CHRONOLOGY OF WATERFOWL MIGRATION

Spring, 1973

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Donald McLennan — Sackville, New Brunswick

data collection only

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I Amherst Point Bird Sanctuary

II John Lusby National Wildlife Area

III Shepody National Wildlife Area and surrounding coastal areas

Foreword

Observations at the John Lusby National Wildlife Area and Amherst Point Bird Sanctuary were by Myrtle Bateman. Observations at the Tintamarre National Wildlife Area and Cole's Island - Ram Pasture were by Donald McLennan. The Shepody area and the Missaquash were observed by both Bateman and McLennan.

The written report for the John Lusby, Amherst Point and the Shepody area is by Bateman (Parts I - III). The report for the Tintamarre, Cole's Island - Ram Pasture and the Missaquash is by McLennan (Parts IV - VI).

I Amherst Point Sanctuary

Procedure

Migratory waterfowl on the Amherst Point Sanctuary were observed on 41 days from March 19 to May 31. Observation periods were in early morning (beginning at 7.00 a.m. local time) or late afternoon (beginning at 3.00 p.m. local time). The birds were observed from points which could be reached with a minimum of disturbance.

Results and Discussion

As in previous years, black duck, pintail and American green-winged teal were the most numerous species observed (Table 1).

The number of black duck at Amherst Point peaked about a week earlier than in 1972 and a week later than in 1971 (Figure 1). The percentage of blacks which were paired was at a high level in the first and last weeks of May (Table 2).

Flocks of American green-winged teal were seen on the sanctuary until mid-April. After the first of May, most teal were paired (Table 3). Green-wings did not appear in the numbers seen during the 1972 migration, but arrived a month earlier (Figure 2).

More male than female pintail were seen on the sanctuary (Table 4). Two distinct waves of pintail passed through Amherst Point - April 5 to 10 and April 17 to 30 (Figure 3).

Ring-necks arrived two weeks earlier and reached a maximum number about one week earlier than in 1972 (Figure 4). A smaller percentage of ring-necks observed were paired in 1973 (Table 5) than in 1972, when 73 per cent or more of the birds observed were paired on every occasion.

Migrating American wigeon did not remain long on the sanctuary (Figure 5). There appeared to be two nesting pairs that were observed after May 18. The sharp peaks in the blue-winged teal population after the first of May (Figure 5) were probably caused by the nesting behaviour of females.

There was very little open water on the sanctuary on March 19 (Figure 6). The lakes were still mostly ice-covered on April 8, but Impoundment 1 was flooded (Figure 7). Only small patches of ice remained in the lakes on April 10 (Figure 8), and the sanctuary was virtually ice-free by April 19. Ice-out was approximately the same time as in 1971 and at least three weeks earlier than in 1972.

Because the area remained frozen until late in 1972, waterfowl arrived late and probably stayed for shorter periods than in 1973. The 1972 and 1973 chronologies are, therefore, very different. Figures 1 - 3 indicate that the number of blacks using the sanctuary in 1973 was close to the number observed in 1971, while there may have been more pintails and American green-winged teal in 1973.

The number of ring-necks on the sanctuary appeared to be less in 1973 than in either 1972 or 1971. However, ring-necks collected in a new impoundment on the John Lusby National Wildlife Area. They were not recorded on the National Wildlife Area in previous years.

A smaller area was flooded in 1973 than in 1972. Blacks and pintail were feeding in open water on the area below the Impoundment 2 dike as early as March 19 (Figure 6). Water had receded from this area by the first week in April.

Waterfowl were observed resting and feeding in Impoundment 1 as soon as water appeared there in late March. The water level was not artificially maintained in either impoundment, but ducks continued to feed in some areas of Impoundment 1 until mid-May. A brood of six blacks was observed there on May 30.

American green-winged teal were often seen feeding along the north-west shore of Lake A. Ring-necks also favoured Lake A as a feeding area.

The field of barley and oats planted in 1972 to act as supplemental goose food was not utilized. No geese were observed on the Sanctuary in 1973. This was probably a result of the open salt marshes with adjacent unharvested grain fields.

Courtship behaviour was first observed in black ducks in March (Table 6). American green-winged teal in predominantly male flocks were frequently seen displaying in April.

Six pairs of blue-winged teal had well established territories by the last week in May (Figure 9). A blue-wing nest containing six eggs was located May 24 (Figure 9). The nest contained 12 eggs and the female was incubating on May 31.

Table 1. The number of each species of waterfowl seen on each observation at Amherst Point Sanctuary - 1973
AM indicates a morning observation; PM an afternoon observation

Dates	Mal.	Blk.	Pin.	Gwt.	Ring.	Bwt.	Wid.	C.merg.	Shov.	C.scot.	C.loon	R-b.merg.
March 19 PM	1	12	2									
20 AM	1	24	17									
22 PM		38										
23 AM	1	22										
26 PM		5		3								
27 AM		14	7	2	1							
28 PM		13										
29 AM		21		24								
April 2 PM		17	3	16								
3 AM		17	12	10								
4 PM		31	9	23								
5 AM		27	1	8								
7 AM						2						
9 PM		28	66	14	5		1					
10 AM	2	38	9	21	1	2						
11 PM	2	14		16				3				
12 AM		41		22			4		2			
16 PM		27		18	13							
17 AM		31	8	15	8	1	5					
18 PM		50	9	5		2						
19 AM		48	15	52	9	5						
23 PM		64	20	16	3							
24 AM		26	23	25	5							
25 PM		31	3	40								
26 AM		32	16	35	4	4	5			2		
30 PM		1	4	27	10	3	2			3	1	

Table 1. The number of each species of waterfowl seen on each observation at Amherst Point Sanctuary - 1973
AM indicates a morning observation; PM an afternoon observation (continued)

Dates		Mal.	Blk.	Pin.	Gwt.	Ring.	Bwt.	Wid.	C.merg.	Shov.	C.scot.	C.Loon	R-b.merg.
May	1 AM	2	11	1	11	28	6	1				1	
	3 PM		10	2	26	20	7	2		1			
	4 AM		12		41	11	10					1	
	7 PM		1			19	5						
	8 AM		4		4	12	6						
	11 AM		5	3	7	18	15						
	14 PM		6		4	3	4						3
	15 AM		10	3	13	3	10						
	18 AM	1	14	1	2	8	9	4					
	21 PM		10				6	2				1	
	22 AM	1	8			2	4	3					
	23 PM		6			2	8	3					
	24 AM	1	4		2	2	12						
	30 AM		4(6yg.)		2	3	13	3					
	31 PM		2		1	2	7	3					

Table 2. Black duck - total number, number of pairs and per cent paired on each observation date at Amherst Point Sanctuary - 1973

Date	Total number	Number of pair	Per cent paired
March 19	12	3	50
20	24	3	25
22	38		
23	22	2	18
26	5		
27	14	2	29
28	13	1	15
29	21	5	50
April 2	17	3	33
3	17	7	82
4	31	5	33
5	27	2	14
9	28	5	36
10	38	2	10
11	14	7	100
12	41	7	35
16	27	6	44
17	31	5	33
18	50	5	20
19	48	7	29
23	64	5	16
24	26	7	55
25	31	4	25
26	32	7	44
30	1		
May 1	11	4	73
3	10	3	60
4	12	4	67
7	1		
8	4		
11	5	1	40
14	6	1	33
15	10	1	20
18	14	2	29
21	10	1	20
22	8	2	50
23	6	2	67
24	4	2	100
30	4		
31	2	1	100

Table 3. American green-winged teal - total number, number of pairs, per cent paired, and number of male and female on each observation date at Amherst Point Sanctuary - 1973

Date	Number of ducks	Number of pairs	Per cent paired	Number of males	Number of females
March 19					
20					
22					
23					
26	3			3	
27	2			2	
28					
29	24	3	25		
April 2	16			14	2
3	10				
4	23			15	8
5	8				
9	14	3	43	11	3
10	21				
11	16				
12	22	1	10	15	7
16	18			14	4
17	15			14	1
18	5	2	80	3	2
19	52	10	40	36	16
23	16	5	62	11	5
24	25	4	33	20	5
25	40	6	30	24	6
26	35	6	25	28	7
30	27	4	29	15	12
May 1	11	4	73	7	4
3	26	12	92	14	12
4	41	10	50		
7					
8	4	2	100	2	2
11	7	3	86	4	3
14	4			4	
15	13	3*	-	-	-
18	2	1	100	1	1
21					
22					
23					
24	2	1	100	1	1
30	2			2	
31	1			1	

* At least 3 pairs were observed, probably more.

Table 4. Pintail - total number, number of pairs, per cent paired, and number of male and female on each observation date at Amherst Point Sanctuary - 1973

Date	Number of ducks	Number of pairs	Per cent paired	Number of males	Number of females
March 19	2	1	100	1	1
20	17	2	25	15	2
22					
23					
26					
27	7			7	
28					
29					
April 2	3	1	67	2	1
3	12	2	33	10	2
4	9	2	44	7	2
5	1			1	
9	66	3	9	63	3
10	9			9	
11					
12					
16					
17	8	3	75	5	3
18	9	4	89	5	4
19	15	4	53	11	4
23	20	5	50	15	5
24	23	5	43	18	5
25	3			3	
26	16	3	37	13	3
30	4	(2 M and 1 F flying)		3	1
May 1	1			1	
3	2	1	100	1	1
4					
7					
8					
11	3	1	67	2	1
14					
15	3	1	67	2	1
18	1			1	
No pintails observed May 21 to 31					

Table 5. Ring-necked duck - total number, number of pairs, per cent paired, and number of male and female on each observation date at Amherst Point Sanctuary - 1973

Date	Number of ducks	Number of pairs	Per cent paired	Number of males	Number of females
March 19					
20					
22					
23					
26					
27	1			1	
28					
29					
April 2					
3					
4					
5					
9	5			4	1
10	1			1	
11					
12					
16	13			11	2
17	8			6	2
18					
19	9	1	22	7	2
23	3	1	67	2	1
24	5	2	80	3	2
25					
26	4	2	100	2	2
30	10	2	40	8	2
May 1	28	5	36	23	5
3	20			16	4
4	11	2	36	8	3
7	19	7	70	12	7
8	12	4	67	7	5
11	18	7	78	11	7
14	3	1	67	1	2
15	3	1	67	2	1
18	8	3	75	5	3
21					
22	2			2	
23	2	1	100	1	1
24	2			1	1
30	3			3	
31	2	1	100	1	1

Table 6. Observations of waterfowl courtship behaviour at Amherst Point Sanctuary - Spring 1973

Date	Observation
March 22	Wing-flapping and chasing among 38 black duck.
28	The male of a pair of black duck nodding his head.
	One black in a group of 11 flapping his wings and rushing at other ducks.
April 3	Male pintail preening-behind-wing to female.
4	Two male pintail, in a group of four males with a pair nearby, vigorously nodding their heads.
10	A group of 18 American green-winged teal peeping and performing "head up-tail up" display.
12	Fourteen males in a group of 20 American green-winged teal peeping, flapping wings, and doing "head up-tail up" displays. The females were bobbing their heads.
16	One female ring-neck, in a group of two females and 11 males, inciting. Males were observed bobbing their heads with raised crests.
17	Flock of 15 American green-winged teal peeping and chasing.
24	One female American green-winged teal in a group of seven males inciting. The males were peeping and displaying.
26	Male of a pair of ring-necks preening-behind-the-wing to female and making a clicking sound.
30	A paired male ring-neck rushed at a single male swimming near.

Table 6. Observations of waterfowl courtship behaviour at Amherst Point Sanctuary - Spring 1973 (continued)

Date	Observation
May 1	Male ring-necks in a group of 23 flapping wings, preening-behind-wing and bobbing heads with raised crests.
11	One female blue-winged teal inciting two males. Males bobbed their heads, dipped their bills in water and preened behind-the-wing.
18	The male of a pair of blue-wings chased a single male from the area.
	Male of a pair of blue-winged teal darted at a single male. The three birds then flew with the female in the lead.
22	One male blue-winged teal chased another single male from the lake.
	A pair of feeding wigeon left immediately when a single male approached.
	A single male blue-wing pursued another single male.
23	A male wigeon flew to remove a pair which had just landed.
30	A male wigeon chased a pair from Lake A.

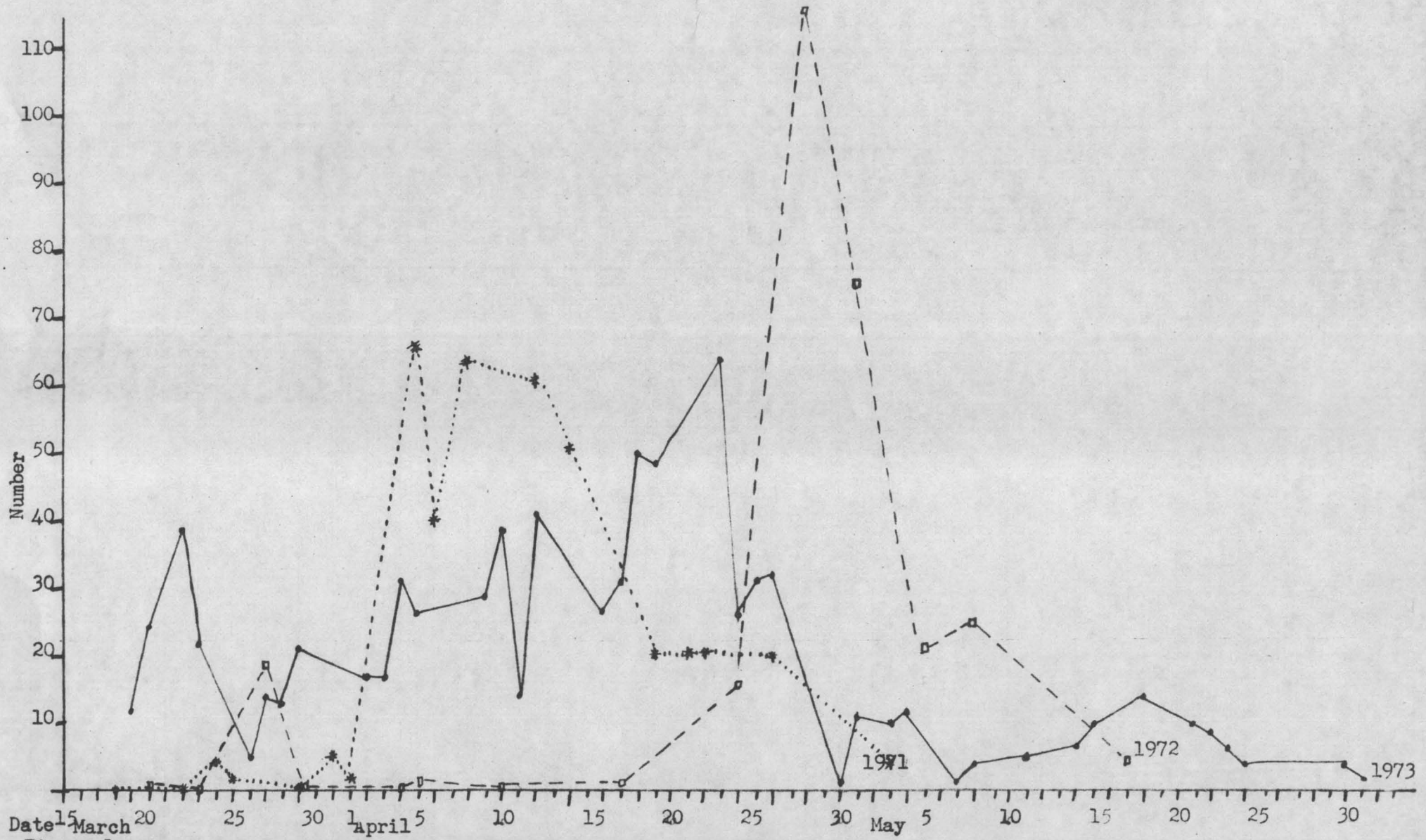


Figure 1. Black duck numbers at Amherst Point Sanctuary, 1971, 1972, and 1973. The numbers for 1971 are from Hall (1971); and for 1972, from Hall and MacInnis (1972).

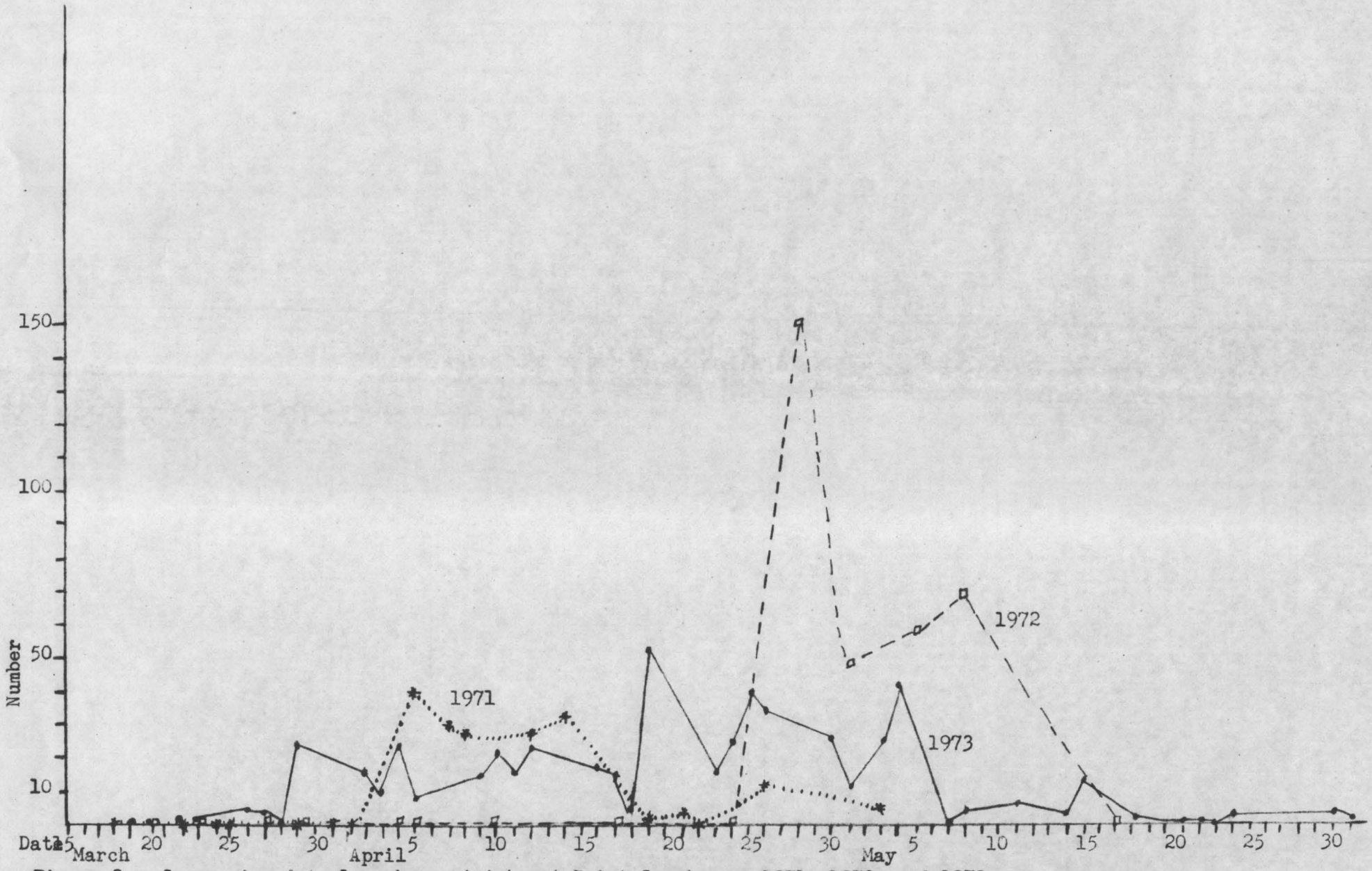


Figure 2 . Green-winged teal numbers at Amherst Point Sanctuary, 1971, 1972, and 1973. The numbers for 1971 are from Hall (1971); and for 1972, from Hall and MacInnis (1972).

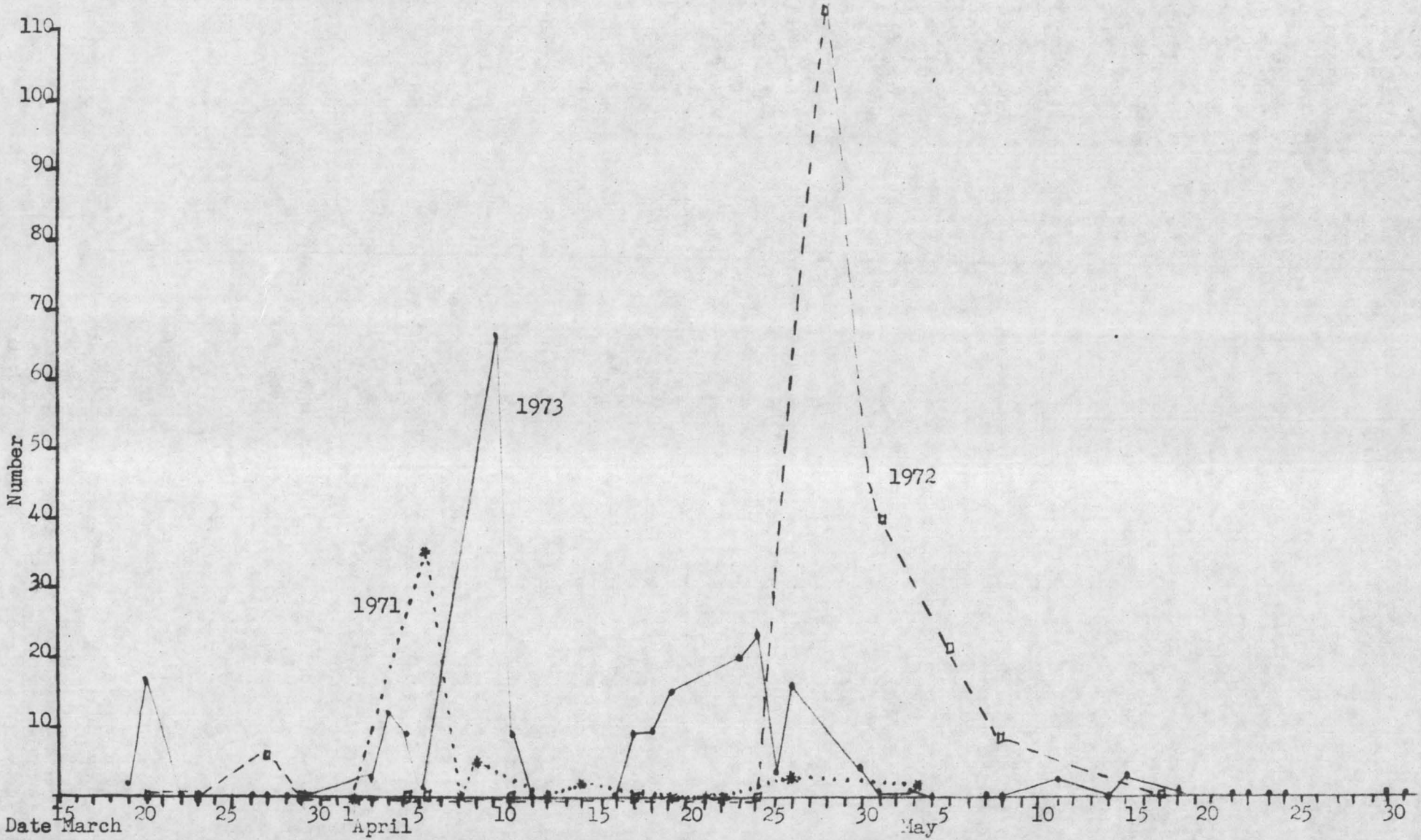


Figure 3 . Pintail numbers at Amherst Point Sanctuary, 1971, 1972, and 1973. The numbers for 1971 are from Hall (1971); and for 1972, from Hall and MacInnis (1972).

