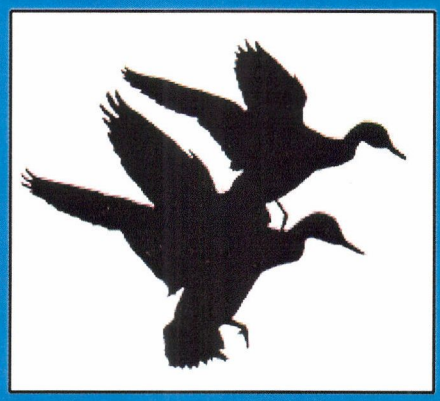
Black Duck



Joint Venture

1999
Annual Report

November, 2000

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Appendices A - F:

1.0 INTRODUCTION

The goal of the Black Duck Joint Venture (BDJV) is to implement a cooperative international program of population monitoring and research. The program will provide information required to improve the management of black ducks. The primary objectives, as stated in the BDJV Strategic Plan (1993), are to:

i) provide statistically reliable indices of population trends and relative densities of black ducks and other waterfowl species throughout the primary breeding range of black ducks,

ii) determine the distribution and derivation of the harvest of black ducks and mallards from throughout the breeding range, along with their harvest and survival rates,

iii) determine, through research, the important factors influencing population status and dynamics of black ducks.

The purpose of this report is to describe the progress made in 1998 toward meeting those objectives.

2.0 SURVEYS

2.1 Helicopter Plot Surveys

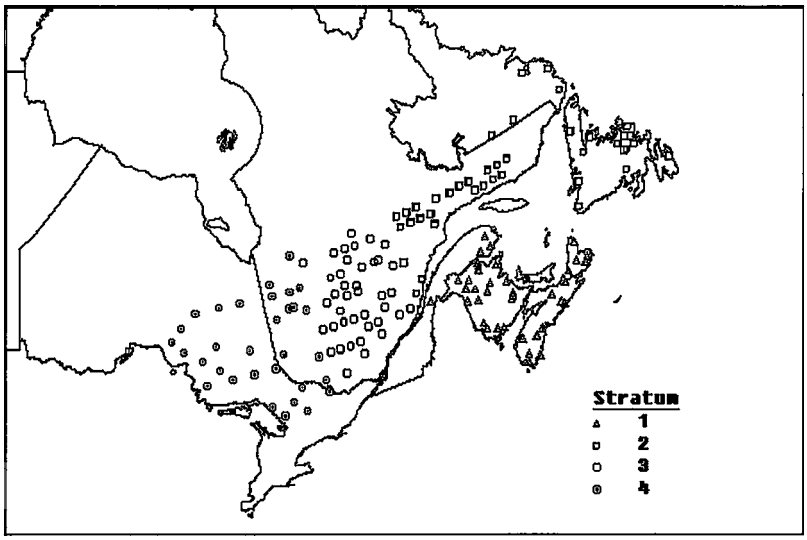
Helicopter survey procedures are described in the draft BDJV Operational Plan (1992). In 1990 and 1991, the survey comprised 229-100 km^2 plots distributed throughout the Boreal Shield and Atlantic Highlands Ecozones. Sample size decreased during the subsequent four years due to decreasing budgets and revised precision requirements.

In 1996, efforts were made to reduce costs while maintaining the precision of the BDJV helicopter survey and increasing its representativeness by (a) reducing plot size from 10 X 10 km to 5 X 5 km and (b) imposing a new survey design based on a rotating sample in which a portion of the plots are retained from one year to the next while other plots are discarded and replaced. These changes allow for annual coverage of a larger number of plots, thus increasing the dispersion of the sample. The sample was allocated to provide a 10% coefficient of variation (cv) for the central part of the black duck range (Boreal Shield and Atlantic Highland Ecoregions), with a 15% cv for each of 4 survey strata (Figure 1).

The rotational sampling regime consists of an annual sample of 151 plots distributed as follows: Atlantic Highlands- 39 (Stratum 1); Eastern Boreal Shield- 40 (Stratum 2), Central Boreal Shield- 40 (Stratum 3), and Western Boreal Shield- 32 (Stratum 4) (Figure 1).

1999 was the fourth year of the rotational survey. The first rotation has now been completed so that all plots have received two coverages over the last four years. Spring arrived early for the second year in a row throughout the east

Figure 1. Survey Strata and Plot Distribution for the 1999 Helicopter Survey



2.2 Population Estimation

Population estimates for each stratum and overall were calculated for each year using the standard equations for analysis of a stratified random sample. The results for both indicated pairs and total individuals are shown in Tables 1 and 2 respectively. Figure 2 illustrates black duck breeding population estimates within the four helicopter plot survey strata in Eastern Canada.

It is important to note that the method for calculating indicated breeding pair estimates of black ducks has been improved. Consequently, the entire data within Tables 1 and 2, as well as the data shown in Figure 2 have been revised.

Table 1. Estimated Number of Indicated Pairs of Black Ducks and Standard Error. From *Collins*, February, 2000[1].

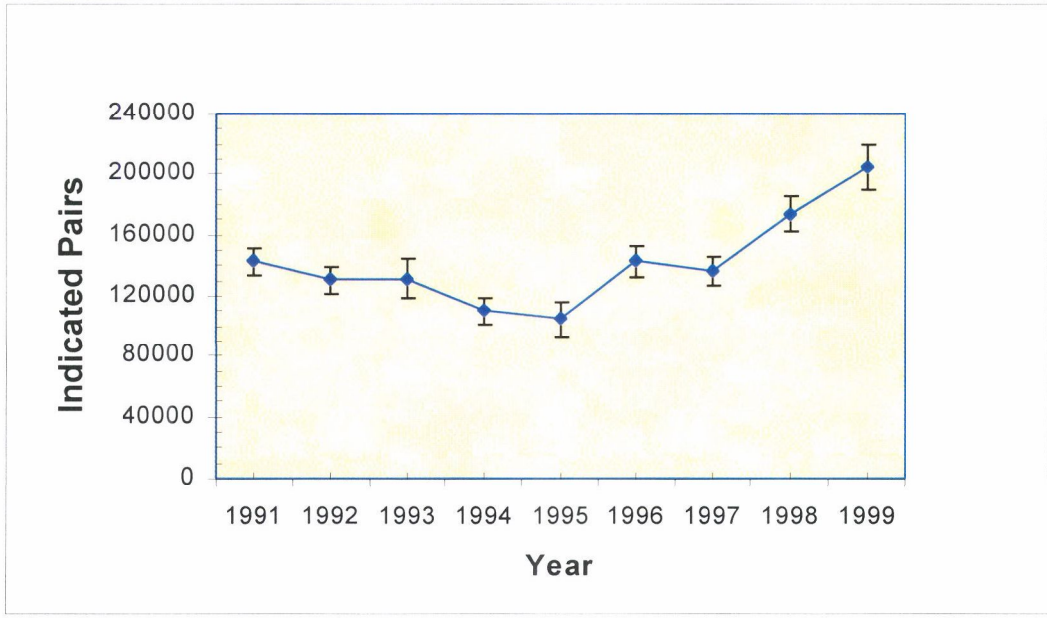
Year	Stratum 1	Stratum 2	Stratum 3	Stratum 4	TOTAL
1990	34286 ± 6197	18144 ±3026	37852 ± 3850		
1991	31122 ± 4117	15264 ± 2690	37360 ± 4274	59202 ± 5753	142948 ± 8692
1992	33516 ± 4390	14452 ± 2171	30232 ± 3094	52121 ± 6041	130321 ± 8369
1993	32275 ± 3960	9568 ± 1794	33209 ± 7361	56477 ± 8970	131529 ± 12392
1994	30834 ± 3722	12890 ± 3574	20155 ± 4414	45948 ± 5762	109826 ± 8905
1995	32851 ± 7275	11140 ± 2359	21976 ± 3195	38666 ± 8120	104634 ± 11604
1996	40964 ± 3505	11679 ± 1716	33157 ± 4695	57255 ± 8158	143055 ± 10190
1997	40374 ± 5152	15732 ± 3152	33157 ± 3578	47279 ± 6844	136542 ± 9804
1998	58165 ± 7441	17008 ± 2210	39462 ± 4121	58990 ± 8021	173624 ± 11898
1999	56263 ± 7112	27368 ± 5185	48335 ± 5093	72436 ± 10938	204401 ± 14935

[1] Collins, Brian. Feb. 16, 2000. Analysis of 1999 Black Duck Breeding Ground Survey (memorandum). Migratory Bird Populations Division, National Wildlife Research Centre, Hull, P.Q.

Table 2. Estimated Number of Total Individuals of Black Ducks and Standard Error. From *Collins*, February, 2000[1].

Year	Stratum 1	Stratum 2	Stratum 3	Stratum 4	TOTAL
1990	86965 ± 24415	35568 ± 7330	68575 ± 7752		
1991	60584 ± 10561	34128 ± 8507	60584 ± 7877	94327 ± 9345	249623 ± 18256
1992	67298 ± 9011	26647 ± 5403	55794 ± 6002	95460 ± 11798	245199 ± 16900
1993	61091 ± 7513	23368 ± 7530	87692 ± 19601	89023 ± 15487	261175 ± 27151
1994	64405 ± 9426	24706 ± 8705	373605 ± 8135	68443 ± 8426	194914 ± 17373
1995	63973 ±13480	17463 ± 3496	45052 ±9236	65434 ± 11942	191922 ± 20539
1996	80332 ± 8995	21092 ± 3313	62345 ± 9817	117113 ± 17329	280881 ± 22103
1997	75141 ± 10220	33617 ± 6240	69350 ± 11414	99763 ± 15267	277870 ± 22511
1998	138852 ± 26429	29360 ± 5123	75654 ± 9253	127956 ± 17845	371823 ± 33597
1999	123553 ± 24237	67460 ±16820	85228 ± 8203	129691 ± 21988	405932 ± 37697

Figure 2. Estimated Number of Indicated Pairs of Black Ducks (+/- 1 SE) in the Breeding Ground Survey area of Eastern Canada.



[1] Collins, Brian. Feb. 16, 2000. Analysis of 1999 Black Duck Breeding Ground Survey (memorandum). Migratory Bird Populations Division, National Wildlife Research Centre, Hull, P.Q.

2.3 Trend Analysis

A test for trend was done using the estimating equations technique (Link and Sauer, 1994). The data used for trend estimation was selected using the same criteria used in route-regression analyses done in previous years. The 1990 data for Ontario were discarded due to changing survey methodology. The data for New Brunswick was partitioned into two subsets (1990-1992) and (1993-1998) due to a change in observer in 1993. The resulting estimates of trend for indicated pairs and total individuals are illustrated in Table 3.

Table 3. Estimated trends 1990-1999 for black duck indicated pairs and total individuals. Adapted from *Collins,* February, 2000.

	Range-wide	Stratum 1	Stratum 2	Stratum 3	Stratum 4
Indicated Pairs	5.1*	9.0*	6.5*	5.6*	0.0
Total Individuals	4.7*	12.7*	8.6*	5.4*	1.5

** Significant p>0.05 level.*

2.4 Fixed-Wing Surveys

Fixed-wing aircraft surveyed line transects using 3 crews to obtain range-wide population data. Each observation was geo-referenced using global positioning systems. Visibility rates continue to be assessed by following selected fixed-wing segments with helicopter surveys. This was the tenth year of fixed-wing survey of eastern Ontario, southern Québec and northern New York (strata 51-56). Results for these strata are described in Appendix A. The survey results for the Lake States of Michigan, Wisconsin and Minnesota are presented in Appendix B. This was the fourth year for fixed-wing surveys covering Maine, the Maritime provinces and central Quebec (strata 62-69). This survey is still in the experimental stage and data are presented in Appendix C for informational purposes only.

