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P. O. BOX 1590  
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**Canada Goose Breeding Ground Survey**

**Labrador 1994**

**M.C. Bateman  
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### Abstract

A survey for breeding Canada Geese was flown in Labrador and Quebec, June 1 to 15, 1994. Transects totalling 7714 km (6754 km in Labrador and 960 km in Quebec) were flown with a fixed-wing aircraft. Based on this survey an estimated 28000 (Standard Error = SE = 4200) pairs of Canada Geese breed in Labrador. Few geese breed outside the surveyed area.

Comparison of the estimated number of pairs of geese in Labrador in 1994 with the estimated breeding population in 1993 indicated no change (28 000 SE4200 pairs compared to 27 000 SE3500 pairs;  $P>0.05$ ). The estimated number of geese (breeders and non-breeders) in Labrador in 1994 was higher than in 1993 (95 800 SE14400 compared to 53 800 SE8600;  $P<0.05$ ).

Transects 1 to 15 sampled the area surveyed by the same method in 1980 and 1993. Comparison of the 1994 results with the results from 1993 and 1980 indicated fewer breeding pairs in 1994 (but not significantly fewer  $P=0.5$  for 1993 and 1994 comparison), more total geese than in 1993 ( $p<0.05$ ) and numerically fewer geese than in 1980.

## **Introduction**

The migrant portion of the Atlantic Flyway Canada Goose population is declining as evidenced by a decreasing Midwinter Index in the US since the mid-1980's (Serie 1993). Although indexes from wintering birds in the Atlantic flyway states are influenced by the resident population, accumulating data suggest a significant decrease in the number of migrants wintering south from the mid-Atlantic states. To address this problem some states reduced their harvest in 1988 and changes to reduce the harvest were made in regulations of all Atlantic flyway states in 1992. In 1994, Canada Goose harvest regulations were changed in eastern Ontario and Quebec in order to reduce harvest on the birds migrating through those provinces.

Information available for the Atlantic Flyway Canada Geese include harvest estimates, age ratios in the harvest, midwinter indices, band recoveries and survival rates. Analysis of this information is complicated by the presence of different populations or subpopulations on the wintering grounds. The summer population of resident birds in the Atlantic Flyway may approach 600 000 (preliminary data presented at the At. Fly. Tech. Section July 1993), whereas the Atlantic Province birds may make up 15 percent of the migrants.

Consistent breeding ground surveys to monitor the subarctic-nesting migrants are conspicuously lacking. Early surveys by Chamberlain and Kazinski (1965) and Gillespie and Wetmore (1974) provided distribution information but the data were not precise enough for monitoring purposes.

In 1980, Goudie and Whitman (1987) estimated 22000 breeding pairs of Canada Geese in Labrador. As many as 5000 pairs of Canada Geese may breed on insular Newfoundland (Goudie 1987). In 1988, Malecki and Trost (1990) estimated a breeding population of 157 000 pairs in northern Quebec. Breeding ground surveys in northern Quebec in 1993 and 1994 estimated 91 000 and 40 000 breeding pairs, respectively. Although the number of pairs estimated in 1994 was less than in 1993, the estimated number of birds did not differ between years (Harvey 1994). A survey in Labrador in 1993 indicated no change in the number of breeding pairs compared to the 1980 survey,

but fewer total geese (Bateman 1993).

The Department of National Defence and the native people of Labrador have concerns about possible impacts of low level flying on breeding waterfowl populations in Labrador. The Wildlife Avoidance Programs of the Department of National Defence require information on distribution and densities of breeding geese. The survey flown in 1993 to collect this information was duplicated in 1994. This report presents the results from the 1994 survey in Labrador.

#### Acknowledgements

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## Methods

The 1994 survey was designed to repeat the 1993 survey and to survey some additional parts of the Low Level Flying Area. The techniques were the same as those used for the fixed-wing transect survey flown in southeast Labrador in 1980 (Goudie and Whitman 1987). The north-south transects followed the 0° and 30' longitude lines. Transects 1 to 9 and 17 to 24 were from the coast or the Quebec border in the south to the coast, the Quebec border or the 55° latitude in the north ; transects 9 to 16 were from 51° latitude in the south to 55° latitude (transects 9,10,11) or to 56° (transects 14,15,16) or were not completed because of weather (transects 12, 13) (Figure 1). Twenty four transects totalling 7714 km were flown between 1 June and 15 June 1994 (6754 km of those transects were in Labrador and 960 km were in Quebec).

