



2010 WATERFOWL HARVEST SURVEY

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ABSTRACT

A sample of waterfowl hunters was contacted after the 2010 hunting seasons to estimate hunting activity and determine opinions and satisfaction with hunting regulations. Waterfowl hunting license sales declined by nearly 3% between 2009 and 2010; however, the number of people hunting ducks and geese was not significantly different between 2009 and 2010. In 2010, about 47,788 people hunted waterfowl in Michigan (nearly 40,865 duck hunters and 34,724 goose hunters). Satisfaction with waterfowl numbers, hunting experience, and hunting season dates among duck and goose hunters was similar between 2009 and 2010. Duck hunters were asked to indicate their preferred opening date for the 2011 duck hunting season (i.e., September 24, October 1, October 8, or October 15). Among hunters that preferred to hunt in the South Zone, nearly equal proportions preferred to begin the 2011 duck hunting season on September 24, October 1, or October 8. Among hunters who preferred to hunt in the Middle Zone, nearly equal proportions preferred to begin the 2011 duck hunting season on September 24 or October 1. Among hunters that preferred to hunt in the North Zone, the most popular date to begin the 2011 duck hunting season was September 24.

INTRODUCTION

The Michigan Natural Resources Commission and Department of Natural Resources (DNR) have authority and responsibility to protect and manage wildlife resources in the state of 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



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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, 2010, through January 30, 2011, (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 2010 hunting seasons, a questionnaire (Appendix A) was sent to 5,984 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, 2010, and January 30, 2011, that had registered with the HIP by January 30, 2011. The overall sample consisted of 4,860 people from the first stratum (N=56,576), and 1,124 people from the second stratum (N=12,669).

Questionnaires were mailed initially in late March. 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 146 people, primarily because of changes in residence. Questionnaires were returned by 3,113 of 5,838 people receiving the questionnaire (53% 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 2010, 56,689 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% (941) 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 include all youth waterfowl hunters. About 98% of the waterfowl hunting license buyers were males.

An estimated 47,788 people went afield to hunt waterfowl in 2010 (Table 3). The mean age of the active waterfowl hunter was 42 years, and about 11% of the active hunters were less than 17 years old (5,191 youth hunters). About $69 \pm 2\%$ of the people eligible to hunt waterfowl spent time hunting ducks or geese. About $75 \pm 2\%$ of the people that had purchased a waterfowl hunting license (stratum 1) hunted waterfowl. In contrast, $43 \pm 5\%$ of the people less than 16 years old that had registered with the HIP (stratum 2) hunted waterfowl. An estimated 40,865 duck hunters spent 329,608 days afield; while an estimated 34,724 goose hunters spent 271,954 days afield (Tables 4 and 5). About $40 \pm 2\%$ ($27,801 \pm 1,143$) of those eligible to hunt waterfowl attempted hunting both ducks and geese.

About $20 \pm 2\%$ of waterfowl hunters hunted on Managed Waterfowl Hunt Areas in 2010 (Table 6). The Managed Waterfowl Hunt Areas (MWA) consisted of Allegan Fennville Farm, Fish Point, Muskegon County Wastewater, Nayanquing Point, Pointe Mouillee, Shiawassee River State Game Area, and St. Clair Flats (Harsens Island). About $18 \pm 2\%$ of the hunters that hunted ducks hunted on MWAs, while $13 \pm 1\%$ of active goose hunters had hunted geese on MWA.

Harvest and hunting trends

The number of active duck hunters statewide (all seasons combined), hunting effort, and harvest did not change significantly between 2009 and 2010 (Tables 4, 5, and 8). The number of goose hunters, their hunting effort, and harvest also did not change significantly statewide (all seasons combined) between 2009 and 2010 (Tables 4, 5, 7 and 9).

Hunter opinions

An estimated 61% of the Michigan duck hunters were satisfied with their duck hunting experience in 2010, 21% had a neutral opinion about their experience, while 20% of duck hunters were dissatisfied (Table 10). Satisfaction among goose hunters with their goose hunting experience was similar to the satisfaction levels reported for duck hunting.

Nearly 50% of Michigan duck hunters were satisfied with the 2010 duck hunting season dates, length of the duck season, and the daily duck limit (Table 10). About 47% of the duck hunters reported they were satisfied with the number of ducks seen in 2010, but only 32% of duck hunters were satisfied with the number of ducks harvested. Similarly, about 59% of goose hunters were satisfied with the number of geese seen in 2010, but only 34% of goose hunters were satisfied with the number of geese harvested.

Most ($62 \pm 2\%$) duck hunters preferred to hunt in the South Zone, while $23 \pm 2\%$ of duck hunters preferred to hunt in the Middle Zone and $12 \pm 1\%$ preferred to hunt in the North Zone. About $4 \pm 1\%$ 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 2011 duck hunting season on September 24, October 1, or October 8 (Table 11). Among hunters who preferred to hunt in the Middle Zone, nearly equal proportions preferred to begin the 2011 duck hunting season on September 24 or October 1. Among hunters that preferred to hunt in the North Zone, the most popular date to begin the 2011 duck hunting season was September 24.

Duck hunters were divided in their opinion about maintaining split seasons (i.e., seasons broken into two segments) for 2011 (Table 12). About 46% of duck hunters favored having split seasons, and most of these hunters preferred to maintain the splits as done in 2010 (see Table 1 for 2010 season dates). In contrast, 29% of duck hunters preferred a continuous season in 2011. In addition 21% of duck hunters were undecided and 4% of hunters did not indicate a preference.

Active waterfowl hunters indicated having an opportunity to hunt ducks and geese at the same time was important; 32% reported hunting season overlap was extremely important and 38% stated it was very important (Table 13). About 13% 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.

Hunters were asked whether they would hunt teal if a September teal hunting season was established. About 30% of the active waterfowl hunters indicated they were very likely to participate, and 24% of hunters were somewhat likely to hunt teal (Table 14).

DISCUSSION

Raftovich et al. (2011) reported estimates of harvest, hunter numbers, and hunting effort of Michigan waterfowl hunters in 2010 from a USFWS survey. These estimates were based on responses received from a random sample of HIP registrants. Estimates of hunter numbers from the current survey and the USFWS survey were not significantly different (Table 15). In contrast, estimates of hunting effort and harvest among duck and goose hunters were significantly different between the surveys. These differences may reflect unknown differences in the way the surveys were implemented.

Wright (1978) and Frawley (2012) 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.