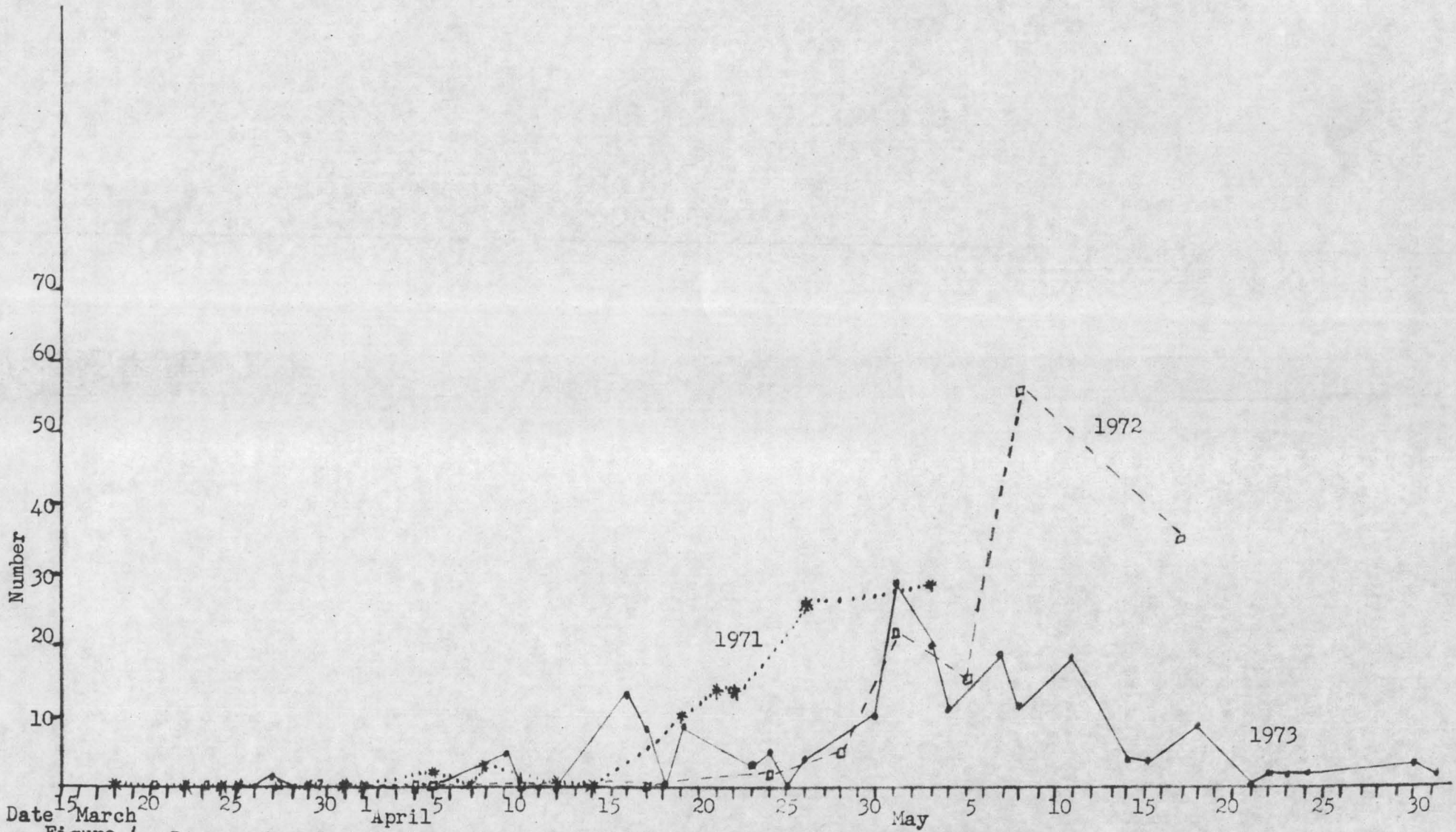


Figure 4. Ring-necked duck numbers at Amherst Point Sanctuary, 1971, 1972, and 1973. The numbers for 1971 are from Hall (1971); and for 1972, from Hall and MacInnis (1972).

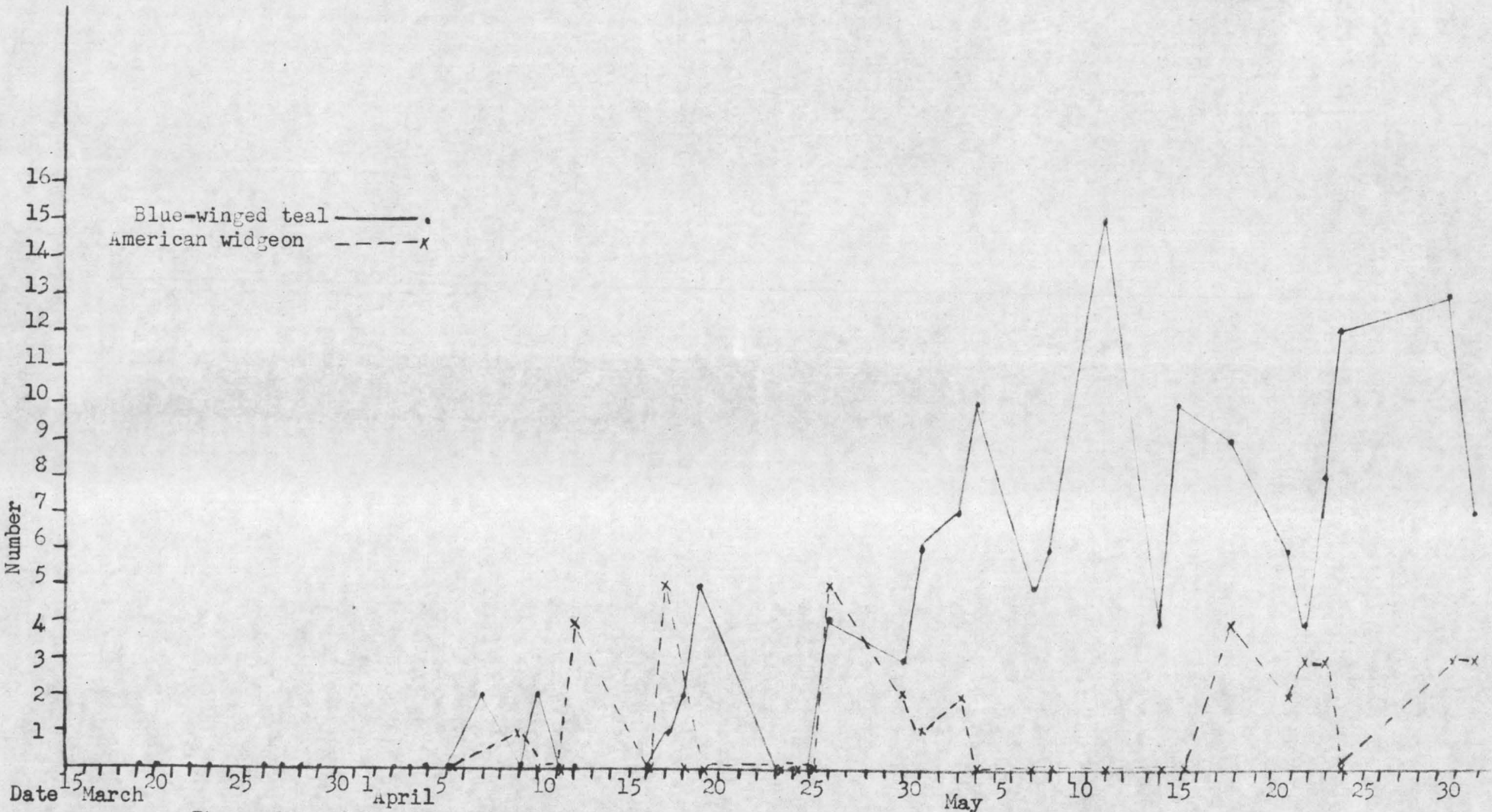


Figure 5. The number of American widgeon and blue-winged teal at the Amherst Point Sanctuary, 1973.

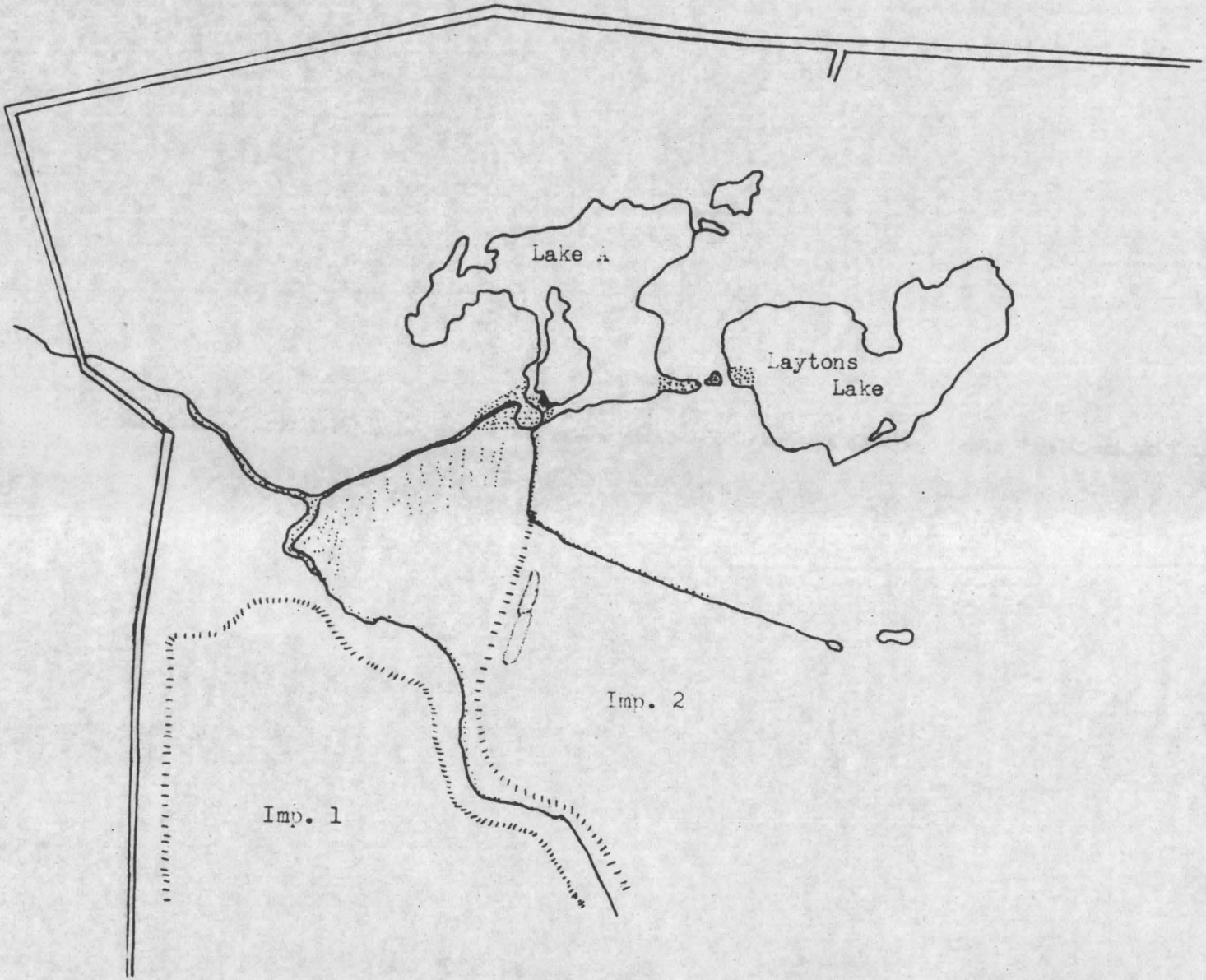


Figure 6. Areas of open water on the Amherst Point Sanctuary on March 19, 1973. (Open areas are shaded).

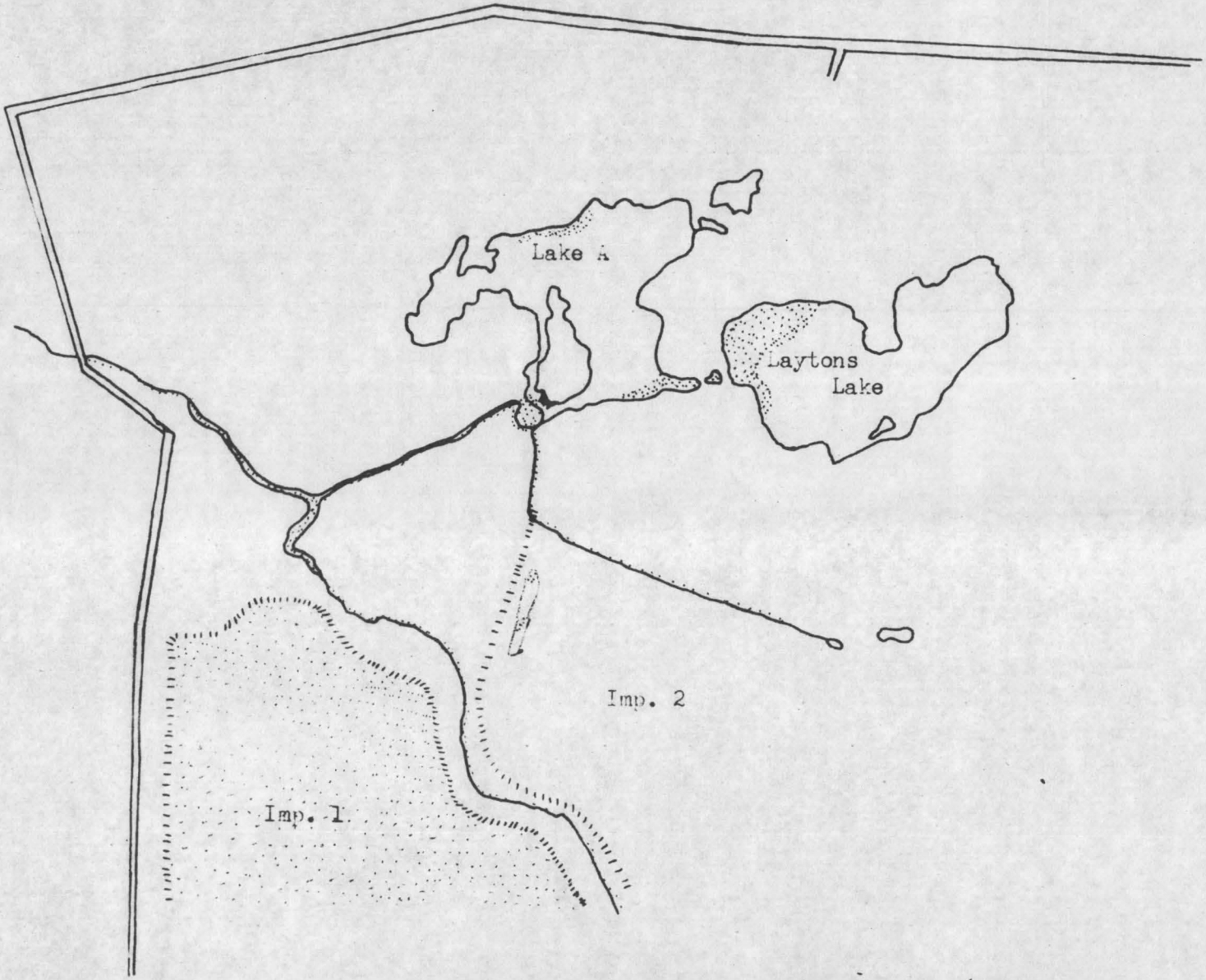


Figure 7. Areas of open water on the Amherst Point Sanctuary on April 3, 1973. (Open areas are shaded).

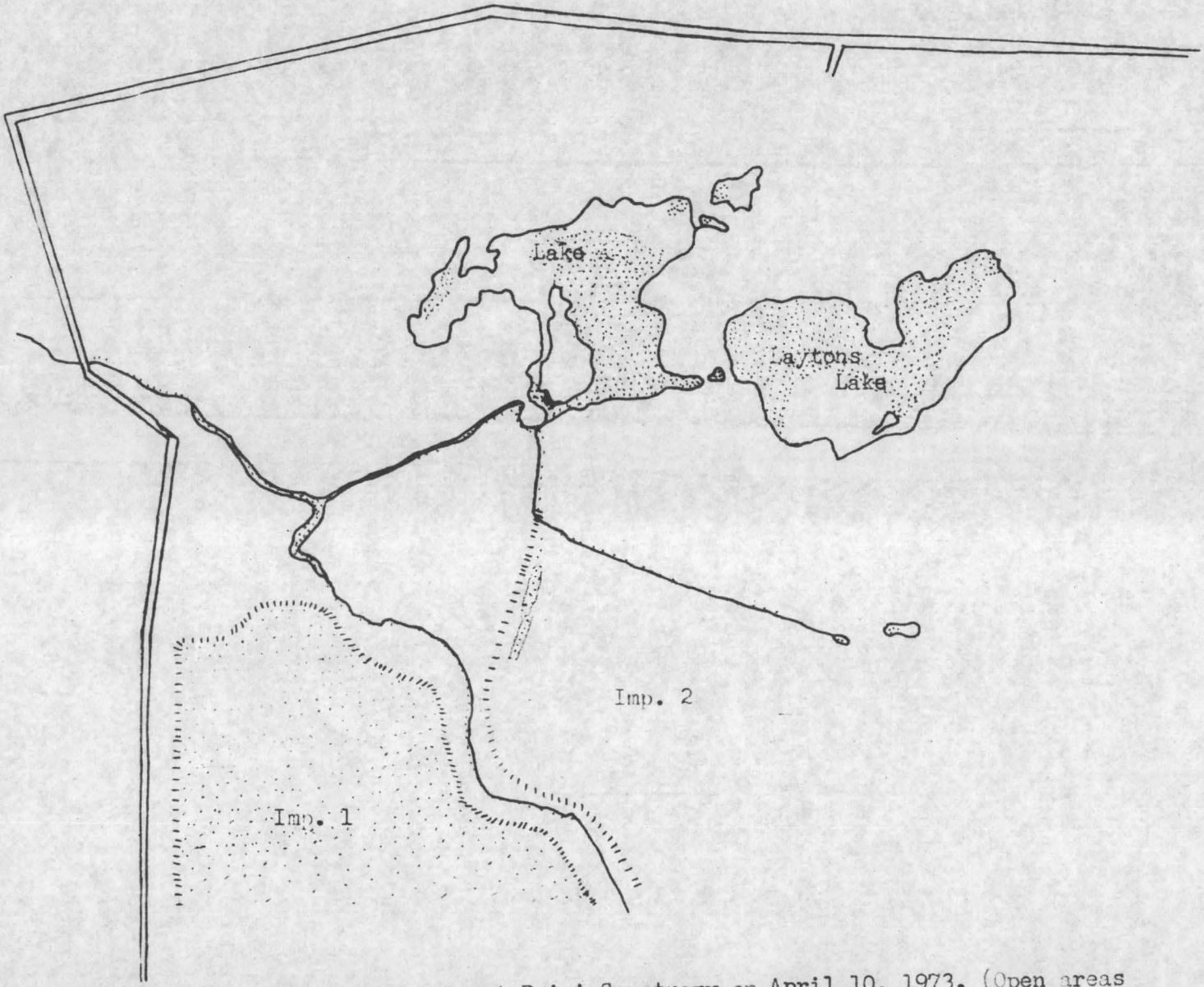


Figure 8. Areas of open water on the Amherst Point Sanctuary on April 10, 1973. (Open areas are shaded).

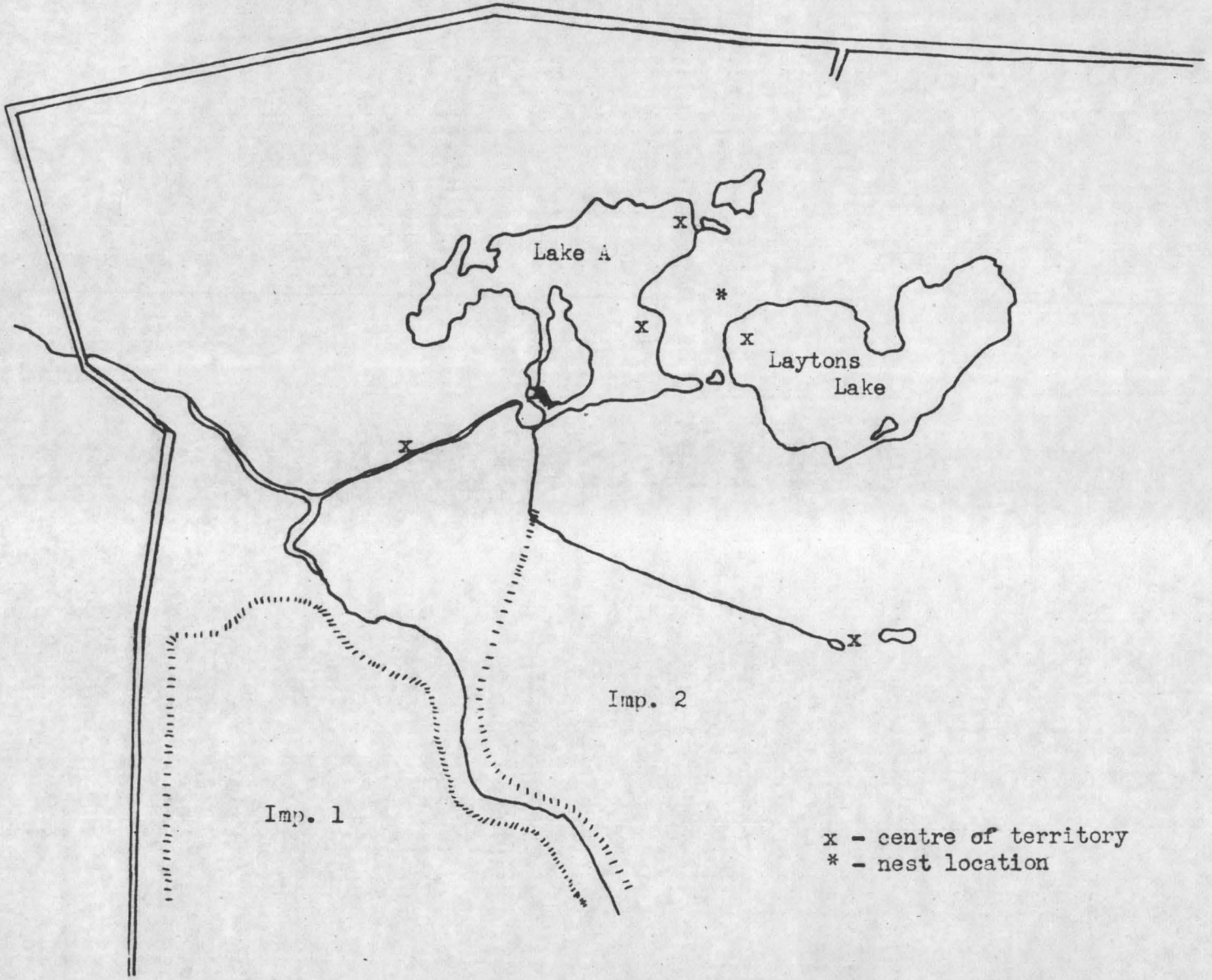


Figure 9. The location of six blue-winged teal territories at Amherst Point Sanctuary, 1973.

II John Lusby National Wildlife Area

Procedure

The John Lusby National Wildlife Area was observed from three locations (Figure 1) on 61 days between March 15 and May 31. Morning observations most often began at 7.00 a.m., afternoon observations at 3.00 p.m. local time.

Results and Discussion

Canada geese first arrived on the area March 15. The marsh was covered with patches of shallow ice and snow until the first week of April, when high tides removed the last of the ice and left the mud flats covered with water.

The maximum number of geese on the area at one time, around 2,000, was present the last week in March (Table 1). Smaller concentrations of geese in 1973 than in other years, geese have concentrated in numbers up to 4,400 (Figure 2), were probably the result of bare marshes and weather favourable to migration.

Canada geese frequently fed in fields of unharvested grain and new-seeded clover, even though the number on the marsh was not as high as in former years.

The 1973 migration was similar to the 1969 migration, but was some days earlier (Figure 2). The

four days in April (2 to 5) when few geese were present, were preceded by warm days with light winds. This may have allowed migrating birds to fly through. The strong easterly winds on those days could then have prevented others from flying into the area (see Appendix I for a summary of weather conditions). No geese were present after May 18.

Black duck utilization of the John Lusby National Wildlife Area was less in 1973 than in 1969, 1970, 1971 or 1972 (Figure 3). The number of blacks present was over 100 on only four days and remained at a relatively low level after April 28.

The percentage of paired black duck observed was high after mid-April, but dropped off after the second week in May when paired migrants had moved away (Table 2).

American green-winged teal and pintail remained on the area later than in previous years (Figures 4 and 5). These species were most often observed in Amherst Point Impoundment 1 (Figure 1) late in the season. Many of the large numbers of red-breasted merganser observed (Figure 6) were feeding in that impoundment. Ring-necks frequently fed and rested in the impoundment until May 11 (Table 1). No ring-necks were recorded on the area outside of the impoundment.

Thirteen American green-winged teal and 14 blacks were the first waterfowl observed in Amherst Point Impoundment 1 on April 2. The ice was two-thirds gone at that time. Ducks fed and rested in that impoundment on most days, sometimes in large numbers. The favourite feeding area in the impoundment was the south-west edge.

John Lusby Impoundment A was not flooded, but was included in a pair of blacks' territory.

Flocks of paired green-wings were seen as late as May 12 (Table 3). The number of male pintail observed was greater than the number of females (Table 4).

The red-breasted mergansers observed in May were largely immatures. Immature males often did the "knicks" display and rushed at other males even when there were no females present.

Early in the season ducks were frequently observed in the long pond south and west of John Lusby Impoundment A. Flocks of American green-winged teal fed in that pond until mid-April. Blacks fed in the pond and rested on the adjacent marsh throughout the period of observation.

A female black with two ducklings was seen on May 23 in Amherst Point Impoundment 1. The ducklings

may have fallen prey to the many gulls in the area, since they were not observed again.

Courtship behaviour was observed from late March until observations were terminated at the end of May (Table 5).

