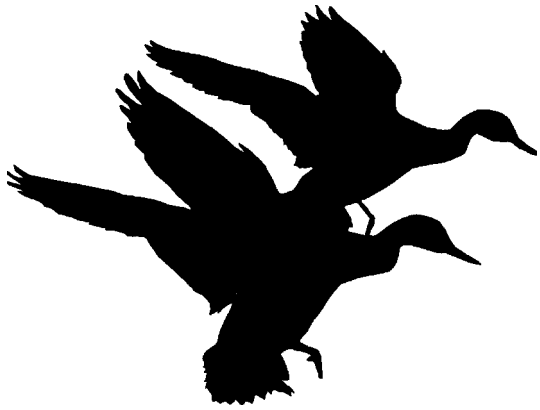
BLACK DUCK JOINT VENTURE

A sub-plan of the North American Waterfowl Management Plan

1996 PROGRESS REPORT



Prepared by the
Black Duck Joint Venture Technical Committee

August 1997

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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 1996 toward meeting those objectives.

2.0 SURVEYS

2.1 Helicopter 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 improve the precision of the BDJV helicopter survey and increase the representativeness of the sample by (a) reducing plot size from 10km by 10km to 5km by 5km 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, and periodic coverage of northern areas not previously included. 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 1996 sample consisted of a total 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).

The estimated total number of indicated pairs of black ducks by stratum for the years 1991-1996 is presented in Table 1. Due to the new survey design, the previous approach to the analysis (based on trends over plots which had been consistently run for several years) is no longer appropriate. For this reason, the estimates presented in Table 1 are different from those which have previously been presented because a) the analysis was done using the revised survey strata and b) all data were used in the analysis.[1]

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[1] Collins, Brian. 1997. Analysis of 1996 Black Duck Breeding Ground Survey (memorandum). Migratory Bird Populations Division, National Wildlife Research Centre, Hull, P.Q.

Figure 1. **Survey Strata and Sample Sizes for the 1996 Helicopter Survey**

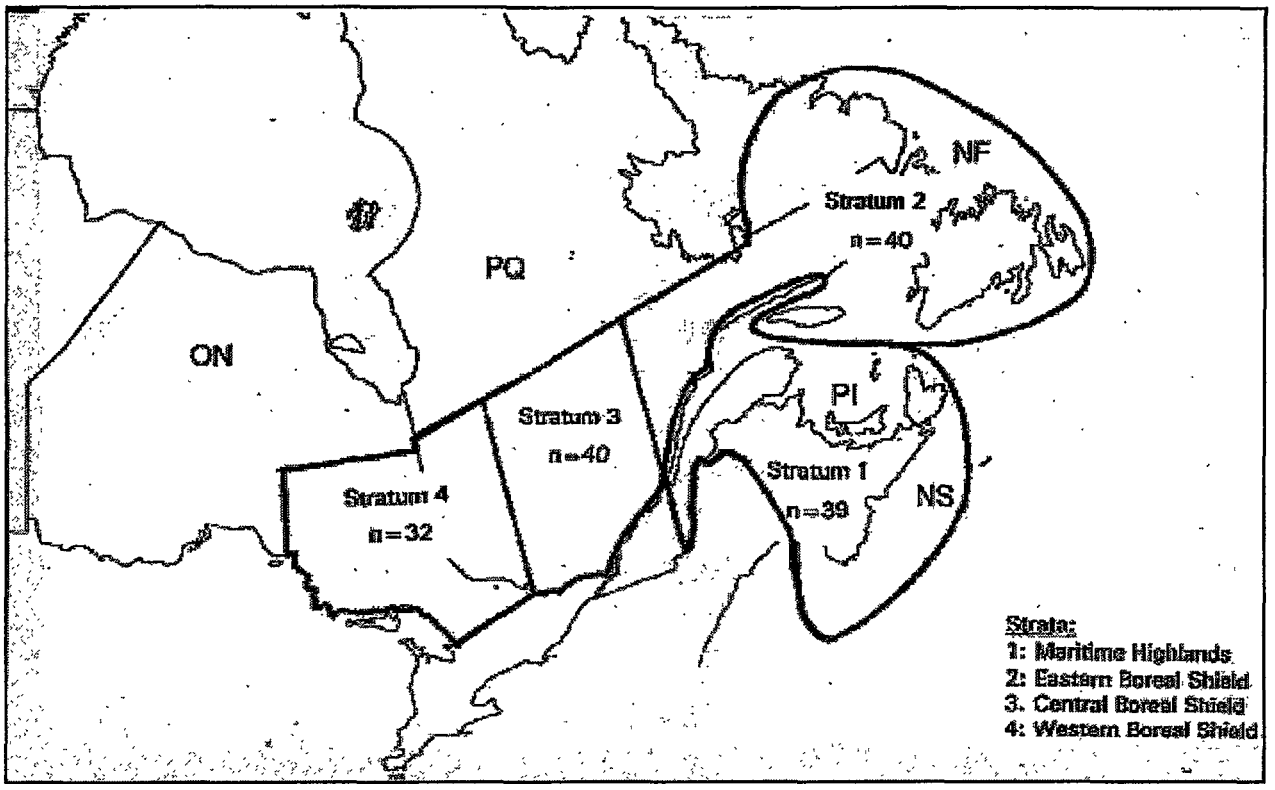


Table 1. **Estimated Number of Total Indicated Pairs of Black Ducks with Standard Errors.** From ***Collins***, **January, 1997.**

Year	Stratum -1-	Stratum -2-	Stratum -3-	Stratum -4-	TOTAL
1991	18955 ± 2010	16560 ± 2458	32259 ± 2650	56829 ± 4135	127602 ± 5848
1992	21677 ± 2327	11829 ± 1220	31464 ± 2300	58775 ± 4406	123744 ± 5622
1993	20620 ± 1759	9762 ± 1141	17415 ± 1807	50523 ± 4621	98320 ± 5386
1994	21912 ± 2106	9936 ± 1406	22183 ± 2285	48902 ± 3680	102932 ± 5018
1995	27170 ± 4914	10800 ± 1574	21138 ± 2196	52054 ± 6228	111162 ± 8380
1996	40787 ± 3536	10102 ± 1604	32924 ± 4684	65450 ±10456	149262 ± 12097

2.2 Fixed-Wing Surveys

The fixed-wing aircraft surveys were also conducted in 1996. Surveys were expanded to cover Maine and Eastern Canada and results of this pilot survey are presented in Appendix B. Survey results for the states of Michigan, Minnesota and Wisconsin are shown in Appendix C. The seventh year of fixed-wing surveys in eastern Ontario, southern Québec and northern New York is described in Appendix D.

Other surveys of relevance to the BDJV include ground counts that are conducted annually 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. 1996 was the fourteenth consecutive year of the ground-based survey of breeding waterfowl in Prince Edward Island. 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. Results of the brood survey suggest that 1996 was a good production year for black ducks.[1]

Results of the midwinter inventories from 1955-1996 are presented in Appendix E. 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 35 banding stations distributed across eastern Canada.

A total of 3,737 black ducks were banded in 1996 (4,266 were banded in 1995). The banding sites in Canada are illustrated on the map in Appendix F. The total number of black ducks banded throughout the Atlantic Flyway States in 1996 was 1,075.[2] 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 summary of 1996 Atlantic Flyway banding results by state is presented in Appendix F. A final report on the preseason banding activities in eastern Canada and the northeastern US is provided annually at the summer meeting of the Atlantic Flyway Technical Section.[2]

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

[1]Bateman, M.C. and R.L. Dibblee. 1996. Progress Report: Waterfowl Surveys on Prince Edward Island 1995. Unpubl. Rep. of Can. Wildl. Serv. (Atlantic Region). 30 pp.
[2]West Virginia Division of Natural Resources, 1996, Annual Report of Cooperative Banding Program.

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, hybridization and ecological competition 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 1996. The objectives and current status of each project are presented in Appendix G.

5.0 BUDGET

Allocation of 1996 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:				
	227,100	38, 400		265, 500 Cdn.
	165, 766	28, 029		193, 795 U.S.
USFWS- BDJV:				
	122, 300		109, 600	231, 900 Cdn.
	89, 272		80,000	169, 272 U.S.
Patuxent Wildlife Research Center:				
		490, 500		490, 500 Cdn.
		358, 000		358, 000 U.S.
Atlantic Waterfowl Council:				
			260, 000	260, 000 Cdn.
			189, 780	189, 780 U.S.
Mississippi Flyway Council:				
			15, 000	15, 000 Cdn.
			11,000	11, 000 U.S.
Total	**$349, 400**	**$528, 900**	**$384, 600**	**$1, 262, 900 Cdn.**
	$255, 038	**$386, 029**	**$280, 780**	**$ 921, 847 U.S.**

6.0 PROGRAM HIGHLIGHTS IN 1996

For the BDJV, 1996 was a year filled with exceptional progress. Integration of the Canadian helicopter surveys and the U.S. fixed-wing surveys program was achieved via the BDJV Technical Committee Surveys Task Force. The redefined survey objectives will be incorporated into a revised BDJV Strategic Plan in 1997.

A Banding Task Force was assembled in 1996 to produce a revised banding strategy to address current black duck population management requirements. The Task Force is presently examining the feasibility of proposed program changes. This effort will continue into 1997 with any changes to the program being reported in the revised BDJV Strategic Plan.

Extensive research into the factors affecting the decline of the black duck has been undertaken over the past 10 years. In order to provide effective information to waterfowl population managers, the Technical Committee believes that the results to date require an in-depth examination and synthesis by an outside source. A Research Task Force was struck to 1) supervise the synthesis of all available data sets into a simplified black duck population model; 2) identify data gaps, and 3) determine the most appropriate directions for black duck research. This analysis will be ongoing through 1997.

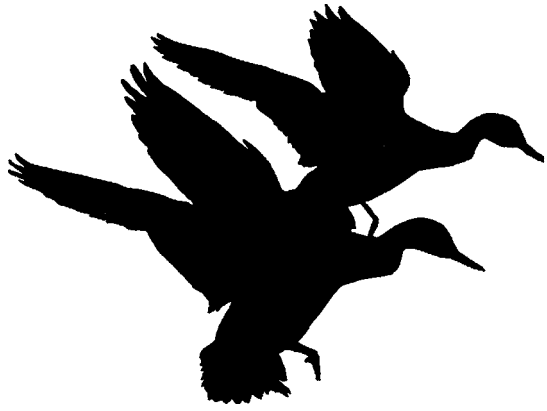
The BDJV Technical and Management Board Committees hosted a workshop in Québec City on the development of an International Harvest Management Strategy. Interested stake holders along with federal, state and provincial government agencies gathered to share scientific knowledge on the factors associated with the decline of the black duck population and to explore issues relevant to the development of an international harvest management strategy. Currently, the US Fish and Wildlife Service is working in conjunction with the Canadian Wildlife Service to develop this strategy.

APPENDIX A

Breeding Waterfowl Survey in Eastern Canada

Preliminary
Progress Report

July 11, 1996



A component of the Black Duck Joint Venture

Surveys conducted by the
Atlantic, Quebec and Ontario Regions of the
Canadian Wildlife Service

Introduction

In the past, surveys of black ducks on their wintering areas were used to examine trends in population size. While this information is useful for studying overall population trends, it is not effective 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 throughout 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, were 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 were 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. This report summarizes the results obtained in 1996 in comparison to the years 1990 through 1995.

The BDJV Helicopter Survey

The helicopter survey procedures are described in the draft Operational Plan for the BDJV. In total, 229 100-km^2 plots distributed throughout the Boreal Shield and Atlantic Highlands Ecological Areas 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. In 1993 and 1994, a total of 175 plots were surveyed, and this number was reduced to 84 in 1995 (much of this decline resulted from discontinuing the survey in Maine).

In 1996, efforts were made to increase the precision of the BDJV helicopter survey at the

same time that sample sizes were being reduced. An analysis was conducted to determine the effect of using smaller plots (5 x 5 km), more plots in total, and a rotating sample design. It was decided that these changes would increase the representativeness of the sample, allowing annual coverage of a larger number of plots, and interval coverage of northern areas not currently included. The sample was allocated to give 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 zones (Figure 1). The 1996 sample consisted a total of 151, 5x5 km plots distributed as follows: Maritime Highlands - 39, Eastern Boreal Shield - 40, Central Boreal Shield - 40 and Western Boreal Shield - 32 (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. For this preliminary report, the data are presented by province, rather than by stratum. The population densities in Table 1 are total observed birds per 100km^2. Please note that these data are preliminary and subject to further verification and analyses.

