



Department of Natural Resources  
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## EVALUATION OF EXPANDED LATE CANADA GOOSE SEASON IN CENTRAL LOWER MICHIGAN, 1998 - 2001 (Final Report)

by

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Special "early" and "late" hunting seasons have been used in Michigan to help control populations of resident giant Canada geese (*Branta canadensis maxima*). The early goose season is 1 - 10 September in Michigan's Upper Peninsula and 1 - 15 September in the Lower Peninsula. The late season has been 30 days long, starting in early January and only in southern Lower Michigan. While an increasing trend in hunter participation and giant Canada goose harvest was observed during special seasons of the 1990s (Karasek 1998, Soulliere and Martz 1997), resident goose populations continued to grow in much of the state (Figure 1). Increases in human-goose conflicts necessitate population control measures, and hunting has been identified as an important population management tool (Zenner 1996).

In 1997, the Michigan Department of Natural Resources (MDNR) received approval from the Mississippi Flyway Council and the U. S. Fish and Wildlife Service (USFWS) to experimentally expand the late Canada goose season hunt-area. The late season boundary was moved north about 65 km (40 miles) into central Lower Michigan (Figure 2). This portion of the state has growing human and goose populations but also has a relatively high proportion of area open to hunting. The experimental zone excluded specific Goose Management Units traditionally used by fall staging migrant Canada geese. Migrant geese staging in Michigan are almost exclusively interiors (*B. c. interior*) of the Mississippi Valley Population (MVP) and Southern James Bay Population (SJB).

The goal of the expanded late hunting season was to increase mortality on giant Canada geese wintering in the experimental area. Harvest composition during the late season must remain at or above 80% giants as required by the USFWS. The time period established for the experiment was 3 years, encompassing January 1998 - 2000 (the 1997-98 to 1999-00 waterfowl seasons). Because of the normal delay in receiving leg-band recovery data to help evaluate the season, the experiment was later expanded to a fourth year. This evaluation estimates hunter participation, goose abundance, and harvest during the experimental season. It also includes leg-band analysis, neck-collar observations, and morphometric analysis to estimate the relative abundance and harvest of giants vs. interior Canada geese.



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## Hunter Participation and Goose Abundance

According to the 1997/98 Michigan Small Game Survey, 14,000 hunters participated in the January/February 1998 late goose season for a total of 62,900 hunter days (Karasek 1998). There was an estimated 17% increase in hunters and 23% increase in hunter days compared to the 1997 late season (without the expansion area). Although popularity of the late season has generally been increasing each year within the operational hunt area (Soulliere and Martz 1997), at least some of the increase in participation during 1998 was due to the addition of the experimental Central Zone. Moreover, relatively mild weather in January 1998 may have resulted in more days of hunter activity.

Hunter participation during the 1999 late goose season was similar, with 16,000 hunters and an estimated 65,000 hunter days (B. Frawley, Mich. Dept. Nat. Resourc., Lansing, unpubl. data). Michigan small game survey results are not yet available for 2000 and 2001. Based on reports from field biologists, hunter participation during 2000 was similar to 1998 and 1999, but hunter effort was lower in 2001 due to severe weather (i.e., deep snow).

Wintering Canada geese were most abundant in both the South and Central Zones during January 1998 and 2000 (Table 1). Severe weather resulted in fewer geese recorded during mid-winter surveys conducted in 1999 and 2001. Because winter weather is generally more severe in the experimental Central Zone, January survey results fluctuate more dramatically from year to year. Canada goose abundance at survey locations in the expansion area was as low as 2,200 in 1999 and as high as 35,000 in the year 2000. On average 27,000 (20%) of the mid-winter geese recorded in Southern Michigan were located in the expansion area during the four-year experiment (Table 1).

## Band Recovery Analysis and Harvest Estimate

As of June 2001, there were 697 Mississippi Flyway Canada goose leg band recoveries reported for the 1998-2000 Michigan late goose seasons (no data available for 2001) and 7 recoveries originating from the Atlantic Flyway. One hundred and four (15%) band recoveries came from the experimental late zone, including 85 summer-banded giants from Michigan and several other states. Nineteen Canada geese marked on Hudson and James Bay were also reported in the experimental hunt area, including 10 summer banded on the MVP breeding grounds and 9 banded on SJBP breeding locations. The origins of banded Canada geese recovered in the experimental area were similar to the traditional area open to late season goose hunting (Table 2).