2.5 Ground Surveys

Another survey of relevance to the BDJV is the ground count that is conducted annually on Prince Edward Island. One hundred randomly selected wetlands covering a wide range of habitat types are surveyed four times each summer. The number of early and late breeding species, and their productivities are estimated annually. 1999 was the seventeenth consecutive year of the ground-based survey and it was carried out on schedule by CWS and provincial staff. The data show a long term increase (1985 - 1999) in the breeding population of black ducks on Prince Edward Island[1].

This was the 11th consecutive year of the Atlantic Flyway Breeding Plot Survey for Waterfowl. A comparison of indicated pair counts for mallards, black ducks, wood ducks and Canada geese with past years has been included in Appendix D.

2.6 Mid-winter Inventory

Mid-winter inventories in the Atlantic and Mississippi Flyways have shown that black ducks gradually declined from the late 1950s until the early 1980s, when the population stabilized at a low level (Figure 1, Appendix E).

[1]Bateman, M.C and R.L. Dibblee. 2000. Waterfowl Surveys on Prince Edward Island, 1997-1999. Progress Report. Canadian Wildlife Service, 41 pp.

The mid-winter population of black ducks in the Mississippi Flyway reached an even lower level in the last two years, with a recorded index of only 46,700 birds in 1999, slightly higher than in 1998 (40, 889). The total mid-winter population estimate for black ducks in the Atlantic Flyway in 1999 showed an increase to 271,300 ducks compared to 202,500 in 1998.

3.0 BANDING

Recoveries of banded birds can be used to determine the distribution and derivation of the harvest of individuals from throughout the breeding range, and their harvest and survival rates. Black ducks were captured at about 33 banding stations distributed across eastern Canada.

Overall, numbers of black ducks banded in eastern Canada in 1999 declined slightly from 1998 due to the dryer than normal conditions. These results may indicate lower productivity in 1999. Banding priority is to maintain established stations with a history of productive black duck bandings for comparative purposes.

The Canadian banding sites are illustrated on the map in Appendix F. The BDJV extends many thanks to those provinces which contribute to the banding effort. Much of the eastern Canada banding effort is possible due to Atlantic Flyway Eastern Cooperative Banding Program funds and the Mississippi Flyway banding fund. A summary of 1999 regional banding results by station is presented in Appendix F.

4.0 RESEARCH

The research component of the BDJV addresses important information gaps in our knowledge needed to improve the management of black ducks, and to provide necessary information to the habitat oriented joint ventures.

The primary research effort was directed towards a contract with the Georgia Cooperative Wildlife Research Unit to review, assemble, and integrate key databases into models to test hypotheses relating to factors limiting the size of the black duck population. Such hypotheses include over-harvest, competition with mallards, and quality and quantity of breeding and wintering habitats. A final report was submitted in early 1999, which suggested that single factor explanations tended to yield unpredictable results. Combined models including the joint effects of harvest and mallard competition appear to hold the best promise for use in an adaptive management context. New contracts were funded to evaluate the utility of adaptive resource management in guiding a more informed decision-making process.

Future research will be directed toward refining the population models and assessing the potential of an adaptive harvest management system for the black duck.

5.0 BUDGET

Allocation of 1999 BDJV funds (the upper value is in Canadian dollars, and the lower in U.S. dollars using 1.40 for conversion).

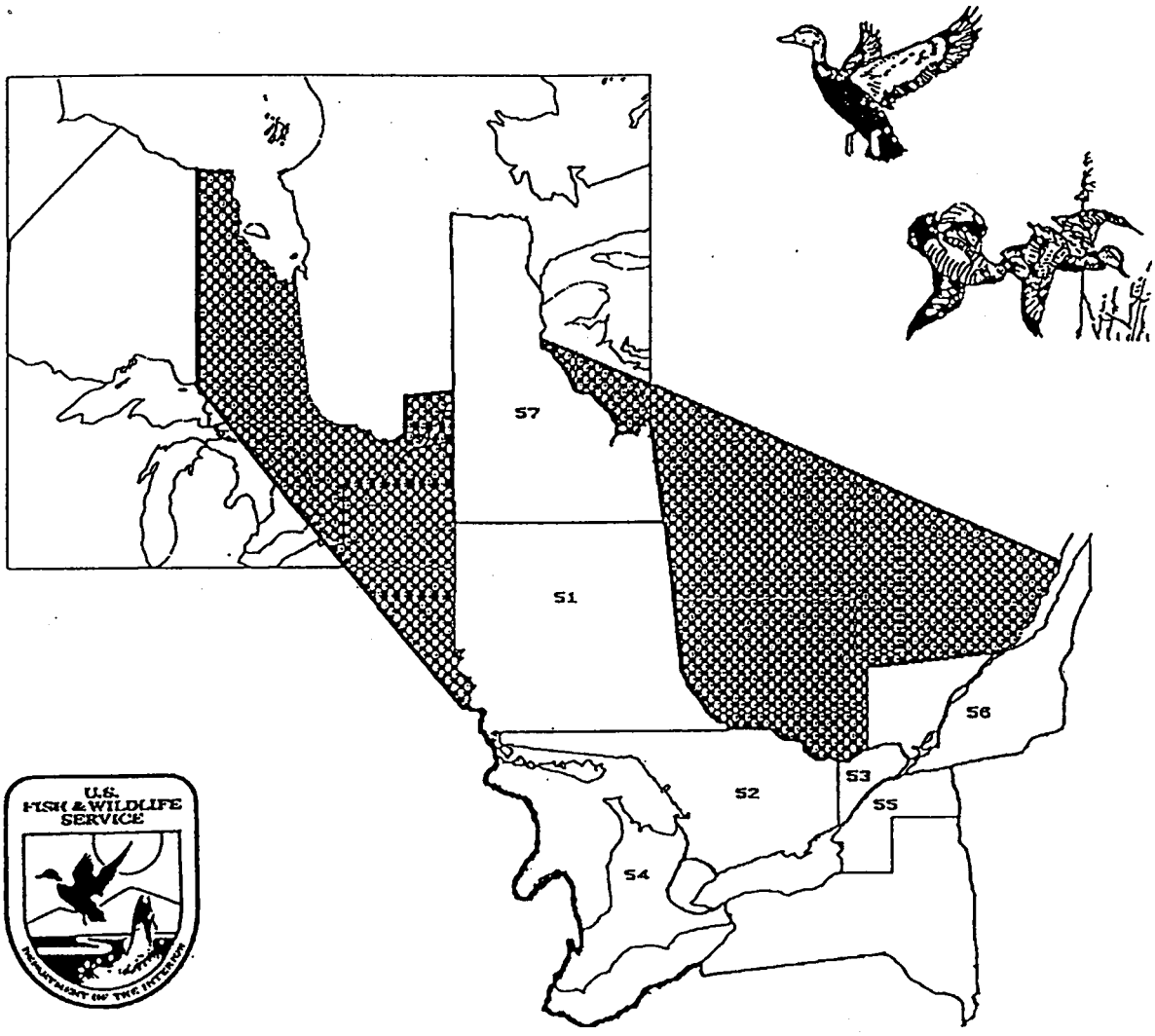
Organization	Surveys	Research	Banding	TOTAL
Canadian Wildlife Service	224, 700 160, 500	10,000 7,200	5, 000 3, 570	239, 700 171, 270
U.S. Fish and Wildlife Service	245, 434 176, 310		113, 400 80, 000	358, 830 256, 310
US Geological Service- Biological Resources Division		105, 840 75, 600		105, 840 75, 600
Atlantic Flyway Cooperative Waterfowl Banding Program			163, 800 117,000	163, 870 117, 000
Mississippi Black Duck Banding Fund			18, 200 13, 000	18, 200 13, 000
Total Expenditures	**$ 470, 134** **$ 336, 810**	**$115, 840** **$ 82, 800**	**$ 300, 400** **$ 213, 570**	**$ 886, 440 Cdn** **$ 633, 180 U.S**

APPENDIX A

WATERFOWL BREEDING POPULATION SURVEY

New York, Eastern Ontario, and Southern Quebec

1999



1999 Experimental Waterfowl Breeding Population Survey New York, eastern Ontario, and southern Quebec

April/May 1999

Strata Surveyed
51,52,53,54,55,56

Survey Conducted and Data Supplied by
United States Fish & Wildlife Service

Aerial Crews			
	Stratum 51	Pilot/Observer	William I. Butler, USFWS
		Observer	Burr Fisher, USFWS
	Strata 52-56	Pilot/Observer	James S. Wortham, USFWS
		Observer	Mark D. Koneff, USFWS
Helicopter Crew		Pilot	Rob LaMont, Ontario MNR
		Observer	Mark D. Koneff, USFWS

Abstract

In conjunction with the Black Duck Joint Venture, this is the tenth year of surveys to determine breeding waterfowl population numbers of Ontario, southern Quebec, and northern New York. A warm dry winter followed by an early and dry spring perpetuated the dry conditions of 1998. Breeding habitats are improved from 1998, and are characterized as fair to excellent across the survey area. Estimates of total ducks across the survey area were up 52.5% from last year, and up 6.4% from the 8-year mean (1991-1998). Canada goose populations increased 1721.8% from 1998, an increase of 758.4 % above the long-term mean. During the 1999 survey, an inordinately large number of migrant Canada geese were observed transitioning the survey area.

Methods

The procedures followed in conducting this survey are detailed in the Standard Operating Procedures for Aerial Waterfowl Breeding Ground Population and Habitat Survey, Section III, revised April 1987. The aerial crew was experienced and had surveyed these strata the previous year. A Cessna U206F fixed-wing aircraft equipped with amphibious floats was used for the survey. Visibility corrections were obtained using pooled data from an ongoing helicopter visibility bias correction study being conducted in eastern Canada. Calculated correction factors are applied across the eastern survey area, and 1999 marks the sixth crew to be assessed.

Beginning in 1998, waterfowl and habitat data were collected using an aerial onboard digital recording system designed to attribute each waterfowl observation with a respective location

recorded as a latitude/longitude coordinate. Each data point (observation) is then logged along with the sample details, i.e. strata, transect, and segment, time, climatic conditions, and location. This survey system, having initially begun testing in Alaska during 1996, was used this year for the first time in the entire continental survey.

Due to past revisions to survey methodology, the reader is cautioned not to compare data and tables contained herein to those published in previous issues of the Waterfowl Breeding Population Survey reports.

Weather and Habitat Conditions

Stratum 51: This stratum lies north of Lake Huron, east of Lake Superior, south of James Bay, and east of the Quebec border along the Ottawa River. The stratum is characterized by rolling terrain in the east, central, and northern sections with hilly terrain in the south and west. Habitat can be described as boreal forest mixed with agricultural lands in the center and east (locally referred to as the "clay belt"). Common throughout the area is the logging of mixed old and new growth timber. The landscape also supports extensive mining with concentrations occurring in the southern half. Permanent water areas are common with many water bodies connected by streams, marshes and muskegs. Water and habitat varies only slightly over time.

