→ Ray. S. et al.

BLACK DUCK JOINT VENTURE

1995 Annual Progress Report

Prepared by the Black Duck Joint Venture Technical Committee

September 1, 1996

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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 1995 toward meeting those objectives.

2.0 Surveys

Operational Surveys in 1995:

Helicopter surveys were conducted as described in the draft BDJV Operational Plan (1992). The survey was designed to detect a 10% change in numbers of black ducks in the survey area with 90% confidence over a 5-year period. The sample was then enhanced to allow detection of changes within each province/state at a similar significance level over a 10-year period.

In total, 229-100 km^2 plots were originally planned for the survey. These plots were covered in 1990 after which re-evaluations of sample size requirements led to several reductions while maintaining sufficient precision of the population estimates. The 1995 sample consisted of a subset of the original plots, with a total of 84 plots distributed as follows: Ontario - 10, Québec - 36, Nova Scotia - 10, New Brunswick - 9, Newfoundland - 13, and Maine - 6.[1] Table 1 shows the population indices for all years (1990-1995), using only the plots that were part of the reduced sample. The coefficients of variation (cv=s.e./mean) for the entire survey area were 6% for both black duck indicated pairs and total individuals. For individual provinces, the cv's fell between 8 and 20% for indicated pairs, and between 13 and 19% for total individuals.

Table 2 shows the results of trend analysis for 1990-1995. For black ducks, the number of indicated pairs declined significantly in Québec and Newfoundland, whereas the total number of individuals declined in Ontario, Québec and Newfoundland. Black ducks showed no significant trends in the other provinces. For interest, Table 2 also shows estimated trends for mallards and ring-necked ducks. A description of the first six years of the helicopter surveys is given in Appendix A.

[1]Data from Maine were excluded from the trend analysis in 1995 due to: (1) the small number of plots, and (2) 1995 was the final year for helicopter survey.

Table 1: Estimates of the total population of black ducks (indicated pairs and total individuals) with standard errors. From *Collins*, March, 1996.

Year	Stratum	Number of Plots	Indicated Pairs			Total Individuals		
90	NB	25	8187	±	2060	20926	±	7026
	NF	25	16947	±	2314	27581	±	4275
	NS	25	7102	±	829	14013	±	1678
	ON	25	38649	±	4115	70094	±	7603
	PQ	43	84137	±	7502	153605	±	13924
	TOTAL	143	155021	±	9138	286220	±	17948
91	NB	25	5096	±	899	9132	±	1551
	NF	25	21063	±	4492	36089	±	8370
	NS	25	8095	±	969	16381	±	2141
	ON	25	40034	±	4287	91427	±	9668
	PQ	43	74312	±	6680	132294	±	12059
	TOTAL	143	148599	±	9216	285322	±	17775
92	NB	25	7157	±	1088	12481	±	1982
	NF	25	13173	±	1890	22435	±	3700
	NS	25	8497	±	1209	22510	±	3876
	ON	25	43636	±	4599	88934	±	9079
	PQ	43	67531	±	5812	129250	±	10387
	TOTAL	143	139993	±	7820	275610	±	14931
93	NB	25	8473	±	984	14972	±	1906
	NF	25	9125	±	1343	20583	±	4011
	NS	25	7060	±	817	15091	±	1870
	ON	25	42804	±	3821	78544	±	8008
	PQ	43	44559	±	3782	97975	±	10152
	TOTAL	143	112022	±	5687	227165	±	13799
94	NB	25	7328	±	1196	13389	±	2123
	NF	25	10772	±	1887	23121	±	6201
	NS	25	6996	±	832	14950	±	1676
	ON	25	38649	±	3235	74250	±	6973
	PQ	43	48019	±	4045	94654	±	8389
	TOTAL	143	112175	±	5744	220707	±	12837
95	NB	9	8776	±	1809	17818	±	3357
	NF	13	11119	±	2017	21600	±	3421
	NS	10	9784	±	1817	17608	±	3138
	ON	10	37029	±	5111	71097	±	9401
	[1]PQ	35	50346	±	4238	97624	±	9352
	TOTAL	77	117053	±	7398	225747	±	14445

[1] Plot #99 was excluded from the route regression analysis because it had not been surveyed prior to 1995, but will be included in future analysis.

Table 2: Route regression analysis of breeding pairs and total individuals, 1990-1995 (using only the plots that have been surveyed in all years). From *Collins*, March, 1996.

Species	Variable	Stratum	Number of Plots	Estimated Trend	Annual Change Factor	Estimated p-value	
ABDU	IP	NF	25	-0.1366	0.8723	0.0004	*
		PQ	43	-0.1348	0.8739	0.0001	*
		ON	25	-0.0298	0.9706	0.3388	
		NS	25	0.0218	1.0220	0.4051	
		NB	25	0.0321	1.0321	0.5614	
		TOTAL	143	-0.1027	0.9024	0.0001	*
	TI	PQ	43	-0.1134	0.8928	0.0001	*
		ON	25	-0.0830	0.9203	0.0108	*
		NF	25	-0.0689	0.9334	0.0404	*
		NB	25	-0.0076	0.9925	0.9174	
		NS	25	0.0249	1.0252	0.3806	
		TOTAL	143	-0.0925	0.9116	0.0001	*
RNDU	IP	NF	22	-0.2898	0.7486	0.0001	*
		NB	25	-0.1305	0.8776	0.5421	
		PQ	43	-0.0624	0.9395	0.0278	*
		ON	25	-0.0486	0.9526	0.2493	
		NS	25	-0.0127	0.9874	0.7660	
		TOTAL	140	-0.0837	0.9197	0.0002	*
	TI	NB	23	-0.1746	0.8398	0.2551	
		NF	25	-0.1216	0.8855	0.0004	*
		ON	25	-0.0701	0.9323	0.0339	*
		PQ	43	-0.0624	0.9395	0.0278	*
		NS	25	0.0439	1.0449	0.2140	
		TOTAL	141	-0.0719	0.9306	0.0001	*
MALL	IP	NB	13	-0.0512	0.9501	0.7828	
		NS	14	-0.0325	0.9680	0.7407	
		ON	25	-0.0048	0.9952	0.8030	
		PQ	42	-0.0038	0.9962	0.9449	
		NF	5	0.2105	1.2343	0.3800	
		TOTAL	99	-0.0078	0.9923	0.7036	
	TI	NB	13	-0.2031	0.8162	0.4261	
		NS	14	-0.0171	0.9830	0.8919	
		ON	25	-0.0093	0.9907	0.7147	
		PQ	42	0.0300	1.0304	0.5969	
		NF	6	0.1852	1.2035	0.3431	
		TOTAL	100	0.0003	0.9997	0.9907	

ABDU- American Black Duck
MALL- Mallard
RNDU - Ring-necked Duck

IP- indicated pairs
TI - total individuals

The fixed-wing aircraft surveys in the southern part of the survey area were also conducted in 1995. Results of the fourth year of survey in the state of Michigan is shown in Appendix B. The fifth year of fixed-wing surveys in southern and northeastern Ontario, Québec and New York is described in Appendix C. Helicopters were used to establish visibility rates for species sufficiently common to allow calculation of the ratio.

Other surveys of relevance to the BDJV include ground counts that are conducted annually in Prince Edward Island.[1] 1995 was the thirteenth consecutive year of the ground-based survey of breeding waterfowl in 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 pairs, and their productivity are estimated annually. The results for black ducks are shown in Appendix D. There has been an overall decline in the number of breeding pairs since the beginning of the survey. However, the trend since 1989 (when further restrictions on hunting in PEI were imposed) shows a stable breeding pair index.

Appendix E shows the results of the midwinter inventories from 1955-1995. The winter population index for black ducks appears to have stabilized since 1980 at about 300,000 birds. This figure is about 85,000 below the population goal as stated in the North American Waterfowl Management Plan.

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 40 banding stations distributed across eastern Canada.

A total of 4,266 black ducks were banded in 1995 (5,125 were banded in 1994). The banding sites in Canada are illustrated on the map in Appendix F. The total number of black ducks banded throughout Michigan, (excluding Wisconsin)[2] and the Atlantic Flyway States in 1995 was 1,995[3]. The number of ducks banded at each station is also shown in Appendix F where they are, for the most part, broken down by age and sex categories. Much of the banding occurs as part of the Atlantic Flyway Eastern Cooperative Banding Agreement. A final report on the preseason banding activities in eastern Canada and the northeastern U.S. is provided annually at the summer meeting of the Atlantic Flyway Technical Section.

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[1] Bateman, M.C. and R.L. Dibblee. 1995. Progress Report: Waterfowl Surveys on Prince Edward Island 1995. Unpubl. Rep. of Can. Wildl. Serv. (Atlantic Region). 32 pp.

[2] Data from Wisconsin was not available at the time of this report.

[3] Atlantic Flyway states banded 1,850 black ducks (taken from Annual Report of Cooperative Banding Program, 1995), and Michigan banded 145 black ducks, pers. comm. Jerry Martz, Dept. Natural Resources, Michigan.

4.0 Research

Trends in population size, productivity, survival and harvest rates cannot be explained, or managed, without adequate understanding of the relationships among population parameters and ecological factors. The research component of the BDJV addresses important information gaps in our knowledge that are required to improve the management of black ducks, and to provide necessary information to the habitat oriented joint ventures. It remains unclear to what extent production, mortality, habitat change, and hybridization with mallards has affected the status of black duck populations. Research funded by the BDJV is intended to assess the relative importance of these factors.

Several research projects were funded in 1995. The objectives and current status of each project are presented in Appendix G. Briefly, they addressed such issues as: the use of beaver pond habitats by ducks; habitat use and productivity of sympatrically breeding black ducks and mallards on agricultural landscapes in Québec; the impacts of wetland restoration on Atlantic dykeland soils; the fledging success of black ducks and mallards at both high and low productivity sites; and the feasibility of an adaptive management experiment designed to test hypotheses about the decline of black ducks.

5.0 Budget

Allocation of 1995 BDJV funds (the upper value is in Canadian dollars, and the lower in US dollars using 1.37 for conversion).