Since 1954, the highest numbers of duck and goose hunters recorded in Michigan occurred in 1970 (Figure 3). From this peak, the current number of people hunting ducks has declined 70% (average annual decline = 3.0%), while the number of people hunting geese has declined 46% (average annual decline = 1.5%). 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). Between 2001 and 2006, the number of hunters pursuing ducks declined 28% nationally (U.S. Fish and Wildlife Service 2010). Similarly, the number of people hunting ducks in the regular duck hunting season (first season split) declined an estimated 27% in Michigan during this same period (Figure 3). 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 4). Goose harvest and the mean number of geese taken per day of hunting effort also have increased gradually since the 1970s (Figure 4).

The proportion of duck hunters satisfied with their overall duck hunting experience was the same in both 2009 and 2010 (57% versus 61%, Table 9). Moreover, similar proportions of duck hunters were satisfied with the number of ducks seen, ducks harvested, and hunting season dates in both 2009 and 2010. Goose hunters also reported similar levels of satisfaction with their overall goose hunting experience in 2009 and 2010 (53% versus 54%, Table 9). Furthermore, goose hunters in 2009 and 2010 reported similar levels of satisfaction with the number of geese seen and geese harvested.

Following the last three duck hunting seasons, duck hunters in Michigan have been asked to indicate their preferred opening date for next years duck hunting season (Frawley 2012a, 2012b). Hunters could choose among (1) the last Saturday in September, (2) first Saturday in October, (3) second Saturday in October, and (3) third Saturday in October. Preferences have generally been similar among the past three years (Figure 5). Among hunters that preferred to hunt in the South Zone, none of the choices were favored by a plurality of hunters. Among hunters who preferred to hunt in the Middle Zone, nearly equal proportions preferred to begin the 2011 duck hunting season during late September or early October. Among hunters that preferred to hunt in the North Zone, the most popular date to begin the duck hunting season was the last Saturday in September.

After the last two duck hunting seasons, duck hunters also were asked to indicate whether they preferred a continuous duck hunting season or a season divided into two segments (Frawley 2012b). Hunter preferences have generally been similar the last two years (Figure 6). Nearly half of the duck hunters favored having split seasons, and most of these hunters preferred to maintain the splits as set in the previous year.

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 13). This opinion was consistent with preferences reported among Michigan goose hunters in 2005 (Frawley and Soulliere 2005).

Waterfowl hunting activity and harvest was estimated previously for 2005 (Frawley 2007). The number of active waterfowl hunters on Managed Waterfowl Hunt area (all seasons combined), hunting effort, and harvest did not change significantly between 2005 and 2010.

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Table 1. Waterfowl hunting seasons in Michigan, 2010-2011.

Species, season, and area ^a	Season dates
Ducks ^b	
North Zone (UP)	Oct. 2 – Nov. 30
Middle Zone	Oct. 2 – Nov. 28 and Dec. 4 – 5
South Zone	Oct. 9 – Dec. 5 and Jan. 1 – 2
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. 16 – Oct. 30
Middle Zone	Oct. 2 – Nov. 8 and Nov. 25 – Dec. 1
South Zone	Oct. 9 – Nov. 14 and Dec. 4 – Dec. 11
Late season	
South Zone	Jan. 1 – 30

^aSee Figure 1 for boundaries of hunt areas.

^bDucks and geese could also be taken during a special 2-day Youth Season (September 18-19).

^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, 2006-2010.

Item	Year					2009-2010 % Change
	2006	2007	2008	2009	2010	
Number of licenses sold ^a	60,994	59,475	58,526	58,663	57,162	-2.6
Number of people buying a hunting license ^{b,c}	60,401	58,863	58,036	58,209	56,689	-2.6

^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 age of active waterfowl hunters, and proportion and number of youth waterfowl hunters in Michigan, 2006-2010.^a

Hunters	2006	2007	2008	2009	2010	
					Estimate	95% CL
Waterfowl ^b	50,230	47,748	47,384	50,064	47,788	1,084
Males (%)	97.1	95.7	94.2	97.0	97.2	0.7
Females (%)	2.9	3.9	3.0	3.0	2.8	0.7
Age (Years)	40.4	40.2	41.4	41.4	41.7	0.7
Youth (%) ^c	10.9	11.2	10.2	12.6	10.9	1.2
Youth (No.) ^c	5,471	5,331	4,819	6,299	5,191	616

^aAnalyses included only those people that hunted.

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

^cHunters 10-16 years of age.

^dNot available.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2009 and 2010 (P<0.005).

Table 4. Estimated number of waterfowl hunters by season and region in Michigan, 2007-2010.^a

Species and area (stratum)	2007	2008	2009	2010		2009-2010 % Change
				No.	95% CL	
Ducks (First split)						
UP	5,698	5,897	5,749	5,649	632	-2
NLP	16,319	16,892	17,936	17,083	1,006	-5
SLP	21,073	21,809	23,268	22,374	1,096	-4
Statewide	38,142	39,764	41,930	40,238	1,155	-4
Ducks (Second split)						
UP			463			NA
NLP	1,855	1,934	1,899	1,686	356	-11
SLP	7,844	6,471	7,022	6,537	674	-7
Statewide	9,514	8,285	9,158	8,160	757	-11
Ducks (Seasons combined)						
UP	5,703	5,903	5,801	5,666	632	-2
NLP	16,689	17,100	18,288	17,265	1,008	-6
SLP	22,331	22,704	24,078	23,241	1,106	-3
Statewide	39,299	40,405	42,554	40,865	1,151	-4
Geese (Early season)						
UP	2,120	1,592	1,564	1,761	365	13
NLP	6,771	6,953	7,376	7,033	703	-5
SLP	12,801	12,345	13,782	12,059	878	-13
Statewide	21,093	20,084	22,023	20,331	1,067	-8
Geese (Regular season)						
UP	3,659	3,145	3,169	2,879	460	-9
NLP	9,388	9,716	10,776	10,687	840	-1
SLP	13,637	14,871	14,548	14,840	946	2
Statewide	25,650	26,300	27,106	27,007	1,139	0
Geese (Late season)						
UP						
NLP	569	445	507	225	134	-56
SLP	7,597	6,071	6,206	6,054	655	-2
Statewide	8,166	6,497	6,653	6,259	673	-6
Geese (Seasons combined)						
UP	4,415	3,716	3,559	3,586	512	1
NLP	11,738	12,123	13,637	13,319	921	-2
SLP	20,835	21,122	21,665	20,723	1,061	-4
Statewide	34,445	34,292	36,202	34,724	1,170	-4

^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 2009 and 2010 (P<0.005).