Stratum 52: Stratum 52 lies east of the Georgian Bay, north of Lake Ontario, south of the Ottawa River, and west of the line running from Ottawa to Kingston, Ontario. Topography varies from hilly in the north to rolling in the south. Algonquin Park lies totally within this stratum. The northern part of the stratum is primarily mixed northern hardwood forest, except along the Ottawa River where some farming occurs. The southern half of the stratum is a mixture of woodland and agriculture. Many small to moderate size lakes are found throughout the area, with some large lakes connected by small streams. Small reservoirs and farm ponds are present. Water in this area appears to be relatively stable.

Stratum 53: This is a small stratum located southeast of Ottawa, bounded on the north by the Ottawa River and on the south by the St. Lawrence River. The area is relatively flat with some rolling terrain along the west boundary. Agriculture is the primary land use of this area and it has been extensively cleared and drained. The remaining habitat consists of a few marshes, small streams and drainage ditches. Water availability could be variable in this area depending on the spring and summer rainfall.

Stratum 55: The St. Lawrence lowlands dominate this area, bounded by Lake Champlain to the east, the Adirondacks to the south, Lake Ontario to the west, and the St. Lawrence River to the north. The terrain varies from rolling to moderate in the south, to flat and slightly rolling to the north. Habitat consists of hardwood forests interspersed with streams, lakes, marshes, bogs, and wooded swamps with many small marshes along the St. Lawrence River . Agriculture is in the form of small farms spread throughout the area. Timber harvest also occur, but only on a small scale. Habitat appears to be of a permanent nature in this stratum.

Stratum 56: Stratum 56 is located in southern Quebec. The boundary lies just south of Montreal and extends to Quebec City, the west end of the Gaspe Peninsula, down to Maine, New Hampshire, Vermont, and New York borders, and back to Montreal. Th area can be described as flat in the west and north to rolling and moderate in the southeast. All of the area is agricultural except the southeast where some forestry and mining activities occur. The western region is extensively drained and cleared; the remaining area is mixed forest and farmland. Some tidal marshes occur along the St. Lawrence River, and are quite extensive in the Lake St. Peter area. Habitat in the west consists drainage ditches, farm ponds, and some natural streams. Farm ponds, some natural lakes, and wet areas along streams, a few wooded swamps, and some fresh marshes comprise habitat in the north. Lake St. Peter is a natural marsh occurring along the St. Lawrence River. The marsh is extensive and provides excellent nesting areas. To the southeast, along the Maine to new York borders, habitat consists of natural streams, small natural lakes, a few bogs, and some larger lakes. Available waterfowl habitats in the southeast are limited due to increasing terrain.

The winter of 1998/99 was warmer and dryer than usual across southern Ontario and southern Quebec. An early spring resulted in the early melt of the low or near-normal snowfall accumulations in the area perpetuating the already low water levels in local basins. Spring rainfall was below normal, but area lakes thawed slightly early as a result of the warmer temperatures. Breeding habitat across the area remains dry this year, but improved from the drier conditions of 1998. Despite the dry conditions, habitats were ice-free and accessible and could be generally categorized as "fair" throughout the survey area with local wetlands along the St. Lawrence River and also in New York state exhibiting "good" conditions.

Breeding Populations

Estimates of total ducks across the survey area increased (52.5%) from last year, and increased (6.4%) from above the 8-year mean (1991-1998). Dabbling ducks increased (27%) from 1998 levels, and (1.5%) above the 8-year mean. In contrast, abundances mallards decreased 18.3% from 1998 (10.9% below the 8-year mean), while black ducks increased (23.9%) from last year, remaining only 14.9 % below the 8-year average. Diving ducks increased (94.3%) from 1998 climbing to 54.4% above the 8-year mean. However, numbers of scaup declined (92.9%) from 1998, falling to 87.5% below the long-term average.

Table 1. Survey design for Ontario, New York, and Quebec, May 1999

	51	52	53	54	55	56
Survey Design						
Square Miles in Stratum	78,680	28,265	4,259	12,245	4,149	21,721
Linear Miles in Sample	1,512	720	180	648	216	900
Number of Segments in Sample	84	40	10	36	12	50
Expansion Factor	208.15	157.03	94.64	75.59	76.83	96.54

Table 1. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) by species and stratum with comparisons against the previous year and the long-term mean for Eastern Ontario, Southern Quebec, and New York.

Species/Ponds	Stratum (1999)						1999 Total	1998 Total	1990-1998 Mean	% Change From 1998	% Change From 1990-1998 Mean
	51	52	53	54	55	56					
Ducks											
Dabblers											
Mallard	116.8	31.3	10.7	41.5	19.7	12.3	232.2	284.2	260.7	-18.3%	-10.9%
Am. black duck	72.0	7.9	1.6	0.0	6.3	15.9	103.7	83.7	121.9	23.9%	-14.9%
Gadwall	0.0	0.0	0.0	0.0	1.4	12.3	13.7	4.0	7.7	240.8%	78.5%
Am. wigeon	14.3	31.4	0.0	0.0	0.0	31.4	77.1	21.0	22.9	267.6%	236.3%
Am. green-winged teal	16.3	12.5	18.5	8.2	39.0	60.2	154.7	55.3	80.2	179.9%	92.9%
Blue-winged teal	0.0	0.0	0.0	1.6	0.0	0.0	1.6	14.6	80.2	-89.3%	-98.1%
N. shoveler	0.0	1.1	0.0	0.0	0.0	1.3	2.4	0.0	1.0	--	135.8%
N. pintail	0.0	0.8	0.5	0.0	0.0	1.0	2.4	0.0	4.3	--	-45.3%
Subtotal	219.3	85.0	31.3	51.3	66.5	134.5	587.8	462.8	579.0	27.0%	1.5%
Divers											
Redhead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	3.4	-100.0%	-100.0%
Canvasback	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	--	-100.0%
Scaups	0.0	0.0	0.0	1.5	0.0	0.0	1.5	20.5	12.0	-92.7%	-87.5%
Ring-necked duck	173.7	13.4	0.9	0.0	0.0	1.8	189.7	122.0	182.8	55.5%	3.8%
Goldeneyes	276.5	16.6	0.0	0.5	2.3	7.3	303.3	93.2	99.6	225.5%	204.5%
Bufflehead	21.1	8.3	4.6	0.4	3.6	2.1	40.1	37.0	46.1	8.5%	-13.0%
Ruddy Duck	0.0	5.6	0.0	0.0	0.0	0.0	5.6	4.5	3.8	23.1%	48.7%
Subtotal	471.3	43.9	5.5	2.5	5.9	11.2	540.2	278.0	349.8	94.3%	54.4%
Miscellaneous											
Oldsquaw	0.0	0.0	0.0	0.9	0.0	0.0	0.9	10.4	2.8	-91.3%	-67.2%
Scoters	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.6	4.3	-63.7%	-94.9%
Mergansers	51.4	27.5	0.5	0.8	4.6	2.5	87.2	45.7	207.7	90.8%	-58.0%
Subtotal	51.4	27.5	0.5	1.9	4.6	2.5	88.4	56.7	214.8	55.9%	-58.9%
Total Ducks	742.0	156.3	37.3	55.7	77.0	148.1	1216.3	797.4	1143.5	52.5%	6.4%
Canada Goose	15.4	10.7	1544.1	91.7	95.8	730.9	2488.6	136.6	289.9	1721.8%	758.4%
Am. coot	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	6.5	-100.0%	-100.0%
Am. coot	0.0	0.0	0.0	5.2	0.0	0.0	5.2	2.4	7.0	118.7%	-26.1%

Crew Area: NY-Ontario (strata 51-56)

Species/Pond	Stratum Estimates TIB	Est Pop	SE	95% Confidence Int	Stratum Estimates TIB	Est Pop	SE	95% Confidence Int	Stratum Estimates TIB	Est Pop	SE	95% Confidence
	Stratum 51 (area exp. factor = 208.148)				Stratum 52 (area exp. factor = 157.033)				Stratum 53 (area exp. factor = 94.644)			
1290 Merganser	235	61361	22803	(6666, 96055)	136	27464	7054	(13639, 41290)	4	487	399	(0, 1269)
1320 Mallard	192	116750	28923	(60061, 173439)	141	31259	14150	(3524, 58994)	80	10689	5401	(103, 21275)
1330 American Black Duck	148	71992	28332	(16461, 127523)	24	7941	2772	(2506, 13375)	8	1595	1036	(0, 3627)
1350 Gadwall	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
1370 American Wigeon	12	14262	7882	(0, 29711)	35	31383	33443	(0, 96930)	0	0	0	(0, ?)
1390 Green-winged Teal	34	16323	7591	(1444, 31202)	15	12454	9402	(0, 30882)	37	18514	17395	(0, 52608)
1400 Blue-winged Teal	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
1420 Northern Shoveler	0	0	0	(0, ?)	2	1096	1062	(0, 3178)	0	0	0	(0, ?)
1430 Northern Pintail	0	0	0	(0, ?)	2	835	837	(0, 2477)	2	504	412	(0, 1311)
1460 Redhead	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
1470 Canvasback	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
1490 Scaup	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
1500 Ring-necked Duck	384	173692	68043	(40328, 307056)	28	13361	3902	(5713, 21008)	3	863	709	(0, 2253)
1510 Goldeneye	368	276521	101497	(77587, 475454)	14	16593	6492	(3866, 29318)	0	0	0	(0, ?)
1530 Bufflehead	70	21059	6835	(7662, 34456)	24	8329	2492	(3444, 13214)	22	4602	3788	(0, 12026)
1540 Oldsquaw	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
1600 Common Eider	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
1630 Scoter	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
1670 Ruddy Duck	0	0	0	(0, ?)	6	5597	5422	(0, 16224)	0	0	0	(0, ?)
1720 Canada Goose	27	15361	10639	(0, 36213)	25	10730	10359	(0, 31034)	5969	1544131	564846	(397833, 2690428)
1800 Swan	4	833	833	(0, 2464)	0	0	0	(0, ?)	0	0	0	(0, ?)
2210 American Coot	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
9990 Unadjusted Ponds	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
	Stratum 54 (area exp. factor = 75.586)				Stratum 55 (area exp. factor = 76.833)				Stratum 56 (area exp. factor = 96.538)			
1290 Merganser	10	794	575	(0, 1920)	47	4644	1873	(972, 8316)	20	2483	1184	(163, 4803)
1320 Mallard	188	41513	16439	(9293, 73733)	182	19742	6701	(6609, 32875)	90	12266	4862	(2737, 21795)
1330 American Black Duck	0	0	0	(0, ?)	39	6314	2326	(1755, 10873)	78	15867	6392	(3338, 28395)
1350 Gadwall	0	0	0	(0, ?)	6	1401	527	(369, 2434)	42	12326	9581	(0, 31105)
1370 American Wigeon	0	0	0	(0, ?)	0	0	0	(0, ?)	57	31420	25543	(0, 81485)
1390 Green-winged Teal	47	8194	7390	(0, 22677)	96	38997	21680	(0, 81490)	118	60227	38001	(0, 134708)
1400 Blue-winged Teal	2	1559	1574	(0, 4644)	0	0	0	(0, ?)	0	0	0	(0, ?)
1420 Northern Shoveler	0	0	0	(0, ?)	0	0	0	(0, ?)	4	1348	779	(0, 2874)
1430 Northern Pintail	0	0	0	(0, ?)	0	0	0	(0, ?)	4	1027	714	(0, 2427)
1460 Redhead	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
1470 Canvasback	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
1490 Scaup	10	1497	1512	(0, 4460)	0	0	0	(0, ?)	0	0	0	(0, ?)
1500 Ring-necked Duck	0	0	0	(0, ?)	0	0	0	(0, ?)	6	1760	1634	(0, 4962)
1510 Goldeneye	2	546	566	(0, 1656)	4	2320	2506	(0, 7232)	10	7286	4354	(0, 15821)
1530 Bufflehead	4	437	313	(0, 1050)	21	3564	1616	(398, 6734)	10	2133	1015	(145, 4122)
1540 Oldsquaw	6	903	981	(0, 2825)	0	0	0	(0, ?)	0	0	0	(0, ?)
1600 Common Eider	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
1630 Scoter	2	219	240	(0, 690)	0	0	0	(0, ?)	0	0	0	(0, ?)
1670 Ruddy Duck	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
1720 Canada Goose	444	91731	38746	(15789, 167673)	456	95764	39346	(18646, 172881)	2770	730911	366114	(0, 1487695)
1800 Swan	17	1285	1285	(0, 3804)	0	0	0	(0, ?)	0	0	0	(0, ?)
2210 American Coot	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)
9990 Unadjusted Ponds	0	0	0	(0, ?)	0	0	0	(0, ?)	0	0	0	(0, ?)

