AN EVALUATION OF LURE CROPS AS A MEANS OF ALLEVIATING CROP DEPREDATION BY WATERFOWL IN SASKATCHEWAN

Department of the Environment
Canadian Wildlife Service

November 23, 1972

Table of Contents

List of Figures

List of Tables

Introduction:

In recent years, migratory waterfowl have caused severe damage to Saskatchewan's cereal crops. During the five-year period from 1967 to 1971, a crop insurance plan sponsored by the provincial government (Paynter 1955) has paid 1.7 million dollars in claims. A preliminary report on crop depredation conducted in 1970 by Renewable Resources Consulting Services Limited demonstrated that damage repeatedly occurs near certain major waterfowl staging areas. The report concluded that control measures, such as a lure crop program, could be effective in alleviating depredation, and such a program would be more desirable than the present insurance scheme. MacLennan (1970) reviewed crop damage claims in Saskatchewan and located the sections upon which severe damage was frequently reported. Later, MacLennan (1971 and 1972) conducted field studies in trouble areas and recommended that certain lands be purchased to serve as permanent lure crops.

In the fall of 1972, a lure crop evaluation study was initiated in the three Prairie Provinces. The findings of the investigations conducted in Saskatchewan are presented in this report.

Methods:

Numbers of waterfowl on staging areas associated with lure crops were compared to numbers found on other staging areas. Weekly aerial census were conducted on 10 staging areas in agro-Saskatchewan from September 12 to October 17, 1972. Two aircraft were employed. One aircraft was used to census the Qu'Appelle Arm of Diefenbaker Lake, Last Mountain Lake, Kutawagan Lake and Eyebrow Lake, and a second aircraft was used to survey Waterhen Marsh, Lake Lenore, Ranch, Ponass, Little Quill and Big Quill Lakes. Census were conducted on Tuesday or as soon thereafter as weather permitted. The numbers and species of waterfowl observed were recorded on tapes and later transcribed onto field sheets(Form 1, Appendix A).

Four of the staging areas surveyed, Waterhen Marsh, Eyebrow, Last Mountain and Diefenbaker Lakes are bordered by Canadian Wildlife Service or Saskatchewan Department of Natural Resources lure crops. The Waterhen Marsh and Eyebrow Lake lure crops were studied extensively. The number and distribution of field-feeding waterfowl in the Waterhen Marsh area were compared to those found in other nearby staging areas. Twice-weekly ground transects were conducted in the Waterhen Marsh, Lake Lenore-Ranch Lake, and Ponass Lake areas. Transect routes were along all-weather roads that encompassed these water-bodies. The observer travelled along the routes at speeds of 10 to 20 miles per hour, scanning cereal crops within one half mile of both sides of the road. Locations, species and numbers of field-feeding waterfowl were recorded on municipal maps, and

subsequently transcribed onto field sheets (Form 2, Appendix B). Observations on the numbers of waterfowl using the Eyebrow Lake lure crop were supplied by Mr. D. Grey, D.N.R. Ancillary observations on the locations and numbers of field-feeding waterfowl in the Kindersley District were supplied by Mr. D. Nieman, C.W.S.

Progress of the harvest was recorded for areas in which ground transects were conducted. An additional transect was conducted in each of the three areas to collect weekly harvest chronology data on the crops under surveillance. Mr. D. Nieman supplied similar information for the Kindersley District. Harvest chronology data were recorded on Form 3 (Appendix C). The three data forms used were designed for the Manitoba lure crop evaluation study.

The cost of the Waterhen Marsh and Eyebrow Lake lure crops and the economic benefits derived from such were calculated to determine their economic feasibility. Both cost of land and the annual operational expenditures were considered. Each lure crop area had to be assessed separately. The Eyebrow Lake lure crop is farmed under contract, so the annual operational expenditure could be calculated by compiling the bills submitted by the contractor. The annual operational costs of the Waterhen Marsh lure crop could not be calculated as it is farmed under a "land lease crop-share agreement", whereby the lessee does not receive direct payment but is allowed to farm 200 acres of crown land.