We compared the population affiliation of band recoveries in the experimental and traditional late season areas using log-linear analysis. Based on results of a log-linear model including population, hunt year, and hunt area, the proportion of band recoveries affiliated with MVP, SJBP, and the giant population was similar in the traditional and expansion zones ( $G^2_{df=2} = 0.674$ ;  $P=0.714$ ). The proportion of band recoveries during Michigan's late season from these three populations has been relatively stable over time (Figure 3). Recoveries were dominated (>80%) by giants in both the experimental and traditional hunt areas (Table 2).

A crude estimate of harvest composition (by population) may be achieved by weighting individual band recoveries by an estimate of harvest / band (J. Wood, Wisconsin Coop. Wildl. Res. Unit, Madison, work in progress). Using this technique, 82% of the late goose season harvest within the experimental area consisted of giants (Table 3). This estimate of giant composition is likely biased low due to assigning incorrect population affiliation (via banding) to molt migrant giants on interior breeding grounds (Abraham et. al. 1999).

According to USFWS harvest estimates (P. Padding, USFWS, Laurel, MD, unpubl. data), late goose season harvest ranged from 2,900 to 18,800 (Figure 4), and averaged 7,600 during the four-year experiment. Late season harvest accounted for 3 - 10% of Michigan's total goose harvest during 1998 - 2001. A crude estimate of harvest within the expansion area can be determined by comparing the proportion of band recoveries in the expansion area to the total number of recoveries for the late season.



With 15% of the band recoveries occurring within the expansion zone, the estimated average annual harvest within this area was 1,140 ( $7,600 \times 0.15 = 1,140$ ).

### Neck-collar Observations

The most recently compiled set of neck-collar observations provided by the USFWS (J. Peterson, Columbia, MO, unpubl. data) was plotted over time for the traditional and expansion late season hunt areas. The occurrence of migrant geese has been relatively low in both areas during January and February (Figure 5). Observations of MVP and SJBP geese significantly declined by mid-December in the experimental hunt area, which was before migrant goose declines in the traditional hunt area. The total number of migrant goose collar observations was also lower in the experimental zone compared to the traditional zone.

### Morphometric Analysis

Body parts (heads and sex organs) were collected from harvested geese in the experimental late season zone during January/February 1998 - 2001. Samples were aged, sexed, and culmens measured at the Rose Lake Pathology Lab (T. Cooley and J. Gormley, MDNR - Wildlife). We used adult goose mean culmen lengths for each sex and baseline measurements for Mississippi Flyway giants and MVP interior geese (Moser and Roley 1990) with an algebraic proportioning formula (Trost et al. 1992) to estimate harvest composition.

Culmen measurements were collected from 485 samples of which 331 were adult geese (Table 4). Culmen length was similar each year, with the largest measurements for both sexes occurring in 2001. Based on morphometric analysis, the harvest sample in the experimental Central Zone averaged 86% giants during the four-year period (Table 5). When the sample was weighted for the estimated size of the harvest each year, 93% of the harvest was giants.

### Conclusion

During the 1990's late goose season hunter participation and goose harvest generally increased in Michigan along with the size of the resident Canada goose population. However, participation and harvest appear lower in recent years in part due to weather. The expansion zone provided some additional opportunity to control resident Canada goose populations via hunting. Data available for the Central Zone expansion area suggests hunter participation and harvest are considerably less than the existing South Zone, and goose availability may be less predictable due to more severe weather. Band-recovery and morphometric analysis indicates the proportion of giants in the harvest meets the 80%-giant criteria needed to maintain the season.

Mississippi Flyway late seasons have been an effective tool to increase harvest of giant Canada geese in Michigan and Minnesota. Similarly, nine states in the Atlantic Flyway harvested Canada geese during late seasons in 2000 (P. Padding, USFWS preliminary harvest estimates, 2001). Season evaluations such as this report and research on migration chronology of interior geese (Malecki et al. 2001) suggest that late-season interior harvest should rarely exceed established guidelines in northern regions. We recommend a late season be allowed throughout the entire state of Michigan where resident Canada goose populations and human-geese conflicts continue to increase.

**Acknowledgements:** MDNR field personnel collected goose parts from hunters and T. Cooley and J. Gormley completed culmen measurements. S. Chadwick, V. Tuovila, T. Maples, and P. Fritzell assisted with data analysis and preparing the report. S. Chadwick and P. Squibb provided helpful comments on the draft report.

