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2011 WATERFOWL HARVEST SURVEY

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ABSTRACT

A sample of waterfowl hunters was contacted after the 2011 hunting seasons to estimate hunting activity and determine opinions and satisfaction with hunting regulations. Waterfowl hunting license sales declined by nearly 2% between 2010 and 2011; however, the number of people hunting ducks and geese was not significantly different between 2010 and 2011. In 2011, about 45,786 people hunted waterfowl in Michigan (nearly 38,783 duck hunters and 32,685 goose hunters). Duck harvest did not change significantly between 2010 and 2011, however, hunting effort of duck hunters declined significantly by 12%. Hunting effort by goose hunters and goose harvest did not change significantly statewide between 2010 and 2011. Satisfaction with waterfowl numbers and hunting season dates among duck and goose hunters was significantly lower between 2010 and 2011. Duck hunters were asked to indicate their preferred opening date for the 2012 duck hunting season (i.e., September 22, September 29, October 6, or October 13). Among hunters that preferred to hunt in the South Zone, nearly equal proportions preferred to begin the 2012 duck hunting season on October 6 or October 13. Among hunters who preferred to hunt in the Middle Zone, nearly equal proportions preferred to begin the 2012 duck hunting season on September 22, September 29, or October 6. Among hunters that preferred to hunt in the North Zone, the most popular date to begin the 2012 duck hunting season was September 22.

INTRODUCTION

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Michigan. This responsibility is shared with the U.S. Fish and Wildlife Service (USFWS) and other state and provincial wildlife management agencies for the management of migratory birds such as ducks (*Anatinae*) and geese (*Branta* and *Anser* spp.). Harvest surveys are one of the management tools used by the Wildlife Division in developing regulations. Estimating harvest and hunting effort are among the primary objectives of these surveys. Estimates derived from harvest surveys, as well as breeding bird abundance and population models, are used to develop harvest regulations that provide sustainable recreational hunting and viewing opportunities of migratory game birds. Wildlife management agencies also consider hunter opinions and desires when establishing regulations.

Waterfowl could be harvested during hunting seasons that occurred September 1, 2011, through January 29, 2012, (Table 1) by a person possessing both a waterfowl and a small game hunting license (includes resident, nonresident, 3-day nonresident, resident junior, and senior small game hunting licenses). Waterfowl hunters also had to obtain a federal waterfowl stamp and register with the National Migratory Bird Harvest Information Program (HIP). Hunters younger than 16 years of age could hunt waterfowl without a waterfowl hunting license or a federal waterfowl stamp; however, they still were required to purchase a small game license and register with the HIP.

The HIP is a cooperative effort between state wildlife agencies and the USFWS. It was implemented to improve knowledge about harvest of migratory game birds (e.g., ducks, geese, and woodcock [*Scolopax minor*]). Beginning in 1995, any person who hunted migratory game birds in Michigan was required to register with the HIP and answer several questions about their hunting experience during the previous year. The HIP provided the USFWS with a national registry of migratory bird hunters from which they can select participants for Federal harvest surveys.

State wildlife agencies select specific regulations, such as hunting season dates, within overall frameworks (e.g., number of days of hunting and bag limits) set by the USFWS. Both waterfowl population status and hunter attitudes are used when developing Michigan waterfowl hunting regulations. Although estimating harvest, hunter numbers, and hunting effort were the primary objectives of the waterfowl harvest survey, this survey also provided an opportunity to collect information about management issues. Questions were added to the questionnaire to estimate hunters' opinions and satisfaction with hunting regulations and waterfowl numbers.

METHODS

Following the 2011 hunting seasons, a questionnaire (Appendix A) was sent to 5,977 randomly selected people that were eligible to hunt waterfowl in Michigan. The people selected were grouped into one of two strata on the basis of their age, licenses purchased, and whether they had registered with the HIP. The first stratum consisted of people at least 16 years old that had purchased a waterfowl hunting license. The second stratum consisted of people 10-15 years old during September 1, 2011, and January 29, 2012, that had registered with the HIP by January 29, 2012. The overall sample consisted of 4,771 people from the first stratum (N=55,603), and 1,206 people from the second stratum (N=12,416).

Questionnaires were mailed initially in late February. Up to two follow-up questionnaires were sent to non-respondents. Hunters were asked to report whether they hunted, locations hunted (county and management zone), type of land on which hunt occurred (public or private lands), number of days spent afield, and number of waterfowl harvested. Hunters were also asked to rate their overall hunting experience and indicate satisfaction with hunting regulations (e.g., season dates and bag limits). Questionnaires were undeliverable to 151 people, primarily because of changes in residence. Questionnaires were returned by 3,273 of 5,826 people receiving the questionnaire (56% response rate).

Estimates were calculated using a stratified random sampling design (Cochran 1977). Using stratification, hunters were placed into similar groups (strata) based on their age, licenses purchased, and whether they had registered with the HIP. Then estimates were derived for each group separately. The statewide estimate was then derived by combining group estimates so the influence of each group matched the proportion its members occurred in the statewide population of hunters. 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 were to be repeated.

Estimates were derived separately for the Upper Peninsula (UP), northern Lower Peninsula (NLP), and southern Lower Peninsula (SLP, Figure 1). These areas are consistent with areas used for estimation in previous years, although they do not match formal management zones. Estimates were also calculated separately for waterfowl management zones. Hunting effort and birds harvested from unknown locations were allocated among areas in proportion to the known effort and harvest. 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 difficult to measure these biases. Thus, estimates were not adjusted for possible bias.

Statistical tests are used routinely to determine the likelihood that 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

License sales and hunter participation

In 2011, 55,721 people purchased a Michigan waterfowl hunting license (Table 2). The average age of people that purchased a waterfowl hunting license was 43 years (Figure 2). About 2% (922) of waterfowl license buyers were younger than 17 years old. Hunters 10-15

years of age could legally hunt waterfowl without a waterfowl hunting license; thus, the count of youth license buyers failed to count all youth waterfowl hunters. About 97% of the waterfowl hunting license buyers were males.

An estimated 45,786 people went afield to hunt waterfowl in 2011 (Table 3). The mean age of the active waterfowl hunter was 42 years, and about 12% of the active hunters were less than 17 years old (5,245 youth hunters). About $67 \pm 2\%$ of the people eligible to hunt waterfowl spent time hunting ducks or geese. About $73 \pm 2\%$ of the people that had purchased a waterfowl hunting license (stratum 1) hunted waterfowl. In contrast, $40 \pm 4\%$ of the people less than 16 years old that had registered with the HIP (stratum 2) hunted waterfowl. An estimated 38,783 duck hunters spent 291,474 days afield; while an estimated 32,685 goose hunters spent 251,309 days afield (Tables 4 and 5). About $38 \pm 2\%$ ($25,682 \pm 1,085$) of those eligible to hunt waterfowl attempted hunting both ducks and geese.

An estimated $2,602 \pm 416$ youth hunters (10-15 years old) participated during the 2-day youth waterfowl hunting season (Figure 3). About $21 \pm 3\%$ of the youth hunters eligible to hunt during the youth season actually participated.