Table 1. The number of each species of waterfowl seen on each observation at the John Lusby National Wildlife Area - 1973. AM indicates a morning observation; PM, an afternoon observation

Date	C.goose	Blk.	Gwt.	Bwt.	Pin.	Ring.	G-eye	Wid.	C.merg.	R-b.merg.	Oldsquaw	Scaup	C.Scoter
March 15 AM	170	5											
16 PM	350	9											
17 AM	500	54			4		1						
19 AM	1,500	135			7								
21 AM	1,800	62											
22 AM	1,500	14											
23 PM	2,000	7			2								
24 PM	2,050	23			2								
26 AM	1,660	164			17				2				
27 PM	1,834	13											
28 AM	1,710	17											
29 PM	2,112	21			6								
31 PM	800	56	28		9				4	2			
April 2 AM	34	32	13										
3 PM	28	7	6							4			
4 AM	127	94	2							4			
5 PM	14	99	13		3					4			
6 PM	200	302	21							8			
7 AM	391	382			8					12			
9 AM	1,013	41	33		21		2	3		7			
10 PM	1,248	116	11		42					7			
11 AM	646	30	76							24			
12 PM	512	79	100		6					11			

Table 1. The number of each species of waterfowl seen on each observation at the John Lusby National Wildlife Area - 1973 (continued). AM indicates a morning observation; PM, an afternoon observation

Date	C.goose	Blk.	Gwt.	Bwt.	Pin.	Ring.	G-eye	Wid.	C.merg.	R-b.merg.	Oldsquaw	Scaup	C.Scoter
April 13 PM	704	62	16		76			5		24			
14 AM	660	61	23	4	16	5		6		39	1	1	
16 AM	1,330	66	42	1	38	2		22		20	1	1	
17 PM	202	38	41	13	4			2		16	1		
18 AM	122	75	41		38			25		29			
19 PM	1,144	80	35	9	29	6		6		6			
20 PM	618	16	7										
21 AM	545	74	95		12	14		19		44			1
23 AM	1,068	55	59	4	10	7		8		49			1
24 PM	810	50	90		10	15				62			
25 AM	1,025	55	191	2	15	14		10		78			1
26 PM	952	34	95	5	13	6		10		57			
27 PM	384	40	122		7	3		13		111		2	
28 AM	781	16	27		25	4		5		33			
30 AM	1,026	23	36	2	3	3		6		34			
May 2 PM	576	35	109	9	11	4		9					
3 AM	618	20	146		6	4		7		16			
4 PM	422	23	41	4	4	4		3		19			
5 AM	470	42	123	4	3	2		6		23			
7 AM	374	10	80	2	10			2		65			
8 PM	156	41	102	20	17	4		4		72			
9 AM	461	25	80	2	16			5		75			
10 PM	110	22	70		8			3		148			
11 PM	82	17	56		6	2		3		132			
12 AM	12	21	36		8			5		78			

Table 1. The number of each species of waterfowl seen on each observation at the John Lusby National Wildlife Area - 1973 (concluded). AM indicates a morning observation; PM, an afternoon observation

Date		C.goose	Blk.	Gwt.	Bwt.	Pin.	Ring.	G-eye	Wid.	C.merg.	R-b.merg.	Oldsquaw	Scaup	C.Scoter
May	14 AM	6	42	40	3	5				5	59			
	17 AM	6	25	11	1	9				5	30			
	18 PM		17	24		4				3	41			
	19 AM		26	8	1	5				3	7			
	21 AM		50	26		4				2	15			
	22 PM		24	10		2				1	13			
	23 AM		21	2	2	4				1	36			
	25 PM		21	6						1	20			
	26 AM		26			1				1	8			
	28 AM		40	1	1	2				1	4			
	29 PM		33	2	3					4	8			
	30 AM		33	5						3	2			
	31 PM		36	4		2				3	10			

Note: April 7 AM - 19 Brant, 1 Snow goose
May 3 AM - 1 Shoveler

Table 2. Black duck - total number, number of pairs and per cent paired on each observation date on the John Lusby National Wildlife Area - 1973

Date	Total number	Number of pairs	Per cent paired
March 15	5	2	80
16	9	0	
17	54	5	18
19	135	7	10
21	62	0	
22	14	2	28
23	7	0	
24	23	1	9
26	164	3	4
27	13	0	
28	17	0	
29	21	9	86
31	56	15	54
April 2	32	2	12
3	7	0	
4	94	6	13
5	99	7	14
6	302	3	2
7	382	6	3
9	41	7	34
10	116	7	12
11	30	9	60
12	79	12	30
13	62	15	48
14	61	14	46
16	66	11	33
17	38	8	42
18	75	11	29
19	80	8	20
20	16	8	100
21	74	23	62
23	55	5	18
24	50	10	40
25	55	7	25
26	34	11	65
27	40	13	65
28	16	7	88
30	23	6	50

Table 2. Black duck - total number, number of pairs and per cent paired on each observation date on the John Lusby National Wildlife Area - 1973 (continued)

Date		Total number	Number of pairs	Per cent paired
May	2	35	12	68
	3	20	8	80
	4	23	6	52
	5	42	14	67
	7	10	4	80
	8	41	12	58
	9	25	7	56
	10	22	6	60
	11	17	7	82
	12	21	10	95
	14	42	15	72
	17	25	5	40
	18	17	4	47
	19	26	3	23
	21	50	7	28
	22	24	3	25
	23	21	6	57
	25	21	6	57
	26	26	1	8
	28	40	7	35
	29	33	1	6
	30	33	4	24
	31	36	4	22

Table 3. American green-winged teal - total number, number of pairs, per cent paired, and number of male and female on each observation date on the John Lusby National Wildlife Area - 1973. (No American green-winged teal were observed on the area until March 31).

Date	Number of ducks	Number of pairs	Per cent paired	Number of males	Number of females
March 31	28			-	-
April 2	13			13	
3	6			-	-
4	2	1	100	1	1
5	13			-	-
6	21			-	-
7					
9	33			23	10
10	11			-	-
11	76			-	-
12	100	2	4	-	-
13	16			-	-
14	23	1	9	-	-
16	42			-	-
17	41	4	20	-	-
18	41	5	25	-	-
19	35			-	-
20	7	3	86	4	3
21	95	20	42	-	-
23	59	6	20	-	-
24	90	-	-	-	-
25	191	41	42	-	-
26	95	27	57	-	-
27	122	-	-	-	-
28	27	1	7	-	-
30	36	11	61	25	11
May 2	109	29	53	-	-
3	146	-	-	-	-
4	41	18	90	23	18
5	123	59	95	64	59
7	80	40	100	40	40
8	102	51	100	51	51
9	80	40	100	40	40
10	70	35	100	35	35
11	56	28	100	28	28
12	36	18	100	18	18

Table 3. American green-winged teal - total number, number of pairs, per cent paired, and number of male and female on each observation date on the John Lusby National Wildlife Area - 1973 (continued)

Date		Number of ducks	Number of pairs	Per cent paired	Number of males	Number of females
May	14	40	-	-	-	-
	17	11	3	55	7	4
	18	24	3	25	-	-
	19	8	1	25	7	1
	21	26	4	31	22	4
	22	10	3	60	7	3
	23	2			2	
	25	6	2	67	4	2
	26					
	28	1			1	
	29	2			2	
	30	5	2	80	3	2
	31	4			4	

Table 4. **Pintail - Total number, number of pairs, per cent paired and** number of male and female on each observation date on the John **Lusby National Wildlife Area - 1973 (No pintail were observed** on the area until March 17)

Date	Number of ducks	Number of pairs	Per cent paired	Number of males	Number of females
March 17	4			4	
19	7	3	86	4	3
21					
22					
23	2			2	
24	2	1	100	1	1
26	17	1	12	16	1
27					
28					
29	6			6	
31	9			8	1
April 2					
3					
4					
5	3			3	
6					
7	8			8	
9	21	2	20	19	2
10	42	4	20	38	4
11					
12	6	3	100	3	3
13	76	-		-	-
14	16	6	75	10	6
16	38	4	21	34	4
17	4			4	
18	38			30	8
19	29	6	41	23	6
20					
21	12	3	50	9	3
23	10	4	80	6	4
24	10	2	40	8	2
25	15	3	40	12	3
26	13	3	46	10	3
27	7			7	
28	25	-		-	-
30	3	1	67	2	1

Table 4. Pintail - Total number, number of pairs, per cent paired and number of male and female on each observation date on the John Lusby National Wildlife Area - 1973 (continued). (No pintail were observed on the area until March 17).

Date		Number of ducks	Number of pairs	Per cent paired	Number of males	Number of females
May	2	11	2	36	9	2
	3	6	1	33	5	1
	4	4	1	50	3	1
	5	3	1	67	2	1
	7	10	1	20	9	1
	8	17	3	35	14	3
	9	16	4	50	12	4
	10	8	3	75	5	3
	11	6	2	67	4	2
	12	8	3	75	5	3
	14	5	2	80	3	2
	17	9	2	44	7	2
	18	4			4	
	19	5	1	40	4	1
	21	4	2	100	2	2
	22	2			2	
	23	4	1	50	3	1
	25					
	26	1			1	
	28	2			2	
	29					
	30					
	31	2	1	100	1	1

Table 5. Observations of waterfowl courtship behaviour at John Lusby National Wildlife Area - Spring 1973

Date	Observation
March 24	Male of a pair of pintail nodding his head.
26	Male of a pair of common merganser displaying.
29	Some birds in a group of 14 blacks wing-flapping and chasing.
31	Flock of 27 American green-winged teal performing "head up-tail up" display.
	Male of a pair of red-breaster merganser doing "knicks".
April 3	Three male red-breasted merganser doing "knicks". The one female present appeared already paired.
4	Red-breasted merganser in Amherst Point Impoundment 1 doing "knicks".
9	Five blacks flapping wings and chasing.
10	Red-breasted merganser displaying.
16	Red-breasted mergansers displaying.
	Male wigeon chin-lifting. There were no other wigeons present.
21	Red-breasted merganser displaying.
24	Red-breasted merganser displaying.
25	Red-breasted merganser displaying.
26	Red-breasted merganser displaying.
27	Red-breasted merganser displaying.
28	Red-breasted merganser displaying.
30	Red-breasted merganser displaying.

Table 5. Observations of waterfowl courtship behaviour at John Lusby National Wildlife Area - Spring 1973 (continued)

Date	Observation
May 2	Two male ring-necks in a group of two males and two females nodding and "purring".
	Both males of two pair of pintail stretching their necks.
	Many of 90 American green-winged teal peeping and doing "head up-tail up" display.
4	Male of a pair of blacks approached female bobbing his head. After copulation, the female bathed, completely submerging twice. The male swam away and bathed, but did not submerge.
8	Red-breasted merganser displaying.
9	Red-breasted merganser displaying.
18	A pair of blacks landed in John Lusby Impoundment A and flew when approached by a single black. The same pair returned to a different part of the impoundment, but did leave when the single black flew over five times.
25	Female of a pair of American green-winged teal inciting. The male responded by bobbing his head.
28	Single black chased a pair from John Lusby Impoundment A. The pair moved only short distances at a time, and were followed by the single black.

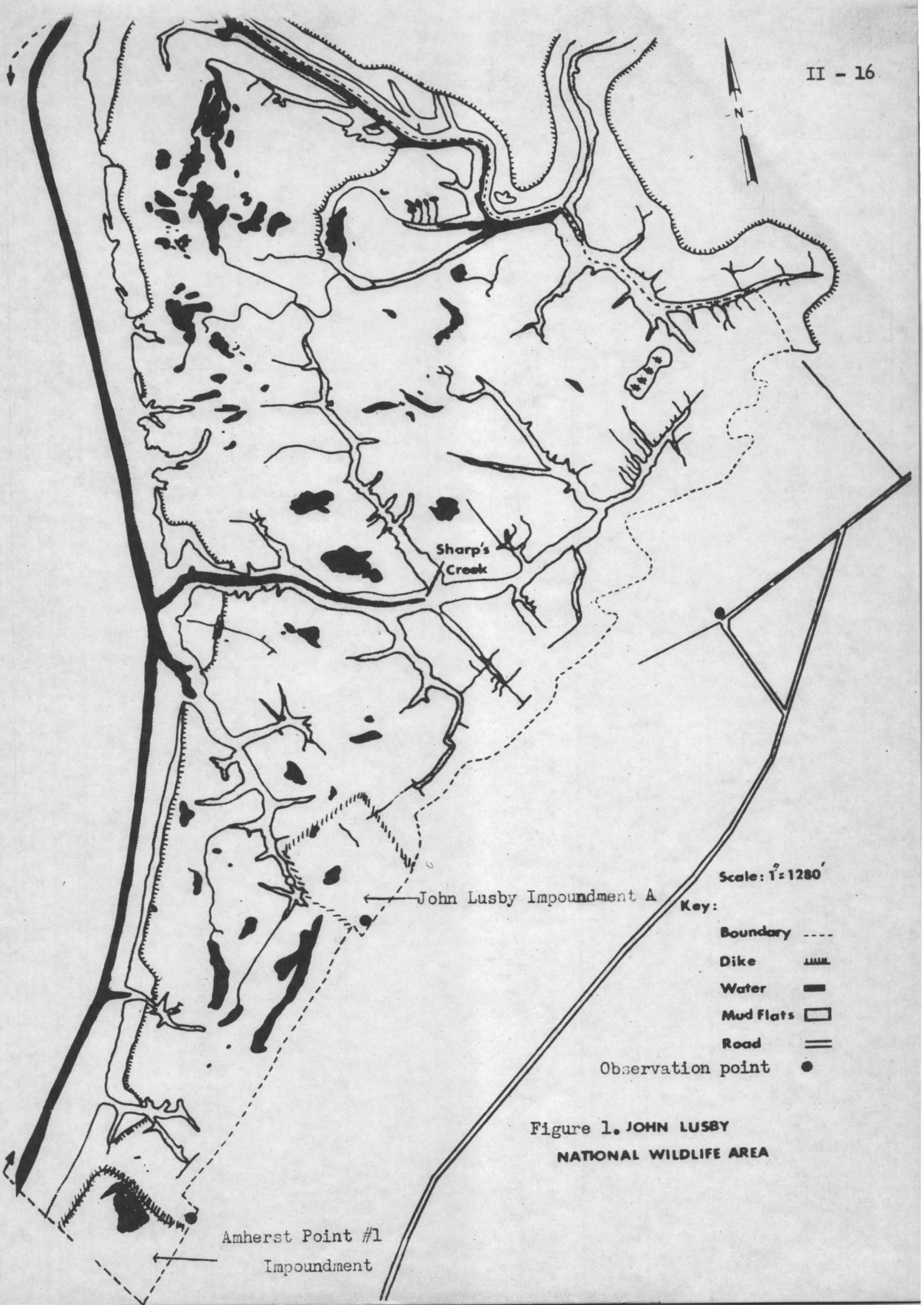


Figure 1. JOHN LUSBY NATIONAL WILDLIFE AREA

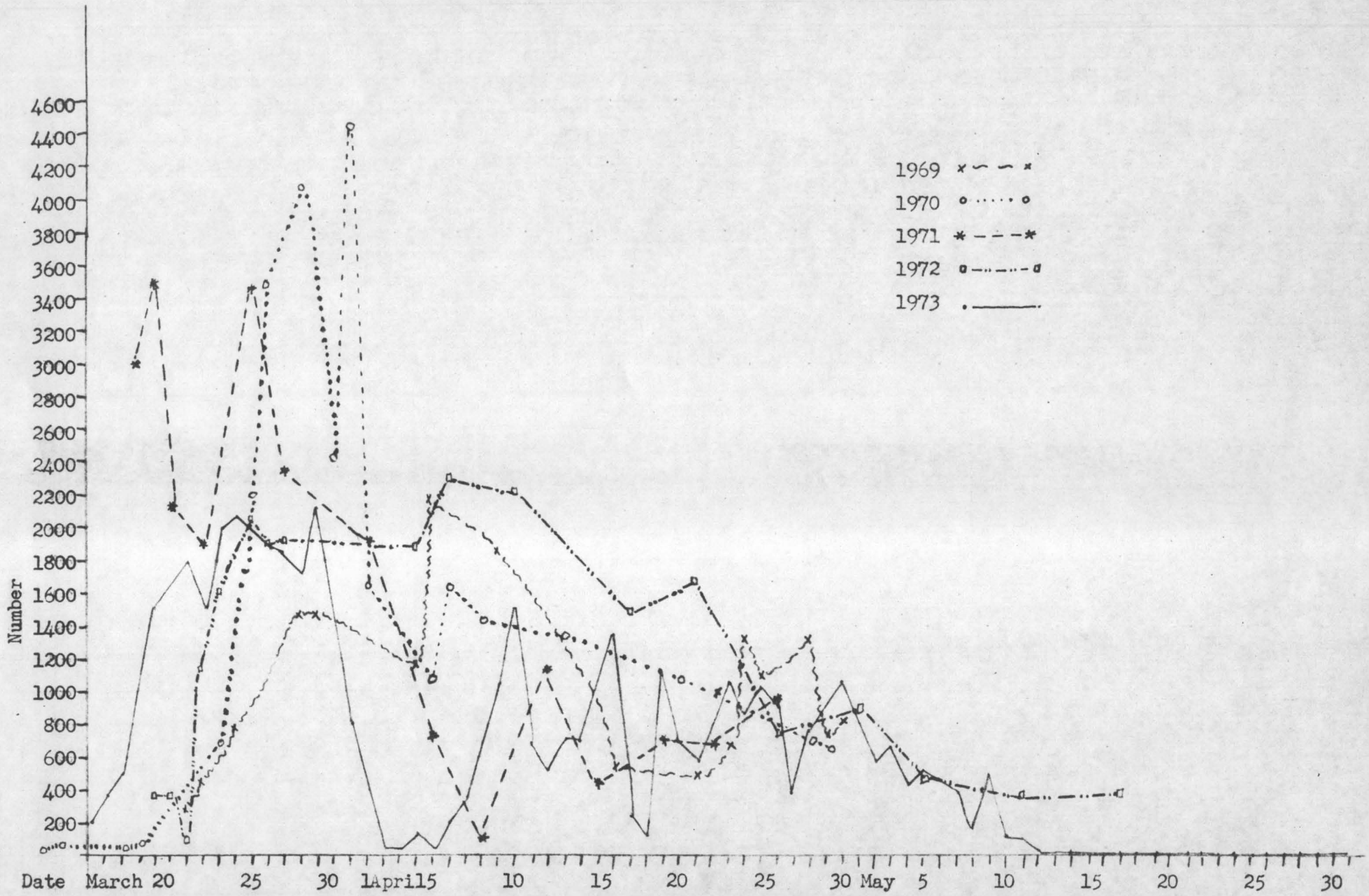


Figure 2. The numbers of Canada geese on the John Lusby National Wildlife Area, 1969, 1970, 1971, 1972, and 1973. The numbers for 1969,1970 are from Van Zoost (1970) in Hall (1971); numbers for 1971 are from Hall (1971); numbers for 1972 are from Hall and MacInnis (1972).

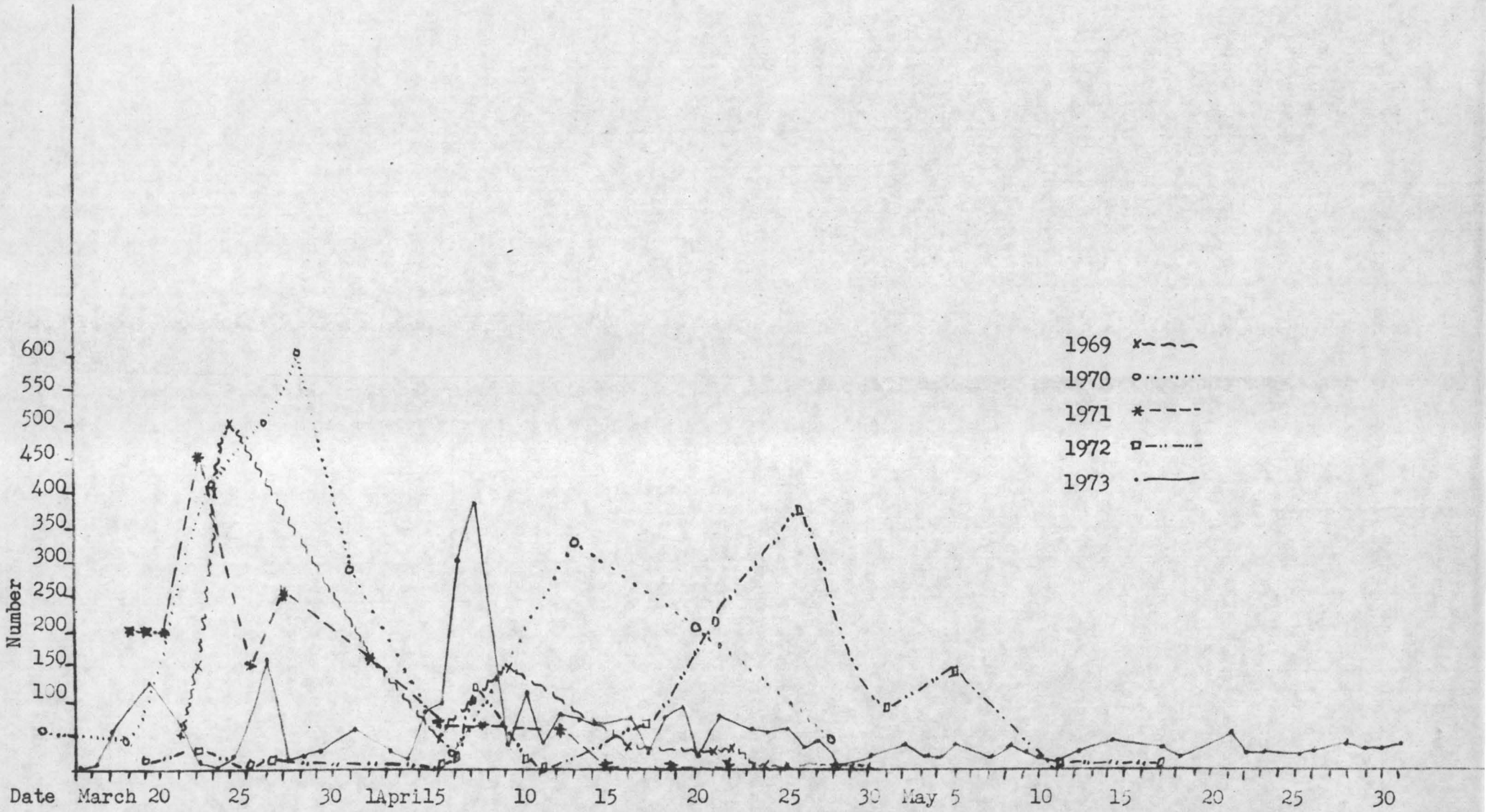


Figure 3. The numbers of black ducks on the John Lusby National Wildlife Area, 1969, 1970, 1971, 1972, and 1973. The numbers for 1969, 1970 are from Van Zoost (1970) in Hall (1971); numbers for 1971 are from Hall (1971); numbers for 1972 are from Hall and MacInnis (1972).

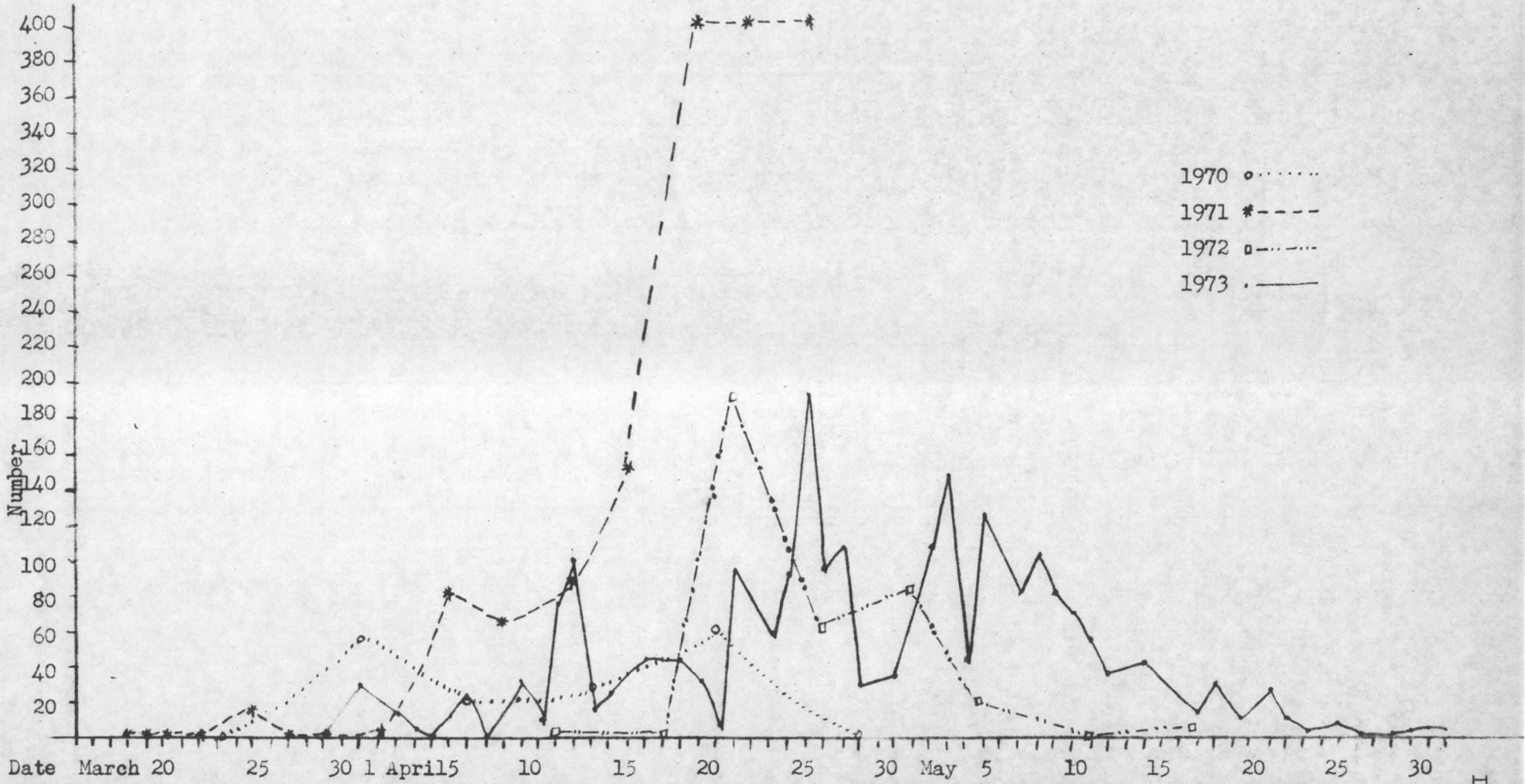


Figure 4. The numbers of green-winged teal on the John Lusby National Wildlife Area, 1970, 1971, 1972, and 1973. The numbers for 1970 are from Van Zoost (1970) in Hall (1971); numbers for 1971 are from Hall (1971); numbers for 1972 are from Hall and MacInnis (1972).