Organization	Surveys	Research	Banding	TOTAL
Canadian Wildlife Service:				
	228 ,000	46 ,000		274, 000 Cdn.
	166, 424	33, 576		200, 000 U.S.
USFWS- BDJV:				
	411, 000		130 ,150	541, 150 Cdn.
	300, 000		95 ,000	395, 000 U.S.
Patuxent Wildlife Research Center:				
		485, 117		485, 117 Cdn.
		354, 100		354, 100 U.S.
Atlantic Waterfowl Council:				
			270, 575	270, 575 Cdn.
			197,500	197, 500 U.S.
Mississippi Flyway Council:				
			17 ,810	17, 810 Cdn.
			13 ,000	13, 000 U.S.
Total	**$639 ,000**	**$531, 117**	**$418, 535**	**$1, 588, 652 Cdn.**
	$466, 424	**$387, 676**	**$305, 500**	**$ 1, 159, 600 U.S.**

APPENDIX A

Breeding Waterfowl Survey in Eastern Canada and the State of Maine

Progress Report

July 18, 1995
1st revision August 15, 1995

A component of the Black Duck Joint Venture

Helicopter Surveys conducted by:
Atlantic, Quebec and Ontario Regions of the
Canadian Wildlife Service, and the
Maine Department of Inland Fisheries and Wildlife

Introduction

In the past, surveys of black ducks on their wintering areas have been used to examine trends in population size. This information is useful for studying overall population trends, but not for evaluating the status of various components of the breeding population. Among other goals, the Black Duck Joint Venture (BDJV) of the North American Waterfowl Management Plan (NAWMP) was designed to provide improved information on black duck populations in their breeding areas.

A historical database of waterfowl population status does exist for breeding areas, but it is not continuous. In Ontario, for instance, the relative abundance of ducks breeding in southern Ontario was measured in 1951 (Boyd 1974) and surveys from 1971 to 1987 documented the decline of black duck populations in the south (Dennis et. al. 1989). Some early information on black ducks in boreal Ontario, Quebec and Labrador was recorded by Kaczynski and Chamberlain (1968) in the late 1950s and 1960s. Ross (1987, 1990) has been studying waterfowl population densities in northern Ontario since about 1980.

Surveys of breeding areas, with varying levels of intensity, have been ongoing in various parts of Atlantic Canada since the 1930s (Erskine 1987). During the early years, biologists from the USFWS visited the Atlantic provinces and produced reports (unpublished) giving their impressions of population trends. Since that time, increasingly systematic surveys have been implemented. In the late 1950s ground surveys of breeding waterfowl populations were initiated in Prince Edward Island and continue today although they have not been run continuously since that time. Waterfowl in forested areas of the Maritimes were studied in the late 1960s, and in Newfoundland and Labrador in the early 1970s (Boyd 1974), late 1970s and early 1980s (Erskine 1987).

To improve the continuity and coverage of surveys of eastern waterfowl populations, systematic helicopter surveys have been conducted in the Atlantic provinces, Quebec and Ontario since about 1985. These surveys provided the basis for the BDJV surveys initiated in 1990. As a result of the BDJV, there now exists a substantial survey effort in eastern Canada and Maine. This report summarizes the results obtained in 1995 in comparison to the years 1990 through 1994.

The 1995 Helicopter Survey

The helicopter survey procedures are described in the draft Operational Plan for the BDJV. In total, 229 100-km^2 plots were originally planned for the survey, and were included from 1990 through 1992. Re-evaluation of sample size requirements showed that the sample could be reduced and continue to provide sufficient precision of the population estimates. The 1995 sample consisted of a subset of the original plots, with a total of 84 plots distributed as follows: Ontario - 10, Quebec - 36, Nova Scotia - 10, New Brunswick - 9, Newfoundland - 13, and Maine - 6 (Figure 1).

All waterfowl were counted and the social structure of groups was recorded. Birds were recorded by sex, when possible, and identified as singles, or as belonging to pairs, groups or flocks. The total numbers of birds of each species were calculated by summing all observations for each plot. Population densities within the survey area are presented in Table 1 as birds per 100-km^2. The densities were calculated using all of the plots surveyed each year, with the exceptions of plots 7 and 8 in Maine which were dropped as outliers and are no longer included in the survey sample. Please note that these data are preliminary and subject to further verification and analyses.

Spring 1995 Habitat Conditions

In Newfoundland, spring was about 1 - 1.5 weeks earlier than in 1994. The water levels on major river systems and lakes had already subsided. heavy snowfall in southern Labrador last winter resulted in thin ice conditions on lakes and ponds there. Even though the surveys were flown a week early for this area, only the larger lakes had any remaining ice.

Breeding chronology in Nova Scotia was apparently advanced at the time of the survey, whereas the development of vegetation was not advanced. Northern New Brunswick had a high accumulation of snow during the winter, but the snow and ice remaining at the time of the survey was normal. Warm weather in March may have advanced the duck breeding chronology although April and early May were cold. The timing of the ice-out in Prince Edward Island appeared to be about normal although early April was very cold,

In southern Quebec, the spring thaw was a bit earlier than last year throughout Quebec, except in the Gaspé where snowfall to late April was above average. Ice break-up at Lac St. Jean in central Quebec was 6 days earlier than in 1994. However, the spring thaw overall was probably a bit later than normal. Weather conditions during the survey in May were poor, with near constant rain and drizzle. June was sunnier and warmer, so conditions during the incubation and hatching periods were good. Water levels were higher than normal in western Quebec, perhaps due to the unusually rainy conditions. This may have resulting in flooding of some nests in the western part of the province.

In Ontario, spring started very early, with a substantial thaw in March throughout the survey area; however, April reversed the trend, being much cooler than usual to the point that vegetational phenology was quite delayed (thus maximizing visibility).Some ice was encountered on plots around Sudbury, although not enough to affect local distribution of the birds. Snow levels were average during the winter and most of the snow melted during the March thaw after which there was record low precipitation. Although reduced water levels were expected, it was not evident from the air. There has been some delay in breeding phenology likely due to the cool April and May. Conditions however, have been good during most of the incubation and brood-rearing period.

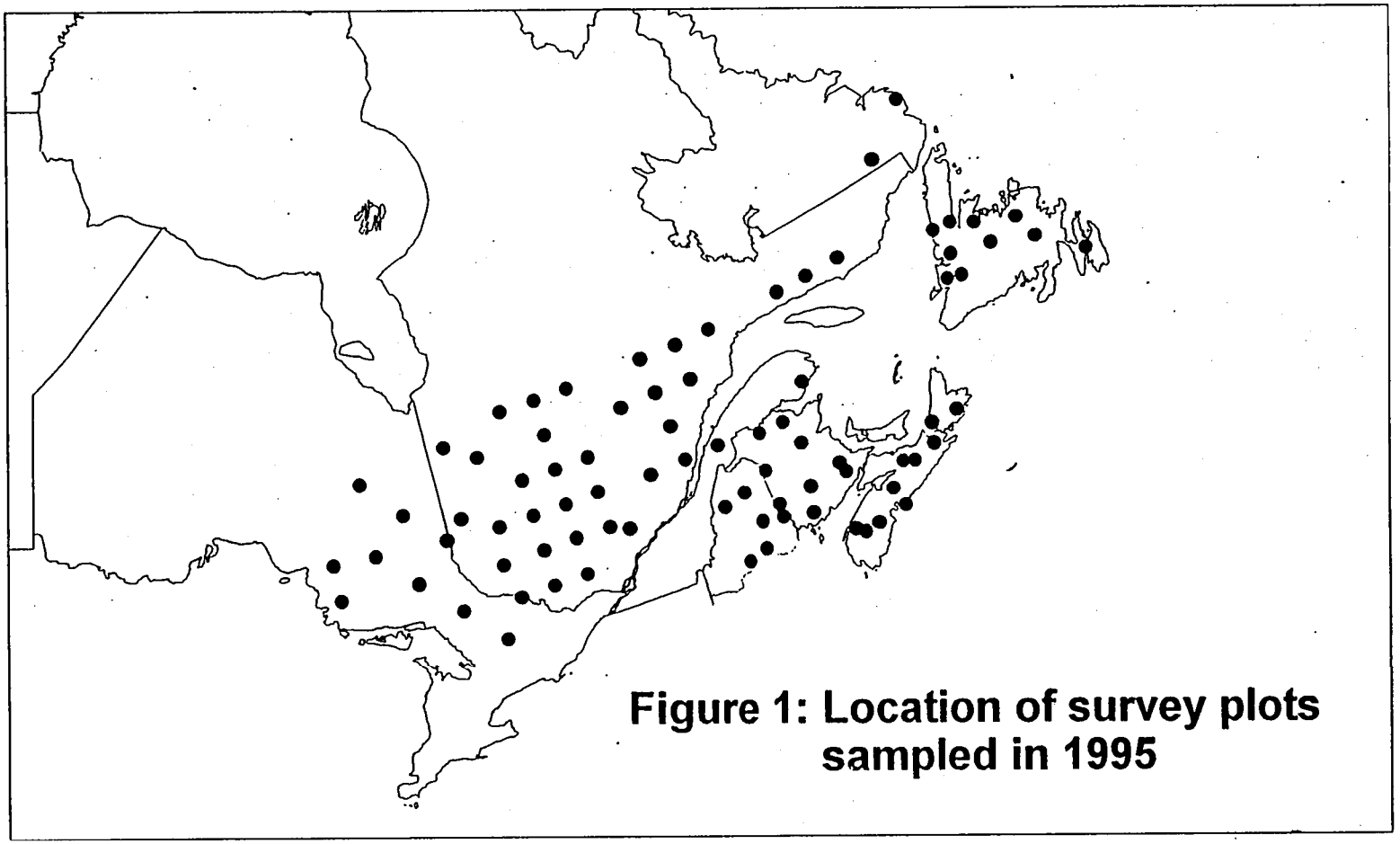

Figure 1: Location of survey plots sampled in 1995

Table 1: Density estimates by region

	Indicated birds per 100km2														
	ME						NB						NF		
	90	91	92	93	94	95	90	91	92	93	94	95	90	91	92
1290 COME Common Merganser	24.12	18.64	14.28	15.48	16.08	13.50	8.96	8.88	4.40	7.84	4.20	6.67	4.68	5.08	5.56
1300 RBME Red-breasted Merganser	.	.	.	.	.	.	1.20	.	.	.	0.12	.	1.52	2.08	1.32
1310 HOME Hooded Merganser	5.00	5.36	5.96	5.52	5.80	9.17	2.04	0.32	0.76	0.80	0.56	2.67	0.16	0.20	.
131a UNME unid. merganser	.	.	.	.	.	.	.	.	.	0.88	4.60	3.00	.	.	.
1320 MALL Mallard	4.84	5.48	5.40	3.83	4.52	5.00	0.60	0.20	0.32	0.28	0.28	0.56	0.08	0.08	0.04
1330 ABDU American Black Duck	27.88	36.96	28.52	28.22	24.08	24.00	29.24	12.76	17.44	20.92	17.96	27.89	16.08	21.04	13.08
133a MBDH Mallard-like Hybrid	.	0.04	.	.	0.08	.	.	.	.	.	.	.	.	.	.
133b BDMH Black Duck-like Hybrid	.	.	.	.	.	.	.	.	.	.	.	.	.	0.08	.
133c BLML M Black, F Mallard	.	.	.	.	.	.	.	.	.	0.16	.	.	.	.	.
133d MLBL M Mallard, F Black	.	.	0.16	0.09	0.24	.	0.24	0.24	0.56	0.28	0.24	0.78	.	.	.
133e BHML M blck-like hyb, F Mallard	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
133f BHBL M blck-like hyb, F Black	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
133h MHBL M mall-like hyb, F Black	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1350 GADW Gadwall	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1370 AMWI American Wigeon	.	0.08	.	0.09	0.20	.	2.56	0.56	0.16	2.44	1.72	0.67	0.08	.	.
1390 AGWT American Green-winged Teal	7.12	7.36	2.76	2.13	4.16	2.83	13.64	2.40	3.80	4.40	3.24	5.11	9.24	13.48	7.08
1400 BWTE Blue-winged Teal	0.12	0.72	0.08	0.70	0.08	0.33	2.32	1.20	0.84	1.44	1.40	0.56	.	.	.
1401 UNTE Unidentified Teal	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1420 NSHO Northern Shoveler	.	.	.	0.09	.	.	.	.	.	.	.	.	.	.	.
1430 NOPI Northern Pintail	.	.	.	0.09	.	.	0.16	.	.	0.08	0.08	.	0.24	1.00	.
1440 WODU Wood Duck	4.28	3.56	3.60	3.09	2.76	4.50	0.76	0.32	1.04	2.64	4.04	1.11	.	.	.