Harvest and hunting trends

The number of active duck hunters statewide (all seasons combined) and their harvest did not change significantly between 2010 and 2011, however, hunting effort for ducks declined significantly by 12% (Tables 4-7). The number of goose hunters, their hunting effort, and harvest did not change significantly statewide (all seasons combined) between 2010 and 2011 (Tables 4-6 and 8).

Hunter opinions

An estimated 56% of the Michigan duck hunters were satisfied with their duck hunting experience in 2011, 19% had a neutral opinion about their experience, while 20% of duck hunters were dissatisfied (Table 9). Satisfaction among goose hunters with their goose hunting experience was similar to the satisfaction levels reported for duck hunting. In addition, overall satisfaction among duck and goose hunters in 2011 was not significantly different from 2010.

About 28% of duck hunters were satisfied with the number of ducks they harvested, and 30% of goose hunters were satisfied with the number of geese harvested (Table 9). These estimates of harvest satisfaction were not significantly different from 2010 estimates. The proportion of ducks hunters satisfied with the number of ducks seen in 2011 declined significantly from 2010 (42% versus 47% satisfied). The proportion of duck hunters satisfied with the duck season dates in 2011 declined from 2010 (40% versus 48% satisfied).

Most ($61 \pm 2\%$) duck hunters preferred to hunt in the South Zone, while $22 \pm 2\%$ of duck hunters preferred to hunt in the Middle Zone and $11 \pm 1\%$ preferred to hunt in the North Zone. About $5 \pm 1\%$ of the duck hunters did not indicate a preferred hunt zone. Among hunters that preferred to hunt in the South Zone, nearly equal proportions preferred to begin the 2012 duck hunting season on October 6 or October 13 (Table 10). Among hunters who preferred to hunt in the Middle Zone, nearly equal proportions preferred to begin the 2012

duck hunting season on September 22, September 29, or October 6. Among hunters that preferred to hunt in the North Zone, the most popular date to begin the 2012 duck hunting season was September 22.

Active waterfowl hunters indicated having an opportunity to hunt ducks and geese at the same time was important; 35% reported hunting season overlap was extremely important and 33% stated it was very important (Table 11). About 7% of goose hunters indicated having the opportunity to hunt both ducks and geese at the same time was only somewhat important and 8% said it was not important.

DISCUSSION

Raftovich et al. (2012) reported estimates of harvest, hunter numbers, and hunting effort of Michigan waterfowl hunters in 2011 from a USFWS survey. These estimates were based on responses received from a random sample of HIP registrants. Estimates of duck harvest and goose hunter numbers from the current survey and the USFWS survey were not significantly different (Table 12). In contrast, estimates of duck hunter numbers, duck and goose hunting effort, and harvest among goose hunters were significantly different between the surveys. These differences may reflect variations in the way the surveys were implemented.

Wright (1978) and Frawley (2012b) compared estimates of waterfowl hunting activity and harvest of waterfowl hunters derived from mail surveys to information reported at mandatory check stations. Estimates of waterfowl harvest were overestimated by 100-135%, and the number of hunting trips was overestimated by 35-73%. Wright attributed the largest source of bias associated with the harvest estimate to hunters reporting the take of hunting partners, rather than only reporting their harvest.

The number of people buying a waterfowl hunting license in 2011 declined by about 16% compared to the number of license buyers in 2001 (55,721 people purchased a license in 2011 versus 65,966 in 2001). There were fewer license buyers for the age classes between 24 and 48 years of age in 2011, compared to 2001 (Figure 4). However, there were increased hunter numbers among the oldest age classes in 2011. The increased hunter numbers in the oldest age classes likely represented the rising share of older people in the population as the baby-boom generation aged and life expectancies have increased.

Since 1954, the highest numbers of duck and goose hunters recorded in Michigan occurred in 1970 (Figure 5). From this peak, the current number of people hunting ducks has declined 72% (average annual decline = 3.1%), while the number of people hunting geese has declined 50% (average annual decline = 1.7%). Declining numbers of small game hunters, including waterfowl hunters, has been noted previously in Michigan and throughout the United States since the mid-1970s (Enck et al. 2000, U.S. Department of the Interior 2002, Aiken 2004, Frawley 2006). Many factors are responsible for declining waterfowl hunter numbers including increased urbanization of the human population, increased competition between hunting and other recreational activities, decreased access to private land for hunting, and loss of waterfowl habitat. Although the number of duck hunters and duck harvest has decreased since 1970, duck harvest per day of hunting effort has increased

(Figure 6). Goose harvest and the mean number of geese taken per day of hunting effort also have increased gradually since the 1970s (Figure 6).

Most waterfowl hunters indicated having an opportunity to hunt ducks and geese at the same time was an important consideration when setting hunting season dates (Table 11, Figure 7). This opinion was consistent with preferences reported previously among Michigan waterfowl hunters (Frawley and Soulliere 2005, Frawley 2012a).

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Table 1. Waterfowl hunting seasons in Michigan, 2011-2012.

Species, season, and area ^a	Season dates
Ducks ^b	
North Zone (UP)	Sept. 24 – Nov. 18 and Nov. 24 – Nov. 27
Middle Zone	Oct. 1 – Nov. 27 and Dec. 3 – 4
South Zone	Oct. 8 – Dec. 4 and Dec. 10 – 11
Canada geese ^{b,c}	
Early seasons	
North Zone (UP)	Sept. 1 – 10
Middle and South zones (LP)	Sept. 1 – 15
Regular seasons	
North Zone (UP)	Sept. 17 – Oct. 31
Middle Zone	Oct. 1 – Nov. 8, Nov. 24 – 27, and Dec. 3 – 4
South Zone	Oct. 8 – Nov. 10 and Nov. 24 – Dec. 4
Late season	
South Zone	Dec. 31 – Jan. 29

^aSee Figure 1 for boundaries of hunt areas.

^bDucks and geese could also be taken during a special 2-day Youth Season (September 17-18).

^cSpecial goose hunting seasons also occurred on Goose Management Units, but these seasons affected a relatively small area.

Table 2. Number of waterfowl hunting licenses sold in Michigan, 2007-2011.

Item	Year					2010-2011 % Change
	2007	2008	2009	2010	2011	
Number of licenses sold ^a	59,475	58,526	58,663	57,162	56,270	-1.6
Number of people buying a hunting license ^{b,c}	58,863	58,036	58,209	56,689	55,721	-1.7

^aThe number of licenses sold is higher than the number of people buying licenses because some people purchased multiple licenses.

^bA person was counted only once, regardless of how many licenses they purchased.

^cHunters 10-15 years of age could legally hunt waterfowl without a waterfowl hunting license.

Table 3. Estimated number, sex, and mean age of active waterfowl hunters, and proportion and number of youth waterfowl hunters in Michigan, 2007-2011.^a

Hunters	2007	2008	2009	2010	2011	
					Estimate	95% CL
Waterfowl ^b	47,748	47,384	50,064	47,788	45,786	1,029
Males (%)	95.7	94.2	97.0	97.2	96.4	0.8
Females (%)	3.9	3.0	3.0	2.8	3.6	0.8
Mean age (Years)	40.2	41.4	41.4	41.7	41.5	0.7
Youth (%) ^c	11.2	10.2	12.6	10.9	11.5	1.1
Youth (No.) ^c	5,331	4,819	6,299	5,191	5,245	546

^aAnalyses included only those people that hunted.