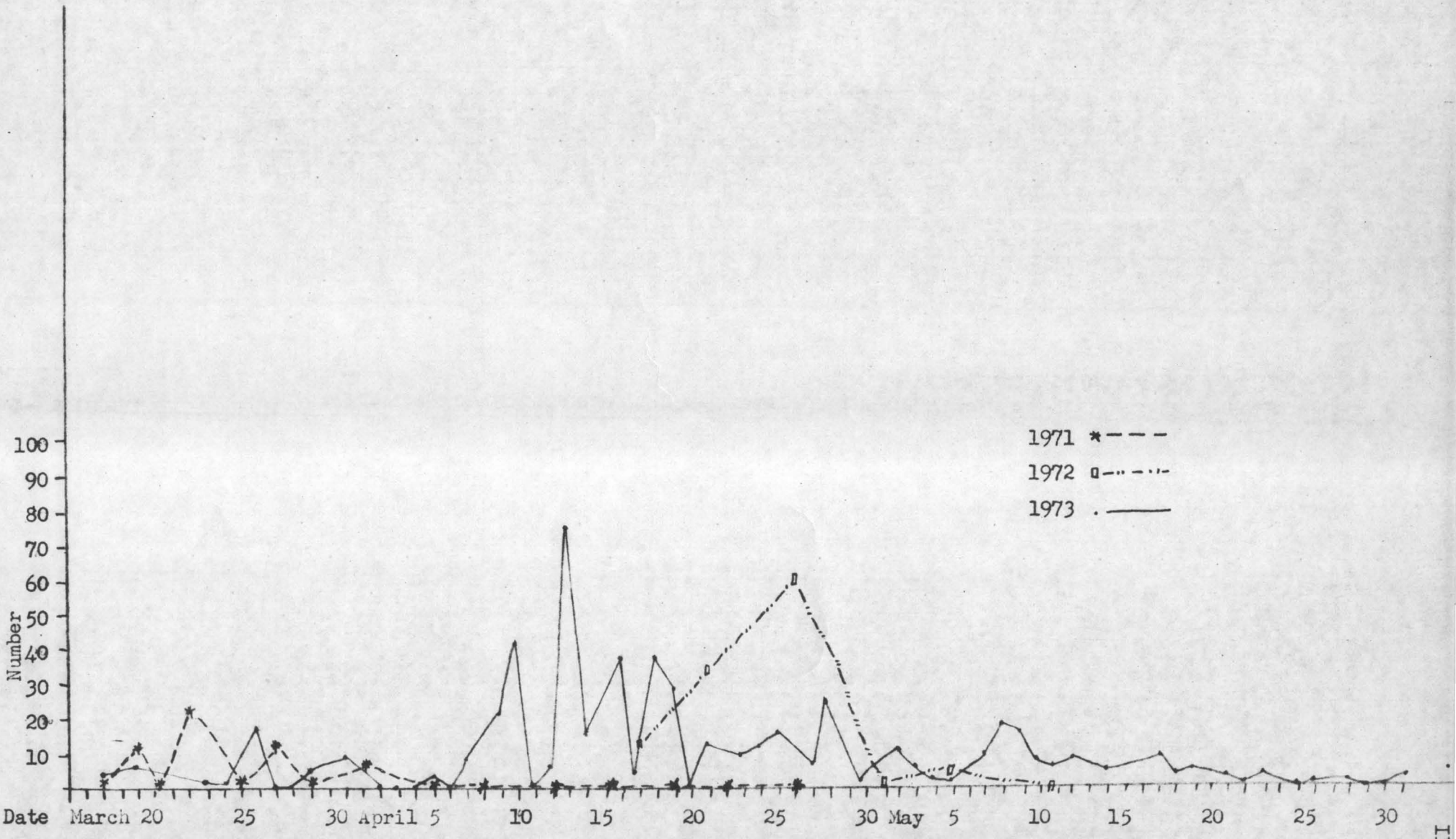


Figure 5 . The numbers of pintails on the John Lusby National Wildlife Area, 1971, 1972, and 1973. The numbers for 1971 are from Hall (197 1); numbers for 1972 are from Hall and MacInnis (1972).

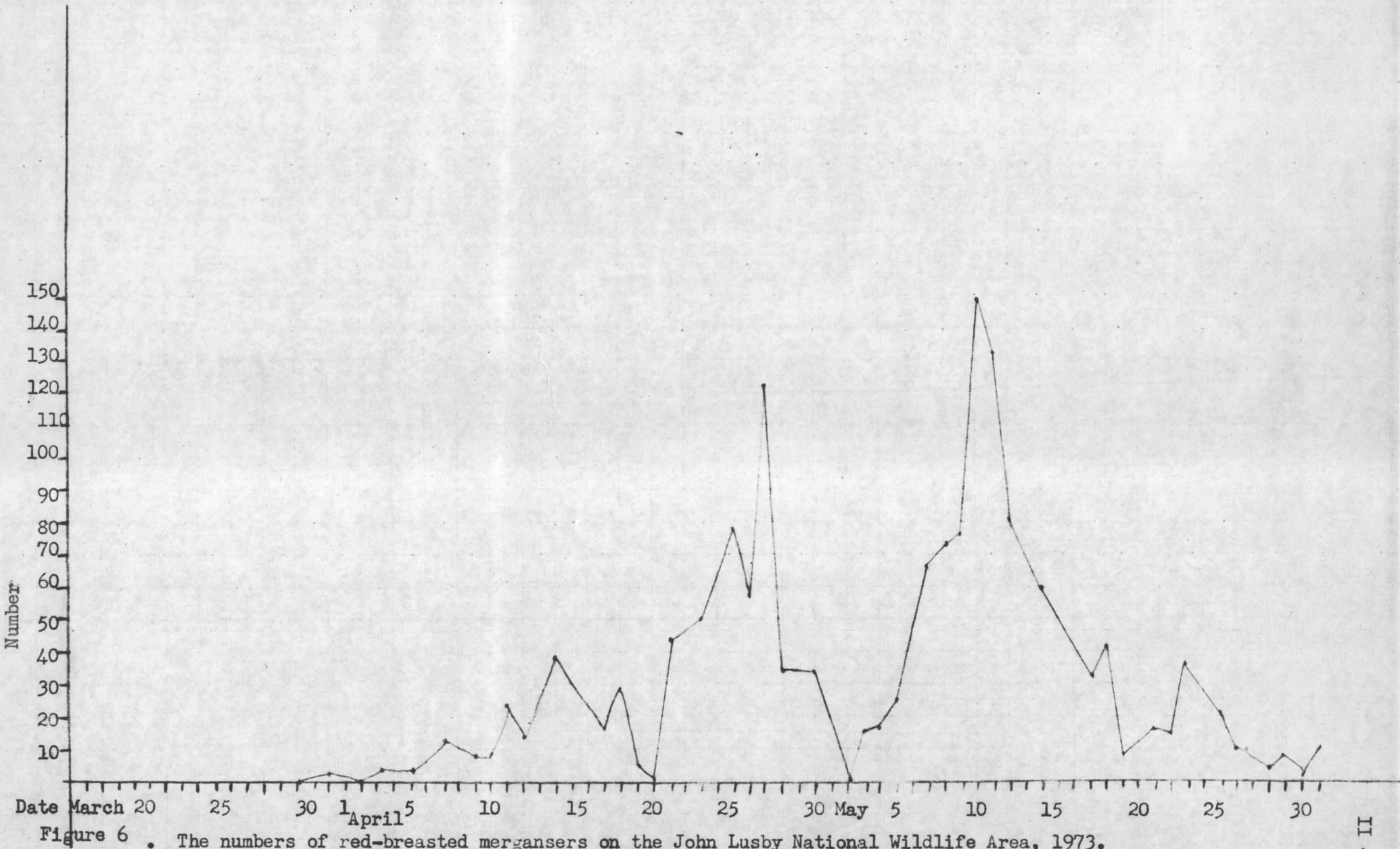


Figure 6 . The numbers of red-breasted mergansers on the John Lusby National Wildlife Area, 1973.

Figure 1. A map of the Shepody National Wildlife Area and surrounding coastal areas.

III Shepody National Wildlife Area

Procedure

The Shepody National Wildlife Area and five coastal areas were observed on 12 days in a manner similar to that used in 1972. Coastal areas were observed from the points on the road indicated in Figure 1.

The five coastal areas were: (1) Calhoun Flats, (2) Mountville Flats, (3) pasture land protected by the Shepody dam (Harvey Marsh), (4) salt marsh below the Shepody dam (Mary's Point), and (5) Anderson Hollow (Waterside).

March and April observations were made between 10.00 a.m. and 2.30 p.m. Morning observations in May were made between 7.00 a.m. and 12.30 p.m.; evening observations were between 4.00 and 8.00 p.m.

A canoe was taken down the Shepody River through the National Wildlife Area on March 30, April 13, 20, May 1, 9, 10, 15, 16, and 24. When the canoe was not taken down the river, Germantown Lake, the most productive area, was observed from the edges.

Results and Discussion

The river and some ditches on the National Wildlife Area were open on March 20, but the marsh was

ice covered. The marsh was bare and Germantown Lake was open on March 30. The canal was traversed by canoe March 30, some four weeks earlier than ice conditions allowed in 1972. Most snow and ice was gone from the coastal marshes on March 20. Maximum flooding of Germantown Lake occurred on May 1.

As in the Amherst area, Canada goose numbers did not reach the maximums in 1973 that they did in 1972 (Figure 2). The concentrations of geese reported in 1971 were also higher than in 1973. Geese were not observed on the National Wildlife Area, only on the surrounding marshes (Table 1).

Black duck numbers peaked on April 13, a week later than in 1971. The maximum number of blacks observed (119) was only one-third of the maximum number counted in 1971, and about one-fifth the number seen on April 27 in 1972 (Figure 3).

The curve depicting numbers of American green-winged teal in 1973 was similar to the 1971 curve (Figure 4). The 1972 data showed a much larger concentration of green-wings.

A maximum percentage of paired blacks was observed in the first half of May (Table 2).

Most courtship behaviour (Table 3) was observed at Anderson Hollow because birds there were not disturbed while watching.

*Area

1. Calhoun flats
2. Mountville flats
3. Protected land above Shepody Dam (Harvey Marsh)
4. Salt marsh below Shepody Dam (Mary's Point)
5. Anderson's Hollow (Waterside)
6. Shepody National Wildlife Area

** March and April observations were from 10:00 a.m. to 2:30 p.m.

Table 1. The number of each species of waterfowl observed on each day of observation at Shepody National Wildlife Area and five surrounding coastal areas, 1973

Species	Area*	March**		April		May							
		20	30	13	20	1 PM	2 AM	9 PM	10 AM	15 PM	16 AM	24 PM	25 AM
C. goose	1					10	12						
	2		7	58	22	93	71		32				
	3	500	500	460-510	425	140	211	500	142	12	100		
	4	40	90										
	5	10	25		3	-	21		8	11	9	1	1
	6						7						
	Total	550	622	518-568	450	243	322	500	182	23	109	1	1
Brant	2						12						
Snow goose	5					-				1	1		
Mallard	6					2	2						
Black duck	1	2		4		2	2			1			1
	2		10	63	2	3	4	2	4	3	1	9	1
	3	1	1	6		2						1	2
	4	11					4	2		2		3	
	5	11	36	6	16	-	10	13	17	4	6	7	9
	6	3	7	40	9	31	16	16	9	8	2	7	2
	Total	28	54	119	27	38	36	33	30	18	9	27	15
G.-w. teal	1												
	2				3								
	4	1											
	5			25	3	-	23	44	21				1
	6				34	28		12	6	11			
	Total	1		25	40	28	23	56	27	11			1
B.-w. teal	6			2		12	17	12		6			
Pintail	4	2							2				
	5					-		8	6				
	6				5					2	3	1	
	Total	2			5			8	8	2	3	1	
Widgeon	6				2								

Table 1. The number of each species of waterfowl observed on each day of observation at Shepody National Wildlife Area and five surrounding coastal areas, 1973 (continued)

Species	Area*	March**		April		May							
		20	30	13	20	1 PM	2 AM	9 PM	10 AN	15 PM	16 AM	24 PM	25 AM
Shoveler	6					4		1					
Ring-neck	5					-	4						
	6						3	2	8	10	4	4	2
	Total					4	7	3	8	10	4	4	2
C.goldeneye	5			2		-	4						
	6	4											
	Total	4		2			4						
C. eider	1					200							
	5	250				-							
		250				200							
C. Merganser	5			1		-							
	6		1		1	2		2					
	Total		1	1	1	2		2					
Hooded Merg.	6		2										
R-b. merganser	1						28	2					
	2				2		33				1		
	4							2	12				
	5				8	-	41	70	62	39	12	218	40
	Total				10		102	74	74	39	13	218	40
W-w. Scoter	5					-				1			
Bufflehead	5		4			-							
G-b. heron	1		3		2								
	2		9										
	4							1		1		1	
	5			2	11	-	18	4	12				4
	Total		12	2	14		18	5	12	1		1	4
Cormorant Total							82			11			

Table 2. Black duck - Total number, number of pairs and per cent paired on each observation at Shepody National Wildlife Area and five surrounding coastal areas, 1973

Date	Total number	Number of pairs	Per cent paired
March 20	28	5	36
30	54	14	52
April 13	119	23	39
20	27	10	74
May 1	38	13	65
2	36	17	94
9	33	16	96
10	30	10	67
15	18	7	78
16	9	3	67
24	27	6	44
25	15	2	27

Table 3. Observations of waterfowl behaviour in the Shepody National Wildlife Area and surrounding areas, 1973

Date	Observation
April 20 - Anderson Hollow -	One male red-breasted merganser doing "knicks" display to two females.
	Two male American green-winged teal peeping and doing "head up-tail up" display to one female.
May 1 - Anderson Hollow -	Male of pair of blacks nodding his head to female.
2 - Anderson Hollow -	Red-breasted merganser displaying.
10 - Anderson Hollow -	Males of two pair of American green-winged teal doing "head up-tail up" display.
15 - Anderson Hollow -	Flock of immature red-breasted merganser doing "knicks".
24 - Mary's Point -	Male of a pair of blacks vigorously nodding his head to female.

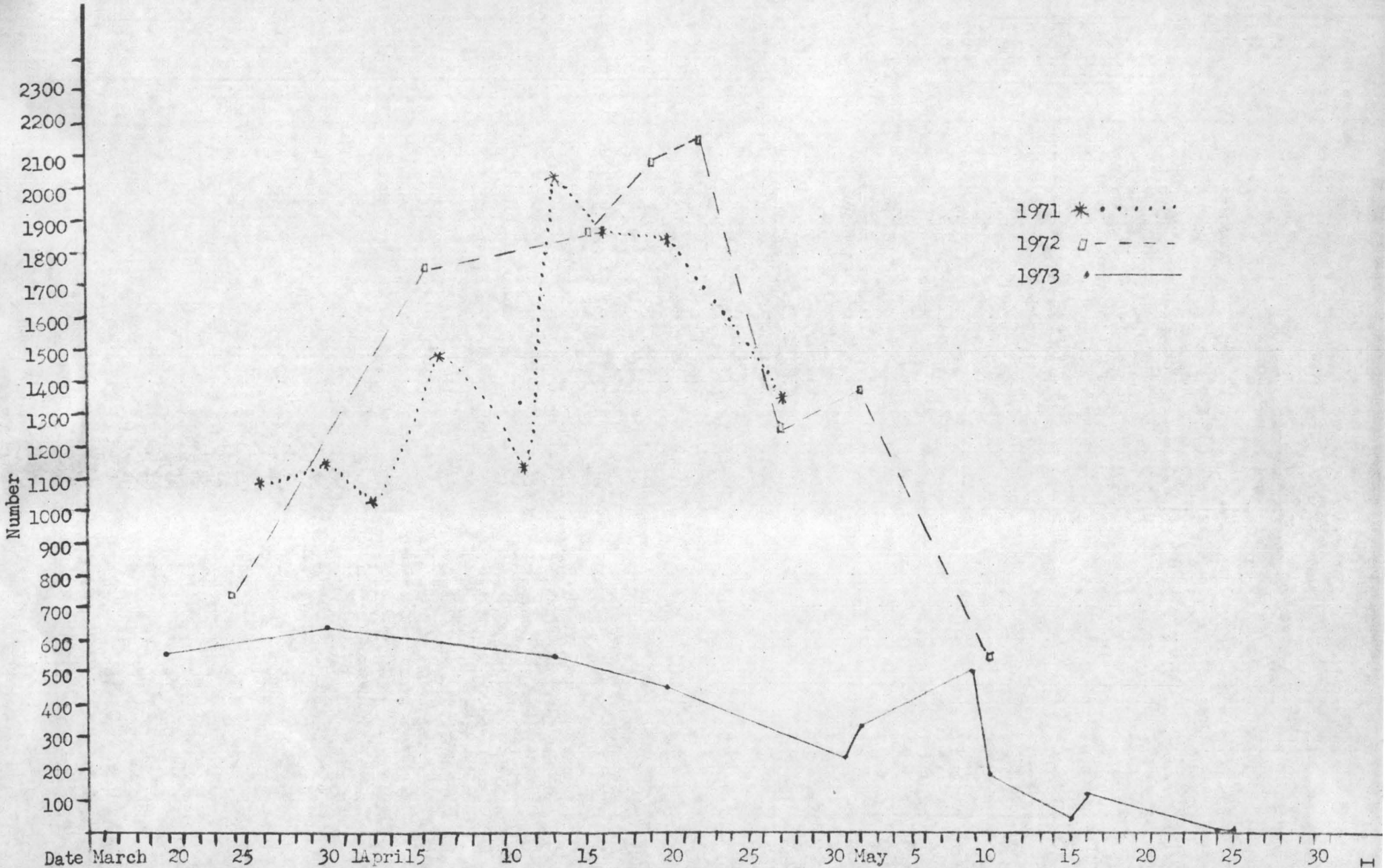


Figure 2. The number of Canada geese on the Shepody National Wildlife Area and surrounding marshes, 1971,1972, 1973. The numbers for 1971 are from Hall (1971); and for 1972, from Hall and McInnis (1972).

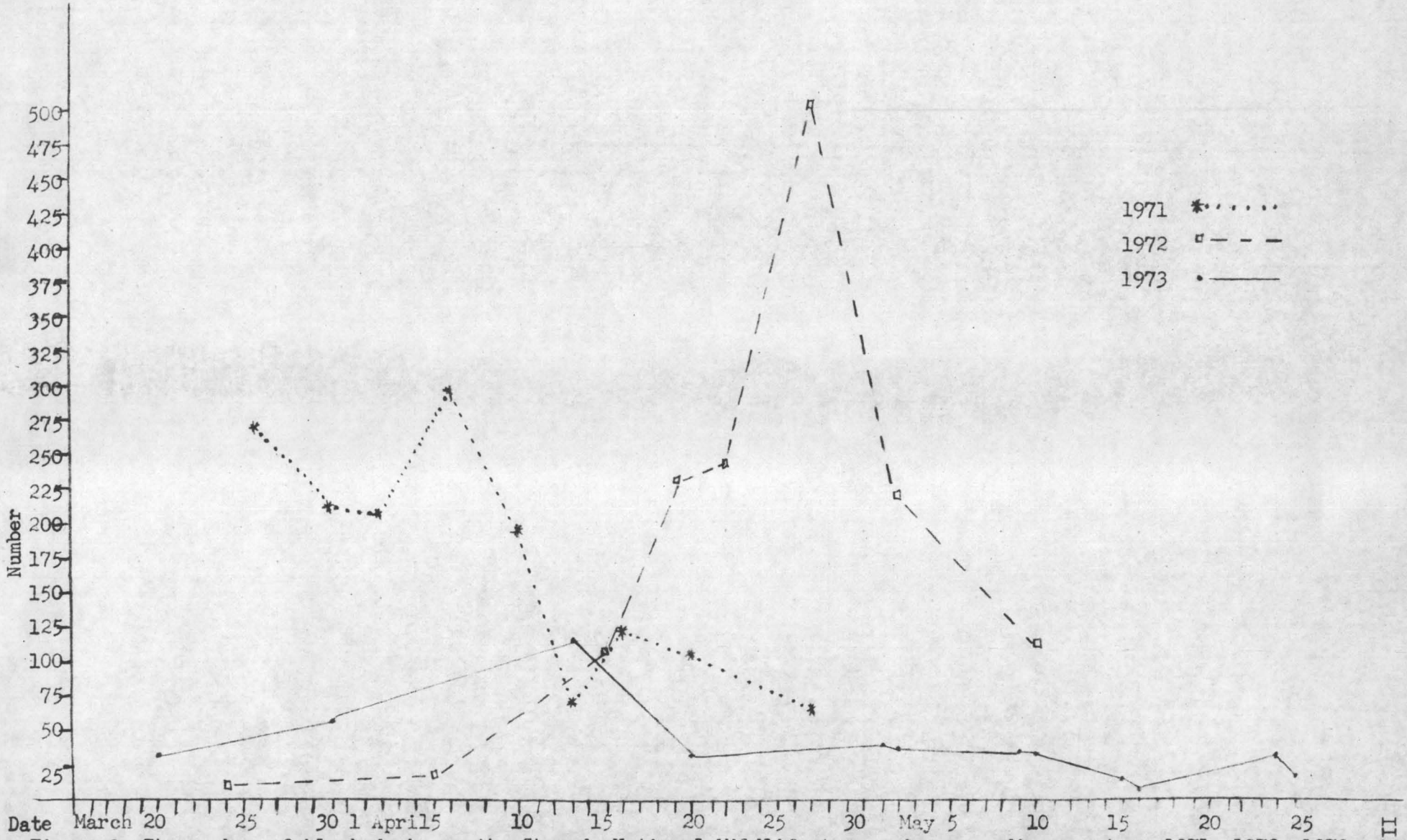


Figure 3. The number of black ducks on the Shepody National Wildlife Area and surrounding marshes, 1971, 1972, 1973. The numbers for 1971 are from Hall (1971); and for 1972, from Hall and McInnis (1972).

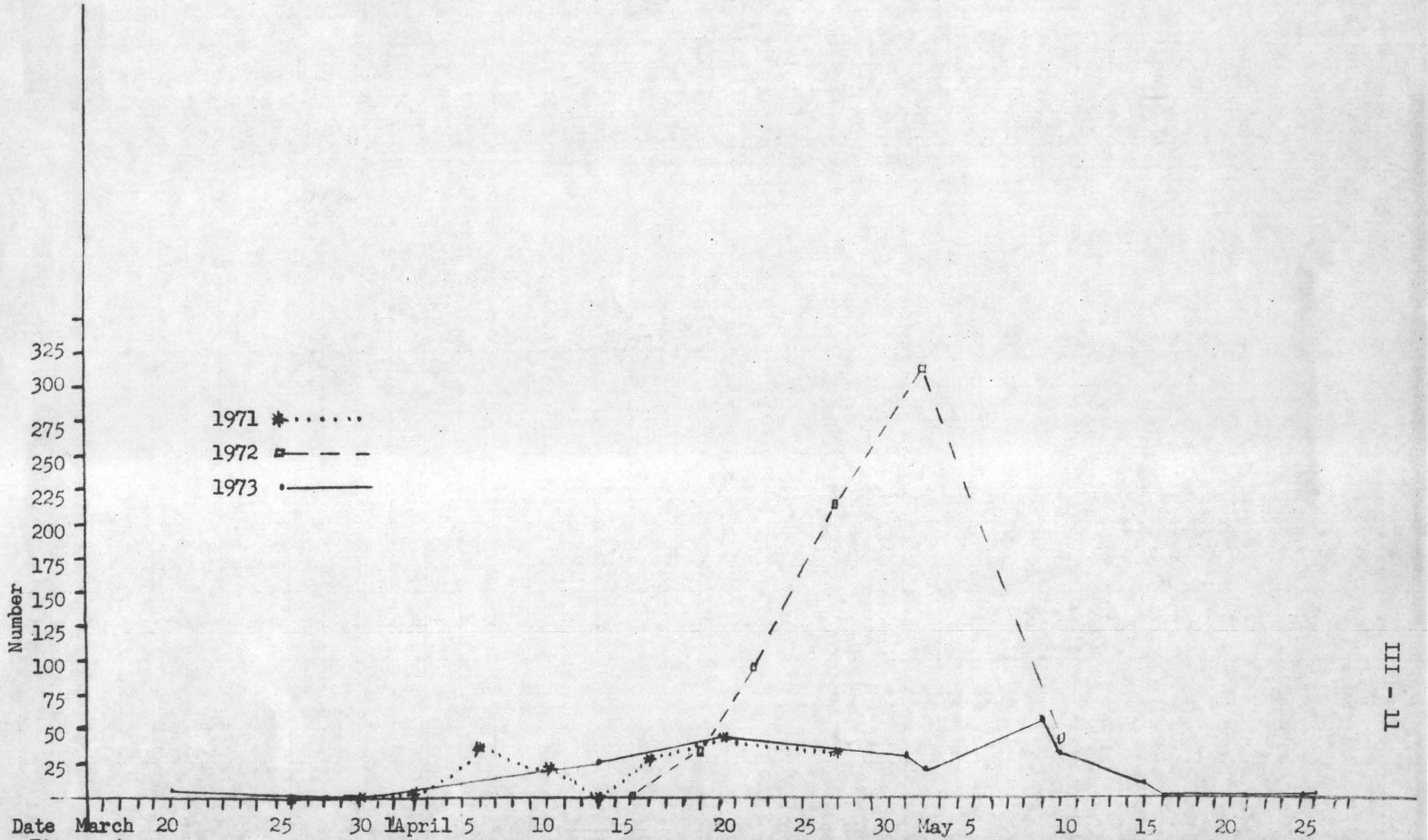


Figure 4. The number of green-winged teal on the Shepody National Wildlife Area and surrounding marshes, 1971, 1972, 1973. The numbers for 1971 are from Hall (1971); and for 1972, from Hall and McInnis (1972).