Spring 1996 Survey and Habitat Conditions

Newfoundland and Labrador experienced a mild winter and received little snow in 1995/96. As a result, spring arrived early and water levels were below normal. The surveys were initiated one week early in the eastern sections of the province, while the western section was flown at about normal time. In general there was less ice cover than in previous surveys, however, one of the plots in southern Labrador was completely covered with snow and ice.

In the Maritimes, ice-out was early with warm weather in April. Cold temperatures in late April and May slowed the development of vegetation such that the phenology was somewhat later than average during the breeding duck surveys. Black duck breeding chronology appeared to be similar to other years despite the early open water and later cold temperatures. Good production of young waterfowl is expected in 1996. The late cold weather is not expected to have a detrimental effect on hatching or survival of ducklings.

In Quebec, the weather was cool in May and the vegetation phenology was delayed compared to normal. The spring thaw was a little earlier than last year; break-up on Lake St. Jean in central Quebec was 2 days earlier in 1996 (May 12) than in 1995 (May 14). However, the spring thaw was late when compared to normal (break-up average date for the last 10 years on Lake St. Jean is May 9). Weather conditions during the survey were good but windy for the western part of the survey area, but poor in the east, with a lot of rain, fog and drizzle. June was sunny and warm so incubation and hatching was under good conditions, but will probably be delayed, for most species of ducks throughout southern Quebec.

Spring was very late in Ontario, in fact it was the latest of the past 17 years. Very little thawing occurred in northern Ontario until early May at which point concentrated melting led to very high water levels and record flooding (water levels were more normal in southern areas). In some parts of the survey area, vegetational phenology was delayed by at least two weeks, or as much as one month. The survey was delayed by three days (May 9) in response to heavy ice on wetlands, even in the southern portion of the survey area. Once the survey began, no significant icing was encountered until the crew began working north of Sudbury (May 16). This necessitated a further delay until 21 May after which ice was found only in the centres of larger lakes. Nesting phenology of waterfowl was also delayed, although not to the same extent as the vegetation. The cold spring during nest initiation of the early species was stressful bioenergetically and may have caused local redistribution to less desirable habitat, both of which point to lower productivity for this group. Weather during incubation and brood-rearing was warm and dry, and may have had a mitigating effect. Later nesting species were probably not affected by the late spring and may actually benefit from the abundant water.

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Erskine, A.J. (Ed.). 1987. Waterfowl breeding population surveys, Atlantic provinces. Can. Wildl. Serv. Occas. Paper No. 60.

Kaczynski, C.F. and E.B. Chamberlain. 1968. Aerial surveys of Canada Geese and Black Ducks in Eastern Canada. Special Scientific Report - Wildlife No. 118. Washington, DC.

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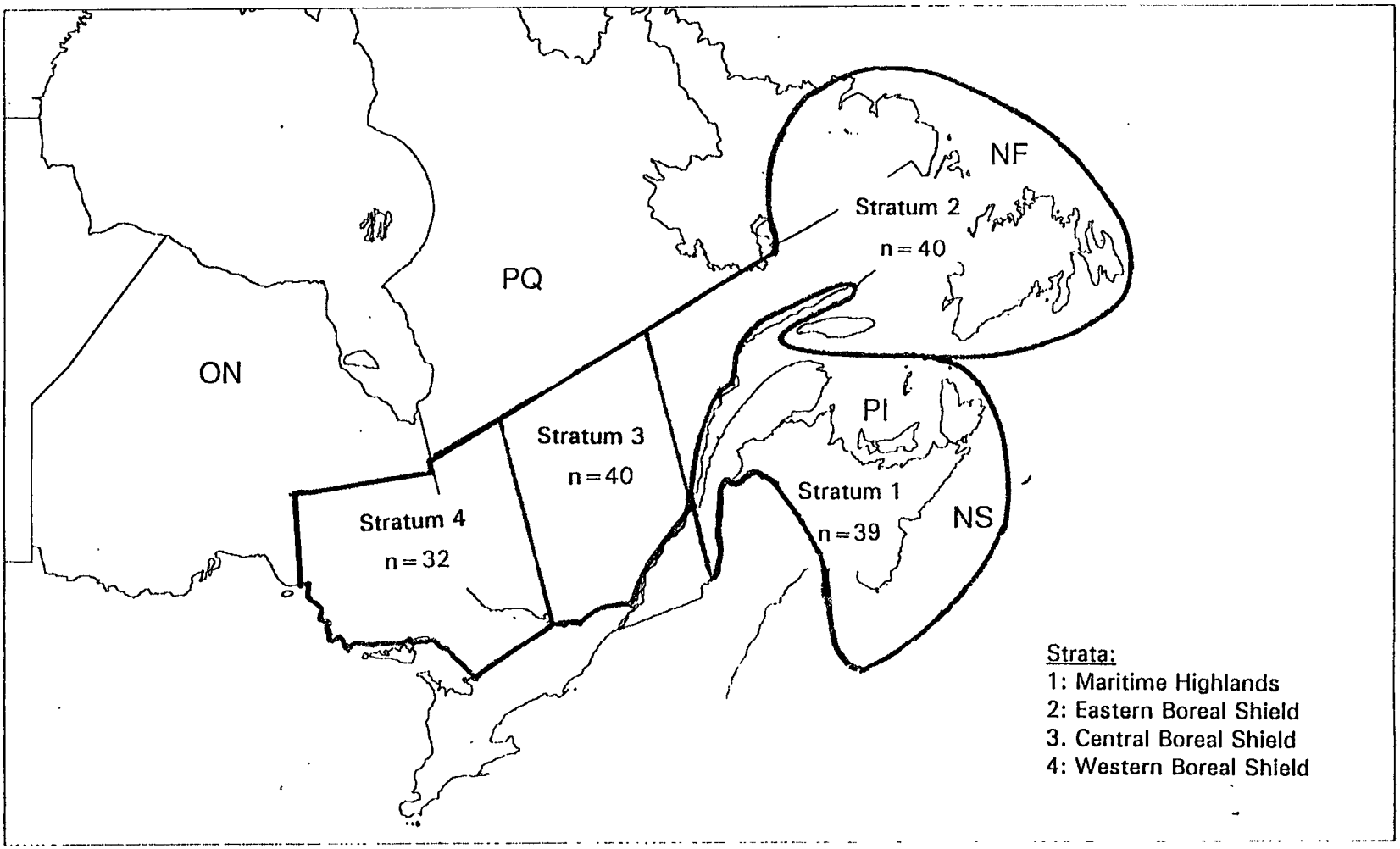
Figure 1: Survey Strata and Sample Size for the 1996 Helicopter Plot Survey



	Total birds per 100km2														
	NB							NF							NS
	90	91	92	93	94	95	96	90	91	92	93	94	95	96	90
1290 COME Common Merganser	8.96	8.88	4.40	7.84	4.20	6.67	12.20	4.68	5.08	5.56	3.32	2.40	4.00	2.44	4.32
1300 RBME Red-breasted Merganser	1.20	.	.	.	0.12	.	.	1.52	2.08	1.32	2.00	3.28	1.31	.	0.04
1310 HOME Hooded Merganser	2.04	0.32	0.76	0.80	0.56	2.67	5.80	0.16	0.20	.	0.08	0.32	0.15	.	0.80
131a UNME unid. merganser	.	.	.	0.88	4.60	3.00	5.80	.	.	.	0.60	.	0.38	.	2.44
1320 MALL Mallard	0.60	0.20	0.32	0.28	0.28	0.56	1.20	0.08	0.08	0.04	0.16	0.12	.	.	0.60
1330 ABDU American Black Duck	29.24	12.76	17.44	20.92	20.04	27.89	44.00	16.00	21.04	13.04	12.00	13.68	10.54	7.78	26.52
133a MBDH Mallard-like Hybrid	.	.	.	.	.	.	.	.	.	.	0.04	.	.	.	.
133b BDMH Black Duck-like Hybrid	.	.	.	.	.	.	.	.	0.08	.	.	.	.	.	.
133c BLML M Black, F Mallard	.	.	.	0.16	.	.	.	.	.	.	.	.	.	.	.
133d MLBL M Mallard, F Black	0.24	0.24	0.56	0.28	0.24	0.78	0.40	.	.	.	0.08	0.08	.	.	.
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	2.56	0.56	0.16	2.44	1.72	0.67	0.80	0.08	.	.	.	.	.	.	0.48
1390 AGWT American Green-winged Teal	13.64	2.40	3.80	4.40	4.20	5.11	18.40	9.24	13.48	7.08	5.56	6.08	5.54	2.44	7.28
1400 BWTE Blue-winged Teal	2.32	1.20	0.84	1.44	1.40	0.56	3.80	.	.	.	.	.	.	.	1.68
1401 UNTE Unidentified Teal	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1420 NSHO Northern Shoveler	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1430 NOPI Northern Pintail	0.16	.	.	0.08	0.08	.	.	0.24	1.00	.	0.04	0.04	.	.	.
1440 WODU Wood Duck	0.76	0.32	1.04	2.64	4.04	1.11	2.60	.	.	.	.	.	.	.	1.20

	Total birds per 100km2															
	NS						ON								PQ	
	91	92	93	94	95	96	90	91	92	93	94	95	96	90	91
1290 COME Common Merganser	5.88	7.04	7.40	7.24	4.50	9.87	16.84	17.57	23.89	17.32	19.68	12.00	24.60	17.86	20.20
1300 RBME Red-breasted Merganser	.	.	.	.	.	1.07	0.25	0.20	0.43	1.88	0.80	0.40	0.80	0.45	0.43
1310 HOME Hooded Merganser	0.08	0.16	0.64	0.56	0.60	.	22.09	24.86	28.91	23.64	29.68	29.40	34.60	5.17	4.94
131a UNME unid. merganser	1.96	.	.	.	2.10	3.73	.	.	.	.	0.12	.	.	0.05	.
1320 MALL Mallard	0.36	0.68	0.36	0.52	0.20	.	19.57	23.27	27.98	20.48	21.36	23.20	32.60	2.87	1.59
1330 ABDU American Black Duck	31.00	42.60	28.56	31.56	32.10	56.53	18.34	24.80	25.16	22.68	21.44	21.20	25.20	27.49	22.67
133a MBDH Mallard-like Hybrid	.	.	.	.	.	.	0.05	0.16	0.48	0.28	0.16	0.10	0.60	0.07	.
133b BDMH Black Duck-like Hybrid	.	.	.	.	.	.	0.02	0.18	0.32	0.32	0.08	0.20	0.40	0.24	0.06
133c BLML M Black, F Mallard	.	.	0.16	.	.	.	0.05	0.07	0.05	0.08	.	.	.	0.02	0.04
133d MLBL M Mallard, F Black	1.12	0.52	0.12	0.88	1.10	.	0.09	0.14	0.09	.	0.48	.	0.40	0.07	0.29
133e BHML M blck-like hyb, F Mallard	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.02
133f BHBL M blck-like hyb, F Black	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
133h MHBL M mall-like hyb, F Black	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.10
1350 GADW Gadwall	.	.	.	.	.	.	.	0.02	.	.	.	.	.	.	.
1370 AMWI American Wigeon	1.48	1.72	1.40	0.80	.	.	0.50	1.07	0.80	0.64	0.40	1.50	0.80	0.24	0.17
1390 AGWT American Green-winged Teal	8.16	13.80	8.04	8.96	3.40	17.60	5.43	5.77	7.82	3.92	5.88	5.10	8.60	13.61	9.94
1400 BWTE Blue-winged Teal	2.32	2.80	1.52	1.04	0.30	3.47	6.11	5.00	6.34	1.72	1.84	1.00	3.40	0.93	0.19
1401 UNTE Unidentified Teal	0.04	.	.	.	.	.	.	.	.	.	.	0.20	.	.	.
1420 NSHO Northern Shoveler	.	.	.	.	.	.	.	0.09	0.02	0.08	.	.	.	0.02	.
1430 NOPI Northern Pintail	.	.	.	.	.	.	0.07	0.09	0.07	.	.	.	0.40	0.48	0.05
1440 WODU Wood Duck	0.84	1.92	1.84	3.64	2.10	0.53	13.09	11.84	13.82	15.00	20.28	15.40	14.80	1.06	0.46