The survey was flown in a Cessna 206 on wheels (Labrador Travel Air) with a pilot, a navigator/observer and one observer. Locations of all observations of Canada Geese were mapped on 1:250 000 National Topographic Series maps. Navigation was assisted by the use of a Geographical Positioning System. The transects were flown at ground speeds of 120-130 km/hour and an altitude of about 30 meters agl. Aircraft struts were marked for transect widths of 200 m (100 m each side).

The data were compiled by Ecological (biophysical) Land Units (Lands Directorate, Environmental Management Service, Canada Dept. of Fisheries & Environment 1977) (Appendix I), and for the complete survey. Transects 1 to 15 covered the area surveyed by the same methods in 1980 and were analyzed separately for comparison to results from that survey and from those transects on the 1993 survey.

A single Canada Goose or two geese together were considered an indicated pair. A lone bird in most cases would have had a mate on a nest in the immediate area at that time of year. Groups of more than two birds were considered to be non-breeders.

## **Results and Discussion**

Timing of the survey (June 1 to 15, 1994) was judged appropriate for breeding geese. All bogs and ponds were snow and ice-free. Large bodies of water, such as the Smallwood Reservoir, had significant ice cover remaining. Although nesting chronology can vary from year to year depending on weather conditions, early June generally corresponds to nest initiation for geese in Labrador.

The estimated 1994 breeding population of Canada Geese in the surveyed portion of Labrador (247,000 km<sup>2</sup>) was 14,000 (SE 2100) without adjusting for visibility (Table 1). Comparison of the fixed-wing results with results from a helicopter survey in Labrador suggests that a visibility correction of 2 is conservative (Bateman 1993). Using a visibility correction of 2x, the estimated breeding population for Labrador is 28,000 (SE 4200).

Fixed-wing transect surveys carried out in southeastern Labrador in 1980 (Goudie and Whitman 1987) covered only the area surveyed by transects 1 to 15 in 1993 and 1994. Comparison of results from the 1994 transects 1 to 15 with the 1980 and 1993 results indicated no statistical difference ( $P=0.5$ ) in the number of breeding pairs of geese observed even though fewer pairs were observed on the 1994 survey (Table 2). The total number of geese observed in 1994 was significantly more than was recorded in 1993 ( $P<0.05$ ) but numerically less than recorded in 1980.

The proportion of non-breeding geese is an indication of the well-being of the population. In 1993, the total number of geese observed was approximately double the number of indicated pairs and in 1980 and 1994 the total number of geese was 4-5 times the number of indicated pairs. Data from six 10 km x 10 km Black Duck Joint Venture blocks in southeastern Labrador in 1990 also showed a total number of geese about double the number of indicated pairs (Goudie unpub. data). As well, results from helicopter surveyed plots in western Labrador in 1992 showed total numbers approximately 2 to 3 times the number of indicated pairs (CWS unpublished data). Previous surveys in Labrador (Gillespie and Wetmore 1974) in 1970, 1971, 1972 reported totals for Canada Geese 3 to 4 times the number of pairs. The number of Canada Geese on six 100 km<sup>2</sup> plots surveyed by

helicopter in 1994 was less than 2 times the number of indicated pairs. The helicopter plots were surveyed at the same time as the transects in 1994 but differences may result from different areas surveyed.

Possible reasons for these differences in number of (assumed) non-breeding birds relative to breeding pairs include different proportions of subadults and a different distribution of non-breeders. Gillespie and Wetmore (1974) reported an influx of non-breeding geese after the breeding pair survey in 1970. Few non-breeding birds (sub-adults) in 1993 suggests that production may have been low in previous years. This agrees with the age ratios from the Species Composition Survey. Managers should be aware that low representation of those age cohorts in the population may affect the number of breeding birds in future years as those age classes mature. The high number of apparently non-breeding birds in the 1994 results suggests high production in the 1993 year and good survival over winter.

Canada Geese were not uniformly distributed over the survey area (Figure 2). Overall the density of geese observed inside the low level flying zones (5.3 indicated pairs per 100 km<sup>2</sup> and 19.1 birds per 100 km<sup>2</sup>) was not different from the same ecoregions outside the zones (5.7 indicated pairs per 100 km<sup>2</sup> and 18.6 birds per 100 km<sup>2</sup>).

The 960 km of transect in Quebec (Figure 1) resulted in observations of 6 indicated pairs and 16 birds. The calculated densities are 3.1 indicated pairs per 100 km<sup>2</sup> and 8.1 birds per 100 km<sup>2</sup>.

