HA FILE NO. 94.47

WINTER RAPTOR AND WATERFOWL STUDIES BETWEEN 1994 AND 1995 ON THE MAURICE RIVER IN CUMBERLAND COUNTY, NEW JERSEY

Submitted October 31, 1995

to

JANE MORTON GALETTO

CITIZENS UNITED TO PROTECT
THE MAURICE RIVER AND ITS TRIBUTARIES, INC.
P.O. BOX 474, MILLVILLE, NEW JERSEY 08332

By

VINCENT J. ELIA and CLAY C. SUTTON

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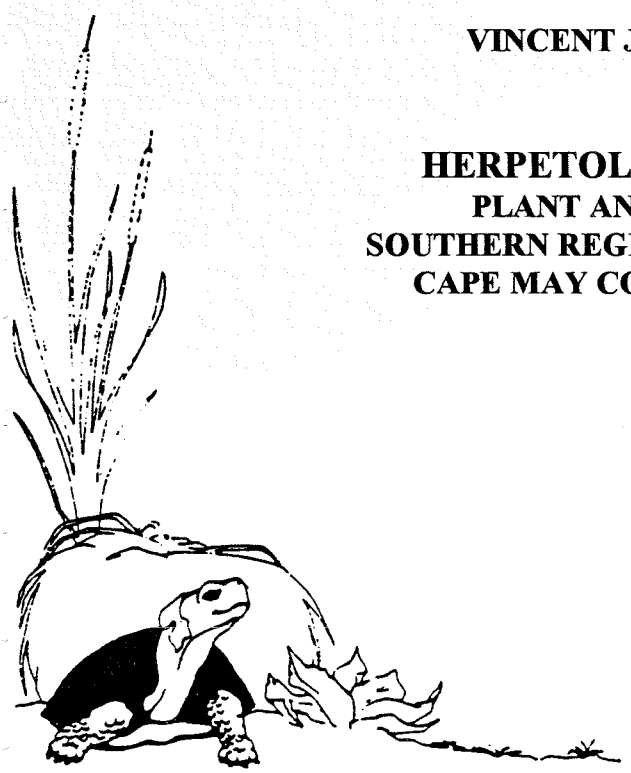

Bog Turtle, *Clemmys muhlenbergii*

Herpetological Associates, Inc. - Environmental Consultants
- Plant and Wildlife Specialists -

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October 31, 1995

Jane Morton Galetto, President
Citizens United to Protect the
Maurice River and Its Tributaries
Post Office Box 474
Millville, New Jersey 08332

Re: Submittal of the Final 1995 Annual Winter Raptor and Waterfowl Survey Along the Maurice River Between November 1994 and March 1995 - HA File No. 94.47.

Dear Jane:

Enclosed please find several copies of the report you commissioned Herpetological Associates, Inc. to compile and prepare for your organization. The report is entitled: "*Winter Raptor and Waterfowl Studies Between 1994 & 1995 on the Maurice River in Cumberland County, New Jersey.*"

This document represents hundreds of man-hours on the river by Clay Sutton, Vince Elia, and Jim Dowdell over the winter of 1994 and 1995. Additionally, they spent several days comparing these current data with that of past years, as well as that of the Division of Fish, Game and Wildlife (NJDEP). The Cohansey River and East Point information was also compared with the Maurice River data as a point of interest for those who track waterfowl and raptor migration numbers in southern New Jersey. We hope you find the report satisfactory. Thank you for the opportunity to conduct this important work in Cumberland County.

Sincerely,

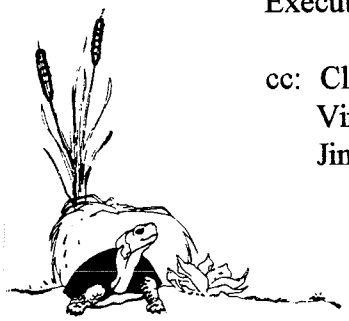
Herpetological Associates, Inc.

Robert T. Zappalorti

Robert T. Zappalorti
Executive Director/President

cc: Clay Sutton, VP -HA
Vince Elia, HA
Jim Dowdell, HA

HA File Name: B:Maurice CU



INTRODUCTION

The winter of 1994-1995 marked the eighth consecutive season of wintering raptor and waterfowl studies along the Maurice River conducted by Herpetological Associates, Inc. (**HA**) under contract to an organization known as "Citizens United to Protect the Maurice River and Its Tributaries" (**CU**). As in previous years of this long-term study, birds of prey (raptors - 10 species) and waterfowl (ducks and geese- 4 species) were counted on the average of every ten days to two weeks, between mid-December (December 8, 1994) and mid-March (March 25, 1995).

METHODOLOGY

A total of nine individual surveys were conducted along the length of the mainstream Maurice River between Millville, the northern limit of the survey, to East Point, New Jersey, the southern terminus of the study corridor. This investigation was carried out during the winter of 1994-1995. The study corridor encompassed a 14 mile stretch along the river. **HA** staff established sampling stations at eight observation points widely separated along the shore of the river. Thirty to forty minutes were spent counting raptors and waterfowl at each of these sampling sites. For a complete explanation of methodology, please see the extensive write up found in "Wintering Raptors and Waterfowl on the Maurice River" by Clay Sutton in *Records of New Jersey Birds,* Vol. XIV, No. 3, Autumn, 1993, published by the New Jersey Audubon Society. Also, see the six subsequent reports written for **CU** by **HA** for each past winter season.

RESULTS - RAPTOR SURVEY

A total of 1,368 raptors, of 10 species, were seen during the nine surveys, with an average of 155 birds of prey per survey. **Table 1** shows the raptors recorded on the Maurice River during the winter of 1994 - 1995. **Figures 2** show the seasonality of raptor concentrations during the same period. Following is a species by species account of the raptors observed and recorded during this investigation.

1. Black Vulture - At an average of 20.5 birds per survey, black vultures were slightly below 1993-1994's average of 24.7 birds, but still far higher than other previous seasons. The table shows a peak of 45 birds in late December followed by a steady decline in numbers over the following weeks. While some birds may have dispersed as spring approached, the drop in numbers was more likely related to the surveys not intersecting the concentration of the birds near roost sites.

2. Turkey Vulture - At 59.3 birds per survey compared to last year's 106.7, turkey vultures accounted for nearly the entire difference in averages for total raptors between '93-'94 and '94-'95 (203 in '93-'94 / 155 in '94-'95). This year's average is in line with the years prior to 1993-1994.

3. Bald Eagle - The average of 3.9 eagles in 1994-1995 was lower than the two previous seasons (8.4 in '92-'93 / 9.5 in '93-'94), but in line with the first five years of the study. The mild weather of '94-'95 was no doubt a major contributing factor as there was no influx of northern birds. Also, waterfowl numbers were down on the river. The peak occurred on February 8th, with a total of six birds (see **Figure 2**).

4. Golden Eagle - One golden eagle was seen on the surveys. It was recorded on January 26th, a date that might indicate a bird wintering on the river, or at least in the region.

5. Northern Harrier - At 23.8 birds per survey, harrier numbers virtually equaled the previous high average of 24 birds in 1991-1992. Numbers on the surveys were very constant during the season. This might be attributed to the consistently moderate weather patterns (**Figure 2**).

6. Cooper's Hawk - During the first five years of the surveys, Cooper's hawks averaged about one per survey. During the following three years, the average was 1.5 ('92-'93), 1.7 ('93-'94), and 1.4 ('94-'95). This would seem to indicate a slight increase in the wintering population along the river over the last three years. This also coincides with its apparent increase as a breeder in the state over the same time frame. Due to its stealthy hunting habits, Cooper's Hawks are much less obvious than the other raptors seen along the river (i.e. vultures, red-tailed hawks, harriers), so any conclusions drawn as to its wintering status are tenuous. Sharp-shinned hawk totals during the surveys were average, but for the second consecutive survey season, northern goshawk went unrecorded.

7. Red-shouldered Hawk - Two different individual red-shouldered hawks were recorded during the survey, about an average number.

8. Red-tailed Hawk - The average of 41.6 red-tails during the 1994-1995 surveys was the highest recorded in the eight years of the study, but only slightly higher than the previous high of 41.0, recorded in 1992-1993. When viewed over the eight years, red-tailed numbers have been remarkably consistent. Rough-legged Hawks were scarce again this season with one or two individuals accounting for the four sightings made in 1994-1995 (see **Figure 2**).

9. American Kestrel - At 1.1 birds per survey, the alarming decline of kestrels as wintering species in New Jersey is evident. This is the lowest average in the eight years of the study and the drop has been steady. The averages have gone from 2.5 in the first five years to 1.9 in 1992-1993, to 1.67 in 1993-1994, to this past years 1.1. Both breeding and migratory numbers have dropped in the same time frame.

10. Peregrine Falcon - Two different peregrines were encountered on the survey. One was an adult female and the other a sub-adult bird. No Merlins were seen during the surveys.

RAPTOR SURVEY SUMMARY

In summary, 1994-1995 was an average year for raptor numbers on the Maurice River. Average, that is, for the Maurice River. It should be noted that raptor concentrations along the river are among the highest in both New Jersey and along the entire east coast. After two years of higher than average bald eagle totals, 1994-1995 returned to averages matching the first five years of the surveys. However, the relative abundance of eagles along the river is tied to both weather and to waterfowl concentrations. Unquestionably, the area continues to be an important over-wintering feeding and roosting site for eagles.

RESULTS - WATERFOWL SURVEY

Four key species of waterfowl, black duck, mallard, northern pintail, and snow goose, were tracked during this investigation among others (**Figures 1 and 3**). The winter of 1994-1995 was quite mild throughout, and open water was prevalent. Not only was the weather relatively mild in New Jersey, but along most of the northeast coast. Possibly because of this, waterfowl numbers were low for the second year in a row, as dabbling ducks and geese will tend to winter as far north as they can. In 1993-1994, it was the cold weather and rather sudden and total ice-up of the river that drove waterfowl out of the area, producing low numbers. In any given year, however, wide fluctuations in numbers may be related to breeding success in the "prairie pothole" regions of the United States and Canada. **Table 2** shows the waterfowl recorded on the Maurice River, during the winter of 1994-1995. **Figure 1** shows the seasonality of waterfowl concentrations during the same period. **Figure 3** shows longer-term peaks and averages for certain species. The graphs showing seasonality reflect expected migratory patterns, the impact of waterfowl hunting season, and expected variation due to tide and weather. To some degree, waterfowl numbers may reflect the amount of eagle activity on the river. Key species accounts follow.

