Progress Report
Waterfowl Surveys on Prince Edward Island, 2000

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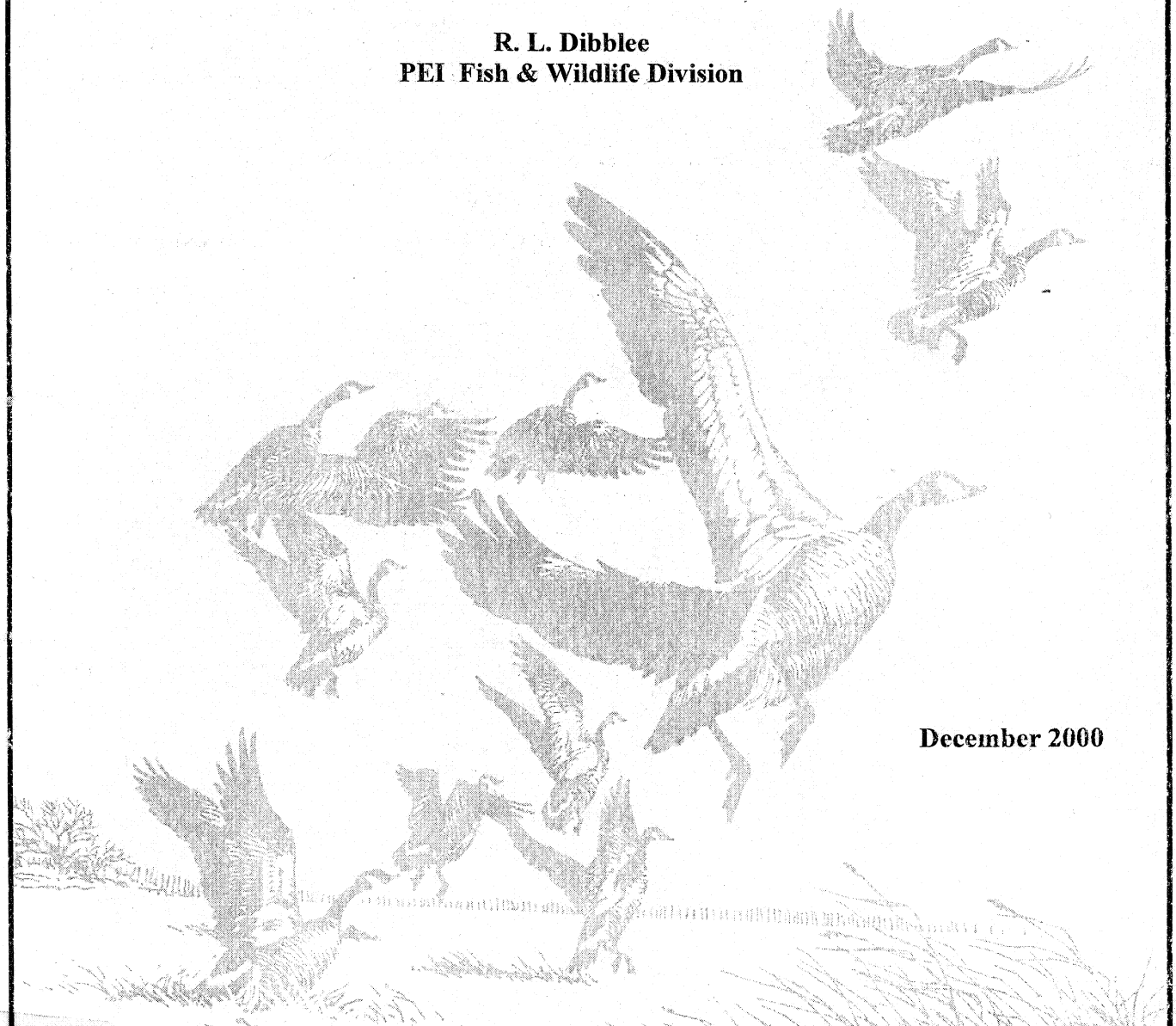

December 2000

Environment Canada
Canadian Wildlife Service

Environnement Canada
Service Canadien de la faune

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Environmental Conservation Branch
Atlantic Region
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1. Introduction

Consistent long-term monitoring surveys are a necessary part of waterfowl management. Population managers must be able to monitor changes in populations and determine the effects of management strategies. In 1983 the Canadian Wildlife Service and the PEI Fish and Wildlife Division initiated a cooperative survey consisting of four annual counts each year. The 2000 season was the nineteenth consecutive year of the survey and makes it the longest-running breeding ground survey in the Atlantic Provinces. However, the first two years of the survey (1983 and 1984) are considered trial years and the data are not included here.

Information from this survey is used to monitor population status and used in conjunction with other data to set appropriate hunting season regulations. The most abundant species, such as Black Ducks, are most usefully sampled but changes in minor species such as Mallards are also documented. This survey provides long term monitoring for breeding populations and in addition, records valuable information on spring migrants, habitat use by waterfowl and annual brood production. This report summarizes results from 2000 and updates the long term data.

2. Methods

2.1 Selection of wetlands

One hundred wetlands were randomly selected by computer from the data file of freshwater wetlands on Prince Edward Island (later documented in Hudgins, 1987) (Figure 1). The total number of wetlands selected was restricted by manpower available to do the survey. The quality of selected wetlands ranged from poor to very good. Twenty-eight wetlands which had no apparent potential for waterfowl use were discarded after the initial survey in 1983. In addition, some wetlands were eliminated from the survey in subsequent years because of lack of waterfowl use, destruction of the wetland, or because the wetland was found impossible to survey in a reproducible manner. Subsequent analysis of data indicated that 900 wetlands must be surveyed to reliably detect a 10 percent change in the Black Duck population over five years.

2.2 Methods of survey

Four counts were scheduled for each year. Timing was adjusted for an "early" or "late" spring and the first count was scheduled to begin in late April or early May. The other three counts were scheduled 4 (Count 2), 8 (Count 3) and 12 (Count 4) weeks after the first count. Two weeks were allowed for each survey. Count 1 and Count 2 were scheduled 17 April through 01 May and 15 May through 29 May in 2000. Counts 3 and 4 were scheduled between 19 June and 03 July and between 17 July and 31 July.

The surveys on each wetland were carried out by walking, canoeing, or observing from a blind. Each wetland was surveyed in a manner that permitted a complete count of all waterfowl present. Each wetland was assigned to an observer to ensure consistency of methods used at each site each year (Appendix I). Observations of waterfowl on each

area were recorded by species, age of ducklings (Gollop and Marshall, 1954), sex and group size. In addition, behaviour of the birds was noted and pairs thought to be breeding locally (indicated pairs) were determined by the observers. Weather conditions, water conditions and time of the survey were also recorded.

2.3 Analysis of data

Data were analyzed on the basis of total ducks and indicated pairs observed. Counts 1 and 2 were analyzed separately because they represented different stages in the breeding chronology. Black Duck breeding pair data used in the analysis were from only those wetlands surveyed within definite two-week periods for each of Count 1 and Count 2. Statistical analysis for trends in the Black Duck population was performed using a route regression analysis program prepared by B. Collins (CWS-HQ). Trend was determined using an averaged regression method. Assessments of breeding pair data were not so restricted for other species.

Brood survey data from a wetland in any year were used only if Count 3 and Count 4 were done on that wetland that year. The minimum number of broods of each species on each wetland was determined by assuming that broods of appropriate age for each count on each wetland were the same broods.

3. Results and Discussion

The survey was conducted by participants from the Canadian Wildlife Service and PEI Fish and Wildlife Division. Workshops held in Charlottetown in March 1989 and April 1991 permitted discussion, evaluation and modification of survey techniques. As a result, observation methods may have been applied more consistently by all observers during the 1989 and later surveys than in the early years. Data from previous years are included in this report (except for 1983 and 1984) but comparisons with data prior to 1989 must be interpreted with caution. Wetlands were not all surveyed in all years, and some of the counts were not done on schedule.

Total counts of all waterfowl recorded are included in Appendix II, Tables i - ii. The minimum numbers of broods recorded on all wetlands surveyed on both Counts 3 and 4 are tabulated by species in Appendix II, Table iii. Graphic illustrations of the numbers of Mallards, wigeon, Gadwall, Wood Ducks and Canada Geese recorded on Counts 1 and 2 in 1985 - 2000 are included in Appendix III.

Black Ducks made up 43.8 percent of the breeding pairs observed on Count 1, Ring-necked Ducks accounted for 23.1 percent and Green-winged Teal were 15.6 percent of pairs recorded on Count 1 in 2000 (Figure 2). In 1998 Black Duck pairs were 33.3 percent of the total and in 1999, 30.9 percent. Ring-necked Ducks made up 31.3 percent of the pairs in 1998 and 28.0 percent in 1999. Green-winged Teal were 13.5 percent of pairs in 1998 and 15.5 percent in 1999.

Results from Count 2 in 2000 showed 27.4 percent of pairs observed were Black Ducks, 21.9 percent were Ring-necked Ducks, 13.7 percent were Green-winged Teal and 11.8 percent were Blue-winged Teal (Figure 3). Comparable numbers from Count 2 in 1998 were 25.9 percent Black Ducks, 23.0 percent ring-necks, 11.8 percent green-wings and 16.0 percent blue-wings. In 1999, the species composition of pairs observed on Count 2 was 26.2 percent blacks, 21.0 percent ring-necks, 11.2 percent green-wings and 14.2 percent blue-wings.

Black Duck, Blue-winged Teal, Canada Goose, Ring-necked Duck and Green-winged Teal were the most numerous species in the brood counts (Figure 4). Black Duck broods made up 29.6 percent of the total; blue-wing broods, 15.0 percent; green-wing broods, 10.2 percent; Canada Goose broods, 14.5 percent and ring-neck broods, 9.2 percent. In 1998 and 1999 Black Duck broods were 31.3 and 32.5 percent of total broods, respectively; Blue-winged Teal were 14.8 and 13.2 percent; Canada Geese were 10.3 and 7.7 percent; Green-winged Teal were 10.7 and 9.0 percent and Ring-necked Duck broods were 13.2 and 14.5 percent.

3.1 Black Duck

In 2000, 75 wetlands were surveyed on Count 1 and 71, on Count 2 during the time period specified for these early surveys (Table 1). Results of a trend analysis using an estimating equations method (B.Collins, pers.com.) and numbers of indicated pairs on Count 1 showed an increasing population 1990 to 2000 and 1985 to 2000 (positive slope; $p<0.01$) (Figure 5). An increasing trend was also indicated using the data from Count 2. Results of Count 1 and Count 2 are not comparable and must be analyzed separately. The first survey is affected by migrants and the second survey underestimates the breeding population because brooding females are not always observed. However, both Counts suggest an increasing breeding population of Black Ducks on Prince Edward Island.

The number of broods produced each year depends on factors other than the number of breeding pairs. Unfavourable weather conditions can, for example, cause high mortality in ducklings. The relationship between the number of pairs and the number of broods recorded varied between years during the surveys (Bateman and Dibblee, 1988). However, the results of brood surveys provide essential data for evaluation of wetland habitat and annual production. The minimum number of Black Duck broods produced on 71 wetlands surveyed in 2000 was 61 (Table 1). The number of wetlands surveyed for broods is not consistent among years and therefore not statistically comparable, but data suggest that 2000 was not a very productive year for Black Ducks on Prince Edward Island (Figure 6).