Table 5. Estimated amount of waterfowl hunter effort (days afield) by season and region, 2007-2010.^a

Species and area (stratum)	2007	2008	2009	2010		2009- 2010 %
				No.	95% CL	Change
Ducks (First split)						
UP	37,279	34,630	34,669	32,293	5,111	-7
NLP	105,988	113,509	118,951	117,629	11,509	-1
SLP	151,414	148,105	158,734	167,107	17,709	5
Statewide	294,681	296,244	312,353	317,029	20,710	1
Ducks (Second split)						
UP			1,259			NA
NLP	3,129	2,920	2,966	2,584	617	-13
SLP	11,888	9,775	9,802	9,995	1,142	2
Statewide	15,018	12,695	14,027	12,579	1,299	-10
Ducks (Seasons combined)						
UP	37,279	34,634	35,927	32,301	5,111	-10
NLP	109,117	116,434	121,914	120,225	11,745	-1
SLP	163,302	157,870	168,539	177,082	18,102	5
Statewide	309,699	308,939	326,380	329,608	21,128	1
Geese (Early season)						
UP	7,988	5,742	6,073	6,185	1,656	2
NLP	29,809	25,793	27,868	26,897	3,591	-3
SLP	50,956	45,194	51,787	44,615	4,487	-14
Statewide	88,753	76,729	85,727	77,697	5,748	-9
Geese (Regular season)						
UP	27,795	18,795	20,484	18,598	4,290	-9
NLP	49,547	58,468	62,943	67,146	8,229	7
SLP	66,334	82,754	79,795	87,075	8,839	9
Statewide	143,677	160,017	163,222	172,819	12,391	6
Geese (Late season)						
UP						
NLP	1,894	1,030	1,592	512	383	-68
SLP	29,271	21,844	20,609	20,925	3,232	2
Statewide	31,166	22,875	22,201	21,437	3,282	-3
Geese (Seasons combined)						
UP	35,890	24,488	26,502	24,762	5,239	-7
NLP	81,457	85,197	92,303	94,512	10,433	2
SLP	146,248	149,936	152,345	152,679	13,301	0
Statewide	263,595	259,620	271,150	271,954	16,982	0

^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 2009 and 2010 (P<0.005).

Table 6. Estimated number of waterfowl hunters, hunting effort, and waterfowl harvested on Managed Waterfowl Hunt Areas in Michigan, 2010.^a

Species	Hunters		Effort		Harvest	
	No.	95% CL	No.	95% CL	No.	95% CL
Ducks	8,645	790	48,318	7,072	63,031	13,081
Geese	6,263	690	31,895	5,324	12,887	3,656
Ducks and geese combined	9,679	830	80,213	11,530	75,918	15,382

^aThe Managed Waterfowl Hunt Areas consisted of Allegan Fennville Farm, Fish Point, Muskegon County Wastewater, Nayanquing Point, Pointe Mouillee, Shiawassee River State Game Area, and St. Clair Flats (Harsens Island).

Table 7. Estimated waterfowl harvest by season and region in Michigan, 2007-2010.^a

Species and area (stratum)	2007	2008	2009	2010		2009- 2010 % Change
				No.	95% CL	
Ducks (First split)						
UP	46,586	37,290	37,196	35,459	6,786	-5
NLP	140,932	132,361	149,538	149,797	20,966	0
SLP	162,350	173,402	190,827	196,846	21,621	3
Statewide	349,868	343,052	377,561	382,102	30,595	1
Ducks (Second split)						
UP			1,599			NA
NLP	4,686	4,289	4,870	4,628	1,715	-5
SLP	19,508	16,263	15,568	20,635	3,116	33
Statewide	24,195	20,553	22,036	25,263	3,624	15
Ducks (Seasons combined)						
UP	46,591	37,295	38,790	35,482	6,786	-9
NLP	145,626	136,659	154,380	154,476	21,512	0
SLP	181,846	189,650	206,427	217,407	23,119	5
Statewide	374,062	363,605	399,598	407,365	32,084	2
Geese (Early season)						
UP	7,879	4,338	3,644	4,329	1,567	19
NLP	26,402	27,357	31,537	28,367	4,991	-10
SLP	46,499	49,271	53,530	51,763	7,629	-3
Statewide	80,780	80,966	88,712	84,459	9,372	-5
Geese (Regular season)						
UP	16,408	8,035	9,531	8,943	4,079	-6
NLP	25,636	32,154	31,815	35,145	6,482	10
SLP	39,667	48,464	47,274	47,902	7,157	1
Statewide	81,712	88,652	88,620	91,989	10,484	4
Geese (Late season)						
UP						
NLP	1,133	673	814	899	1,247	10
SLP	19,179	13,766	16,113	22,970	4,912	43
Statewide	20,312	14,439	16,927	23,869	5,105	41
Geese (Seasons combined)						
UP	24,254	12,345	13,165	13,245	4,773	1
NLP	53,169	60,075	64,146	64,406	10,434	0
SLP	105,380	111,638	116,948	122,666	15,632	5
Statewide	182,804	184,058	194,259	200,317	19,412	3

^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 2009 and 2010 (P<0.005).

Table 8. Estimated number of duck hunters, hunting effort, and ducks harvested, summarized by season and management zone in Michigan, 2010.

Season and waterfowl zone ^a	Hunters		Effort		Harvest	
	No.	95% CL	No.	95% CL	No.	95% CL
First split						
North	5,725	642	32,618	5,129	36,412	6,919
Middle	11,373	868	64,033	8,205	75,047	13,815
South	27,926	1,157	220,377	19,093	270,643	26,063
Statewide	40,238	1,155	317,029	20,710	382,102	30,595
Second split					382,102	
North	0	0	0	0	0	0
Middle	1,600	355	2,377	595	4,116	1,481
South	6,665	689	10,203	1,156	21,147	3,213
Statewide	8,160	757	12,579	1,299	25,263	3,624
Seasons combined						
North	5,726	642	32,619	5,129	36,411	6,919
Middle	11,608	874	66,410	8,503	79,162	14,452
South	28,682	1,162	230,579	19,457	291,792	27,403
Statewide	40,865	1,151	329,608	21,128	407,365	32,084

^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 2009 and 2010 (P<0.005).

Table 9. Estimated number of goose hunters, hunting effort, and geese harvested, summarized by season and management zone in Michigan, 2010.

Season and waterfowl zone ^a	Hunters		Effort		Harvest	
	No.	95% CL	No.	95% CL	No.	95% CL
Early						
North	1,917	365	6,792	1,656	4,764	1,567
Middle	4,118	523	15,874	2,678	16,173	3,610
South	14,901	926	55,032	4,665	63,522	7,945
Statewide	20,331	1,067	77,697	5,748	84,459	9,372
Regular						
North	3,165	460	20,196	4,290	9,605	4,079
Middle	5,266	586	32,087	5,749	17,730	5,015
South	19,810	1,013	120,536	9,980	64,654	7,976
Statewide	27,007	1,139	172,819	12,391	91,989	10,484
Late						
North	0	0	0	0	0	0
Middle	0	0	0	0	0	0
South	6,259	658	21,437	3,236	23,869	4,920
Statewide	6,259	673	21,437	3,282	23,869	5,105

^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.