	Total birds per 100km2											
	PQ					SUM						
	92	93	94	95	96	90	91	92	93	94	95	96
1290 COME Common Merganser	16.52	9.36	13.95	11.06	11.18	15.05	16.21	15.89	10.79	13.23	9.96	13.73
1300 RBME Red-breasted Merganser	0.27	0.88	1.02	0.33	.	0.57	0.62	0.48	1.44	1.23	0.50	0.84
1310 HOME Hooded Merganser	3.53	4.16	6.65	7.39	5.79	8.68	9.22	11.16	9.03	11.36	11.86	15.64
131a UNME unid. merganser	0.35	.	0.02	0.11	0.21	0.24	1.96	0.35	0.68	0.38	0.51	1.02
1320 MALL Mallard	4.66	8.56	3.19	3.08	6.05	6.84	7.24	9.93	10.57	7.44	9.10	14.79
1330 ABDU American Black Duck	21.65	16.78	15.91	16.56	26.36	23.60	23.42	22.37	19.83	18.01	18.58	25.77
133a MBDH Mallard-like Hybrid	.	.	.	.	0.10	0.06	0.14	0.48	0.20	0.15	0.04	0.29
133b BDMH Black Duck-like Hybrid	0.01	0.02	0.05	0.08	.	0.16	0.10	0.12	0.13	0.06	0.13	0.40
133c BLML M Black, F Mallard	0.05	.	0.05	.	.	0.03	0.05	0.05	0.10	0.05	.	.
133d MLBL M Mallard, F Black	0.07	0.12	0.28	0.22	.	0.09	0.28	0.13	0.14	0.32	0.34	0.40
133e BHML M blck-like hyb, F Mallard	.	.	.	.	.	.	0.02	.	.	.	.	.
133f BHBL M blck-like hyb, F Black	0.05	.	.	.	.	.	.	0.05	.	.	.	.
133h MHBL M mall-like hyb, F Black	0.02	.	.	.	.	.	0.10	0.02	.	.	.	.
1350 GADW Gadwall	.	.	.	.	.	.	0.02	.	.	.	.	.
1370 AMWI American Wigeon	0.06	0.16	0.47	0.19	0.77	0.44	0.53	0.39	0.55	0.53	0.67	0.78
1390 AGWT American Green-winged Teal	7.37	2.86	7.60	2.39	21.13	10.31	8.69	7.32	4.07	6.61	3.74	14.72
1400 BWTE Blue-winged Teal	0.39	0.22	0.44	0.11	0.21	2.62	1.87	2.35	0.87	0.95	0.43	1.65
1401 UNTE Unidentified Teal	.	.	.	.	.	.	0.04	.	.	.	0.20	.
1420 NSHO Northern Shoveler	0.02	.	.	.	0.10	0.02	0.09	0.02	0.08	.	.	0.10
1430 NOPI Northern Pintail	0.11	0.04	0.05	.	0.82	0.31	0.21	0.09	0.05	0.05	.	0.67
1440 WODU Wood Duck	0.40	0.32	1.09	1.94	0.97	4.92	4.14	4.82	5.35	7.41	6.18	5.55

	Total birds per 100km2														
	NB							NF							NS
	90	91	92	93	94	95	96	90	91	92	93	94	95	96	90
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	0.80	1.72	1.23	.	.
1500 RNDU Ring-necked Duck	20.00	12.00	11.52	14.88	13.92	13.78	17.80	29.12	44.72	26.56	25.80	20.36	15.23	4.67	12.60
150a UNAY unid. Aythya	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1510 COGO Common Goldeneye	3.60	5.44	1.88	1.68	2.32	0.44	3.60	21.28	18.44	11.76	12.52	10.92	11.31	5.78	.
1520 BAGO Barrow's Goldeneye	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
152a UNGO unid. goldeneye	0.24	.	.	.	.	.	.	.	.	.	.	.	.	.	3.40
1530 BUFF Bufflehead	.	.	0.04	.	.	.	.	.	0.08	.	.	.	.	.	.
1540 OLDS Oldsquaw	.	.	.	.	.	.	.	.	.	.	0.08	.	.	.	.
1550 HARD Harlequin Duck	.	.	.	.	.	.	.	.	.	.	0.16	.	0.08	.	.
1590 COEI Common Eider	0.08	.	.	1.60	.	.	.	.	.	.	.	.	.	.	7.08
1630 BLSC Black Scoter	.	.	.	.	.	.	.	.	0.12	0.16	.	.	.	.	.
1650 WWSC White-winged Scoter	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1660 SUSC Surf Scoter	0.16	.	.	.	.	.	.	3.04	3.20	2.20	2.44	2.08	0.31	2.89	.
166a USCO unid. scoter	.	.	.	.	.	.	.	.	.	.	.	0.04	.	.	1.88
168a UNDI unid. diving duck	.	.	.	.	.	.	.	.	.	.	0.08	0.20	0.46	.	.
168b UNDU unid. duck	.	0.08	.	0.16	0.16	.	.	0.04	0.08	0.20	.	.	.	0.22	0.12
1720 CAGO Canada Goose	0.16	.	.	.	.	0.89	1.00	13.44	16.84	13.76	16.96	16.04	17.54	10.00	0.32

	Total birds per 100km2														
	NS						ON							PQ	
	91	92	93	94	95	96	90	91	92	93	94	95	96	90	91
144a UNDA unid. dabbling duck	.	.	.	.	.	.	0.41	.	.	.	.	.	.	0.01	.
1460 REDH Redhead	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1480 GRSC Greater Scaup	.	.	.	.	.	.	0.36	0.05	3.11	0.24	0.04	.	.	0.14	0.54
1490 LESC Lesser Scaup	.	.	.	.	.	.	3.18	1.05	0.39	0.12	0.76	0.70	.	2.48	3.80
149a USCA unid. Scaup	.	0.36	0.64	.	.	.	2.20	0.80	2.30	.	0.20	.	.	0.20	0.04
1500 RNDU Ring-necked Duck	14.08	23.88	15.12	12.92	15.80	51.47	36.23	30.34	42.34	28.28	31.24	24.80	41.40	25.82	20.33
150a UNAY unid. Aythya	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.04
1510 COGO Common Goldeneye	1.48	2.44	1.20	.	.	.	18.32	18.64	20.02	12.64	14.40	13.70	25.80	16.82	16.77
1520 BAGO Barrow's Goldeneye	.	.	.	.	.	.	.	.	.	.	.	.	.	0.31	0.88
152a UNGO unid. goldeneye	.	.	.	.	.	.	.	.	.	.	.	.	.	0.01	0.13
1530 BUFF Bufflehead	0.32	1.08	0.28	0.24	.	.	7.07	2.98	14.05	3.92	5.48	2.50	8.60	2.54	2.31
1540 OLDS Oldsquaw	.	.	.	.	.	.	.	.	.	.	0.92	.	.	0.16	0.02
1550 HARD Harlequin Duck	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1590 COEI Common Eider	9.08	7.84	2.96	2.92	.	0.53	.	.	.	.	.	.	.	.	.
1630 BLSC Black Scoter	.	1.56	.	.	.	.	.	0.05	.	.	.	.	.	0.14	1.23
1650 WWSC White-winged Scoter	.	.	.	.	.	.	.	0.07	.	.	0.40	.	.	0.01	0.04
1660 SUSC Surf Scoter	.	0.76	.	1.16	.	.	.	0.05	0.11	.	.	.	.	1.23	1.05
166a USCO unid. scoter	0.48	.	.	0.16	.	.	.	.	.	.	.	.	.	.	0.02
168a UNDI unid. diving duck	.	.	.	.	.	.	0.25	0.41	1.30	1.44	3.28	0.60	0.20	1.04	1.08
168b UNDU unid. duck	1.00	0.12	0.08	.	3.00	.	0.45	0.14	0.27	0.12	0.12	0.10	.	.	0.07
1720 CAGO Canada Goose	0.44	1.96	0.32	0.44	0.20	2.93	3.50	2.77	3.95	2.64	4.52	2.80	1.80	18.75	13.20

	Total birds per 100km2											
	PQ					SUM						
	92	93	94	95	96	90	91	92	93	94	95	96
144a UNDA unid. dabbling duck	0.01	0.02	0.33	.	0.10	0.16	.	0.01	0.02	0.33	.	0.10
1460 REDH Redhead	.	0.04	.	.	.	.	.	.	0.04	.	.	.
1480 GRSC Greater Scaup	1.47	0.80	0.63	0.92	1.54	0.50	0.59	2.07	0.59	0.41	0.92	1.54
1490 LESC Lesser Scaup	2.20	0.54	2.79	0.14	1.74	2.47	2.42	1.54	0.39	2.04	0.35	1.74
149a USCA unid. Scaup	0.11	.	0.79	0.92	0.10	0.91	0.36	0.94	0.76	0.75	0.99	0.10
1500 RNDU Ring-necked Duck	19.57	16.02	22.88	20.83	19.23	28.01	25.99	26.07	20.39	23.54	20.59	24.71
150a UNAY unid. Aythya	0.17	.	0.02	.	.	.	0.04	0.17	.	0.02	.	.
1510 COGO Common Goldeneye	14.67	13.26	16.70	13.25	21.95	16.81	15.65	14.18	11.60	13.81	11.90	19.62
1520 BAGO Barrow's Goldeneye	0.76	1.16	0.05	0.25	0.36	0.31	0.88	0.76	1.16	0.05	0.25	0.36
152a UNGO unid. goldeneye	0.48	0.06	0.09	0.03	.	0.28	0.13	0.48	0.06	0.09	0.03	.
1530 BUFF Bufflehead	1.58	0.12	2.00	0.53	1.64	4.77	2.48	5.27	1.42	3.22	1.28	4.20
1540 OLDS Oldsquaw	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	.	0.53
1630 BLSC Black Scoter	2.39	1.60	.	0.17	0.15	0.14	0.69	1.87	1.60	.	0.17	0.15
1650 WWSC White-winged Scoter	1.08	0.32	4.91	.	.	0.01	0.05	1.08	0.30	3.25	.	.
1660 SUSC Surf Scoter	2.04	1.98	4.47	1.78	0.67	1.51	1.07	1.43	2.00	3.75	1.45	1.16
166a USCO unid. scoter	0.35	0.02	0.07	.	0.21	1.88	0.06	0.35	0.02	0.07	.	0.21
168a UNDI unid. diving duck	2.73	0.50	1.16	1.94	2.46	0.75	0.84	2.21	0.73	1.67	1.30	1.63
168b UNDU unid. duck	0.66	0.08	1.14	0.17	0.46	0.41	0.21	0.45	0.11	0.72	0.33	0.41
1720 CAGO Canada Goose	15.88	15.30	10.60	5.61	37.23	11.62	9.74	10.99	10.80	8.82	5.90	19.98

APPENDIX B

Pilot Waterfowl Breeding Population Survey Maine, and Eastern Canada

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

DATES May 1 - June 4, 1996

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

Aerial Crew			
	Crew 1	Pilot/Observer	J. R. Goldsberry, USFWS
		Observer	P. Poulos, USDA
	Crew 2	Pilot/ Observer	T. Curtis, USFWS
		Observer	L. Breton, CWS
Helicopter Crew			
		Pilot	G. Cullingford, USFWS
		Observer	P. Corr, Maine, DIF&W

ABSTRACT: The Waterfowl Breeding Population Survey, in conjunction with the Black Duck Joint Venture was conducted for the first time this year in Strata 63 (New Brunswick),64 (Nova Scotia), 65 (Prince Edward Island), 66 (Newfoundland/Island), 67 (Newfoundland/Labrador), 68 (Central and Eastern Quebec), and for only the second year in Stratum 62 (Maine). The geography for the most part was suitable to this type of survey. Those areas not suitable will be reviewed and adjustments made to strata and transects over the next few years to provide a representative survey. Fixed-wing/ Helicopter comparisons were made in Maine to provide visability corrections for various waterfowl species.

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

This is a new survey area and survey coverage can be noted in Table 1.

The crew for strata 62,63,64,65,66, and 67, had flown together on this type of survey since 1990. Both the pilot and observer in stratum 68, both had experience in conducting aerial waterfowl surveys. The helicopter pilot and the observer were very experienced in conducting aerial surveys of waterfowl from helicopters and had flown together in previous years. Transect flights in Stratum 68, were flown using a Cessna 185 amphibian aircraft, while strata 62, 63, 64, 65, 66,

and 67, were flown using Partenavia P68-TC wheeled aircraft. A Bell Jet Ranger was used for the helicopter portion of the survey. The survey was initiated on May 1,1996 and completed on June 4, 1996. Weather caused the surveys to be delayed for periods that added up to two weeks. There were only minor delays due to mechanical problems with the aircraft.