^bPeople that hunted ducks or geese (active hunters).

^cHunters 10-16 years of age.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2010 and 2011 ($P < 0.005$).

Table 4. Estimated number of waterfowl hunters by season and region in Michigan, 2008-2011.^a

Species and area (stratum)	2008	2009	2010	2011		2010-2011 % Change
				No.	95% CL	
Ducks (First split)						
UP	5,897	5,749	5,649	5,349	601	-5
NLP	16,892	17,936	17,083	15,480	938	-9
SLP	21,809	23,268	22,374	20,986	1,030	-6
Statewide	39,764	41,930	40,238	38,146	1,104	-5
Ducks (Second split)						
UP		463		636	217	NA
NLP	1,934	1,899	1,686	3,140	469	86*
SLP	6,471	7,022	6,537	6,726	667	3
Statewide	8,285	9,158	8,160	10,258	805	26*
Ducks (Seasons combined)						
UP	5,903	5,801	5,666	5,442	606	-4
NLP	17,100	18,288	17,265	15,900	946	-8
SLP	22,704	24,078	23,241	21,602	1,038	-7
Statewide	40,405	42,554	40,865	38,783	1,100	-5
Geese (Early season)						
UP	1,592	1,564	1,761	1,775	354	1
NLP	6,953	7,376	7,033	6,488	650	-8
SLP	12,345	13,782	12,059	11,831	836	-2
Statewide	20,084	22,023	20,331	19,603	1,014	-4
Geese (Regular season)						
UP	3,145	3,169	2,879	2,919	452	1
NLP	9,716	10,776	10,687	9,394	766	-12
SLP	14,871	14,548	14,840	13,820	891	-7
Statewide	26,300	27,106	27,007	25,094	1,078	-7
Geese (Late season)						
UP						
NLP	445	507	225	663	218	194*
SLP	6,071	6,206	6,054	6,491	651	7
Statewide	6,497	6,653	6,259	7,113	690	14
Geese (Seasons combined)						
UP	3,716	3,559	3,586	3,545	495	-1
NLP	12,123	13,637	13,319	11,609	834	-13
SLP	21,122	21,665	20,723	19,395	998	-6
Statewide	34,292	36,202	34,724	32,685	1,111	-6

^aThe number of hunters does not add up to the statewide total because hunters can hunt in more than one region. Regions did not match hunting zones; see Tables 7 and 8 for estimates by hunting zones.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2010 and 2011 ($P < 0.005$).

Table 5. Estimated amount of waterfowl hunter effort (days afield) by season and region, 2007-2011.^a

Species and area (stratum)	2008	2009	2010	2011		2010-2011 % Change
				No.	95% CL	
Ducks (First split)						
UP	34,630	34,669	32,293	30,676	5,043	-5
NLP	113,509	118,951	117,629	98,528	9,640	-16
SLP	148,105	158,734	167,107	145,025	11,541	-13
Statewide	296,244	312,353	317,029	274,230	14,855	-14*
Ducks (Second split)						
UP		1,259		1,184	480	NA
NLP	2,920	2,966	2,584	5,548	926	115*
SLP	9,775	9,802	9,995	10,512	1,152	5
Statewide	12,695	14,027	12,579	17,244	1,558	37*
Ducks (Seasons combined)						
UP	34,634	35,927	32,301	31,862	5,210	-1
NLP	116,434	121,914	120,225	104,078	10,081	-13
SLP	157,870	168,539	177,082	155,533	12,199	-12
Statewide	308,939	326,380	329,608	291,474	15,604	-12*
Geese (Early season)						
UP	5,742	6,073	6,185	6,029	1,492	-3
NLP	25,793	27,868	26,897	24,992	3,313	-7
SLP	45,194	51,787	44,615	45,411	4,461	2
Statewide	76,729	85,727	77,697	76,432	5,701	-2
Geese (Regular season)						
UP	18,795	20,484	18,598	18,354	4,260	-1
NLP	58,468	62,943	67,146	53,729	6,802	-20
SLP	82,754	79,795	87,075	76,409	7,525	-12
Statewide	160,017	163,222	172,819	148,493	10,548	-14*
Geese (Late season)						
UP						
NLP	1,030	1,592	512	1,863	941	264*
SLP	21,844	20,609	20,925	24,521	3,715	17
Statewide	22,875	22,201	21,437	26,384	3,867	23
Geese (Seasons combined)						
UP	24,488	26,502	24,762	24,439	5,276	-1
NLP	85,197	92,303	94,512	80,653	9,192	-15
SLP	149,936	152,345	152,679	146,217	12,743	-4
Statewide	259,620	271,150	271,954	251,309	15,889	-8

^aRegions did not match hunting zones; see Tables 7 and 8 for estimates by hunting zones.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2010 and 2011 (P<0.005).

Table 6. Estimated waterfowl harvest by season and region in Michigan, 2008-2011.^a

Species and area (stratum)	2008	2009	2010	2011		2010- 2011 % Change
				No.	95% CL	
Ducks (First split)						
UP	37,290	37,196	35,459	32,720	7,199	-8
NLP	132,361	149,538	149,797	120,127	14,719	-20
SLP	173,402	190,827	196,846	171,984	18,248	-13
Statewide	343,052	377,561	382,102	324,831	24,134	-15*
Ducks (Second split)						
UP		1,599		1,391	842	NA
NLP	4,289	4,870	4,628	7,721	1,854	67
SLP	16,263	15,568	20,635	16,462	2,649	-20
Statewide	20,553	22,036	25,263	25,575	3,345	1
Ducks (Seasons combined)						
UP	37,295	38,790	35,482	34,117	7,362	-4
NLP	136,659	154,380	154,476	127,858	15,534	-17
SLP	189,650	206,427	217,407	188,431	19,716	-13
Statewide	363,605	399,598	407,365	350,406	25,749	-14
Geese (Early season)						
UP	4,338	3,644	4,329	4,841	1,985	12
NLP	27,357	31,537	28,367	24,219	4,125	-15
SLP	49,271	53,530	51,763	50,700	7,212	-2
Statewide	80,966	88,712	84,459	79,760	8,715	-6
Geese (Regular season)						
UP	8,035	9,531	8,943	6,968	2,590	-22
NLP	32,154	31,815	35,145	23,291	4,258	-34*
SLP	48,464	47,274	47,902	40,001	5,982	-16
Statewide	88,652	88,620	91,989	70,261	7,740	-24*
Geese (Late season)						
UP						
NLP	673	814	899	1,482	945	65
SLP	13,766	16,113	22,970	18,174	4,065	-21
Statewide	14,439	16,927	23,869	19,655	4,189	-18
Geese (Seasons combined)						
UP	12,345	13,165	13,245	11,810	4,073	-11
NLP	60,075	64,146	64,406	48,928	7,454	-24
SLP	111,638	116,948	122,666	108,938	13,821	-11
Statewide	184,058	194,259	200,317	169,676	16,280	-15

^aRegions did not match hunting zones; see Tables 7 and 8 for estimates by hunting zones.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2010 and 2011 (P<0.005).