1999 Breeding Population and Habitat Survey

Crew Area: NY-Ontario (strata 51-56)

Species/Pond	Visibility Correction Factor				Crew Area Total		
	Mean	SE	CV %	Pooling Level	Population Estimate	SE	95% Confidence Interval
1299 Merganser	1.29	0.17	13.3	Other	35078	7405	(20565, 49591)
1320 Mallard	1.41	0.39	27.4	Other	73956	17261	(40124, 107787)
1330 American Black Duck	2.11	0.40	19.2	Other	31718	7418	(17178, 46257)
1350 Gadwall	3.04	0.16	5.3	Other	13727	9595	(0, 32535)
1370 American Wigeon	5.71	0.81	14.2	Other	62803	42081	(0, 145283)
1390 Green-winged Teal	5.29	0.64	12.2	Other	130191	48011	(36090, 224293)
1400 Blue-winged Teal	10.31	2.13	20.7	Other	0	0	(0, ?)
1420 Northern Shoveler	3.49	0.41	11.7	Other	2444	1317	(0, 5025)
1430 Northern Pintail	2.66	0.22	8.3	Other	2366	1175	(63, 4670)
1460 Redhead	3.11	0.24	7.7	Other	0	0	(0, ?)
1470 Canvasback	2.59	0.46	17.8	Other	0	0	(0, ?)
1499 Scaup	1.98	0.12	6.1	Other	0	0	(0, ?)
1500 Ring-necked Duck	3.04	0.50	16.5	Other	15983	4289	(7577, 24390)
1519 Goldeneye	7.55	2.04	27.0	Other	26199	8209	(10109, 42289)
1530 Bufflehead	2.21	0.40	18.1	Other	18630	4920	(8988, 28272)
1540 Oldsquaw	1.99	0.71	35.7	Other	0	0	(0, ?)
1600 Common Eider	3.58	3.58	100.0	Other	0	0	(0, ?)
1639 Scoter	1.45	0.29	20.0	Other	0	0	(0, ?)
1670 Ruddy Duck	5.94	0.36	6.1	Other	5597	5422	(0, 16224)
1710 Greater White-fronted Goose	1.00	1.00	100.0	VCF Fixed	0	0	(0, ?)
1720 Canada Goose	2.73	0.77	28.3	Other	2381536	701986	(1005643, 3757428)
1809 Swan	1.00	1.00	100.0	Other	0	0	(0, ?)
2210 American Coot	4.71	0.53	11.3	Other	0	0	(0, ?)
9990 Unadjusted Ponds	1.00	0.00	0.0	VCF Fixed	0	0	(0, ?)

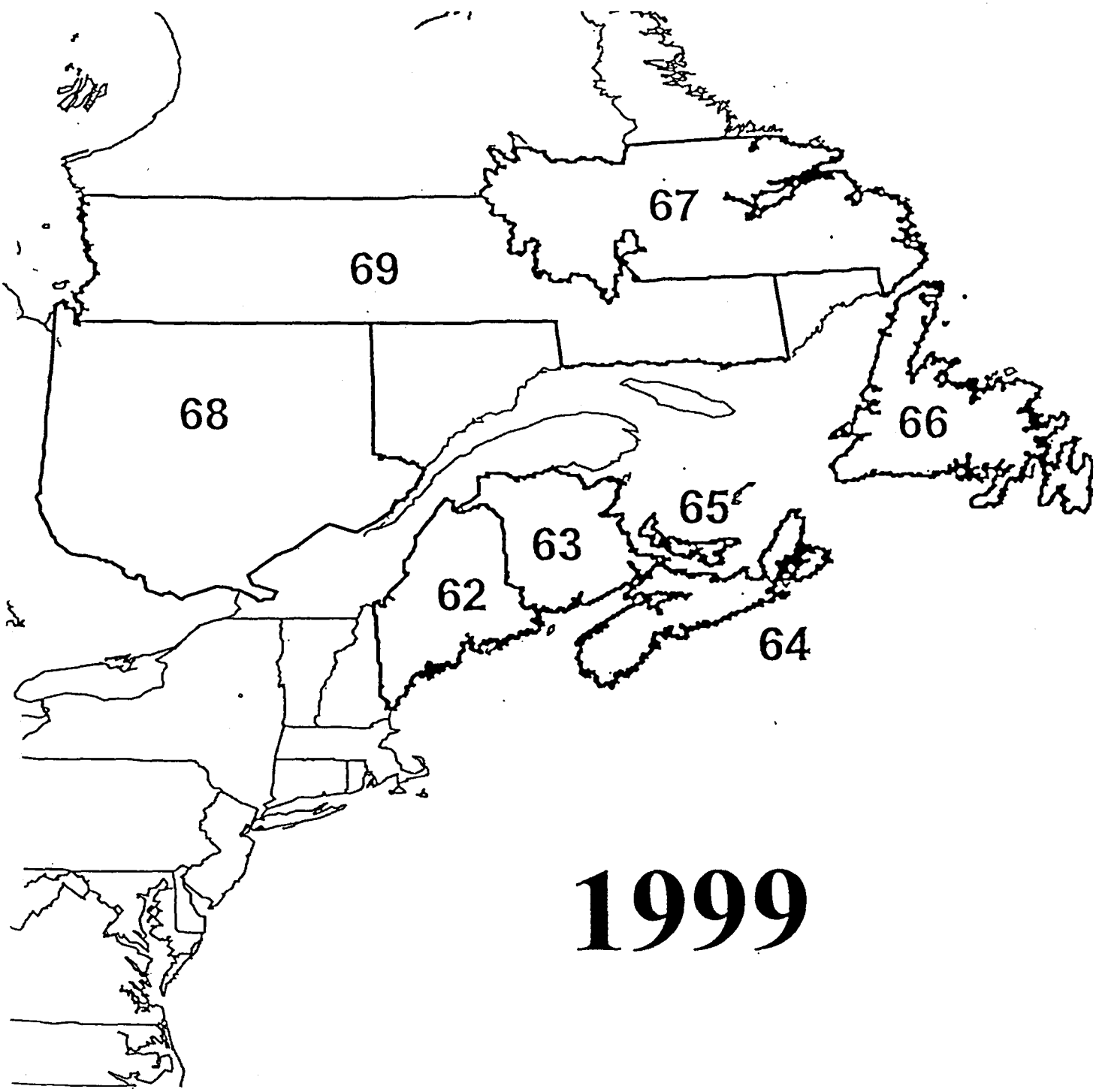
Appendix 1. Long-term trend in adjusted waterfowl breeding population estimates (thousands) for Eastern Ontario, Southern Quebec, and New York.

Species/Ponds	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Ducks										
Dabblers										
Mallard	208.6	169.8	362.2	333.8	238.6	202.8	313.1	233.5	284.2	232.2
Am. black duck	160.9	126.0	160.3	124.6	116.3	152.6	104.3	68.6	83.7	103.7
Gadwall	11.2	7.4	4.9	1.9	0.0	30.6	6.6	2.7	4.0	13.7
Am. wigeon	31.0	45.4	15.4	9.4	18.9	13.8	31.5	19.8	21.0	77.1
Am. green-winged teal	47.1	42.2	43.8	47.4	169.2	90.7	138.4	87.9	55.3	154.7
Blue-winged teal	135.7	43.5	65.6	288.6	81.9	60.5	16.1	14.9	14.6	1.6
N. shoveler	2.2	2.2	0.0	1.0	1.1	0.5	2.4	0.0	0.0	2.4
N. pintail	25.6	3.4	2.0	0.4	1.1	1.4	1.5	3.5	0.0	2.4
Subtotal	622.3	439.9	654.3	807.0	627.0	552.9	613.9	430.9	462.8	587.8
Divers										
Redhead	4.7	3.6	0.7	4.5	5.8	6.1	1.8	3.0	0.8	0.0
Canvasback	3.3	4.4	1.5	3.0	4.6	2.1	0.0	0.0	0.0	0.0
Scaups	10.9	5.1	9.9	6.8	16.7	4.7	6.3	27.1	20.5	1.5
Ring-necked duck	92.1	158.1	251.6	248.1	163.5	187.6	214.1	207.8	122.0	189.7
Goldeneyes	73.3	138.4	241.0	90.2	55.0	6.5	121.5	77.4	93.2	303.3
Bufflehead	99.9	94.1	59.0	13.1	33.4	17.0	47.1	14.3	37.0	40.1
Ruddy Duck	0.0	12.0	0.0	5.1	0.0	0.0	12.2	0.0	4.5	5.6
Subtotal	284.2	415.7	563.6	370.7	279.0	223.9	403.1	329.7	278.0	540.2
Miscellaneous										
Oldsquaw	10.6	0.0	0.0	3.8	0.0	0.0	0.0	0.0	10.4	0.9
Scoters	1.9	6.4	3.0	0.0	18.3	5.0	0.2	3.2	0.6	0.2
Mergansers	157.5	263.9	128.1	164.9	358.4	293.6	340.9	116.4	45.7	87.2
Subtotal	170.0	270.3	131.1	168.7	376.8	298.6	341.1	119.6	56.7	88.4
Total Ducks	1076.5	1125.9	1349.1	1346.5	1282.8	1075.4	1358.1	880.2	797.4	1216.3
Canada Goose	366.3	862.1	157.0	232.1	289.4	332.8	137.2	95.7	136.6	2488.6
Am. coot	4.1	19.0	6.1	5.1	2.4	5.2	15.6	0.0	0.8	0.0
Am. coot	2.6	19.0	6.1	5.1	2.4	5.2				

The data presented in this report are preliminary. Final estimates are available from the U. S. Fish and Wildlife Service, Office of Migratory Bird Management, Patuxent Wildlife Research Center, Laurel, Maryland 20708-9619

APPENDIX B

MAINE
EASTERN CANADIAN & MARITIME AREAS



1999

Map prepared by:

D. Alan ve port
Office of Migratory Bird Management
U. S. Fish and Wildlife Service
Laurel, MD 20708

TITLE Experimental Waterfowl Breeding Population Survey Maine, the Maritime provinces, and Central Quebec

STRATA SURVEYED 62, 63, 64, 65, 66, 67, 68, 69

DATA SUPPLIED BY United States Fish and Wildlife Service
&
Canadian Wildlife Service

Crew 1	Pilot/Observer	J. Goldsberry	USFWS
	Observer	J. Bidwell	USFWS
Crew 2	Pilot/Observer	J. Wortham	USFWS
	Observer	L. Breton	CWS

ABSTRACT

This survey is still in the experimental stage and the strata, transect, and segments were last reviewed and changed during 1997. Strata 62-67 under went minor adjustments over time and the data for these can now be compared with reservations. Strata 68 & 69 were revised so drastically that comparisons at the present time will be of little value. The strata transacts, and segments for all these new areas have been stabilized at this point and it is likely that only minor changes will occur in the future. Although comparisons for Strata. 62-67 are being made in this report it must be remembered that these comparisons are being made with a minimum of historical data . Data is presented for informational purposes only.