(CONTINUED)

	Indicated birds per 100km2														
	ME						NB						NF		
	90	91	92	93	94	95	90	91	92	93	94	95	90	91	92
144a UNDA unid. dabbling duck	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1460 REDH Redhead	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1480 GRSC Greater Scaup	.	.	.	.	.	.	.	.	.	.	.	.	2.04	1.88	.
1490 LESC Lesser Scaup	.	.	.	.	.	.	.	.	.	.	.	.	1.00	0.44	.
149a USCA unid. Scaup	.	.	.	.	.	.	0.52	0.92	0.52	.	.	.	.	.	1.44
1500 RNDU Ring-necked Duck	21.56	31.16	13.44	13.26	14.64	21.67	20.00	12.00	11.52	14.88	13.92	13.78	29.12	44.72	26.56
150a UNAY unid. Aythya	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1510 COGO Common Goldeneye	10.36	2.64	6.88	7.04	2.72	2.67	3.60	5.44	1.88	1.68	2.32	0.44	21.28	18.44	11.76
1520 BAGO Barrow's Goldeneye	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
152a UNGO unid. goldeneye	.	.	.	.	.	.	0.24	.	.	.	.	.	.	.	.
1530 BUFF Bufflehead	14.44	10.76	0.72	0.91	5.04	1.67	.	.	0.04	.	.	.	.	0.08	.
1540 OLDS Oldsquaw	.	0.08	.	.	0.28	.	.	.	.	.	.	.	.	.	.
1550 HARD Harlequin Duck	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1590 COEI Common Eider	0.32	12.68	1.44	5.13	0.88	.	0.08	.	.	1.60	.	.	.	.	.
1630 BLSC Black Scoter	.	.	.	.	.	.	.	.	.	.	.	.	.	0.12	0.16
1650 WWSC White-winged Scoter	.	.	.	0.04	.	.	.	.	.	.	.	.	.	.	.
1660 SUSC Surf Scoter	.	.	.	0.87	.	.	0.16	.	.	.	.	.	3.04	3.20	2.20
166a USCO unid. scoter	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
168a UNDI unid. diving duck	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
168b UNDU unid. duck	1.52	1.96	0.28	0.43	0.72	1.00	.	0.08	.	0.16	0.16	.	0.04	0.08	0.20
1720 CAGO Canada Goose	5.72	2.92	2.28	4.39	2.16	4.17	0.16	.	.	.	.	0.89	13.44	16.84	13.76

	Indicated birds per 100km2														
	NF			NS						ON					
	93	94	95	90	91	92	93	94	95	90	91	92	93	94	95
1290 COME Common Merganser	3.32	2.40	4.00	4.32	5.88	7.04	7.40	7.24	4.50	16.84	17.57	23.89	17.32	19.68	12.00
1300 RBME Red-breasted Merganser	2.00	3.28	1.31	0.04	.	.	.	.	.	0.25	0.20	0.43	1.88	0.80	0.40
1310 HOME Hooded Merganser	0.08	0.32	0.15	0.80	0.08	0.16	0.64	0.56	0.60	22.09	24.86	28.91	23.64	29.68	29.40
131a UNME unid. merganser	0.60	.	0.38	2.44	1.96	.	.	.	2.10	.	.	.	.	0.12	.
1320 MALL Mallard	0.16	0.12	.	0.60	0.32	0.68	0.36	0.52	0.20	19.57	23.27	27.98	20.48	21.36	23.20
1330 ABDU American Black Duck	12.00	13.68	10.54	26.52	31.00	42.60	28.56	27.16	32.10	18.34	24.80	25.16	22.68	21.44	21.20
133a MBDH Mallard-like Hybrid	0.04	.	.	.	.	.	.	.	.	0.05	0.16	0.48	0.28	0.16	0.10
133b BDMH Black Duck-like Hybrid	.	.	.	.	.	.	.	.	.	0.02	0.18	0.32	0.32	0.08	0.20
133c BLML M Black, F Mallard	.	.	.	.	.	.	0.16	.	.	0.05	0.07	0.05	0.08	.	.
133d MLBL M Mallard, F Black	0.08	0.08	.	.	1.12	0.52	0.12	0.72	1.10	0.09	0.14	0.09	.	0.48	.
133e BHML M blck-like hyb, F Mallard	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
133f BHBL M blck-like hyb, F Black	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
133h MHBL M mall-like hyb, F Black	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1350 GADW Gadwall	.	.	.	.	.	.	.	.	.	.	0.02	.	.	.	.
1370 AMWI American Wigeon	.	.	.	0.48	1.48	1.72	1.40	0.80	.	0.50	1.07	0.80	0.64	0.40	1.50
1390 AGWT American Green-winged Teal	5.56	6.08	5.54	7.28	8.16	13.80	8.04	8.96	3.40	5.43	5.77	7.82	3.92	5.88	5.10
1400 BWTE Blue-winged Teal	.	.	.	1.68	2.32	2.80	1.52	1.04	0.30	6.11	5.00	6.34	1.72	1.84	1.00
1401 UNTE Unidentified Teal	.	.	.	.	0.04	.	.	.	.	.	.	.	.	.	0.20
1420 NSHO Northern Shoveler	.	.	.	.	.	.	.	.	.	.	0.09	0.02	0.08	.	.
1430 NOPI Northern Pintail	0.04	0.04	.	.	.	.	.	.	.	0.07	0.09	0.07	.	.	.
1440 WODU Wood Duck	.	.	.	1.20	0.84	1.92	1.84	3.64	2.10	13.09	11.84	13.82	15.00	20.28	15.40

(CONTINUED)

	Indicated birds per 100km2														
	NF			NS						ON					
	93	94	95	90	91	92	93	94	95	90	91	92	93	94	95
144a UNDA unid. dabbling duck	.	.	.	.	.	.	.	.	.	0.41	.	.	.	.	.
1460 REDH Redhead	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1480 GRSC Greater Scaup	.	.	.	.	.	.	.	.	.	0.36	0.05	3.11	0.24	0.04	.
1490 LESC Lesser Scaup	.	.	.	.	.	.	.	.	.	3.18	1.05	0.39	0.12	0.76	0.70
149a USCA unid. Scaup	0.80	1.72	1.23	.	.	0.36	0.64	.	.	2.20	0.80	2.30	.	0.20	.
1500 RNDU Ring-necked Duck	25.80	20.36	15.23	12.60	14.08	23.88	15.12	12.92	15.80	36.23	30.34	42.34	28.28	31.24	24.80
150a UNAY unid. Aythya	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1510 COGO Common Goldeneye	12.52	10.92	11.31	.	1.48	2.44	1.20	.	.	18.32	18.66	20.02	12.64	14.40	13.70
1520 BAGO Barrow's Goldeneye	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
152a UNGO unid. goldeneye	.	.	.	3.40	.	.	.	.	.	.	.	.	.	.	.
1530 BUFF Bufflehead	.	.	.	.	0.32	1.08	0.28	0.24	.	7.07	2.98	14.05	3.92	5.48	2.50
1540 OLDS Oldsquaw	0.08	.	.	.	.	.	.	.	.	.	.	.	.	0.92	.
1550 HARD Harlequin Duck	0.16	.	0.08	.	.	.	.	.	.	.	.	.	.	.	.
1590 COEI Common Eider	.	.	.	7.08	9.08	7.84	2.96	2.92	.	.	.	.	.	.	.
1630 BLSC Black Scoter	.	.	.	.	.	1.56	.	.	.	.	0.05	.	.	.	.
1650 WWSC White-winged Scoter	.	.	.	.	.	.	.	.	.	.	0.07	.	.	0.40	.
1660 SUSC Surf Scoter	2.44	2.08	0.31	.	.	0.76	.	1.16	.	.	0.05	0.11	.	.	.
166a USCO unid. scoter	.	0.04	.	1.88	0.48	.	.	0.16	.	.	.	.	.	.	.
168a UNDI unid. diving duck	0.08	0.20	0.46	.	.	.	.	.	.	0.25	0.41	1.30	1.44	3.28	0.60
168b UNDU unid. duck	.	.	.	0.12	1.00	0.12	0.08	.	3.00	0.45	0.14	0.27	0.12	0.12	0.10
1720 CAGO Canada Goose	16.96	16.04	17.54	0.32	0.44	1.96	0.32	0.44	0.20	3.50	2.77	3.95	2.64	4.52	2.80