Table 7. Estimated number of duck hunters, hunting effort, and ducks harvested, summarized by season and management zone in Michigan, 2011.

Season and waterfowl zone ^a	Hunters		Effort		Harvest	
	No.	95% CL	No.	95% CL	No.	95% CL
First split						
North	5,308	603	30,655	5,044	32,675	7,201
Middle	10,588	815	62,013	7,667	71,043	11,434
South	26,688	1,094	181,561*	12,359	221,112*	20,038
Statewide	38,146	1,104	274,230*	14,855	324,831*	24,134
Second split						
North	668	224	1,235	494	1,496	874
Middle	2,251	403	4,057*	823	5,484	1,592
South	7,665	710	11,952	1,209	18,594	2,796
Statewide	10,258*	805	17,244*	1,558	25,575	3,345
Seasons combined						
North	5,418	609	31,889	5,212	34,169	7,367
Middle	10,843	823	66,070	8,118	76,527	12,224
South	27,391	1,098	193,515*	12,988	239,710*	21,461
Statewide	38,783	1,100	291,474*	15,604	350,406	25,749

^aEstimates for the zones do not equal estimates for the areas in Tables 4-6 because hunting effort and birds harvested from unknown locations were allocated among areas in proportion to the known effort and harvest.

*Non-overlapping 95% confidence intervals indicated estimates declined significantly between 2010 and 2011 (P<0.005).

Table 8. Estimated number of goose hunters, hunting effort, and geese harvested, summarized by season and management zone in Michigan, 2011.

Season and waterfowl zone ^a	Hunters		Effort		Harvest	
	No.	95% CL	No.	95% CL	No.	95% CL
Early						
North	1,980	354	6,744	1,492	5,515	1,985
Middle	3,530	466	13,844	2,446	10,629	2,575
South	14,692	872	55,844	4,543	63,616	7,399
Statewide	19,603	1,014	76,432	5,701	79,760	8,715
Regular						
North	3,263	452	20,166	4,260	7,717	2,590
Middle	5,272	564	30,042	4,987	12,956	3,179
South	17,807*	936	98,285*	8,075	49,587*	5,983
Statewide	25,094	1,078	148,493*	10,548	70,261*	7,740
Late						
North	0	0	0	0	0	0
Middle	0	0	0	0	0	0
South	7,157	668	26,384	3,816	19,655	4,115
Statewide	7,113	690	26,384	3,867	19,655	4,189

^aEstimates for the zones do not equal estimates for the areas in Tables 4-6 because hunting effort and birds harvested from unknown locations were allocated among areas in proportion to the known effort and harvest.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2010 and 2011 (P<0.005).

Table 9. Level of satisfaction among waterfowl hunters with the 2010 and 2011 waterfowl hunting seasons and hunting regulations in Michigan (summarized as the proportion of active waterfowl hunters reporting various levels of satisfaction).^a

Hunting experience or regulation	Level of satisfaction and year											
	Very satisfied or somewhat satisfied			Neutral			Somewhat dissatisfied or strongly dissatisfied			No answer		
	2010		2011	2010		2011	2010		2011	2010		2011
			95%			95%			95%			95%
	%	%	CL	%	%	CL	%	%	CL	%	%	CL
Ducks seen	47	42*	2	19	19	2	33	38*	2	1	1	1
Ducks harvested	32	28	2	21	21	2	41	44	2	5	6	1
Duck hunting experience	61	56	2	19	19	2	19	20	2	2	2	1
Duck season dates	48	40*	2	27	27	2	21	30*	2	4	3	1
Length of duck season	54	49*	2	26	26	2	17	22*	2	3	3	1
Daily duck limit	59	58	2	27	27	2	11	10	1	3	3	1
Geese seen	59	56	2	17	15	2	22	27*	2	2	2	1
Geese harvested	34	30	2	21	23	2	39	40	2	6	7	1
Goose hunting experience	54	53	2	22	21	2	22	24	2	2	3	1

^aEstimates associated with duck hunting were derived from answers provided by people that had hunted ducks, while estimates associated with goose hunting were derived from answers received from people that had hunted geese.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2010 and 2011 ($P < 0.005$).

Table 10. Preferred opening date of the 2012 duck hunting season in Michigan among active 2011 duck hunters, summarized by their preferred duck hunt zone.

Opening date	Preferred hunt zone											
	North Zone				Middle Zone				South Zone			
	Hunters (%)	95% CL	Hunters (No.)	95% CL	Hunters (%)	95% CL	Hunters (No.)	95% CL	Hunters (%)	95% CL	Hunters (No.)	95% CL
Sep. 22	38	6	1,652	349	19	4	1,650	349	18	2	4,368	557
Sep. 29	24	6	1,059	282	26	4	2,293	409	12	2	2,941	460
Oct. 6	16	5	672	222	23	4	1,952	380	24	2	5,759	628
Oct. 13	3	2	122	95	13	3	1,128	288	23	2	5,489	615
Undecided	15	5	639	219	15	3	1,285	310	14	2	3,342	490
Other	2	2	81	78	1	1	102	87	6	1	1,527	336
No answer	2	2	107	91	3	2	244	135	1	1	308	152

Table 11. Proportion and number of 2011 waterfowl hunters that preferred to hunt both ducks and geese simultaneously in Michigan.

Importance of hunting ducks and geese simultaneously	Hunters preferring option			
	%	95% CL	No.	95% CL
Extremely important	35	2	15,797	955
Very important	33	2	15,325	941
Somewhat important	7	1	3,133	477
Not sure	13	1	6,032	640
Not important	8	1	3,747	516
No answer	4	1	1,751	359

Table 12. Comparison of estimates of waterfowl hunter numbers, hunting effort, and harvest in Michigan during 2010 from the USFWS harvest survey and the Michigan waterfowl harvest survey.

Estimate	USFWS survey ^a		Michigan survey		Difference (%)
	No.	95% CL	No.	95% CL	
Ducks					
Hunters	31,500	3,465	38,783	1,100	23*
Hunting effort	191,000	22,920	291,474	15,604	53*
Harvest	287,500	46,000	350,406	25,749	22
Geese					
Hunters	28,400	3,408	32,685	1,111	15
Hunting effort	166,900	25,035	251,309	15,889	51*
Harvest	125,400	22,572	169,676	16,280	35*
Ducks and geese combined					
Hunters	39,400	3,940	45,786	1,029	16*

^aRaftovich et al. (2012).

*Non-overlapping 95% confidence intervals indicated estimates from the surveys were significantly different (P<0.005).