## Summary

- 1) A Canada Goose survey was flown in Labrador June 1 to 15 1994 using fixed-wing aircraft and north-south transects at intervals of 30' of longitude.
- 2) The density of indicated pairs of Canada Geese in the surveyed area in 1994 did not differ from the number recorded on the 1993 survey (5.5 indicated pairs per 100 km<sup>2</sup> compared to 5.7). The total number of geese was significantly higher than on the 1993 survey (19.4 geese per 100 km<sup>2</sup> compared to 10.9).
- 3) The estimate of the breeding Canada Goose population in Labrador from the results of that survey (using a visibility correction of 2x) was 28,000 (SE 4200) pairs.
- 4) Comparison of the results from transects 1 to 15 in 1994 with results from fixed-wing transects in the same area in 1993 and in 1980 indicated no change in breeding pairs in 1994 ( $p=0.5$  for 1993 and 1994 comparison), more total geese than in 1993 ( $p<0.05$  for 1993 and 1994 comparison) and numerically fewer geese than in 1980.
- 5) The high number of geese observed in 1994 compared to 1993 suggests that 1993 was a good production year and overwinter survival was good.
- 6) The areas of highest densities of observed geese were in the southeast (St. Paul, Eagle Rivers) and southwest (Atikonak Lake, Domagaya Lake).



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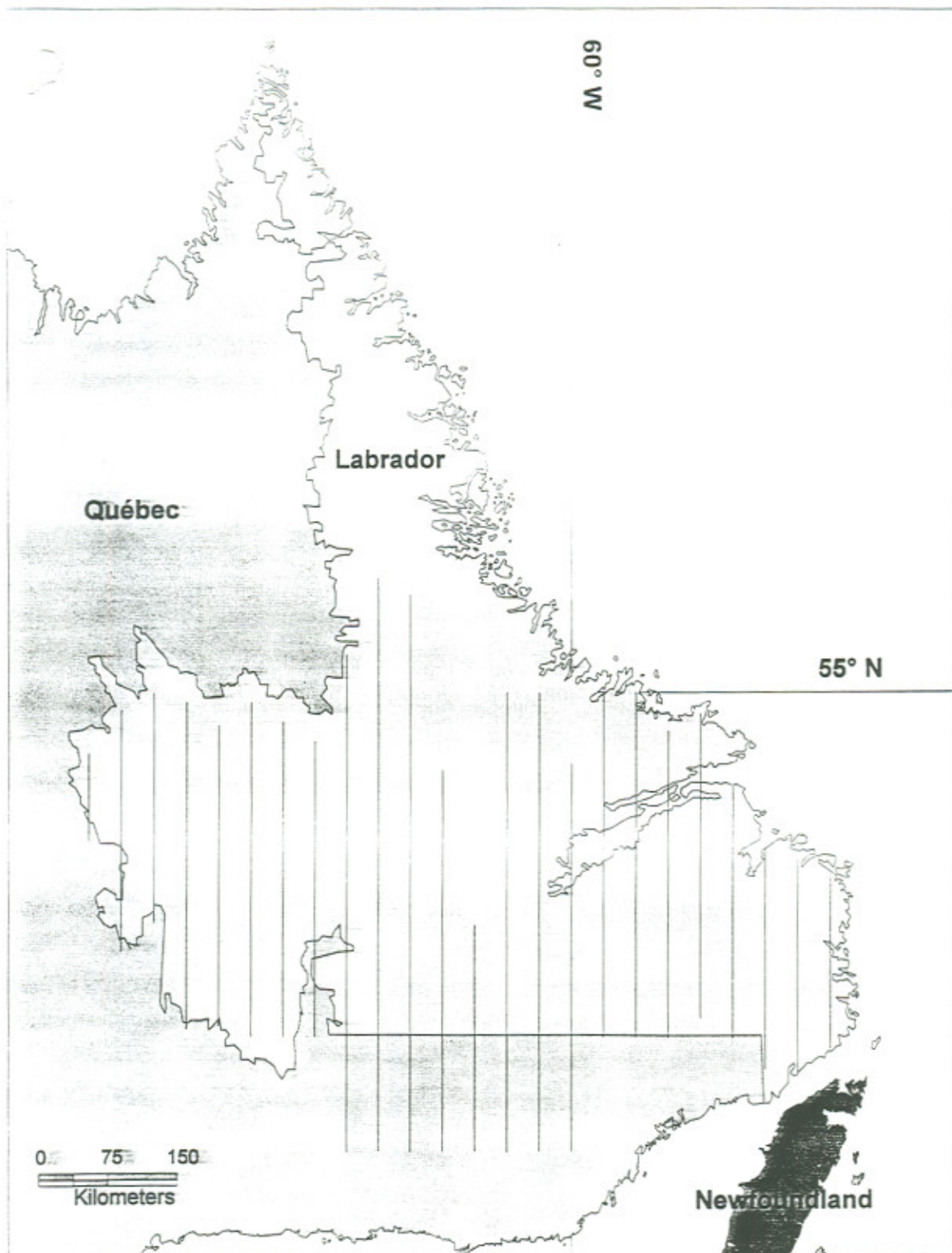


Figure 1. Approximate locations of north-south transects flown with a fixed-wing aircraft on a Canada Goose survey of Labrador and part of Quebec June 1-15, 1994. The transects are 30' longitude apart on the degree and 30' lines.