Table 10. Level of satisfaction among waterfowl hunters with the 2009 and 2010 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		
	2009	2010	95% CL	2009	2010	95% CL	2009	2010	95% CL	2009	2010	95% CL
	%	%		%	%		%	%		%	%	
Ducks seen	43	47	2	18	19	2	38	33*	2	1	1	0
Ducks harvested	29	32	2	22	21	2	43	41	2	6	5	1
Duck hunting experience	57	61	2	21	19	2	20	19	2	2	2	1
Duck season dates	46	48	2	31	27	2	20	21	2	3	4	1
Length of duck season	53	54	2	27	26	2	17	17	2	3	3	1
Daily duck limit	59	59	2	27	27	2	11	11	1	3	3	1
Geese seen	58	59	2	17	17	2	23	22	2	2	2	1
Geese harvested	33	34	2	21	21	2	38	39	2	8	6	1
Goose hunting experience	53	54	2	23	22	2	22	22	2	2	2	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 2009 and 2010 (P<0.005).

Table 11. Preferred opening date of the 2011 duck hunting season in Michigan among active 2010 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. 24	45	6	2,122	401	25	4	2,382	428	22	2	5,598	647
Oct. 1	32	6	1,536	344	30	4	2,883	472	18	2	4,586	587
Oct. 8	6	3	292	157	16	3	1,473	341	24	2	6,122	670
Oct. 15	6	3	282	151	10	3	919	272	16	2	4,065	550
Undecided	9	4	449	188	14	3	1,316	326	13	2	3,340	516
Other	1	2	52	72	2	1	177	121	3	1	815	253
No answer	0	1	21	40	3	2	303	156	3	1	689	239

Table 12. Proportion and number of 2010 waterfowl hunters that preferred a split season or a continuous season for the 2011 waterfowl hunting season in Michigan.

Preferred option	Hunters preferring option			
	%	95% CL	No.	95% CL
Split season and have dates similar to 2010	33	2	13,473	940
No split season (i.e., continuous season)	29	2	11,930	889
Split season but split differently than 2010	13	1	5,234	624
Undecided	21	2	8,640	778
No answer	4	1	1,588	355

Table 13. Proportion and number of 2010 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	32	2	15,509	990
Very important	38	2	18,041	1,033
Somewhat important	13	1	6,424	686
Not sure	7	1	3,267	510
Not important	8	1	3,595	519
No answer	2	1	951	274

Table 14. Proportion and number of 2010 waterfowl hunters that hunters would hunt during a future September teal hunting season in Michigan.

Likelihood of hunting teal	Hunters preferring option			
	%	95% CL	No.	95% CL
Very likely	30	2	14,403	963
Somewhat likely	24	2	11,675	892
Not very likely	21	2	9,894	822
Not at all likely	15	1	7,377	722
Not sure	7	1	3,415	516
No answer	2	1	1,024	286

Table 15. 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	37,100	3,710	40,865	1,151	10
Hunting effort	203,000	22,330	329,608	21,128	62*
Harvest	288,000	37,440	407,365	32,084	41*
Geese					
Hunters	30,700	3,377	34,724	1,170	13
Hunting effort	164,300	21,359	271,954	16,982	66*
Harvest	125,100	20,016	200,317	19,412	60*
Ducks and geese combined					
Hunters	43,200	3,888	47,788	1,084	11

^aRaftovich et al. 2011.