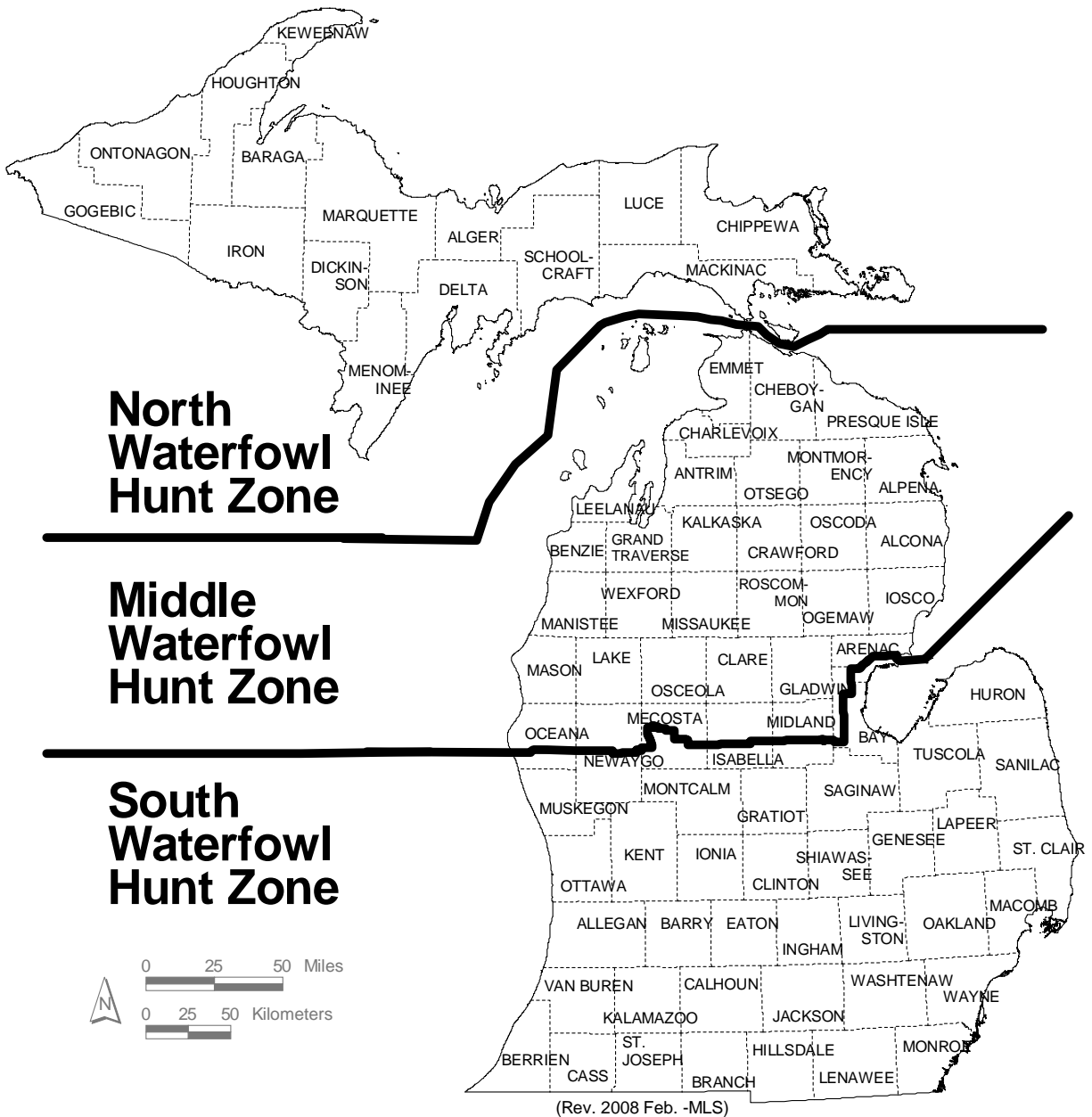
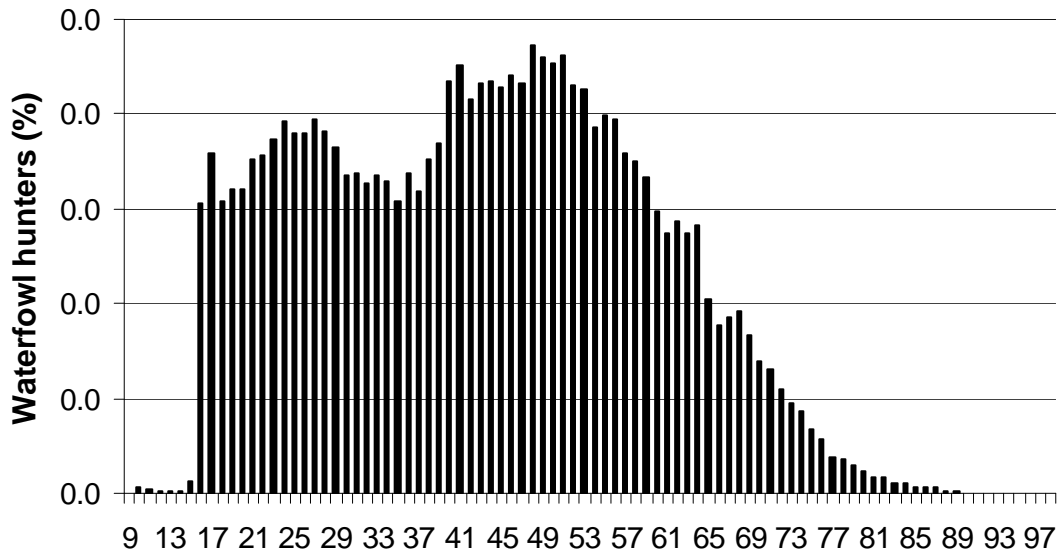


Figure 1. Areas used to summarize the waterfowl survey data for the 2010 waterfowl hunting seasons in Michigan. Regional boundaries did not match the waterfowl management hunting zones.



Hunter's age on October 1, 2011

Figure 2. Age of people that purchased a waterfowl hunting license in Michigan for the 2010 hunting seasons (\bar{x} = 43 years). Hunters 10-15 years of age could legally hunt waterfowl without a waterfowl hunting license.

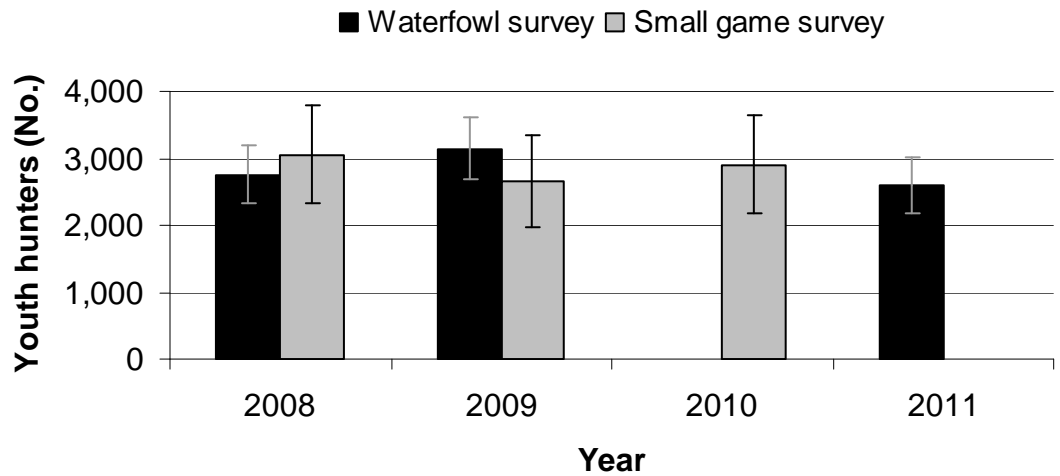


Figure 3. Estimated number of youths (10-15 years old) hunting during the youth waterfowl hunting weekend in Michigan during 2008-2011. Estimates plotted separately by the source of the estimate (waterfowl harvest survey or small game harvest survey).