11. Black Duck - At an average of only 810 birds per survey, and at a peak of only 1,509 birds black duck totals were the lowest of the eight seasons of the study. The previous low was last winter's 953 birds per survey. While the black duck population is under pressure from several sources (e.g. interbreeding with mallards) the low numbers of the last two seasons is probably weather related.

12. Mallard - The average of 374 birds per survey in 1994-1995 was higher than in 1993-1994, but numbers were well below the totals of the first six years of the study. While extremes in weather can offer a partial explanation for the decline in dabbler numbers over the past two years, recent poor reproductive seasons in the prairie pothole regions may be the larger reason.

13. Northern Pintail - While the 360 birds per survey was a significant increase over last year's record low, numbers were still down compared to the first six years of the study. Here again, we have the same debate as to whether reproductive success or weather conditions is at the center of the dabbler number decline in the last two years.

14. Snow Goose - The average of 778 birds per survey is easily the lowest in the eight years of the study. There are probably several factors involved, none of which would point to anything more than a one-year aberration. In most years snow geese are driven to the river by freeze-outs to the north (particularly from Edwin G. Forsythe National Wildlife Refuge) which never happened. Also, it should be noted that on one date, January 6, 1995, over 13,000 snow geese were counted on the nearby Cohansey River, a regional concentration which may explain low numbers on the Maurice. .

In summation, low waterfowl totals recorded during 1994-1995 were, for the most part, due to the mild weather encountered during most of the winter. As has been stated, however, low numbers for dabblers such as mallards and pintails may be attributed to poor breeding success over the last couple of years. As of this writing, it has been reported that in 1995 the "prairie pothole" regions have produced a bumper crop of ducks. It will be interesting to see, given a reasonably moderate winter, if numbers rebound in 1995-1996.

ADDITIONAL WATERFOWL DATA

United States Fish and Wildlife Service Aerial Surveys

The U.S. Fish and Wildlife Service, in cooperation with the Atlantic Flyway Council, conducts annual aerial waterfowl surveys in the state of New Jersey. Aerial waterfowl surveys, in some form, have been conducted along the coast of New Jersey for over forty years to determine population trends. The current censuses are conducted in mid-November and early January. The state is divided into five major flight zones and these zones into 56 flight segments. Two of these segments cover the same general area as the **HA** ground surveys. **Table 3** shows comparative totals of the two surveys.

A noticeable difference in the numbers from the fall surveys is in the totals of dabbling ducks (particularly green-winged teal). The **HA** fixed point totals are barely a third of the state's totals. This is due, almost entirely, to the state surveys being done juste before waterfowl hunting season begins and the **HA** surveys after. The mid-winter totals show much closer counts. Otherwise, the totals show expected variations given the two different methods of observation (in particular the greater diversity obtained from ground observations).

First, and foremost, the state surveys confirm and corroborate the **HA** survey results, which indicate that the Maurice River is an important wintering ground for more than 20 species of waterfowl. At any given point in the winter season, with suitable and conducive weather conditions, over 10,000 individual birds can be found using the river for food and shelter. This compares quite favorably to other waterfowl concentration points in the state.

DISCUSSION

Comparison to the Cohansey River

As an adjunct to the Maurice River study conducted for Citizens United, **HA** staff, while involved in other endeavors, were able to carry out a similar (though less intensive) survey of the Cohansey River. The data accrued during that time is presented here, and allows an important comparison between Cumberland County's (and New Jersey's) two largest tributaries to the Delaware Estuary.

Table 4 shows raptors recorded on the Cohansey River during the winter of 1994-1995. **Table 5** shows waterfowl recorded on the Cohansey during the same time frames. For a complete summary of methodology and previous Cohansey River survey results for the winter of 1990-1991 and 1991-1992, see: *"Cumberland County Delaware Estuary Study, Vol. 1, Rare, Threatened and Endangered Species"* (by Herpetological Associates, Inc., October 1992, pages 71-73).

In past studies it has been noted that both vulture and eagle numbers have averaged less for the Cohansey River, when compared to the Maurice River. This was again true in the 1994-1995 studies, although eagle numbers were only slightly lower (3.5 versus 3.9). This had more to do with lower numbers on the Maurice than with any increase on the Cohansey. Northern harrier and red-tailed hawk totals compared favorably again this year. Cooper's Hawks showed a jump in density in 1994-1995 with 5 birds being seen on January 1st. As in the past, American kestrels were more numerous along the Cohansey (7.0 versus 1.1) due to the prevalence of agricultural lands.

With the exception of snow geese, considerably fewer waterfowl were found along the Cohansey. As has been stated in the past, this is no doubt due to the lack of brackish/wild rice wetlands. The presence of 13,000 snow geese on January 6th continues a trend seen in past years. The same prevalence of agricultural lands that attract kestrels do the same for geese.

AUTUMN HAWK MIGRATION AT EAST POINT

As an additional adjunct to the wintering raptor studies, 9.25 hours were spent during the fall of 1994 assessing raptor migration at East Point, at the mouth of the Maurice River. For a full discussion of hawk migration at East Point, see *Autumn Raptor Migration Along New Jersey's Delaware Bayshore: A Hawk Migration Study at East Point, New Jersey*, by Clay Sutton, Chris Schultz, and Paul Kerlinger, submitted to Citizens United by **HA**, dated April 1991.

The brief studies at East Point in 1994 confirmed and corroborated previous findings. Table 6 shows the hawk migration counts from East Point in the fall of 1994. A total of 444 raptors were recorded in 9.25 hours of observation. Highlights included 4 bald eagles and a total of 136 American kestrels (101 in 2.5 hours on September 18th).

SUMMARY

The winter raptor populations on the Maurice River in 1994-1995 were similar to those of the previous seven years. Vulture populations along the river (particularly black vulture) continue on the upswing. While eagle numbers vary with weather and prey availability, the river can, on any given day, play host to a half dozen birds or more. The river also supports very stable winter populations of northern harrier and red-tailed hawk. The only species of concern, American kestrel, appears to be in trouble throughout its wintering range.

Waterfowl populations on the river were down for the second year in a row. As previously discussed, this may be related to weather conditions at either extreme, or more ominously, to long-term declines in duck populations. However, according to the U.S. Fish and Wildlife Service, the population of breeding ducks in the summer of 1995 was double the average of the last four decades in the "prairie pothole" region of the Dakotas and Montana. The restoration and protection of millions of acres in this region may finally be bearing fruit. However, the long term success of increased duck populations also depends on stable wintering grounds and food-rich migratory stopovers. In this respect, the Maurice River plays a crucial role in the health of North American duck populations.

ACKNOWLEDGMENTS

Matching funds for staff salaries and project management were provided by Herpetological Associates, Inc. We thank Robert T. Zappalorti, president of **HA,** for his encouragement and support of this important research project. The authors also thank James Dowdell of **HA** for assisting us on the surveys. Lee Widgeskog, of the New Jersey Department of Environmental Protection, Division of Fish, Game and Wildlife, provided the aerial waterfowl information to us; we graciously appreciate his timely assistance in forwarding the voluminous data. We also wish to thank Citizens United for their ongoing confidence in our work and their continued financial support for this project. We particularly thank Donald Fauerbach and Glenn Ewan for their continuing interest. Finally, **HA** staff particularly acknowledges Jane Galetto of **CU** for her interest, assistance, and logistical support throughout this project.

Respectfully submitted,

Clay C. Sutton

and

Vincent J. Elia

HERPETOLOGICAL ASSOCIATES, INC.

TABLE 1 - RAPTORS RECORDED ON THE MAURICE RIVER - WINTER, 1994-1995

	12/08	12/26	01/08	01/26	02/08	02/22	03/02	03/14	03/25	AVG	MAX
Black Vulture	12	45	35	31	23	9	3	6	4	20.5	45
Turkey Vulture	52	99	70	74	41	41	37	60	86	59.3	99
Bald Eagle	5	4	4	4	6	4	3	1	0	3.9	6
Golden Eagle	0	0	0	1	0	0	0	0	0		1
Northern Harrier	23	25	25	26	22	18	28	23	13	23.8	28
Sharp-sh Hawk	4	2	6	3	2	1	2	2	0	2.8	6
Cooper's Hawk	2	2	1	0	3	0	1	2	0	1.4	3
Red-shld Hawk	2	0	0	0	0	0	0	0	0		2
Red-tailed Hawk	52	34	41	39	29	43	50	45	21	41.6	52
Rough-leg Hawk	0	1	1	0	1	0	0	1	0		1
Am Kestrel	0	2	2	0	2	3	0	0	0	1.1	3
Peregrine Falcon	0	1	0	0	0	0	0	1	1		1
TOTAL RAPTORS	152	215	185	178	129	119	124	141	125	155.4	215

Source: HA, Inc., for CU, 1995

TABLE 2 - WATERFOWL RECORDED ON THE MAURICE RIVER - WINTER, 1994-1995

	12/08	12/26	01/08	01/26	02/08	02/22	03/02	03/14	03/25	AVG	MAX
Mute Swan	3	11	1	13	14	0	13	15	40	8.8	40
Canada Goose	48	69	0	242	290	72	26	20	0	95.9	290
Snow Goose	0	550	603	1000	270	650	800	2355	0	778.5	2355
Mallard	77	110	493	474	671	235	666	269	140	374.4	671
Am Black Duck	360	817	1055	968	1509	480	867	422	666	809.8	1509
Gadwall	0	0	1	0	6	0	6	2	8	1.9	8
N Pintail	1	13	680	414	496	463	400	413	70	360.0	680
Gr-winged Teal	110	98	21	9	23	187	544	205	412	149.6	544
N Shovler	0	0	0	0	0	0	0	0	4	0.0	4
Am Wigeon	0	0	0	0	7	4	3	2	2	2.0	7
Wood Duck	0	0	0	0	0	0	0	0	2	0.0	2
Canvasback	0	0	0	3	0	9	0	0	0	1.5	9
Ring-necked Duck	0	1	0	0	31	0	0	0	0		31
Greater Scaup	0	0	0	0	0	0	4	0	0		4
Lesser Scaup	1	0	0	0	0	7	3	68	0	9.9	68
Scaup Sp	0	1000	0	0	0	0	7	4	0		1000