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

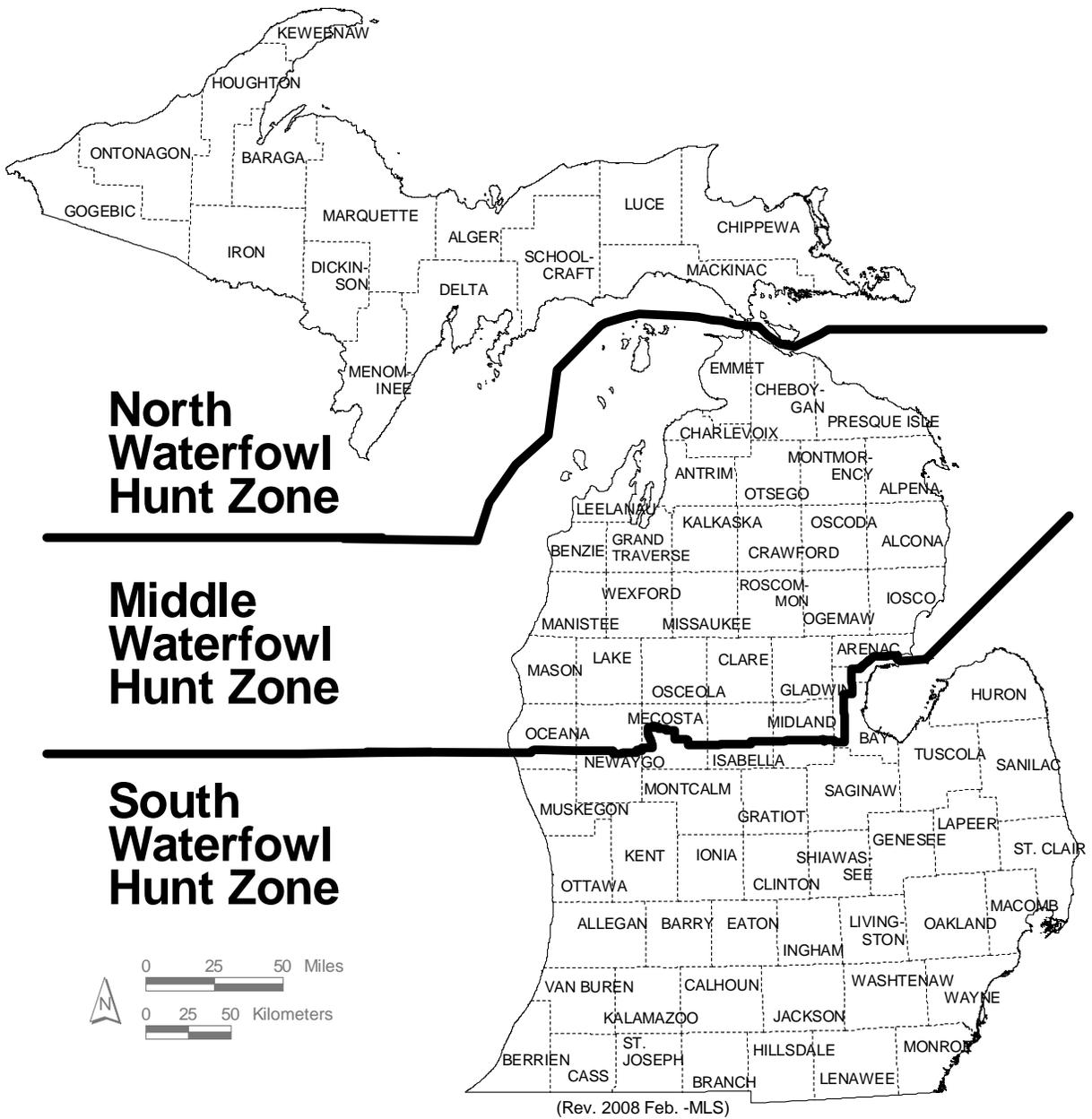


Figure 1. Areas used to summarize the waterfowl survey data for the 2010 waterfowl hunting seasons in Michigan. Regional boundaries did not match the waterfowl management hunting zones.

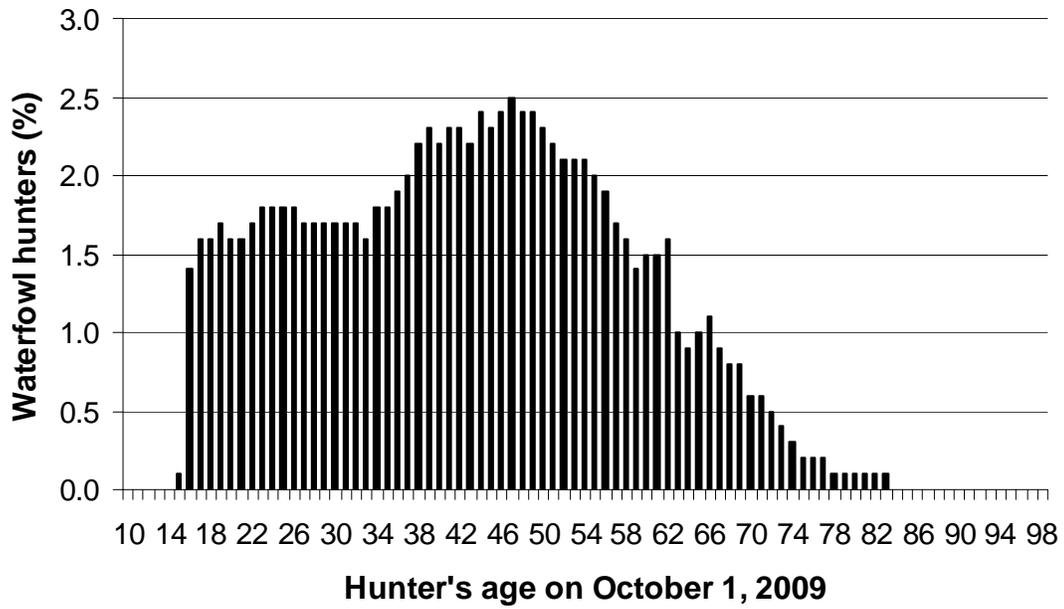


Figure 2. Age of people that purchased a waterfowl hunting license in Michigan for the 2010 hunting seasons (\bar{x} = 43 years). Hunters 10-15 years of age could legally hunt waterfowl without a waterfowl hunting license.

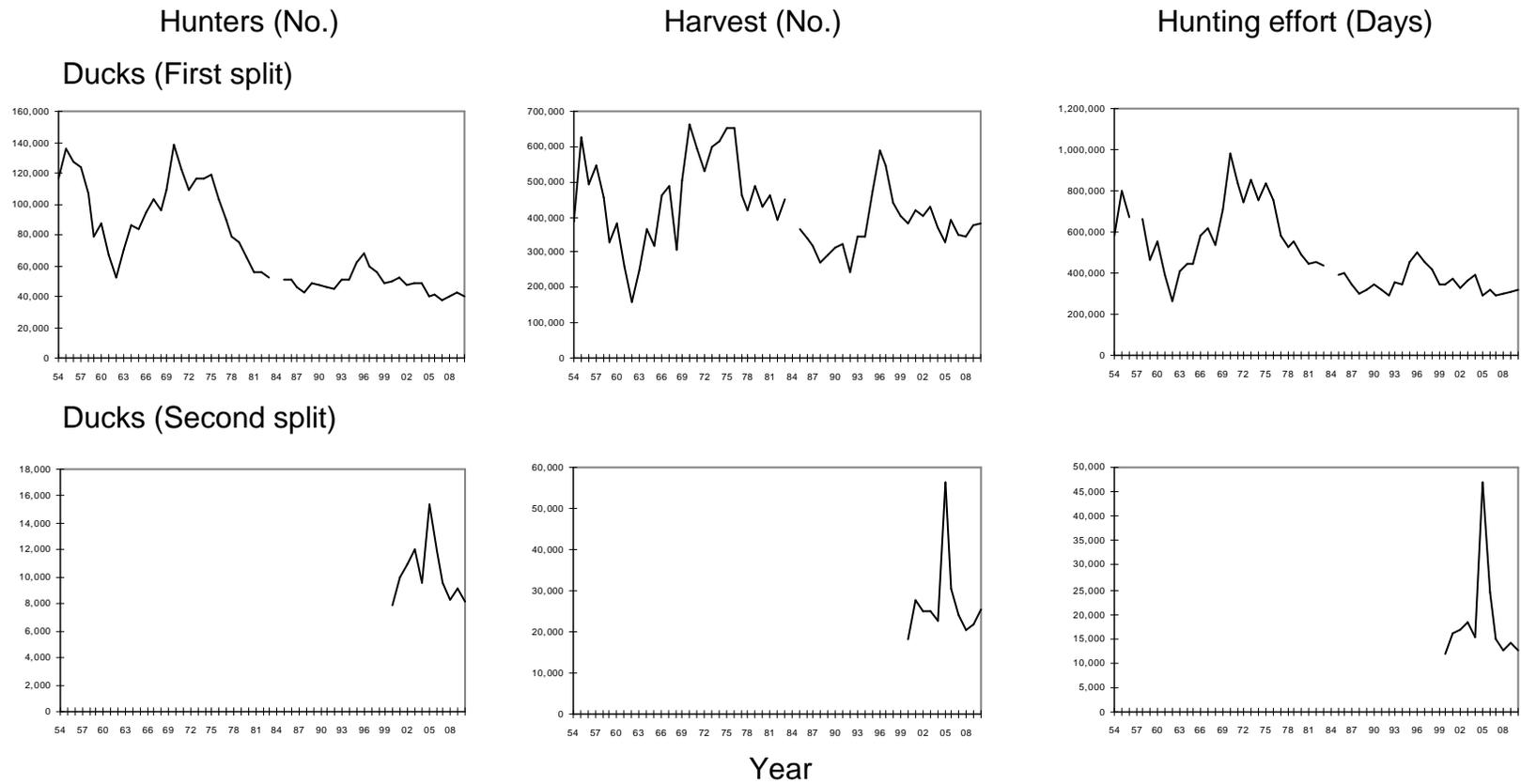


Figure 3. Estimated number of hunters, harvest, and hunting effort in Michigan during the waterfowl hunting seasons, 1954-2010. No estimates were available or no seasons existed during years when no data are plotted.