WEATHER AND HABITAT: Fall and Winter weather throughout Maine and the Maritimes was erratic. Warm rainy periods were followed by cold and snow storms followed by warming and more rain this pattern once established continued through the entire winter. Flooding occurred at many locations through the winter and into the spring. The warm trend provided for an early breakup of ice and a slightly earlier than normal spring. As an example shipping began the earliest this century into Goose Bay, Labrador. Eastern Quebec had similar weather as the maritimes. However, central Quebec had a typical cold winter with a later than a normal spring breakup. Water conditions were good to excellent over the survey area with the only problem being possible flooding of some early nesting attempts. Habitats that were completely dry during 1995 were fully recovered in 1996. There was one late snow storm that may have impacted nesting across northern New Brunswick, and into the Gaspe peninsula. Generally, conditions were good to excellent throughout most of the survey area with only central Quebec being behind schedule because of a late spring. Nesting and brood habitat conditions should remain good to excellent with plenty of water. If there are no extreme adverse weather conditions duck production should be good from this area.

Following is a brief description of the habitat found in each strata.

Stratum 62, Maine: This stratum consists of the state of Maine. The habitat is primarily mixed forest throughout, with large tracts of farm land in the northeastern section, along the St.John river. Other areas of farm land can be found in scattered throughout the central and southern areas. Small to large lakes are abundant as are rivers, and streams. Bogs and freshwater marshes can be found throughout the area. Beaver ponds are abundant. The Atlantic coast with associated coastal marshes makes up the southern boundary of the stratum. The principle land manipulation is of coarse is the forest industry , and all stages of can be found from fresh cut areas to saplings , to fully recovered forests ready to be harvested again. Most of the cities are found in the southern part of the stratum with Bangor and Portland being the largest.

Stratum 63, New Brunswick: Stratum 63 is the province of New Brunswick. This stratum is primarily mixed forest, with some farming occurring along the St. John river valley bisecting the area from north to south in western New Brunswick. The stratum is mountainous in the northwest , hilly in the west and south and flat in the central and eastern sections . The Bay of Fundy and the Northumberland Strait provide the boundrys on the south and east. The St. John river, provides a variety of waterfowl habitats along it's shores from small to large extensive fresh water marshes. Smaller rivers and streams are abundant throughout the stratum. Bogs and boggy lakes are noted in the relatively flat central area, with most of the larger lakes being found in the southwestern corner of the stratum. Beavers again are the principle natural habitat manipulator. Like stratum 62, forestry plays a major role in land use in the northern and central areas, while some farming can be found in more southern areas and along the St. John river valley.

Stratum 64, Nova Scotia: Nova Scotia is almost completely surrounded by salt water Northumberland Strait to the north, Cabot Strait to the east , Atlantic to the south, and Bay of Fundy to the west. The central section of the stratum is rolling hills of mixed forest, with some farming in the northern sections. Small rivers , streams ,and lakes are well distributed throughout the stratum. Many coastal tidal rivers are indented several miles into the interior with small marshes abundant. Beaver although present have not had a major influence on habitat. Elevations range from of course sea level to around 1, 000 feet in the interior. On the northern arm of Cape Breton Island elevations range to 2,000 feet. Major land manipulation comes from forestry industry, mining (primarily coal), and some farming.

Stratum 65, Prince Edward Island: Stratum 65 is completely surrounded by water. The stratum is also highly developed with cropland being the predominate land feature. Some limited forest land can still be found scattered around the island. The coastal area with accompanying coastal marshes is the principle waterfowl habitat of this stratum.

Stratum 66, Newfoundland: Stratum 66, is the island of Newfoundland. The stratum is bounded on the west by the Gulf of St.Lawrence, the south by the Cabot Strait, the East by the Atlantic Ocean, and the North by the Labrador Sea. The Boreal Shield with it's inherent rock base make up the sub-straight of the island. The stratum ranges from mountains in the west and northern arm to rolling plateau over the remainder of the area.. Many bays, fiords, rivers, and streams are found around the coast. The interior of the stratum is primarily coniferous forest, with extensive areas of sub arctic barrens particularly along the south half of the stratum. Large, medium, and small lakes are abundant, as are small rivers and streams. Freshwater meadows and marshes are found throughout the interior. The major land manipulation has been forestry in the interior and some farming primarily along the west coast. Most of the towns occur around the coast with only a few in the interior.

Stratum 67, Labrador/ Newfoundland: Stratum 67 is bounded on the west and south by Quebec and on the east by the Labrador Sea. The stratum is Boreal Shield with vast coniferous forests. Lake rivers and streams are found throughout the stratum. The topography is primarily rolling with extensive boggy plateaus, containing freshwater meadows and marshes, some mountainous areas are found in the center, northern and western areas of the stratum. There has been some limited habitat manipulation by forestry in the central area of the stratum. However, a major manipulation has been the development of Smallwood Reservoir and hydro electric power in the northwestern portion of the stratum at Churchill Falls.

Stratum 68, Central and Eastern Quebec: Stratum 68, is the largest stratum and extends from the north shore of the St. Lawrence River, to Lac St. Jean, to the western border with Ontario,

north to James Bay , and then east to Labrador. The stratum is primarily Boreal Shield , with extensive coniferous forests, except for farmland around Lac St. Jean, and from Val-d'OR to the Ontario border in the clay belt. Lakes of all sizes are abundant as are rivers, streams, marshes, and bogs. The eastern area of the stratum lays long the north shore of the St. Lawrence River and Gulf and ranges from a high plateau falling through incised valleys to the river. The remainder of the area is rolling hills with flat areas . There have been three major manipulations of the habitat the first and most extensive is forestry, the second is the development of reservoirs for hydro electric power, and the third farming. In addition there is also some mining development in various locations.

BREEDING POPULATION ESTIMATES: This is a new survey and no data is available for comparisons at this time. Population estimates can be seen in Table 2. Among puddle ducks the most abundant species was Black Duck (433,400) , followed by Am.Green-winged Teal (93,600), Mallard (45,800), Blue-winged Teal (30,000), Pintail (9,100) and Northern Shoveler (700). Diving duck species were representented first by Goldeneye (607,700), then Ring-necked duck (429,000), and Bufflehead (5,000). Among Miscellaneous species, Mergansers (327,400), were the most abundant, followed by Eiders (172,900), then Scoters (23,300) and Old Squaw(1,500).

CANADA GEESE: The population estimate for Canada Geese, was (663,700), this estimate includes those geese considered resident nesting geese (those nesting below 48 degrees north latitude), migrant geese nesting on the island of Newfoundland , migrant geese nesting in Labrador/Newfoundland, migrant geese nesting in the northern area of Central Quebec stratum 68, and those transient migrant geese that nest in the Ungava, whose migration was held up due to the late spring breakup in the north. The population estimates for Canada Geese area as follows, stratum 62, Maine (7,500); stratum 63, New Brunswick (5,200); stratum 64, Nova Scotia (3,800); stratum 65; Prince Edward Island (2,300); stratum 66, Island of Newfoundland (74,400); stratum 67, Labrador/Newfoundland (138,600); and stratum 68, Central and Eastern Quebec (432,000) (includes transient geese nesting in the Ungava Peninsula).

FIXED-WING /HELICOPTER COMPARISON: This was the second year of Fixed-wing / Helicopter comparisons in Maine to obtain visibility corrections for fixed-wing transect surveys. Pat Corr & Glen Cullingford completed a total of 18 comparison segments. Data from this and other comparison surveys will be reported at a later date.

CONCLUSIONS: This survey proved to be flyable, and with a few minor adjustments should provide over the long term, a very practical survey for tracking waterfowl nesting species in the eastern North America. Black Ducks proved to be the most abundant nesting puddle duck species. Mallards showed up on all of the aerial survey strata except 66, Island of Newfoundland (where several pair were actually see in un-official ground surveys). Most surprising the survey

with a few minor adjustments survey should provide an excellent tool for monitoring the maritime population of the Atlantic Canada Goose population.

Our Thanks!! goes out to those listed on this report for without there help this survey could not have been completed.

Table 1. Survey design for Maine, and Eastern Canada 1996

	STRATUM						
	62	63	64	65	66	67	68
SURVEY DESIGN							
Square miles in stratum	33,215	28,354	21,425	2,184	41,780	114,405	248,614
Square miles in sample	306	266	216	27	180	230	833
Lineaal miles in sample	1,224	1,062	864	108	720	918	3,330
Number of transects in sample	10	8	10	3	7	5	19
Number of segments in sample	68	59	48	6	40	51	185
Expansion factor	108.5458	106.7947	99.1898	80.8889	232.1111	498.4967	298.6354

This is a preliminary survey design subject to review. Data is based on information obtained from GIS.

Waterfowl Breeding Population Survey Maine and Eastern Canada

Table 2. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) by species and stratum for Maine, the Maritime provinces, and Northern Quebec.

	Stratum (1996)							
Species/Ponds	62	63	64	65	66	67	68	1996 Total
Ducks								
Dabblers								
Mallard	6.8	3.6	2.8	2.1	0.0	1.0	38.5	54.8
Am. black duck	32.4	33.8	30.3	4.7	19.5	57.6	255.1	433.4
Gadwall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Am. wigeon	0.0	1.2	2.2	0.0	0.0	0.0	0.0	3.4
Am. green-winged teal	2.1	6.3	5.9	0.0	11.3	31.0	37.1	93.6
Blue-winged teal	8.7	16.2	6.1	0.0	0.0	0.0	0.0	31.0
N. shoveler	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.7
N. pintail	0.0	0.0	0.0	0.0	1.2	7.8	0.0	9.1
Subtotal	50.0	61.8	47.3	6.8	32.0	97.4	330.6	625.9
Divers								
Redhead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canvasback	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scaups	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ring-necked duck	15.5	16.0	10.1	0.0	19.5	29.7	338.2	429.0
Goldeneyes	11.1	14.3	5.9	0.0	3.5	55.7	517.2	607.7
Bufflehead	2.8	0.0	0.0	2.2	0.0	0.0	0.0	5.0
Ruddy Duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	29.4	30.3	16.0	2.2	23.0	85.3	855.4	1041.7
Miscellaneous								
Oldsquaw	0.0	0.0	0.0	0.0	0.0	1.5	0.0	1.5
Eiders	172.9	0.0	0.0	0.0	0.0	0.0	0.0	172.9
Scoters	7.9	0.0	0.0	0.0	0.0	15.5	0.0	23.3
Mergansers	46.7	28.3	5.4	4.9	23.6	18.3	200.2	327.4
Subtotal	227.5	28.3	5.4	4.9	23.6	35.2	200.2	525.2
Total Ducks	307.0	120.4	68.6	13.9	78.6	217.9	1386.3	2192.7
Canada Goose	7.5	5.2	3.8	2.3	74.4	138.6	432.0	663.7
Am. coot	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

MICHIGAN SPRING BREEDING WATERFOWL SURVEY RESULTS

47680:00:00
YEAR - 1996

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	199,912	103,136	35,764	1417117442	532721349.1	416146997.3	338,812	2385985769	14.36	243,475	434,149
Blue-winged Teal	44,615	0	0	377868909.9	0	0	44,615	377868909.9	43.57	6,515	82,715
Wood Duck	79,136	62,162	10,820	864239270.3	1020969802	101711667.2	142,120	1986813939	31.36	54,756	229,485
Black Duck	1,476	1,166	1,936	648107.6234	509798.1083	1731632.269	4,578	2887538.001	37.12	1,248	7,909
Green-winged Teal	1,127	0	0	306011.8508	0	0	1,127	306011.8508	49.08	43	2,211
Shoveler	425	0	0	177078.1142	0	0	425	177078.1142	99.13	-490	1,249
Widgeon	4,179	0	1,043	8731241.538	0	1023445.671	5,222	9754687.209	59.81	-990	11,344
Pintail	0	0	0	0	0	0	0	0	#DIV/0!	0	0
Gadwall	0	0	555	0	0	289773.7557	555	289773.7557	96.96	-590	1,610
Canvasback	315	0	0	97381.04126	0	0	315	97381.04126	99.14	-297	926
Redhead	1,707	0	0	2863455.915	0	0	1,707	2863455.915	99.12	-1,909	5,024
Scaup	14,975	9,151	362	90709956.44	34546849.69	105563.5269	24,488	125361769.7	45.72	2,543	46,433
Ring-necked Duck	19,002	3,353	5,817	55587365.55	9542203.597	11952315.98	28,172	77081885.13	31.16	10,984	45,360
Goldeneye	5,971	0	5,646	6733666.647	0	20710254.76	11,616	27443921.41	45.10	1,349	21,884
Bufflehead	10,649	9,112	2,016	24116980.19	69265895.52	2439527.203	21,777	99841792.91	43.59	3,199	40,355
Merganser	982	11,445	5,040	246142.405	66574069.17	2674028.774	17,467	69494240.35	47.73	1,128	33,806
DUCK TOTAL	384,472	189,528	68,999	2,849,433,689	1,728,048,957	559,785,406	642,997	5,136,268,053	11.15	321,513	964,481
Coots	30,451	0	0	187355239.9	0	0	30,451	187355239.9	44.85	3,823	57,279
Canada geese	135,951	9,494	13,937	1458517910	20818742.49	46955224.25	159,382	1526091876	24.51	82,814	235,950
Swan	3,690	2,201	0	13392417.58	4844078.079	0	5,860	18236495.66	72.97	-2,510	14,231
								0	#DIV/0!	0	0
Ind. breeding pairs Canada geese (excluding groups)	46,952	6,208	3,939	190814223	9641898.038	3079548.704	57,099	143535669.7	20.98	33,617	80,581
Canada geese excluding groups and pairs without nests or broods)	22,191	5,842	909	29331871.68	9715901.202	356880.04	28,943	39404632.92	21.69	16,639	41,248

* For further information please contact Earl Flegler, Wetland Habitat Specialist, Michigan Department of Natural Resources (517) 373-9309.