Appendix I. A summary of weather conditions on days of observation during the migration chronology study, 1973. Maximum and minimum temperatures are from the Atmospheric Environment Service, Department of the Environment, Monthly Meteorological Summary, Moncton, New Brunswick Station.

Date	Max. Temp. °F	Min. Temp. °F	Cloud cover	Wind speed	Wind direction	Precipitation
March 13	43	28	clear	high	W	
14	44	24	clear	high	NW	
15	45	22	clear	light	SW	
16	39	31	overcast	light	S	
17	36	31	overcast	light	E	
19	40	29	overcast	moderate	N	
20	30	24	overcast	light	N	snow flurries
21	26	18	overcast	high	NE	snow flurries
22	27	19	½ overcast	high	NE	
23	33	17	clear	high	NE	
24	53	15	clear	light	W	
26	45	29	overcast	light	SW	
27	30	14	½ overcast	high	N	
28	42	10	clear	light	N	
29	53	21	clear	moderate	S	
30	57	28	clear	moderate	SW	
31	50	30	clear	light	NE	
April 2	246	29	overcast	moderate	E	
3	34	30	overcast	high	NE	snow
4	35	30	overcast	high	NE	snow & drizzle
5	37	32	overcast	high	E	rain
6	39	32	overcast	high	W	showers
7	36	30	overcast	high	NW	
9	39	23	clear	high	NW	
10	40	19	clear	high	E	
11	34	27	overcast	high	SW	snow & drizzle
12	29	21	overcast	high	W	snow
13	39	20	½ overcast	moderate	W	
14	48	24	clear	light	W	
16	67	37	clear	high	SW	
17	72	35	clear	high	SW	
18	69	39	clear	moderate	SW	
19	58	27	clear	light	NE	
20	44	25	overcast	high	NE	
21	52	23	clear	light	E	
23	54	37	overcast	light	S	Rain
24	42	35	overcast			Rain
25	45	31	overcast	moderate	N	Mist
26	49	28	overcast			
27	49	36	overcast	moderate	E	
28	47	37	overcast	high	SE	light rain
30	52	37	overcast			foggy

Appendix I. A summary of weather conditions on days of observation during the migration chronology study, 1973. Maximum and minimum temperatures are from the Atmospheric Environment Service, Department of the Environment, Monthly Meteorological Summary, Moncton, New Brunswick Station.

Date		Max. Temp.°F	Min. Temp.°F	Cloud cover	Wind speed	Wind direction	Precipitation
May	1	45	33	overcast	light	S	mist
	2	56	33	overcast	light	NE	mist
	3	63	40	overcast	light	S	
	4	63	50	overcast	high	W	mist
	5	57	35	overcast	light	SW	light rain
	7	39	33	overcast	high	N	rain & snow
	8	40	35	overcast	high	N	
	9	47	33	overcast	moderate	N	
	10	56	32	overcast	light	S	
	11	59	44	overcast	moderate	S	
	12	65	41	overcast	moderate	SW	light rain
	14	65	45	clearing	moderate	W	
	15	67	39	clear	light	W	
	16	48	38	overcast	moderate	NE	rain
	17	55	36	overcast	light	SE	
	18	54	39	overcast	light	NE	
	19	59	39	½ overcast	high	SW	
	21	53	45	overcast	light	SE	rain
	22	49	44	overcast	moderate	E	
	23	49	40	overcast	light	NE	rain
	24	45	40	overcast	light	E	foggy
	25	42	38	overcast	high	NE	
	26	45	34	overcast	moderate	NE	mist
	28	67	39	clear	light	SW	
	29	73	50	overcast	moderate	S	rain
	30	71	47	overcast	light	SE	
	31	74	44	clear	light	S	showers

IV Missaquash Marsh

Introduction

Waterfowl populations on Missaquash Marsh were estimated in the spring of 1973. The total area is large in relation to that area that could be surveyed at one time, so it is important to note that the observations made are not a census of population numbers. The data for that area give a qualitative indication of those species that were present on the marsh during the study time. The data is also indicative of general population trends for fresh water areas in the New Brunswick - Nova Scotia Border area.

Procedure

Nine trips were made to the Missaquash Marsh between March 23 and May 29. The first two trips were made in late March and, because the main canal was frozen, observations were limited to the water control dam at the south end of the area.

The main canal opened up between March 29, the date of the second trip in which the canal was frozen, and April 10, the date of the third trip. On April 10 the main canal was free of ice, with ice in the impoundments being quite soft and rotten. Patten Lake and Hackmatack Lake were about two-thirds covered with a three to six inch layer of rotten ice.

On April 18 the impoundments were almost totally free of ice except for those areas with a heavy concentration of Typha sp. On that occasion Patten Lake and Hackmatack Lake were not surveyed.

On April 30 the main side ditch was surveyed along with impoundment evaluation from the observation tree (Figure 1). That was the same route that was used on April 18. It was assumed that Hackmatack Lake and Patten Lake were open.

On May 14 high winds blowing directly along the main canal hampered observation. Counting was done from a spot approximately 300 yards down the main canal.

May 17 was the first time that a motor was used with the canoe, making it possible to cover much more area. In addition, the noise from the motor flushed ducks from thick vegetation cover that would not otherwise have been seen. All major accessible areas of the marsh were observed.

On May 28 the motor was used again but counting is only for the main canal. A broken shear pin caused the observers to abandon the canoe at the bottom of Hackmatack Lake and walk out to the Trans Canada Highway.

The May 29 census was taken during the rescue of the canoe. The weather was windy with heavy rains, only the main canal was considered.

Results and Discussion

The results of the spring census for 1973 are tabulated in Table 1. Some general observations about the data can be made. The predominance of black duck and pintail on April 10 corresponds to local estimates at Tintamarre National Wildlife Area. The appearance and relative numbers of blue-winged teal and American green-winged teal are also coincident with that area. The behavioural stages observed at Tintamarre NWA are vaguely reflected in the data. On April 10 there is an abundance of pintail and blacks. This changes by April 18 to April 30 to a number of multi-species flocks with much intra-specific behaviour. On May 17 waterfowl numbers were almost equally divided between mated pairs engaged in pre-nuptial display and groups of four or five drakes (American green-winged teal were exhibiting chase behaviour at that time). On May 28 observations were almost entirely groups of males resting on open water except where nests were located close to the canal, in which case the females would rise with the males.

That data is not indicative of total population nor even of relative population numbers. The census was taken either along the main canal, the main side ditch or in the open lake areas. Large numbers of waterfowl were seen landing quite close to the upland fringe out

of sight from the main canal. It is in those areas adjacent to the upland that the largest concentration of waterfowl seemed to be located. The data is not representative of relative population numbers over the study period because of the lack of a standard technique. If the major part of the day were spent on the marsh adjacent to the upland, for example, then there would be more black ducks recorded, whereas, if the side ditch was not taken, then blacks would not be properly represented.

The method employed on May 17 would seem to be the best that was tried this spring. Using a motor to travel one way along the main canal (depending on wind direction), the route followed in Figure 1 gives a fair estimate of both adjacent upland areas as well as open marsh. In addition, more time can be spent observing waterfowl and less on transportation problems. Counting both with and without the motor gives an unbiased estimate. For example, we travelled down the main canal with the motor and then paddled back with the wind. An estimate was made going in both directions and the highest number was taken.

An accurate ground survey of Missaquash Marsh is difficult due to its size and the inaccessibility of highly populated areas of the marsh. This year's survey

did succeed in observing which species were present in the area and the ratio between those species on a given day in the area of the Missaquash Marsh that was surveyed.

Table 1. Species and daily totals at Missaquash Marsh, Spring, 1973

Date	Mal.	Blk.	A.wid.	Ring-n.	C.goose	Gwt.	Bwt.	C.merg.	Wood	Pin.	Oldsq.	A.coot
April 10		66		7		2		2		32	1	
18	1	43	4	9		12	2		9	14		
30		45	2	22		20	36		8	18		
May 14*		8	2	4		5	4			5		
17		36	5	19		8	17		4	11		
18		5		5		6	14			3		2
29		10	5	14		4	25			11		

* Bad weather

Table 2. Black duck - Daily totals, number of pairs and per cent paired for Missaquash Marsh, Spring 1973

Date	Total number	Number of pairs	Per cent paired
April 10	66	29	88
18	43	18	84
30	45	20	89
May 14	8	4	100
17	36	8	44
28	5	2	80
29	10	5	100

Table 3. American green-winged teal - Daily totals, number of pairs and per cent paired for Missaquash Marsh, Spring 1973

Date	Total number	Number of pairs	Per cent paired
April 10	2	1	100
18	12	5	83
30	20	10	100
May 14	5		
17	8	4	100
28	6	1	33
29	4	1	50

Table 4. Blue-winged teal - Daily totals, number of pairs and per cent paired for Missaquash Marsh, Spring 1973

Date	Total number	Number of pairs	Per cent paired
April 18	2		
30	36	16	89
May 14	4	2	100
17	17	7	82
28	14	1	14
29	25	3	24

Table 5. Pintail - Daily totals, number of pairs and per cent paired for Missaquash Marsh, Spring 1973

Date	Total number	Number of pairs	Per cent paired
April 10	32	6	38
18	14	4	57
30	18	9	100
May 14	5	2	80
17	11	2	36
28	3		
29	11	2	36

Table 6. Ring-necked duck - Daily totals, number of pairs and per cent paired for Missaquash Marsh, Spring 1973

Date	Total number	Number of pairs	Per cent paired
April 10	7		
18	9	3	67
30	22	11	100
May 14	4	2	100
17	19	9	95
28	5	2	80
29	14	2	29

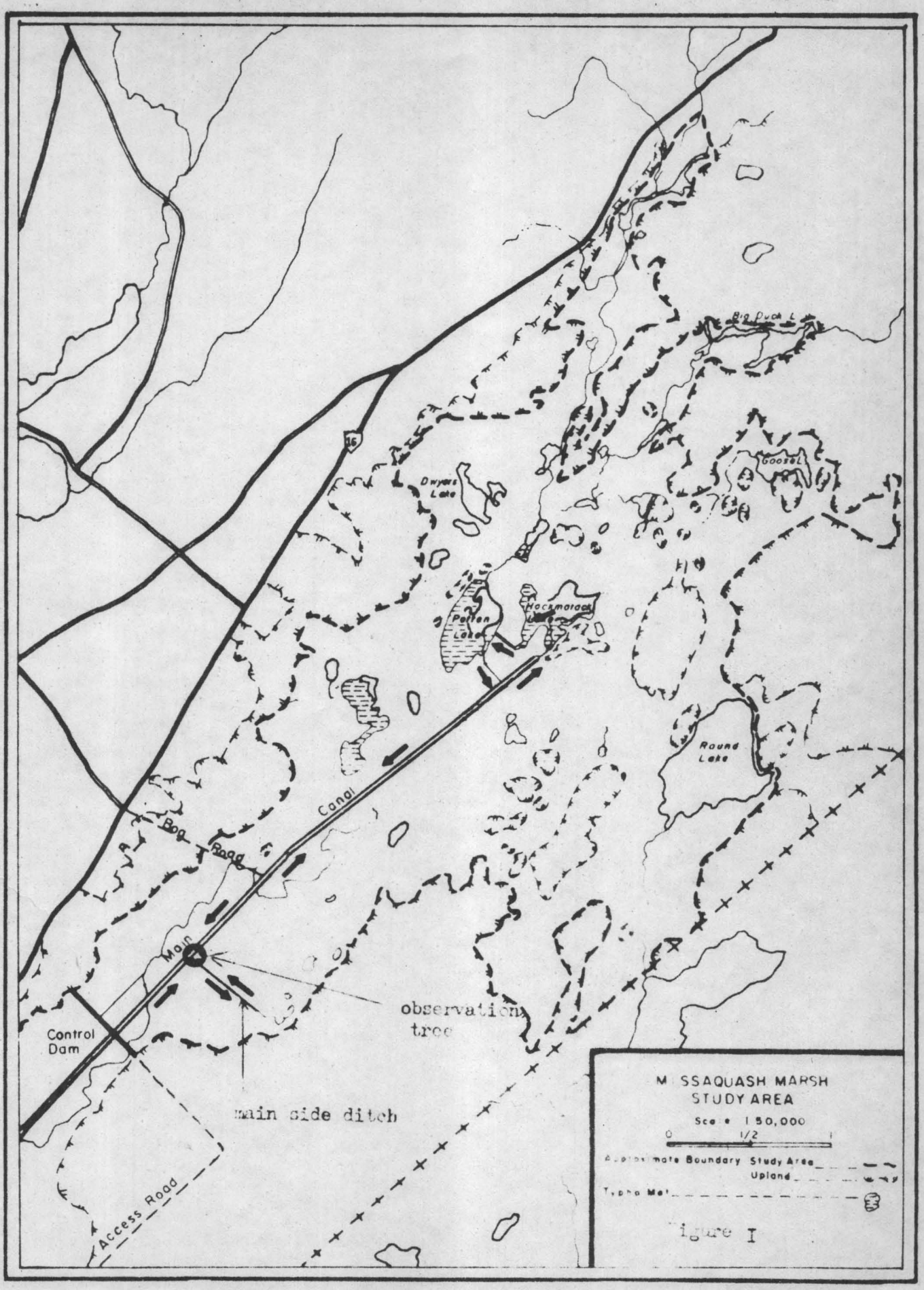

Big Duck L.
Goose L.
Owens Lake
Hackmatack
Patton Lake
Round Lake
Canal
Bog Road
Main
observation tree
Control Dam
main side ditch
Access Road
MASSAQUASH MARSH
STUDY AREA
Scale 1:50,000
0 1/2 1
Approximate Boundary Study Area
Upland
Typha Mat

Figure I

Tintamarre National Wildlife Area

Introduction

The major portion of the observer's time during the spring of 1973 was spent at Tintamarre National Wildlife Area. Over the period of the spring, several phases of waterfowl use of the area were observed and recorded. It was that changing nature of the area which, paralleling habitat changes, forms the skeleton of this presentation.

Procedure

Surveying procedure of Tintamarre NWA changed as the season progressed and as use of the area became more intensive. The area was first visited on February 16 and the last numerical observations were made on May 30. A visit to the area to confirm nesting observations was made on June 27. An attempt was made to visit the area every day throughout that period (beginning after the first concentrations of migrants arrived) with observations alternating between dawn and dusk. This was quite easy early in the study as the area available to waterfowl was limited to ice-free areas. As the season progressed, a compromise occurred between

enumeration of waterfowl and observation of waterfowl behaviour. In this way numerical trends were tabulated as well as behavioural changes. The observer intended to build a blind for that purpose but it was subsequently discovered that sitting quietly on the dike and masking one's silhouette was sufficient camouflage.

Observations to the northern part of the area were made from the observation tower (Figure 1) and the Canadian Wildlife Service camp at Large Lake, as well as along the road through that area for the top of Front Lake and Long Lake.

On April 26, a canoe was taken to the north end of Large Lake and a considerable way up Robinson Brook, as well as through the Community Pasture via the LeCoupe River.

Results and Discussion

Table 1 presents data from daily observations at Tintamarre NWA for the spring of 1973. Noted near some dates with an asterisk is any cause that might produce aberrant results, e.g. poor weather, shortening survey time for that observation period, or a restricted observation area, such as only the top of the Wildlife Area along the road, or observations from the tower at Long Lake. In 1972 there were more red-breasted merganser and more Canada goose sightings than in either 1971 or

1973. This can be explained by the harsh spring conditions in 1972, which forced those otherwise coastal species into the protection of inland areas. Other than those differences, there are no major irregularities in new species coming into the area - this will be discussed below.

The daily totals for black duck are presented in Figure 2. Data for 1971 and 1973 are very similar, whereas that of 1972 shows fewer numbers of blacks for March and April of that year. This is again attributable to the weather. It is a tribute to the hardiness of the black duck that there were as many individuals present during March and April as were indicated. The high peak on May 6, however, shows the negative effect of inclement weather on migration, with a large number of black duck migrating with the first warm wave.

Figure 3 indicates a significant increase in the importance of pintail at Tintamarre NWA in 1973. This increase in importance is shared with two other species, namely blue-winged teal (Figure 5) and shoveler (Table 1). No definite reason for the increase in the importance of those species is known but the reason may be one of habitat. As the vegetation matures in this newly formed area, the habitat becomes more suitable for those species. A.C. Bent, in Life Histories of North

American Wild Fowl, Part One, page 112, has noted that those three species are often found together and seem to demand similar habitats.

Figure 4 shows the effect of cold weather on the less hardy migrants such as the American green-winged teal. Graphs for 1971 and 1973 are highly synchronized whereas in 1972 the green-wings rushed through all at once during the warm spell in the first week of May.

Figure 6 shows daily totals for ring-necked duck that only began to appear in the spring of 1972. Several small peaks representing migrant flocks passing through the area can be seen during the middle part of April, after which a relatively constant number were seen in Tintamarre NWA. Several pairs are reported nesting.

Figure 7 gives the daily totals for all species during the spring of 1973. The graphs of the two years indicate no striking difference in the number of waterfowl, but it does indicate a significant difference in the use of the area over the two years. Due to the severe spring in 1972 many ducks were forced to remain farther south, proceeding north only when the weather was more suitable. For that reason a great number of waterfowl passed through the area in a very short period during the first week of May. In 1973, however, the weather was much

milder and a more leisurely utilization of the Tintamarre NWA habitat was possible. I have attempted to describe this usage by a number of phases, the boundaries of which are indicated on Figure 7, by the vertical dashed lines. The dates, of course, are approximate as one phase would gradually pass into the other over usually a week or ten day period.

The phases of usage by waterfowl of Tintamarre NWA can be correlated directly to open water. Open water, correspondingly, is an excellent indication of local weather conditions as well as vegetation development. All of these factors combine to make the habitat more suitable for a growing diversity of waterfowl species. Table 2 summarizes feeding observations and indicates the use of the area with the change in species composition.

The first phase of usage that was observed was what was probably the end of the wintering waterfowl in the Wildlife Area. During this time a population of common merganser were seen daily on the open water that was available to them (Figure 8). Those birds seemed in good health and fed actively on perch, small trout and eels. There seemed to be no shortage of those food stuffs. There was considerable stealing of fish among the common merganser. One bird would catch an eel and another would try and grab it, often losing the eel in

the fight. Prey was often taken up onto the ice in order to swallow the fish without losing it. Several fish managed to escape after being caught. Common goldeneye, local wintering blacks and one bufflehead were also seen during that time. The use of the area by black duck in the winter, was probably only by local semi-domestic ducks. Over the period ending around March 27 the common merganser changed from approximately 10% paired to 60 - 70% paired. Much aggression between the males was seen at that time with the group motoring behaviour as well as the breast-raising ritual being witnessed on several occasions. The behaviour of shooting jets of water out behind with the bright orange feet was also witnessed, although the culminating aspect of that motion was never seen. On March 19 a "laying-the-neck-on-the-water" activity was seen at Fillmore's Hole. In that activity a male common goldeneye would swim repeatedly toward a female bufflehead. When the former was five or six feet away from the latter, he would dive toward her under water. When the common goldeneye dove the bufflehead would fly about 30 feet away and resume feeding. This action was repeated six times.

The second phase began this year with the arrival of significant numbers of black duck and the departure of the common merganser around March 27. The

black duck were mostly paired upon arrival and were distributed throughout the open water as seen in Figure 4. Toward the end of this phase, waves of pintail passed through the area. Those flocks were comprised almost entirely of males and few behavioural observations were made for pintail at that time. Both species flocked together and utilized most of the open water areas in Figure 4. Feeding observation saw the blacks and pintail feeding mostly in the open waters in Impoundments 1 and 6 and resting on the open water at Fillmore's Hole and Front Lake. No intraspecific behaviour was observed as the birds seem to co-habitate quite peacefully. The only common behavioural activity among the blacks at that time was the pursuit flight by one male of another pair (Table 3).

The third phase began around April 14 with the arrival of significant numbers of American green-winged teal, ring-necked duck and pintail, followed shortly by blue-winged teal and shoveler. Until about the end of April one or two large flocks of many species were flushed from one impoundment to the next. Those areas which were used to the greatest extent by that flock are shown in Figure 10. This was the time for maximum usage of the area which is evident from Figure 7. At that time all open water areas were clear of ice and only those areas with a thick mat of Typha sp. were ice-bound. Blue-winged

teal, American green-winged teal, pintail, shoveler and black duck would flock together. Ring-necked duck kept pretty much to themselves as their habitat requirements were quite different. As the phase progressed, fewer black duck were seen with the flock - being associated mostly with upland-adjacent parts of the area. The most popular area of concentration for the large flock was the open water at the back of Impoundment 1. In that flock there was always interspecific activity but little intraspecific activity. The only association was the area in which the ducks were located. When flushed, for example, the pintail would go one way, the blue-wings another, and the shoveler yet another. When on the water there was very little interaction between species. Among species, however, was a different story. Toward the latter part of phase 3 and the beginning of phase 4 many behavioural observations were made. Those are listed in Table 3. On the whole, this phase and the next are very active times.

Phase 4 is really a later progression of the third phase, the difference being that the population is smaller, distribution more general throughout the impoundments, and behaviour among later migrants such as blue-winged teal, more intense. Behavioural notes for that period are also listed in Table 3. Small groups of

all birds are spread throughout the vegetation which is at that time getting quite dense. When observing the impoundments during that phase the usual sight was groups of two to seven birds engaged in some sort of feeding or courtship behaviour among the young green shoots of Typha sp.

The last phase represents a time when much pairing is complete and nesting activity is the major behavioural characteristic. Numbers of waterfowl remain constant (Figure 7) and the same pairs of ducks can be flushed from the same spot on most occasions. That suggests that definite nesting territories are being developed. In Figure 6 the observations concerning those territories are indicated. The list is by no means meant to tabulate all nesting pairs in the area. In most cases the areas are those accessible to walking routes. Major resting areas are denoted by the barred lines in Figure 11. Those areas were used mainly by ring-necked duck, which seem to be very gregarious - flocking mainly in the Impoundment 2 area. Blue-winged teal, on the other hand, are distributed regularly throughout the area and the males are usually flushed singly or, at most, in pairs (as at the east end of Impoundment 5).

The observations made during the spring of 1973, coupled with those available from 1972 and 1971, seem to

indicate that the vegetation at Tintamarre NWA is maturing and that this change in vegetation is bringing about a more diverse habitat. That growing diversity of habitat, in turn, is responsible for the increasing complexity and intensity of use of the area by waterfowl.

Table 1. Species and daily totals at Tintamarre NWA, Spring 1973

Date	C.goose	Mal.	Blk.	Wid.	Pin.	Gwt.	Bwt.	Shov.	Wood.	Ring.	G.eye	C.Merg	Total
March 8			2								2	3	7
10			2								2	9	13
15											1	14	15
19			6								1	3	11
22			5								3	15	23
25			5								3	14	22
26			3									6	9
27			2								1	7	10
29	19		5										24
31			30										30
April 2			29										29
3*			8										8
4**			1										1
5			5										5
7			30		25								55
8			20		40								60
9			49		66	2				18			135
10			21		10								31
12		1	31		6					25			68
14			26		4	19							49
15*			10		85	8							103
16			42		36	66	19	5					168
17			32		24	55	12	4		22			149
21	2		30		55	54	4						147
22**			18		5	3	6		2				34
23			23		19	30	2	7	2				81
24	6		41	2	42	55	14	10					170
25			86		44	45	25	7		18			225
26			67		12	24	4			42			157
28			14		8	12	6	2		15			57

Table 1. Species and daily totals at Tintamarre NWA, Spring 1973 - continued

Date	C.goose	Mal.	Blk.	Wid.	Pin.	Gwt.	Bwt.	Shov.	Wood.	Ring.	G.eye	C.Merg	Total
April 29			46	2	12	20	24			28			132
May 3			16		6	13	8	2		18			63
4			10		22	17	20	2		28			99
6			20		8	29	18	2		27			104
8			42		14	22	32			20	2		132
9**			3		2	2	14			10			31
10*			8				6	2		4			20
11			8		2	8	14	2		18			48
12			33		14	25	10	2		32		6	122
13			24		8	15	18			18			73
14			17		10		28			14			69
16			12		8	8	28	10		10			76
18**			8		2	6	6			28			50
20			12		3	6	10			10			41
21			12				12			14			36
22***						2	2			2			6
27			20			8	12			4			44
29			15		4	8	14	6		10			57
30			24		3	10	18	5		12			72

March 19 - 1 Bufflehead
April 26 - 4 Surf Scoter
4=Common Scoter
April 29 - 1 Common Loon

* Bad weather
** Top part of Tintamarre NWA only
*** Impoundment VI only.

Table 2. Feeding observations of waterfowl at Tintamarre NWA, Spring, 1973

Phase	Species	Particulars
I	Common merganser	Observed actively diving for fish in Fillmore's Hole - prey is mostly perch, trout and eels.
II	Black duck Pintail	Observed dabbling in open water in Impoundment I - assumed that composition of food stuff is similar to Phase III.
III	Blue-winged teal Am. green-w. teal Pintail Shoveler	Observed feeding in open water of Impoundments I and IV - Blue-winged teal caught in Con-o-bear trap showed 15 Sparganium sp., 4 Littorinea sp., 30 Scirpus sp.,, and 10 Polygonum sp. in the gizzard - it was assumed that all of those species were feeding on the same thing.
	Ring-necked duck	Same as above except seen feeding in areas where bottom vegetation is inaccessible to surface-feeding ducks, e.g. Paunchy Pond and Fillmore's Hole.
IV	Blue-winged teal Am.green-w. teal Shoveler	Same as above except diet now supplemented by free-swimming invertebrates.