	Indicated birds per 100km2											
	PQ						SUM					
	90	91	92	93	94	95	90	91	92	93	94	95
1290 COME Common Merganser	17.86	20.20	16.52	9.36	13.95	11.06	15.05	16.21	15.89	10.79	13.23	9.96
1300 RBME Red-breasted Merganser	0.45	0.43	0.27	0.88	1.02	0.33	0.57	0.62	0.48	1.36	1.23	0.50
1310 HOME Hooded Merganser	5.17	4.94	3.53	4.16	6.65	7.39	8.68	9.22	11.16	8.57	11.36	11.86
131a UNME unid. merganser	0.05	.	0.35	.	0.02	0.11	0.24	1.96	0.35	0.68	0.38	0.51
1320 MALL Mallard	2.87	1.59	4.66	8.56	3.19	3.08	6.84	7.24	9.93	9.65	7.44	9.10
1330 ABDU American Black Duck	27.49	22.67	21.65	16.78	15.91	16.56	23.60	23.42	22.37	18.92	18.01	18.58
133a MBDH Mallard-like Hybrid	0.07	.	.	.	.	0.00	0.06	0.14	0.48	0.20	0.15	0.04
133b BDMH Black Duck-like Hybrid	0.24	0.06	0.01	0.02	0.05	0.08	0.16	0.10	0.12	0.13	0.06	0.13
133c BLML M Black, F Mallard	0.02	0.04	0.05	.	0.05	.	0.03	0.05	0.05	0.10	0.05	.
133d MLBL M Mallard, F Black	0.07	0.29	0.07	0.12	0.28	0.22	0.09	0.28	0.13	0.12	0.32	0.34
133e BHML M blck-like hyb, F Mallard	.	0.02	.	.	.	.	.	0.02	.	.	.	.
133f BHBL M blck-like hyb, F Black	.	.	0.05	.	.	.	.	.	0.05	.	.	.
133h MHBL M mall-like hyb, F Black	.	0.10	0.02	.	.	.	.	0.10	0.02	.	.	.
1350 GADW Gadwall	.	.	.	.	.	.	.	0.02	.	.	.	.
1370 AMWI American Wigeon	0.24	0.17	0.06	0.16	0.47	0.19	0.44	0.53	0.39	0.51	0.53	0.67
1390 AGWT American Green-winged Teal	13.61	9.94	7.37	2.86	7.60	2.39	10.31	8.69	7.32	3.77	6.61	3.74
1400 BWTE Blue-winged Teal	0.93	0.19	0.39	0.22	0.44	0.11	2.62	1.87	2.35	0.85	0.95	0.43
1401 UNTE Unidentified Teal	.	.	.	.	.	.	.	0.04	.	.	.	0.20
1420 NSHO Northern Shoveler	0.02	.	0.02	.	.	.	0.02	0.09	0.02	0.08	.	.
1430 NOPI Northern Pintail	0.48	0.05	0.11	0.04	0.05	.	0.31	0.21	0.09	0.05	0.05	.
1440 WODU Wood Duck	1.06	0.46	0.40	0.32	1.09	1.94	4.92	4.14	4.82	5.21	7.41	6.18

(CONTINUED)

	Indicated birds per 100km2											
	PQ						SUM					
	90	91	92	93	94	95	90	91	92	93	94	95
144a UNDA unid. dabbling duck	0.01	.	0.01	0.02	0.33	.	0.16	.	0.01	0.02	0.33	.
1460 REDH Redhead	.	.	.	0.04	.	.	.	.	.	0.04	.	.
1480 GRSC Greater Scaup	0.14	0.54	1.47	0.80	0.63	0.92	0.50	0.59	2.07	0.59	0.41	0.92
1490 LESC Lesser Scaup	2.48	3.80	2.20	0.54	2.79	0.14	2.47	2.42	1.54	0.39	2.04	0.35
149a USCA unid. Scaup	0.20	0.04	0.11	.	0.79	0.92	0.91	0.36	0.94	0.76	0.75	0.99
1500 RNDU Ring-necked Duck	25.82	20.33	19.57	16.02	22.88	20.83	28.01	25.99	26.07	20.39	23.54	20.59
150a UNAY unid. Aythya	.	0.04	0.17	.	0.02	.	.	0.04	0.17	.	0.02	.
1510 COGO Common Goldeneye	16.82	16.77	14.67	13.26	16.70	13.25	16.81	15.65	14.18	11.60	13.81	11.90
1520 BAGO Barrow's Goldeneye	0.31	0.88	0.76	1.16	0.05	0.25	0.31	0.88	0.76	1.16	0.05	0.25
152a UNGO unid. goldeneye	0.01	0.13	0.48	0.06	0.09	0.03	0.28	0.13	0.48	0.06	0.09	0.03
1530 BUFF Bufflehead	2.54	2.31	1.58	0.12	2.00	0.53	4.77	2.48	5.27	1.42	3.22	1.28
1540 OLDS Oldsquaw	0.16	0.02	0.02	1.62	1.35	.	0.16	0.03	0.02	1.28	1.14	.
1550 HARD Harlequin Duck	.	.	.	.	0.05	.	.	.	.	0.16	0.05	0.08
1590 COEI Common Eider	.	.	.	0.72	.	.	2.22	10.91	4.59	1.26	1.88	.
1630 BLSC Black Scoter	0.14	1.23	2.39	1.60	.	0.17	0.14	0.69	1.87	1.60	.	0.17
1650 WWSC White-winged Scoter	0.01	0.04	1.08	0.32	4.91	.	0.01	0.05	1.08	0.30	3.25	.
1660 SUSC Surf Scoter	1.23	1.05	2.04	1.98	4.47	1.78	1.51	1.07	1.43	2.00	3.75	1.45
166a USCO unid. scoter	.	0.02	0.35	0.02	0.07	.	1.88	0.06	0.35	0.02	0.07	.
168a UNDI unid. diving duck	1.04	1.08	2.73	0.50	1.16	1.94	0.75	0.84	2.21	0.73	1.67	1.30
168b UNDU unid. duck	.	0.07	0.66	0.08	1.14	0.17	0.41	0.21	0.45	0.11	0.72	0.33
1720 CAGO Canada Goose	18.75	13.20	15.88	15.30	10.60	5.61	11.62	9.74	10.99	10.80	8.82	5.90

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APPENDIX B

Table 1. Results of the 1995 Michigan Spring Waterfowl Survey

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	329,243	148,352	37,666	3184880935	3708927210	274740309.5	515,261	7168548455	16.43	349,313	681,209
Blue-winged Teal	38,063	0	0	325197872.2	0	0	38,063	325197872.2	47.38	2,717	73,408
Wood Duck	73,859	0	0	961621830.9	0	0	73,859	961621830.9	41.99	13,079	134,639
Green-winged Teal	1,449	0	482	816974.8426	0	56335.41047	1,931	873310.2531	48.39	100	3,763
Shoveler	425	0	0	177078.1142	0	0	425	177078.1142	99.13	-400	1,249
Widgeon	3,483	0	0	11637893.75	0	0	3,483	11637893.75	97.95	-3,204	10,169
Black Duck	2,657	0	0	1680551.883	0	0	2,657	1680551.883	48.79	116	5,198
Redhead	0	0	0	0	0	0	0	0	#DIV/0!	0	0
Scaup	12,197	5,406	1,808	66063251.59	20533131.22	3073316.579	19,411	89669699.39	48.78	851	37,971
Ring-necked Duck	12,069	1,839	769	20317922.22	2867239.974	479473.2051	14,676	23664635.4	33.15	5,142	24,211
Goldeneye	0	0	1,375	0	0	1786304.004	1,375	1786304.004	97.19	-1,244	3,995
Bufflehead	22,376	11,584	404	112114137	31934474.74	153435.8413	34,364	144202047.6	34.95	10,827	57,900
Merganser	7,014	502	4,095	8182676.232	277852.0527	1690148.748	11,612	10150677.03	27.44	5,367	17,856
Coots	14,651	514	0	201933098.8	246383.003	0	15,165	202179481.8	93.76	-12,704	43,035
Canada geese	132,209	27,082	21,513	998973073.6	244519014.5	190770892.9	180,805	1434262981	20.95	106,576	255,033
Swan	3,050	655	0	9300289.986	429311.1396	0	3,705	9729601.126	84.19	-2,409	9,819
Pintail	1,616	0	0	1796415.899	0	0	1,616	1796415.899	82.92	-1,011	4,243
TOTAL:	654,360	195,935	68,112				918,407				
Ind. breeding pairs Canada geese (excluding groups)	49,486	11,510	7,360	148247821.1	47446285.17	16892625.22	68,356	212586731.4	21.33	39,778	96,933
Canada geese excluding groups and pairs without nests or broods)	23,389	10,833	1,698	33238309.37	45479925.25	1477687.769	35,920	80195922.39	24.93	18,368	53,473

Source: **Jerry Martz, Department of Natural Resources, Lansing, Michigan**

Note: SLP refers to Southern Lower Peninsula
NLP refers to Northern Lower Peninsula
UP refers to Upper Peninsula