METHODS

The procedures followed in conducting the survey are contained in the *Standard Operating Procedures for Aerial Waterfowl Breeding Ground Population and Habitat Survey,* Section III, revised April 1987. No changes in survey design were made to any of the strata during 1999. All crews were experienced crews and had conducted the Aerial Waterfowl Breeding Ground Population Surveys in the past. Crew one, flew Strata 62, 63, 64, 65, 66, and 67, using a Partenavia twin engine aircraft. Crew two flew Strata 68, and 69 using a Cessna 206 on Amphibious Floats. Weather caused only minor delays in the survey in both crew areas. Both crews used the new data entry program developed by Jack Hodges (USFWS, Waterfowl Investigations, Juneau). Ak.and Alan Davenport (USFWS , MBMO) . This new program is designed to link GPS data to observations so that each observation has a latitude, longitude, and time attached. This system will allow data editing in the field and will provide range wide habitat selection data, for most species over time.

WEATHER AND HABITAT

Snow fall was light across Strata 62 - 66 with a mild winter in most areas. Normal snow fall occurred through stratum 67 the more northern eastern boreal forest area during the winter of

1998-99. Spring conditions came early to most maritime areas. The early spring was also accompanied by very dry conditions, in fact the month of April was the driest since the 1880's in Stratum 62 (Maine). The combination of low run-off from the lighter than normal snow pack and the lack of spring rains caused very dry conditions through most of the survey area. Stream flows were at record lows, pond and lake levels were near summer levels, beaver ponds were low,or dry, small ponds were dry, and marshes and muskegs were drying. In stratum 67 (Labrador), for the second year Lake Melville was open with very little ice along the coast. Stratum 67 Labrador because of near normal snows had normal spring conditions with good water levels .
In strata 68 and 69 (Quebec) winter conditions were mild with temperatures above or close to normal. Snowfall accumulations were low or near normal with some localized areas of significant accumulations occurring along a line from Mason to Chibougamau and Alma. A mild spring resulted in early thawing of lakes and wetlands. During the survey frozen lakes were only encountered above 1500 feet mean sea level. Waterfowl habitat conditions across Central Quebec could be categorized as " fair " to "good" with vegetation phenology 2-3 weeks earlier than normal with good water conditions.
In summary habitat conditions throughout central Quebec and Labrador Newfoundland, will be "fair" to "good". While in Maine and across the southern areas of the Maritimes including the island of Newfoundland, conditions will only be fair, due to a lack of water which will limit brood habitat.

BREEDING POPULATION ESTIMATES

1999 was only the fourth year of this survey in most locations and only the second year for Stratum 69. The data is presented for information purposes and only. Several years of data will be required before any meaningful comparisons can be made. Information on population estimates can be seen in the tables provided with this report.

CONCLUSIONS

Because of an early warm dry spring most habitats were available to nesting waterfowl well in advance of normal. Production across central Quebec and Labrador should be near normal. In Maine, and the maritime provinces of New Brunswick, Prince Edward Island, Nova Scotia, and Newfoundland Island production will be below normal due to dry conditions and resulting lack of brood habitat.

Waterfowl Breeding Population Survey Maine and Eastern Canada
1996-1999 Averages

Species	Straum (1999) 62	63	64	65	66	67	Total 1999	Total 1998	Crew Area 1996-1998 Average	%Change from 1998	%Change from Avg.	** Stratum (1999)** (not compared) 68	69
Ducks													
Dabblers													
Mallard	12.5	4.3	1.9	0.5	0.7	1.4	21.3	47.9	34.1	-55.5	-37.6	25.6	2.1
Am.Black Duck	22.5	36.9	36.2	7.1	30.6	83.5	216.8	288.7	242.8	-24.9	-10.7	94.7	72.8
Gadwall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5	-100.0	-100.0	1.4	2.2
Am. Wigeon	0.0	3.7	0.0	0.0	0.0	0.0	3.7	9.2	5.1	-59.8	-27.5	15.7	25.2
Am. Green-winged te	30.1	25.3	17.6	0.9	11.2	90.1	175.2	170.0	105.5	3.1	66.0	66.7	27.2
Blue-winged teal	0.0	19.0	0.0	0.0	0.0	0.0	19.0	5.6	12.8	239.3	48.4	9.5	15.2
N.shovler	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	-100.0	0.0	0.0
N.pintail	0.5	0.0	1.6	0.0	1.4	6.7	10.2	1.7	4.3	500.0	139.1	0.0	13.7
Subtotal	65.6	89.2	57.3	8.5	44.0	181.7	446.3	524.0	405.5	-14.8	10.1	213.0	158.3
Divers													
Redhead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0
Canvasback	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scaups	0.0	5.8	0.0	0.0	2.9	0.0	8.7	0.6	0.3	1350.0	2510.0	13.6	5.8
Ring-necked duck	22.9	17.2	14.9	0.0	17.3	56.4	128.7	132.4	156.7	-2.8	-17.9	98.2	35.7
Goldeneye	4.4	55.0	14.8	41.1	9.0	121.1	245.4	83.3	73.0	194.6	236.0	266.0	119.2
Bufflehead	23.4	0.0	0.0	0.0	0.0	0.0	23.4	3.1	5.4	654.8	336.0	7.1	0.0
Ruddy duck	2.3	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	1.4	0.0
Subtotal	53.1	77.9	29.7	41.1	20.2	177.5	399.5	219.5	235.4	82.0	69.7	388.0	160.8
Miscellaneous													
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.0	-100.0	-100.0	4.6	51.9
Eiders	0.0	0.0	0.0	0.0	0.0	45.8	45.8	168.3	145.5	-72.8	-68.5	0.0	0.0
Scoters	20.2	7.8	4.4	4.7	7.0	24.2	68.3	60.7	28.0	12.5	143.6	1.0	0.0
Mergansers	20.2	7.8	4.4	4.7	7.0	70.0	114.1	107.3	128.1	6.3	-10.9	87.3	49.1
Subtotal	40.4	15.6	8.8	9.4	14.0	140.0	228.2	337.9	302.7	-32.5	-24.6	92.8	101.0
Total Ducks	138.8	175.0	91.4	54.2	71.1	429.1	959.6	1081.3	943.4	-11.3	1.7	694.0	420.1
Canada Geese	48.0	9.8	3.8	3.2	92.2	122.0	279.0	229.3	215.4	21.7	29.5	462.0	159.7
Am. Coot	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

APPENDIX C

1999 WATERFOWL BREEDING POPULATION SURVEY FOR THE LAKE STATES OF MICHIGAN, WISCONSIN AND MINNESOTA - - A REVIEW - -

Strata Surveyed

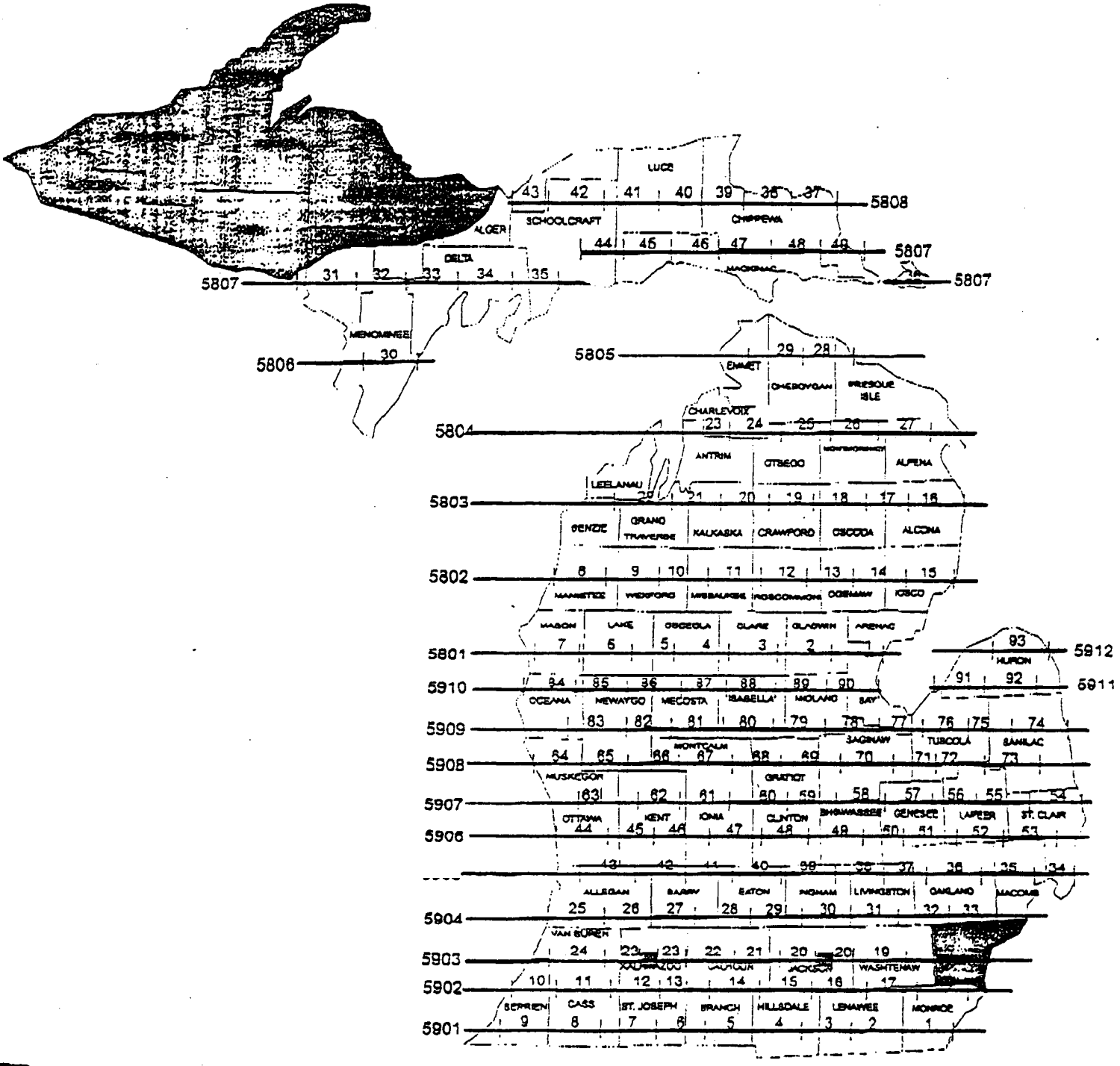
Michigan: Southern Lower, Northern Lower and Upper Peninsula
Minnesota: Minnesota Stratum 1,2 and 3
Wisconsin: Southeast Central, Northern High Density, Northern Low Density and experimental Southwest Driftless.