TABLE 2 - CONTINUED

	12/08	12/26	01/08	01/26	02/08	02/22	03/02	03/14	03/25	AVG	MAX
Black Scoter	0	0	0	0	0	0	3	0	0		3
Surf Scoter	0	0	0	0	0	0	6	0	0		6
Wh-winged Scoter	0	0	0	0	0	2	0	0	0		2
Scoter Sp	0	6	0	0	0	0	15	0	0		15
C Goldeneye	0	22	2	3	2	12	17	9	2	8.4	22
Bufflehead	38	70	91	73	92	87	105	125	100	85.1	125
Oldsquaw	0	5	3	1	0	0	0	0	0	1.1	5
Ruddy Duck	0	2	0	0	0	0	0	3	0		3
Hooded Merganser	0	2	0	0	5	8	2	0	2	2.1	8
Common Merganser	0	0	0	0	33	8	1	0	0	5.3	33
Red-br Merganser	2	12	82	8	25	12	42	16	4	24.9	82
TOTAL WATERFOWL	640	2788	3032	3208	3474	2236	3530	3928	1452	2855	3928

Source: HA, Inc., for CU, 1995

TABLE 3 - STATE AERIAL SURVEYS / HA SURVEYS
COMPARITIVE AVERAGES 1987 - 1995

SPECIES	STATE AVG FALL	HA AVG FALL	% OF STATE FALL	STATE AVG WINTER	HA AVG WINTER	% OF STATE WINTER
Mute swan	3	8	239%	6	8	134%
Tundra Swan	0	0	-	0	1	-
Canada Goose	122	110	90%	126	236	187%
Wood Duck	0	0	-	0	0	-
Brant	0	0	-	0	2	-
Snow Goose	143	938	657%	3,298	1,849	56%
Mallard	1,169	637	54%	1,703	1,507	89%
Am Black Duck	3,349	1,105	33%	3,108	2,613	84%
Gadwall	64	2	3%	1	1	100%
N Pintail	64	40	63%	113	444	392%
Gr-winged Teal	1,437	216	15%	91	23	25%
Bl-winged Teal	0	0	-	0	0	-
Am Wigeon	7	1	7%	0	1	-
Canvasback	0	1	-	0	1	-
Ring-necked Duck	0	7	-	0	0	-
Scaup Sp	3	81	2831%	38	31	81%
C Goldeneye	0	3	-	0	85	-
Bufflehead	19	50	269%	17	38	225%
Oldsquaw	0	0	-	0	0	-
Ruddy Duck	0	4	-	0	0	-
Merganser Sp	19	11	58%	122	29	24%
Totals	6,399	3,214	50%	8,622	6,868	80%

Sources: USFWS/NJDEP-DFGW & HA, Inc., 1995

TABLE 4 - RAPTORS RECORDED ON THE COHANSEY RIVER
WINTER - 1994-1995

	01/01	01/06	AVG	MAX
Black Vulture	0	20		20
Turkey Vulture	13	70	41.5	70
Bald Eagle	3	4	3.5	4
Northern Harrier	13	21	17	21
Sharp-sh Hawk	3	2	2.5	3
Cooper's Hawk	5	1	3	5
Red-shld Hawk	1			1
Red-tailed Hawk	27	41	34	41
Am Kestrel	9	5	7	9
TOTAL RAPTORS	74	164	119	164

Source: HA, Inc., 1995

TABLE 5 - WATERFOWL RECORDED ON THE COHANSEY RIVER
WINTER - 1994-1995

	01/01	01/06	AVG	MAX
Mute Swan	3	3	3	3
Canada Goose	108	183	145	183
Snow Goose	5212	13000	9106	13000
Mallard	29	137	83	137
Am Black Duck	22	114	68	114
N Pintail	0	1		1
Gr-winged Teal	46	22	34	46
Am Wigeon	3	0		3
Wood Duck	0	2		2
Greater Scaup	55	1	28	55
C Goldeneye	12	0		
Bufflehead	0	4		4
Hooded Merganser	0	2		2
Common Merganser	0	11		11
Red-br Merganser	6	1	3.5	6
TOTAL WATERFOWL	5496	13481	9489	13481

Source: HA, Inc., 1995

TABLE 6 - MIGRATORY RAPTORS RECORDED AT EAST POINT, AUTUMN, 1994

	09/18	10/05	10/13	11/12	TOTAL
Black Vulture	1	2	2	0	5
Turkey Vulture	13	9	18	24	64
Bald Eagle	2	0	1	1	4
Northern Harrier	7	12	4	13	36
Sharp-sh Hawk	41	35	18	2	96
Cooper's Hawk	1	3	1	2	7
Broad-winged Hawk	0	2	0	0	2
Red-shld Hawk	0	0	0	2	2
Red-tailed Hawk	4	4	4	73	85
Rough-leg Hawk	0	0	0	0	0
Osprey	0	2	1	0	3
Am Kestrel	101	33	1	1	136
Merlin	0	2	0	0	2
Peregrine Falcon	1	0	1	0	2
Total Hours:	(2.50)	(2.00)	(1.50)	(3.25)	(9.25)
TOTAL RAPTORS	171	104	51	118	444