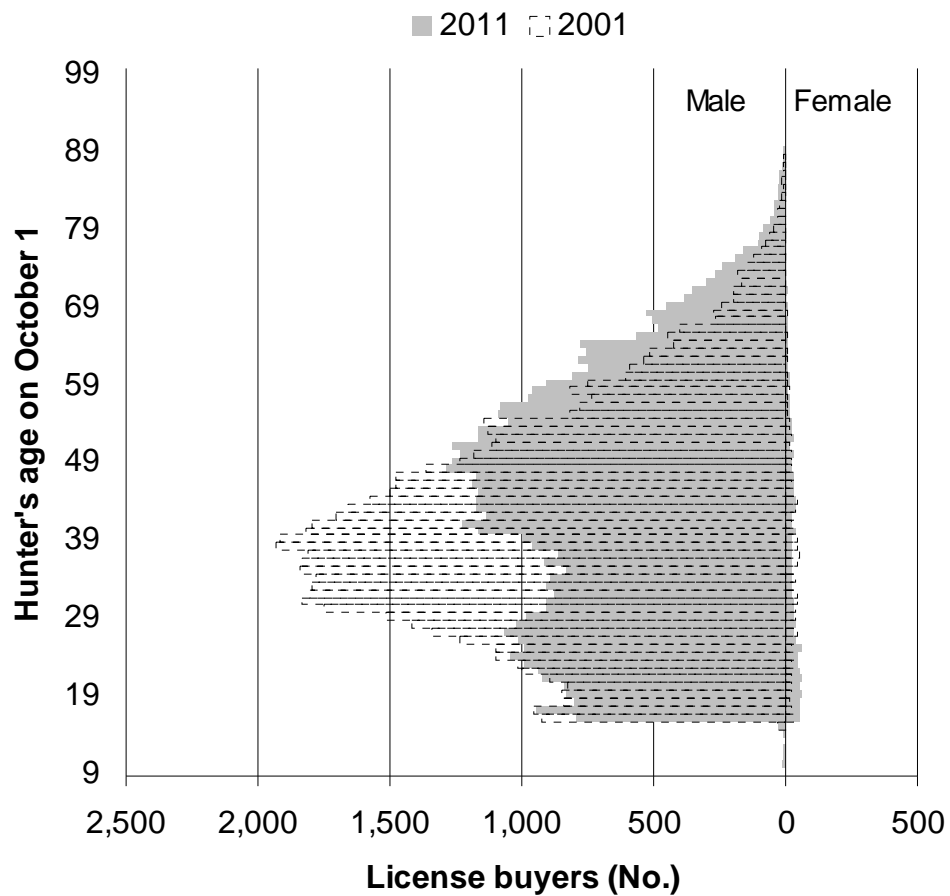


Figure 4. Number of waterfowl hunting license buyers in Michigan by age and sex during 2001 and 2011 hunting seasons. Waterfowl hunting licenses were purchased by 65,966 people in 2001 and 55,721 people in 2011. Hunters 10-15 years of age could legally hunt waterfowl without a waterfowl hunting license.

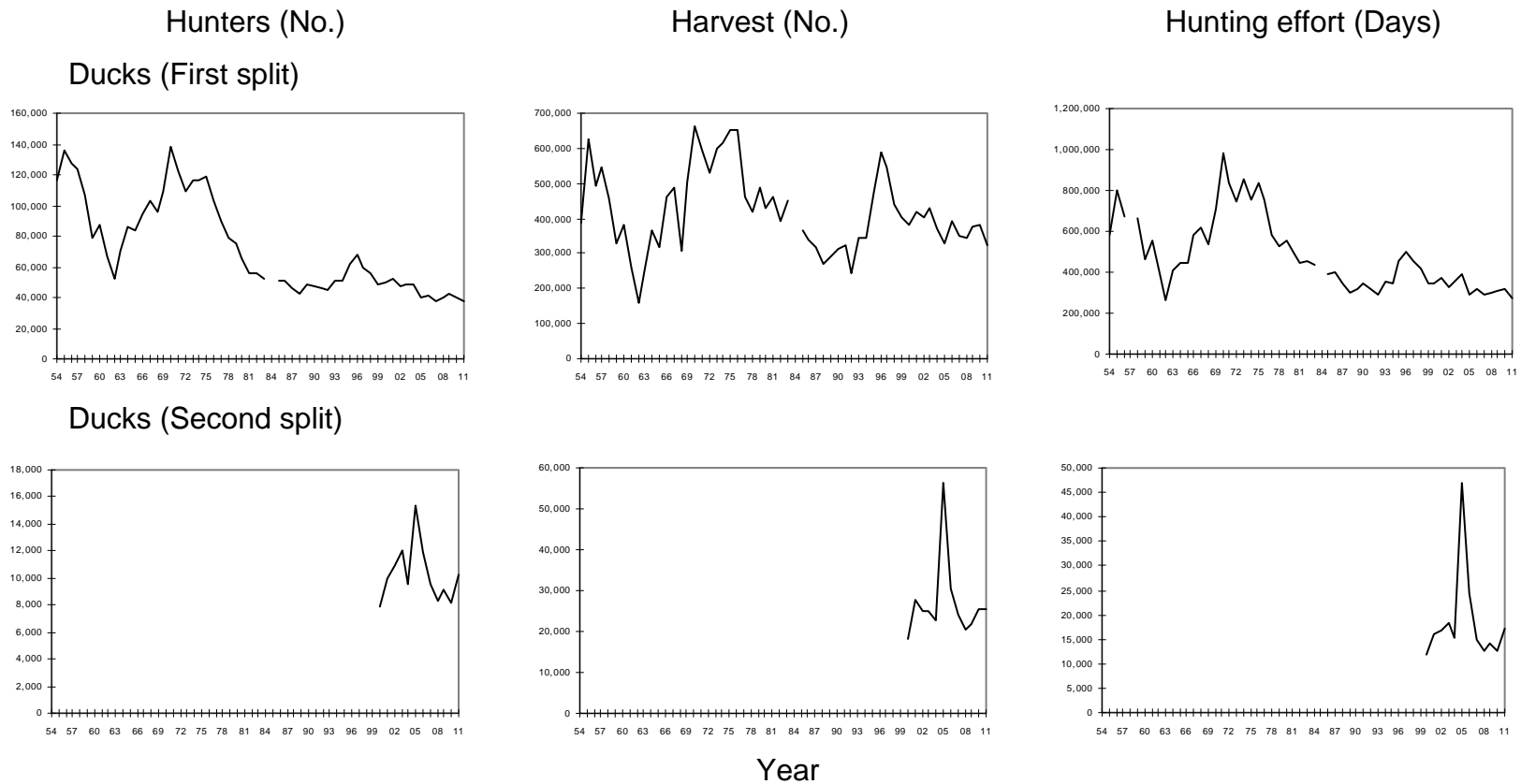


Figure 5. Estimated number of hunters, harvest, and hunting effort in Michigan during the waterfowl hunting seasons, 1954-2010. No estimates were available or no seasons existed during years when no data are plotted.