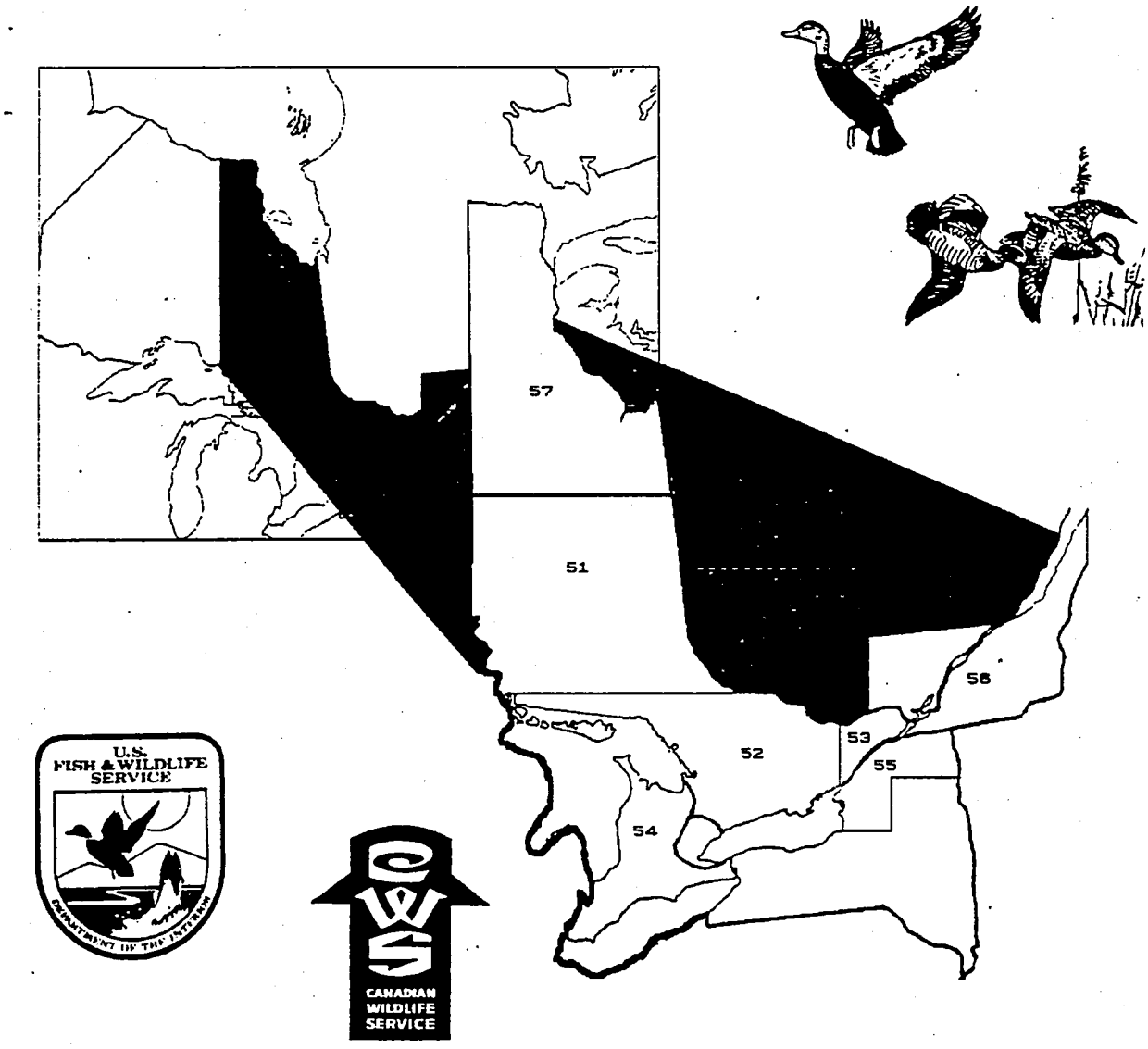
APPENDIX C

PILOT STUDY

WATERFOWL BREEDING POPULATION SURVEY

ONTARIO, QUEBEC, AND NEW YORK

MAY 1995



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

TITLE Waterfowl Breeding Population Survey for Ontario, Quebec, and New York

STRATA SURVEYED 51, 52, 53, 54, 55, 56
(62 experimental)

DATES April 21 - May 21, 1995

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

Aerial Crew

Pilot/Observer	J. R. Goldsberry, USFWS
Observer	P. Poulos, USFWS

Helicopter Crews

Pilot	Glen Cullingford, USWFS
Observer	Brian Benedict, USFWS

ABSTRACT

1995 was the sixth year of surveys to determine the waterfowl breeding populations of northern New York, Ontario, and southern Quebec. The spring was early but remained cool and the survey area with one or two exceptions, was dryer than normal. Duck breeding populations in general were down (-18%) from 1994, and -20% from the previous 5-year average. Canada Goose breeding populations were +15.7% above 1994, but were -19.5% below the 5-year average. In addition, Maine was experimentally flown to determine the effect of different habitats on visibility rates.

REVISIONS TO THE MAY BREEDING WATERFOWL SURVEY

Several revisions to the analytical procedures for the May Breeding Waterfowl Survey were implemented this year. These revisions resulted in more accurate and precise population estimates. As a result of these revisions, population estimates of some species changed. Also, for the first time, measures of precision are available for all estimates.

In 1984 the Office of Migratory Bird Management (MBMO) contracted Dr. David C. Bowden, a statistician at the Statistical Laboratory, Colorado State University, to review the May Survey. Dr. Bowden's review dealt primarily with the problem of visibility bias and he recommended a number of changes in the survey. During 1989-90 another review of the survey was conducted by the Population Assessment Section, Branch of Operations, Office of Migratory Bird Management. In this review, questions about the survey posed by Dr. Bowden were answered and decisions were made for changes in the survey.

Each year the ground and air counts on the air/ground transects of the survey are used to estimate visibility correction factors (VCFs). Usually there is adequate data to reliably estimate a VCF for the major species (i.e., mallard, pintail,

blue-winged teal). However, in some areas, and with some species, too few ducks are seen to reliably estimate a VCF. When this occurs, the Standard Operating Procedure (SOP) requires the use of data from previous years to aid in the estimation. In the past, average VCFs from prairie portions of the survey during 1961-1973 were used. This approach was not used this year. Instead 1992 data, along with data from the most recent past, was used to calculate a VCF. This is a better approach because the most recent, and therefore, the most relevant data have been used to calculate the VCF.

Additional aspects of the survey were also addressed this year. Recent experimental helicopter work has supplied information on VCFs for boreal forest regions of Canada and Alaska and for tundra areas in Alaska. In previous years average VCF values from the prairie and parkland areas of the survey were used in these areas. The new VCFs, for the most part, are lower values than those used historically. This has resulted in population estimates being lower than historical values. The northern pintail is an example of a species with lower population estimates resulting from declines in VCFs in Alaska boreal forest and tundra areas.

MBMO's review of the survey is nearing completion. Results of the review will be distributed as a USFWS Biological Report. The May Breeding Waterfowl Survey must remain dynamic to take advantage of improvements in both survey design and analytical techniques. CWS and USFWS, in cooperation with other federal, provincial, and state entities, are in the process of implementing a number of other improvements. CWS and its Canadian partners are expanding the number of air/ground transects with the hope of improving monitoring capabilities for the Prairie Habitat Joint Venture under the North American Waterfowl Management Plan. MBMO biologists have and will be expanding the number of air/ground transects in the Dakotas and Montana to calculate more precise VCFs. MBMO is cooperating with Flyway Technical Committees to upgrade or initiate surveys in areas currently not part of the Survey. Experimental surveys in eastern Canada, as part of the Black Duck Joint Venture, have been initiated. Surveys by states in the Pacific Flyway have been upgraded and new surveys have begun or will be initiated soon. It is the hope of CWS and USFWS that a better understanding of continental duck populations will result from these efforts.

Due to the above revisions, the reader should be aware that data and tables contained herein should not be compared to tables from previous issues of the Waterfowl Breeding Population Survey reports.

METHODS

The procedures followed in conducting the survey are contained in the Standard Operating Procedures for Aerial Waterfowl Breeding Ground Population and Habitat Surveys, Section III, revised April 1987.

In this sixth year of surveys, no major problems were encountered. The same crew has flown the survey area all six years except for stratum 51 which was flown by a different crew in 1994. The aircraft used was a Soloy converted Cessna 206 amphibian, for strata 52-56. Strata 51 was flown using a Partenavia (light twin engine aircraft). Strata 62 (Maine) was also flown using the Cessna and a Bell 206 Jet Ranger, to determine fixed-wing visibility rates in northern hardwood forests.

Fixed-wing/helicopter comparisons: In 1995 fixed-wing/helicopter comparisons were conducted in Maine to compare northern hardwood forest visibility rates for waterfowl with those obtained in the boreal forests of Ontario. This experiment will be reported on at a later date but data obtained for Maine will be included in (Appendix 1).

Survey dates: The survey was initiated on April 21 and completed on May 21, 1995. The aerial crew pilot and observer were the same as in 1990, 1991, 1992, 1993 and 1994.

WEATHER AND HABITAT CONDITIONS

Weather

The summer of 1994 was warmer than normal with above average precipitation throughout the survey area of northern and southern Ontario, northern New York, and southern Quebec. Fall continued warmer than normal but with lower than normal precipitation.

These fall conditions continued into winter. As an example, Timmins, Ontario had Christmas without snow, the first in the memory of many of the residents. The mild dry conditions extended to much of the survey area. January brought milder than normal temperatures to most of the survey area with daily records being set in several locations.

Precipitation was well above normal in the survey area except for northern Ontario, north of Sudbury were precipitation was slightly below normal. Temperatures dropped to below normal during February and above normal snow fall was recorded throughout the survey area, especially along the St. Lawrence River valley. The only exception to this was southwestern Ontario where precipitation was below normal. March turned mild and dry across the survey area except in southern Quebec were precipitation was above normal. The warmer than normal conditions over the winter led to an early spring which remained cool throughout the survey period, with precipitation well below normal.

Habitat Conditions

Generally, with the higher than average precipitation in the east, water bodies are more permanent in nature and habitat is less variable than in the western surveyed areas. Cool springs with above normal precipitation have the greatest impact on nesting waterfowl by flooding early nesting efforts. This year, although the spring was cool, it was dry and no major flooding occurred. Conditions appeared to be dryer than in the past. Beaver ponds were dry except around the lodges and dams. Flooded timber was very limited, streams were well within their banks, and major lakes were lower than in the past. Even with these dryer conditions waterfowl should not have a problem finding adequate nesting and brood rearing habitat. There should be no major habitat related impacts on waterfowl nesting and brood success in 1995.

BREEDING POPULATION ESTIMATES

The data for 1995 show a total breeding population of 1,049,400 ducks for all of northern New York, northern and southern Ontario, and southern Quebec (strata 51-56). The 1995 breeding population is -18.6% below 1994, and -20.4% below the previous 5-year average (see Table 1). Dabbling ducks were -12.9% below 1994 and -27.2% below the 5-year average. The only specie that showed improvement was Black duck, which was +34.8% above 1994 and +11.6% above the 5-year average. Pintail showed a +22.3% increase above 1994 but remained -83.0% below the 5-year average. Diving duck species were -22.2% below 1994 and -19.1% below the previous 5-year average. Redhead and ring-necked ducks showed a +4.7% and +23.1% increase above 1994, and a +73.3% and +35.2% increase above the 5-year average, respectfully. In the miscellaneous category all species showed a decrease from 1994. Mergansers (+11.4%) were the only specie to show an increase above the 5-year average.

The Canada Goose population showed a +15.7% increase above 1994, but was -19.5% below the previous 5-year average. It must be noted that staging geese are counted in strata 53 and 56, and their numbers may fluctuate from year to year depending on the chronology of the season. Canada Geese, counted in other strata, are actually nesting in those strata.

CONCLUSIONS

Early nesting species should do very well because of the lack of spring floods this year. Given adequate precipitation to maintain brood habitats, production should be normal for the eastern survey area.