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Table 1. Canada geese observed during mid-winter (1 - 10 January) waterfowl surveys in Michigan late season South Zone and experimental Central Zone counties, 1998 - 2001. This survey represents primarily sites inventoried annually within each county; it is not a complete survey of Canada geese in Southern Michigan.

Hunt area	Survey year and proportion by county								All	
	1998	%	1999	%	2000	%	2001	%	years	%
<b>South Zone</b>										
Allegan	17,190	17	25,030	36	40,630	28	13,700	51	119,710	22
Barry	2,497	2	528	1	1,284	1	185	1	9,845	2
Berrien	500	0	500	1	2,817	2	945	4	9,228	2
Branch	2,384	2	608	1	8,006	5	35	0	17,180	3
Calhoun	1,767	2	1,070	2	1,830	1	465	2	10,976	2
Cass	1,043	1	424	1	1,862	1	156	1	6,309	1
Clinton	528	1	0	0	(a)	N/A	64	0	1,024	0
Eaton	2,084	2	1,646	2	3,040	2	32	0	10,903	2
Genessee	3,825	4	3,820	6	1,610	1	433	2	14,748	3
Hillsdale	2,331	2	221	0	3,550	2	(a)	N/A	8,779	2
Ingham	2,229	2	3,604	5	3,970	3	800	3	16,108	3
Ionia	(a)	N/A	423	1	455	0	520	2	1,398	0
Jackson	546	1	711	1	3,272	2	80	0	8,879	2
Kalamazoo	6,409	6	3,523	5	6,801	5	1,654	6	38,299	7
Lenawee	452	0	1,134	2	1,021	1	134	0	6,300	1
Livingston	12	0	290	0	696	0	14	0	5,549	1
Macomb	6,130	6	3,895	6	4,255	3	0	0	19,450	4
Monroe	1,095	1	780	1	1,735	1	293	1	7,703	1
Oakland	8,320	8	3,706	5	4,362	3	59	0	27,659	5
Ottawa	208	0	0	0	500	0	329	1	1,569	0
Shiawassee	519	1	365	1	(a)	N/A	701	3	1,755	0
St. Clair	4,975	5	3,111	5	4,130	3	415	2	17,881	3
St. Joseph	2,402	2	2,978	4	3,504	2	552	2	18,997	3
Van Buren	385	0	(a)	N/A	5,758	4	371	1	9,542	2
Washtenaw	300	0	4,156	6	2,975	2	81	0	19,177	3
Wayne	5,675	6	4,300	6	3,760	3	410	2	33,865	6
Subtotal	73,806	72	66,823	97	111,823	76	22,428	83	442,833	80
<b>Central Zone</b>										
Bay	2,285	2	0	0	530	0	6	0	2,849	1
Gratiot	200	0	0	0	313	0	15	0	928	0
Huron	0	0	0	0	600	0	24	0	944	0
Isabella	347	0	0	0	(a)	N/A	(a)	N/A	365	0
Kent	(a)	N/A	87	0	1,475	1	37	0	1,599	0
Lapeer	100	0	50	0	140	0	0	0	3,906	1
Mecosta	(a)	N/A	0	0	(a)	N/A	(a)	N/A	0	0
Midland	192	0	0	0	8,006	5	13	0	14,446	3
Montcalm	(a)	N/A	420	1	2,355	2	300	1	3,075	1
Muskegon	3,724	4	400	1	4,150	3	50	0	14,774	3
Newaygo	160	0	20	0	835	1	360	1	2,548	0
Oceana	350	0	0	0	204	0	120	0	674	0
Saginaw	19,516	19	230	0	13,963	10	3,610	13	56,965	10
Sanilac	(a)	N/A	0	0	100	0	(a)	N/A	550	0
Tuscola	1,500	1	1,000	1	2,200	1	(a)	N/A	4,700	1
Subtotal	28,374	28	2,207	3	34,871	24	4,535	17	108,323	20
Grand total	102,180	100	69,030	100	146,694	100	26,963	100	551,156	100

a) No data available

Table 2. Origin of leg-band recoveries for Mississippi flyway Canada geese harvested during the Michigan special late Canada goose season, 1998-2000 (1997/98 - 1999/00 waterfowl season).