Table 3. Major behavioural observations at Tintamarre NWA, Spring,1973

Date	Species	Observation
March 15	C. merganser	Birds feeding in Fillmore's Hole - after catching fish bird often goes up on ice to eat it, frequently dropping the prey two or three times in the process - considerable amount of stealing going on - female from female, male from female but stealing from male was not witnessed.
March 19	C. goldeneye	Performing "laying-the-neck-on-the-water" activity against female Bufflehead. (see text)
March 19	C. merganser	"Water-kick" display as well as much male - male aggression activity - considerable wing-flapping and pluming of crests.
March 26	C. merganser	Two females sitting on ice near edge of water - male (apparently asleep) drifts by and, on approach, turns head away from female then swims away shooting jets of water out behind - ritual performed 4 times.
April 8	Black duck	Imp. VI - single black swims towards pair showing aggressive posture to male. The three lift off and the original pair breaks off - the single black alights in water.
April 2	Black duck	Bottom Front Lake, single black sitting in open water is very irritated when flushed, circling observer and making menacing sounds - alights nearby in Spiraea - no nest is found.
April 8	Black duck	On upland fringe of Imp. V a pair of blacks raise noisily and circle very low over the marsh - after 5 minutes of continual harranging a raccoon is seen making his way back into forest.
April 19	Pintail	Imp. I - male chasing female in spectacular twisting, during flight - land in Paunchy Pond.

Table 3. Major behavioural observations at Tintamarre NWA, Spring,1973

Date	Species	Observation
April 20	Blue-w. teal	7 males pursuing one female over Imp. I - chase lasts 2 min. after which they land out of sight.
April 23	Pintail	In Imp. I, 2 females approach singe male - male exposed snowy breast upto 5 seconds at a time, then raises point of tail up and places beak on chest - disappears behind vegetation.
April 24	Green-w.teal	6 males pursuing female - 3 males drop off and remaining group alight in Paunchy - much head-dipping and bobbing among males.
April 24	Pintail	Male flies slowly overhead dipping his head and uttering a low 'peep' as he dips his head.
April 28	Blue-w. teal	3 males after female, 2 males drop off and remaining pair lands, male goes through series of bobbing and wing-flapping - they swim off together.
May 3	Ring-n. duck	Fillmore's Hole - male exhibiting uncomfortable-looking neck posture - females do not appear interested.
May 9	Ring-n. duck	In Imp. III pair is flushed - instead of flying away as usual they circle about the observer quite close - uttering worried clucks - no nest found - behaviour common.
May 9	Blue-w. teal	Pairs along road at bottom of Front Lake are easily approached and when flushed do not fly away but circle at close range - behaviour common.
May 16	Blue-w. teal	9 males going through complete pursuit flight only no female is present - upon landing there is much excited display but more confused than usual - assumed to be late arrivals caught up in the excitement of the season - the observer speculated that those birds were juveniles.

Table 3. Major behavioural observations at Tintamarre NWA, Spring, 1973

Date	Species	Observation
May 30	Blue-w. teal	Flushed from nest on dyke back of Imp. III - 11 eggs.
June 27	Blue-w. teal	Flushed off nest at back of Imp. II - no nest found.
June 27	Am.coot	Young coot caught out in open - female swims out and protects the young bird in the feathers of her rump - uttering distressing cries and faces observer until observer leaves.
June 27	Ring-n. duck	Two broods seen in Imp. II, one with 8 and the other with 9 young - the female did not seem too alarmed when approached and would generally lead young calmly away - often into cover of submerged Spiraea.

Table 4. Black duck - total number, number of pairs and per cent paired in Tintamarre NWA, Spring 1973

Date		Total number	Number of pairs	Per cent paired
March	8	2		
	10	2		
	19	6		
	22	5	1	40
	25	5	2	80
	26	3		
	27	2	1	100
	29	5		
	31	30	10	67
April	2	29	10	69
	3	8	4	100
	4	1		
	5	5	2	80
	7	30		
	8	20		
	9	49		
	10	21	8	76
	12	37	6	32
	14	26	13	100
	15	10	5	100
	16	42	18	86
	17	32	16	100
	21	30	15	100
	22	18	9	100
	23	23	10	87
	24	41	20	97
	25	86		
	26	67		
	28	14	7	100
	29	46	20	87
May	3	16	8	100
	4	10	5	100
	6	20	6	60
	8	42	21	100
	9	3		
	10	8	4	100
	11	8	4	100
	12	33	15	91
	13	24	12	100
	14	17	4	47
	16	12	6	100
	18	8	1	25
	20	12	6	100
	21	12	6	100
	27	20	6	60
	29	15	7	93
	30	24	6	50

Table 5. Pintail - total number, number of pairs and per cent paired in Tintamarre NWA, Spring, 1973

Date	Total number	Number of pairs	Per cent paired
April 7	25		
8	40		
9	66		
10	10	4	80
12	6		
14	4	2	100
15	85		
16	36	3	17
17	24	4	33
21	55	13	47
22	5	1	40
23	19	7	74
24	42	12	57
25	44	18	82
26	12	4	67
28	8	4	100
29	12	5	83
May 3	6	3	100
4	22	10	91
6	8	4	100
8	14	6	86
9	2	1	100
11	2	1	100
12	14	7	100
13	8	4	100
14	10	5	100
16	8	4	100
18	2	1	100
20	3		
29	4	1	50
30	3	1	67

Table 6. Blue-winged teal - total number, number of pairs and per cent paired in Tintamarre NWA, Spring, 1973

Date	Total number	Number of pairs	Per cent paired
April 16	19	7	74
17	12	4	67
21	4	2	100
22	6	3	100
23	2	1	100
24	14	7	100
25	25	12	96
26	4	2	100
28	6	3	100
29	24	12	100
May 3	8	4	100
4	20	10	100
6	18	9	100
8	32	16	100
9	14	7	100
10	6	3	100
11	14	7	100
12	10	5	100
13	18	9	100
14	28	14	100
16	28	7	50
18	6	3	100
20	10	5	100
21	12	6	100
22	2	1	100
27	12	6	100
29	14	7	100
30	18	9	100

Table 7. American green-winged teal - total number, number of pairs and per cent paired at Tintamarre NWA, Spring 1973

Date	Total number	Number of pairs	Per cent paired
April 9	2	1	100
14	19		
15	8		
16	66	15	45
17	55	19	69
21	54	8	29
22	3		
23	30	5	33
24	55		
25	45	20	89
26	24	12	100
28	12	4	67
29	20	10	100
May 3	13	2	31
4	17	3	35
6	29	5	34
8	22	9	82
9	2	1	100
11	8	4	100
12	25	5	40
13	15	2	27
16	8	4	100
18	6		
20	6	3	100
22	2	1	100
27	8	4	100
29	8	4	100
30	10	4	80

Table 8. Ring-necked duck - total number, number of pairs and per cent paired at Tintamarre NWA, Spring 1973

Date	Total number	Number of pairs	Per cent paired
April 9	18	7	78
12	25		
17	22	5	45
25	18	7	78
26	42	11	52
28	15	7	93
29	28	12	86
May 3	18	7	78
4	28	13	93
6	27	12	89
8	20	5	50
9	10	5	100
10	4	2	100
11	18	9	100
12	32	15	94
13	18	9	100
14	14	7	100
16	10	5	100
18	28	14	100
20	10	5	100
21	14	7	100
22	2	1	100
27	4	2	100
29	10	5	100
30	12	6	100

Table 9. Shoveler - total number, number of pairs and per cent paired at Tintamarre NWA, Spring 1973

Date	Total number	Number of pairs	Per cent paired
April 16	5		
17	4		
23	7	1	29
24	10	2	40
25	7	2	57
28	2	1	100
May 3	2	1	100
4	2	1	100
6	2		
10	2	1	100
11	2	1	100
12	2	1	100
16	10	4	80
29	6	1	33
30	5	2	80

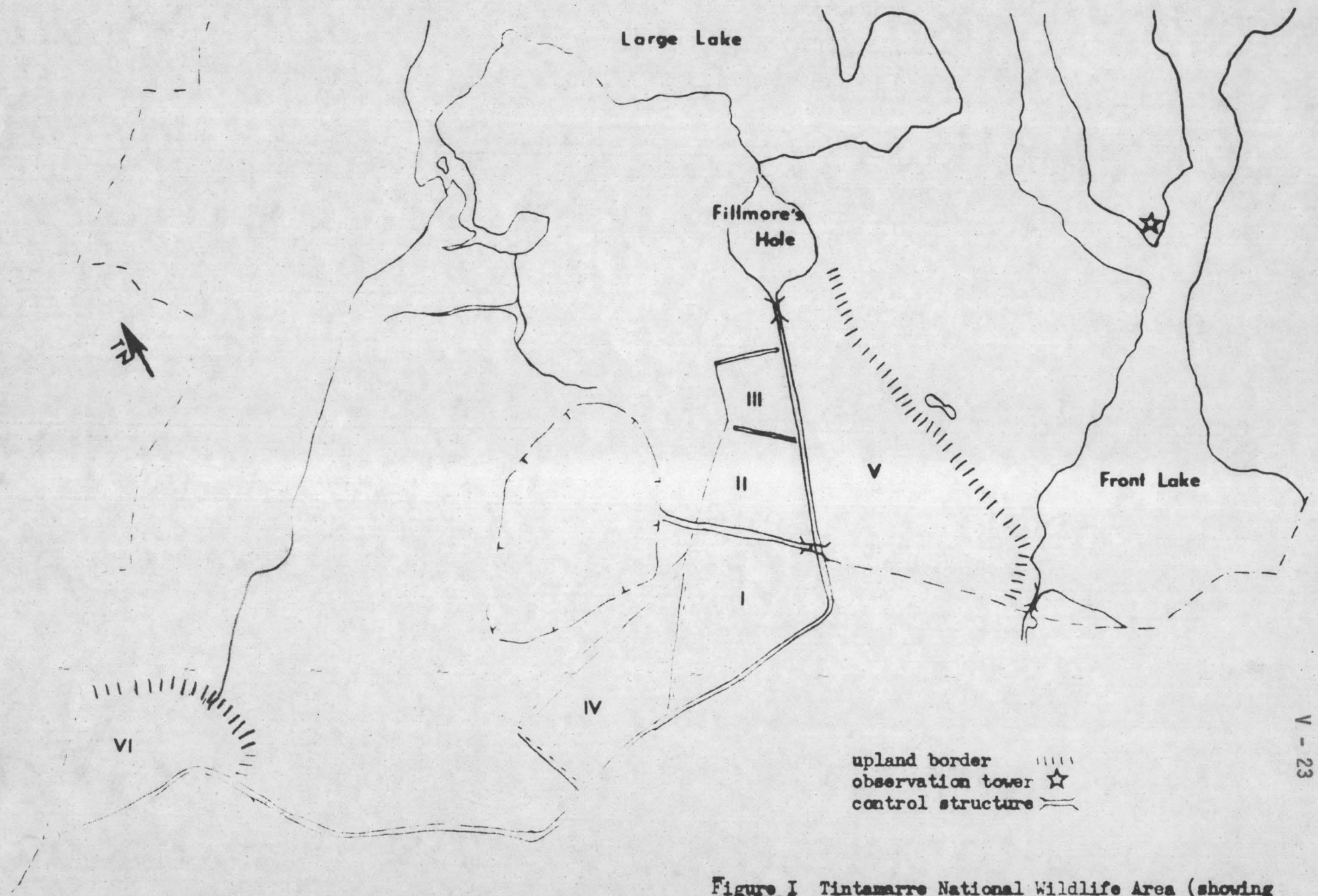


Figure I Tintamarre National Wildlife Area (showing southern parts — sites of major waterfowl concentrations)

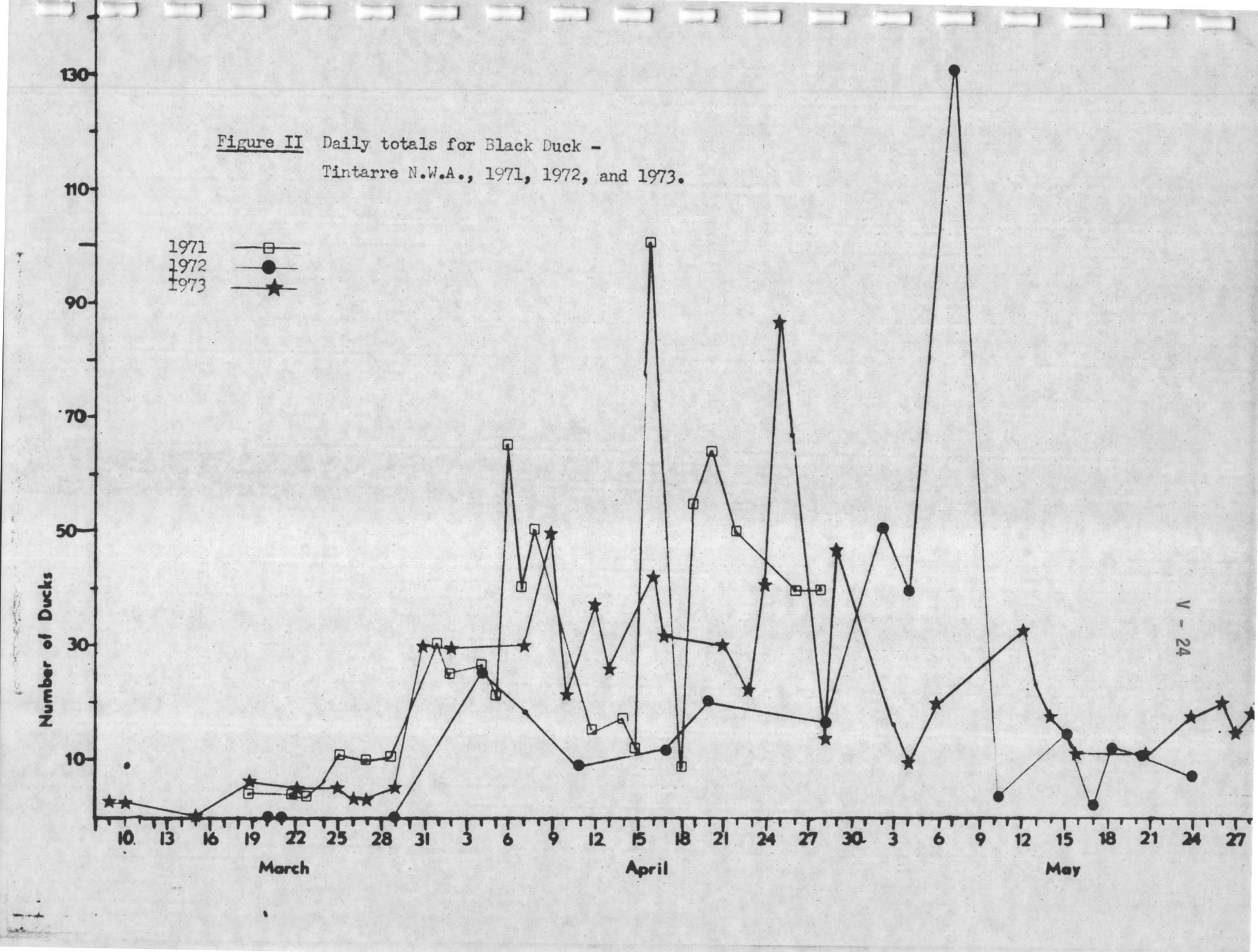
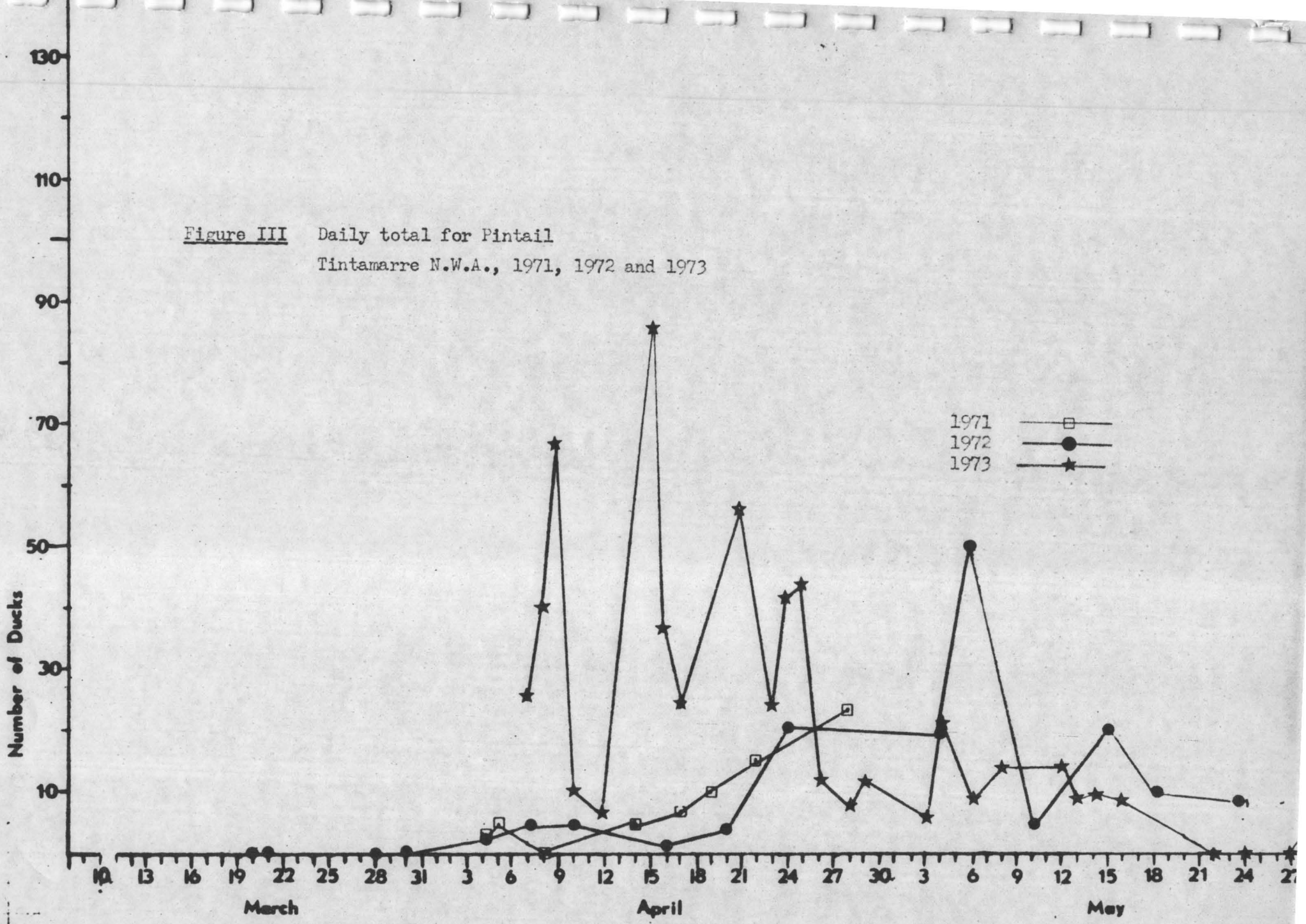


Figure II Daily totals for Black Duck -
Tintarre N.W.A., 1971, 1972, and 1973.
1971
1972
1973
Number of Ducks
130
110
90
70
50
30
10
10 13 16 19 22 25 28 31 3 6 9 12 15 18 21 24 27 30 3 6 9 12 15 18 21 24 27
March
April
May

Figure III Daily total for Pintail
Tintamarre N.W.A., 1971, 1972 and 1973



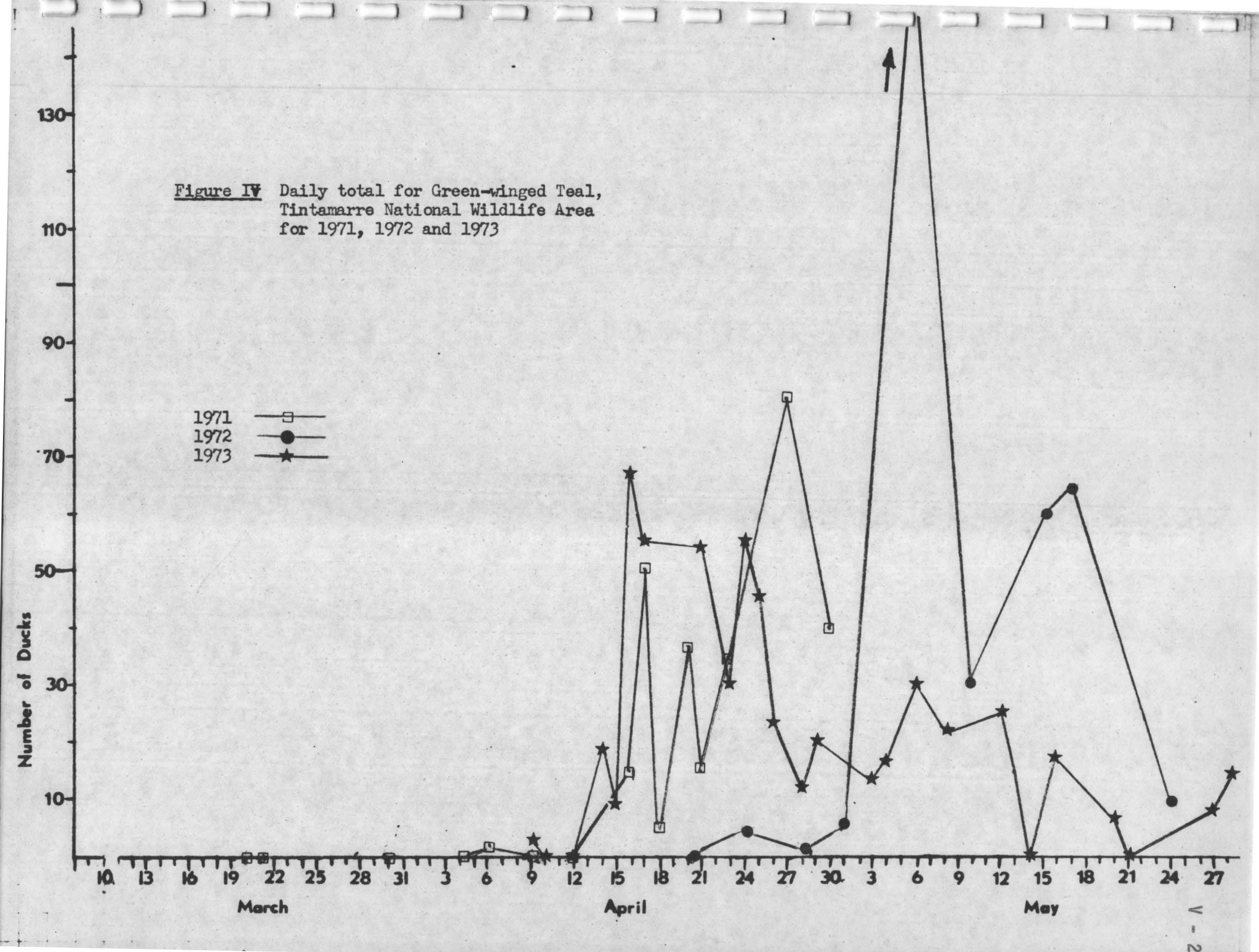


Figure IV Daily total for Green-winged Teal, Tintamarre National Wildlife Area for 1971, 1972 and 1973