The benefits derived from the lure crops were calculated in two methods. Both methods involved calculating the amount

of crop lost to waterfowl and then multiplying the value by the cost per bushel of the grain involved (one dollar per bushel for barley and one and one-half dollar per bushel for wheat). The first method consisted of having the crops assessed by a crop insurance adjustor, who estimated the amount of crop lost as a result of waterfowl damage. The second method consisted of determining minimum and maximum ranges of benefits based on the total numbers of waterfowl observed on lure crops during the season. The minimum value was calculated by multiplying the total numbers of birds observed by the average daily consumption per bird. Values used were one-half pound of grain per day per duck (Biehm 1951, Bossenmaier and Marshall 1958), two ounces per day per sandhill crane (Stephen 1967), and one pound per day per goose (Brace in press). Much crop depredation caused by waterfowl results from scattering of grain (Bossenmaier and Marshall 1958). This source of damage was considered in assessing the maximum loss of crop. The maximum value was calculated for each lure crop by adding the minimum value to the product of the generally accepted scattering rate (four pounds per bird per day) and the total number of birds observed.

Results and Discussion:

(1) Aerial Census

Tables one to three illustrate the numbers of mallards, "other ducks", and geese observed on the 10 staging areas during weekly aerial census. A fourth Table indicates the total numbers of waterfowl observed. Table four includes data from Tables one to three plus periodic observations on sandhill cranes.

The number of mallards staging near the Waterhen Marsh lure crop approximated numbers found at Lake Lenore, Ranch, Kutawagan and Diefenbaker Lakes (Table 1). More mallards were observed at Ponass and Little Quill Lakes, chronic waterfowl depredation areas (Renewable Resources Consulting Services Limited 1970, MacLennan 1970), and at Eyebrow and Last Mountain Lakes, areas also associated with lure crops. Little Quill Lake was found to be the most important mallard staging area. Last Mountain and Eyebrow Lakes were also heavily utilized, as 30 per cent of the total number of mallards observed were found on these waterbodies.

A comparison of the numbers of mallards observed on the various censusing dates suggests a decrease occurred during a period of inclement weather in late September. Another major emigration took place prior to the October 17 census, as is indicated by low counts on the larger staging areas. The high counts observed on smaller staging areas at this time resulted from a concentrating effect. Exceedingly cold weather caused the freezing over of sloughs and much of the smaller staging

Table 1. Weekly census of mallards on 10 staging areas in agro-Saskatchewan.

Staging Area	Sept 12	Sept 19	Sept 26	Oct 3	Oct 10	Oct 17	Total
Waterhen Marsh	2170	3175	2745	3352	2169	2515	16126
Lake Lenore	2320	2220	3993	3940	2948	1857	17278
Ranch Lake	1760	2254	2140	2260	1146	1360	10920
Ponass Lake	2320	4822	2465	3444	5158	3742	21951
Little Quill	14300	---[1]	6628	4093	3701	2256	30978
Big Quill	974	---[1]	425	854	1370	701	4324
Last Mt. Lake	8020	7460	2480	3300	4221	6107	31588
Kutawagan	3190	1490	1490	900	2066	4640	13776
Eyebrow Lake	5400	6765	2370	2530	5639	7140	29844
Diefenbaker	535	1855	1490	2730	3302	7091	17003
Total	40989	30041	26226	27403	31720	37409	193788

[1]Blizzard forced termination of census

areas, such as Waterhen Marsh, Ponass, Ranch, Kutawagan and Eyebrow Lakes. Birds from surrounding sloughs and birds remaining on these smaller staging areas were restricted to small patches of open water; hence, all birds present were plainly visible and easily counted.

Many of the "other ducks" included in Table 2 are divers, and were found chiefly on the larger staging areas, such as Last Mountain Lake, Lake Lenore, Little Quill and Diefenbaker Lakes. Larger numbers of "other ducks" periodically occurred on Kutawagan and Eyebrow Lakes; however, these were primarily gadwall, blue-winged teal, widgeon and shovellers. The number of "other ducks" at Waterhen Marsh remained fairly constant. At Lake Lenore, Ponass and Ranch Lakes, there was a marked increase in gadwall noted during the September 26 and October 3 flights. Nearly one-half of this non-mallard category migrated from agro-Saskatchewan between October 10 and 17.