Table 1. Status of waterfowl breeding population estimates by species and stratum with comparisons against the previous year (estimates in thousands).[a]

	Stratum (1995)									% Change	
Species/Ponds	51	52	53	54	55	56	1995 Total	1994 Total	5-Year Mean	1994	5-Year Mean
Ducks											
Dabblers											
Mallard	22.2	49.2	17.0	65.9	22.8	74.5	251.6	332.5	296.8	-24.3%	-15.3%
Am. black duck	59.8	33.4	0.0	4.3	2.2	44.5	144.2	107.0	129.2	34.8%	11.6%
Gadwall	0.0	0.0	0.0	0.0	0.0	30.6	30.6	0.0	4.8	--	535.0%
Am. wigeon	0.0	3.6	0.0	6.7	0.0	4.7	15.0	20.6	27.0	-27.0%	-44.4%
Am. green-winged teal	12.9	4.1	0.3	3.3	0.4	1.6	22.7	55.3	117.6	-59.1%	-80.7%
Blue-winged teal	9.6	6.5	5.9	37.2	7.9	16.9	84.0	113.6	170.3	-26.1%	-50.7%
N. shoveler	0.0	0.0	0.0	0.5	0.0	0.0	0.5	1.1	1.3	-52.7%	-60.3%
N. pintail	0.0	0.0	0.0	1.4	0.0	0.0	1.4	1.1	8.0	22.3%	-83.0%
Subtotal	104.5	96.9	23.1	119.2	33.4	172.8	549.9	631.2	755.1	-12.9%	-27.2%
Divers											
Redhead	0.0	0.0	0.6	5.5	0.0	0.0	6.1	5.8	3.5	4.7%	73.3%
Canvasback	0.0	0.0	0.0	2.1	0.0	0.0	2.1	4.6	3.4	-54.8%	-38.0%
Scaups	0.0	6.8	0.0	6.7	0.0	0.0	13.5	48.5	35.7	-72.1%	-62.1%
Ring-necked duck	135.4	72.7	2.0	23.5	0.6	16.0	250.3	203.3	185.1	23.1%	35.2%
Goldeneyes	10.5	7.1	0.0	1.1	0.0	0.0	18.7	94.7	71.4	-80.2%	-73.7%
Bufflehead	0.0	16.7	0.0	6.2	1.7	0.0	24.5	48.2	87.3	-49.1%	-71.9%
Ruddy duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	--	-100.0%
Subtotal	146.0	103.3	2.6	45.1	2.3	16.0	315.3	405.1	389.8	-22.2%	-19.1%
Miscellaneous											
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	--	-100.0%
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--
Scoters	0.0	5.0	0.0	0.0	0.0	0.0	5.0	18.3	10.2	-72.8%	-51.0%
Mergansers	85.0	58.1	0.4	11.6	8.6	15.5	179.2	235.0	160.8	-23.7%	11.4%
Subtotal	85.0	63.1	0.4	11.6	8.6	15.5	184.2	253.3	174.0	-27.3%	5.8%
Total Ducks	335.5	263.3	26.1	175.9	44.3	204.3	1049.4	1289.6	1318.9	-18.6%	-20.4%
Canada Goose	2.8	3.5	142.3	17.9	14.9	108.0	289.4	250.1	359.4	15.7%	-19.5%
Am. coot	0.0	0.0	0.0	5.2	0.0	0.0	5.2	2.4	7.0	118.7%	-26.1%
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	585.4	--	-100.0%

[a]Adjusted for visibility bias.

Table 2. Survey design for Ontario, Quebec, and New York, May, 1995.

STRATUM	51	52	53	54	55	56	62*
Survey Design							
Square miles in stratum	78,680	28,266	4,259	12,245	4,149	21,721	33,215
Square miles in sample	378	180	54	189	54	234	310.5
Lineal miles in sample	1,512	720	216	756	216	936	1,242
Number of transects in sample	6	4	4	10	5	9	10
Number of segments in sample	84	40	12	42	12	52	69
Expansion factor	208.1481	157.0333	78.8704	64.7894	76.8333	92.8248	106.9726
Current Year Coverage							
Square miles in stratum	78,680	28,266	4,259	12,245	4,149	21,721	33,215
Square miles in sample	337.5	180	45	166.5. 5	54	212	310.5
Lineal miles in sample	1,350	720	180	666	216	162	1242
Number of transects in sample	6	4	4	9	5	9	10
Number of segments in sample	75	40	10	37	12	47	69
Expansion factor	233.1259	157.0333	94.64444	73.5435	76.8333	102.6998	106.9726

*Experimental

Appendix 1. Status of waterfowl breeding population estimates by species (estimates in thousands).

Species/Ponds	Stratum 62
Ducks	
Dabblers	
Mallard	14.5
Am. black duck	53.5
Gadwall	0.0
Am. wigeon	0.0
Am. green-winged teal	10.8
Blue-winged teal	14.0
N. shoveler	0.0
N. pintail	0.0
Subtotal	92.8
Divers	
Redhead	0.0
Canvasback	0.0
Scaups	0.7
Ring-necked duck	27.7
Goldeneyes	4.9
Bufflehead	8.9
Ruddy duck	0.0
Subtotal	41.5
Miscellaneous	
Oldsquaw	0.0
Eiders	42.4
Scoters	0.0
Mergansers	54.0
Subtotal	96.4
Total Ducks	230.7
Canada Goose	3.5
Am. coot	0.0
Ponds	51.8

APPENDIX D

Table 1. Black Duck results from the PEI surveys, 1985-1995

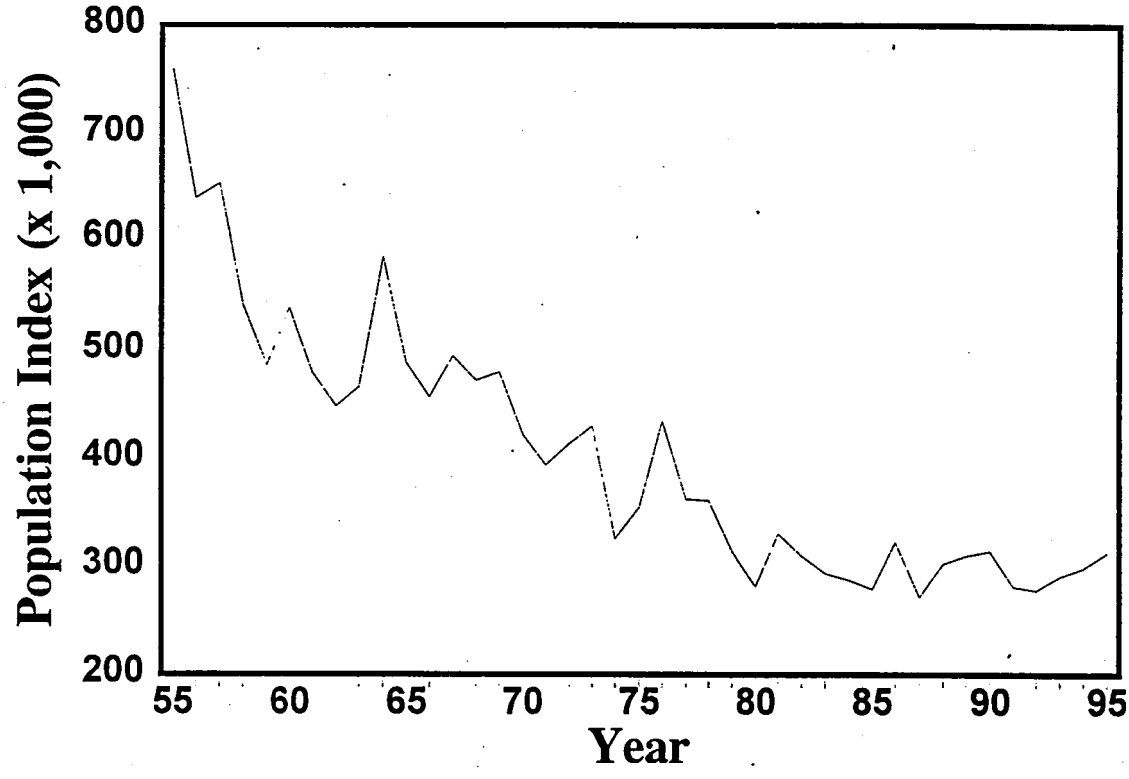
Year	1985		1986		1987		1988		1989		1990		1991		1992		1993		1994		1995	
Count	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
No. of wetlands surveyed within specified time period (see text)	53	74	76	79	74	66	62	67	78	79	76	73	71	73	70	63	75	74	73	72	73	71
No. of indicated pairs	113	116	165	90	131	83	105	95	136	80	167	115	154[2]	118	168[1]	86[1]	155[1]	97	167	116	151[1]	114
Total birds observed	207	195	363	163	240	203	293	255	279	174	656	234	469	283	459	287	336	270	350	311	278	286
Mean no. birds per wetland	3.9	2.6	4.8	2.1	3.2	3.1	4.7	3.8	3.6	2.2	8.6	3.2	6.6	3.9	6.6	4.6	4.5	3.6	4.8	4.3	3.8	4.0
Ave. no. indicated pair per wetland	2.1	1.6	2.2	1.1	1.8	1.3	1.7	1.4	1.7	1.0	2.2	1.6	2.2	1.6	2.4	1.4	2.0	1.3	2.3	1.6	2.0	1.6
No. of wetlands surveyed for broods (both surveys 3, 4)	33		33		28		30		22		25		29		25		30		28		24	
Min. no. of Black Duck broods	38		34		48		39		27		29		48		26		34		37		32	
Average no. broods* per wetland	1.2		1.2		1.6		1.3		1.2		1.1		1.6		1.0		1.1		1.3		1.2	

* corrected for missing data
[1] 1 Blk-Mal. pair included
[2] Blk + Hyb. pair and 1 Blk + Mal. pair included

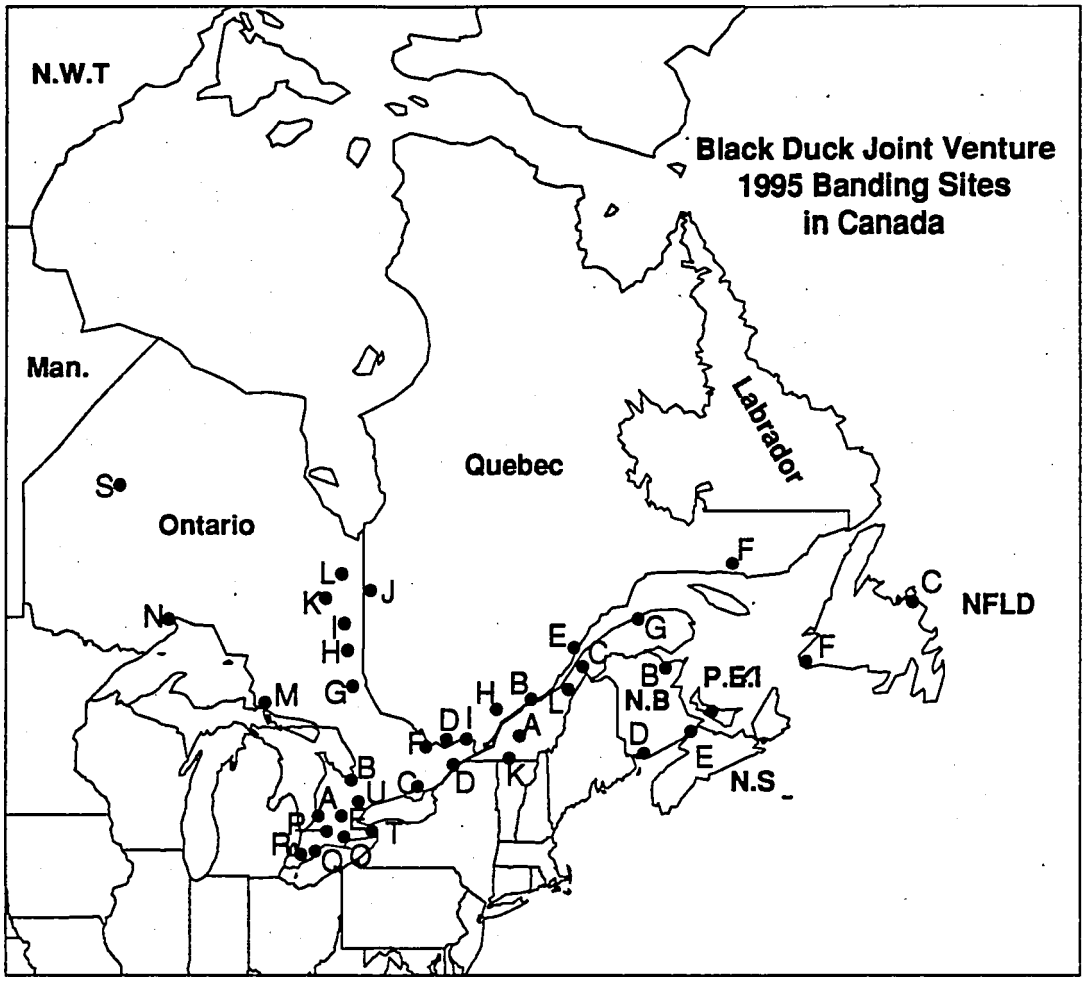
Source: Bateman, M.C. and R.L. Dibblee. 1995. Progress Report: Waterfowl Surveys on Prince Edward Island 1995. Unpubl. Rep. of Can. Wildl. Serv. (Atlantic Region). 32 pp.