3.2 Green-winged Teal

The results of Count 1 for Green-winged Teal include a large number of migrant birds. The accuracy with which migrants were distinguished from local breeders is unknown. Results of Count 2 are more likely to reflect trends in the breeding population. Results of

Count 2, expressed as indicated pairs of green-wings per wetland and as total birds per wetland, suggest an upward trend (Figures 7, 8). The result for 2000 was 1.3 indicated pairs per wetland (Table 1). The number of broods recorded per wetland surveyed suggests that 2000 was not a productive year for green-wings (Table 1) (Figure 9).

3.3 Blue-winged Teal

Count 1 was far too early to provide useful data on Blue-winged Teal but Count 2 may provide a good index to the population. The number of indicated pairs and total number of ducks suggest that the population may have declined since 1985 but has been relatively stable since 1995 (Figure 10). In 2000 the numbers of indicated pairs of Blue-winged Teal per wetland surveyed was 1.2 (Table 1). The mean numbers of broods recorded per wetland surveyed in 2000 suggest a relatively unproductive year for blue-wings on Prince Edward Island (Figure 11).

3.4 Ring-necked Duck

Breeding chronology and behaviour of the Ring-necked Duck were studied in Maine and New Brunswick, 1943-1955 by Mendall (1958). He found that the average date at which 50 percent of nests were initiated was 23 May but did not provide insight into the determination of local breeders vs migrants at this time of year. Large flocks of ring-necks were often recorded during Count 1 on Prince Edward Island. The proportion of those birds that was local breeders cannot be determined. Count 2 may be a more valid index to the breeding population. The average number of ring-necks per wetland suggests a stable population (Figure 12). In 2000, 4.5 ring-necks were recorded per wetland surveyed on Count 2 (Tables 1). Results of the brood surveys suggest that 2000 was not a productive year for Ring-necked Ducks (Figure 13).

4. Summary and Recommendations

1. Ground surveys of selected wetlands on Prince Edward Island were carried out in 2000 using methods similar to those used 1985 to 1999. The survey consisted of four counts on each selected wetland each year. Although techniques used to count waterfowl were the same in all years, interpretation by observers may have been more consistent since 1989 when workshops to discuss techniques were begun.
2. Results of trend analysis on the Black Duck data showed an increasing trend in indicated pairs 1985 - 2000 for both Counts 1 and 2. Results of the brood surveys suggest that 2000 was a relatively unproductive year for Black Ducks on Prince Edward Island.
3. Results of Count 2 for Green-winged Teal suggest an increasing number of green-wings breeding on Prince Edward Island. Results of the brood surveys show low production in 2000.
4. The number of Blue-winged Teal recorded per wetland and the mean number of indicated pairs recorded suggest a decline in breeding blue-wings over the 1985 – 2000 period. Brood survey data indicate that 2000 was a relatively unproductive year.

5. The number of Ring-necked Ducks recorded per wetland suggests a stable population on Prince Edward Island. Brood surveys show low production in 2000.
6. It is recommended that this survey continue to be carried out as a long term survey monitoring breeding waterfowl, brood production and habitat use on the wetlands on Prince Edward Island.

5. References Cited

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Hudgens,E. 1987 (revised). Prince Edward Island Wetlands Inventory Summary Data. Wetland Inventory Report No. 22. Wetland Protection Mapping. Canadian Wildlife Service.

Mendall, H.L. 1958. The Ring-necked Duck in the northeast. Univ. of Maine Bulletin. Vol.LX No. 16, 317pp.

Gollop,J.B. and W.H. Marshall. 1954. A guide to aging duck broods in the field. Miss. Flyway Council Tech. Sect. Rep. 9pp. (mimeo).

Table 1. Results for the major species of waterfowl from the Prince Edward Island survey, 2000

Species	Black Duck		Green-w Teal		Blue-w Teal		Ring-n Duck	
Count	1	2	1	2	1	2	1	2
No. of wetlands surveyed	75	71	75	71	75	71	75	71
No. of ind. prs.	288	190	103	95	4	82	152	152
Total birds observed	1225	651	740	192	11	168	525	318
Mean no. birds per wetland	16.3	9.2	9.9	2.7	0.1	2.4	7.0	4.5
Mean no. ind. prs. per wetland	3.8	2.7	1.4	1.3	0.0	1.2	2.0	2.1
No. wetlands surveyed for broods	71		71		71		71	
Minimum no. broods	61		21		31		19	
Mean no. broods per wetland	0.9		0.3		0.4		0.3	

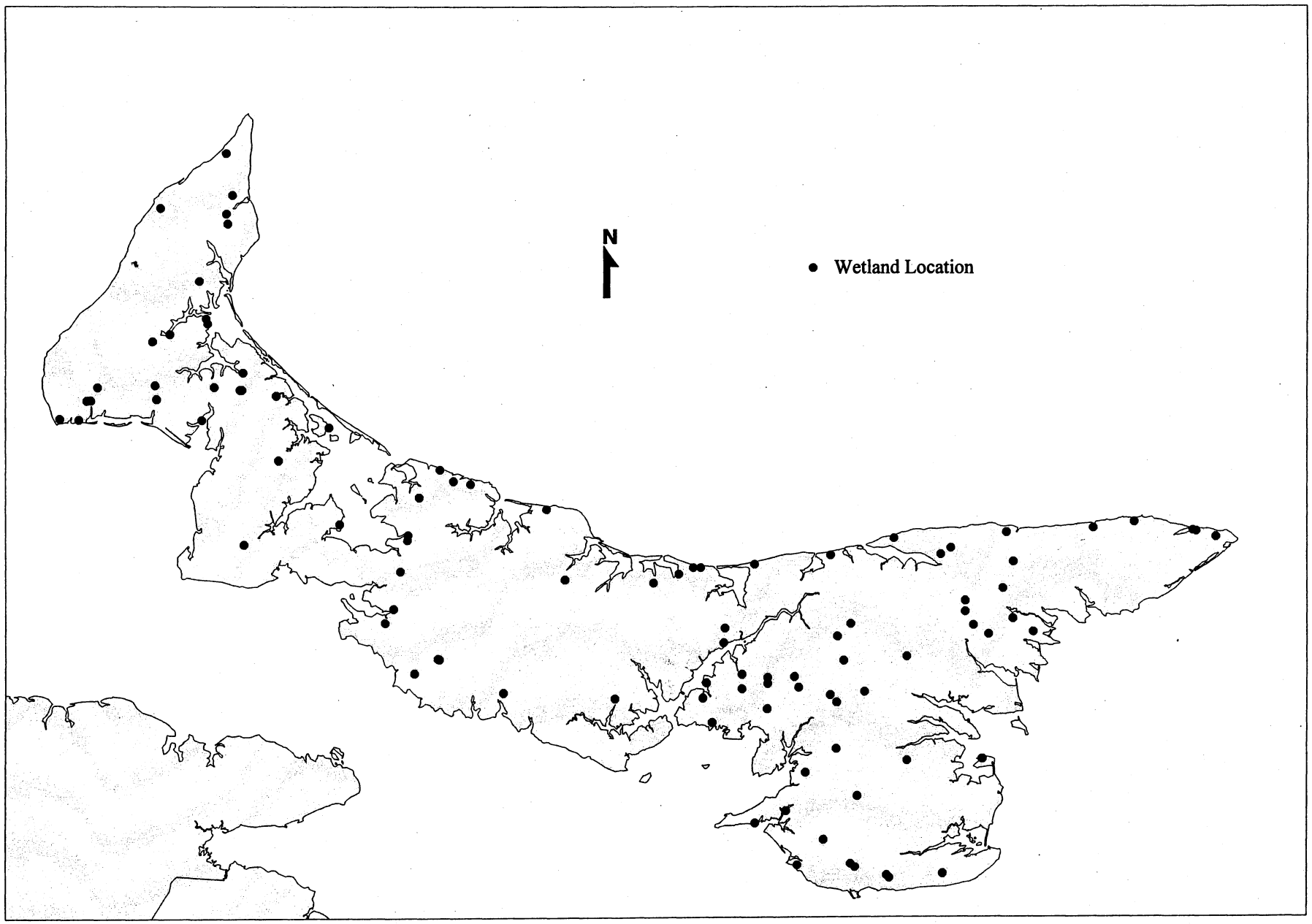


Figure 1. Locations of wetlands randomly selected for the P.E.I. Cooperative Surveys.

Species Composition of Breeding Pairs

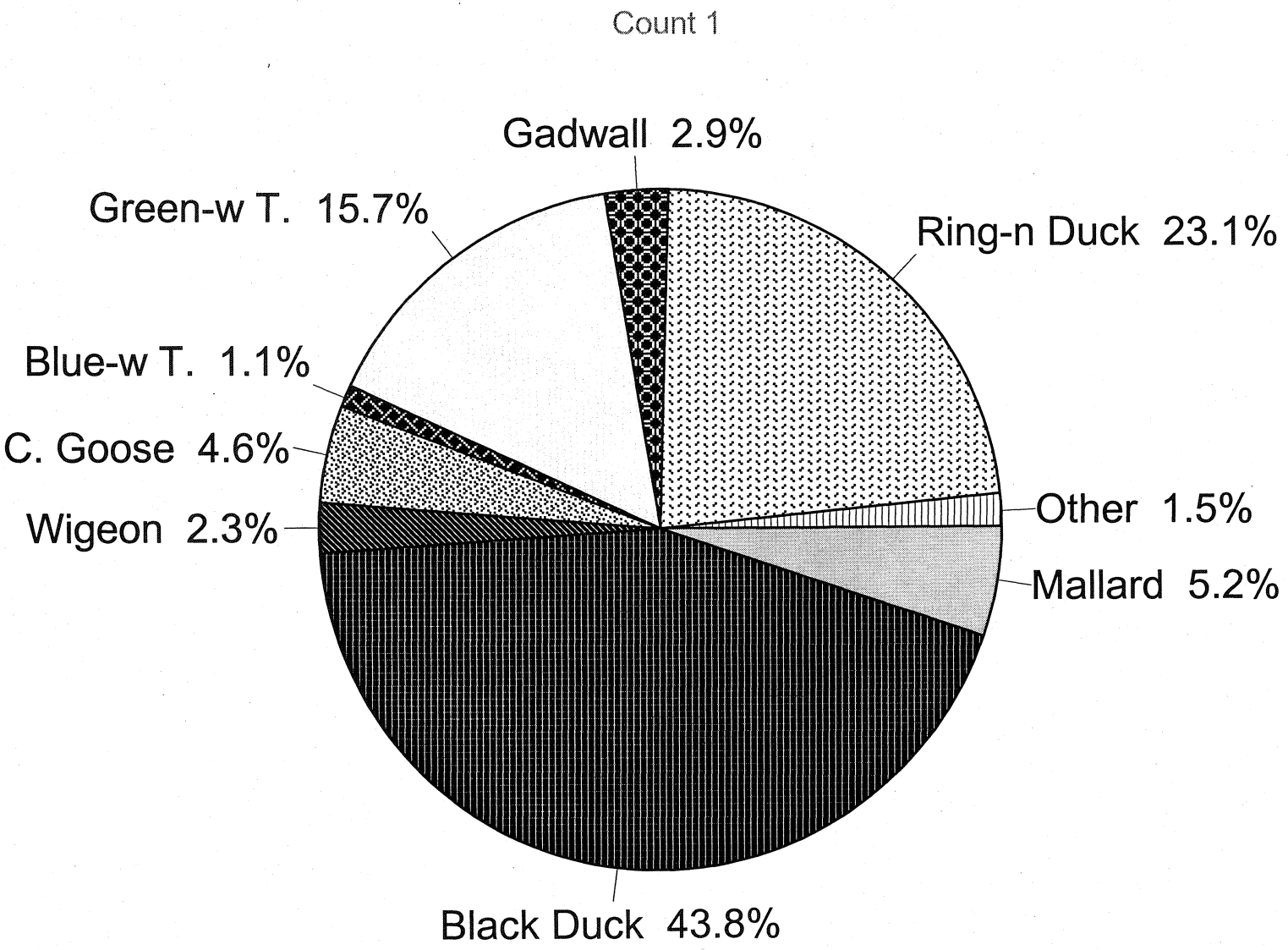


Figure 2. Species composition of breeding pairs recorded on Count 1 on Prince Edward Island, 2000