Source: HA, Inc., 1995

FIGURE 1 - SEASONALITY OF WATERFOWL CONCENTRATIONS ON THE MAURICE RIVER

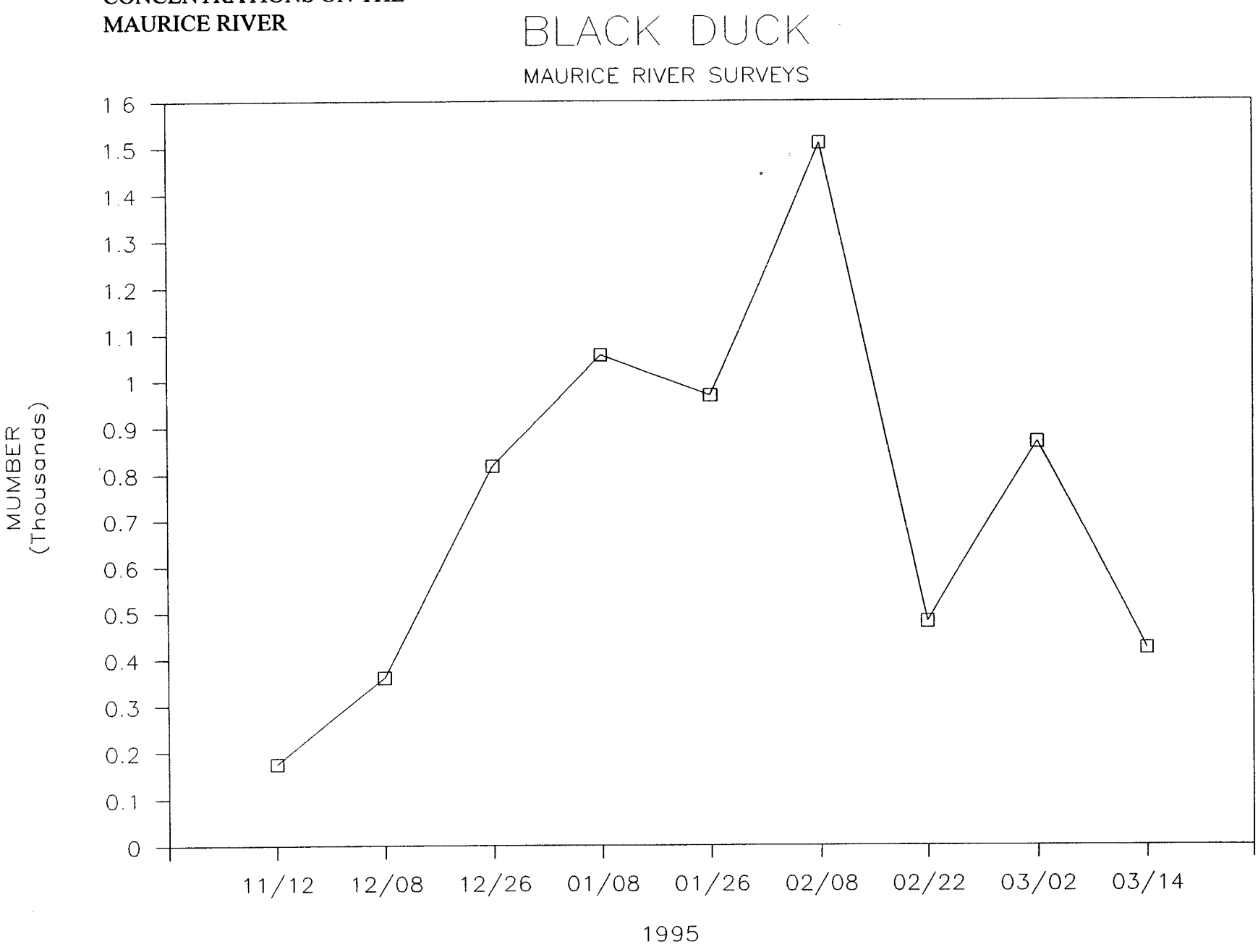


FIGURE 1 - CONTINUED

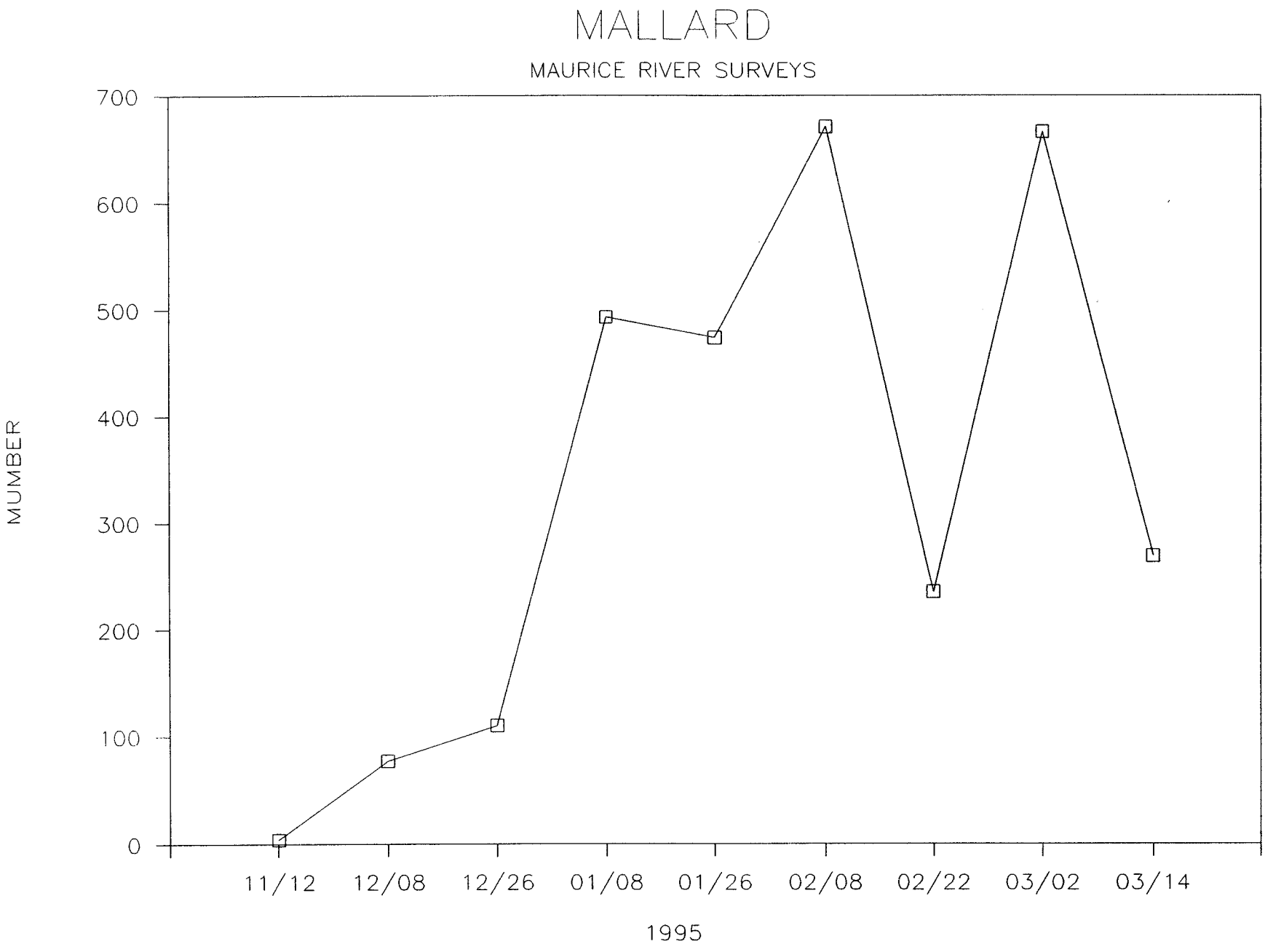