APPENDIX E

Black Duck Population Estimates
From Mid-Winter Surveys 1955-1995



APPENDIX F



Ontario		Quebec	Atlantic Region
A Wingham	K Timmins	A Granby	A PEI
B Midhurst	L Cochrane	B Lac St. Pierre	B Bathurst, NB
C Napanee	M Blind River	C La Pocatiere Bay	C Carmanville, NF
D Cornwall	N Thunder Bay	D Thurso	D St. John River, NB
E Cambridge	O Long Point	E Escoumins	E NS/NB Border Marsh
F Pembroke	P Oxford & Komoka	F Baie John Beetz	F Codroy, NF
G North Bay	Q Aylmer	G Rimouski	
H Temagami	R Lake St.Clair	H Contrecoeur Island	
I Kirkland Lake	S Nikip Lake	I Rigaud	
	T Niagara	J Lac Parent	
	U Mountsberg C.A	K Missisquoi Bay	
		L Montmagny	

CWS ATLANTIC REGION BANDING REPORT

1995 Preseason Banding Report by: M.C. Bateman and R.W. Daury

Banding Station Location: Atlantic Region

Crew Members: A. Foster, C. McAleenan, M. Bowes, D. Sears, L. Willett, R. Wheadon, G. Brinson, D. Thompson, J. Gillan, J. Castiday, and P. Walker.

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	**215**	**175**	**796**	**609**	**93**	**80**	**1,971**
Mallard	46	20	106	82	9	5	269
Mallard X Black Duck	13	4	22	8	0	0	47
Wood Duck	67	6	0	4	1	2	80
Northern Pintail	2	7	16	10	3	2	40
Ring-necked Duck	3	1	10	10	12	19	55
American Wigeon	5	6	9	15	32	22	89
Blue-winged Teal	19	18	65	101	26	19	249
Green-winged Teal	67	68	287	262	3	4	693
Canada Goose	0	4	1	5	0	0	10
Gadwall	0	0	6	6	17	20	49
Shoveler	0	0	5	1	2	0	8
Lesser Scaup	1						1
Total							**3,561**

Comments: Because the black duck breeding population on PEI is being carefully monitored, the two banding stations there will be continued. The station at Terra Nova National Park, NF was discontinued as planned and a successful operation in Carmanville, NF, started this year, and will be continued. The station at Bathurst, NB will be continued as will the station at the NS-NB border marshes.

AHYM- After Hatch Year Male;
HYM- Hatch Year Male;
LM- Local Male;
AHYF- After Hatch Year Female;
HYF- Hatch Year Female;
LF- Local Female

CWS QUÉBEC REGION BANDING REPORT

1995 Preseason Banding Report by: P. Dupuis

Banding Station Location: Québec Region

Crew Members:

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	94	82	702	491	7	11	1,387
Mallard	350	287	1,688	1,061	66	68	3,520
Mallard X Black Duck	5	5	32	29	3	2	77
Wood Duck	445	68	119	86	9	10	737
Northern Pintail	3	30	18	31	5	2	90
Ring-necked Duck	2	1	11	16		1	32
American Wigeon			6	5		1	12
Blue-winged Teal	9	40	114	140	3		306
Green-winged Teal	183	155	546	357	7	1	1,249
Gadwall			7	8	2	5	23
Shoveler			2	3		2	7
Total							**7,440**

Table 1. ONTARIO 1995 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	Ring-Necked Duck	Other[1]	TOTAL
NIAGARA	64	2			1	4			71
AYLMER	776	17	2	240	73	2		2	1,112
CAMBRIDGE	1535	27	10	179	783	9	1	17	2,561
WINGHAM	376	9		100	466	8			959
MIDHURST	839	38		2	19	2		25	925
NAPANEE	375	13	2	6				5	401
CORNWALL	447	64	6	44	5	83	0	4	653
PEMBROKE	197	35	1	125	67	38	8	3	474
THUNDER BAY	829	158	4		18	16	1	24	1,050
TIMMINS	618	113	9	3	33	122	44	32	974
KIRKLAND LAKE	884	99	5	69	227	76	1	17	1,378
TEMAGAMI	33	172	7	8		1	4	2	227
BLIND RIVER	84	14	5	73				4	180
COCHRANE	56	10	7	3	4				80
NORTH BAY	358	110	10	2					480
MOUNTSBERG, C.A	342	14	2	83	5	1	284	62	793
CWS-LONDON	980	7	1	137	351	61		1	1,538
TOTALS	8,793	902	71	1,074	2,052	423	343	198	**13,856**

[1]Other includes: Aylmer: 2 pintails; Cambridge: 3 pintail, 13 redhead, 1 pied-billed grebe; Midhurst: 1 mallard/wigeon hybrid, 1 moorhen, 1 pied-billed grebe, 7 coots & 15 CAGO; Napanee: 4 pintails & 1 mallard/pintail hybrid; Pembroke: 3 hooded mergansers; Thunder Bay: 2 pintail, 4 wigeon, 2 hooded mergansers, 1 horned grebe; Timmins: 22 wigeon, 9 hooded mergansers, 1 common goldeneye; Kirkland Lake: 2 pintail, 12 wigeon, 2 goldeneye, 1 shoveler; Temagami: 1 goldeneye, 1 common merganser; Blind River: 4 wigeon; Mountsberg CA: 1 pintail, 27 lesser scaup, 26 bufflehead, 8 pied-billed grebes; CWS London: 1 pintail.

U.S.F.W.S. BANDING REPORT

1995 Preseason Banding Report by: Fred Roetker, USFWS

Banding Station Location: Nikip Lake, Ontario

Crew Members: Phil Glass (Ecological Field Services, USFWS), Glenn Harris (Cameron Prairie NWR), Roselyn Harris (Region IV, USFWS).

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	**3**	**1**	**1**	**1**	**0**	**0**	**6**
Mallard	21	29	67	69	6	7	199
Northern Pintail	3	1	3	3	0	0	10
American Wigeon	0	0	1	0	2	3	6
Blue-winged Teal	0	0	3	1	0	0	4
Green-winged Teal	4	6	21	17	0	0	48
Shoveler	0	0	0	3	0	0	3
Total							**276**

APPENDIX G

Black Duck Joint Venture Research
Annual Progress Report 1995

Project Title: Beaver Pond Management Assessment Program: Long-term monitoring of waterfowl and non-waterfowl populations on beaver ponds in eastern Ontario.

Investigator(s): T. Shane Gabor, Research Biologist, Institute for Wetland and Waterfowl Research c/o Ducks Unlimited Canada. Henry R. Murkin, Research Scientist, Institute for Wetland and Waterfowl Research c/o Ducks Unlimited Canada and Adjunct Professor, Department of Renewable Resources, McGill University. Ted R. Gadawski, Ontario Provincial Biologist, Ducks Unlimited Canada.

Objectives: The objectives of this study are:

1. To determine waterfowl (primarily black duck, mallard, wood duck, and hooded merganser) density changes and habitat use on landscapes with managed and unmanaged beaver ponds.
2. To determine the abundance and habitat use of selected non-waterfowl species on landscapes with managed and unmanaged ponds.
3. To compare beaver abundance, distribution and habitat change resulting from beaver activity on managed and unmanaged landscapes.

General Description of the Study: In 1993, a long-term monitoring program was initiated to evaluate changes in waterfowl densities and habitat quality on landscapes with and without beaver pond management in eastern Ontario. Aerial pair surveys will be conducted for a 5 year period to determine the efforts of beaver pond enhancement on waterfowl productivity and non-waterfowl abundance and habitat use. Beaver abundance distribution and their effect on habitat quantity and quality will be determined.

Report on Progress (for ongoing work): From 1993-95, aerial pair and brood surveys were conducted on the study areas. Aerial photography was employed to determine habitat use. The 1994 progress report may be obtained by T. Shane Gabor [1]. Data from the 1995 field season is currently being analyzed and will be forwarded to the BDJV upon completion.

Partners: BDJV, DUC, IWWR, OMNR, CWS

Funding Received to date:

IWWR c/o DUC 1993-95	$ 216, 711
BDJV 1993-95	$ 30,000
OMNR 1995	$ 10,000
CWS 1995	$ 40,000

Start Date: March 1, 1993
End Date: December 31, 1997

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[1] T. Shane Gabor can be reached at the Institute for Wetland and Waterfowl Research (204) 467-3000

Project Title: Habitat use and productivity of sympatrically breeding black ducks and mallards of agricultural landscapes in Québec.

Investigator(s): Charles Maisonneuve, Ministère de l'Environnement et de la Faune, Direction de la faune et des habitats, Service de la faune terrestre, Québec, PQ

Objectives: Characterize the habitats used by sympatric black ducks and mallards in a predominantly agricultural landscape, and compare the various aspects of the productivity of these species in such a landscape. Habitat characterization will help to integrate the needs of waterfowl in the planning of a project aiming to restore a typical watershed of the St. Lawrence valley. One of the main objectives of this study is thus to eventually help increasing waterfowl production through habitat enhancement in the major agricultural areas of the province. The productivity estimates obtained through this study should also be a good contribution to the needed comparison of recruitment of black ducks and mallards in different landscape configurations.