APPENDIX C

.. Minnesota waterfowl breeding populations by species for Strata I-III combined, 1986-1997[1].

Species	Year											
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
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
Black Duck	55	1,440	0	0	174	56	0	0	56	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
American Wigeon	0	0	5,445	257	1,413	1,397	929	348	1,335	194	1,512	699
Green-winged Teal	229	1,800	117	639	0	404	0	810	569	0	2,170	638
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
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
Northern Pintail	3,058	1,103	4,187	1,619	1,841	3,004	1,326	2,180	1,331	575	1,154	867
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
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
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
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
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
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
Goldeneye	1,395	408	1,046	1,972	1,016	1,514	1,617	1,391	1,706	2,291	3,834	1,340
Bufflehead	117	0	56	2,676	234	885	1,944	465	1,374	56	1,439	291
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
Hooded Merganser	695	0	408	0	313	348	1,143	1,154	1,275	1,439	2,411	1,719
Large Merganser	0	0	0	0	0	56	576	0	230	174	0	56
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
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
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
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

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

* For further information please contact Jeff Lawrence, Waterfowl Staff Specialist, Minnesota Department of Natural Resources (218) 755-3910.

1997 Wisconsin Spring Duck Survey Results

Species	Population Estimate	Standard Error	Long-term (1973-96) Averages*	Test for Difference From 1996-97 Z-stat	Prob
Mallard	172,856	25,710	140.7	2.66	<0.01
BW Teal	59,373	15,564	120.3	0.45	ns
Other Ducks	149,052	30,101	101.8	2.06	<0.05
Total Ducks	381,281	-	362.8	3.10	<0.01
Canada Geese	77,211	15,978	26.5**	0.23	ns

* in thousands
** averages of 1986-96

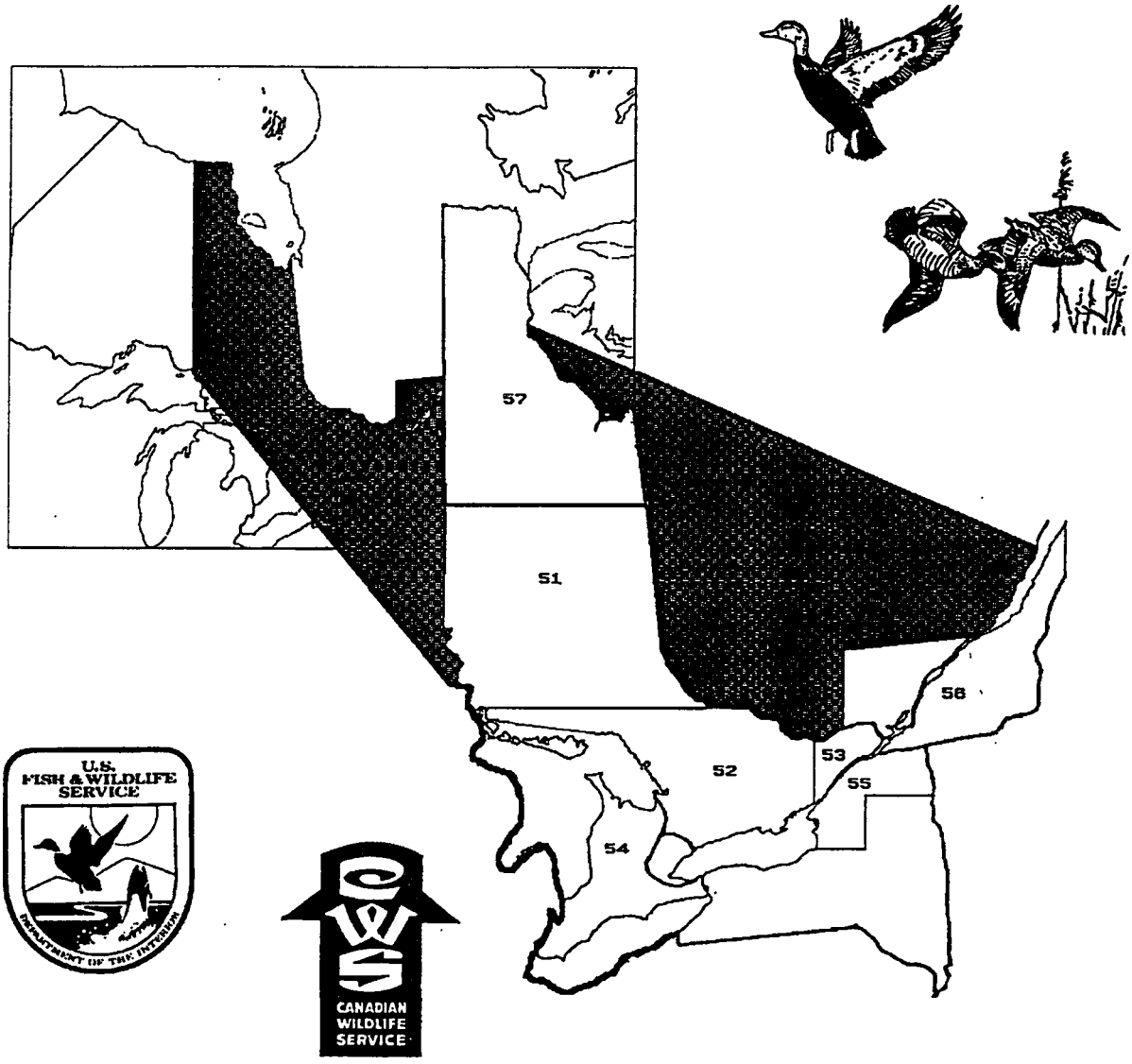
For further information please contact Jon Bergquist, Waterfowl/Wetland Ecologist, Wisconsin Department of Natural Resources (608) 266-8841.

APPENDIX D

WATERFOWL BREEDING POPULATION SURVEY

ONTARIO, QUEBEC, AND NEW YORK

MAY 1996



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 Ontario, Quebec, and New York

STRATA SURVEYED 51, 52, 53, 54, 55, 56

DATES May 1 - May 21, 1996

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

Aerial Crew		
Crew 1	Pilot/Observer	W. Butler, USFWS
	Observer	J.Wortham, USFWS
Crew 2	Pilot/Observer	J. Bredy, USFWS
	Observer	F. SMITH, USFWS
Crew 3	Pilot/Observer	J.R.Goldsberry, USFWS
	Observer	P. Poulos, USDA
Helicopter Crew		
	Pilot	G. Cullingford, USFWS
	Observer	N. NORTH, CWS

ABSTRACT

1996 was the seventh year of surveys to determine the waterfowl breeding population of eastern Ontario, southern Quebec, and northern New York. Spring was slightly delayed in this area with lots of water from spring rains and snow melt. Total duck breeding populations were up slightly from 1995 (7.5%), but were down (-8.8%) from the average of the previous six years. Canada Goose populations were down form 1995 and down from the six year average, by (-58.8%0) and (-63.2%) respectively. It is important to note that the Canada Goose count in this survey area in addition to nesting geese also includes northern migrants and may be up or down depending on the stage of migration.

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 major delays were encountered on the survey this year, however the survey strata were covered by three different aerial crews. All crews were experienced crews and at least one crew member on each crew had conducted the Aerial Waterfowl Breeding Ground Population Surveys in the past. Stratum 50 & 51 were flown by a crew 1, Strata 52,53,54 & 56, were flown by a crew 2, and stratum 55, was flown by the crew 3, who had previously flown this same area. Crew 1, used a Cessna 185 amphibian, crews 2, used a twin engine Partenavia observer model and crew 3 used the standard model of the Partenavia. A Bell 206 Jet Ranger was used to obtain Visibility corrections for crew 1 in Stratum 51. This is a continuing study of visibility bias correction for eastern survey crews ;and is the third crew to be assessed in this stratum. Data from this assessment will be report at a later date.

Survey Dates:

The survey was started on May 1,1996 and completed on May 21,1996.

WEATHER AND HABITAT

Weather:

Following the very dry conditions of last spring and summer the fall started out cool and wet in September with many areas receiving near normal or above normal amounts of precipitation. Conditions continued cool in the western and northern areas were Geraldton, Ontario received record snow falls in October. Southern areas although wet had above normal, record setting temperatures in southern Ontario and Quebec. November and December returned to seasonal temperatures with snow over the survey area, and heavy lake effect snows over much of south western Ontario and New York and southeastern Quebec. Heavy snow fell across northeastern and southwestern Ontario,southern Quebec and New York in early January. Mid-January brought mild above freezing temperatures and rain leading to heavy flooding from melting snow and ice jams in Southern Quebec. Heavy snow was again the norm through February and into the spring months of March and April with spring being delayed significantly in the northern areas and slightly in the southern regions of the survey area.

Habitat conditions:

Habitat conditions were good throughout the survey area. The spring thaw was delayed until the middle of May in Northeastern Ontario, but was only slightly delayed in southern areas. Water levels were high in all areas as compared to last year's very dry conditions

and nesting habitat was abundant. The only draw back might be some loss of early nesting attempts due to flooding of rivers and streams this was particularly true in along the Mattagami river in the Timmons, area of northeastern Ontario. Generally waterfowl should find nesting and brood habitat plentiful this year throughout the survey area.

BREEDING POPULATIONS

The data for 1996 shows a total breeding population of 1,128,200 ducks for all of northeastern, southwestern, and eastern Ontario, southern Quebec, and northern New York. This estimate is (7.5%) above 1995 but (-8.8%) below the last six year average 1990 - 1995 (see Table 1). Dabbling ducks indicated a decline of (-11.3%) from 1995 and a (-30.4%) decline from the average. With the overall decline Mallards (1.6%), Am. widgeon (129.0%), Green-winged teal (181.7%), Northern Shoveler (362.5%) and Northern pintail (12.5%) all showed increases above 1995. Am. widgeon (41.3%) and Northern shoveler (103.9%) were the only dabbling duck species to indicate a increase over the average. Diving ducks indicated a (28.0%) increase over 1995 and a (10.1%) increase over the average. Scaup (34.4%), Goldeneyes (343.1%) and Bufflehead (156.1%) showed increases over 1995 populations. Ring-necked ducks (17.1%), Goldeneyes (36.0%) and Ruddy Duck (329.3%) were the only diving duck species to show increases above the average. Miscellaneous species were above the 1995 (28.0%) and the average (39.7%) respectively. Mergansers were the only Species that was above the 1995 (30.3%) and the average (39.7%). All other miscellaneous species were below 1995 and the average. Canada Goose showed a decline from both 1996 (-58.8%) and from the average (-63.2%). Coots on the other hand showed a increase above 1995 (200.0%) and the average (131.8%).