FIGURE 1 - CONTINUED

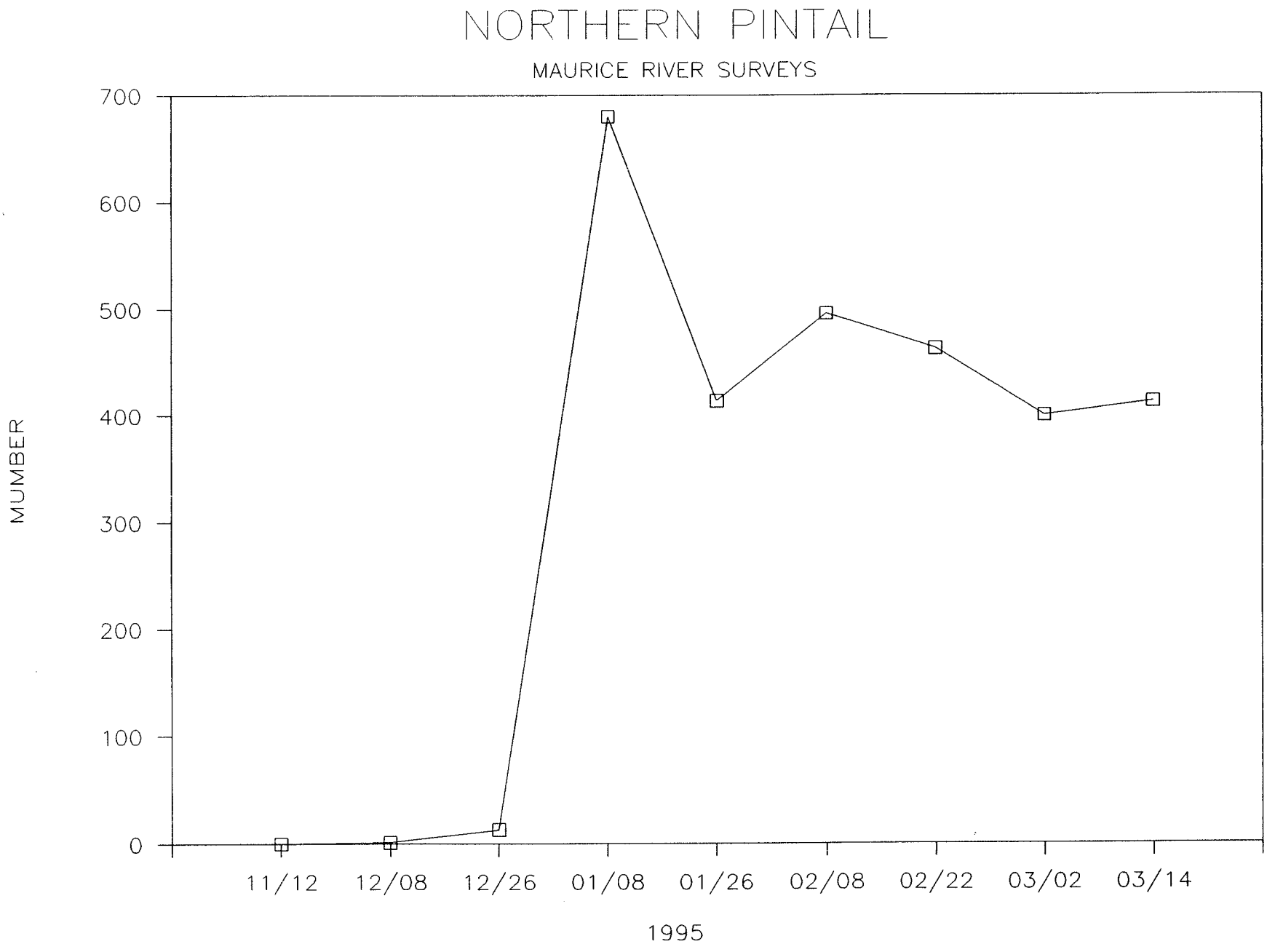


FIGURE 1- CONTINUED

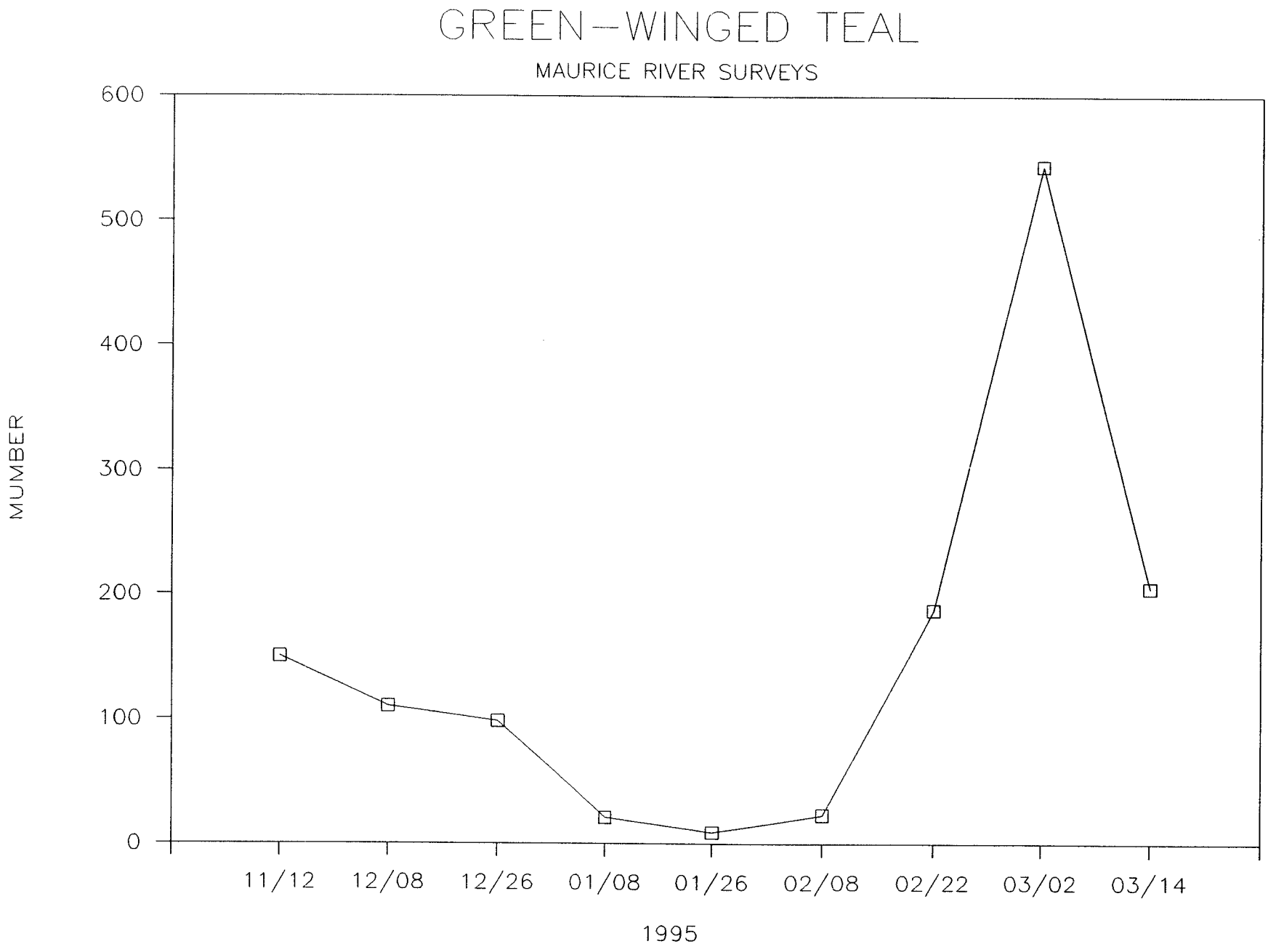
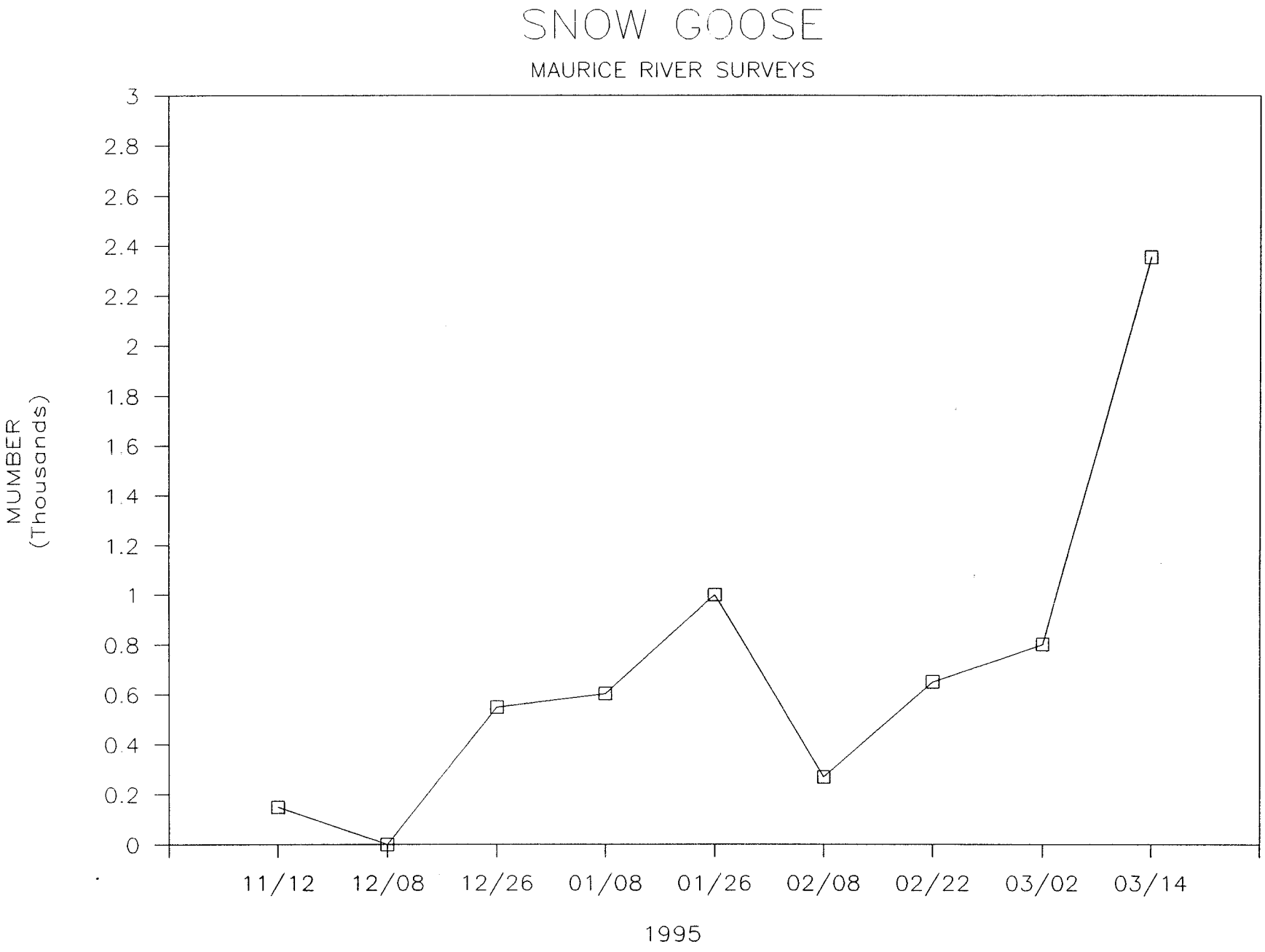


