AN ECOLOGICAL STUDY OF LAKE ST. PETER, QUEBEC.

ANNUAL PROGRESS REPORT - 071

INTRODUCTION

The project was proposed in 1967 and field work began in the spring of 1968. The original objectives were:

1) To determine the current waterfowl production of Lake St. Peter and to discover the factors limiting production of the principal nesting species.
2) To determine the nesting cover and brood rearing cover preferences and requirements of the ducks using the area.
3) To map the distribution and relative quality of the duck nesting and brood rearing habitat on the marshes, islands and adjacent uplands.
4) To make recommendations for increasing waterfowl production on Lake St. Peter.

Modifications were made on the project plan before field work began. Intensive field work was limited to a study area on the south shore of the lake. No attempt was made to locate nests. Instead, traps were set in each drainage ditch to capture females and young as they

descended to the lake. Aquatic invertebrate sampling was limited to a two-week period, enough to find out if the method of sampling was feasible. Young birds were not collected for a study of food habits. It was felt that collecting young birds would interfere to too great an extent with the marking and recapture program. Vegetation studies were reduced to a few line transects with sample plots because the aerial photographs in colour were not taken.

LOCATION AND DESCRIPTION OF AREA

Lake St. Peter is a widening of the St. Lawrence River about 50 miles east of Montreal (Fig. 1). It is a shallow lake with a dredged channel running the length of it deep enough for deep sea ships. The western end of the lake is a delta consisting of many islands and small marshes plus two large bays. Some islands are wooded, others are used for pasture, crops, or summer chalets. There are about 9,000 acres of marsh in the western region. The north shore supports about 6,000 acres of marsh in a narrow strip along the border of the lake and in one large bay. The south shore has a much wider strip of marsh covering more than 10,000 acres. The St. Lawrence River exits at the east end of the lake.

The upland cover within one-half mile of the lake (more than 45,000 acres) consists of mixed hardwoods, pasture, cropland, and abandoned farmland.

The delta marshes appear to be an association of Scirpus validus and S. fluviatilus. Typha sp., Acorus calamus and Lythrium salicaria are associated with the large bays. Submergent vegetation is common in the delta region and is composed of Elodea canadensis, Myriophyllum spp. and Valisneria americana. Most of the south shore supports a mixture of Scirpus americanus, S. Validus, Butomus umbellatus and Zizania aquatica while the north shore has stands of almost pure Scirpus americanus and Carex spp. Some Myriophyllum spp. and Valisneria americana are present on the south shore but the north shore appears to lack extensive beds of submergent vegetation.

An intensive study area was chosen on the south shore near the east end of the lake (Fig. 2). This region was chosen because access was easily available to us and yet limited to the public because the area belongs to the Department of National Defense.

The upland cover adjacent to the study area is mixed hardwood forest and abandoned farmland. Immediately behind the forest the land is cultivated. Thirteen

ditches provided drainage from the cultivated land to the lake.

The water level in the area varies during the summer. It is higher in May than in June, July or August. Although it is at the edge of tidal influence the water level in the lake would rise about two feet at each high tide for two or three days after a new or full moon.

The marsh vegetation in May is sparse and confined to those areas close to the shore. Its development is gradual until early June when emergent plants suddenly appear everywhere in the marsh. Good brood cover is available throughout the marsh from mid-June onward. Most of the emergent vegetation is flattened by wind and wave action in mid-October. The total area of marsh in the intensive study area is about 6,000 acres.

METHODS

Breeding pair counts and periodic surveys were conducted from a helicopter or an airboat. Flightless young were captured by hand or with a dip net after they were located with the aid of an airboat. If the young were too small to hold a regular leg band a small numbered fish tag was placed on the web of the right foot. Modified

clover-leaf traps with a single entrance and wings were set up in each of the drainage ditches to capture broods descending the ditches. Females caught in these traps were colour marked with airplane dope. Bait trapping of flight birds for banding purposes was conducted in August and early September. Hunter surveys and blind counts were conducted the opening weekend of the hunting season.

Modified double-ended minnow traps were used to sample aquatic invertebrates. The traps were covered with plastic sheeting and each entrance funnel with a sheer nylon stocking. Traps were placed in pairs, one submerged with a single entrance against the bottom and one suspended immediately below the surface with an entrance at each end.

Vegetation was sampled in plots with a 25-foot radius at 500-foot distances along line transects.