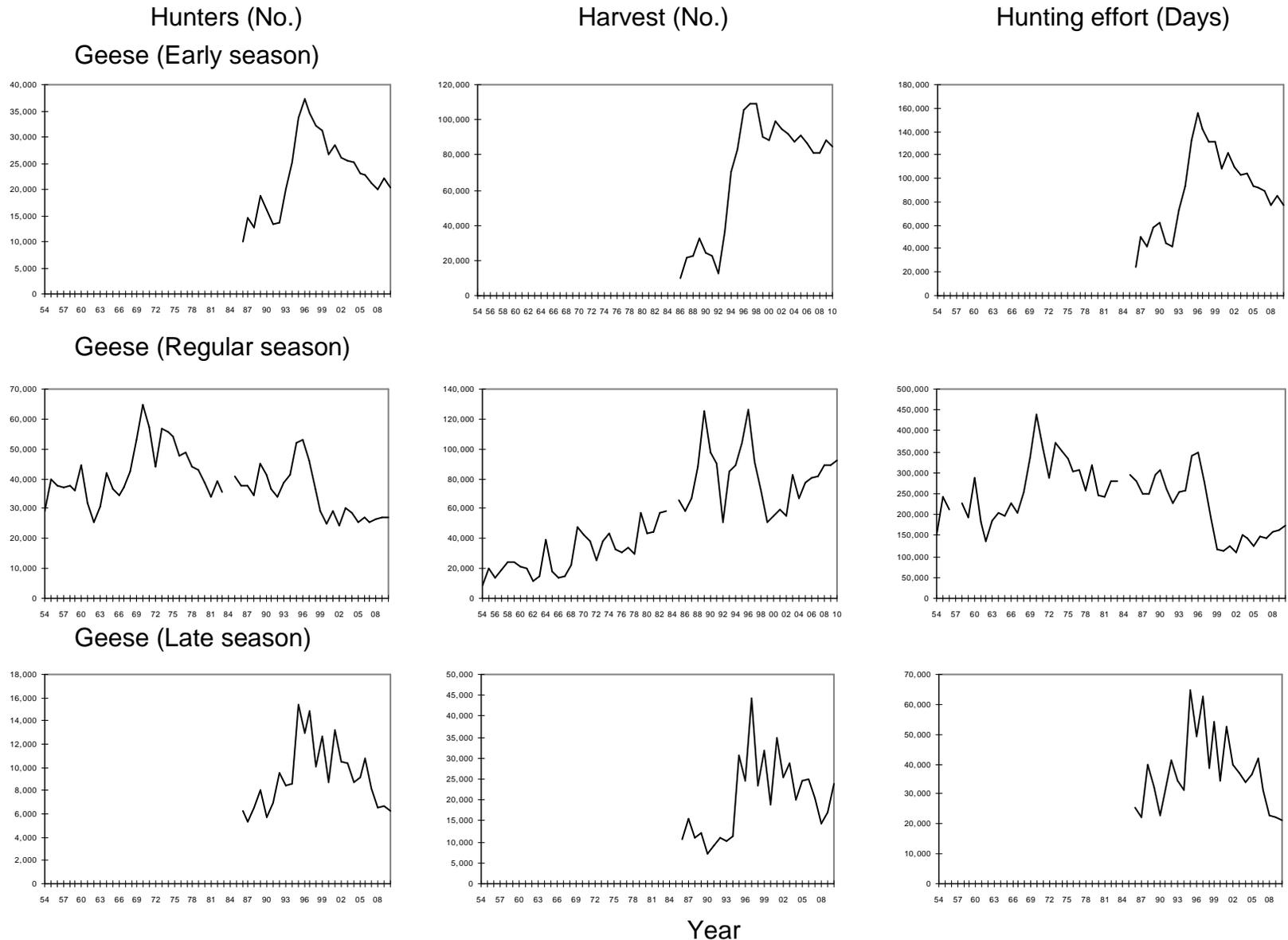


Figure 3 (continued). Estimated number of hunters, harvest, and hunting effort in Michigan during the waterfowl hunting seasons, 1954-2010. No estimates were available or no seasons existed during years when no data are plotted.