As indicated in Table 3, Last Mountain and Little Quill Lakes were the most important goose staging areas. Substantial numbers were recorded on Waterhen Marsh, Lake Lenore, Kutawagan and Diefenbaker Lakes during early surveys; however, soon after the goose hunting season opened on September 27, only small numbers were found on these areas. Most of the geese remaining on these areas after October 3 were large Canadas, and were probably local nesters.

Staging area census data were compared to analogous information collected by Dzubin (in press). A superficial

Table 2. Weekly census of other ducks on 10 staging areas in agro-Saskatchewan.

Staging Area	Sept 12	Sept 19	Sept 26	Oct 3	Oct 10	Oct 17	Total
Waterhen Marsh	720	835	800	749	841	3	3948
Lake Lenore	761	651	2182	262	582	1033	5471
Ranch Lake	440	714	1110	1250	478	23	4015
Ponass Lake	460	125	930	684	309	3	2511
Little Quill	3070	---[1]	2631	1233	1093	305	8332
Big Quill	484	---[1]	75	24	39	145	767
Last Mt. Lake	4375	7605	2310	8580	6332	4302	33504
Kutawagan	2630	4710	2250	4240	3100	0	16930
Eyebrow Lake	2025	2690	1502	2420	3794	2149	14580
Diefenbaker	230	1500	2250	1680	2194	2579	10433
Total	15195	18830	16040	21122	18762	10542	100491

[1]Blizzard forced termination of census

Table 3. Weekly census of geese on 10 staging areas in agro-Saskatchewan.

Staging Area	Sept 12	Sept 19	Sept 26	Oct 3	Oct 10	Oct 17	Total
Waterhen Marsh	1058	547	825	402	345	420	3597
Lake Lenore	1091	1104	872	1352	498	408	5325
Ranch Lake	250	55	92	0	0	60	457
Ponass Lake	92	680	552	183	4	237	1748
Little Quill	3171	----[1]	6672	3648	935	750	15176
Big Quill	1044	----[1]	700	933	461	159	3297
Last Mt. Lake	620	745	5315	5000	----[2]	----[2]	11680
Kutawagan	1200	107	2130	1900	0	250	5587
Eyebrow Lake	40	0	0	0	0	0	40
Diefenbaker	16	0	2330	0	0	0	2346
Total	8582	3238	19488	13418	2243	2284	49253

[1]Blizzard forced termination of census

[2]Incomplete goose count

Table 4. Total numbers of waterfowl observed during weekly census of 10 staging areas in agro-Saskatchewan.

Staging Area	Sept. 12	Sept. 19	Sept. 26	Oct. 3	Oct. 10	Oct. 17	Total
Waterhen Marsh	3994	4584	4370	4503	3355	2938	23744
Lake Lenore	4172	3975	7047	5554	3928	3298	27974
Ranch Lake	2450	3023	3342	3510	1624	1443	15392
Ponass Lake	2872	5627	3937	4311	5471	3982	26200
Little Quill Lake	24374	---[1]	16026	9174	6094	3311	58979
Big Quill Lake	2545	---[1]	1200	2064	1990	1105	8904
Last Mt. Lake	13015	15810	10105	16880	10553	10409	76772
Kutawagan Lake	7020	6307	6070	7040	7166	7390	40993
Eyebrow Lake	7465	9455	3872	4950	9433	9289	44464
Diefenbaker Lake	781	3355	6070	4560	5496	9670	29932
Total	68688	52136	62039	62546	55110	52835	353354

[1]Blizzard forced termination of census

examination revealed that numbers of ducks observed in 1972 were fewer than those annually reported from 1965 to 1970. One noted exception occurred. In early September, 1972, eight of 10 staging areas had as many or more ducks than were reported on a comparable date in 1970.

Dzubin's (in press) data did not suggest that numbers of waterfowl increased on staging areas after lure crops had been established; however, it was of interest that both Dzubin's aerial surveys and the 1972 lure crop study indicated that peak numbers are reached at Waterhen Marsh in early September and a rapid decline occurs in mid-September. The recession appeared to coincide with the opening of the duck hunting season.