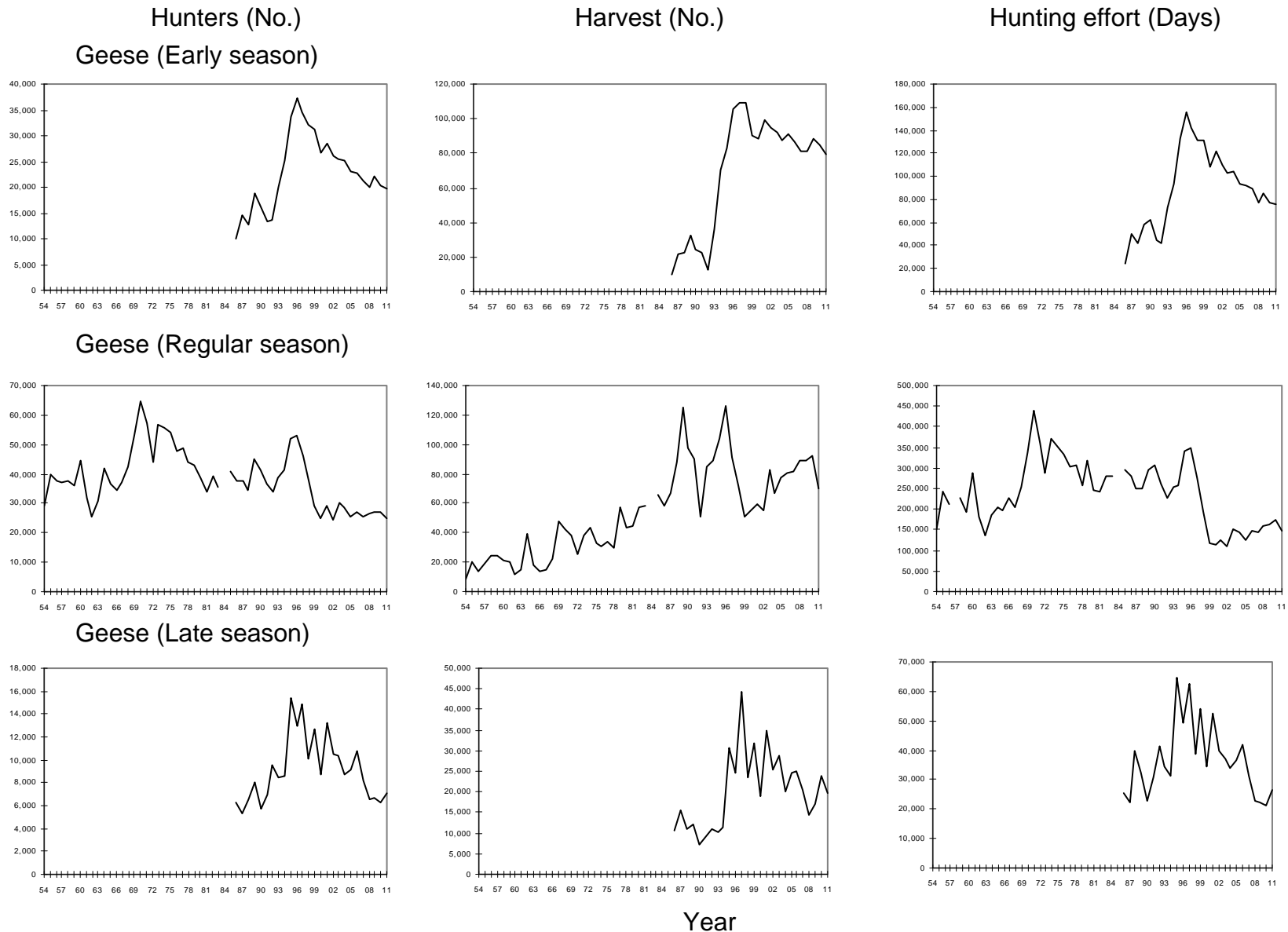


Figure 5 (continued). Estimated number of hunters, harvest, and hunting effort in Michigan during the waterfowl hunting seasons, 1954-2010. No estimates were available or no seasons existed during years when no data are plotted.