Species Composition of Breeding Pairs

Count 2

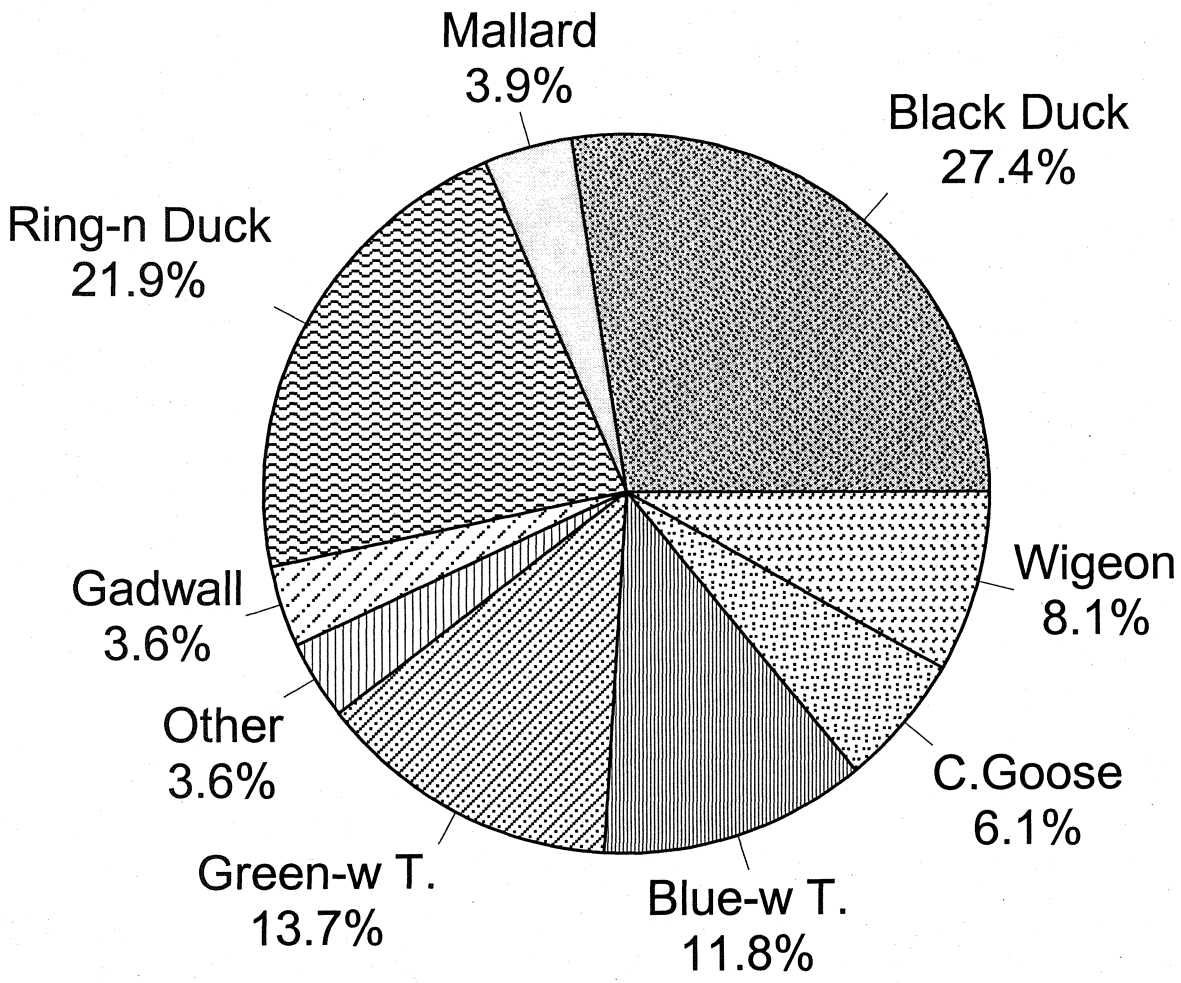


Figure 3. Species composition of waterfowl breeding pairs recorded on Count 2 on Prince Edward Island, 2000

Species Composition of Broods

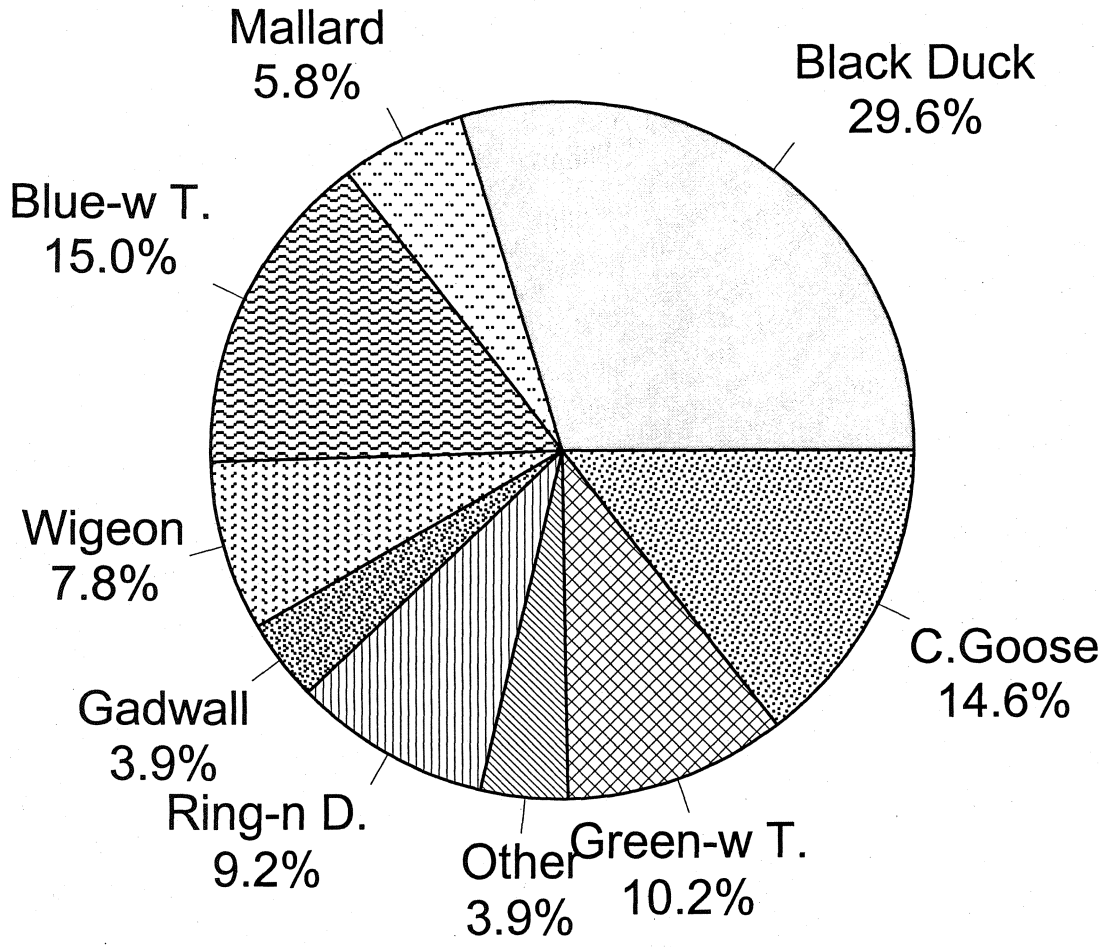
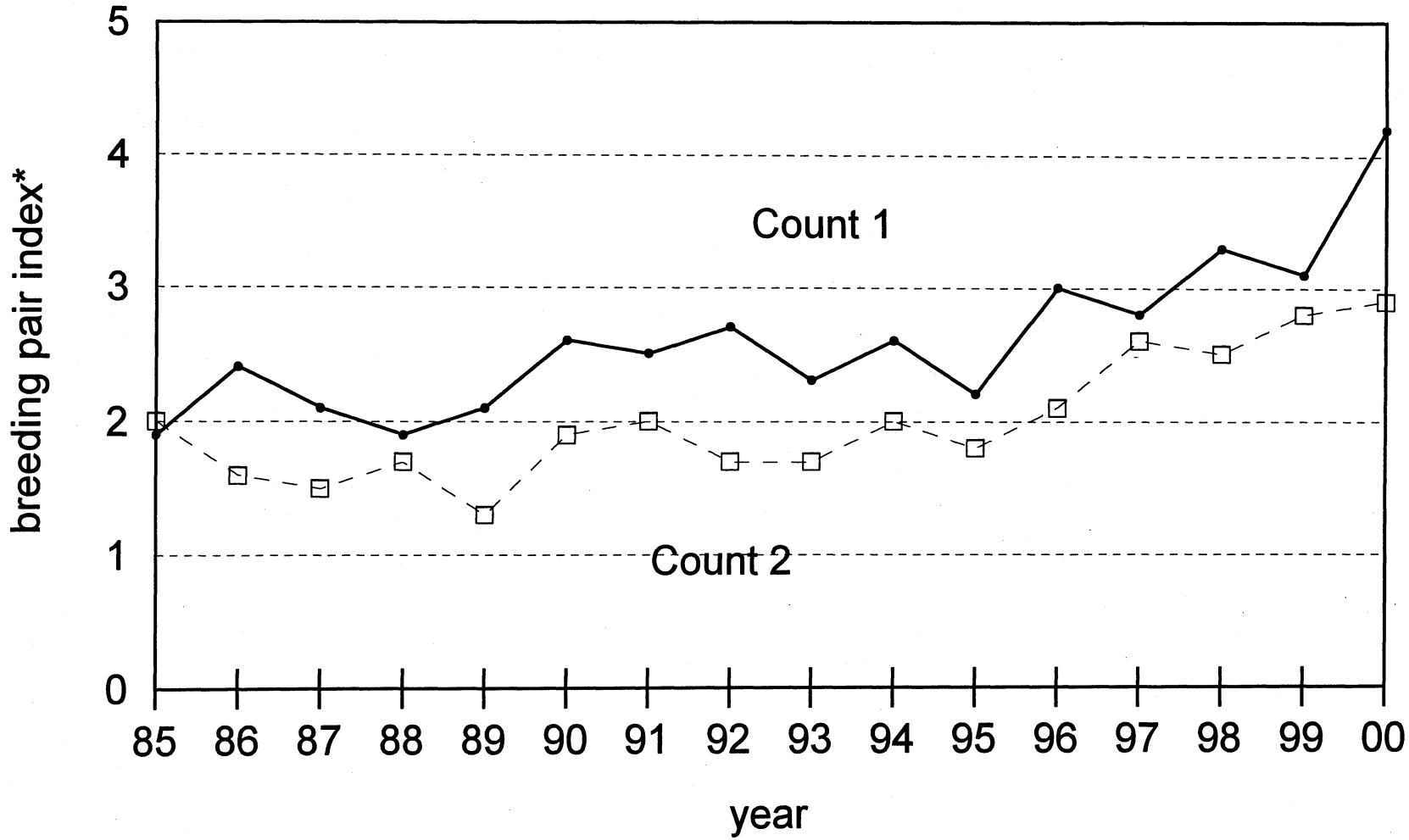


Figure 4. Species composition of broods on wetlands surveyed both on Count 3 and 4 on Prince Edward Island, 2000



*Indices are from Estimating Equations calculations

Figure 5. The mean number of indicated pairs of Black Ducks per wetland surveyed on Counts 1 and 2 on Prince Edward Island, 1985 - 2000.