RESULTS AND DISCUSSION

Breeding pair counts were conducted on Lake St. Peter on May 16 from a helicopter. On June 11, from a helicopter and on June 12 from an airboat, combination breeding pair and brood counts were made on the intensive study area. The counts on May 16 were complicated by large flocks of migrant birds present in the island region of

the lake. Those on June 11 and 12 are difficult to analyze because broods of black ducks, mallards and pintails were present although few were seen. The number of breeding pairs (a lone drake was considered to represent a breeding pair) seen in these surveys are presented in Table 1.

By back dating broods to determine the hatching date we can obtain a better idea of when breeding pair counts should be conducted. The criteria developed by Gollop and Marshall (1954) were used to age all broods seen and to determine hatching dates. The hatching dates of successful clutches of the five major species in the study area are shown in Table 2. Because many broods were observed on the study area almost every day and not all were marked, we had no way of determining with accuracy which broods we had seen previously. In Table 2 I have shown hatching dates in two different columns for each species. One column is based only on those broods that we know were different (but certainly not all that were) and the other is based on all broods observed, and certainly contains duplicate observations for some broods.

From the data in Table 2 it appears that the hatching dates for black ducks and pintails are spread from early

May to the end of June. Because of the possible repetition of broods, biased towards early broods as they had a greater chance of being counted more than once, it is likely that the number of early broods is relatively lower than that recorded. To get maximum benefit from breeding pair (lone male) counts it appears that they should be conducted between the second and third weeks of May for black ducks, mallards and pintails and the first week of June for blue-winged teal.

Therefore the breeding pair counts made on May 16, 1968, are probably the best index to the numbers of black ducks and pintails breeding in the area. One of the surveys made on June 11 or 12 is probably more accurate for the blue-winged teal. It also appears that the surveys of June 11 and 12 were more accurate for the number of mallards. The discrepencies between the surveys taken on June 11 and June 12 are difficult to account for unless groups seen one day were scattered and counted as pairs or single males the other day, or there was a movement of birds into the study area which we counted as pairs or single males but which were not, in fact, breeding birds. Because of the late date of these surveys the results are questionable.

In future years it would be wise to make breeding pair counts on at least three consecutive days with the airboat and with the helicopter to determine if the results are consistant and if the two methods are comparable.

During the summer, 217 broods were observed which could be aged following the classification of Gollop and Marshall (1954). The species composition of these broods is shown in Table 2 with the exception of 3 green-winged teal broods, 2 wood duck broods and 1 baldpate brood. By back dating and avoiding possible repetition the minimum number of broods represented was 71 (Table 2 plus 2 green-winged teal, 2 wood duck, and 1 baldpate). The proportion of these broods that were actually hatched in the study area is unknown. Some may have moved into the area from other parts of the lake.

A total of 230 web tags were placed on young birds in May, June and July. In addition, 54 regular bands were placed on flightless young birds, 3 of which were already web tagged. Therefore a total of 281 different young birds were marked. The species composition of the marked birds is shown in Table 3. Only 25 of these birds were subsequently recaptured by any means other than shooting.

Twenty were recaptured with the airboat in the daytime, 2 were recaptured with an airboat at night and 3 were recaptured in bait traps. The breakdown of recaptures by species is shown in Table 3. The distance travelled between marking and recapture was determined within 500 feet. Individuals recaptured and the distances moved are presented in Table 4. Pintail and black duck broods moved an average of 7,000 feet between captures, blue-winged teal only about 700 feet. One brood of pintails when Class Ia moved 28,000 feet in two days. Movements of such magnitude suggest that birds hatched in the study area could easily have moved out of it and vice versa. This may account for the few recaptures of marked birds. Excessive movement may have been a result of continual airboat operations in the study area.

It was difficult in many cases to determine the exact brood size. When approached quickly by the airboat, the young usually dove; the operator and observer then got out of the airboat and tried to capture individuals. Our average was slightly more than one individual captured per brood seen. Broods were recorded as being a certain size only when we felt we had seen all the young. Often we would merely see a glimpse of the young and then the brood

would be recorded as having x number of young plus (i.e. 4+ indicates 5 or more young). Out of 217 broods seen definite size was obtained for only 87. The sizes by age class of those broods thought to be complete are presented in Table 5.