FIGURE 1 - CONTINUED



Source: HA, Inc., for CU, 1995

FIGURE 2 - SEASONALITY OF RAPTOR CONCENTRATIONS ON THE MAURICE RIVER

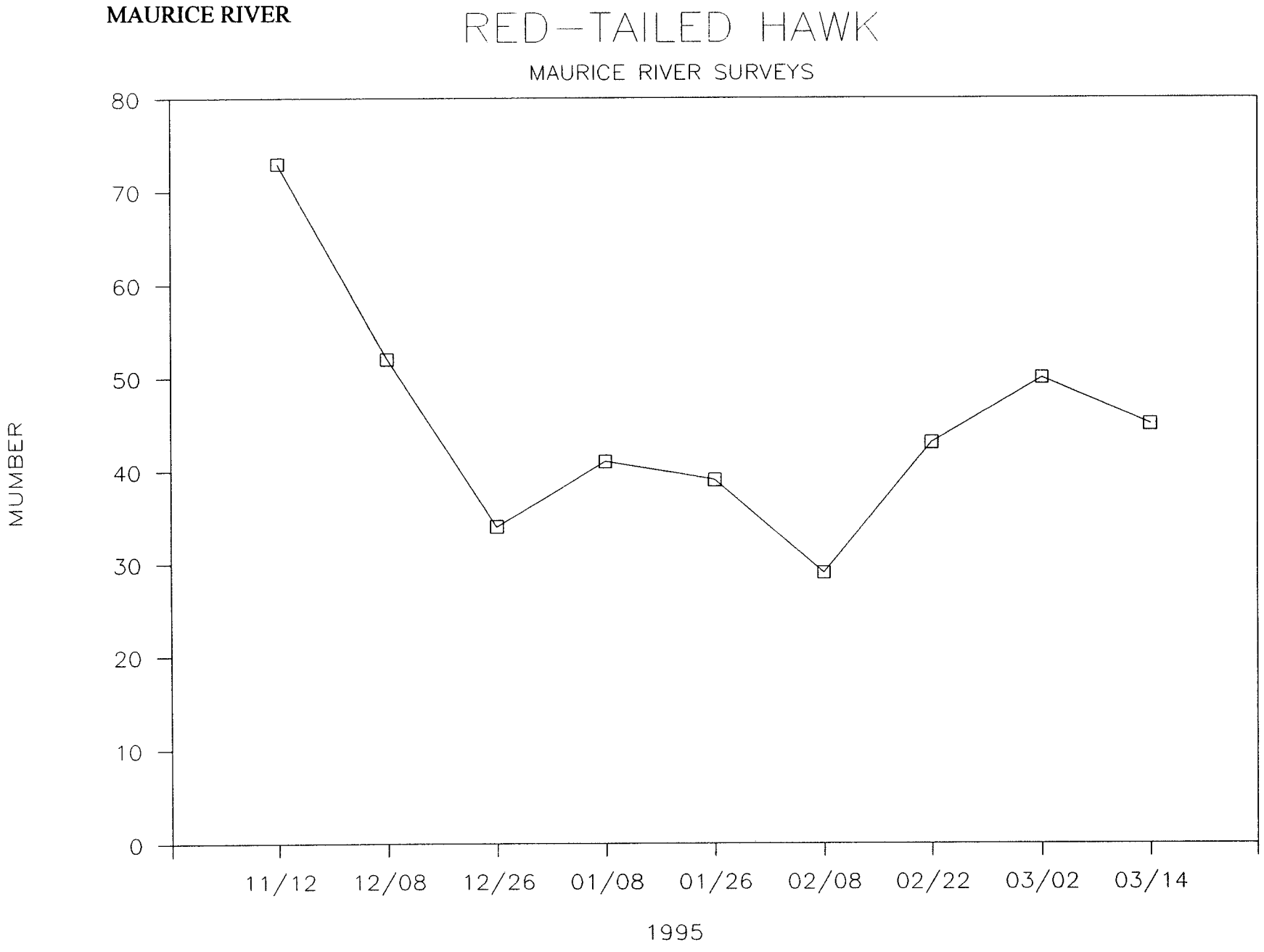


FIGURE 2 - CONTINUED

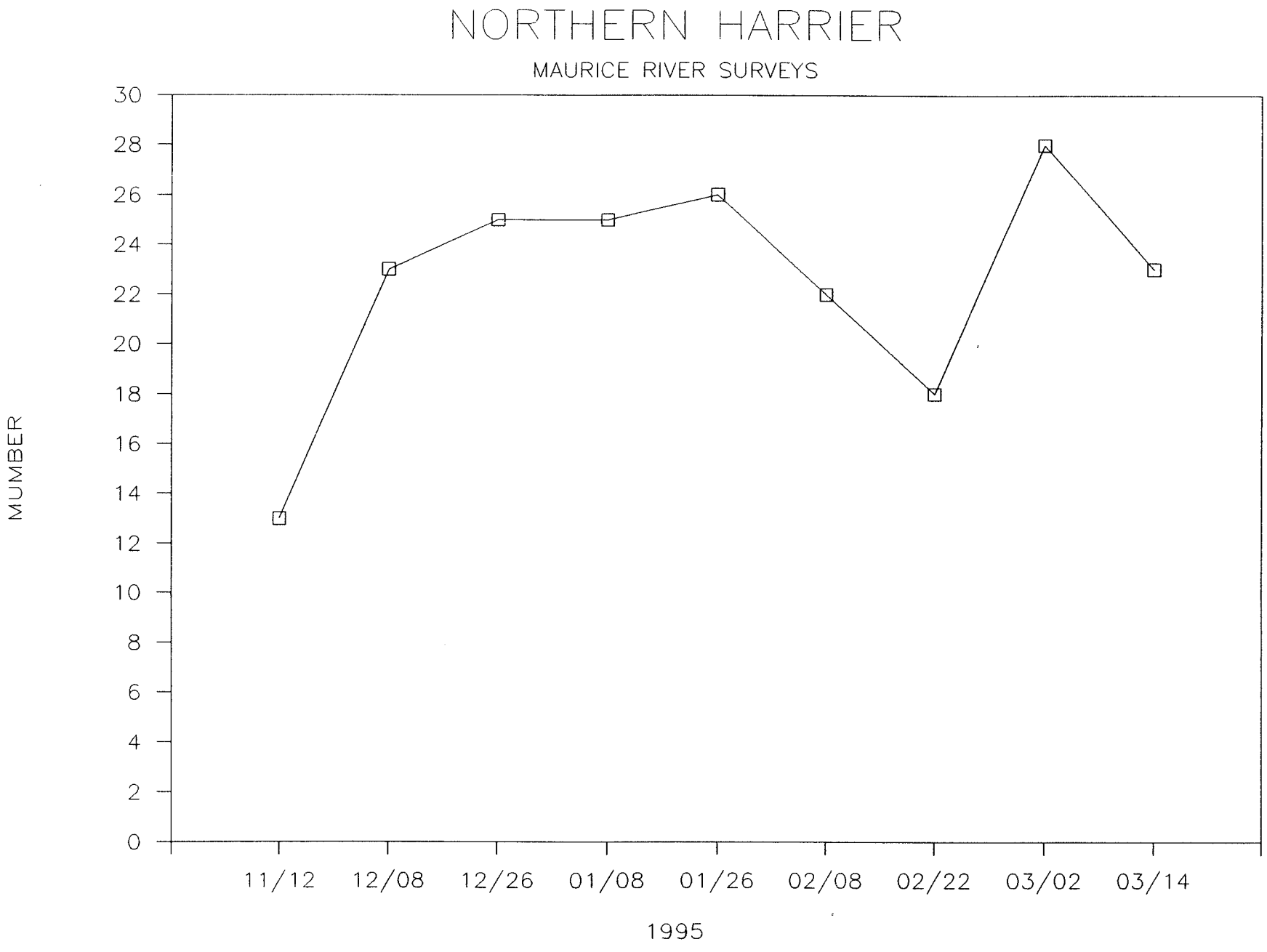
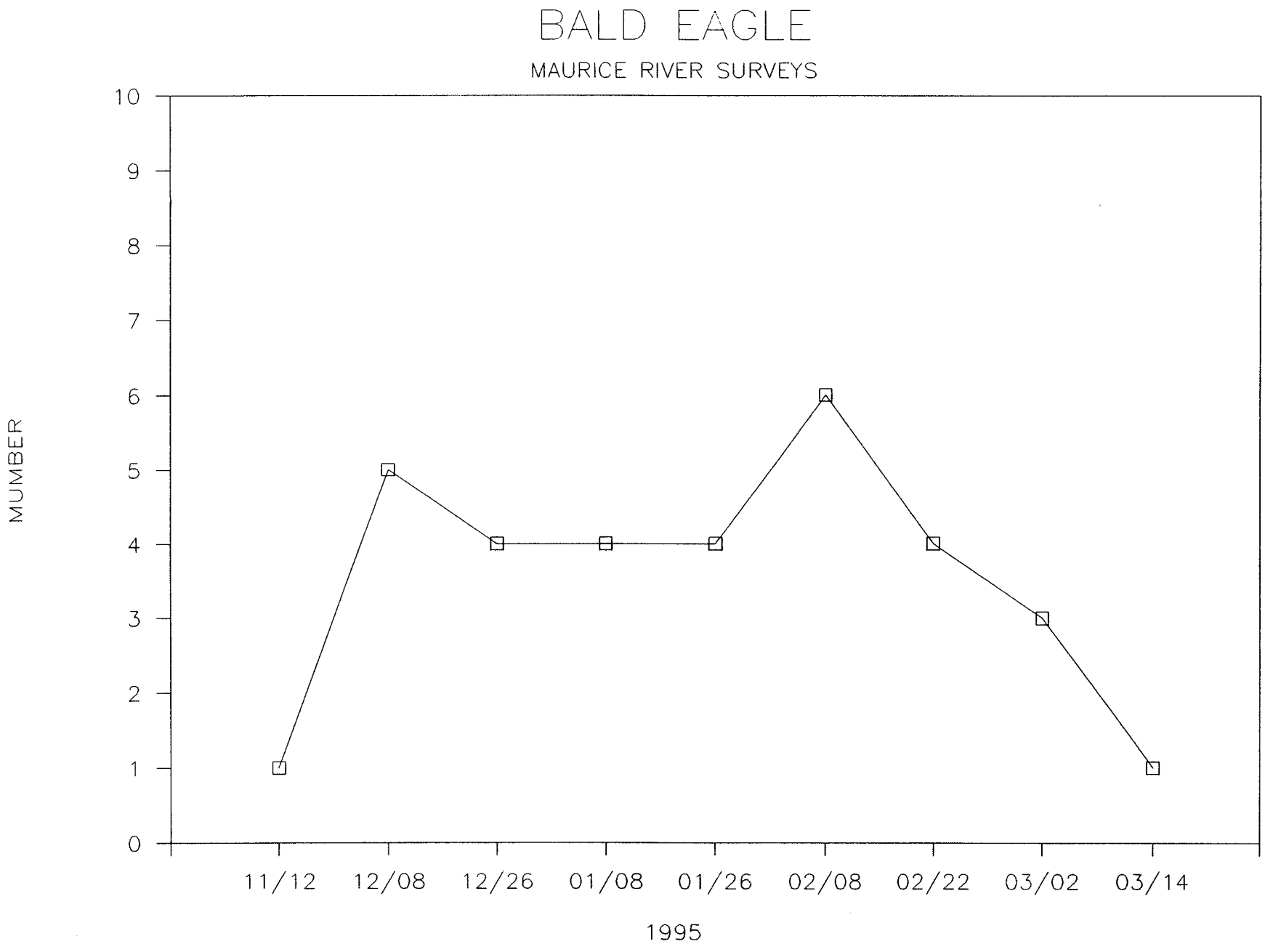