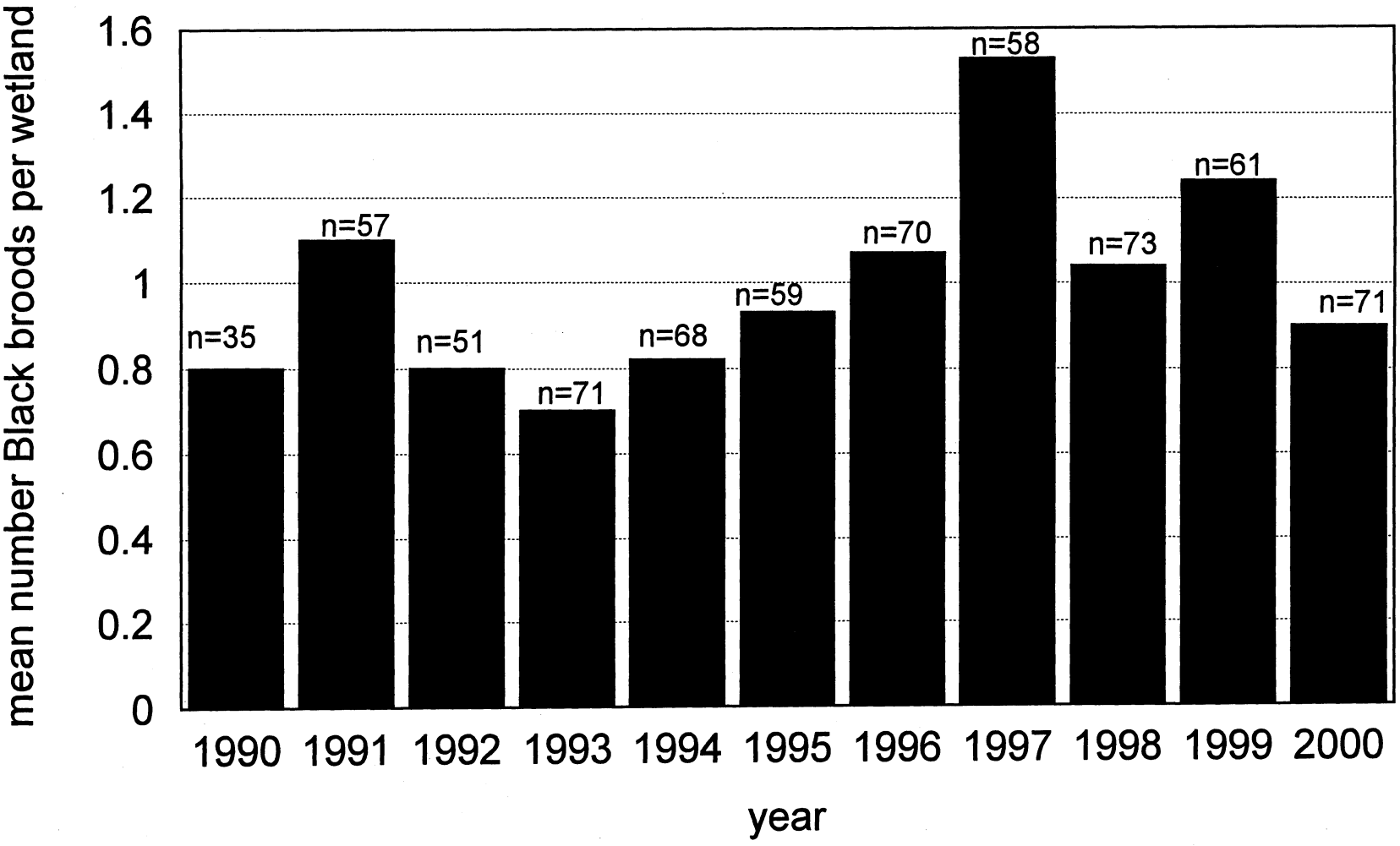


Figure 6. Mean number of Black Duck broods per wetland surveyed on counts 3 and 4 on Prince Edward Island, 1990 - 2000.

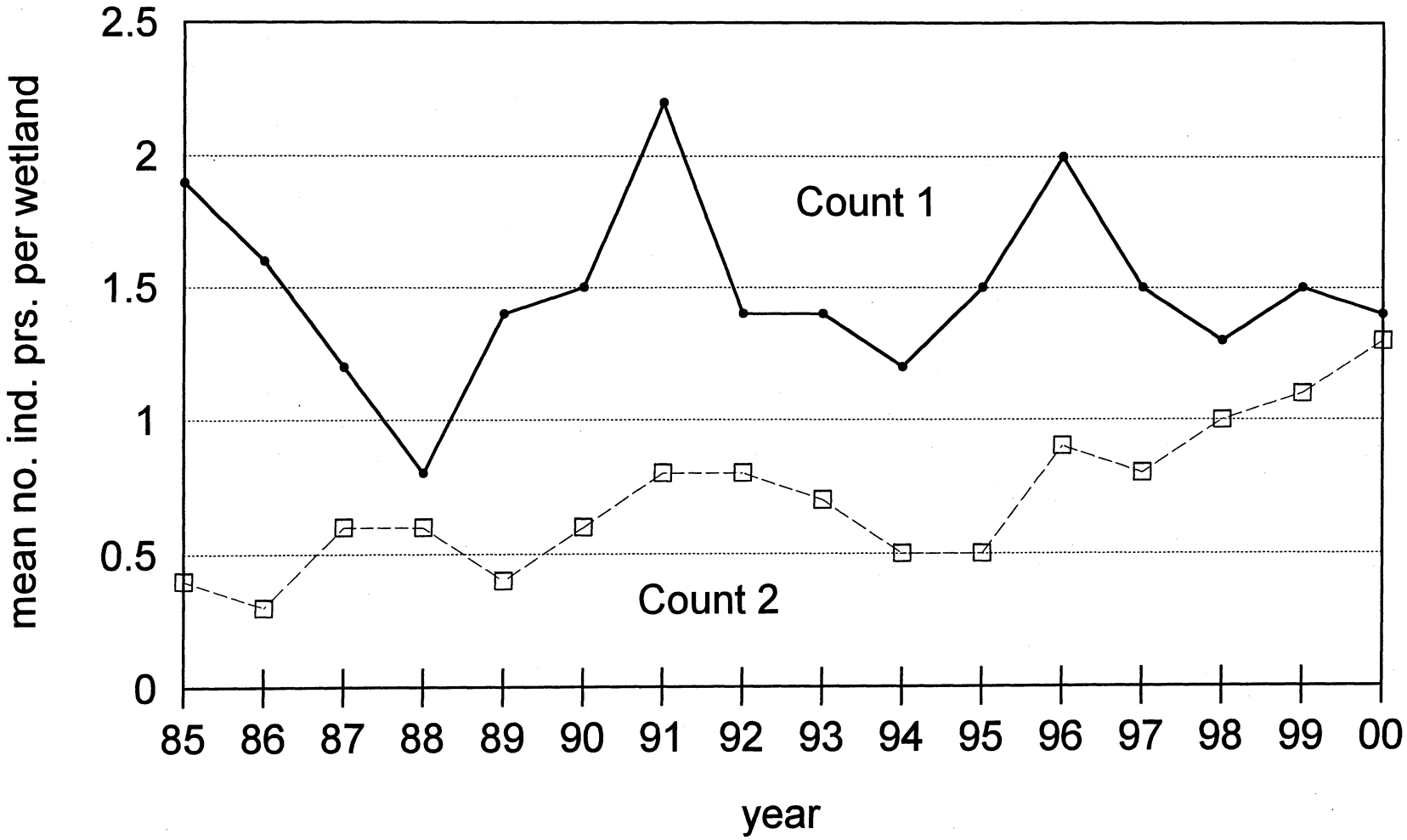


Figure 7. The mean number of indicated pairs of Green-winged Teal per wetland surveyed on Counts 1 and 2 on Prince Edward Island, 1985 - 2000.

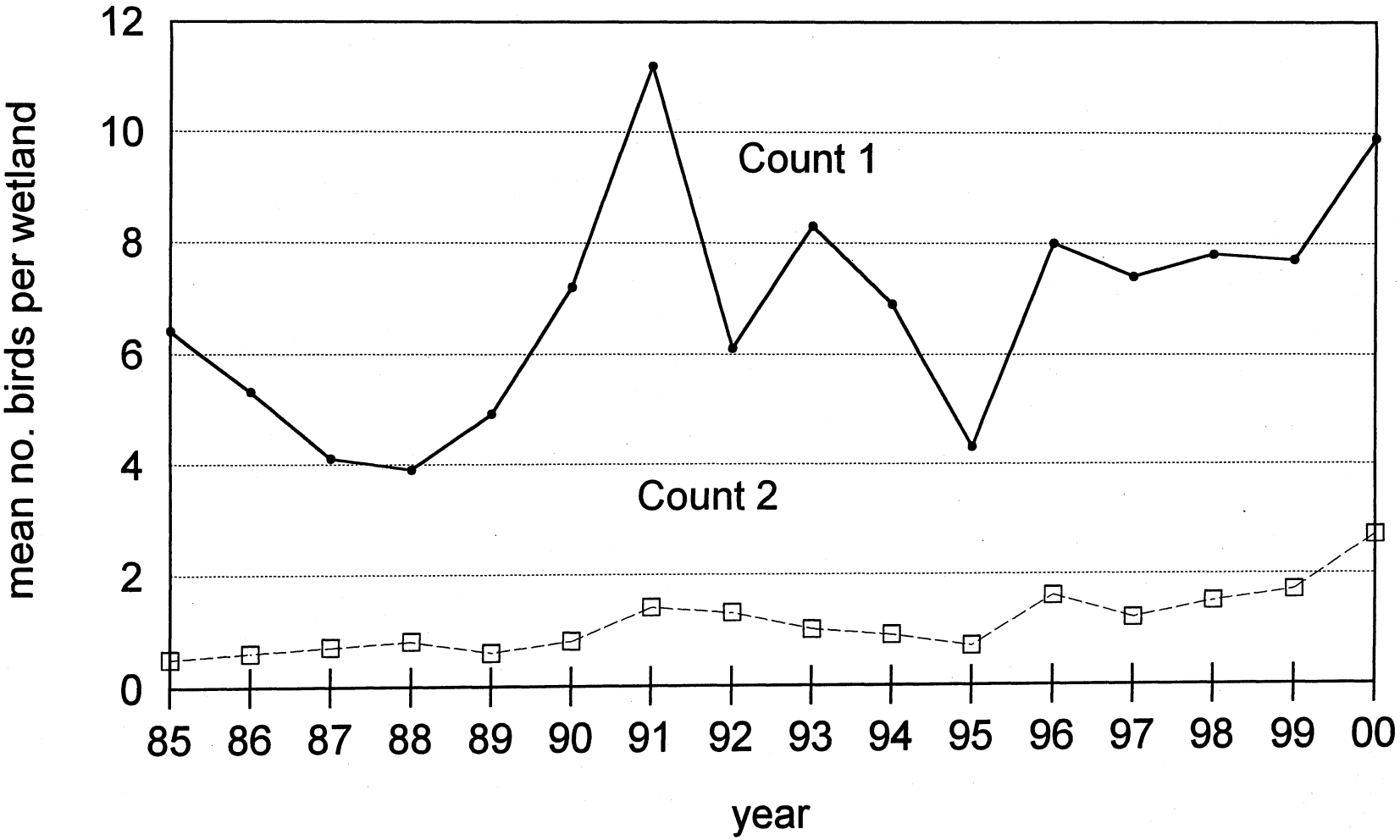


Figure 8. The mean number of Green-winged Teal per wetland surveyed on Counts 1 and 2 on Prince Edward Island, 1985 - 2000.