In order to obtain estimates of brood mortality, both partial and complete, it will be necessary to recapture a much higher proportion of marked birds and to continue recapturing until the birds are able to fly. The difference between the proportion of Class I broods and Class II broods recaptured as Class IIIs would be an indication of total mortality between Class I and Class II. Much more information could be obtained if we could mark the female as well as her young. More complete broods and many females could probably be captured and recaptured by using an airboat equipped for night-lighting. With such a rig it should be possible to band large samples of young from all areas of the lake with only a few nights effort in each location. (See Gavutis 1968). Recovery can be affected at a later date with the airboat either at night or in the daylight.

I believe that the U.S. night-lighting crew did not obtain good results in our study area this summer because

of our daytime airboat operations. We were in the marsh almost every day from dawn until 9 a.m. and from 5 p.m. until dark from late May to mid-July. The ducks became used to us and would swim away from our path as soon as they heard the boat coming. At night this reaction would put them outside the range of the lights.

A brood survey conducted in the study area by helicopter on July 8 turned up only 35 broods and broody females (Table 6). The emergent vegetation at that time was well developed and the females and broods were easily able to hide. Under such conditions a helicopter survey does not appear worthwhile. Mr. Reed, who was with me on this survey, was surprised at the difficulty in locating broods on the Lake St. Peter marsh when they were so easily observed in his study area in Isle Verte Bay. Mr. Reed and Mr. Alliston found that the best time to count broods in the emergent marshes of Lake St. Francis was the first hour or two after daybreak. Any further attempt to count broods from the air at Lake St. Peter should therefore be confined to the two hours immediately following daybreak.

Another helicopter survey was made of the whole lake on August 28 which produced 7,370 birds, 690 of them on

the study area (Table 7). Only 14 flightless broods were seen, 7 black duck and 7 mallard. A female black duck, marked on the back with red and blue airplane paint when caught in a ditch trap on May 28 was seen about one mile from where she was marked. At the time she was marked she appeared to have laid eggs as her oviduct opening was enlarged. The only other colour marked female was a blue-winged teal caught with 2 Class I young on July 17 and never seen again.

Bait traps were operated in August and early September to recapture web-tagged birds and to band flying birds. Birds responded to bait in only one location, they refused bait on floating platforms in the marsh. A total of 590 waterfowl were banded at the one location: 286 green-winged teal, 164 black ducks, 107 mallards, 13 pintails, 5 blue-winged teal, 5 mallard x black duck hybreds, 2 wood ducks, 1 shoveller and 1 gadwall. Only 3 previously marked flightless young were caught in the bait traps. The U.S. night-lighting crew banded 46 birds: 15 blue-winged teal, 12 black ducks, 6 wood ducks, 5 mallards, 4 pintails, 2 shovellers and 2 green-winged teal. Two of the 46 birds were previously marked as flightless young.

The only hunting returns of the banded birds which have been received to date are 9 bands which turned up in bag checks or in wing envelopes. Data on repeats from bait trap banding have been sent to Mr. Boyd for analysis.

A hunter bag check was carried out on Lake St. Peter the opening weekend of the hunting season. Although almost 11,500 ducks (Table 8) were counted on the lake the day before the season opened the hunter success on opening day was low. Dense fog blanketed the lake until noon each day. Many hunters got lost in the fog and never found their blinds. Those that did manage to get set up and hunt were not successful, probably because visibility was often only 20 yards. The fog prevented us from conducting a bag check in the Sorel islands as we have done in previous years. Checks were carried out, however, at Nicolet, Baieville, St. François du Lac and Berthierville. A survey of blinds opening morning was impossible due to the fog. A count was made Sunday about 10 a.m. but many hunters had already left the area. Only 1,138 hunters were counted Sunday morning compared to 1,782 last year on opening day. Details of the bag check are presented in another report (Munro 1968). The overall hunter success this year was 1.4 birds per hunter compared to 2.2 last

year. The estimated kill on opening day this year was 2,446 compared to 3,836 in 1967. The species composition of the kill is shown in Table 9. The kill on Sunday was probably about 1,500 birds making a total weekend kill of about 4,000. Estimates of crippling loss are not available but it was probably high as a result of the fog.

A helicopter survey of the lake conducted on the Monday following opening day produced a total of 6,300 birds (Table 8), a decrease of some 5,000 birds from the Friday preceding opening day.

The results of the aquatic invertebrate sampling will not be known until the contract with Laval University for the identification of the invertebrates is completed in March.

A cover map of the vegetation in the lake and on the surrounded uplands cannot be started until the aerial photographs have been delivered.