	State	1998	1999	2000	Total	Total %	Giants %
Expansion area (≥43° latitude)	MI	34	9	34	77	74	91
	OH	1	1	1	3	3	4
	WI			2	2	2	2
	IN			1	1	1	1
	TN			1	1	1	1
	MO	1			1	1	1
	MVP	5	1	4	10	10	
	SJBP	4		5	9	9	
	Total	45	11	48	104	100	100
Traditional zone (<43° latitude)	MI	200	109	154	463	78	88
	OH	7	8	11	26	4	5
	IN	5	8	12	25	4	5
	WI	1	3	1	5	1	1
	IL	3	1		4	1	1
	KY	2	1		3	1	1
	IA			1	1	0	0
	MVP	13	12	10	35	6	
	SJBP	15	8	8	31	5	
	Total	246	150	197	593	100	100

Table 3. Estimated composition of late season Canada goose harvest from Mississippi Flyway Giants, Mississippi Valley Population (MVP), and Southern James Bay Population (SJBP), based on weighted band recoveries, within the experimental Central Michigan expansion area, 1998-2000

Origin of band	Bands recovered	Weight <sup>a</sup>	Total estimated harvest	Estimated harvest / year	Harvest composition (%)
MI	77	142	10,934	3,645	79.2
IN	1	154	154	51	1.1
WI	2	35	70	23	0.5
TN	1	57	57	19	0.4
OH	3	17	51	17	0.4
MO	1	16	16	5	0.1
MVP	10	208	2,080	693	15.1
SJBP	9	50	450	150	3.3
Total	104		13,812	4,604	100.0

<sup>a</sup>Weight (estimate of retrieved geese / band) from Wisconsin Cooperative Wildlife Research Unit, J. Wood, work in progress.

Table 4. Average culmen length (mm) by age (ahy = after hatch year, hy = hatch year) and sex for Canada geese harvested during Michigan's late Canada goose seasons within the experimental expansion zone, 1998-2001.

Sex	Year	ahy			hy			Total		
		$\bar{x}$	SE	n	$\bar{x}$	SE	n	$\bar{x}$	SE	n
Male	1998	59.4	0.8	17	60.3	0.9	13	59.8	0.6	30
	1999	59.4	0.8	33	59.6	0.8	22	59.5	0.5	55
	2000	58.9	0.4	122	55.3	0.7	42	58.0	0.4	164
	2001	61.9	0.9	15	60.5	0.8	12	61.3	0.6	27
	Total	59.3	0.3	187	57.8	0.5	89	58.8	0.3	276
Female	1998	57.2	1.4	6	54.0	0.9	7	55.5	0.9	13
	1999	55.1	1.1	15	54.5	1.1	13	54.8	0.7	28
	2000	56.2	0.4	101	55.0	0.7	37	55.9	0.3	138
	2001	58.5	0.7	22	58.3	0.9	8	58.4	0.6	30
	Total	56.5	0.3	144	55.2	0.5	65	56.1	0.3	209



Table 5. Average culmen length (mm) of adult Canada geese and estimated proportion of giants in the harvest during Michigan's late Canada goose seasons within the experimental expansion zone, 1998-2001.

Year	Males				Females				Sexes combined
	$\bar{x}$	SE	n	Giants (%)	$\bar{x}$	SE	n	Giants (%)	Giants (%)
1998	59.4	0.8	17	80	57.2	1.4	6	100	90
1999	59.4	0.8	33	80	55.1	1.1	15	71	76
2000	58.9	0.4	122	72	56.2	0.4	101	89	80
2001	61.9	0.9	15	100	58.5	0.7	22	100	100
Total	59.3	0.3	187	79	56.5	0.3	144	94	86
Weighted <sup>a</sup>	59.7			85	57.0			100	93

<sup>a</sup>Mean culmen length and estimated proportion of giants weighted by the estimated size of the harvest each year (USFWS data).