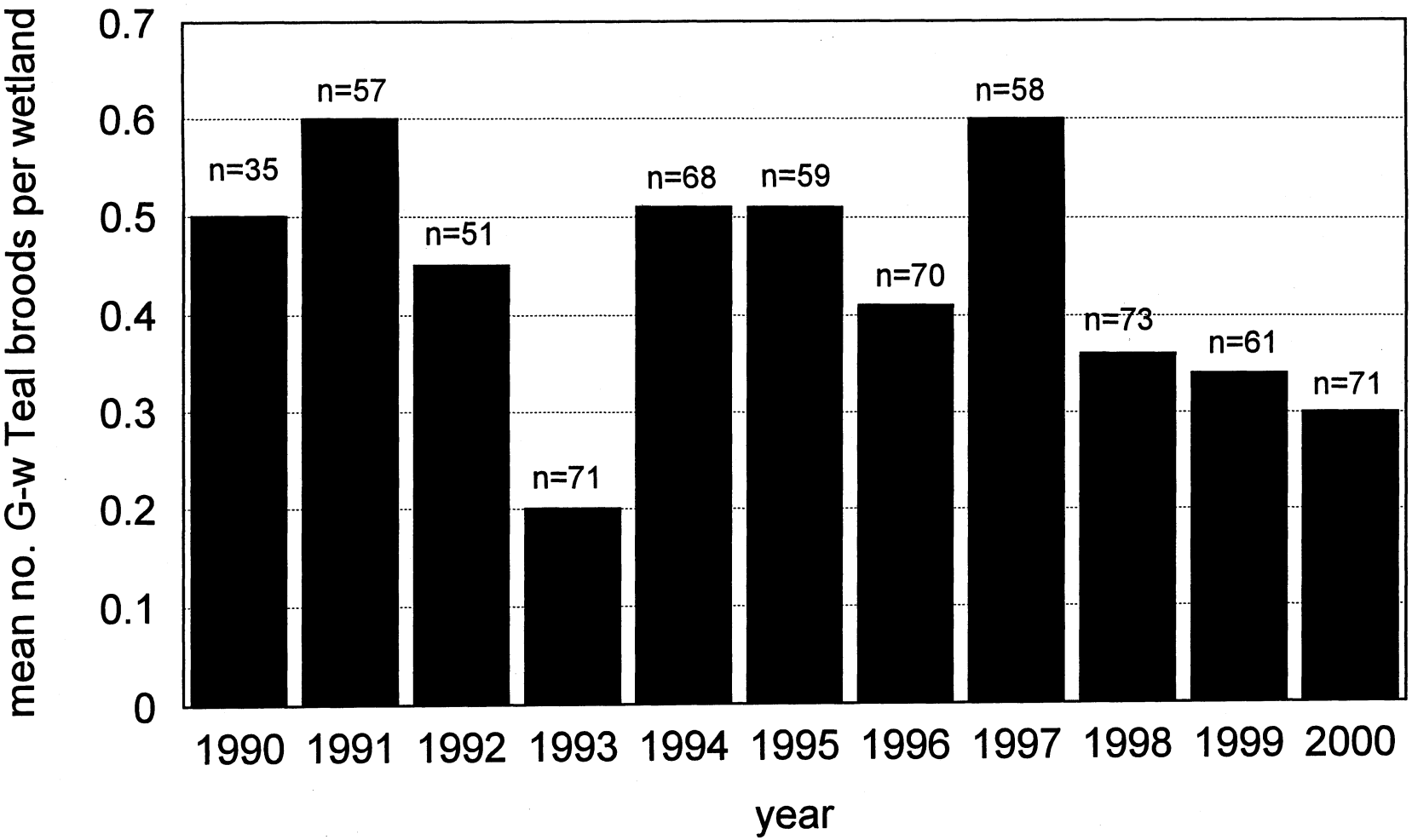


Figure 9. Mean number of Green-wing Teal broods per wetland surveyed on counts 3 and 4 on Prince Edward Island, 1990 - 2000.

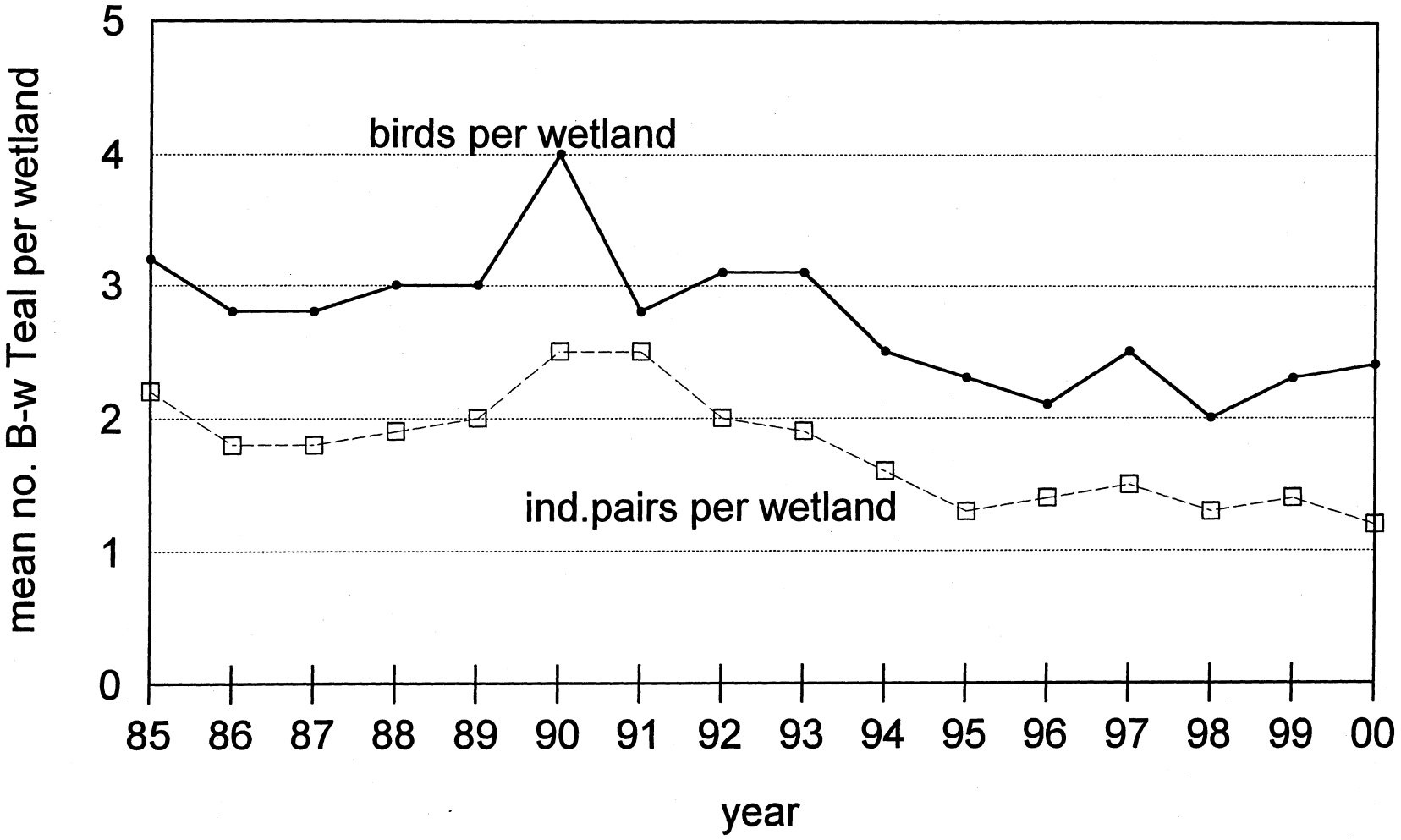


Figure 10. The mean numbers of Blue-winged Teal and mean numbers of indicated pairs per wetland surveyed on Counts 2 on Prince Edward Island, 1985 - 2000.