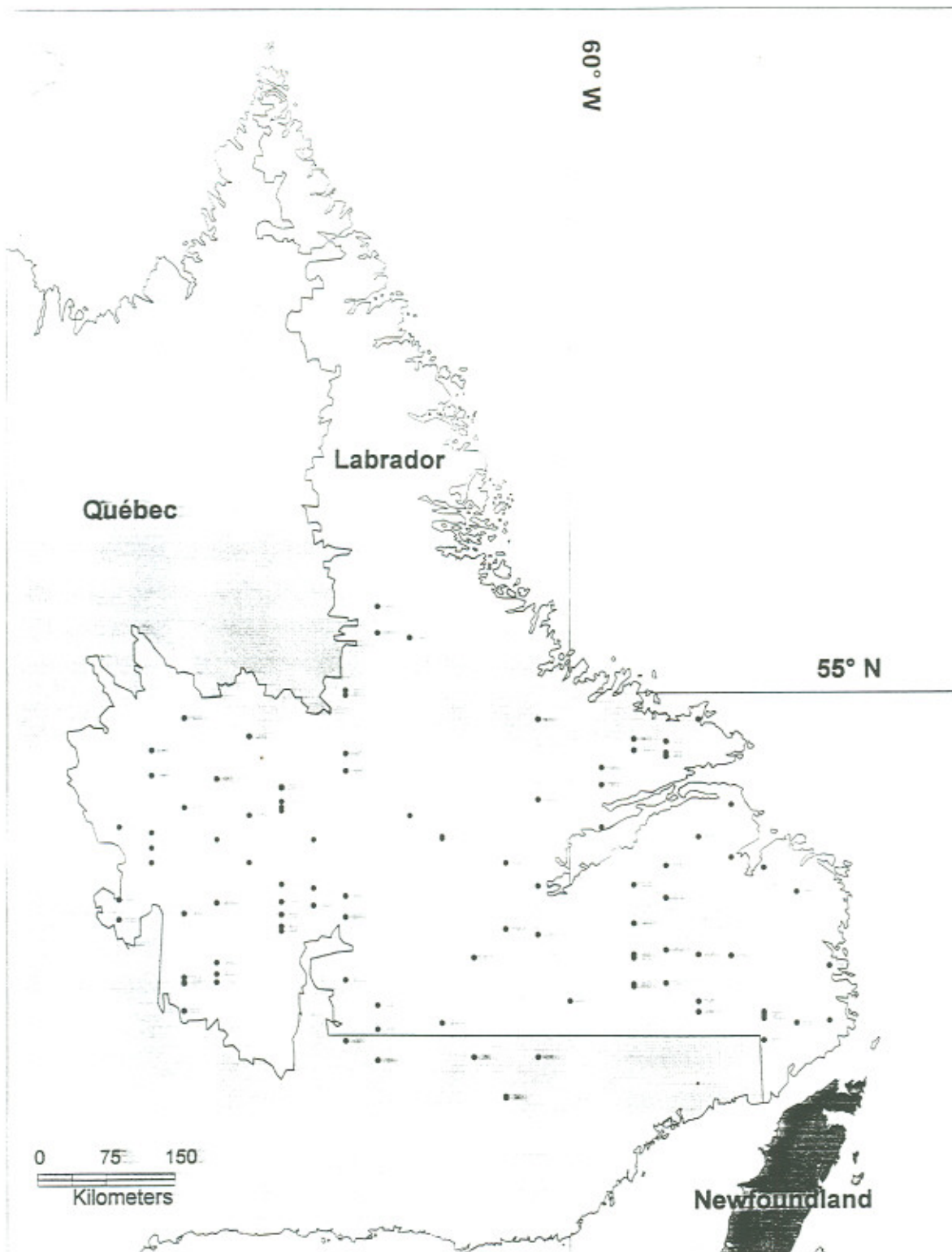


Figure 2. Approximate locations of Canada Goose observations recorded on a fixed-wing transect survey in Labrador and part of Quebec June 1-15, 1994.