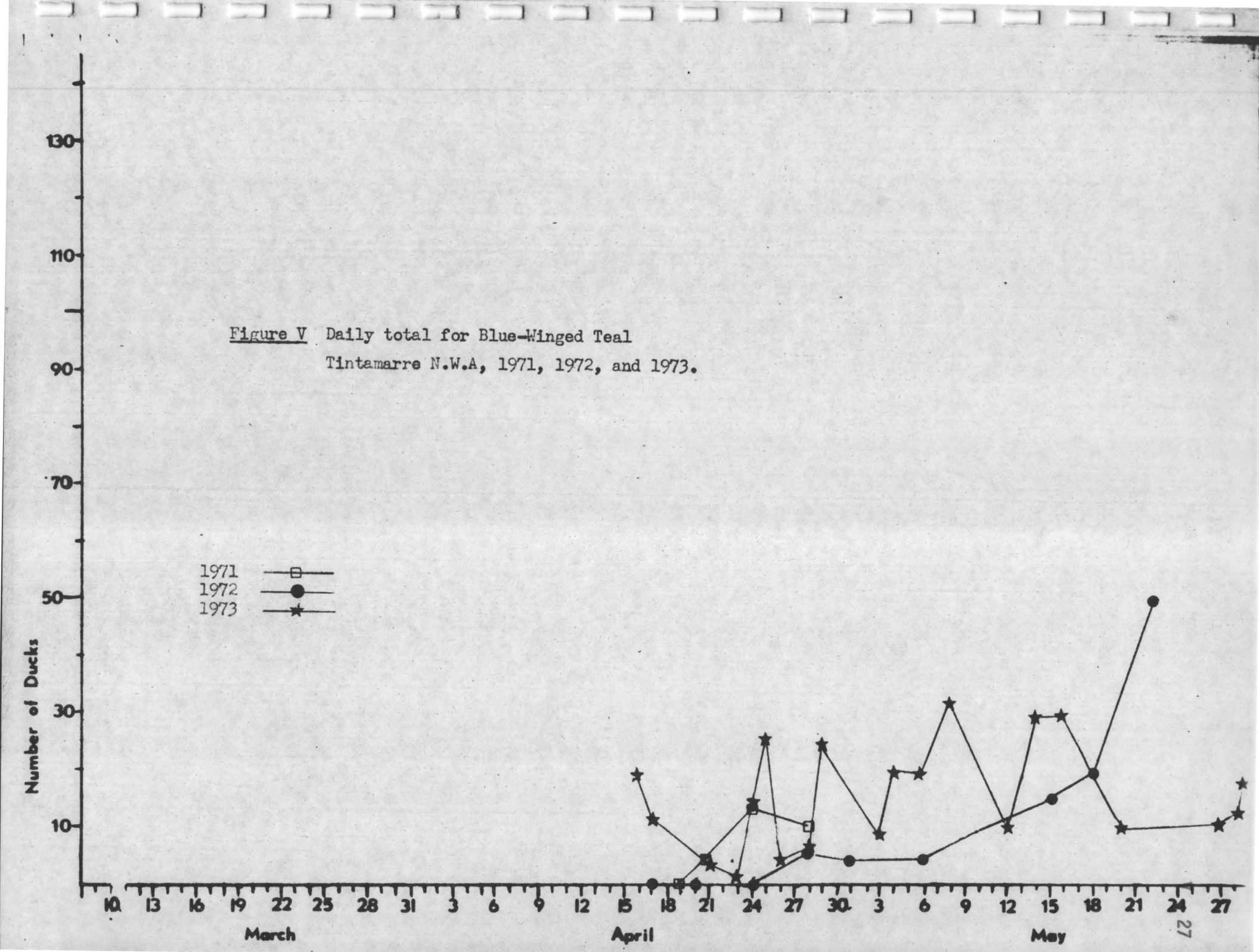
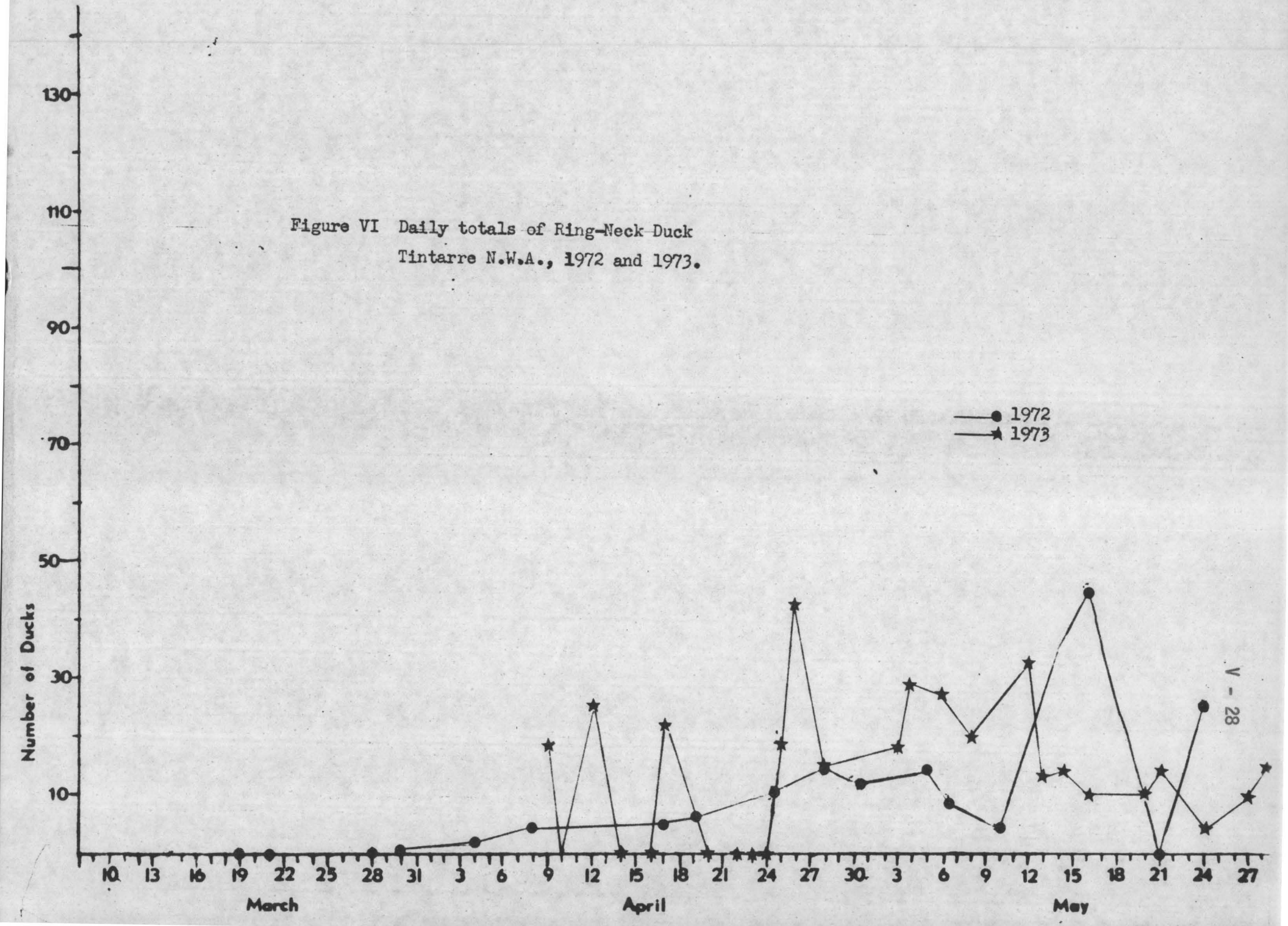


Figure V Daily total for Blue-Winged Teal
Tintamarre N.W.A, 1971, 1972, and 1973.

Figure VI Daily totals of Ring-Neck Duck
Tintarre N.W.A., 1972 and 1973.



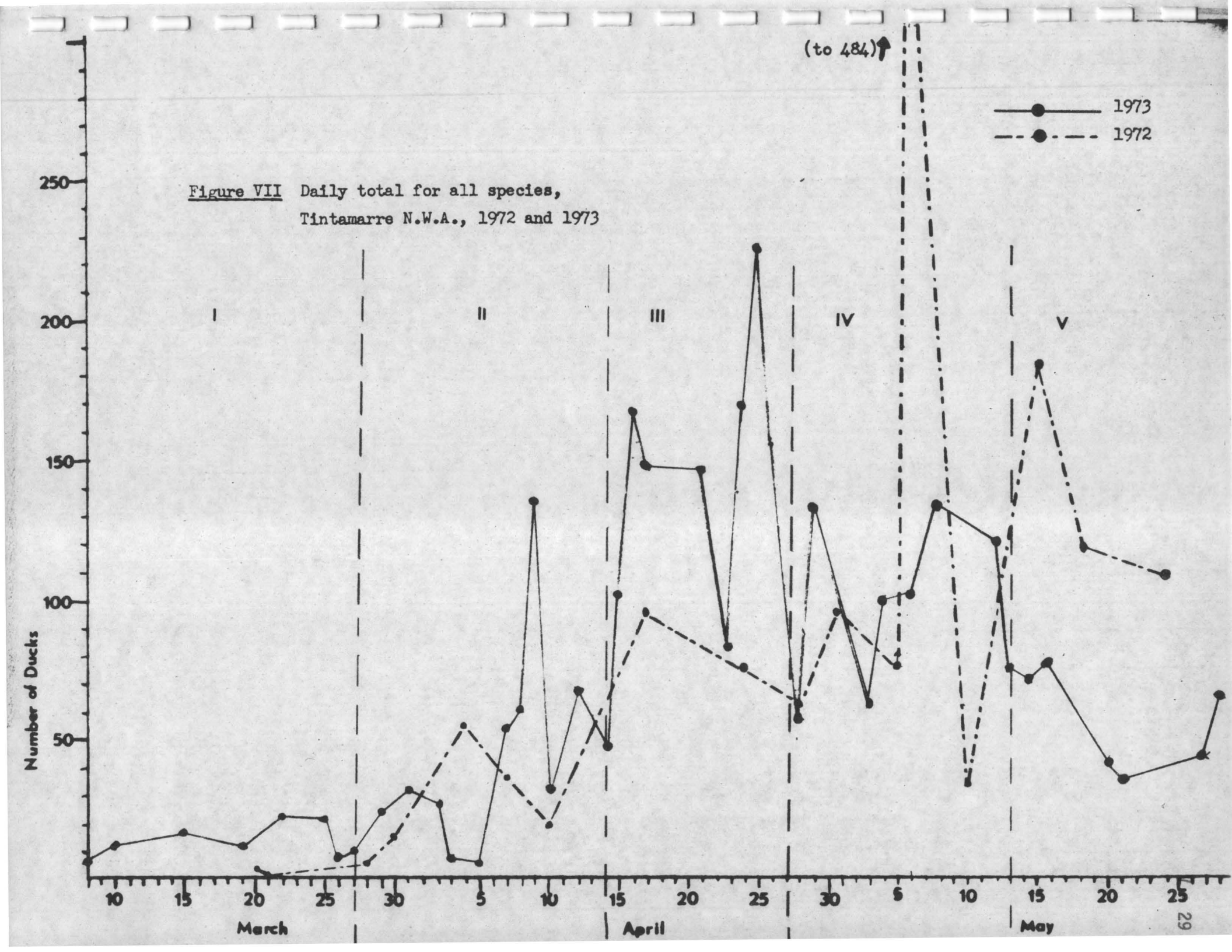


Figure VII Daily total for all species, Tintamarre N.W.A., 1972 and 1973

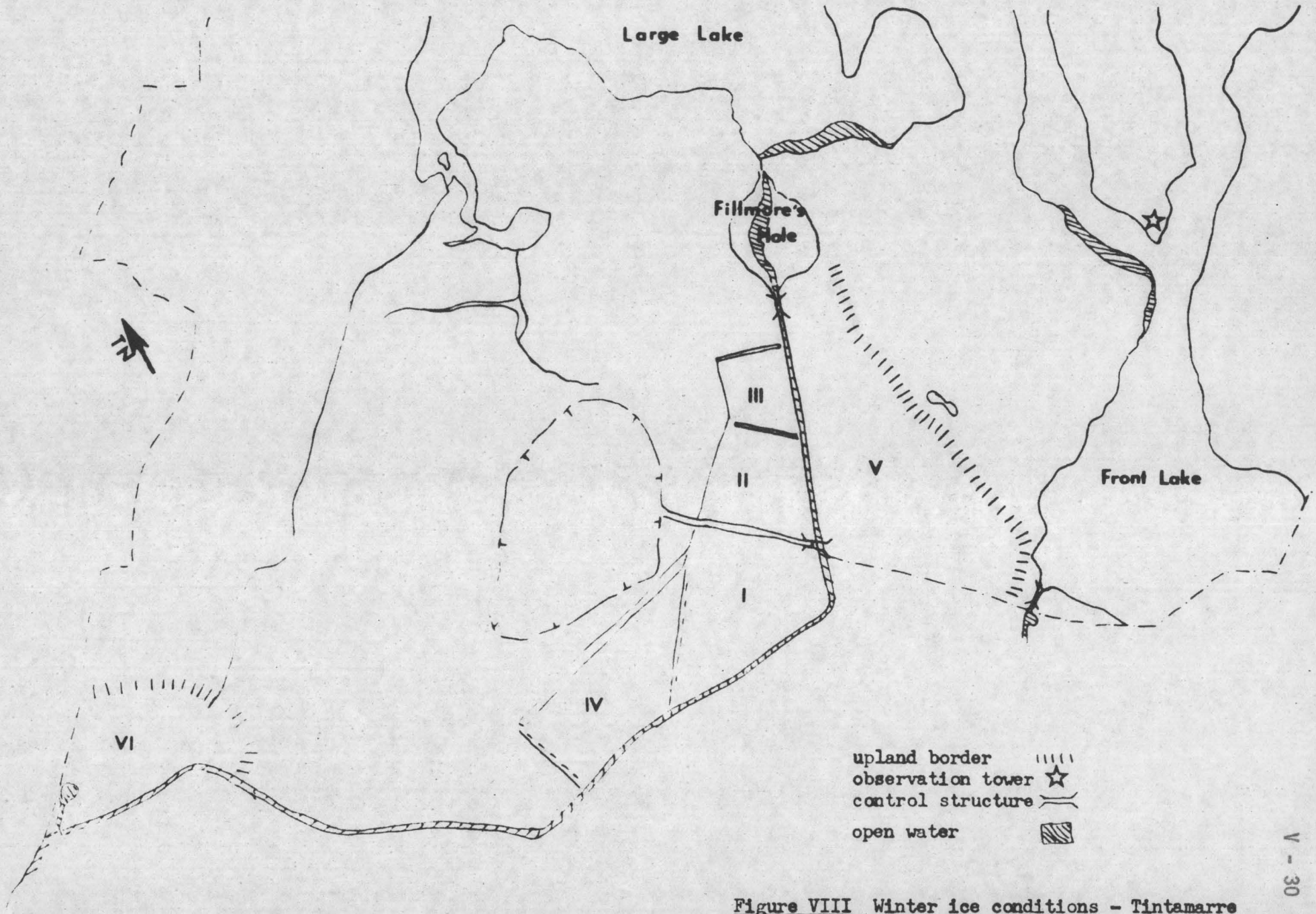


Figure VIII Winter ice conditions - Tintamarre National Wildlife Area, 1973

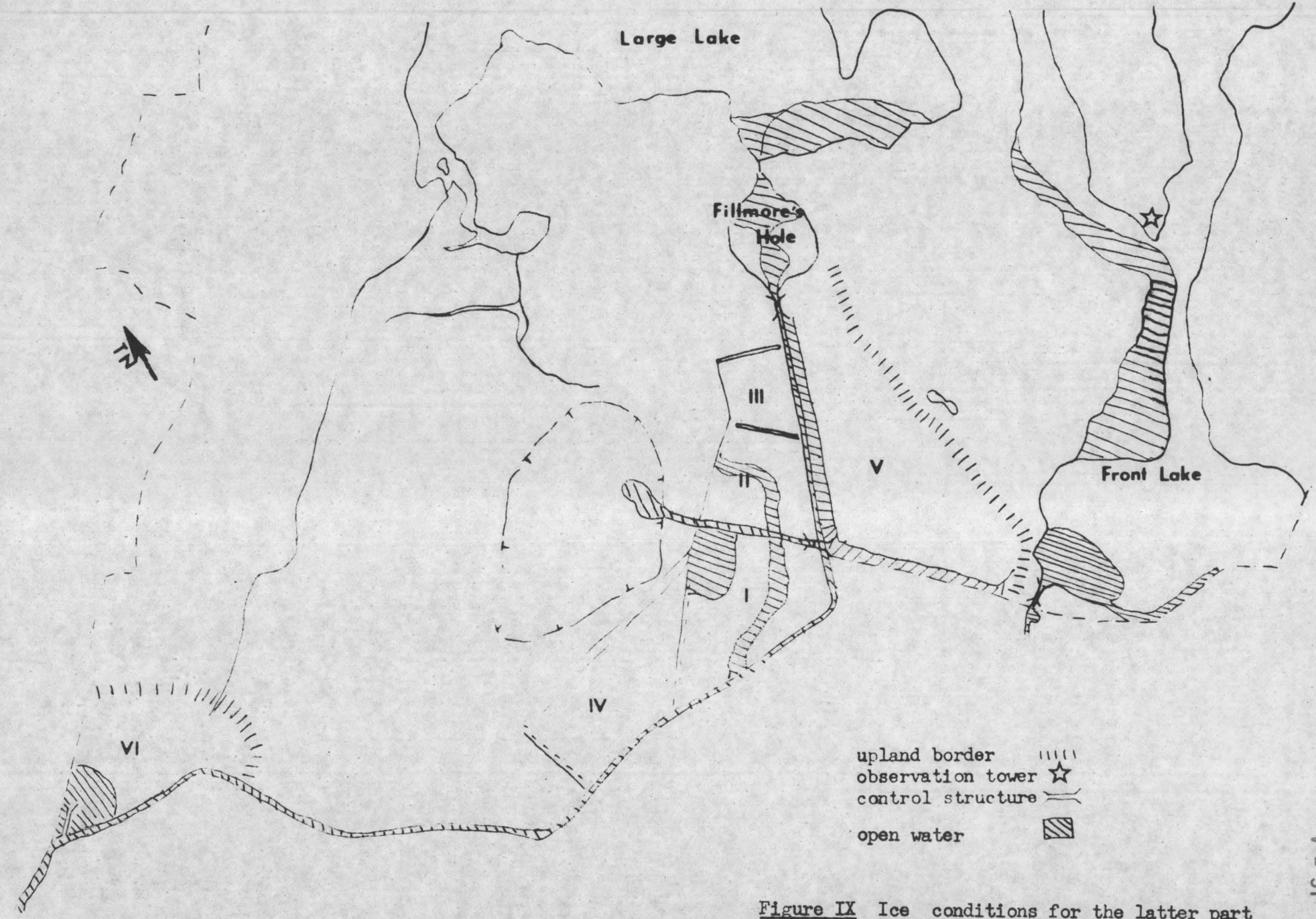


Figure IX Ice conditions for the latter part of March - Tintamarre National Wildlife Area, 1973

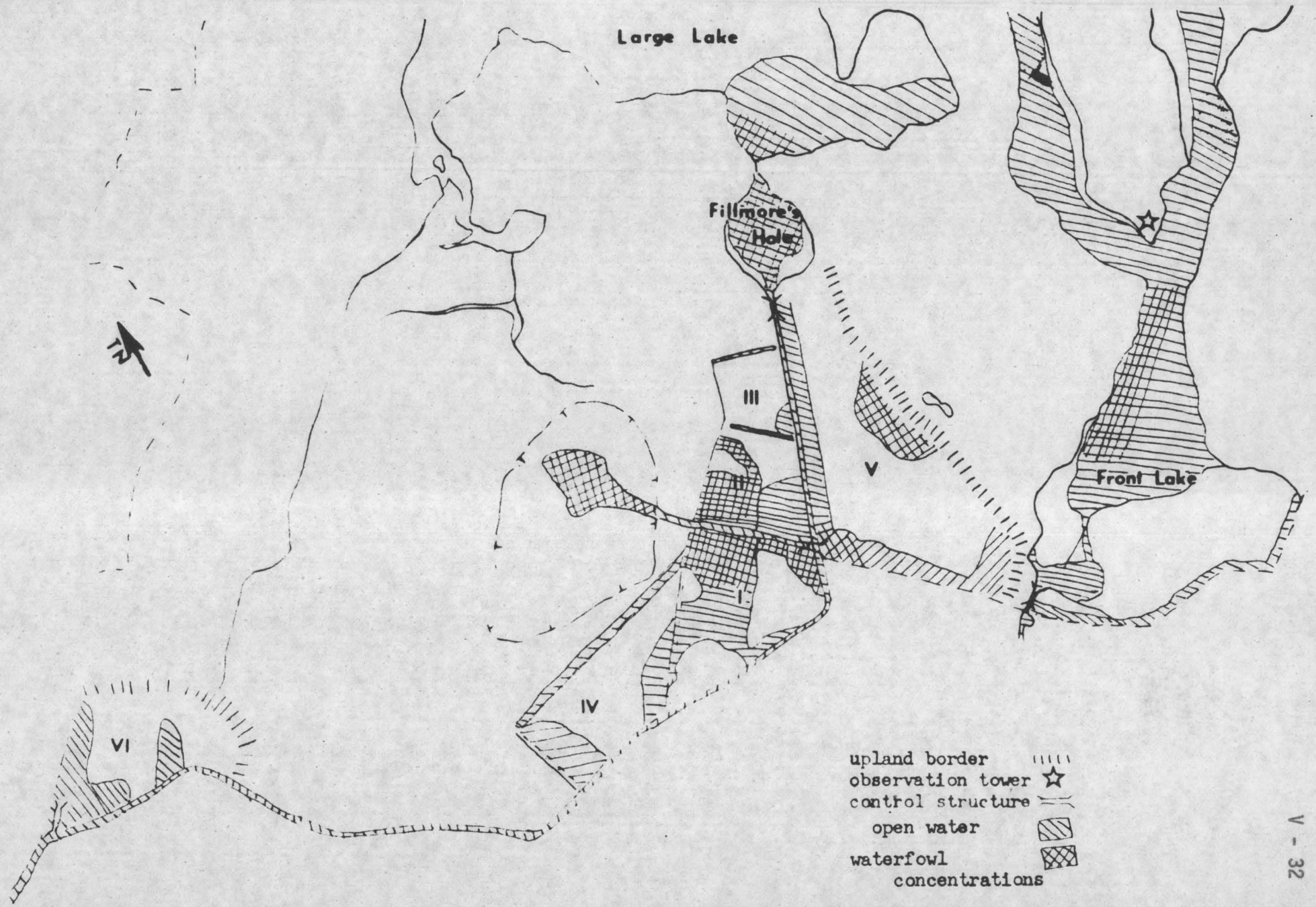


Figure X Ice conditions for the middle part of April, 1973, (only ice in thick stands of Typha sp.), Tintamarre National Wildlife Area.

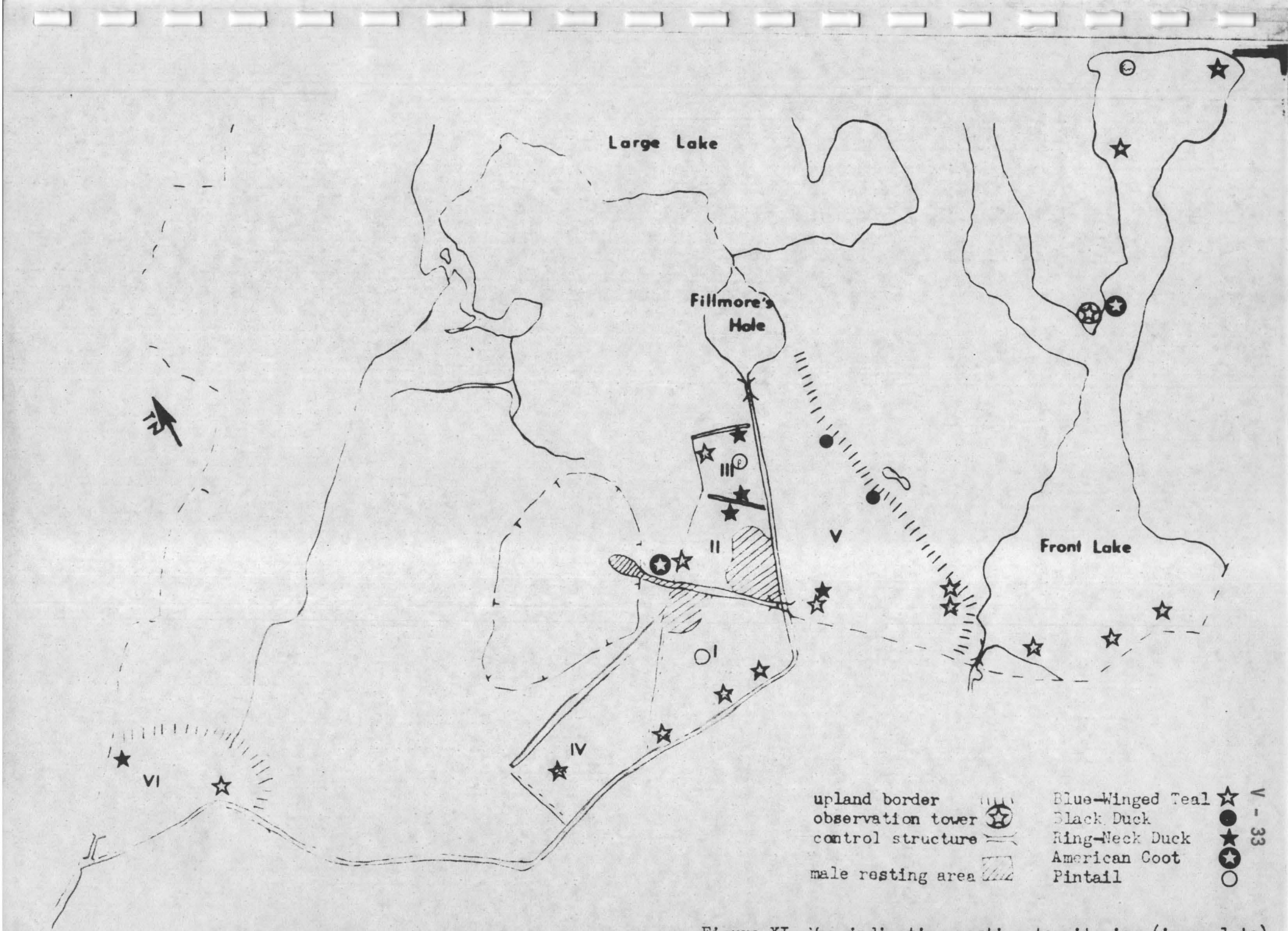


Figure XI Map indicating nesting territories (incomplete) at Tintamarre National Wildlife Area, 1973.

VI Coles Island - Ram Pasture
Salt Marsh

Introduction

The Coles Island - Ram Pasture area is one of many such areas on the Cumberland Basin affected mainly by the huge tidal influence of the Bay of Fundy. Salt marshes such as that one are important resting and feeding areas for migratory waterfowl - with special importance to Canada geese. This year the Canada geese arrived on March 21 following a flood tide on the salt marsh area and during a stretch of good weather. Flocks came and went until the first week in May when the last of the geese left for their breeding grounds.

Procedure

Coles Island - Ram Pasture was surveyed on a daily basis for five days a week, alternating between morning and evening counts with Tintamarre National Wildlife Area and losing out once a week to Shepody NWA.

From March 9 to March 21 the marsh was surveyed from the recommended observation points. From March 22 until May 30 the area was surveyed by walking out the dikes along prescribed paths so as to maintain some sort of constant technique. Those routes are indicated by

the arrows in Figure 1. Observation points were set up as indicated in Figure 1. Both recommended and old observation points were utilized. For example, when walking to the Coles Island observation point, Ram Pasture would be surveyed from the Westcock Road observation point or the Town of Sackville dump location, and vice versa for the C.N.R. tower on Coles Island. In that way a minimum of effort brought about a complete marsh survey about four days a week.