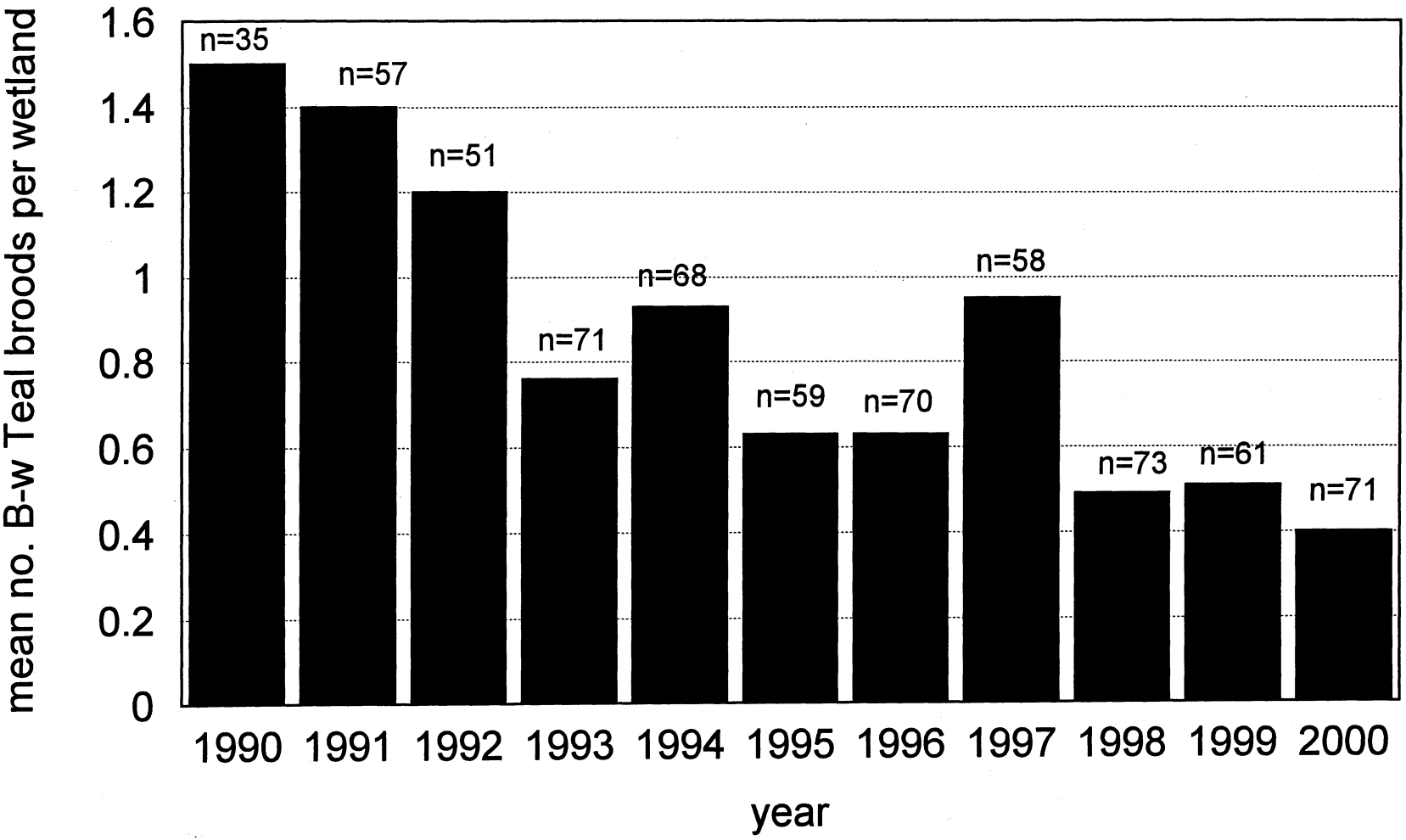


Figure 11. Mean number of Blue-wing Teal broods per wetland surveyed on counts 3 and 4 on Prince Edward Island, 1990 - 2000.

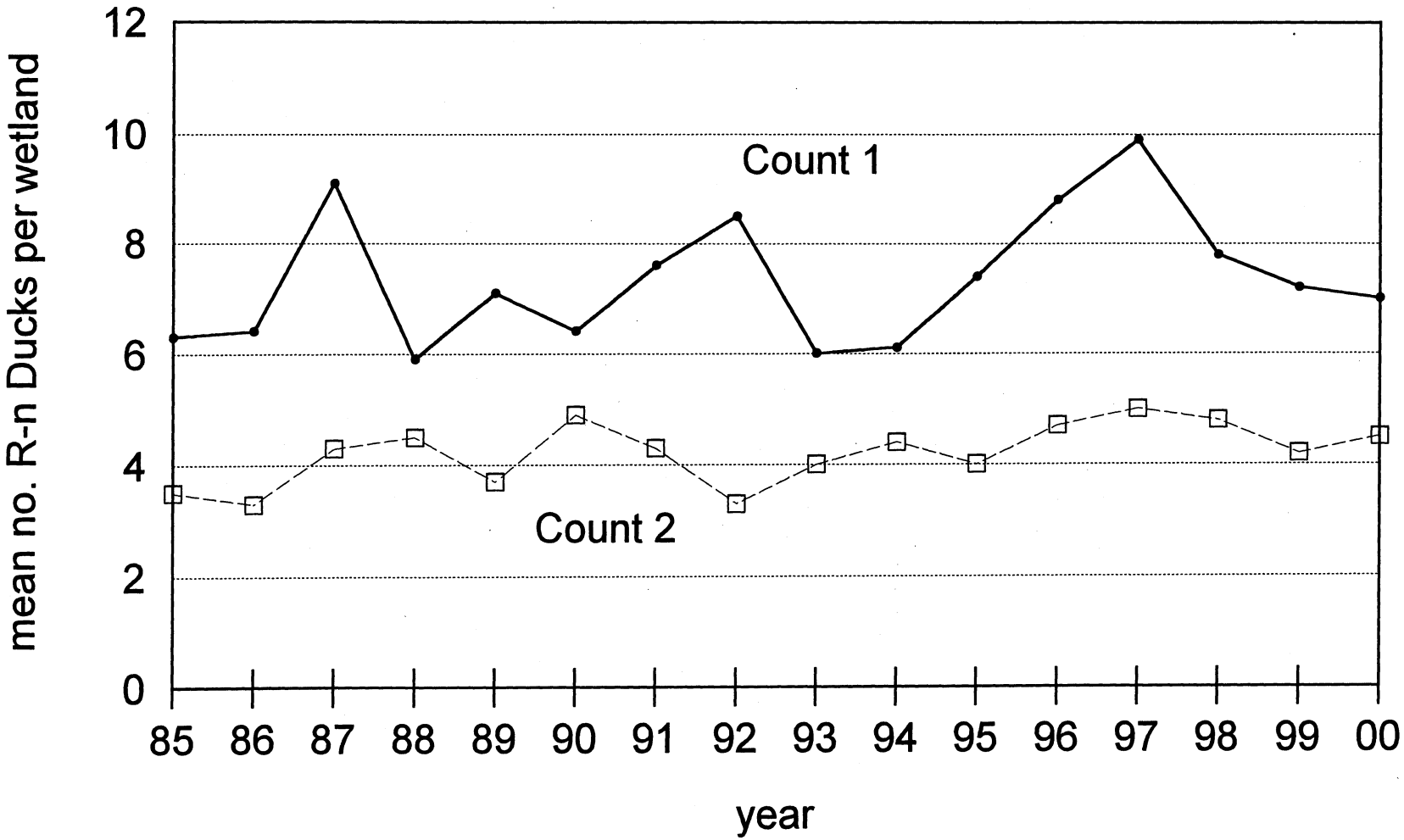


Figure 12. The mean number of Ring-necked Ducks per wetland surveyed on Counts 1 and 2 on Prince Edward Island, 1985 - 2000.

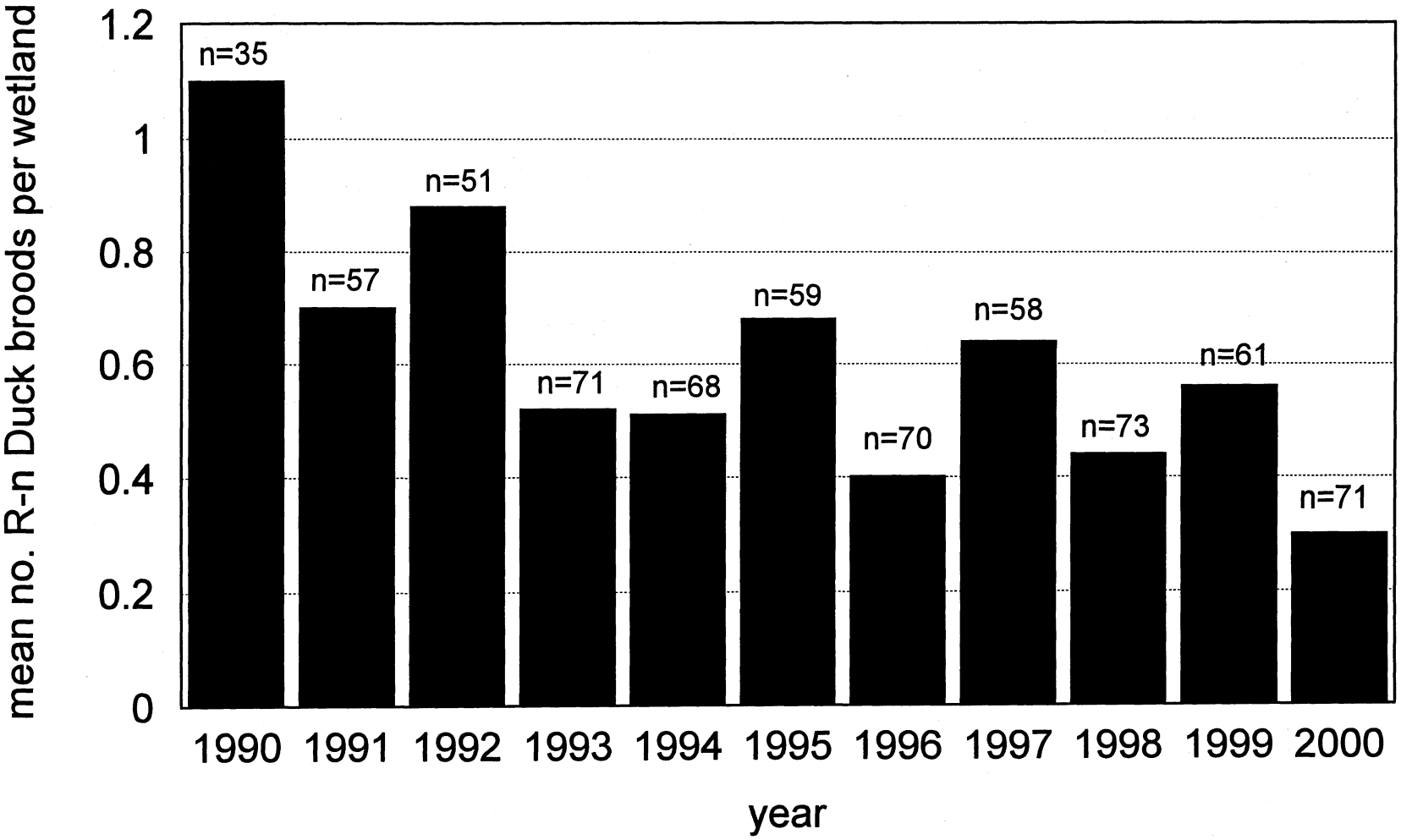


Figure 13. Mean number of Ring-necked Duck broods per wetland surveyed on counts 3 and 4 on Prince Edward Island, 1990 - 2000.