(2) Ground Transects

Figures 1 to 4 illustrate the quarter sections upon which feeding waterfowl were observed. The numerals indicate the number of times waterfowl were observed on the respective quarter sections. As indicated in Table 5, the largest number of flocks per mile was observed in the Kindersley District. Although the Kindersley District is a renowned waterfowl hunting area, the higher densities are thought to be in part affected by: (1) number of observers involved, (2) number of census days, and (3) relative species composition of waterfowl. Two observers were employed in this district; one more than for other regions. Only three census were conducted, whereas other regions were censused on 10 days. Nineteen of the 24 flocks

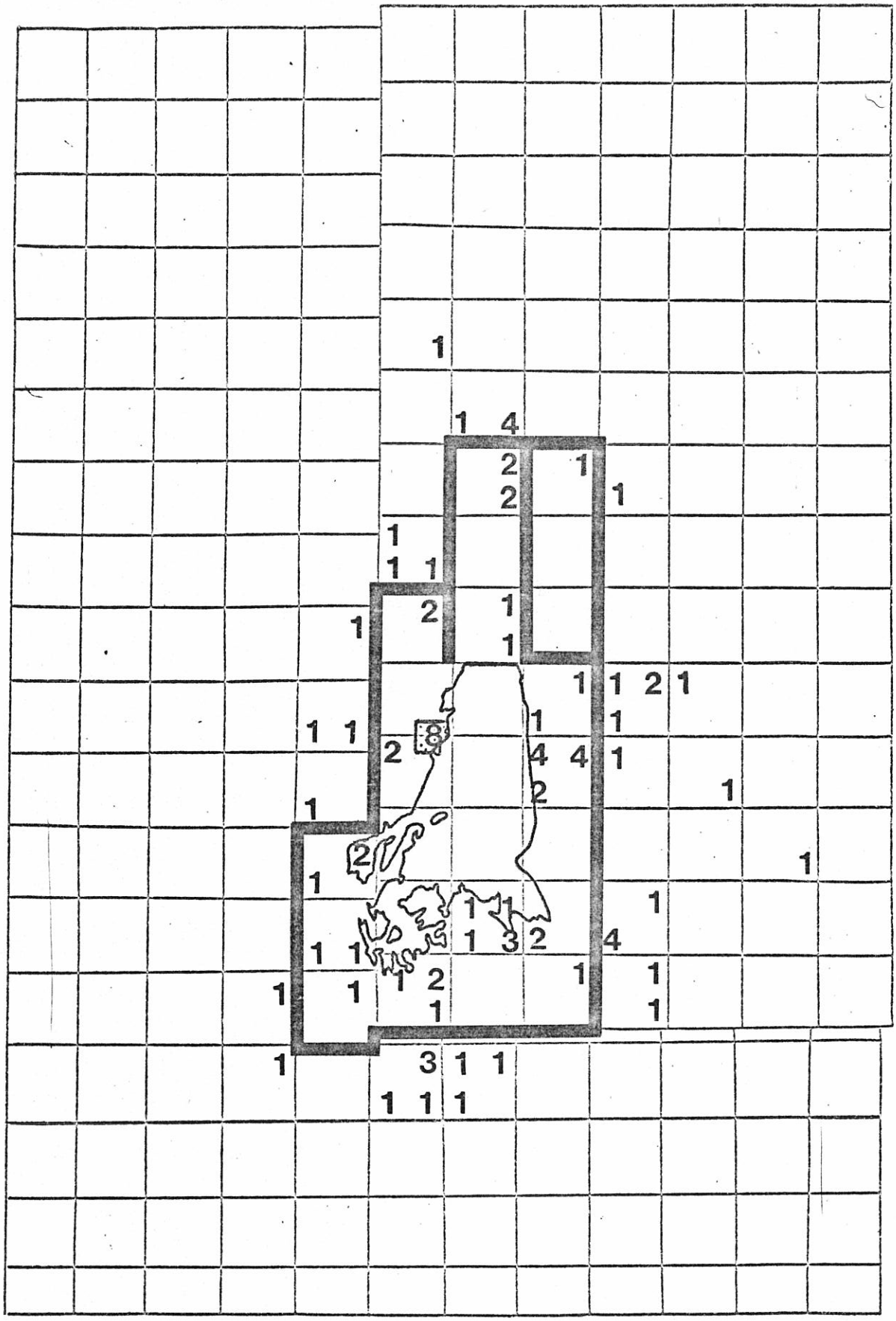

Figure 1. Location and frequency of field-feeding waterfowl at Waterhen Marsh.

