidermy mount)
- _____ Other: Please describe: _____

8. Did you place traps for beaver during the 2018-19 season?

- 1 Yes 2 No, skip to question 15.

9. If you trapped during the 2018-19 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

10. How many of the following traps did you set for beaver in 2018-19?

(For each type, record the average number used per day.)

- _____ Foothold
- _____ Conibear
- _____ Snares

11. Did you attempt to trap beavers with snares in open water during the 2018-19 seasons?

- 1 Yes 2 No (Skip to Question 12)

11a. If you attempted to trap beavers with snares in open water, how many beavers did you harvest with these sets during the 2018-19 seasons?

_____ BEAVER TAKEN

12. Did you attempt to trap beavers during April?

- 1 Yes 2 No (Skip to Question 13)

12a. If you attempted to trap beavers during April, how many beavers did you harvest in April?

_____ BEAVER TAKEN

13. What is the status of beaver in the county you trapped most often in 2018-19?

- 1 Increasing 2 Decreasing 3 Stable 4 Not present

14. Did you catch any otter in traps that were set for beaver in 2018-19?

- 1 Yes 2 No (Skip to Question 15)

14a. If you answered yes, report number of otter caught in your beaver sets.

_____ otter caught in beaver sets

15. 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!