PROPOSED PROGRAM FOR 1969

Breeding pair counts will be conducted around the whole lake on three consecutive days with the airboat some time about mid-May. Successive counts will give us a better

estimate of the number of breeding pairs as well as a chance to determine the variance in the method. A helicopter count will be conducted on the fourth day to determine the accuracy of such counts compared to those made with the airboat. From such counts we should obtain an index of the breeding population.

The major objective of this project is to obtain an estimate of production for Lake St. Peter, and to establish methods to do this that may be applicable on other areas. I believe that our experience past this season has shown that such an estimate is all but impossible to get if work is confined to only one portion of the lake. Movement of broods from one portion of the lake to another appears to be large enough to make an analysis of data from one region too hazardous. To overcome the bias introduced by brood movement sufficient numbers of flightless young must be banded in all parts of the lake. If, at the same time, the females which accompany the broods can be colour-marked the problem is simplified.

Sufficient numbers cannot be banded in the daytime with the airboat. However, it should be possible to band enough birds at night with the airboat. Findings in other areas (Gavutis 1968; Cummings and Hewitt 1964; Lindmeier

and Jersen 1961) suggest that complete broods, often including the female, can be captured by "night-lighting". If complete broods are marked, then recaptures can be made in the daytime as only one duckling need be captured to give the necessary information about the brood. Four or five successive days of "night-lighting" in each of four regions of the lake should provide a large enough proportion of marked birds to make the analysis of the results of re-capturing a worthwhile exercise.

To determine the foods eaten by ducklings during the summer, without having to sacrifice the birds we are trying to study, an attempt will be made to flush out and collect the contents of their gullets when we are banding them. A portable type of apparatus suggested by Mr. Hugh Boyd will be used.

The degree to which aquatic invertebrates will be sampled in situ will not be known until the results of the past seasons work are available.

Our request for colour aerial photographs of the lake has been repeated this year to the "Interdepartmental Committee for Aerial Photography" in the hopes that we will eventually obtain such photographs to facilitate cover mapping of the vegetation.

LITERATURE CITED

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Ste Foy, Quebec,
January, 1969.