FIGURE 2 - CONTINUED



Source: HA, Inc., for CU, 1995

FIGURE 3 - LONG -TERM WATERFOWL PEAKS AND AVERAGES

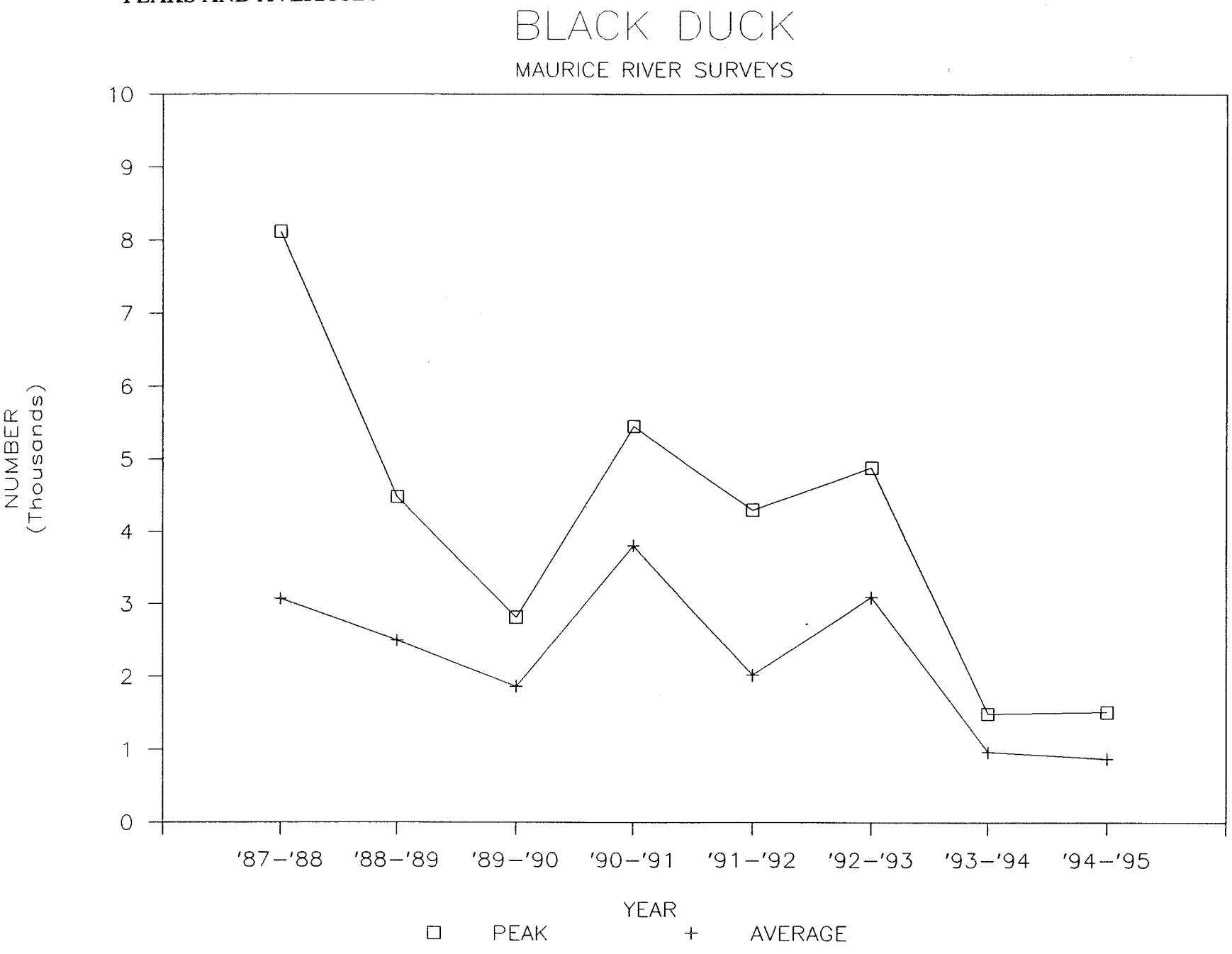


FIGURE 3 - CONTINUED

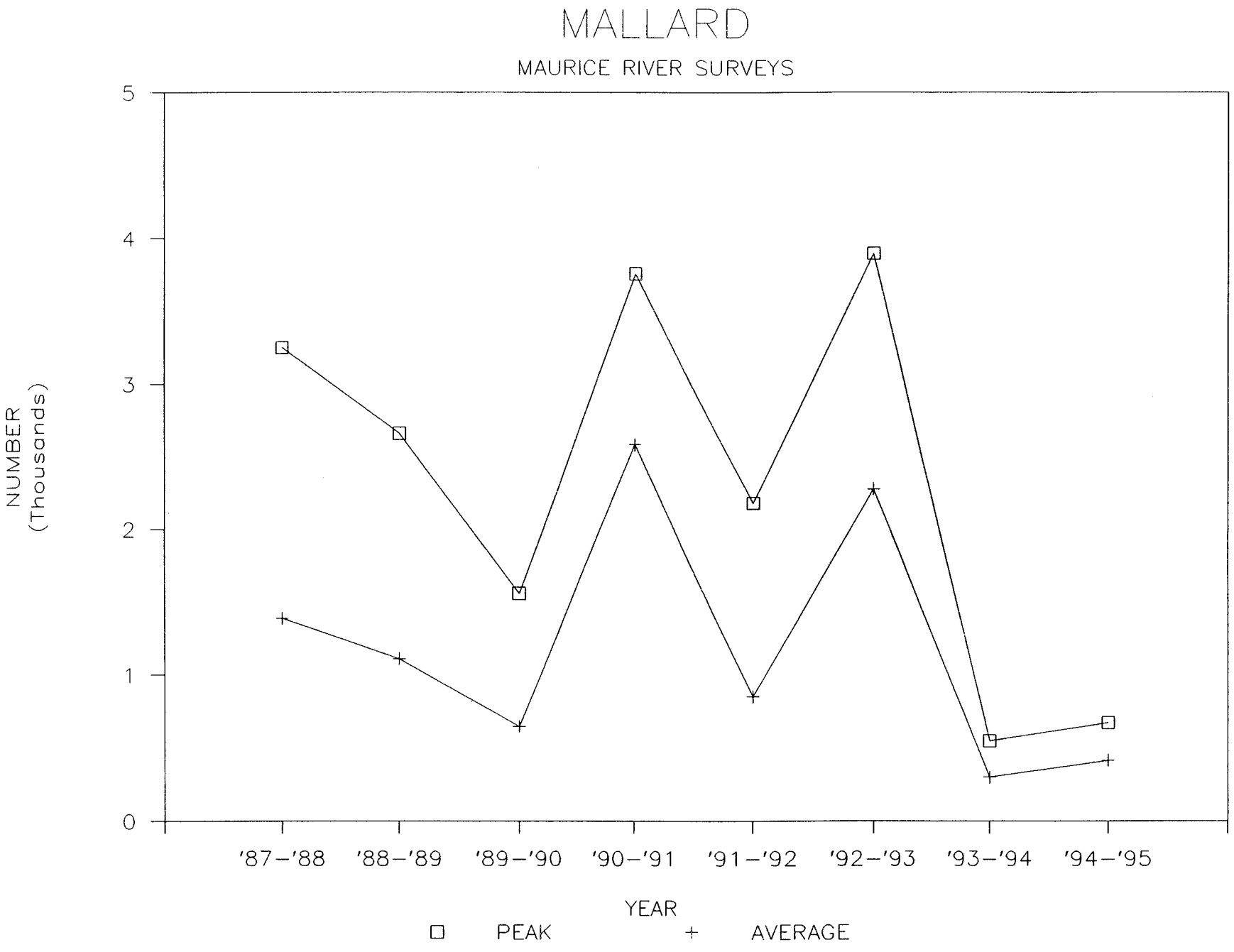


FIGURE 3 - CONTINUED

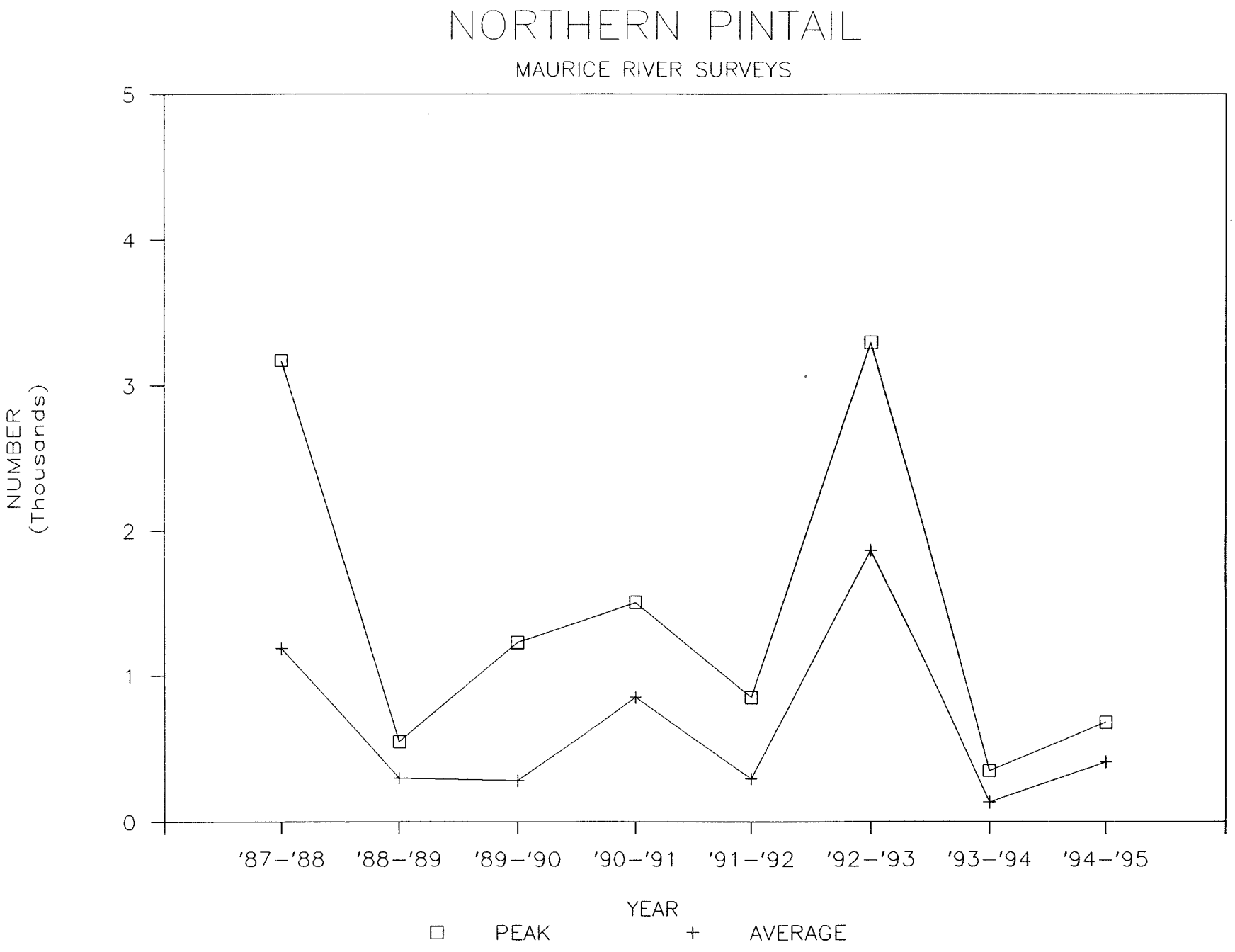


FIGURE 3 - CONTINUED

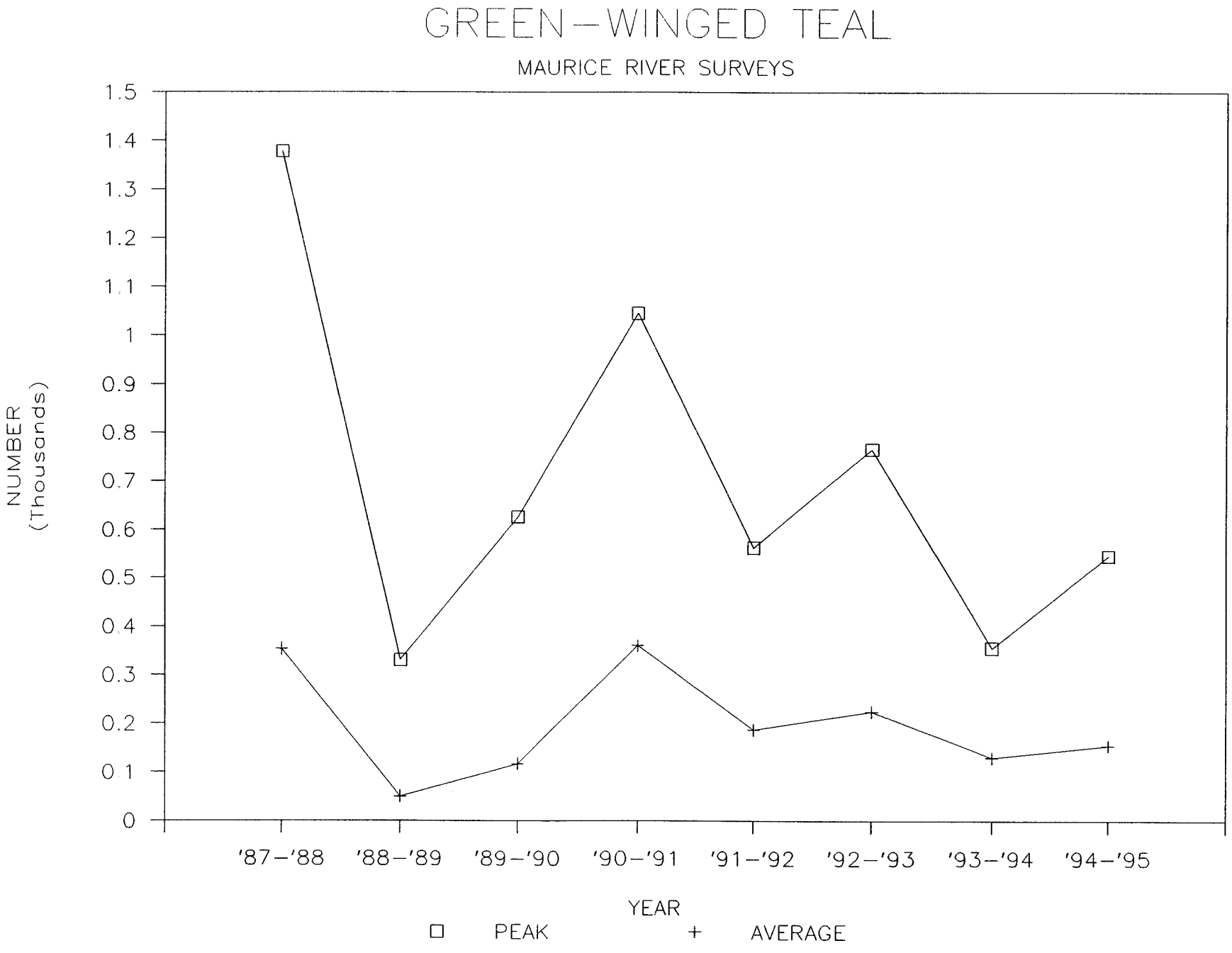
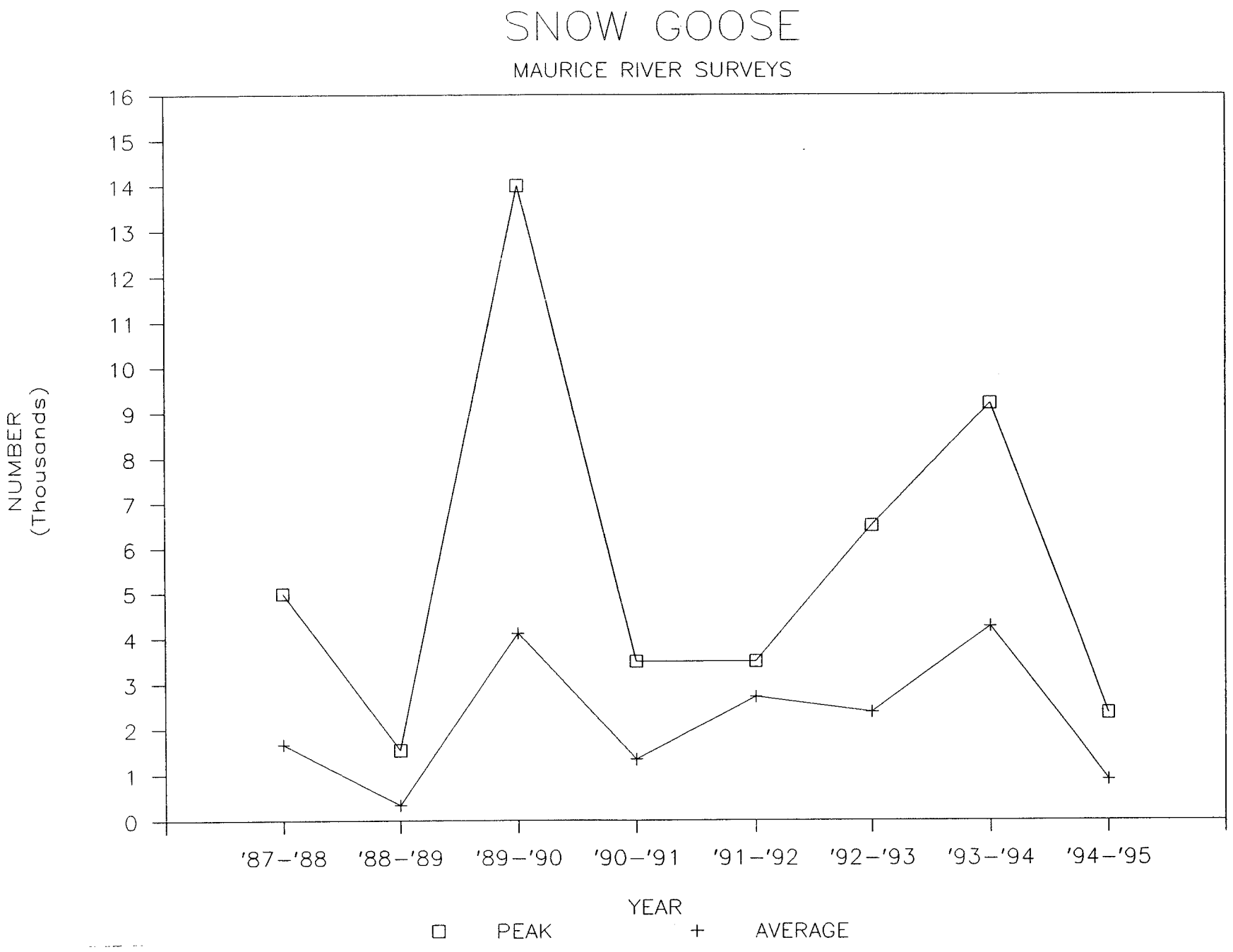