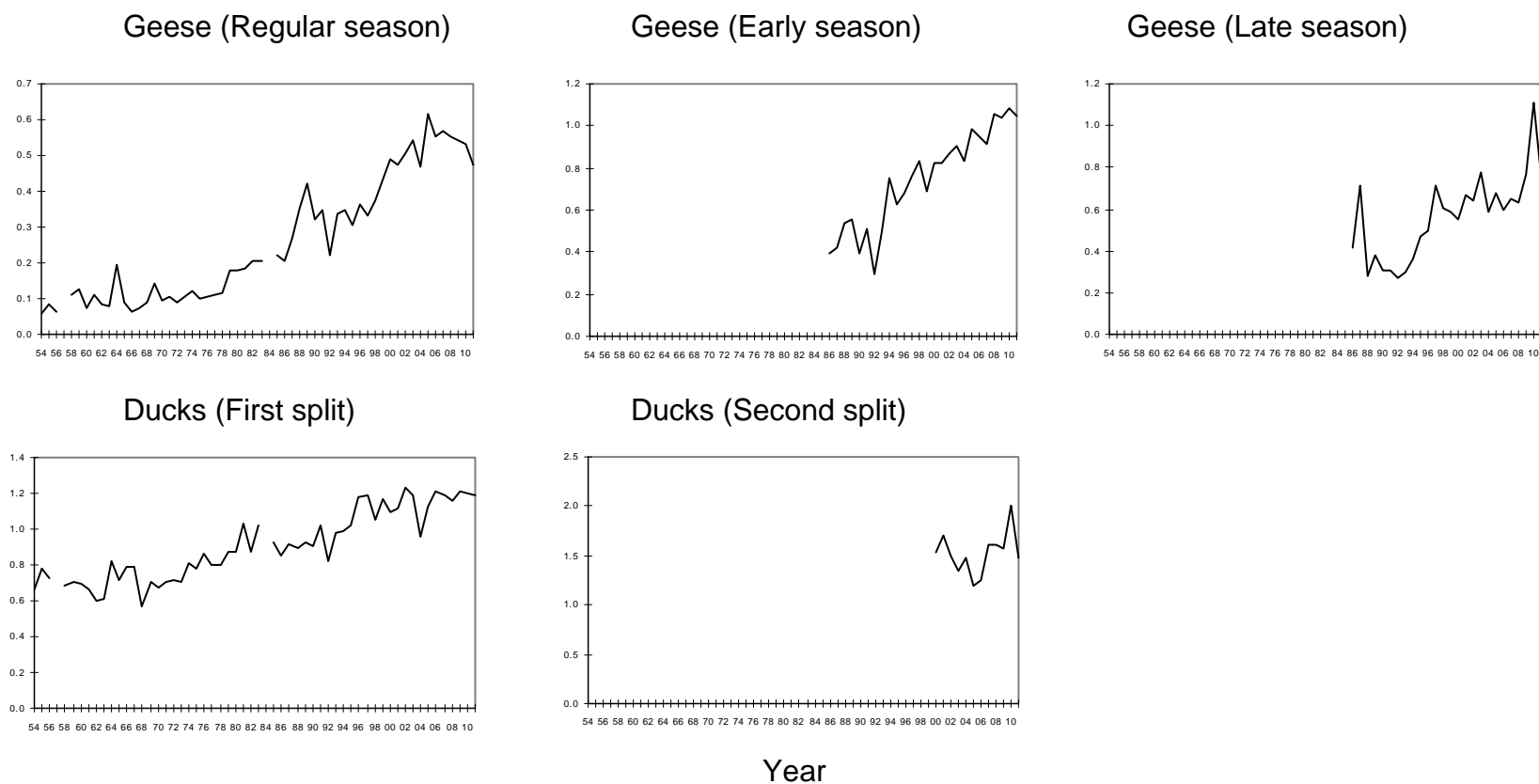


Figure 6. Estimated harvest per effort in Michigan during the waterfowl hunting seasons, 1954-2010. No estimates were available or no seasons existed during years when no data are plotted.

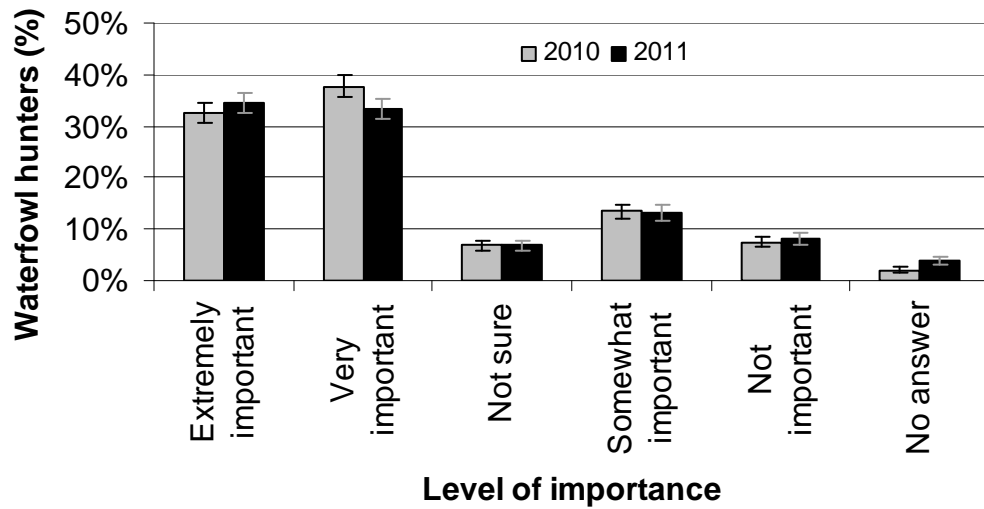


Figure 7. Importance to Michigan waterfowl hunters of having an opportunity to hunt ducks and geese at the same time. Estimates summarized separately for 2010 (Frawley 2012a) and 2011 surveys.

Appendix A

2011-2012 Waterfowl Harvest Questionnaire



2011-2012 WATERFOWL HARVEST REPORT

This information is requested under authority of Part 435, 1994 PA 451, M.C.L. 324.43539.



It is important that you complete this questionnaire even if you did not hunt any waterfowl. Please report only your hunting activities and the birds that you harvested.

1. Did you hunt ducks or geese in Michigan from September 1, 2011, through January 29, 2012 (2011-2012 hunting season)?

☐ Yes. Please complete the table below and answer questions on next page.

☐ No. Skip to Question #3.

SEASON SEGMENT (Check box if you hunted during the season. Note the duck season is divided into two segments and goose season divided into three segments. Dates and areas of each segment listed below.)	COUNTY HUNTED (For each season you hunted, list the counties hunted on separate lines.)	MANAGEMENT ZONE (See figure on last page for zone boundaries.)			DAYS HUNTED	NUMBER OF BIRDS TAKEN	LAND TYPE		
		North (UP)	Middle (NLP)	South (SLP)			Private	Public	Both
<input checked="" type="checkbox"/> Example	1 Jackson	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>	5	12	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>
<input type="checkbox"/> Duck First Portion of Regular Season Sept 24 – Nov 18 (North Zone) Oct 1 – Nov 27 (Middle Zone) Oct 8 – Dec 4 (South Zone)	1	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
<input type="checkbox"/> Duck Late Portion of Regular Season (2-4 days only) Nov 24-27 (North Zone) Dec 3-4 (Middle Zone) Dec 10-11 (South Zone)	1	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
<input type="checkbox"/> Goose Early Season Sept 1-10 (North Zone) Sept 1-15 (Middle Zone) Sept 1-15 (South Zone)	1	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
<input type="checkbox"/> Goose Regular Season Sept 17-Oct 31 (North Zone) Oct 1-Nov 8, Nov 24-27, & Dec 3-4 (Middle) Oct 8-Nov 10 & Nov 24-Dec 4 (South)	1	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
<input type="checkbox"/> Goose Late Season Dec 31 – Jan 29 (South Zone)	1			3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2			3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3			3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4			3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>

2. Please indicate how satisfied or dissatisfied you were with the following for the 2011-2012 waterfowl hunting season and hunting regulations: (Select one choice per item.)

	Very Satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Strongly Dissatisfied	Not Applicable
a. Number of <u>ducks</u> you saw.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
b. Number of <u>ducks</u> you harvested.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
c. Your overall <u>duck</u> hunting experience.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
d. <u>Duck</u> season dates.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
e. The number of days in the <u>duck</u> season.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
f. The size of the daily <u>duck</u> limit.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
g. Number of <u>geese</u> you saw.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
h. Number of <u>geese</u> you harvested.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
i. Your overall <u>goose</u> hunting experience.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>

Questions continue on next page.

3. If you are a youth (*adults skip to question 4*), did you hunt during Michigan's Youth Waterfowl Hunting weekend (September 17-18, 2011)? Eligible youth were 10-15 years old during the youth season.
- ¹ ☐ Yes ² ☐ No
4. What is your preferred zone to hunt ducks in Michigan? (*Check one.*)
- ¹ ☐ North Zone
(Upper Peninsula) ² ☐ Middle Zone
(Northern Lower Peninsula) ³ ☐ South Zone
(Southern Lower Peninsula)
5. For your preferred zone to hunt ducks, as in the previous question, please indicate the opening date you would prefer for that zone for the 2012-2013 duck season. (*Check one.*)
- ¹ ☐ Sept. 22 ² ☐ Sept. 29 ³ ☐ October 6 ⁴ ☐ October 13 ⁵ ☐ Undecided ⁶ ☐ Other: _____
6. How important is it for you to have the opportunity to hunt ducks and geese at the same time?
- ¹ ☐ Extremely Important ² ☐ Very Important ³ ☐ Not Sure ⁴ ☐ Somewhat Important ⁵ ☐ Not Important