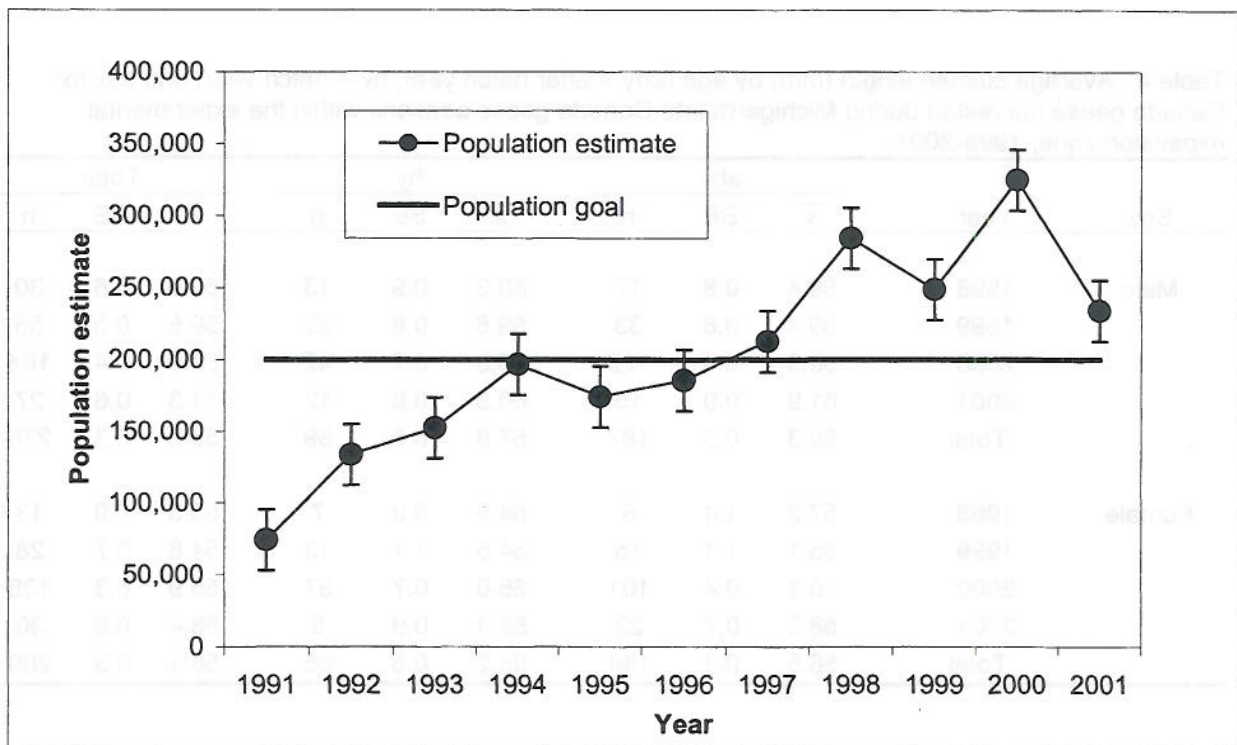


Figure 1. Change in Michigan resident Canada goose population size based on an aerial spring waterfowl survey, 1991-2001.