CONCLUSIONS

Habitat conditions were good at the time of the survey and are expected to remain good throughout the brood period. Production should be good even with slightly lower numbers of some nesting species. Because of the late spring in the north some species occurred in abnormally high numbers. The contribution that these migrants will make to the total production of this area is hard to predict certainly some will stay and nest while others will most likely move north with improving conditions.

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.

	Stratum (1996)									% Change From	
Species/Ponds	51	52	53	54	55	56	1996 Total	1995 Total	1990-1995 Mean	1995	1990-1995 Mean
Ducks											
Dabblers											
Mallard	86.4	50.4	10.6	59.9	22.4	25.9	255.6	251.6	278.8	1.6%	-8.3%
Am. black duck	64.5	19.3	0.0	1.4	2.6	13.1	100.8	144.2	127.0	-30.1%	-20.6%
Gadwall	0.0	0.0	0.0	1.3	0.0	5.3	6.6	30.6	9.0	-78.4%	-26.5%
Am. wigeon	15.8	4.8	1.1	7.1	0.0	5.5	34.3	15.0	24.3	129.0%	41.3%
Am. green-winged teal	47.8	11.6	0.0	1.5	0.6	2.3	63.8	22.7	98.3	181.7%	-35.1%
Blue-winged teal	0.0	13.0	0.0	1.5	7.9	0.0	22.4	84.0	155.9	-73.3%	-85.6%
N. shoveler	0.0	0.0	0.0	1.0	0.0	1.3	2.4	0.5	1.2	362.5%	103.9%
N. pintail	0.0	0.0	0.0	0.0	0.0	1.5	1.5	1.4	5.7	12.5%	-72.9%
Subtotal	214.5	99.0	11.7	73.8	33.5	55.0	487.5	549.9	700.2	-11.3%	-30.4%
Divers											
Redhead	0.0	0.0	0.0	1.8	0.0	0.0	1.8	6.1	3.9	-69.9%	-53.5%
Canvasback	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	3.2	-100.0%	-100.0%
Scaups	0.0	2.5	0.0	14.6	0.0	1.1	18.2	13.5	27.1	34.4%	-32.9%
Ring-necked duck	192.4	19.4	0.0	9.9	3.2	0.4	225.4	250.3	192.4	-10.0%	17.1%
Goldeneyes	70.2	9.5	0.0	2.2	1.2	0.0	83.0	18.7	61.0	343.1%	36.0%
Bufflehead	26.0	27.8	0.4	7.0	0.0	1.7	62.8	24.5	76.1	156.1%	-17.4%
Ruddy Duck	0.0	0.0	0.0	12.2	0.0	0.0	12.2	0.0	2.8	--	329.3%
Subtotal	288.6	59.1	0.4	47.7	4.4	3.3	403.5	315.3	366.6	28.0%	10.1%
Miscellaneous											
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	--	-100.0%
Eiders	0.0	0.0	0.0	0.0	0.0	3.5	3.5	0.0	0.0	--	--
Scoters	0.0	0.0	0.0	0.0	0.0	0.2	0.2	5.0	6.0	-95.1%	-95.9%
Mergansers	190.2	31.5	0.8	5.1	3.3	2.7	233.5	179.2	161.5	30.3%	44.6%
Subtotal	190.2	31.5	0.8	5.1	3.3	6.4	237.2	184.2	169.8	28.8%	39.7%
Total Ducks	693.3	189.7	12.9	126.6	41.2	64.6	1128.2	1049.4	1236.6	7.5%	-8.8%
Canada Goose	13.8	10.8	48.0	32.8	17.9	13.9	137.2	332.8	373.3	-58.8%	-63.2%
Am. coot	0.0	0.0	0.0	15.6	0.0	0.0	15.6	5.2	6.7	200.0%	131.8%

Table 2. Survey design for Ontario, Quebec, and New York, May,1996

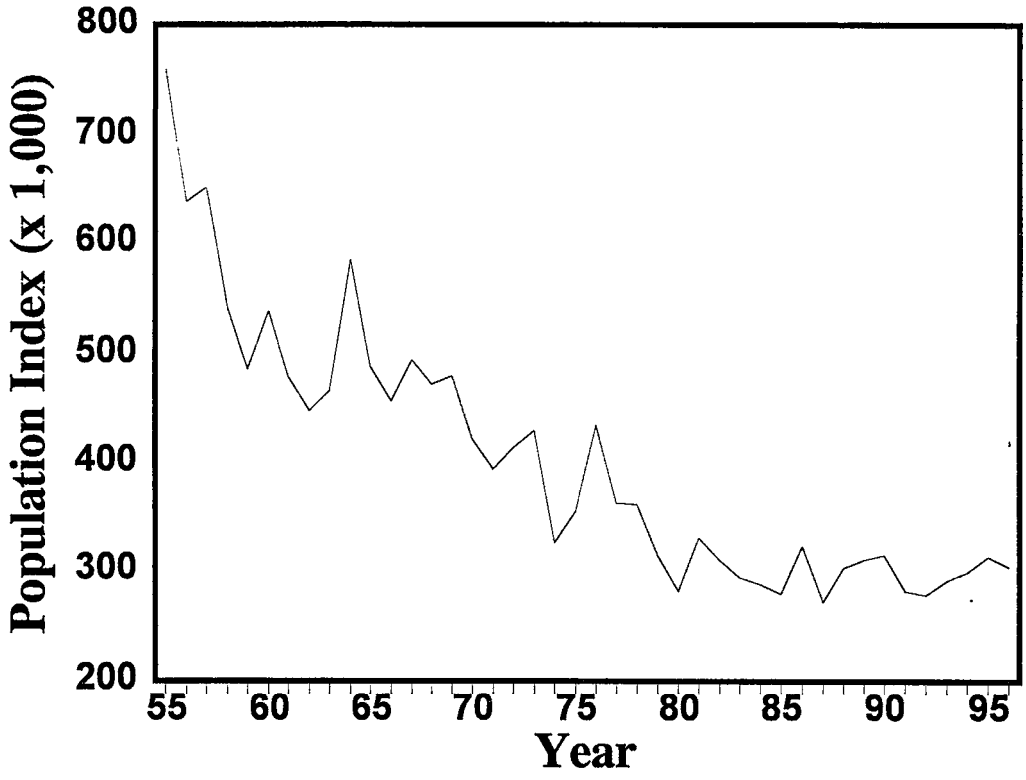
STRATUM	51	52	53	54	55	56
Survey Design						
Square miles in stratum	78,680	28,266	4,259	12,245	4,149	21,721
Square miles in sample	378	180	54	189	54	234
Lineal miles in sample	1,512	720	216	756	216	936
Number of transects in sample	6	4	4	10	5	9
Number of segments in sample	84	40	12	42	12	52
Expansion factor	208.1481	157.0333	78.8704	64.7894	76.8333	92.8248
Current Year Coverage						
Square miles in stratum	78,680	28,266	4,259	12,245	4,149	21,721
Square miles in sample	337.5	180	45	166.5.5	54	212
Lineal miles in sample	1,350	720	180	666	216	162
Number of transects in sample	6	4	4	9	5	9
Number of segments in sample	75	40	10	37	12	47
Expansion factor	233.1259	157.0333	94.64444	73.5435	76.8333	102.6998

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

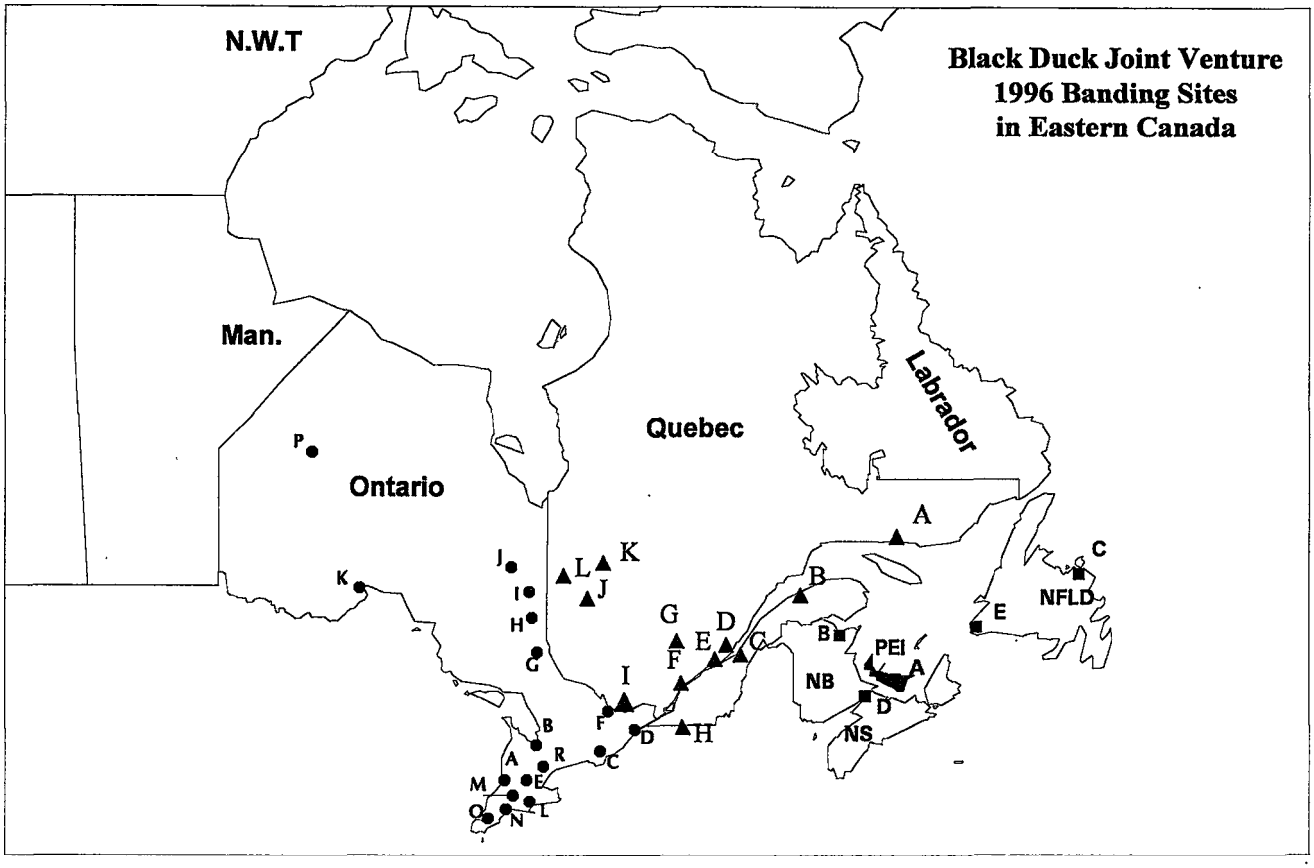
Species/Ponds	1990	1991	1992	1993	1994	1995	1996
Ducks							
Dabblers							
Mallard	176.6	216.5	361.7	334.2	332.5	251.6	255.6
Am. black duck	99.9	125.9	160.6	124.4	107.0	144.2	100.8
Gadwall	9.4	7.4	4.9	1.9	0.0	30.6	6.6
Am. wigeon	33.8	49.5	16.8	10.3	20.6	15.0	34.3
Am. green-winged teal	152.9	154.7	156.7	47.4	55.3	22.7	63.8
Blue-winged teal	186.0	60.4	91.1	400.5	113.6	84.0	22.4
N. shoveler	2.2	2.2	0.0	1.0	1.1	0.5	2.4
N. pintail	25.6	3.4	2.0	0.4	1.1	1.4	1.5
Subtotal	686.3	619.9	793.8	920.1	631.2	549.9	487.5
Divers							
Redhead	3.0	3.6	0.7	4.5	5.8	6.1	1.8
Canvasback	3.3	4.5	1.5	3.0	4.6	2.1	0.0
Scaups	37.5	14.8	28.6	19.8	48.5	13.5	18.2
Ring-necked duck	96.4	104.4	251.9	248.2	203.3	250.3	225.4
Goldeneyes	33.1	64.7	112.7	42.2	94.7	18.7	83.0
Bufflehead	144.1	135.8	85.2	18.9	48.2	24.5	62.8
Ruddy Duck	0.0	12.0	0.0	5.1	0.0	0.0	12.2
Subtotal	317.5	339.7	480.5	341.6	405.1	315.3	403.5
Miscellaneous							
Oldsquaw	10.3	0.0	0.0	3.7	0.0	0.0	0.0
Eiders			0.0	0.0	0.0	0.0	3.5
Scoters	2.2	7.3	3.0	0.0	18.3	5.0	0.2
Mergansers	87.8	126.8	175.2	165.2	235.0	179.2	233.5
Subtotal	100.2	134.1	178.2	168.9	253.3	184.2	237.2
Total Ducks	1104.1	1093.7	1452.5	1430.6	1289.6	1049.4	1128.2
Canada Goose	366.3	862.1	157.0	232.1	289.4	332.8	137.2
Am. coot	2.6	19.0	6.1	5.1	2.4	5.2	15.6