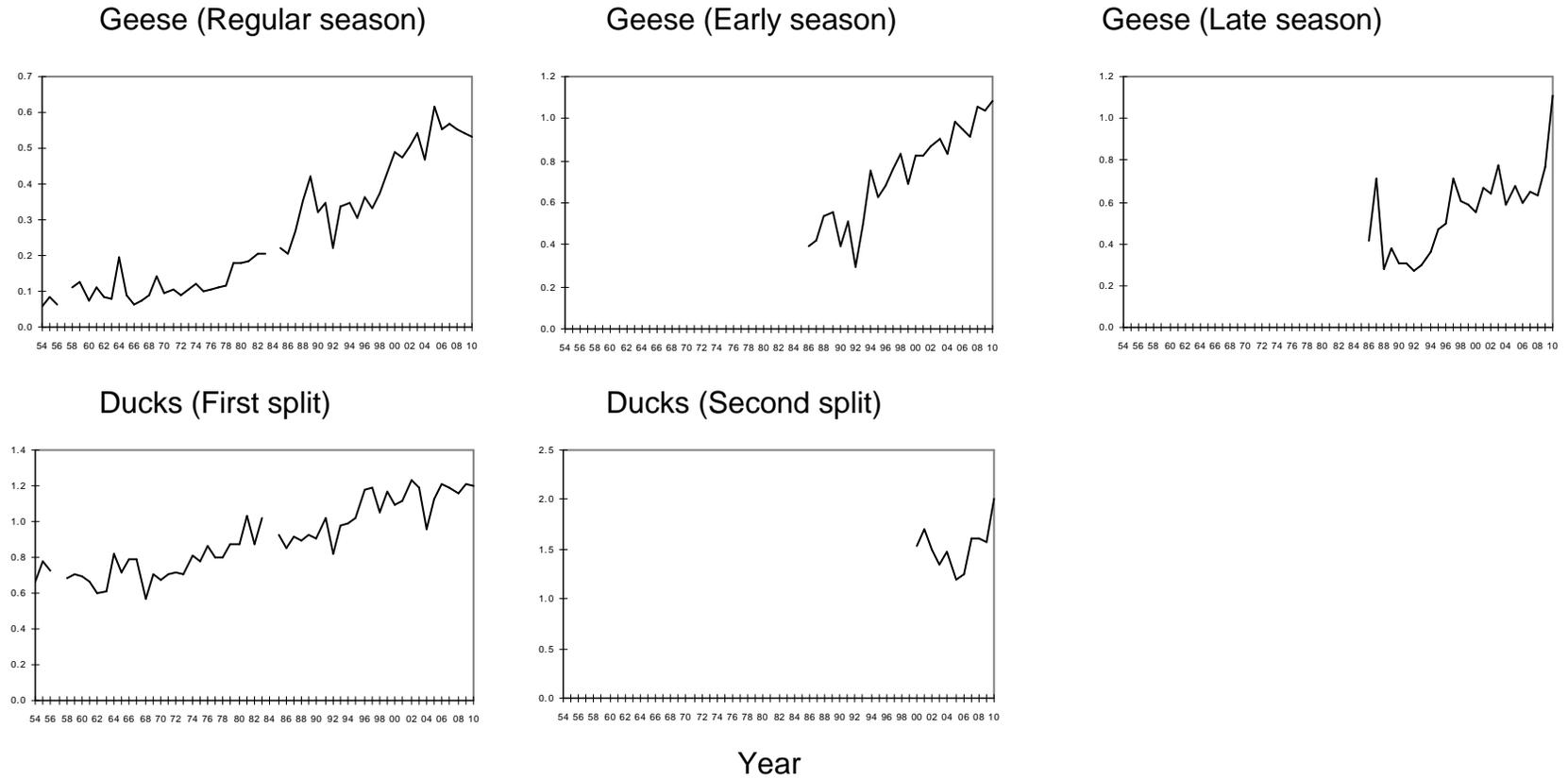


Figure 4. Estimated harvest per effort in Michigan during the waterfowl hunting seasons, 1954-2010. No estimates were available or no seasons existed during years when no data are plotted.

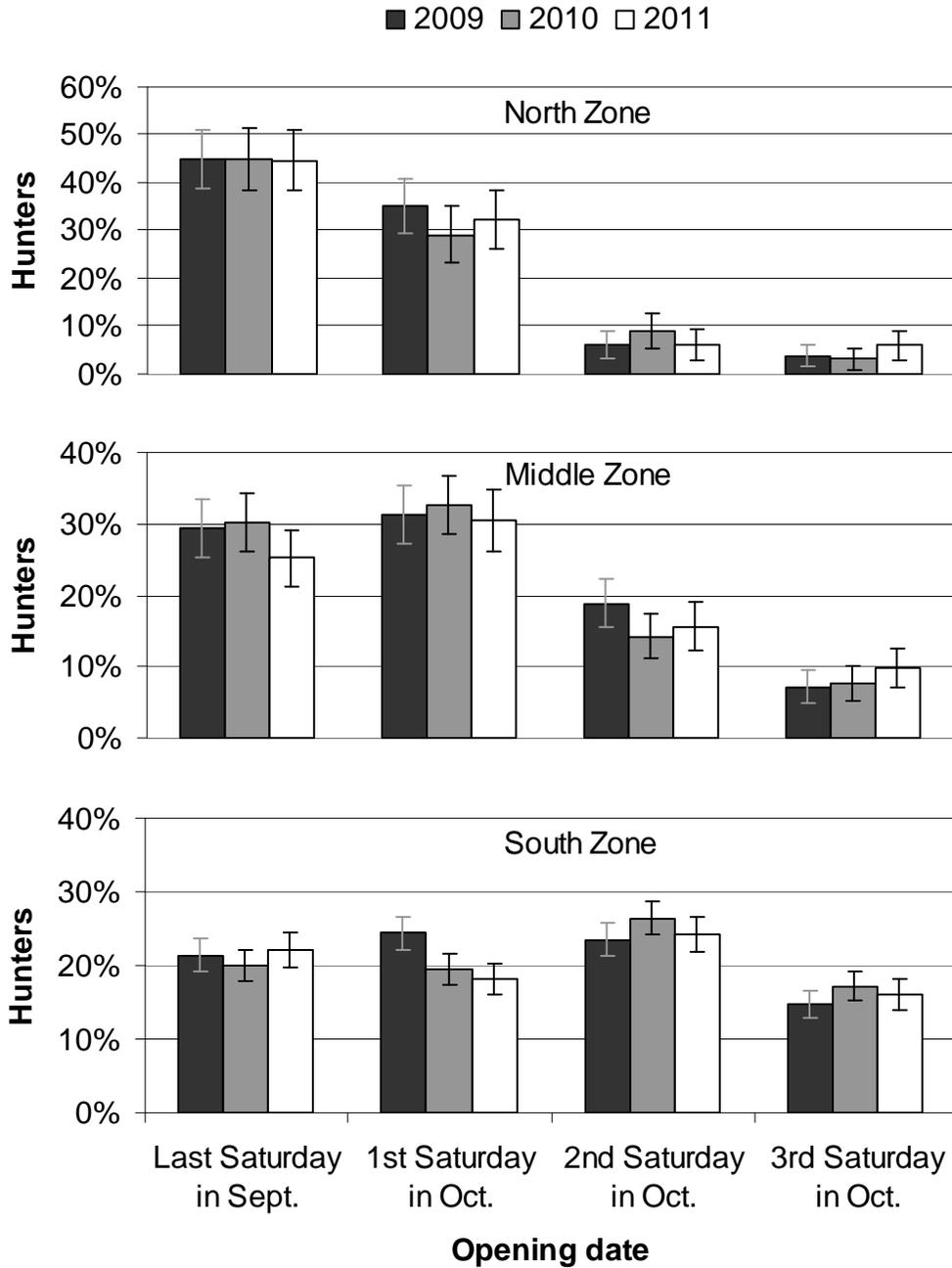


Figure 5. Preferred opening date of the duck hunting season in Michigan among active duck hunters, summarized by their preferred duck hunt zone and hunting season (year).