8. Appendix I

Participants in the Prince Edward Island Waterfowl Surveys - 2000

Participants	Wetland Numbers
PEI Fish and Wildlife	
Clare Birch	82, 95, 20, 45, 6, 65, 79, 47, 36, 54, 34
John Clements	29, 84, 27, 58
Randy Dibblee	33, 48, 63, 90, 88, 39, 70, 74, 99, 21, 23, 35, 202
Gerald MacDougall	87, 10
Ross Bernard	73, 59, 38, 32, 52, 76, 41
Rolland Richard	77, 75, 51,
Buddy MacIntyre	1, 66, 85, 94, 86, 89, 61, 100, 53, 49, 83
Art Smith	44, 19
Tom Duffy	97, 46, 55, 22, 24
Paul Walker	71, 36, 54, 34, 60
Rosie MacFarlane	9, 28, 42
Also Trevor MacKinnon	
CWS	
Myrtle Bateman	57, 72, 81, 78, 69, 80, 98, 15
Randy Hicks	93, 92, 68, 91
Also Andrew Hicks, Jason Hudson	

7. Appendix II

Table i. Results of Waterfowl Count 1 on Prince Edward Island, 2000

Table ii. Results of Waterfowl Count 2 on Prince Edward Island, 2000

Table iii. Minimum number of broods observed on 71 wetlands surveyed on both counts 3 and 4 on Prince Edward Island, 2000

Table i. Results of Waterfowl Count 1 on Prince Edward Island, 2000

Species	Pairs	Singles	Flocks	Estimated Pairs	Total birds
Black Duck	210	78	727	288	1227
Pintail	3	0	22	3	28
Mallard	21	13	7	34	64
Wigeon	12	3	0	15	27
Blue-winged Teal	4	3	0	7	11
Green-winged Teal	85	18	552	103	740
Wood Duck	0	0	2	0	2
Ring-necked Duck	125	27	248	152	525
Goldeneye	7	3	39	0	56
Gadwall	15	4	0	19	34
Shoveler	2	0	0	2	4
Lesser Scaup	0	0	0	0	0
Greater Scaup	0	0	6	0	6
Red-breasted Merganser	3	0	7	0	13
Common Merganser	9	1	73	0	92
Hooded Merganser	0	2	0	2	2
Canada Goose	22	8	465	30	517
Black -Mallard Hyb	0	1	0	1	1
Black-Mallard Pair*	2	0	0	2	0
Merganser-unknown	0	0	30	0	30
Unid. Scaup	0	0	10	0	10
TOTAL	520	161	2188	658	3389

* birds recorded under Black and Mallard totals

Table ii. Results of Waterfowl Count 2 on Prince Edward Island, 2000

Species	Pairs	Singles	Flocks	Estimated Pairs	Total birds
Black Duck	111	79	350	190	651
Pintail	3	1	0	4	7
Mallard	11	16	9	27	47
Wigeon	44	12	8	56	108
Blue-winged Teal	67	15	19	82	168
Green-winged Teal	67	28	30	95	192
Wood Duck	1	13	57	8	72
Ring-necked Duck	122	30	44	152	318
Goldeneye	0	0	9	0	9
Gadwall	20	5	8	25	53
Shoveler	8	3	7	11	26
Lesser Scaup	0	0	0	0	0
Greater Scaup	1	0	0	1	2
Red-breasted Merganser	1	0	17	0	19
Common Merganser	0	0	0	0	0
Hooded Merganser	0	1	0	1	1
Canada Goose	37	5	35	42	114
Black -Mallard Hyb Pair	0	0	0	0	0
Black-Mallard Pair	0	0	0	0	0
TOTAL	493	208	593	694	1787

Table iii. Minimum number of broods observed on 71 wetlands surveyed on both counts 3 and 4 on Prince Edward Island, 2000

Species	Number of Broods
Mallard	12
Black Duck	61
Gadwall	8
Wigeon	16
Pintail	0
Green-winged Teal	21
Blue-winged Teal	31
Wood Duck	2
Ring-necked Duck	19
Unidentified Duck	6
Canada Goose	30
Shoveler	0
Total	206

8. Appendix III

Figure i. The total number of Mallards recorded on Counts 1 and 2 of the Prince Edward Island surveys, 1985 - 2000

Figure ii. The total number of American Wigeon recorded on Counts 1 and 2 of the Prince Edward Island surveys, 1985 - 2000

Figure iii. The total number of Gadwall recorded on Counts 1 and 2 of the Prince Edward Island surveys, 1985 - 2000

Figure iv. The total number of Wood Ducks recorded on Counts 1 and 2 of the Prince Edward Island surveys, 1985 – 2000.

Figure v. The number of indicated pairs of Canada Geese recorded on Counts 1 and 2 of the Prince Edward Island surveys, 1985 – 2000.

PEI survey counts 1 & 2

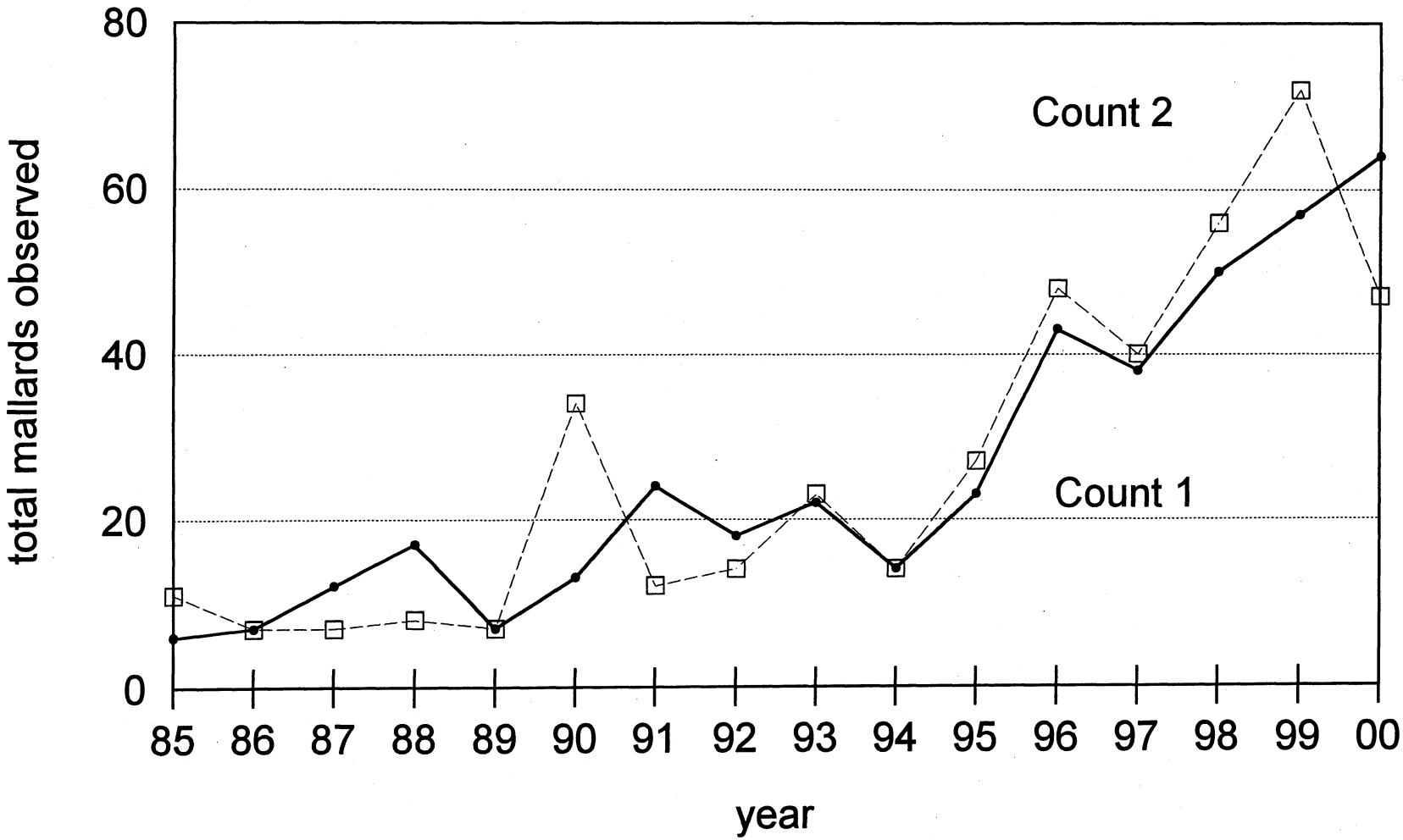


Figure i. The total number of Mallards recorded on Counts 1 and 2 on Prince Edward Island surveys, 1985-2000.

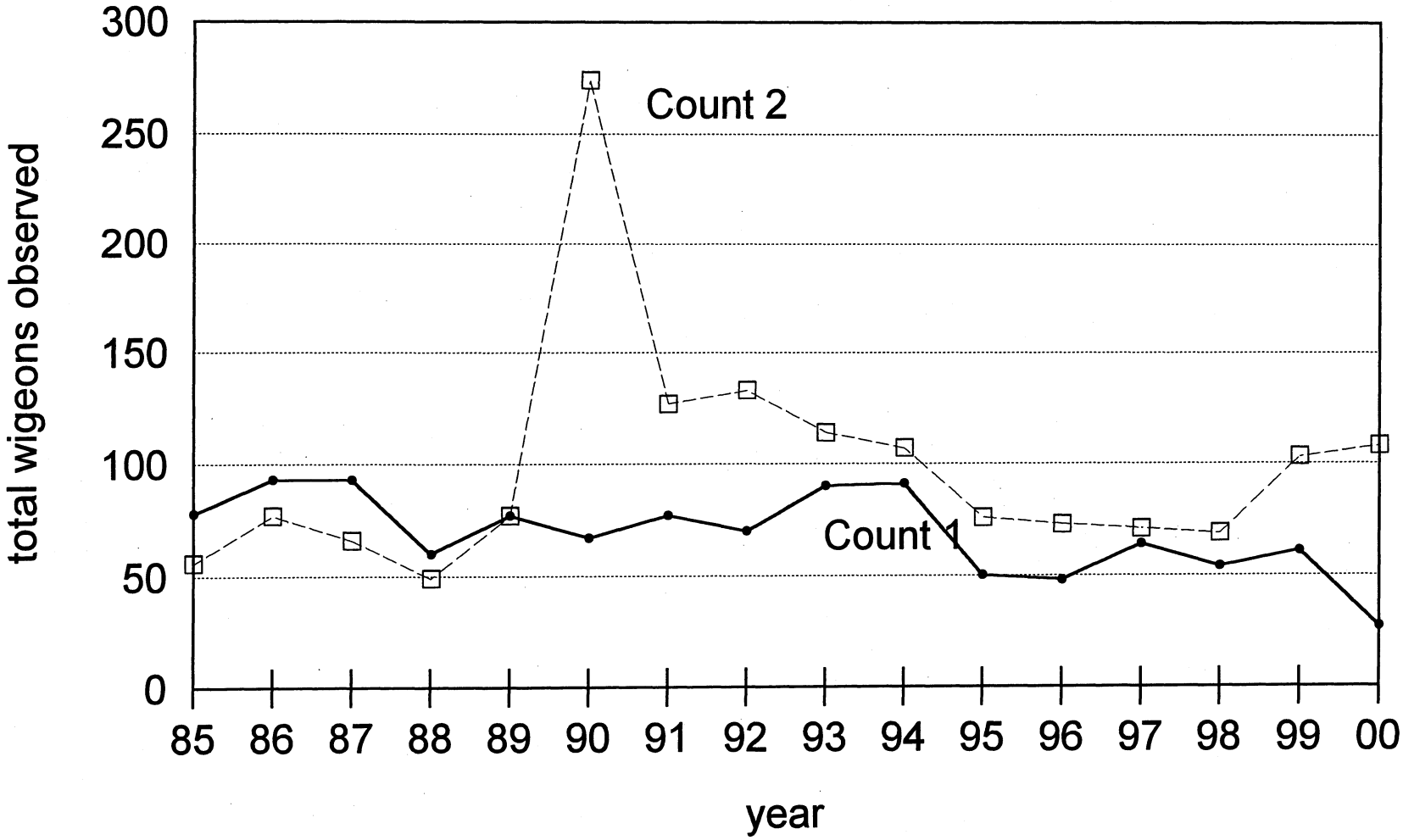


Figure ii. The total number of American Wigeons recorded on Counts 1 and 2 on Prince Edward Island surveys, 1985-2000.