APPENDIX E

Black Duck Population Estimates
From Mid-Winter Surveys 1955-1996



APPENDIX F



Ontario

A Wingham
B Midhurst
C Napanee
D Cornwall
E Cambridge
F Pembroke
G North Bay
H Temagami
I Kirkland Lake
J Timmins
K Thunder Bay
L Long Point
M Oxford & Komoka
N Aylmer
O Lake St.Clair
P Nikip Lake
Q Mountsberg

Quebec

A Baie J. Beetz
B Rimouski/ Isle Verte
C Montmagny
D Cap Tourment
E Duchesnay/ Lac Beauport
F Lac St. Pierre
G La Tuque
H Baie Mississiquoi
I Thurso/ Hull
J Amos/ Riviere Piche
K Lac Parent
L Rouyn

Atlantic Region

A PEI
B Bathurst, NB
C Carmanville, NF
D NS/NB Border Marsh
E Codroy, NF

CWS ATLANTIC REGION BANDING REPORT

1996 Preseason Banding Report by: M.C. Bateman and R.J. Hicks

Banding Station Location: Atlantic Region

Crew Members: A. Foster, C. McAleenan, M. Bowes, D. Sears, L. Willett, J. Hudson, G. Brinson, C. Faulkner, P. Gunn, I. Walker, D. Rerguson, B. Barrow and R. Hicks.

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	**182**	**141**	**587**	**536**	**94**	**69**	**1,610**
Mallard	32	26	125	109	22	20	336
Mallard X Black Duck	8	5	15	9	1	1	39
Wood Duck	113	5	3	2	3	2	128
Northern Pintail	0	0	13	8	0	0	21
Ring-necked Duck	4	10	14	20	31	33	116
American Wigeon	0	1	10	17	24	28	80
Blue-winged Teal	37	23	107	135	21	29	355
Green-winged Teal	73	86	350	298	5	6	818
Canada Goose	282	308	6	3	3	2	606
Gadwall	0	0	1	0	15	21	37
Shoveler	0	0	6	8	2	3	19
Total							**4,166**

CWS QUÉBEC REGION BANDING REPORT

1996 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 includes birds not included in the other columns.

Species	AHYM	AHYF	HYM	HYF	LM	LF	Total
Black Duck	**397**	**185**	**366**	**300**	**30**	**47**	**1,327**
Mallard	1208	499	988	631	71	51	3449
Mallard X Black Duck	40	11	36	19	2	1	109
Wood Duck	613	73	311	208	2	14	1221
Northern Pintail	42	327	28	24	3	0	424
Ring-necked Duck	4	12	0	1	2	1	20
American Wigeon	0	1	5	2	1	1	10
Blue-winged Teal	19	20	104	134	0	0	277
Green-winged Teal	288	225	150	144	0	6	813
Gadwall	0	1	1	1	0	0	3
Shoveler	0	0	0	1	0	0	1
Total							**7,654**

Table 1. ONTARIO 1996 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
ALYMER	904	**17**	0	184	3	1	0	0	1,109
CAMBRIDGE	1391	**17**	11	76	316	17	0	17	1,845
WINGHAM	855	**9**	4	100	9	5	0	1	983
MIDHURST	583	**26**	3	2	0	16	0	33	663
NAPANEE	336	**12**	4	0	3	0	0	9	364
CORNWALL	719	**65**	6	95	3	12	3	4	907
PEMBROKE	45	**18**	0	0	0	0	0	0	63
THUNDER BAY	662	**85**	5	0	9	4	0	17	782
TIMMINS	429	**34**	1	0	35	98	12	4	613
KIRKLAND LAKE	920	**160**	17	81	24	20	1	3	1,226
TEMAGAMI	23	**140**	2	29	0	2	4	5	205
NORTH BAY	321	**52**	22	2	1	1	0	0	399
AIR BOAT	585	**148**	6	190	367	177	103	125	1,701
MOUNTSBERG, C.A	111	**0**	0	57	15	0	76	19	278
CWS-LONDON	1,915	**17**	3	44	370	79	0	22	2,450
TOTALS	9,799	**800**	84	860	1155	432	199	259	**13,588**

[1]Other includes: Cambridge: 2 pintail, 1 redhead, 2 pied-billed grebe, 12 CAGO; Wingham: 1 gadwall; Midhurst: 2 northern pintail, 5 coots & 26 CAGO; Napanee: 7 pintails & 2 lesser scaup; Cornwall: 2 pintails, 1 wigeon, 1 gadwall; Thunder Bay: 4 pintails, 3 wigeon, 1 hooded merganser, 1 horned grebe, 3 common mergansers, 6 redheads; Timmins: 1 pintail, 1 common goldeneye, 1 shoveler, 1 lesser scaup; Kirkland Lake: 1 pintail, 2 goldeneye; Temagami: 5 hooded mergansers; Mountsberg CA: 1 hooded merganser, 3 lesser scaup, 14 bufflehead, 1 pied-billed grebe; CWS London: 22 pintails.

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

1996 Preseason Banding Report by: Fred Roetker, USFWS

Banding Station Location: Nikip Lake, Ontario

Crew Members: Phil Glass (Ecological Field Services, USFWS) and Ron Hook (Office of Aircraft Services).

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	**1**	**1**	**0**	**0**	**0**	**0**	**2**
Mallard	8	8	37	26	4	0	83
Northern Pintail	0	0	3	1	0	0	4
American Wigeon	0	0	2	4	0	0	6
Blue-winged Teal	0	0	23	25	0	0	48
Green-winged Teal	3	7	30	24	2	1	67
Total							**210**

The Atlantic Flyway states banded fewer ducks in 1996 than in 1995. Total ducks banded decreased 23% (-4,888) and black ducks banding decreased 40% (-725) in 1996. Preseason Canada goose banding increased 52% (+2,268) while June Canada goose banding decreased 12% (-1,176) from 1995. State totals are as follows:

STATE	TOTAL* DUCKS		BLACK DUCKS		CANADA GOOSE		JUNE CANADA GOOSE	
	1995	1996	1995	1996	1995	1996	1995	1996
North Carolina	882	1,209	0	0	0	12	0	765
New York	6,134	4,153	168	127	852	1,167	837	529
Delaware	734	447	39	46	0	6	0	0
Maine	1,146	560	620	343	0	0	0	0
Pennsylvania	4,524	3,774	89	56	29	785	1,482	1,407
New Jersey	975	820	152	14	777	1,381	2,694	3,041
South Carolina	558	731	0	0	0	151	641	0
Maryland	1,923	731	381	252	964	0	580	0
Florida	1,235	930	0	0	0	0	0	0
Georgia	266	76	0	0	0	0	378	120
Virginia	245	48	77	38	706	838	1,205	1,534
Connecticut	88	0	7	0	349	832	422	381
Massachusetts	1,236	1,376	188	154	545	1,165	1,040	493
Vermont	690	874	55	21	110	150	0	0
New Hampshire	274	294	24	24	55	125	537	307
West Virginia	27	26	0	0	0	43	0	0
Rhode Island	0	0	0	0	0	0	0	0
Total	20,937	16,049	1,800	1,075	4,387	6,655	9,816	8,640

***Total ducks includes black ducks**

APPENDIX G

Black Duck Joint Venture Research
Annual Progress Report 1996

Project Title: An evaluation of visibility bias of waterfowl broods using helicopters on beaver pond habitat in eastern Ontario.

Investigators: T. Shane Gabor, Research Biologist (IWWR of DUC), Henry R. Murkin, Research Scientist(IWWR of DUC) and Jerry Longcore (Northeast Research Group, NBS).

Objectives: The objectives of this study are:

1. to determine the reliability of helicopter brood counts for different species on forested beaver pond habitats in eastern Ontario;
2. to develop vision correction factors (VCFs) for waterfowl broods on different beaver pond wetland classes;
3. to determine if the visibility bias can be decreased by using multiple helicopter surveys and;
4. to determine the behaviour of females with broods during survey of each technique.

General Description of the Study: The study was conducted on the Beaver Pond Management Assessment site in eastern Ontario. Mornimg brood observations, conducted from elevated platforms, were compared to 2 helicopter brood surveys to establish VCFs and determine efficiency of helicopter brood surveys in forested beaver pond habitat. Fifty-seven wetlands were surveyed and VCFs were developed for waterfowl broods on individual habitat types. As well, behaviour of females with broods were determined by ground observations to determine the effects of helicopter disturbance.

Report on Progress: Of the broods observed from the ground, hooded mergansers, mallards and wood ducks made up 63, 22 and 16% of the total broods observed. Overall, sightability and VCFs for aerial and ground surveys were similar to other surveys conducted by Ducks Unlimited (unpubl. data) on Manitoba and New Brunswick wetlands where aerial observers saw approximately 70% of the estimated number of broods yielding a VCF of 1.43. There was a trend for lower sightability of all brood species combined on forested and scrub-shrub wetlands. This suggests that broods can move quickly to cover when threatened and therefore may be able to conceal themselves more readily on these wetland types.

The improvement in the VCF by adding a second helicopter survey was minimal (from 1.78 to 1.60). As well, the VCF developed by using repeated helicopter surveys resulted in higher VCFs (2.05) than when a single helicoter survey (1.78) was used. Due to the significant cost associated with conducting a second helicopter survey we do not recommend employing additional helicopter surveys to increase the accuracy of the data.

When broods were observed by helicopters during our study, >80% were correctly aged and >90% were correctly enumerated. As well, only 1 brood was misidentified indicating that if broods are present on habitats where they are readily detectable that helicopters can be used to provide accurate information on species, age and number of ducklings.

The helicopter crew located 79% and 43% of the single and multiple (>1) broods observed by the ground crews, respectively suggesting that the sightability of multiple broods is lower than when single broods are present. When multiple broods are present on a wetland the time required to survey the entire wetland increases and consequently, broods have additional time to move to cover.

In general, the effect of the helicopter on normal brood behaviour and activity appears to be of short duration. When broods scattered in response to the helicopter they quickly regrouped (< 7 minutes) and resumed normal activities such as feeding or resting.

Partners: Black Duck Joint Venture (BDJV)
Ducks Unlimited Canada (DUC)
Institute for Wetland and Waterfowl Research (IWWR)
National Biological Service- Northeast Research Group (NBS-NERG)
Ontario Ministry of Natural Resources (OMNR)
Canadian Wildlife Service (CWS)

Funding Received to date:		
	BDJV 1993-96	$ 39,000 ($30,000 for BMP Assessment)
	IWWR/ DUC 1993-96	$ 254, 011 (for BMP Assessment)
	OMNR 1995	$ 10,000 (for BMP Assessment)
	CWS	$ 40,000 (for BMP Assessment)

Start Date: June 1, 1995; March 1, 1993 (for BMP Assessment).
End Date: October 31, 1995; December 31, 1997 (for BMP Assessment).

Annual Progress Report 1996

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

Investigators: J. Bruce Pollard (IWWR), Keith McAloney (DUC) & Andrew MacInnis (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 included habitat-specific productivity and species-specific habitat selection. Additional non-waterfowl objectives included documenting of multi-species benefits of wetland development and management.

General Description of the Study: Intensive breeding pair and brood surveys were conducted on a 250 km^2 landscape surrounding a recently developed wetland complex (BelleIsle Marsh). Breeding effort and production were monitored over a four year post-development period, initiated in 1991 and continued for a four year period following wetland construction (1993-1996). Wetland-specific data on pair and brood use, and apparent brood success provide information directly relevant to stated BDJV priorities. Impacts to passerine, wetland-obligate, upland game bird and furbearer populations were also assessed.