Methods

All states conducted surveys following basic procedures outlined in "Standard Operating Procedures for Aerial Waterfowl Breeding Ground Populations and Habitat Surveys in North America" (USFWS/CWS 1987). Surveys are stratified random transects based on habitat (e.g., wetland density). All states use fixed-wing aircraft for surveys. Wisconsin and Minnesota utilize ground crews to obtain visibility correction factors (VCF) while Michigan uses VCF obtained by surveys conducted by helicopter for major species. For the second year, Wisconsin surveyed an experimental region in the southwest portion of the state. Although birds observed in this experimental region are not included in the state's total estimate, Wisconsin plans to survey this strata again in 2000.

Population Estimates

Michigan: Michigan no longer surveys the western part of the upper peninsula (see attached map). The total mallard population estimate was 419,472, down 6% from 1998. The black duck population was estimated at 2,006 compared to 2,165 in 1998.
Minnesota: The mallard population estimate was 316,394, a decrease of 14% from 1998. No black ducks were observed in any of the strata during the survey period.
Wisconsin: The total mallard population estimate was 221,592, up 34% from 1998, and was 60% above the long-term mean. This was the 4th highest mallard population estimate since 1973. No population estimates were available for black ducks due to insufficient sample size. Black ducks are typically observed in the Northern High Density strata. Due to small n, black ducks are included in the estimate of "other ducks" which decreased by 8% from 1998 estimates in this strata.



Areas omitted from the survey

MICHIGAN SPRING BREEDING WATERFOWL SURVEY RESULTS

47880:00:00
YEAR - 1999

Species	SLP Population	NLP Population	UP Population	SLP Population Variance	NLP Population Variance	UP Population Variance	State Population	State Variance	State Coefficient of Variation (%)	State 95% CI Lower Limit	State 95% CI Upper Limit
Mallard	292,210	69,784	57,477	4883013914	511349376.2	1077088482	419,472	6471451772	19.18	261,799	577,144
Blue-winged Teal	27,388	0	0	229839470.1	0	0	27,388	229839470.1	55.36	-2,327	57,102
Wood Duck	105,517	26,081	0	1527083579	341588541.2	0	131,598	1868672120	32.85	46,871	216,326
Black Duck	0	464	1,541	0	182124.2985	564304140.7	2,006	564486265	1184.55	-44,562	48,573
Green-winged Teal	5,808	0	0	33144284.71	0	0	5,808	33144284.71	99.13	-5,476	17,092
Shoveler	0	0	0	0	0	0	0	0	#DIV/0!	0	0
Widgeon	1,278	0	0	1489492.553	0	0	1,278	1489492.553	95.47	-1,114	3,670
Pintail	0	0	0	0	0	0	0	0	#DIV/0!	0	0
Gadwall	0	0	555	0	0	248792.1992	555	248792.1992	89.84	-422	1,533
Canvasback	316	0	0	98116.8099	0	0	316	98116.8099	99.14	-298	930
Redhead	0	0	0	0	0	0	0	0	#DIV/0!	0	0
Scaup	10,144	14,817	0	35189514.72	150158400.8	0	24,961	185347915.5	54.54	-1,723	51,645
Ring-necked Duck	13,906	669	0	64906781.47	377409.0519	0	14,575	65284190.52	55.43	-1,261	30,412
Goldeneye	0	4,985	0	0	33142718.85	0	4,985	33142718.85	115.48	-6,299	16,269
Bufflehead	1,618	7,053	0	1804944.808	41981673.87	0	8,670	43786618.67	76.32	-4,299	21,640
Merganser	2,046	2,271	3,595	1746510.603	4081335.099	5245007.732	7,912	11072853.43	42.06	1,390	14,434
DUCK TOTAL	460,231	126,124	63,169	6,778,316,609	1,082,861,579	1,646,886,423	649,524	9,508,064,611	15.01	242,279	1,056,770
Coots	50,561	0	0	1418919294	0	0	50,561	1418919294	74.50	-23,270	124,391
Canada geese	183,604	24,830	11,514	1402788175	152652575.8	54291774.61	219,948	1609732526	18.24	141,310	298,586
Swan	3,599	2,421	1,096	12949723.78	5861334.475	1200631.538	7,115	20011689.79	62.87	-1,653	15,883
							0	#DIV/0!		0	0
ind. breeding pairs											
Canada geese (excluding groups)	0	0	0	0	0	0	0	0	#DIV/0!	0	0
Canada geese excluding groups and pairs without nests or broods)	0	0	0	0	0	0	0	0	#DIV/0!	0	0

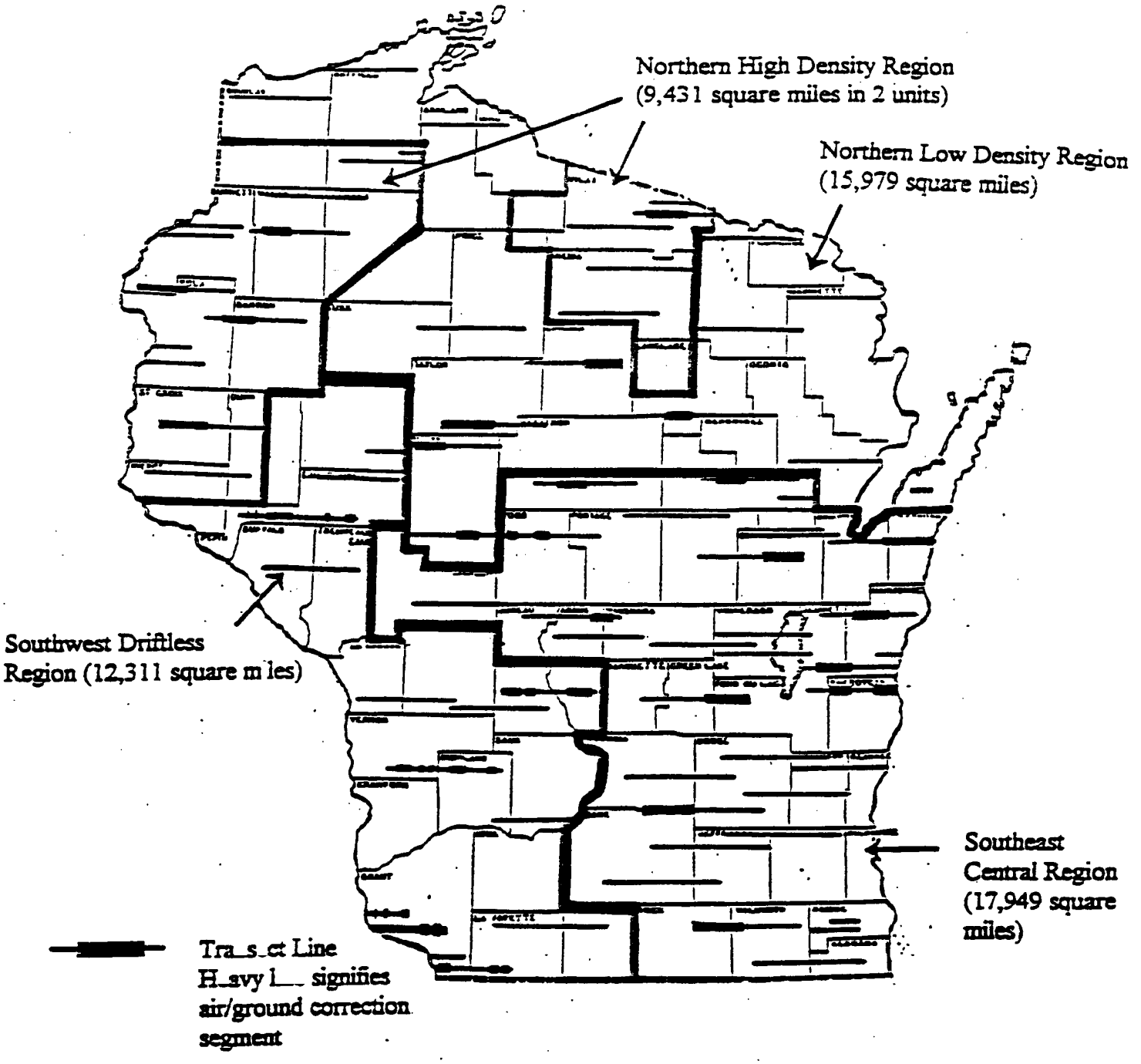


Figure 1. Transect lines and regions surveyed during the Waterfowl Population Breeding Survey for Wisconsin.

Table 5. Breeding waterfowl population estimates in Wisconsin, 1999 (estimates in thousands)

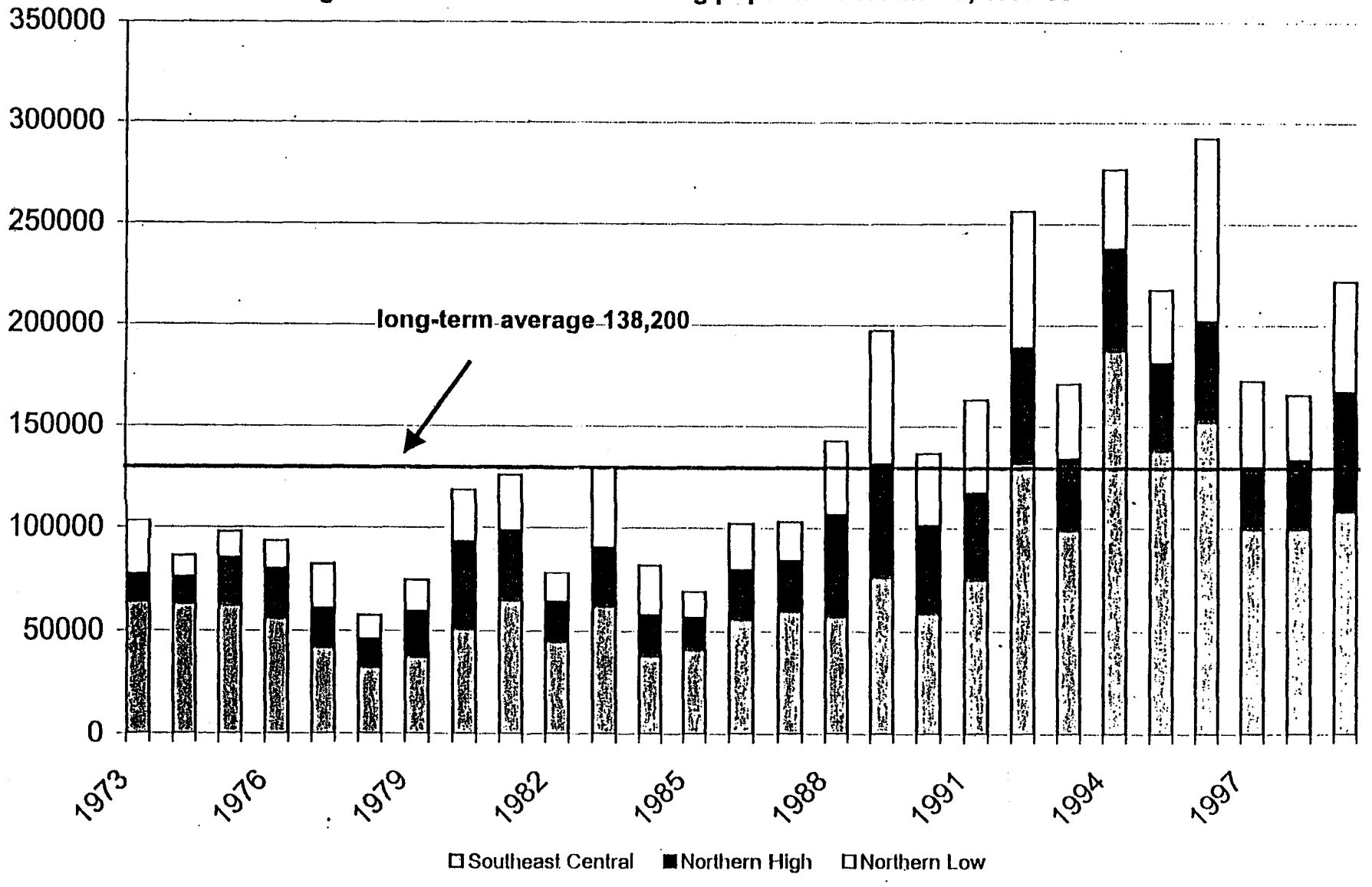
Species	1999	1973-1998 mean[1]	Percent change from 1998	Percent change from 1973-98 mean
Mallard				
Stratum[2]				
SEC	107.6	74.6	8	42
NHI	59.4	32.0	75	86
NLO	54.6	31.5	68	73
Subtotal	221.6	138.1	34	60
Blue-winged teal				
Stratum				
SEC	67.2	75.8	58	-11
NHI	7.7	19.0	-51	-60
NLO	5.2	17.7	23	-71
Subtotal	80.1	115.8	23	-29
Other duck species[3]				
Stratum				
SEC	53.5	41.8	-35	22
NHI	49.9	33.2	-8	50
NLO	29.3	34.2	-52	-14
Subtotal	132.7	109.2	-33	22
Total Ducks				
Stratum				
SEC	228.4	192.2	2	19
NHI	117.0	84.2	12	39
NLO	89.1	83.4	-10	7
Subtotal	434.4	359.8	2	21
Canada Geese				
Stratum				
SEC	47.3	24.3	-8	95
NHI	19.0	6.6	100	187
NLO	12.7	2.7	10	370
Subtotal	79.0	33.6	9	135