Results and Discussion

Table 1 shows the results of the 1973 spring census. It shows why new observation points were necessary where, for example, March 28, April 3, April 23, April 25 and April 27 are compared with the corresponding data for the new observation points. That was due to the fact that the geese spent most of the day resting in the Tantramar River just where it meets the Aulac River (Figure 1). It was necessary to include those geese for an accurate census and they were not visible from the recommended observation points. For that reason, the data for the above dates is not included in Figure 2.

Figure 2 dramatically indicates the influence of weather on the migration of Canada geese in its comparison between 1972 (after A. MacInnis) and 1973. March 1972 was an extremely harsh month and, as a result,

no significant numbers of geese came through the area in 1972 until April 20, a complete month later than 1973. In 1973 the arrival of the geese was brought about by the combination of two factors - the first was an extremely mild spell from March 11 through March 17 that kept the geese moving rapidly up the coast (Table 3). The second factor was a flood tide that cleaned the marsh area of snow and ice and left the salt pools free for feeding. Those numbers decreased due to a cold spell until March 29 when the first major wave of geese passed through the area. The second major peak occurred around April 6 when seasonable temperatures, as well as a flood tide (Table 4), prevailed. Those numbers declined until record high temperatures for the month brought the last major wave of Canada geese through the area on April 18. Those numbers declined steadily until the first week of May, after which only a few stragglers were seen. In 1972 a major flock of geese took advantage of seasonal temperatures on April 20 to move en masse (Table 2). That large group moved through the area as temperatures declined toward the end of April. At the end of April warm temperatures brought the last peak, after which numbers declined rapidly. Although it is interesting to show this correlation between temperature and migratory movements, other factors, for example wind and precipitation are probably involved as well.

Figure 3 shows the similarity in relative numbers of Canada geese between the Coles Island - Ram Pasture area and the John Lusby NWA. As mentioned earlier, warm temperatures and flood tides in Cumberland Basin brought about the March 21 arriva. This comparison tends to verify the results of the census taken on the two areas.

Figure 4 shows an important aspect of the Cumberland Basin by showing the sudden appearance of red-breasted merganser which appear there every spring to take advantage of the gaspereaux which run up the river at that time. The merganser are present in great numbers throughout the run, coming to the concentrations indicated in Figure 1 during the high tide and fishing in the adjacent rivers at the low (although this is not a strict rule).

Several species of pond ducks, especially black duck, blue-winged teal and American green-winged teal use the salt pools (indicated in Figure 1 as "areas of concentration"). Canada geese used those pools for feeding on last year's vegetative stalks of Ruppia maritima. Many seeds of that plant were found throughout the dense matting of the pools. No real cycle for feeding and resting was discovered. Most often, during March, geese would be seen in adjacent stubble fields or pasture

in the afternoon. The same thing could occur early in the morning or in the evening as well. While on the uplands, black duck were usually associated with the flocks of Canada geese. There was significant movement along the coast as well as inland, but no correlation could be drawn between that movement and time of day.

Even though a considerable amount of time was spent observing the Canada geese populations in that area, very few behavioural notes can be made. A "gaping" gesture was observed on a number of occasions and it seemed to be between younger birds (assuming younger birds to have a slightly dingier breast). For the most part, the geese sat about either in pairs, in paired groups of four or six, or in rather large groups of what I took to be unmated young birds. The distinction here between young and older birds is tenuous at best. The observer did, however, have the opportunity to watch the energetic display of the red-breasted merganser. The ritual was performed many times exactly as described by A. C. Bent, Life History of North American Waterfowl, part one, page 14. The nuptial flight of six American green-winged teal drakes after one hen was witnessed throughout the week of May 23 to May 30. The hen would rise out of the water and fly at rapid speeds all around

the pond area with the drakes in hot pursuit. She would then land and the drakes would start on a very impressive series of "tail wagging" and "bobbing" gestures. No culmination of that ritual was observed.

The Coles Island - Ram Pasture area is an important stop-over spot for migratory ducks. It has been seen that movement of the waterfowl is dependent directly on the weather and tidal movements. The concealing nature of dikes and the habit of resting in the bottom of tidal rivers makes that area an excellent spot for studying the mating habits of those birds.

Table 1. Species and daily totals of waterfowl - Coles Island - Ram Pasture Salt Marsh, Spring, 1973

Date		Black	R-b.merg.	C.goose	Gwt.	Pin.	Mal.	Bwt.	C.merg.	C.eider*	Ring-n.
March	9**	2									
	12**										
	13**										
	14	7				2				70	
	16**										
	21**	5								5	
	22	2		85							
	23			75							
	24			85							
	26			100							
	27			30							
	28**			3							
April	2	12		210							
	3**										
	4****			26							
	5	4		50		2		2			
	6***	11		175	3					160	
	9			184							
	11****			18							
	13****	8		6							
	17			66							
	18			38							
	19			146							
	23**	10			10	15	4				12
	24	8	10		6	6					
	25**	4	10	6							
	27**	8	25	2	10	2	4	8			

Table 1. Species and daily totals of waterfowl - Coles Island - Ram Pasture Salt Marsh, Spring, 1973

Date		Black	R.b.merg.	C.goose	Gwt.	Pin.	Mal.	Bwt.	C.merg.	C.eider*	Ring-n.
May	1	6	25	63	7	2		8			
	2	2	15	40	10		2	8			
	4	8	15	34	2						
	5	8	65	25	17			10			
	7	16	24	52	8	2		4	2		
	8		35	12	22	8		20			4
	11	18	24	25	12	2		4			
	14	14	25	6	7	2		8			
	15	8	63					4			
	18	1	35		13						
	19		12	3	5	4					
	22	6	15		7			2			
	23	3	5		6	3					
	30	5	11		5	1					

* Overhead - usually flying in northerly directionoff Bay of Fundy.

** Daily totals from 1972 observation points.

*** Special trip around east side of Aulac River, Fort Beausejour to the mouth of the Missaquash River.

**** Bad weather.

Table 2. April weather for N.B. - N. S. Border Area - 1972

Date	Maximum temperatures	Particulars
April 1	39	Snow until noon. seasonable temperatures
2	51	sunny, seasonable temperatures
3	41	overcast, snow beginning, seasonable temp
4	33	Snow and rain, seasonable temperatures.
5	35	snow, cold
6	35	cloudy, cold
7	31	snow, very cold
8	33	cloudy, very cold
9	28	snow and wind, very cold
10	42	snow, cold
11	44	sunny, cold
12	39	sunny, cold
13	46	sunny, cold
14	34	snow, cold
15	44	cloudy, cold
16	39	snow, seasonable temp.
17	45	sunny, seasonable temp.
18	41	rain, seasonable temp.
19	41	cloudy cold
20	45	cloudy, seasonable temp.
21	39	cloudy, cold
22	48	sunny, seasonable temp.
23	49	cloudy, raining, seasonable temp.
24	47	cloudy, raining, seasonable temp.
25	47	cloudy, raining, seasonable temp.
26	36	cloudy, flurries, very cold
27	37	snow and cloudy, very cold
28	43	cloudy , cold
29	52	cloudy, seasonable temp.
30	62	cloudy and rain, warm

Table 3. March, 1973 weather for N.B. - N.S. Border Area

Date	Maximum Temperatures	Particulars
March 1	22	Sunny, extremely cold
2	18	flurries, very cold
3	28	sunny, very cold
4	44	overcast and rain, very mild
5	40	rain and fog, mild
6	28	sunny, seasonable temps.
7	43	cloudy, mild
8	54	cloudy, record high temp.
9	41	sunny, mild
10	35	sunny, seasonable temps.
11	45	cloudy, very mild
12	48	rain and fog, extremely mild
13	43	sunny, very mild
14	44	sunny, very mild
15	45	sunny, very mild
16	39	overcast and rain, very mild
17	36	rain, very mild
18	49	cloudy, very mild
19	40	flurries, very mild
20	30	flurries and drizzle, cold
21	26	flurries and drizzle, cold
22	27	flurries, cold
23	33	sunny, windy, cold
24	53	sunny, mild
25	57	sunny, extremely mild
26	45	showers, mild
27	30	cloudy, cold
28	42	sunny, cold
29	53	sunny, mild
30	57	sunny, very mild
31	50	sunny, very mild

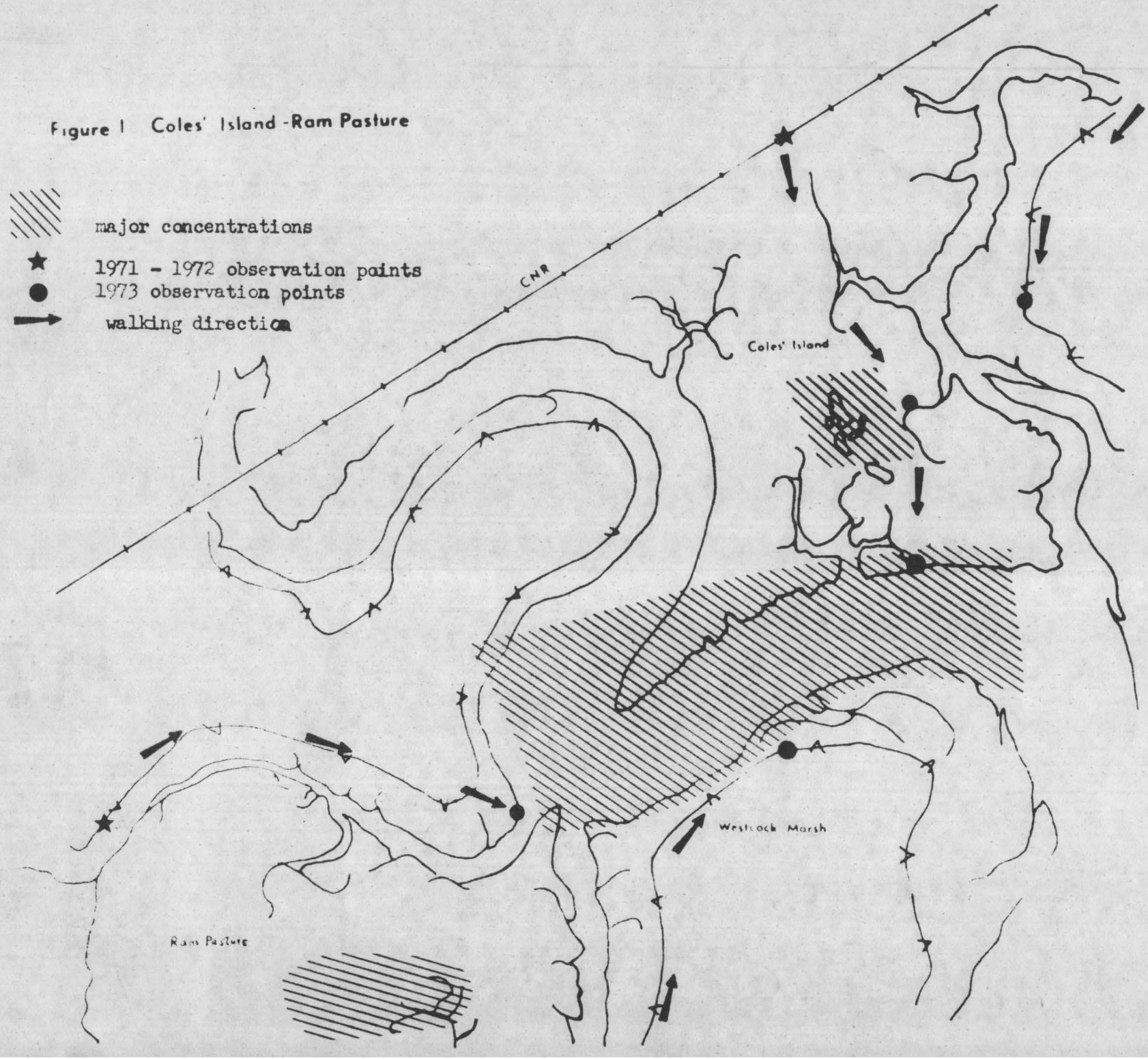
Table 4. April, 1973 weather for N.B. - N.S. Border Area

Date		Maximum temperatures	Particulars
April	1	44	cloudy and showers, mild
	2	46	sunny, mild
	3	34	overcast and snow, cold
	4	35	overcast, seasonable temperatures
	5	37	overcast and rain, seasonable temps.
	6	39	showers, seasonable temps.
	7	36	cloudy, seasonable temps.
	8	47	sunny, seasonable temps.
	9	39	sunny, cold
	10	40	sunny, cold
	11	34	flurries and windy, cold
	12	29	flurries, cold
	13	39	sunny, very cold
	14	48	sunny, seasonable temps.
	15	60	sunny, mild
	16	67	sunny, very warm
	17	72	sunny, record high
	18	69	sunny, record high
	19	58	sunny, seasonable temp.
	20	44	cloudy, flurries, very cold
	21	52	sunny, seasonable temp.
	22	42	overcast, seasonable temp.
	23	54	overcast, cool
	24	42	overcast, seasonable temp.
	25	45	cloudy and drizzle, seasonable temp.
	26	49	overcast, cool
	27	49	overcast, seasonable temp.
	28	47	overcast, seasonable temp.
	29	47	overcast, seasonable temp.
	30	52	overcast, seasonable temp.

Table 5. Black duck - Daily totals, number of pairs and per cent paired for Coles Island - Ram Pasture area, Spring 1973

Date	Total number	Number of pairs	Per cent paired
March 9	2		
14	7		
21	5	2	80
22	2		
April 2	12	3	50
5	4	2	100
6	11		
13	8	4	100
23	10	5	100
24	8	4	100
25	4	2	100
27	8	4	100
May 1	6	3	100
2	2	1	100
4	8	4	100
5	8	4	100
7	16	8	100
11	18	7	78
14	4	2	100
15	8	4	100
18	1		
22	6	3	100
23	3	1	67
30	5	2	80

Figure 1 Coles' Island - Ram Pasture



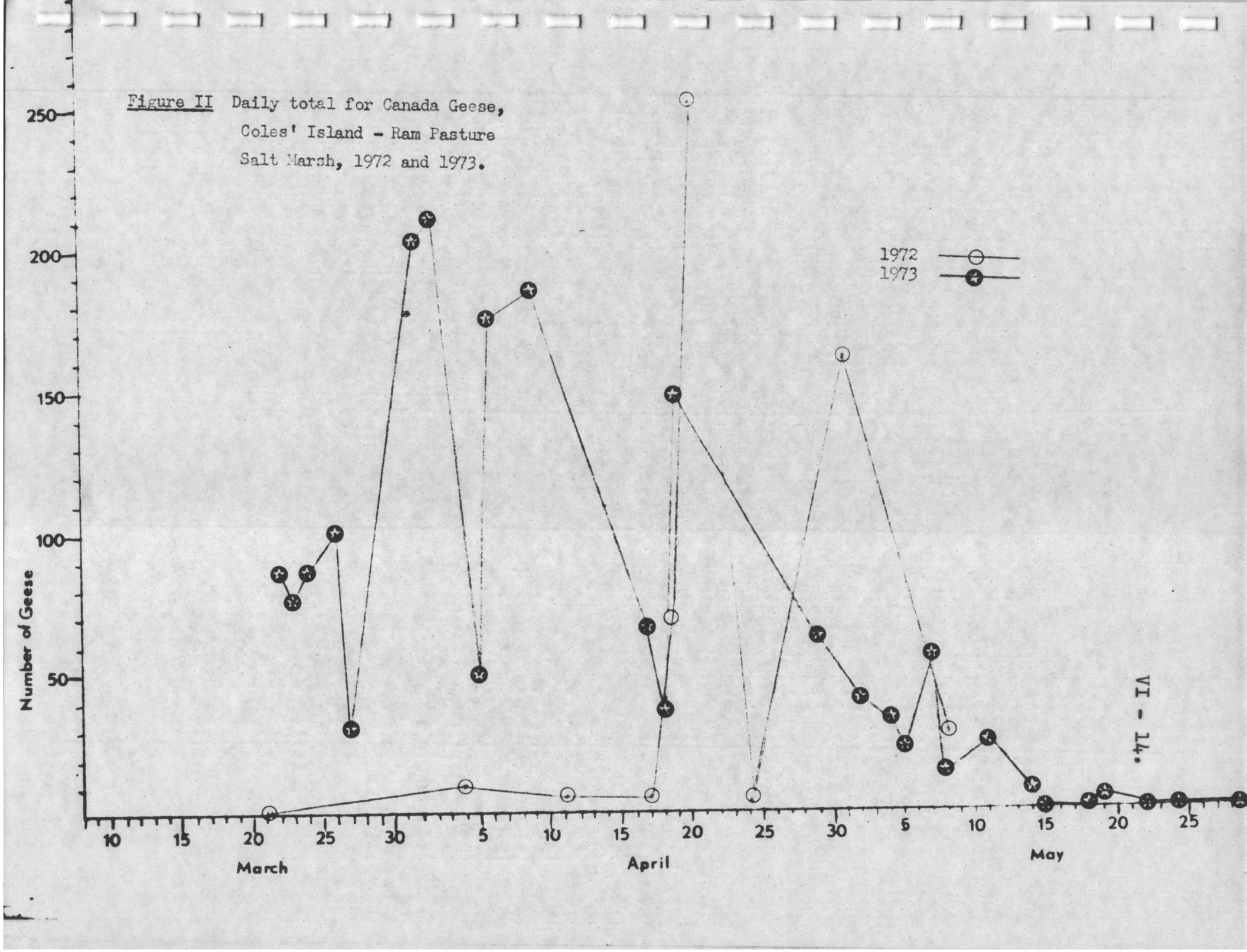


Figure II Daily total for Canada Geese,
Coles' Island - Ram Pasture
Salt Marsh, 1972 and 1973.
1972
1973
Number of Geese
250
200
150
100
50
10
15
20
25
30
5
10
15
20
25
30
5
10
15
20
25
March
April
May
VI - 14.

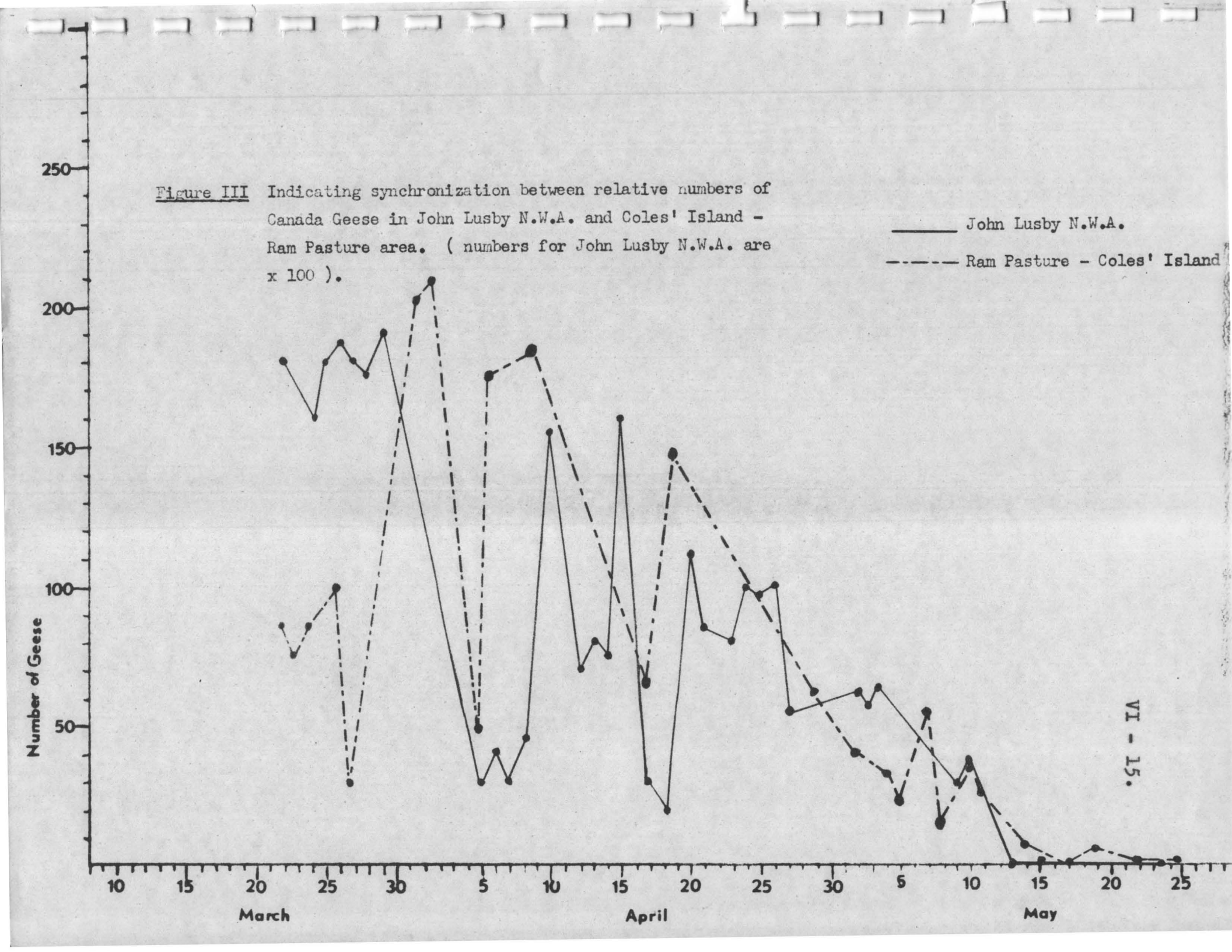


Figure III Indicating synchronization between relative numbers of Canada Geese in John Lusby N.W.A. and Coles' Island - Ram Pasture area. (numbers for John Lusby N.W.A. are x 100).
John Lusby N.W.A.
Ram Pasture - Coles' Island
Number of Geese
250
200
150
100
50
10
15
20
25
30
5
10
15
20
25
30
5
10
15
20
25
March
April
May
VI - 15.

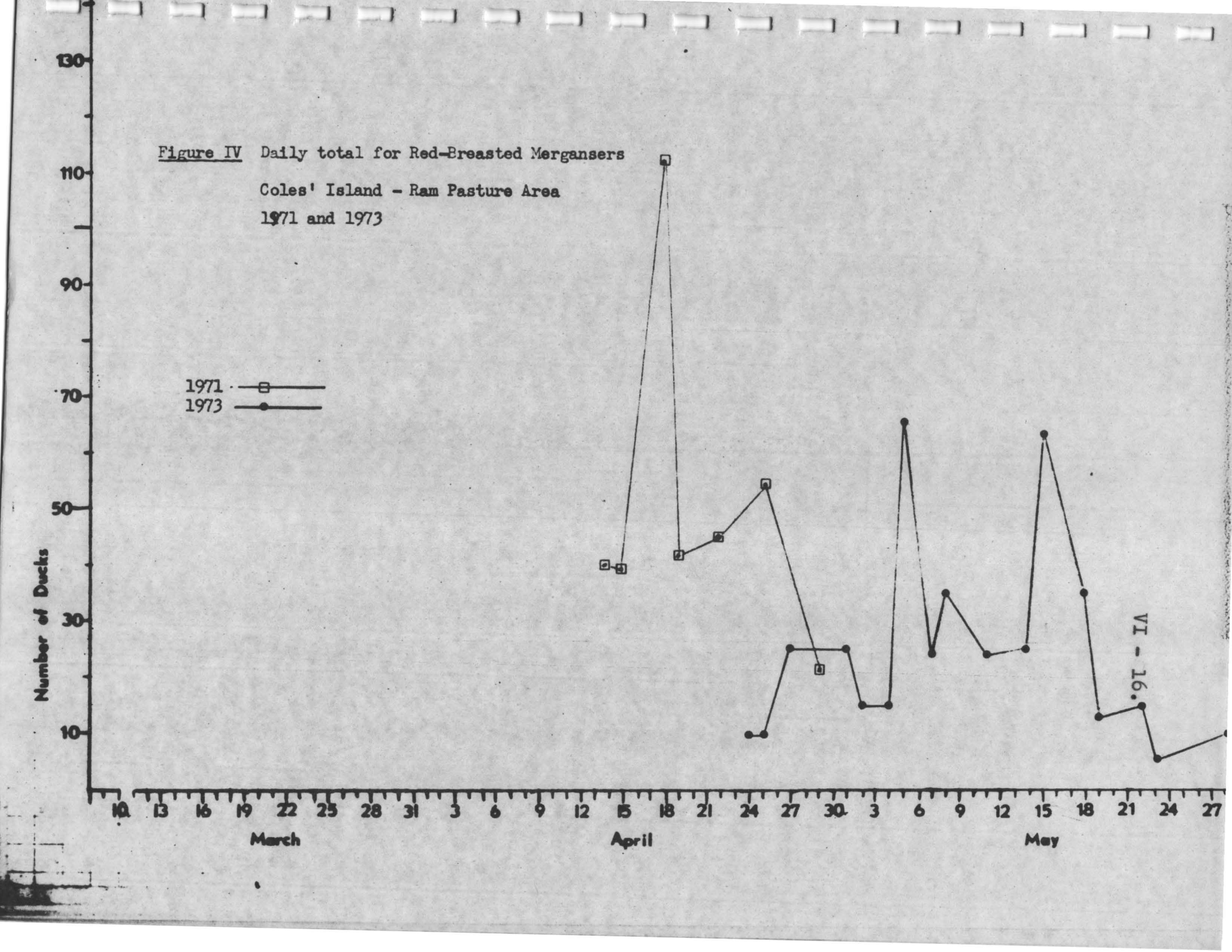


Figure IV Daily total for Red-Breasted Mergansers
Coles' Island - Ram Pasture Area
1971 and 1973
1971
1973
Number of Ducks
130
110
90
70
50
30
10
10 13 16 19 22 25 28 31 3 6 9 12 15 18 21 24 27 30 3 6 9 12 15 18 21 24 27
March
April
May
VI - 16.