General Description of the Study: Habitat use of black ducks and mallards will be determined using telemetry.

Report on Progress: In 1992 and 1993, aerial surveys (breeding pairs and broods) were carried out to determine the general waterfowl use (abundance and production) of a 220 km^2 watershed (the Boyer River watershed, a typical agricultural landscape of the St. Lawrence valley). Black ducks and mallards are the dominant species totalling about 90 pairs with a ratio of 75:25. The telemetry study was initiated in 1994 in the Boyer River watershed, and expanded in the neighbouring Le Bras River watershed in 1995. Decoy traps were used to capture 29 females (13 black ducks and 16 mallards), which initiated 37 nests. Of the 11 broods produced, (5 black ducks, 6 mallards), only 4 (2 of each species) survived to fledging (producing 22 ducklings, 10 black ducks and 12 mallards). After initial moves of sometimes several kilometers, during which many broods are lost, those which survive seem to use a restricted section of river during the whole season.

Nesting success is near 20% for black ducks, and 17% for mallards. But most successful black duck nests are located in the small peatlands where predators are less active. If nests located in these bogs are excluded, nesting success of black ducks nesting in the agricultural landscape is only 6%.

Partners: Ministère de l'Environnement et de la Faune (MEF), St. Lawrence Action Plan, BDJV

Funding Received to date:			
	1992-1993	$15,000	(MEF)
	1993-1994	$33,000	(MEF)
	1994-1995	$13,000	(MEF)
	1995-1996	$18,000	(MEF)
		$ 5,500	(BDJV)

* The St. Lawrence Action Plan contributes to the salary of the project investigator since the beginning of the project.

Start Date: April, 1992

End Date: 1996- Field work

Project Title: Feasibility of an adaptive management experiment to test hypotheses about the decline of black ducks.

Investigators: Miller, M.W., Nudds, T.D., Ankney, C.D.

Objectives:

1) To consider the major competing hypotheses about the black duck decline

2) To develop the most efficient, factorial design for a large-scale experiment to test for main effects and interactions among the various competing factors.

3) To use existing data to develop a priori power analyses to estimate appropriate sample sizes for each of the treatment combinations.

4) To investigate potential field sites, estimate total costs, and investigate potential funding partners.

General Description of the Study: Working from Guelph, Mark Miller consulted widely with waterfowl biologists, managers, statistical design consultants, and limnologists, to collect information relevant to the tasks above. He travelled to London, Dorset and Ottawa, but spent most operating monies on phone and fax communications.

Report on Progress: A full report has been submitted under separate cover. After the short 6 months available to accomplish all the objectives, only part of number 4, namely, "peddling" the proposal to potential partners remains.

Partners:		
	CWS/BDJV	50%
	DU Inc	25%
	DU Canada	25%

Funding Received to date: $17,833

Start Date: 01/05/95

End Date: 30/09/95

Project Title: Impact of Atlantic Dykeland Wetland Restoration to Regional Waterfowl Populations.

Investigators: J. Bruce Pollard, Keith McAloney and Andrew MacInnis (IWWR/DUC)

Objectives: Evaluate the response of waterfowl populations in a regional context, to the securement and development of an impounded wetland complex. Supplemental waterfowl objectives include habitat-specific productivity and species-specific habitat selection. Additional objectives include the documentation of multi-species benefits of wetland development and management.

General Description of the Study: Intensive indicated breeding pair and brood surveys have been conducted on a 250 km^2 landscape surrounding a wetland development complex (BelleIsle Marsh). Waterfowl breeding effort and production will be monitored over a four year post-development period, initiated in 1993. Wetland specific data on pair and brood use and apparent brood success will provide information directly relevant to BDJV priorities. Impacts to passerine, wetland-obligate, small mammal, upland game bird and furbearer populations will also be assessed.

Report on Progress: Comprehensive pre-development waterfowl IBP and brood data collected in 1991/92 indicated relatively little variation in these parameters in two years. Pre-impoundment baseline data for other species were also collected in 1991/92. Using a compound interest model for the population growth rate, black duck IBP on the study area have increased by approximately 19% per year over pre-impoundment levels since 1992. The rate of increase in IBP's is significantly greater than that observed for the province of Nova Scotia based on BDJV survey plot data. The increase in black duck IBP corresponds to an increase in black duck broods on the study area. Other waterfowl species (e.g. ring-necked duck, wood duck) have also shown increases in brood use on the BelleIsle study area to date. Mallard and hybrid pair and brood use of the area remains at or near pre-development levels. Species richness of breeding waterfowl, amphibian, and wetland-obligate avian species at the BelleIsle development site has increased following wetland construction based on preliminary interpretation of survey data collected to date.

Partners: DUC/IWWR, CWS, BDJV, EHJV, NS DNR, NBS-NERG, CEIC

Funding Received to date:

1991-1994:	DUC/IWWR	$99, 750 (+ Technical Assistance)
	CWS	$67, 500 (+ Technical Assistance)
	NS-DNR	$28, 575 (+ Technical Assistance)
	BDJV	$25, 400
	EHJV	$16, 250
	CEIC	$ 2, 500
1995-96 (Projection to 30/03/96)		
	DUC/IWWR	$49, 150 (+ Technical Assistance)
	CWS	$10, 000 (+ Technical Assistance)
	NS-DNR	$ 1, 250 (+ Technical Assistance)
	BDJV	$15, 000
	EHJV	$ 6,000
	NBS-NERG	Technical Assistance

Start Date: April, 1993 (post-development phase)
End Date: November 1996 (field component) November 1997 (data analysis and report preparation)

Project Title: Fledging success of black ducks and mallards at high and low productivity sites.

Investigators: Dr. Norman Seymour, St. Francis Xavier University

Objectives:

1) Test hypothesis that black duck females using high productivity sites fledge more ducklings than those using low productivity sites.

2) Test hypothesis that mallard females fledge more young at high productivity sites than do female black ducks at low productivity sites.

3) Test hypothesis that mallards fledge more young than do black ducks females when they use the same sites.

4) Test hypothesis that specific female black ducks fledge more ducklings when they use high productivity sites than when they use low productivity sites.

General Description of the Study: This study draws on 19 years of data on breeding site selection by black ducks and mallards in northeastern Nova Scotia. These data also include fledging success at various high/low productivity sites in several habitats (river, emergent wetland, lake, estuarine, etc.). I have data on physical, chemical, and biological parameters of sites and on the details of the breeding behaviour of ducks at these sites. Intensive observation of both marked/unmarked birds at specific sites have provided me with details of fledging success. However, increased sample sizes are required to allow me to statistically test the data related to my hypotheses. This is the thrust of my research during 1995 and is the basis of my proposal for the 1996 field season.

Report on Progress: Please see the attached sheet for data already gathered in previous years; these data are listed as preliminary results for each of my four objectives. I have increased my sample sizes during the 1995 field season for each objective. In addition, I have gathered data on invertebrate diversity/abundance at specific sites in all habitats.

Partners: Department of Fisheries and Oceans (Invertebrate study in stream habitats), St. F.X. University supports infrastructure costs, including data analysis and testing.

Funding Received to date: 1994-1995: BDJV $6,300

Start Date: 1995 Field Season

End Date: On-going, but aspects of this project are complete and will be reported on before the 1996 field season.

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Fledging success of black ducks and mallards at high and low productivity sites- con't

Objectives and Preliminary Data/Results:

Objective #1 Compare fledging success of black ducks at high/low productivity sites. Test the hypothesis that females using high productivity sites fledge more ducklings than those using low productivity sites. Productivity (water chemistry parameters/invertebrate availability) has been measured at 9 high and 12 low productivity sites. Invertebrate diversity and biomass have been measured at these sites. Methodology involving sweep netting of the water column and core sampling of sediments has been and will be used to determine diversity/biomass. Identification of specific females/broods is based on marking (nasal discs) and isolated distribution of study birds. The results reported in this proposal are likely to change somewhat, but they are good reflections of what is happening.

Preliminary Results: Females (N=23) at high productivity sites in dispersed wetland habitat fledge 5.7 ducklings while females (N=19) at low productivity sites produced 6.1 (these results were for data collected during a 12 year period). Comparisons were also made within years. For example, during 1993, females at each of four high/low productivity sites fledged 5.e and 5.7 respectively. These results suggest that black ducks can successfully fledge broods at a range of sites, even those which have relatively low productivity and availability of invertebrates. More field work would allow me to increase my within year sample sizes and to further investigate invertebrate availability.

Objective #2 Compare fledging success of black duck females at low productivity sites with mallards at high productivity sites. Test the hypothesis that the mallards fledge more young than do black ducks.

NOTE: Mallards do not use low productivity sites.

Preliminary Results: In habitat consisting of widely dispersed emergent wetlands, mallard females (N=14) fledged 5.4 ducklings while black duck females (N=26) fledged 5.2 ducklings during a 10 year period. During 1991 mallard females (N=2) fledged 6.0 ducklings while black duck females (N=6) fledged 6.5 ducklings. In a tidal marsh where black duck females (N=37) fledged 6.4 ducklings, female mallards (N=8) fledged no ducklings. These results suggest black ducks and mallards are equally successful in fledging broods in dispersed wetlands but female mallards are unsuccessful in brackish, estuarine wetlands. Another year or two of study would allow me to increase my within year sample of mallard fledging success.

Objective #3 Compare fledging success of mallard and black duck females rearing broods at the same site. Test the hypothesis that mallards fledge more ducklings than do black ducks at the same site in small, dispersed wetland habitat.

Preliminary Results: Female mallards (N=12) fledged 4.9 ducklings while black duck females (N=26) fledged 5.8 ducklings during a 9 year period. When the same site was used within the same year (same period of time also) black duck females (N=4) produced 6.2 ducklings while female mallards (N=4) produced 5.3 ducklings. Another year or two of study may allow for an increase in sample size of concurrent, sympatric breeding success. However, obtaining these data are uncertain because black ducks and mallards are interspecifically territorial.

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Fledging success of black ducks and mallards at high and low productivity sites- con't

Objectives and Preliminary Data/Results:

Objective #4 Compare the fledging success of individual female black ducks that use a high productivity site one year but a low productivity site in another year. Test hypothesis that individual female black ducks fledge more ducklings when they use high productivity sites.

Preliminary Results: A total of 9 females were used in this analysis. When females used high/low productivity sites they raised 5.3 and 5.7 ducklings respectively. Additional study should allow me to increase my sample size.