lure crop

transect

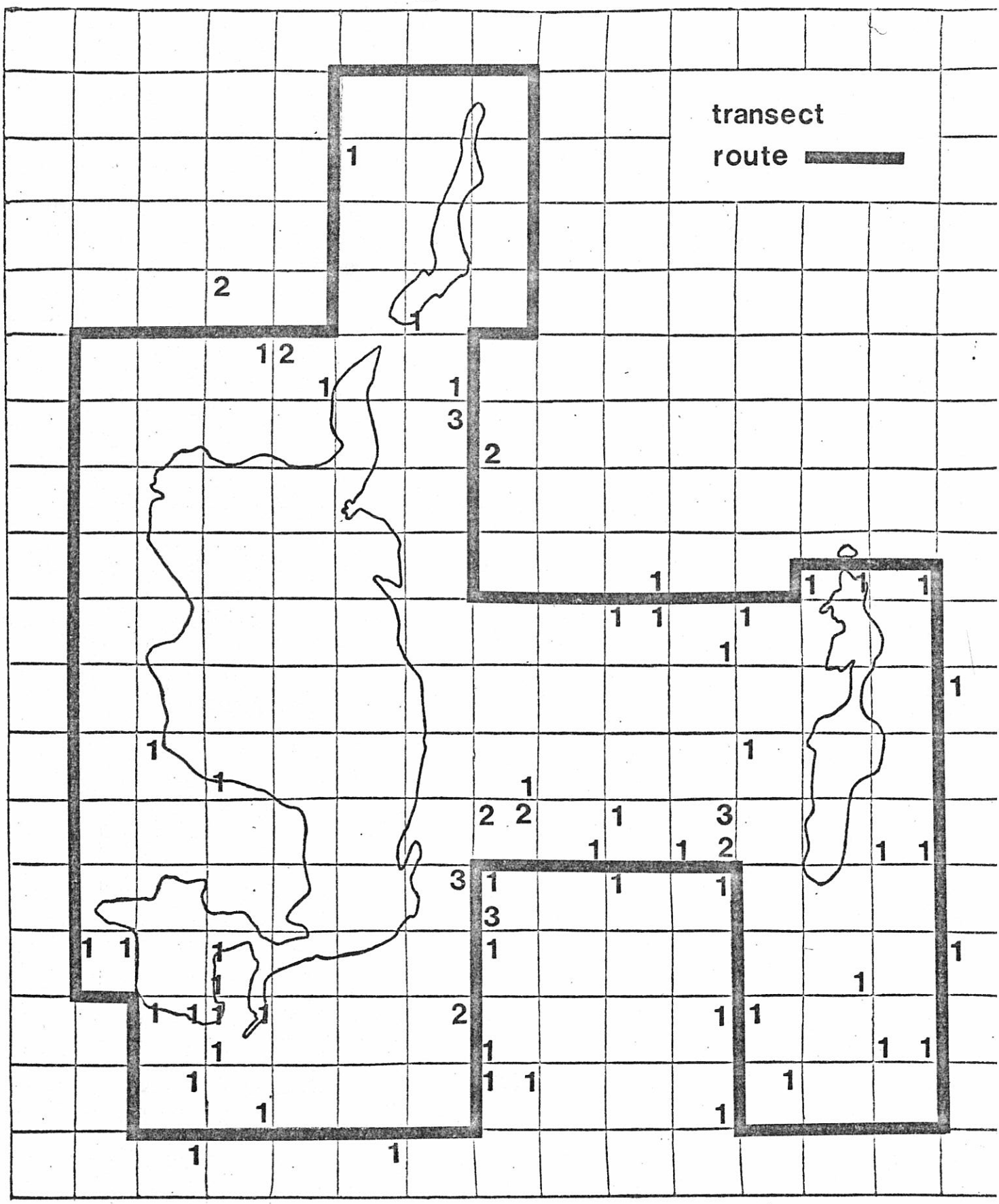

Figure 2 . Location and frequency of field-feeding waterfowl in the Lake Lenore-Ranch Lake Region.