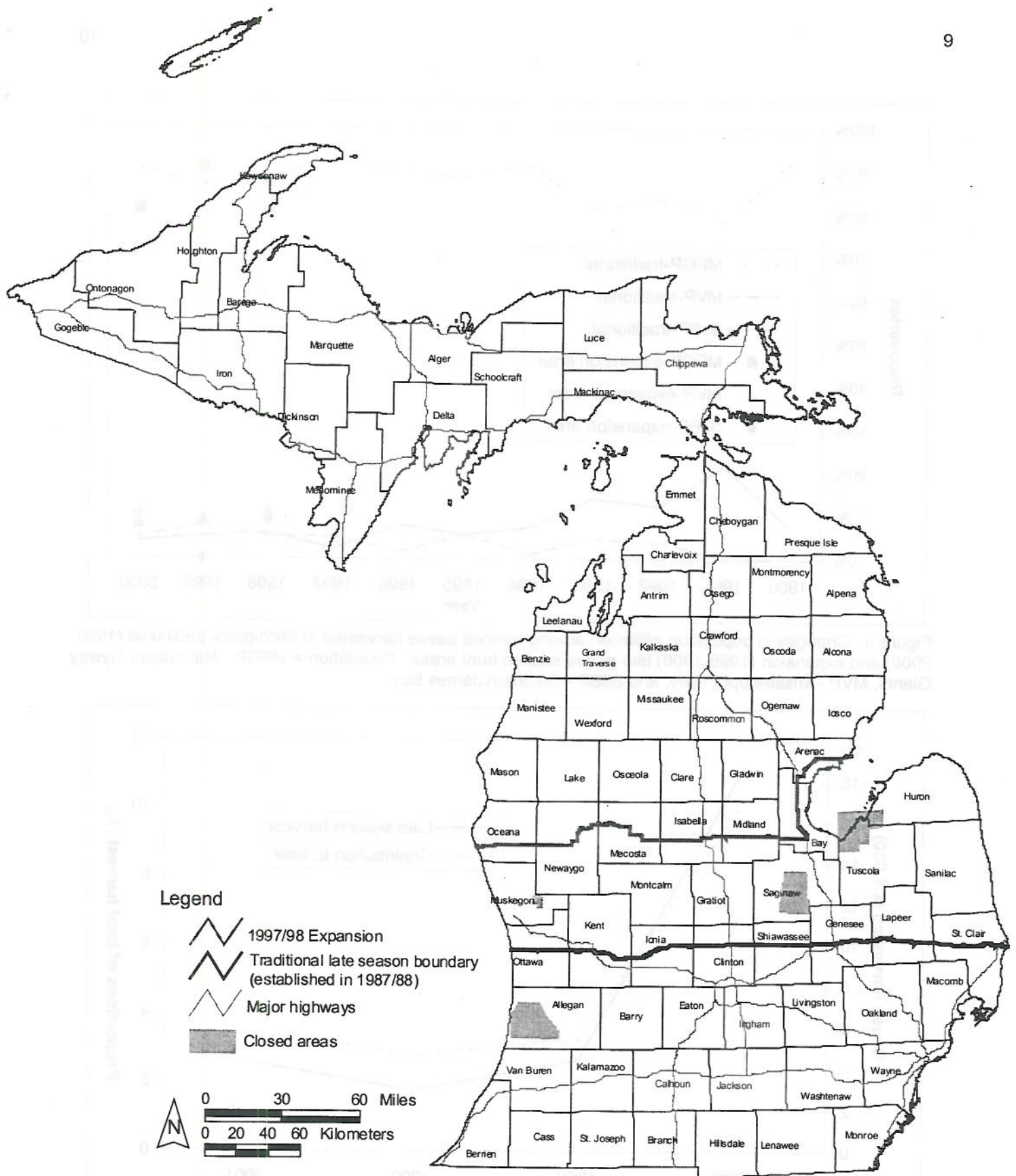


Figure 2. Traditional northern boundary and experimental expansion area for Michigan late Canada goose season. This area is being referred to as the experimental "Central Michigan Zone." Closed areas include (west to east) Allegan County, Muskegon Wastewater, Saginaw County, and Tuscola/Huron Goose Management Units.