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Fig.1 Lake St. Peter

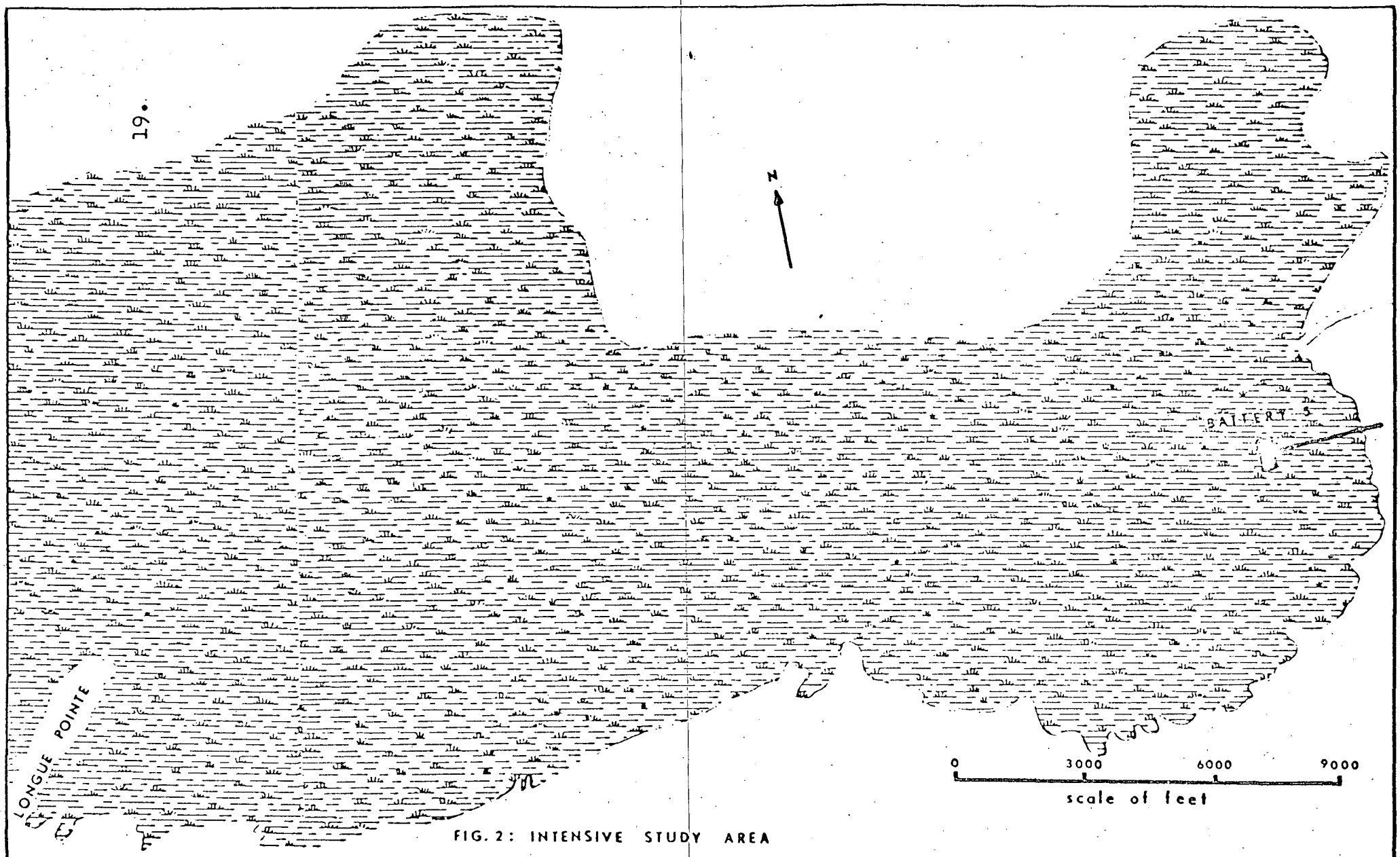

FIG. 2: INTENSIVE STUDY AREA

Table 1. Breeding Pair Counts, Lake St. Peter, Quebec.

Species	Date and Location			
	May 16*		June 11*	June 12**
	Study Area	Lake§	Study Area	Study Area
Black Duck	23	139	18	29
Mallard	8	40	14	15
Pintail	23	91	22	30
B.-w. Teal	27	128	28	42
G.-w. Teal	0	4	0	0
Shoveller	18	55	8	8
Wood Duck	0	3	0	0
Total	109	460	90	124

*Survey by helicopter

**Survey by airboat

§ including those birds in study area

Table 2. Hatching dates of waterfowl, Lake St. Peter, Quebec.

		May				June				July	
		8-14	15-21	22-28	29-4	5-11	12-18	19-25	26-2	3-9	Total
B. Duck	D*	2	3	1	3	1	3	4	3	0	20
	T**	3	6	6	17	6	13	10	4	0	65
Mallard	D	0	1	1	0	2	1	3	1	1	10
	T	0	1	2	2	7	2	2	3	1	19
Pintail	D	2	3	3	2	2	2	3	3	0	20
	T	3	8	15	12	13	11	7	5	0	74
B.-W. T.	D	0	0	0	0	2	3	3	3	0	11
	T	0	0	0	0	2	12	21	9	0	44
Shoveller	D	0	0	0	1	0	2	2	0	0	5
	T	0	0	0	2	0	4	6	0	0	12
			15	23	33	28	142	46	21		

*D= Known different broods, but not all

**T= Total of all broods seen, includes some repetitions

Table 3. Bandings and recaptures of flightless young, Lake St. Peter, Quebec.

Species	Banded			Recaptured	
	Web Tag	Regular Band	Total	Number	Per cent
Pintail	89	30*	117	16	13.7
B. Duck	53	18	71	5	7.0
B.-w. T.	53	1	54	3	5.6
G.-w. T.	3	2**	4	1	25.0
Mallard	17	3	20	0	-
Shoveller	12	0	12	0	-
Wood Duck	2	0	2	0	-
Baldpate	1	0	1	0	-
Total	230	54	281	25	9.3

*two web tags were replaced by regular bands

**one web tag was replaced by regular band

Table 4. Individual flightless young recaptured and distance moved, Lake St. Peter, Quebec.