FIGURE 3 - CONTINUED



APPENDIX 1 - STATE AERIAL/HA SURVEYS / YEARLY COMPARISONS

SPECIES	STATE SURVEYS '87 NOV	STATE SURVEYS '88 JAN	HA SURVEYS '87 NOV	HA SURVEYS '88 JAN	STATE SURVEYS '88 NOV	STATE SURVEYS '89 JAN	HA SURVEYS '88 NOV	HA SURVEYS '89 JAN
Mute swan	0	0	0	3	0	0	16	6
Tundra Swan	0	0	0	0	0	0	0	4
Canada Goose	0	0	0	384	0	0	26	35
Wood Duck	0	0	1	0	0	0	0	0
Brant	0	0	0	0	0	0	0	0
Snow Goose	1,000	5,000	75	800	0	2,000	0	517
Mallard	800	1,500	500	1,167	300	500	90	2,055
Am Black Duck	3,400	2,000	750	2,692	1,700	1,000	533	3,631
Gadwall	0	0	10	2	0	0	0	0
N Pintail	0	0	5	0	0	0	2	412
Gr-winged Teal	1,000	0	1,500	0	800	0	76	0
Bl-winged Teal	0	0	0	0	0	0	0	0
Am Wigeon	0	0	0	0	0	0	0	0
Canvasback	0	0	0	0	0	0	0	0
Ring-necked Duck	0	0	0	1	0	0	0	0
Scaup Sp	0	0	0	3	0	0	0	215
C Goldeneye	0	0	0	1	0	0	1	12
Bufflehead	0	0	12	19	0	0	90	0
Oldsquaw	0	0	1	0	0	0	0	0
Ruddy Duck	0	0	0	0	0	0	0	0
Merganser Sp	0	200	0	14	0	100	2	34
Totals	6,200	8,700	2,854	5,086	2,800	3,600	836	6,920

SPECIES	STATE SURVEYS '89 NOV	STATE SURVEYS '90 JAN	HA SURVEYS '89 NOV	HA SURVEYS '90 JAN	STATE SURVEYS '89 NOV	STATE SURVEYS '90 JAN	HA SURVEYS '90 NOV	HA SURVEYS '91 JAN
Mute swan	0	0	6	0	0	0	9	13
Tundra Swan	0	0	0	6	0	0	0	0
Canada Goose	0	0	500	75	0	0	37	33
Wood Duck	0	0	0	0	0	0	0	0
Brant	0	0	0	0	0	0	2	0
Snow Goose	0	5,000	6,700	4,313	0	2,000	222	1,050
Mallard	400	700	450	572	2,100	4,600	2,257	3,714
Am Black Duck	4,800	3,400	760	1,662	5,900	8,400	2,168	5,448
Gadwall	0	0	0	2	0	0	4	0
N Pintail	0	0	0	143	0	200	86	605
Gr-winged Teal	1,000	0	0	1	4,000	100	4	40
Bl-winged Teal	0	0	0	0	0	0	0	1
Am Wigeon	0	0	0	1	0	0	4	1
Canvasback	0	0	0	3	0	0	9	0
Ring-necked Duck	0	0	0	0	0	0	58	0
Scaup Sp	0	0	0	3	0	0	540	0
C Goldeneye	0	0	0	0	0	0	21	2
Bufflehead	0	0	2	17	100	0	7	34
Oldsquaw	0	0	0	0	0	0	0	0
Ruddy Duck	0	0	0	0	0	0	0	0
Merganser Sp	0	200	10	44	100	100	15	16
Totals	6,200	9,300	8,428	6,842	12,200	15,400	5,443	10,957

APPENDIX 1 - CONTINUED

SPECIES	STATE SURVEYS '91 NOV	STATE SURVEYS '92 JAN	HA SURVEYS '91 NOV	HA SURVEYS '92 JAN	STATE SURVEYS '92 NOV	STATE SURVEYS '93 JAN	HA SURVEYS '92 NOV	HA SURVEYS '93 JAN
Mute swan	8	0	7	10	7	14	5	16
Tundra Swan	0	0	0	1	0	0	0	1
Canada Goose	300	0	200	630	180	0	0	81
Wood Duck	0	0	0	0	0	0	0	0
Brant	0	0	0	13	0	0	0	0
Snow Goose	0	10,180	199	3,040	0	200	310	2,525
Mallard	400	2,335	810	1,435	1,340	1,170	460	2,442
Am Black Duck	1,400	2,940	1,737	2,952	1,890	1,582	1,686	2,757
Gadwall	0	0	0	2	50	0	0	0
N Pintail	0	600	94	625	150	55	20	1306
Gr-winged Teal	600	400	3	9	520	110	1	87
Bl-winged Teal	0	0	0	0	0	0	0	0
Am Wigeon	0	0	0	1	0	0	0	0
Canvasback	0	0	0	0	0	0	0	1
Ring-necked Duck	0	0	0	0	0	0	0	0
Scaup Sp	0	0	41	0	20	0	50	0
C Goldeneye	0	0	2	203	0	0	0	4
Bufflehead	0	0	108	5	0	5	55	95
Oldsquaw	0	0	0	3	0	0	0	0
Ruddy Duck	0	0	0	0	0	0	0	0
Merganser Sp	0	320	2	7	30	0	1	36
Totals	2,708	16,775	3,203	8,933	4,187	3,136	2,588	9,349

SPECIES	STATE SURVEYS '93 NOV	STATE SURVEYS '94 JAN	HA SURVEYS '93 NOV	HA SURVEYS '94 JAN	STATE SURVEYS '94 NOV	STATE SURVEYS '95 JAN	HA SURVEYS '94 NOV	HA SURVEYS '95 JAN
Mute swan	7	9	14	8	N	22	3	6
Tundra Swan	0	0	0	0	O	0	0	0
Canada Goose	375	170	71	530		840	48	117
Wood Duck	0	0	0	0	S	0	0	0
Brant	0	0	0	0	U	0	0	0
Snow Goose	0	0	0	280	R	2,000	0	2,272
Mallard	2,845	785	448	341	V	2,030	77	332
Am Black Duck	4,350	2,710	842	1,082	E	2,830	360	682
Gadwall	400	0	0	0	Y	10	0	0
N Pintail	300	0	115	94		50	1	365
Gr-winged Teal	2,140	0	33	20	C	120	110	25
Bl-winged Teal	0	0	0	0	O	0	0	0
Am Wigeon	50	0	0	0	N	0	0	1
Canvasback	0	0	2	4	D	0	0	1
Ring-necked Duck	0	0	0	0	U	0	0	0
Scaup Sp	0	305	15	27	C	0	1	0
C Goldeneye	0	0	0	452	T	0	0	6
Bufflehead	30	30	88	79	E	100	38	55
Oldsquaw	0	0	1	0	D	0	0	1
Ruddy Duck	0	0	34	0		0	0	0
Merganser Sp	0	15	54	47		40	2	32
Totals	10,497	4,024	1,717	2,961		8,042	640	3,893

Sources: USFWS/NJDEP-DFGW & HA, Inc., 1995

Peregrine Falcon (*Falco peregrinus*)

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