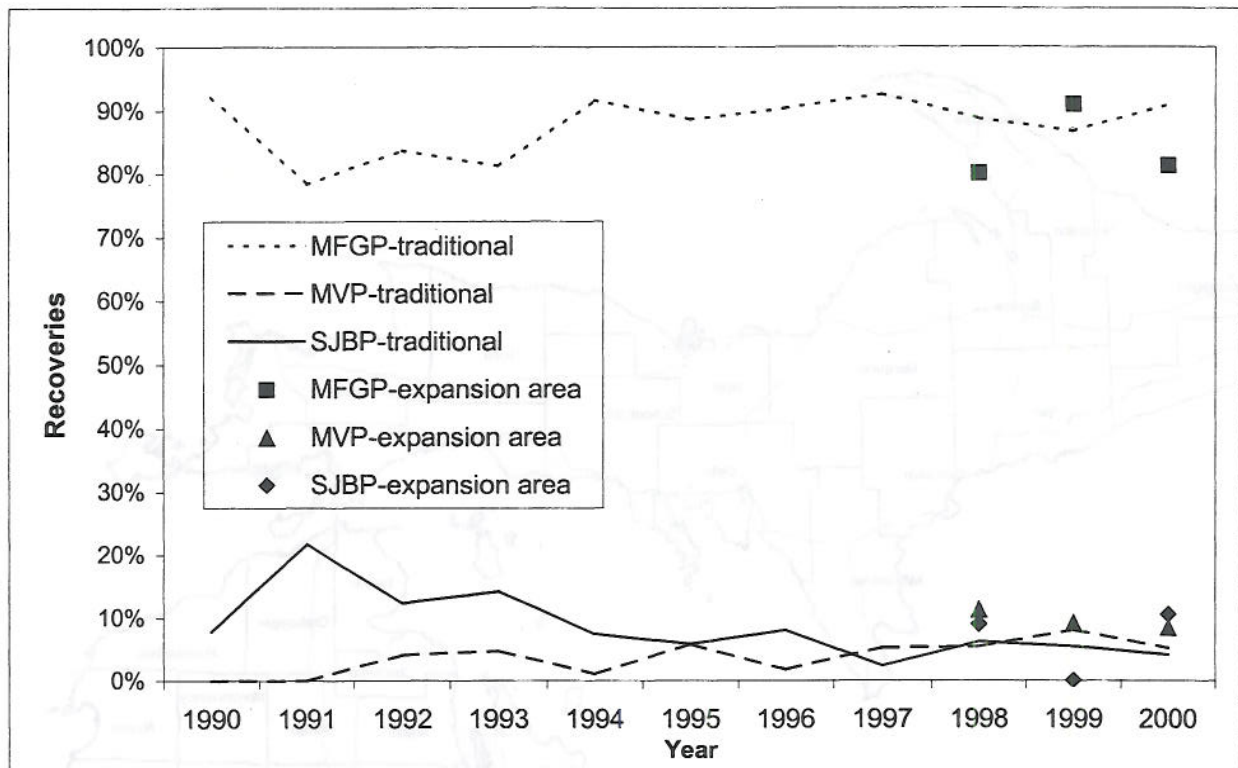


Figure 3. Changes in population affiliation among banded geese harvested in Michigan's traditional (1990 - 2000) and expansion (1998-2000) late goose season hunt areas. Population = MFGP - Mississippi Flyway Giants, MVP - Mississippi Valley, and SJBP - Southern James Bay.

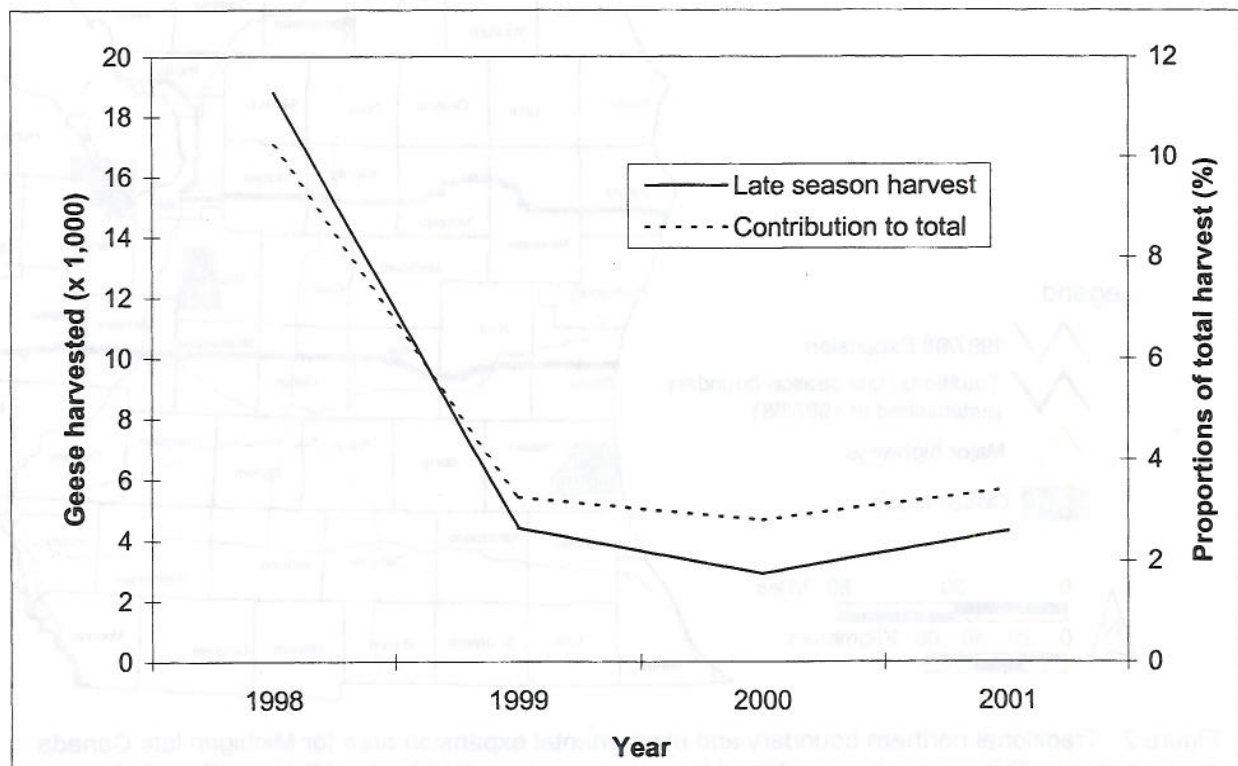


Figure 4. Estimated number of Canada geese harvested during Michigan's late Canada goose season and proportion of the total harvest for all goose seasons, 1998 - 2001. Harvest estimates from USFWS (P. Padding, Laurel, MD, unpubl. data).