[1] Mean for Canada geese determined from 1986-98 data.

[2] SEC=Southeast Central, NHI = Northern High, NLO= Northern Low

[3] Included are green-winged teal, common merganser, wood duck, ring-necked duck, and hooded merganser in all 3 strata, plus northern shoveler and ruddy duck in the SEC, black ducks and common goldeneyes in the NHI.

Fig. 2 Wisconsin Mallard breeding population estimates, 1973-99



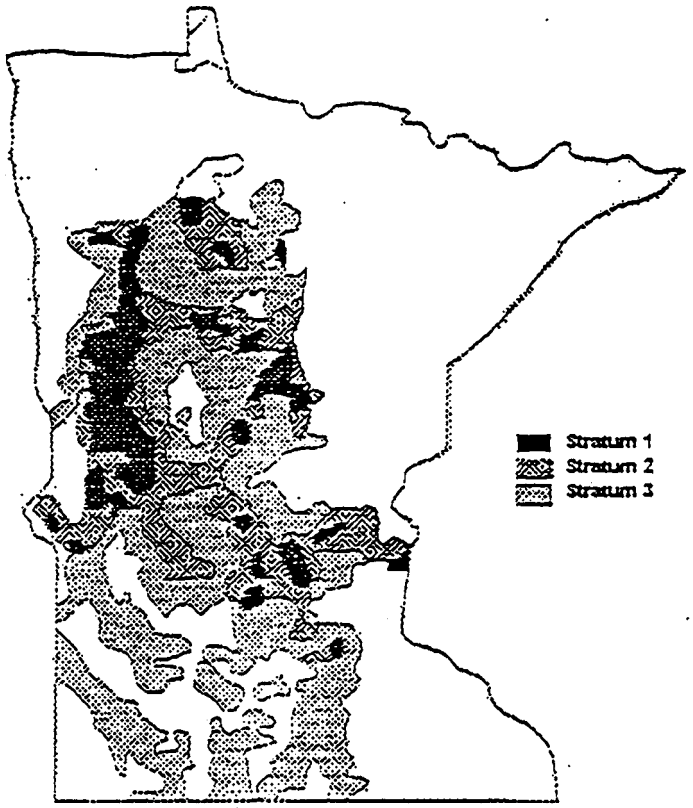


Fig. 1. Location of waterfowl breeding population survey strata in Minnesota.

Table 5. Minnesota waterfowl breeding populations by species for Strata I-III combined, 1968-99[1].

Species	Year													
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Dabblers:														
Mallard	108,328	165,881	155,543	124,362	140,879	128,315	144,126	123,771	138,481	142,556	153,473	160,628	188,972	169,213
Black Duck	55	1,440	0	0	174	56	0	0	56	0	0	0	0	0
Gadwall	1,432	499	3,414	7,286	14,286	6,853	7,258	3,282	4,457	5,413	5,324	3,515	4,740	5,733
American Wigeon	0	0	5,445	257	1,413	1,397	929	348	1,335	194	1,512	699	1,570	56
Green-winged Teal	229	1,800	117	639	0	404	0	810	569	0	2,170	638	858	117
Blue-winged Teal	68,235	102,480	101,183	90,300	107,177	91,496	93,107	64,670	70,323	47,737	57,196	45,495	47,788	36,106
Northern Shoveler	7,148	4,838	5,627	9,324	26,545	11,202	13,684	3,311	3,997	6,236	15,614	15,120	5,377	6,661
Northern Pintail	3,058	1,103	4,187	1,619	1,841	3,004	1,326	2,180	1,331	575	1,154	867	1,449	1,153
Wood Duck	14,483	55,290	47,736	42,022	54,426	36,587	46,347	46,333	39,996	29,848	43,132	35,103	46,659	45,866
Subtotal	202,968	333,331	323,252	275,809	346,741	279,314	306,777	244,705	260,545	232,559	279,575	262,065	297,413	264,905
Divers:														
Redhead	1,708	3,197	3,055	6,449	10,849	6,684	13,034	5,522	8,729	9,176	2,876	3,809	3,880	5,616
Canvasback	1,176	1,357	1,831	3,646	3,250	3,118	2,111	3,709	4,914	4,034	2,792	2,034	5,200	3,262
Scaup	6,247	10,306	10,545	71,898	40,075	40,727	66,071	11,801	57,670	28,420	65,585	31,138	28,416	14,041
Ring-necked Duck	2,543	4,309	4,198	6,802	6,239	7,361	11,297	8,249	12,481	4,030	23,755	9,913	7,986	6,060
Goldeneye	1,395	408	1,046	1,972	1,016	1,514	1,617	1,391	1,706	2,291	3,834	1,340	1,041	1,687
Bufflehead	117	0	56	2,676	234	885	1,944	465	1,374	56	1,439	291	404	111
Ruddy Duck	4,862	2,498	4,394	5,417	3,945	14,315	8,513	5,858	3,223	2,633	1,937	993	11,052	1,613
Hooded Merganser	695	0	408	0	313	348	1,143	1,154	1,275	1,439	2,411	1,719	1,202	2,641
Large Merganser	0	0	0	0	0	56	576	0	230	174	0	56	0	0
Subtotal	18,743	22,075	25,533	98,860	65,921	75,008	106,306	38,149	91,602	52,253	104,629	51,293	59,181	35,031
Total Ducks	221,711	355,406	348,785	374,669	412,662	354,322	413,083	282,854	352,147	284,812	384,204	313,358	356,594	299,936
Other:														
Coot	12,884	4,246	66,055	51,333	50,874	64,247	85,011	18,546	14,777	4,965	193,021	34,700	6,331	15,020
Canada Goose	19,599	29,959	39,090	51,946	58,425	42,231	33,965	43,858	48,595	58,066	60,870	60,449	79,147	80,012

[1] Estimates expanded for coverage but not for visibility.

APPENDIX D

REPORT ON THE 1999 ATLANTIC FLYWAY BREEDING PLOT SURVEY FOR WATERFOWL

The winter of 1998-99 was drier than normal, slightly milder than average with few major snow storms. Rainfall in March made up for some of the shortfall in precipitation, but, in contrast to the unusually wet spring of 1998, 1999 was unusually dry, breaking records in some areas. In Boston, no measurable rainfall was recorded for 44 straight days and a moderate drought was declared. States recorded mixed conditions, varying by region. Increased beaver populations in some northeastern states ameliorated dry conditions caused by lack of rainfall. Thunder storms and showers improved conditions slightly by early July.

Mallard indicated pair counts increased numerically 12% from last year but statistically were unchanged. However, this increase reversed a 3 year decline and is the second highest count in the survey's 11 year history. Black ducks continue to comprise less than 10% of the "big" duck breeding population and, while this year's pair count is 21% higher than last year's, no trend is evident. Wood duck pair counts were at a new high but statistically unchanged from the past several years.

Canada goose indicated pair counts continue their upward trend, increasing 16.8% from last year, but the resident goose population appears to have stabilized over the past 3 years at about a million birds based on total counts. This figure does not include resident geese from Maine or the southern states.

* * * * * * * * * *

The attached sheets summarize the results of the 1999 Northeast Plot survey. Table 1 compares indicated pair counts for mallards, black ducks, wood ducks and Canada geese with past years, along with total Canada goose counts. The totals for geese are based on birds <u>actually</u> seen and not adjusted for females assumed to be on nests but not observed as was done for ducks.

The other sheets indicate the state of observation in the second column, the stratum number in the third, the year of the count followed by the area in square kilometers. The NCOUNT column is the number of plots checked. The MCOUNT is the mean number of birds of that species seen recorded per plot and the next column is the variance. TOT is the total number projected for the stratum followed by the variance.

The back page of each sheet has data summarized by states, by strata, and the Northeastern states totals. Note that the totals added for the individual states do not match the totals added together by stratum. The survey was designed to give population estimates by physiographic strata, not by state. The information presented by state is only for purposes of individual state interests. While not valid as an absolute figure, the trends at a state level are likely reasonably accurate.