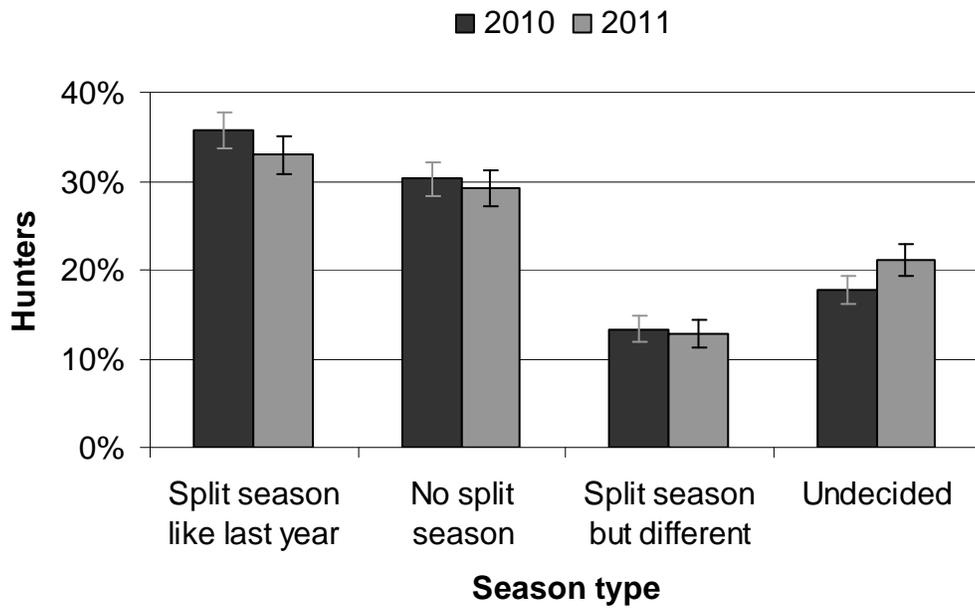


Figure 6. Proportion of waterfowl hunters that preferred a continuous season or a season divided into two segments for the waterfowl hunting season in Michigan, summarized by year.

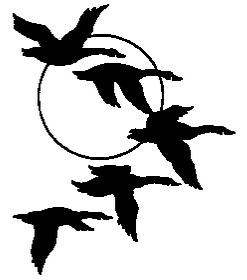
Appendix A

2010-2011 Waterfowl Harvest Questionnaire



2010-2011 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, 2010, through January 30, 2011 (2010-2011 hunting season)?

- Yes. Please complete the table below and answer questions on next page.
- No. Skip to Question #5.

SEASON SEGMENT <i>(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.)</i>	COUNTY HUNTED <i>(For each season you hunted, list the counties hunted on separate lines.)</i>	MANAGEMENT ZONE <i>(See figure on last page for zone boundaries.)</i>			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 Oct 2 – Nov 30 (North Zone) Oct 2 – Nov 28 (Middle Zone) Oct 9 – Dec 5 (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 Split Portion of Regular Season (2 days only) Dec 4-5 (Middle Zone) Jan 1-2 (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 16-Oct 30 (North Zone) Oct 2-Nov 8 & Nov 25-Dec 1 (Middle) Oct 9-Nov 14 & Dec 4-11 (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 Jan 1-30 (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 2010-2011 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. Did you attempt to hunt ducks or geese on any Managed Waterfowl Hunt Area during 2010-2011? The Managed Waterfowl Hunt Areas consisted of Allegan Fennville Farm, Fish Point, Muskegon County Wastewater, Nayanquing Point, Pointe Mouillee, Shiawassee River State Game Area, and St. Clair Flats (Harsens Island).

¹ Yes. Please complete the table in Question #4.

² No. Skip to Question #5.

4. If you attempted to hunt ducks or geese on any Managed Waterfowl Hunt Area (MWhA), please mark an "X" in the box next to the name of each species you attempted to hunt and report number of days hunted and number of birds harvested.

SPECIES HUNTED ON MWhA (Check box if you hunted the species.)	NUMBER OF DAYS HUNTED ON MWhA (Report all days hunted even if you did not take a bird.)	NUMBER OF BIRDS HARVESTED ON MWhA
¹ <input type="checkbox"/> Ducks		
² <input type="checkbox"/> Geese		

5. 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)

6. 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 2011-2012 duck season. (Check one.)

¹ Sept. 24 ² October 1 ³ October 8 ⁴ October 15 ⁵ Undecided ⁶ Other: _____

7. The duck season was 60 days in 2010-2011 and was split into two segments in two zones (for example, Oct 9 – Dec 5 and Jan 1-2 in the South Zone). For your preferred zone to hunt ducks, please indicate which option you would prefer for the 2011-2012 duck season? (Check one.)

¹ Split the duck season and maintain dates similar to the 2010-2011 seasons (for example, include a 2-4 day late hunt).

² Do not split the season and instead run duck season dates consecutively without a 2-4 day late hunt.

³ Continue to split the season into 2 periods, but time the split differently. (Please specify alternative dates for the 2011-2012 duck season: _____).

⁴ Undecided.

8. 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

9. Some states have additional duck hunting days in September, when only teal can be taken. If a September teal season was offered by the U.S. Fish and Wildlife Service, how likely is it that you would hunt teal in Michigan?

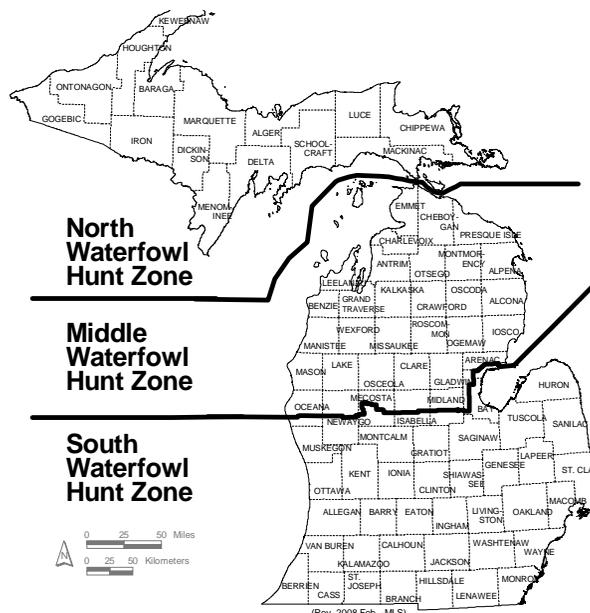
¹ Very likely

² Somewhat likely

³ Not very likely

⁴ Not at all likely

⁵ Not sure



Please return questionnaire in the enclosed postage-paid envelope.

Thanks.