Report on Progress: Comprehensive pre-development waterfowl IBP and brood data collected in 1991/92 indicated relatively little variation in these parameters in the two years. Pre-impoundment (baseline) data for other species were also collected in 1991/92. While provincial black duck breeding pair densities have increased slightly in recent years, the average annual growth rate of black duck IBP densities on the study area differed significantly from reference area data, demonstrating increases of roughly 20% *per annum* for the period 1993-1996. Black duck brood production for the study area more than doubled over pre-impoundment levels by the end of 1996. Redistribution of waterfowl broods has occurred from apparent low quality wetland habitat in agricultural zones of the study area, though increases in brood production on the newly created wetlands has more than offset any declines in brood use of these sites. No reductions in brood use of forested wetlands in the study area have been noted to date. Mean brood size estimates for managed and non-managed wetlands within the study area indicate that duckling survival on managed sites is greater than that seen on non-managed sites. Several waterfowl species (American wigeon, gadwall, ring-necked duck, Canada goose) not present beforehand have been recorded as breeding on the site following impoundment development.

Partners:
Black Duck Joint Venture (BDJV)
Human Resources Development Canada (HRDC)
Canadian Wildlife Service (CWS)
Ducks Unlimited Canada (DUC)
Institute for Wetland and Waterfowl Research (IWWR)
Eastern Habitat Joint Venture (EHJV)
New Brunswick Department of Natural Resources and Energy
National Biological Service- Northeast Research Group (NBS-NERG)
Nova Scotia Department of Natural Resources (NS DNR).

Funding Received in 1994/95 and Previous Years (includes allowance for principle investigators time):

1991/95: IWWR/DUC: $148 900 (+ Technical Assistance)
BDJV: $40 400
EHJV: $22 250
CWS: $82 500 (+ Technical Assistance)
NS DNR: $28 825 (+ Technical Assistance)
HRDC: $2 500
NB DNR & E: Techniclal Assistance
NBS-NERG: Technical Assistance

1996/97: IWWR/DUC: $ 55 462 (+ Technical Assistance)
BDJV: $15 000
EHJV: $8 000
CWS: $ Technical Assistance
NS DNR: $1 250 (+ Technical Assistance)
HRDC: $1 600
NBS-NERG: Technical Assistance

Start Date: April 1993 (post-development phase)
Ending Date: November 1997 (field program); 1998 (data analysis and report preparation)

Annual Progress Report 1996

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

Investigator: 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 planing 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 balck 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 a the neighbouring Le Bras River watershed in 1995. From 1994 to 1996, decoy traps were used to capture 53 females (26 balck ducks and 27 mallards), which initiated 53 nests. Two additional black duck nests were found during searches in peatlands.

Nesting success is near 22% for black ducks, and 15% for mallards. But most successful black duck nests are located in the small peatlands where predators are less active or efficient. If nests located in these bogs are excluded, nesting success of black ducks nesting in the agricultural landscape is of only 12%. No significant differences were obtained between species. Overall, hen success was 35% (90% CI = 24-47%, $n = 45$) and similar among years ($\chi^2 = 1{,}01$, df = 2, $P = 0{,}621$). The proportion of marked females successful at hatching a clutch was also similar ($\chi^2 = 0{,}15$, df = 1, $P = 0{,}702$) for black ducks (40%, 90% CI = 22-58%, $n = 20$) and for mallards (32%, 90% CI = 17-47%, $n = 25$). Nesting effort was estimated at 1,8 nests/black duck female and 2,1 nests/mallard female. When nests initiated in peatlands are excluded, black duck nesting effort is reduced to 1,1 nest/female.

Detailed analysis for habitat selection and comparisons of success between habitats are planned for fall 1997.

Partners: Ministère de l'Environnement et de la Faune (MEF)
St. Lawrence Action Plan
Black Duck Joint Venture (BDJV)

Funding received in previous years:

1992-1993	15,000 $	(MEF)
1993-1994	33,000 $	(MEF)
1994-1995	13,000 $	(MEF)
1995-1996	18,000 $	(MEF)
	5,500 $	(BDJV)
1996-1997	18,000$	(MEF)
	5,500$	(BDJV)

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

Start date: April 1992

Ending date: 1996 (field work)
1997-1998 (data analysis and report preparation)

Annual Progress Report 1996

Project Title: Survival of juvenile male and female black ducks during staging and migration to the Atlantic Coast wintering areas

Investigators: Jerry R. Longcore, Daniel G. McAuley

Objective: To determine survival and habitat use by black ducks and mallards during staging and migration form Québec, Nova Scotia, and Vermont to mid-Atlantic wintering areas.

General Description of the Study: The project employed telemetry to document black duck mortalities from all causes at 3 locations (Québec, Nova Scotia, Vermont/Quebec border) over 2 years in conjunction with the Canadian Wildlife Service and Provincial fish and wildlife agencies, and to determine Kaplan-Meier survival estimates by location, sex and age classes.

Report on Progress: Co-authors are completing final review of a manuscript, which will be submitted for publication in June, 1997. Key finding were as follows. Eighty-six percent of all known mortality was associated with hunting. Seventy-two percent of the black ducks were shot and retrieved and 14% were crippled by hunters and not retrieved. The highest survival rage (0.63) was at the most remote location (Escoumins, PQ) and survival was related to habitat use. The lowest period survival rates were 0.15 to 0.36 at the Vermont/Quebec border where a "firing-line" effect might have affected survival. Early and substantial harvest of staging black ducks, which was been considered additive by Canadian researchers in the 1970s, still occurs on the breeding grounds along the St. Lawrence estuary.

Partners: Canadian Wildlife Service, Atlantic and Québec Regions
University of Québec at Montreal
Office of Migratory Bird Management, US Fish & Wildlife Service

Funding Received to date: Part of total RWO funding ($432,508), which began in 1990. FY96 funding US: $38,200.

Start Date: FY90
End Date: FY98

Annual Progress Report 1996

Project Title: Breeding ecology of the American black duck (Anas rubripes) on Bloodsworth, South Marsh, and Smith Islands, Chesapeake Bay.

Investigators: G. M. Haramis and D. G. Jorde, U.S. Geological Survey, Patuxent Wildlife Research Center, Laurel, Maryland 20708

Objective: Determine the breeding productivity and principal ecological relationships of nesting American black ducks on island saltmarsh habitats of mid Chesapeake Bay.

General Description of the Study: An initiative by the Department of Defense (U.S. Navy) to include its 5,400 acre Bloodsworth Island Shore and Bombardment Range under cooperative management by the North American Waterfowl Management Plan has resulted in our participation to conduct research on the breeding ecology of the American black duck in the Bloodsworth archipelago. This series of 3 large, offshore islands remains some of the most valuable wild lands and wildlife habitat in the Chesapeake Bay, and is one of the last strongholds for a formerly large southern breeding black duck population endemic to the Chesapeake Bay. Island nesting black ducks have never been studied at this location and few management guidelines are available. Because of live ordinance on Bloodsworth Island, comparative study of black ducks was conducted in 1995 and 1996 on Martin National Wildlife Refuge on Smith Island.

Report on Progress: We marked 56 females and 10 male black ducks during the 2-year study with 20-g implant, radio transmitters. Individuals were tracked throughout the breeding season to locate nests and to determine nest fate, period survival of adult females, and habitat use by broods. Analyses of data and preparation of a final report are underway. A pilot study investigating movements of red foxes (Vulpes vulpes) was initiated in 1996 and GIS mapping of the island is in progress through support from the Navy and the University of Maryland. In addition, a 12-year summary and analysis of black duck and mallard (Anas platyrhynchos) bandings in the region has been completed.

Partners: Department of Defense - Navy, Blackwater National Wildlife Refuge, Maryland Department of Natural Resources, and the University of Maryland.

Funding Received to Date: FY96 funding US: $107,800 ($27,000 reimbursable from U.S. Navy).

Start Date: October 1994

End Date: October 1997

Annual Progress Report 1996

Project Title: Landscape-level determinants of the distribution and abundance of black ducks wintering in habitats along the Atlantic coast.

Investigators: Dennis G. Jorde; Jerry R. Longcore

Objective: To determine landscape level changes in habitat used by black ducks wintering in the Atlantic Flyway with a primary focus on coastal wintering areas, but will include inland sites (e.g.. Reservoirs, lakes) were black ducks previously and currently concentrate in large numbers (e.g. >10% of the Atlantic Flyway population).

General Description of the Study: The project is focused on assembling, examining and interpreting existing data on black duck populations and Atlantic Coast habitats collected by federal and state agencies during mid-winter inventories and at other times.

Report on Progress: Midwinter Waterfowl Survey zones and segments have been digitized and preliminary maps have been distributed to State and Canadian representatives of the Atlantic Flyway Council; final MWS maps will probably be completed by summer, 1997.

Midwinter Waterfowl Survey data for 1955 - 1995 for black ducks has been verified for Maryland and New Jersey; data from 1955 - 1972 for Delaware, Maine, Massachusetts, New York, North Carolina, and Virginia will probably be entered in the computer and verified by summer, 1997.

Maryland was selected as a test State to intensively search for availability of wetland databases and to analyze for changes in black duck numbers and distribution in relation to habitat changes; this effort probably will be completed in 1997. Additional estuarine habitat data have been obtained from New Jersey and Connecticut. Identification of sources of estuarine habitat data for other Atlantic Flyway States is in progress; digitizing and analyses will continue into 1998.

Funding Received to date: FY96 funding US: $33,400.

Start Date: FY96
End Date: FY99

Annual Progress Report 1996

Project Title: Productivity of sympatrically breeding black ducks and mallards on wetlands of forested and agricultural landscapes in Maine. (Includes data on behavioral interactions of these species)

Investigators: Jerry R. Longcore, Daniel G. McAuley

Objective: (a) To determine if brood sizes of sympatric black ducks and mallards are different from each other on wetlands where they occur together in forested and agricultural wetlands, and (b) to determine if either species is behaviorally dominant over the other in competing for wetlands and females.

General Description of the Study: Previous researchers have hypothesized that hybridization and competitive exclusion were the primary causes of the decline of the American black duck. It was speculated that mallards forced black ducks from fertile wetlands onto less fertile wetlands where fewer young were produced. Our work during 1992 and 1993 evaluated the null hypothesis that black ducks and mallards produced equal brood sizes. Regarding competitive exclusion, we observed sympatric populations of black ducks and mallards during 1993 and 1994 in Maine during breeding to document behavior and interactions between black ducks and mallards.

Report on Progress: Two manuscripts were prepared on this work; one has been accepted by the JWM and the other is still in review. Basic findings were that mean ± SE brood size of black ducks (3.94 ± 0.22) and mallards (3.96 ± 0.35) in 1993, and brood sizes of black ducks (4.57 ± 0.62) and mallards (5.00 ± 0.43) in 1994 were not different ($P = 0.77$) from each other either year. Of the competitive interactions, black ducks won 87%, lost none, and were ignored during 13% of the interactions they initiated, whereas mallards won 63%, lost 15%, and were ignored 22% of the interactions they initiated. These findings contradict earlier speculations that competitive exclusion was responsible for the long-term decline of the black duck population.

Partners: Maine Department of Inland Fisheries and Wildlife

Funding Received to date: Part of total RWO funding ($432,508), which began in 1990. FY96 funding US: $142,800.

Start Date: FY90
End Date: FY98

Annual Progress Report 1996

Project Title: An evaluation of visibility bias of waterfowl broods from helicopters over beaver pond habitat in eastern Ontario.

Investigators: Jerry R. Longcore, Daniel G. McAuley

Objective: (a) To determine the reliability of helicopters in counting waterfowl broods in forested wetlands of Nova Scotia and Ontario, and (b) to assess behavior of broods in response to the helicopter over the wetland.

General Description of the Study: Although helicopter surveys for breeding pairs produce results similar to those of ground surveys, the results for broods is not as reliable. To determine the reliability of helicopter surveys in detecting broods simultaneous ground and helicopter counts were conducted in Nova Scotia and Ontario.

Report on Progress: Manuscripts are being prepared by cooperators with the Institute for Waterfowl and Wetland Research, Ducks Unlimited. Preliminary review of data suggests that helicopters miss about 45-50% of the broods and 40-50% of the ducklings compared with observations from elevated platforms. Visibility of broods is different amount species.

Partners: Institute for Waterfowl and Wetland Research, Ducks Unlimited. (Bruce Pollard, T. Shane Gabor)

Funding Received to date: Part of total RWO funding ($432,508), which began in 1990. FY96 funding US: $15,000.

Start Date: FY90
End Date: FY98