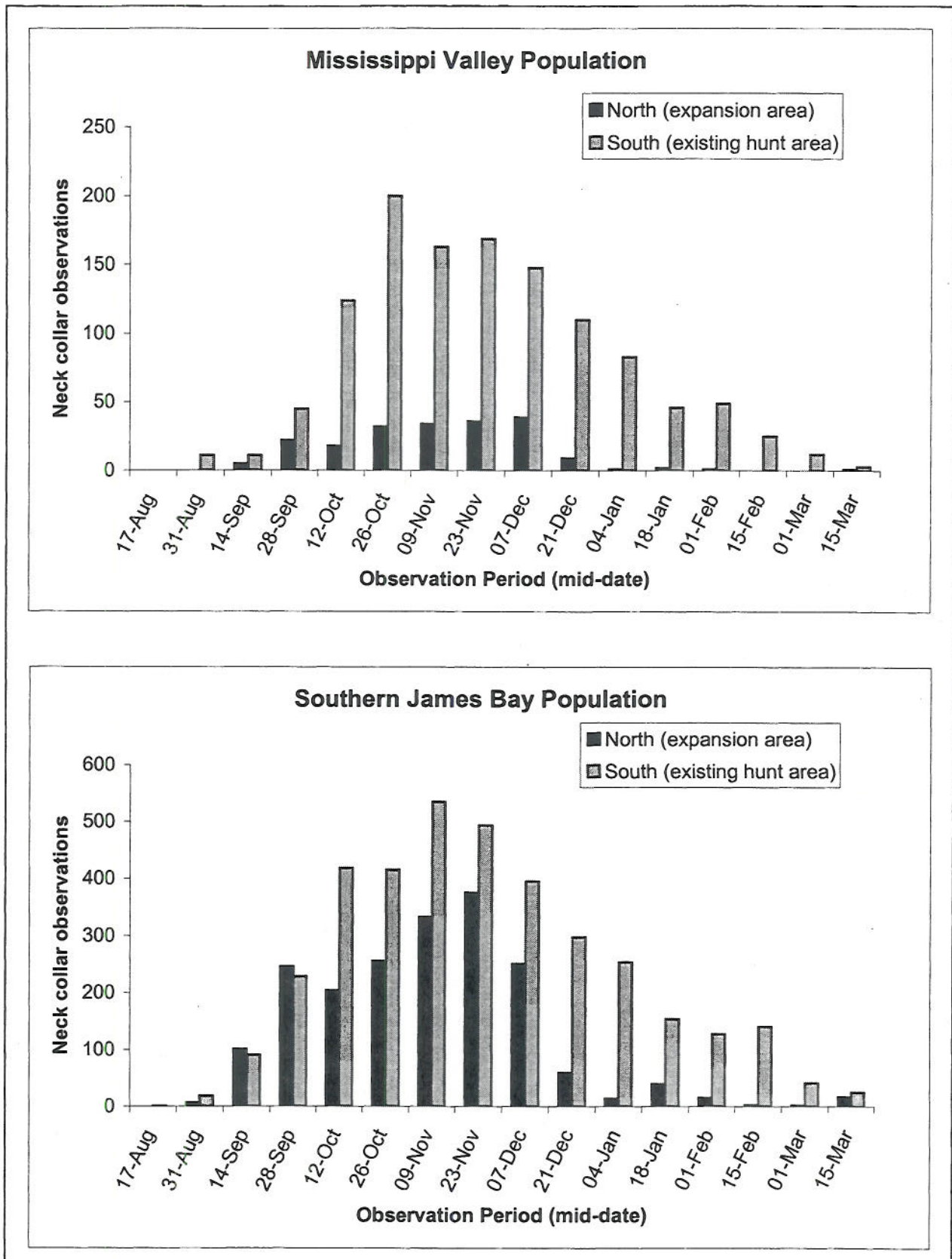


Figure 5. Distribution of MVP ( $n = 1,399$ ) and SJB ( $n = 5,568$ ) Canada goose neck-collar observations collected in Michigan north and south of the 43rd parallel (traditional late hunt boundary), 1977-96 (compiled by two week periods, indicated date = midpoint of two-week period).