PEI survey counts 1 & 2

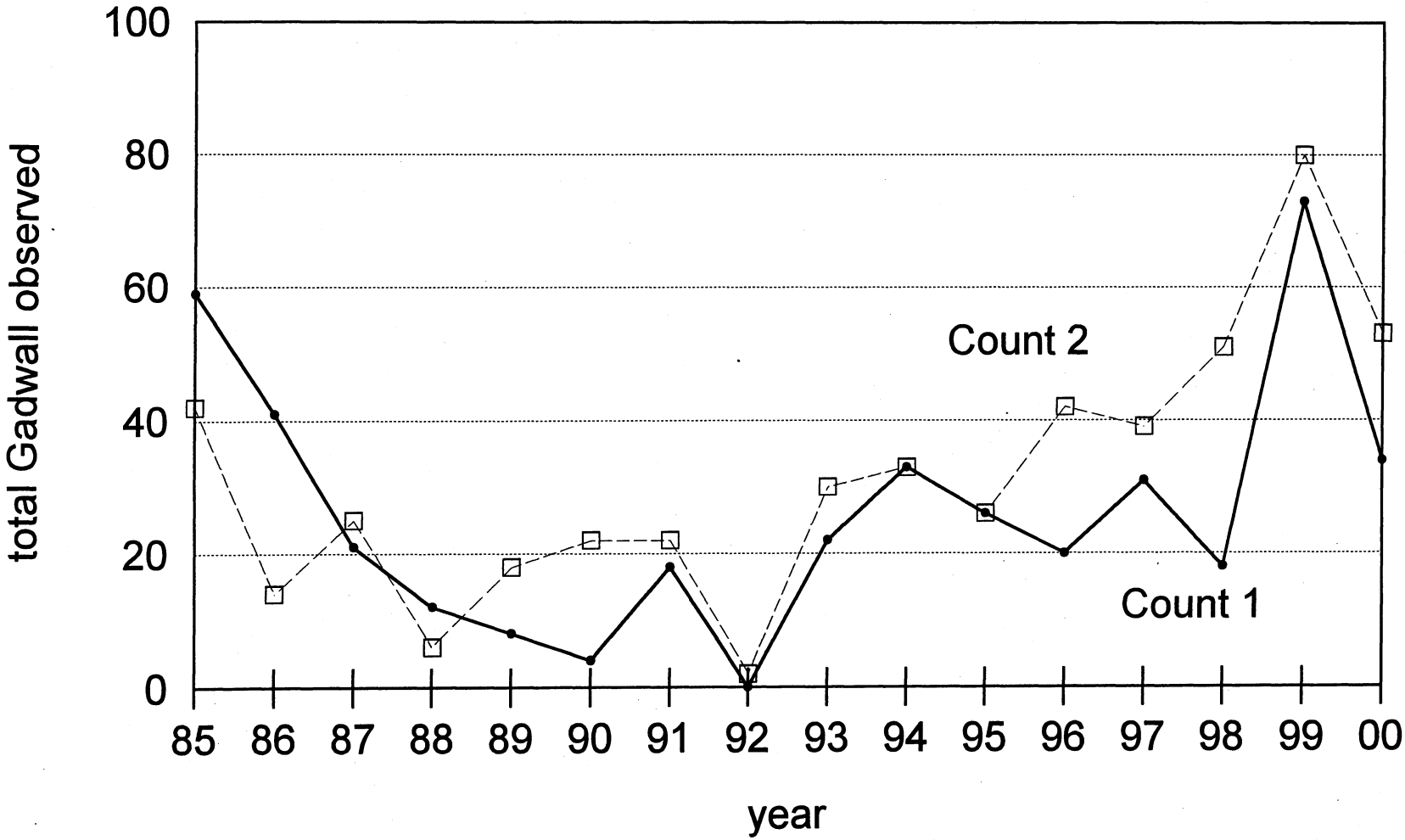


Figure iii. The total number of Gadwall recorded on Counts 1 and 2 on Prince Edward Island surveys, 1985-2000.

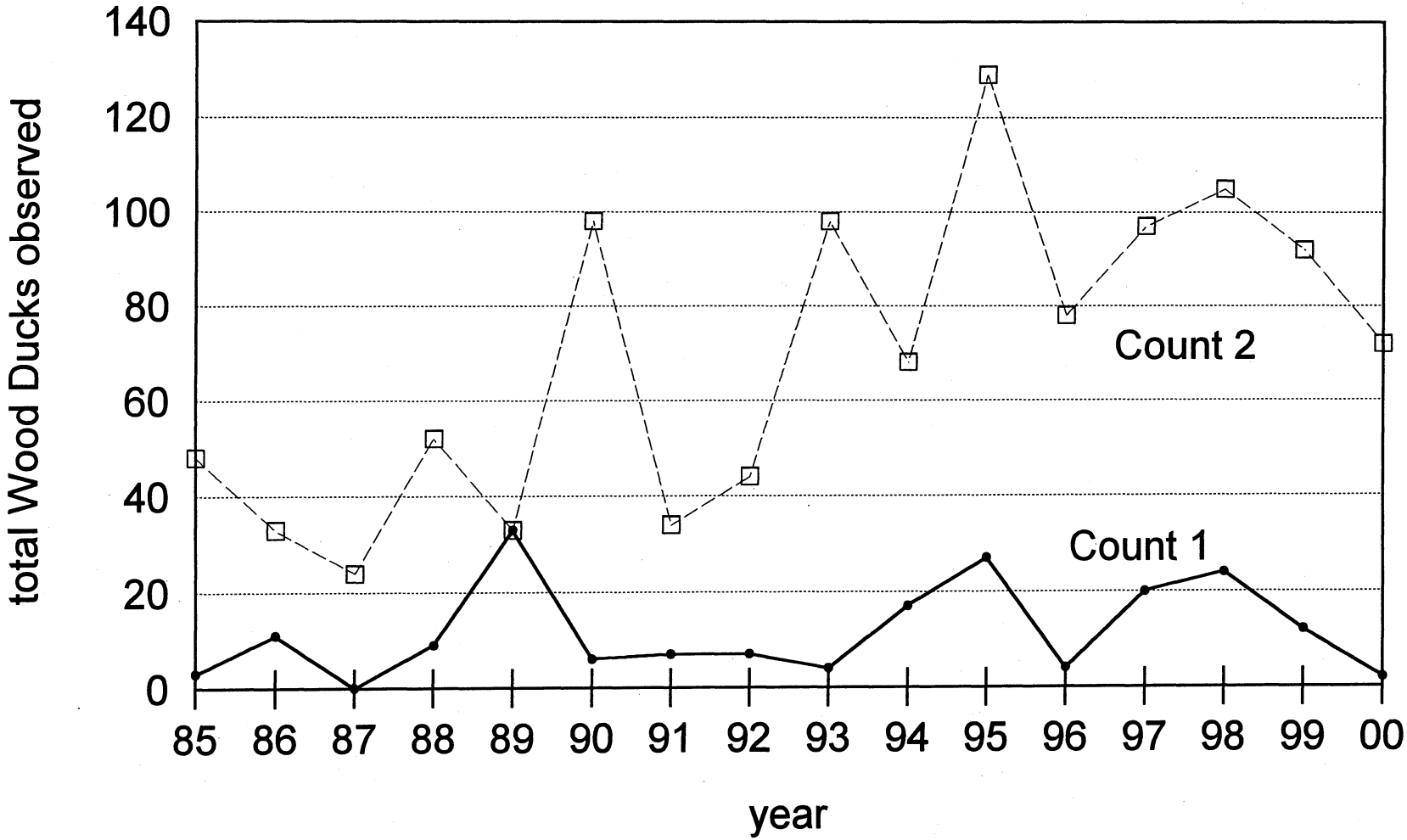


Figure iv. The total number of Wood Ducks recorded on Counts 1 and 2 on Prince Edward Island surveys, 1985-2000.

PEI survey counts 1 & 2

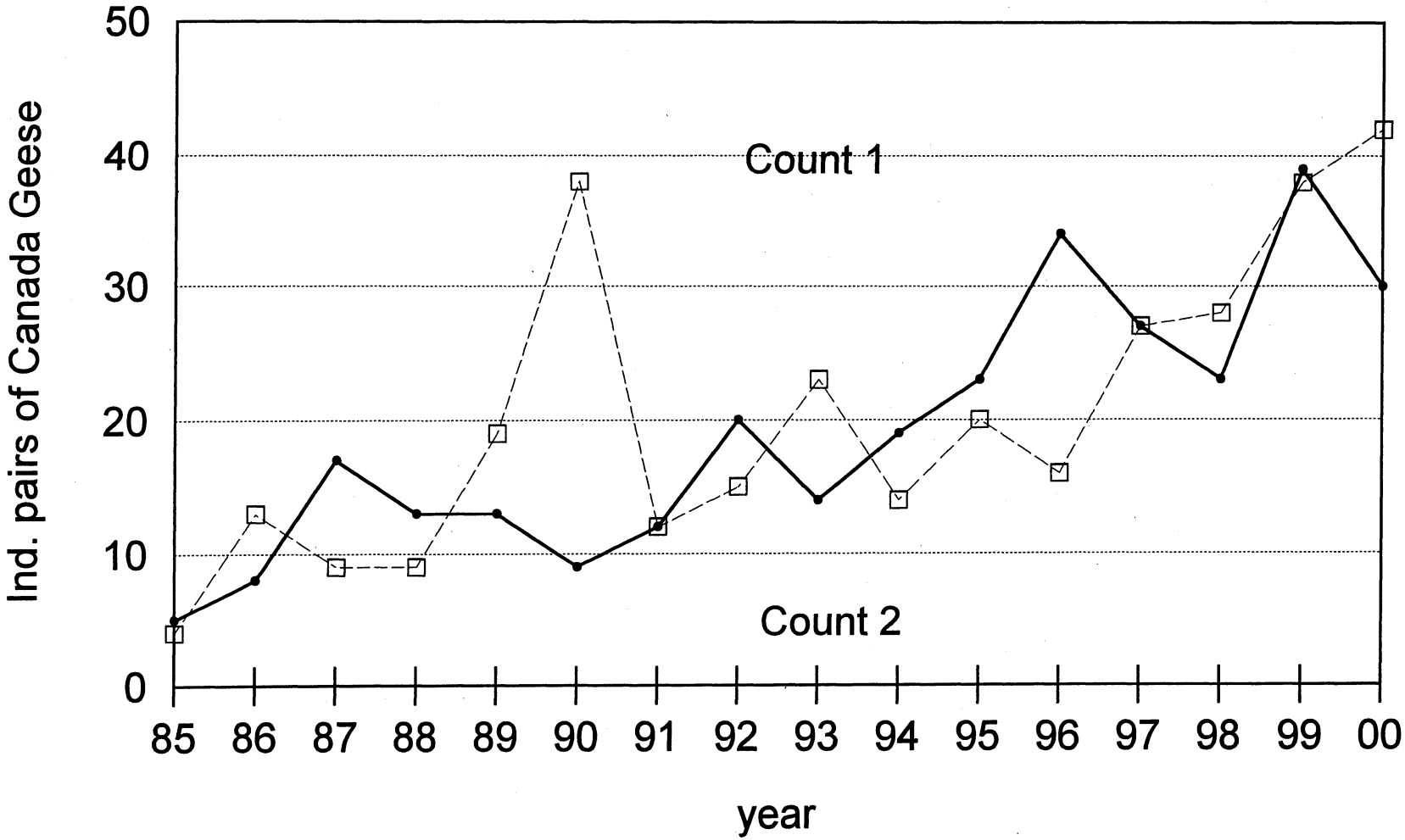


Figure v. The number of Canada Geese indicated pairs on Counts 1 and 2 on Prince Edward Island, 1985 - 2000.