Species and Band number	Date Captured	Brood Size and Class	Date Recaptured	Brood Size and Class	Distance Moved in feet
Pintail ♀ C089	June 12	4+ Ib	June 17	5+ Ic	17,000
Pintail ♂ C098	June 12 same brood	7+ Ib	June 18	7 IIa	500
Pintail ♂ C097	June 12	7+ Ib	June 21	4+ IIa	6,500
Pintail ♀ C010	June 9	8 Ic	June 23	5 IIb	11,000
Pintail 1♂, 3♀♀ C106,7,8&9	June 23	6 Ic	June 25	6 IIa	500
Pintail ♂ C075	June 11	7 Ia	July 5	5 III	4,500
Pintail C179	July 4	3+ Ia	July 5	4 Ia	28,000
Pintail ♂ C155	June 29	3+ Ic	July 6	5+ IIa	4,000
Pintail 2♂♂ C130-131	June 25	5+ Ia	July 12	3+ IIa	3,000
Pintail ♀ 656-49808	June 30	3+ IIa	July 12	2+ IIc	3,000
Pintail ♀ C034	June 23	5+ Ib	Aug. 1	Night light	unknown
Pintail ♂ C232	July 22	1 IIa	July 28,30	In Bait trap	500
Black Duck ♂ C100	June 11	9 Ib	June 23	5+ IIa	12,000

Table 4. Individual flightless young recaptured and distance moved, Lake St. Peter, Quebec. (continued)

Species and Band Number	Date Captured	Brood Size and Class	Date Recaptured	Brood Size and Class	Distance Moved in feet
Black Duck ♂ 567-36802	June 16	5 IIc	July 7	III alone	500
Black Duck ♂ C228	July 13	1+ IIa	Sept. 9	Bait trap	11,000
Black Duck ♀ 567-36810	July 5	5 IIc	July 31	Bait trap	4,500
Black Duck ♂ 567-36807	July 4	2 IIb	Aug. 1	Night light	unknown
B.-w. Teal ♂ C138	June 25	7 Ib	July 1	9 Ic	500
B.-w. Teal ♀ C043	June 23	6+ Ia	July 11	2 IIb no ♀	1,000
B.-w. Teal C042	same brood June 23	6+ Ia	June 24	6+ Ia	500
G.-w. Teal ♀ C056	June 22	3+ Ib	July 7	2+ IIb	13,000

Table 5. Size by age class and species of those broods believed to be complete, Lake St. Peter, Quebec.

Species	Class	Number of Broods	Mean Size	Mode	Range
Black Duck	I	15	6.6	7	1-10
	II	11	6.1	8	2- 9
	III	1	11.0	-	-
Mallard	I	4	7.3	8	6- 8
	II	5	6.4	5	4-11
	III	0	-	-	-
Pintail	I	8	6.3	8	3- 8
	II	16	6.3	6	3- 9
	III	5	4.8	5	4- 5
B.-w. Teal	I	12	8.3	9	4-12
	II	6	5.5	3	3-12
	III	0	-	-	-
Shoveller	I	1	7.0	-	-
	II	3	3.3	3	3- 4
	III	0	-	-	-

Table 6. Broods observed in the study area on helicopter survey, July 8, Lake St. Peter, Quebec.

Species	Class			Broody ♀♀	Total
	I	II	III		
Black Duck	2	2	0	4	8
Mallard	0	2	0	2	4
Pintail	0	2	2	10	14
B.-w. Teal	1	5	0	3	9
Total	3	11	2	19	35

Table 7. Birds observed on helicopter survey, August 28, Lake St. Peter, Quebec.

Species	Study Area	Lake	Total
Black Duck	360	2,420	2,780
Mallard	110	1,370	1,480
B.-w. Teal	130	2,060	2,190
G.-w. Teal	30	620	650
Pintail	20	140	160
Other	40	70	110
Total	690	6,680	7,370

Table 8. Birds observed on helicopter surveys, September 20 and 23, Lake St. Peter, Quebec.

	Date					
	September 20			September 23		
Species	Study Area	Lake	Total	Study Area	Lake	Total
B. Duck	1,100	4,850	5,950	2,590	2,120	4,710
Mallard	80	2,200	2,280	580	620	1,200
B.-w. Teal	40	1,370	1,410	20	40	60
G.-w. Teal	10	230	240	-	10	10
Pintail	-	1,530	1,530	150	170	320
Other	30	10	40	-	-	-
Total	1,270	10,190	11,460	3,340	2,960	6,300

Table 9. Species composition of the estimated duck kill by percentage, September 21, Lake St. Peter, Quebec.

Black Duck	Mallard	B.-w. Teal	G.-w. Teal	Other	Estimated Kill
30.2	20.5	25.6	6.8	16.9	2,446