Table 1. Results of fixed-wing transect surveys for Canada Geese in Labrador in June 1993 and 1994.

	Uncorrected		With visibility correction x 2	
	1993	1994	1993	1994
Total transect length (km)	6687	6754	-	-
Total area surveyed (km <sup>2</sup> )	1337	1350	-	-
Average density (ind.prs. per 100km <sup>2</sup> )	5.5	5.7	11.0	11.4
Average density (total geese per 100km <sup>2</sup> )	10.9	19.4	21.8	38.8
Estimated indicated pairs in area sampled (247000 km <sup>2</sup> )	13500 (SE1766)	14000 (SE2100)	27000 (SE3532)	28000 (SE4200)
Estimated total geese in area sampled (247000 km <sup>2</sup> )	26900 (SE4300)	47918 (SE7188)	53800 (SE8600)	95800 (SE14400)

Table 2. Comparison of the 1980 fixed-wing transect results with results from transects 1 to 15 in 1993 and 1994 (uncorrected for visibility).

	1980	1993	1994
Total transect length (km)	4252	4379	4320
Total area surveyed (km <sup>2</sup> )	850	876	864
Average density (ind.prs. per 100km <sup>2</sup> )	5.6	5.4	4.4
Average density (total geese per 100km <sup>2</sup> )	26.8	10.9	19.7
Estimated indicated pairs in area sampled (138520 km <sup>2</sup> )	7756(SE=?)	7480(SE=1077)	6094(SE=914)
Estimated total geese in area sampled (138520 km <sup>2</sup> )	37100(SE=?)	15100(SE=2627)	27284(SE=4092)

## Appendix I

### Analysis by ecoregion of results from a fixed-wing transect Canada Goose Survey in Labrador June 1993 and 1994

Analyses by Ecoregion suggested no difference in the number of indicated pairs of Canada Geese in Labrador in 1994 compared to 1993, but an increase in the total number of birds observed was recorded (Table i).

The most important Ecoregions in both years were Smallwood Reservoir, Nipishish Lake, Churchill Falls, Eagle Plateau and St. Paul. Those Ecoregions each contributed ten percent or more of the pairs and total birds in one or both years. Higher densities were recorded on some small Ecoregions but total contribution to the population was less. In addition, sample sizes from the small Ecoregions were very small and results are not reliable. Small sample sizes in some Ecoregions may also have caused the discrepancies between observed densities in the 1993 and 1994 surveys.

Table i. A comparison by Ecoregion of densities of Canada Geese observed (uncorrected for visibility) on fixed-wing transects in Labrador in June 1993 and 1994.

Ecoregion	Sample Size km <sup>2</sup>		Mean No. Ind. Pr/ 100 km <sup>2</sup>		Mean No. birds/ 100 km <sup>2</sup>		Estimated pr. Ecoregion		Estimated birds per Ecoregion	
	1993	1994	1993	1994	1993	1994	1993	1994	1993	1994
Central Ranges	-	6	-	0	-	0	-	0	-	0
Fraser R.	0.2	16	0	6	0	6.2	0	548	0	566
Hopedale	0.8	10	0	20	0	40	0	1240	0	2480
Mistastin L.	42	74	7	7	9.5	31.1	1008	1008	1368	4478
Harp L.	31	25	0	0	0	28.4	0	0	0	2431
Postville	99	81	3	0	5	3.7	544	0	907	671
Smallwood R.	234	234	7	10	14.1	26.5	2541	3630	5118	9619
Benedict Mt.	18	12	0	8.5	0	8.4	0	284	0	280
Nipishish L.	117	92	6	7.5	9.4	28.4	1134	1418	1777	5368
MacPhayden R.	48	48	4	2	6.2	2	306	154	475	153
Seahorse	81	81	5	8.5	8.7	16.1	690	1173	1200	2222
Domagaya L.	36	53	8.5	4	11	5.7	841	396	1089	564
Churchill Falls	149	149	5.5	4.5	11.4	9.3	1291	1058	2678	2184
L. Melville	128	119	1	2.5	1.5	5	168	422	253	842
Mealy Mt.	18	18	0	0	0	0	0	0	0	0
Eagle Plateau	110	110	8	8	14.5	38.1	1527	1528	2768	7273
Porcupine St.	12	12	0	8.5	0	16.9	0	119	0	235
St. Paul	70	70	16	7	45.8	34.4	1960	858	5610	4214
Paradise R.	119	119	5	2.5	10.1	20.9	995	498	2009	4159
Harbour	24	24	0	0	0	21.2	0	0	0	1081
Total	1337	1353					13005	14169	25252	48820