Table 1. The Northern Atlantic Flyway Waterfowl Breeding Survey (NH, VT, MA, CT, RI, NY, PA, NJ, MD, DE, VA)

Year	No. of 1 Km² Plots	Mallard Pairs	Black Duck Pairs	Wood Duck Pairs
1989[1]	1,340	272,124 (±17%)	30,159[2] (±31%)	130,537 (±18%)
1990	1,446	319,184 (±22%)	26,177[2] (±25%)	117,764 (±19%)
1991	1,510	363,925 (±20%)	30,508[2] (±30%)	146,512 (±18%)
1992	934	268,911 (±16%)	44,271[2] (±39%)	153,947 (±25%)
1993	1,478	322,315 (±14%)	39,475 (±27%)	140,400 (±20%)
1994	1,471	425,636 (±14%)	29,497 (±28%)	148,104 (±19%)
1995	1,467	404,177 (±15%)	32,650 (±35%)	172,622 (±19%)
1996	1,470	403,821 (±14%)	31,645 (±31%)	156,160 (±18%)
1997	1,473	383,252 (±12%)	29,780 (±27%)	186,107 (±17%)
1998	1,475	374,589 (±13%)	31,817 (±30%)	184,708 (±15%)
1999	1,491	421,369 (±13%)	38,661 (±33%)	194,468 (±17%)

		Canada Goose Pairs	Total No. of Canada Geese
1989[1]	1,340	72,207 (±30%)	395,985 (±48%)
1990	1,226	84,071 (±21%)	236,555 (±25%)
1991	1,510	100,347 (±18%)	305,654 (±22%)
1992	934	101,497 (±27%)	439,181 (±39%)
1993	1,478		646,806 (±34%)
1994	1,471	191,057 (±20%)	647,487 (±22%)
1995	1,467	230,360 (±18%)	779,159 (±25%)
1996	1,470	277,608 (±18%)	932,592 (±23%)
1997	1,473	326,982 (±24%)	1,013,324 (±24%)
1998	1,475	324,628 (±18%)	970,055 (±23%)
1999	1,491	379,467 (±20%)	999,469 (±24%)

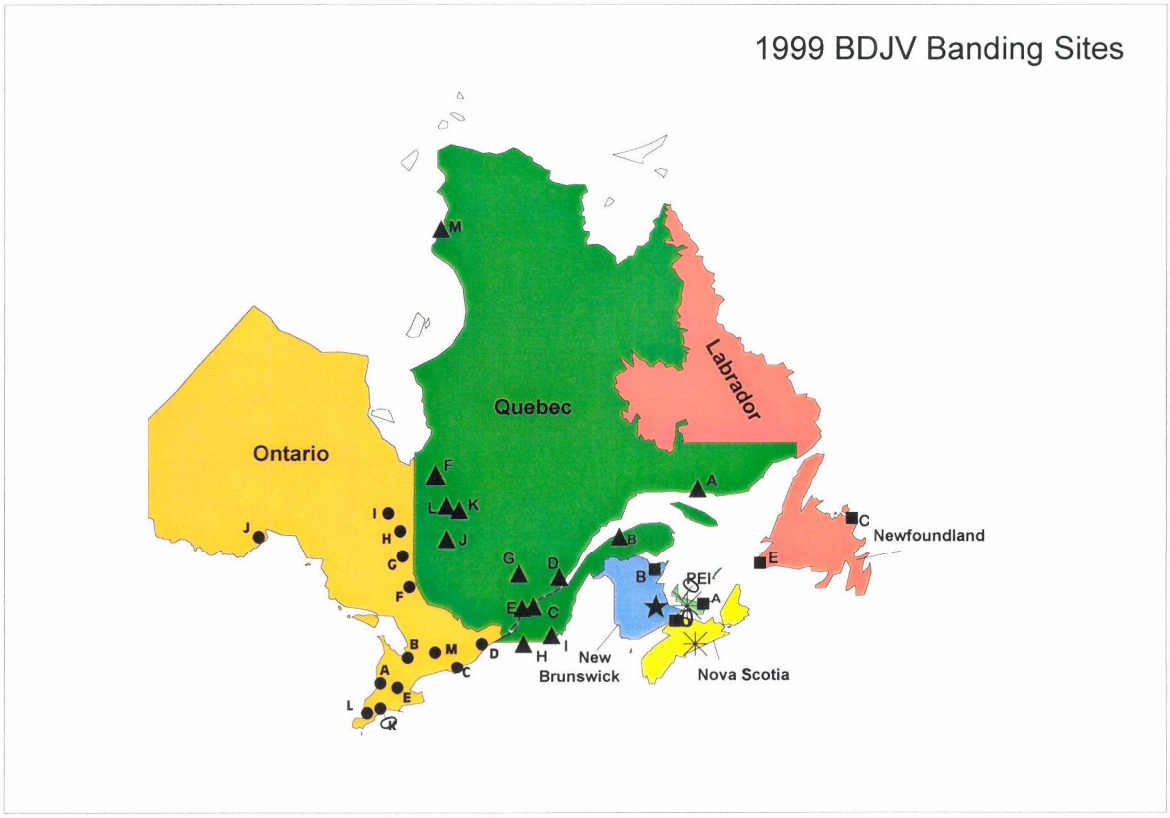
[1] Does not include VT or RI

[2] Does not include NJ salt marsh/tidal flat habitat

APPENDIX E

Black Duck Population Estimates
From Mid-Winter Surveys 1955-1999

APPENDIX F



Banding Stations

● Ontario

A. Wingham
B. Midhurst
C. Peterborough
D. Cornwall
E. Cambridge
F. North Bay
G. Temagami
H. Kirkland Lake
I. Timmins
J. Thunder Bay
K. Alymer
L. Lake St. Clair
M. Lindsay

▲ Quebec

A. Baie J. Beetz
B. Isle-Verte
C. Nicolet
D. Cap Tourmente
E. Baie Lavalliere
F. Abitibi (2 Stations)
G. La Tuque
H. Baie Missisquoi
I. Sherbrooke
J. Riviere Piche
K. Lac Parent
L. Lac des Hauteurs
M. Ungava

■ Atlantic Provinces

A. Prince Edward Island
B. Bathurst, NB
C. Carmanville, NF
D. NS/NB Border
E. Codroy, NF
F. Belle Isle, NS

★ Provincial Pre-season banding

✳ Provincial Winter banding

New Brunswick Department of Natural Resources and Energy 1999 Banding Report

Banding Station Location: Saint John River Wetlands

Crew Members: New Brunswick DNRE Staff

Results: Note that when age and sex were not given for an individual, the total also includes birds not included in the other columns.

Species	AHYM	AHYF	HYM	HYF	LM	LF	Total
Black Duck	55	130	198	173	1	3	560
Mallard	47	68	81	64	2	-	262
Mallard X Black Duck	6	5	8	8	-	-	27
Wood Duck	4	2	3	5	-	-	14
Northern Pintail	-	3	1	3	-	-	6
Ring-necked Duck	-	-	-	1	-	-	1
Blue-winged Teal	3	8	2	5	2	-	20
Green-winged Teal	27	31	61	45	-	1	165
American Wigeon	-	-	-	-	-	-	-
Total							**1055**

Nova Scotia Department of Natural Resources 1999 Banding Report

Pre-season and Winter Banding Report by: Randy Milton

Crew Members: Staff- Nova Scotia Department of Natural Resources.

SPECIES	AGE - SEX				TOTAL
9 Sept.- 1 Oct.	HY-M	HY-F	AHY-M	AHY-F	
Black Duck	94	65	19	15	193
Mallard	0	1	0	0	1
Black/Mallard	1	0	0	0	1
Pintail	0	1	0	1	2
Green-winged Teal	21	22	2	1	46
Blue-winged Teal	1	0	0	0	1
6 Jan. - 24 Feb.					
Black Duck	0	0	51	52	103
Mallard	0	0	7	0	7
Black/Mallard	0	0	2	1	3

Note: Preseason banding (9 Sept. - 1 Oct. 1999) station is Musquodoboit Harbour.
Postseason banding (6 Jan. - 24 Feb. 1999) station is Sullivan's Pond.

Ontario 1999 BANDING RESULTS

Includes all birds banded under programs or stations in Ontario that were at least partially supported by the Atlantic Flyway Cooperative Banding Program.

Station	Mallard	Black Duck	Mallard-Black Hybrid	Wood Duck	Blue-Winged Teal	Green-Winged Teal	Pintail	Ring-Necked Duck	Other	TOTAL
ALYMER	623	5	2	159	2	3	2	0	0	796
CAMBRIDGE	3	0	0	60	40	1	0		23	127
WINGHAM	308	7	0	137	252	24	0	0	0	728
MIDHURST	526	24	2	48	1	53	0		1	655
PETERBOROUGH	227	3	3	0	0	0	0	0	0	233
CORNWALL	977	143	9	268	8	23	34	1	1	1464
LINDSAY	78	2	0	48	55	12	0	0	0	195
THUNDER BAY	1073	224	6	1	13	27	8	1	9	1362
TIMMINS	318	49	1	0	0	3	0	0	0	371
KIRKLAND LAKE	825	80	6	91	79	19	0	0	8	1108
TEMAGAMI	33	284	7	2	0	0	0	0	0	326
NORTH BAY	242	79	30	8	1	0	0	0	0	360
CWS-Lake St. Clair	895	8	2	79	50	0	0	0	0	1034
AIR BOAT	546	100	7	210	274	168	2	125	95	1527
TOTAL	6674	1008	7	1111	775	333	46	127	137	10286

Quebec Region Canadian Wildlife Service 1999 BANDING RESULTS

Station	Mallard	Black Duck	Hybrid Black Duck	Wood Duck	Blue-Winged Teal	Green-Winged Teal	Pintail	Ring-Necked Duck	Other	TOTAL
Lac Parent	58	**334**	1	77	0	31	0	8	2	510
Riviere Piche	48	**47**	0	30	0	0	0	18	2	145
La Ferme (Abitibi)	159	**45**	0	0	0	0	0	0	0	204
Lac Gauvin	115	**24**	0	8	1	10	0	0	23	181
Lac des Hauteurs	11	**51**	0	2	3	0	0	0	0	67
Cap Tourmente	59	**4**	0	120	117	189	0	0	64	553
Isle Verte	172	**508**	1	0	87	1295	12	0	6	2080
Baie Johan-Beetz	3	**170**	0	0	17	660	5	0	0	855
Baie Lavalliere	2203	**140**	4	141	19	159	5	0	12	2679
Nicolet	972	**131**	5	183	0	14	102	38	64	1503
Varennes	0	**0**	0	0	0	0	0	0	216*	216
Nicolet Drive Trap	2	**2**	0	1	0	3	5	0	10	23
La Tuque	19	**42**	0	52	0	0	0	0	2	115
Baie Missisquoi	466	**46**	2	191	7	1097	8	0	3	1818
Sherbrooke	163	**163**	0	0	0	0	0	0	0	163
Ungava	0	**0**	0	0	0	0	21	0	0	21
TOTAL	4450	**1544**	134	805	251	3458	158	64	404	11134

* Canada geese

Atlantic Region Canadian Wildlife Service 1999 BANDING RESULTS

Station	Mallard	Black X Mallard	Black Duck	Gadwall	American Wigeon	Green-Winged Teal	Blue-Winged Teal	Northern shoveler	Northern Pintail	Wood Duck	Ring-Necked Duck	Other	TOTAL
Bathurst, N.B.	34	6	**389**	-	-	38	-	-	1	-	-	-	468
Belleisle, N.S.	-	-	**210**	-	-	-	-		-	-	-	258	468
N.B / N.S. Border	105	2	**129**	-	-	169	15	-	4	34	18	-	476
Codroy, N.F.	3	-	**157**	-	-	289	3	-	3	-	-	-	455
Carmanville, N.F.	-	-	**7**	-	-	19	-	-	-	-	-	2*	28
Central P.E.I.	21	4	**329**	-	1	194	26	-	8	30	1	-	614
Airboat, P.E.I.	34	-	**231**	25	93	216	172	3	9	88	83	3**	957
CWS- AR Airboat	13	-	**21**	1	27	5	9	-	-	16	8	6***	106
P.E.I Rocket Netting	-	-	-	-	-	-	-	-	-	-	-	487*	487
Total	210	12	**1473**	26	121	930	225	3	25	168	110	756	**4059**

* Canada geese
** 1 Hooded Merganser, 1 Pied-billed Grebe, 1 Canada goose
*** 4 Hooded Merganser, 2 Pied-billed Grebe