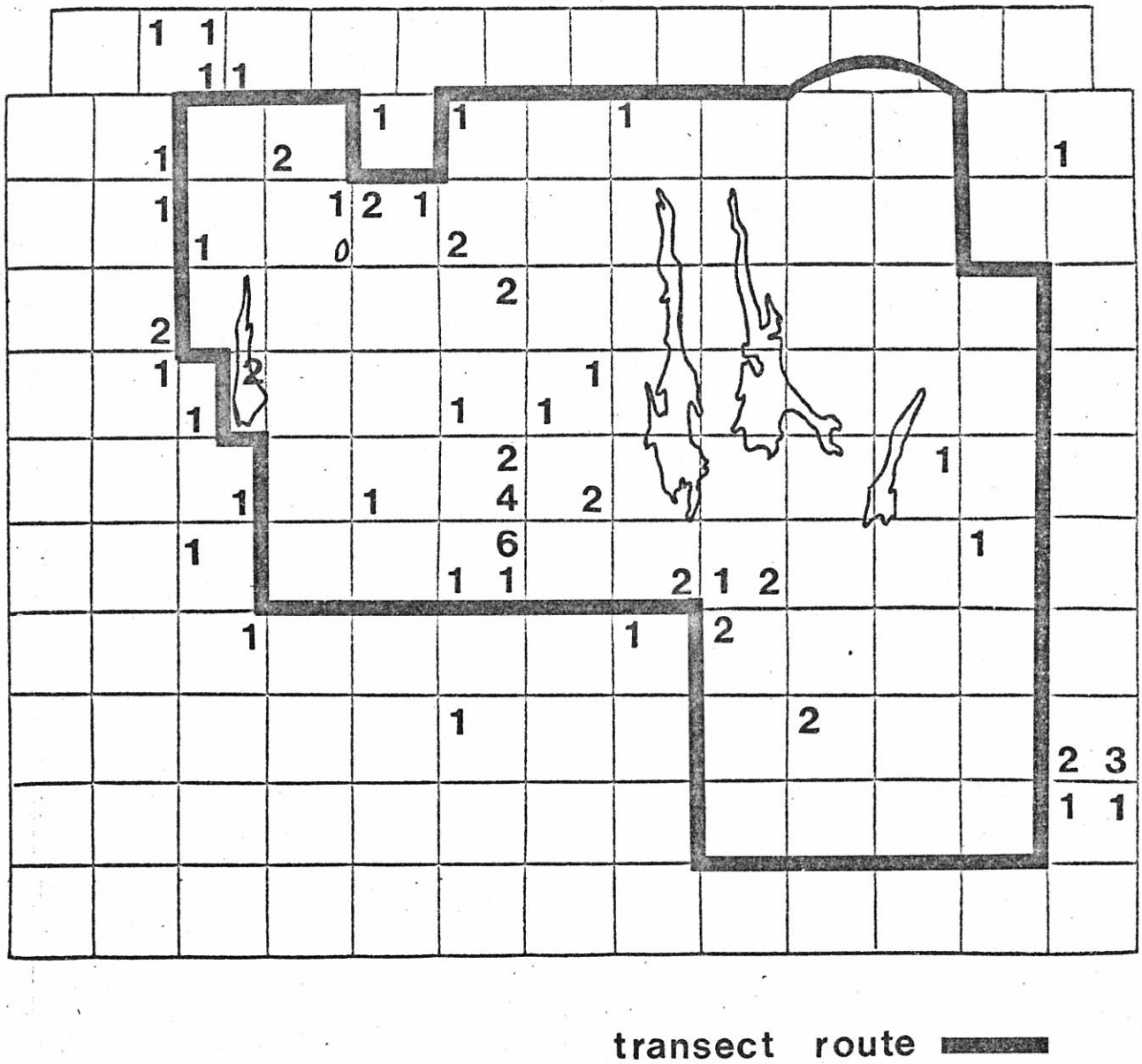

Figure 3 . Location and frequency of field-feeding waterfowl at Ponass Lake .

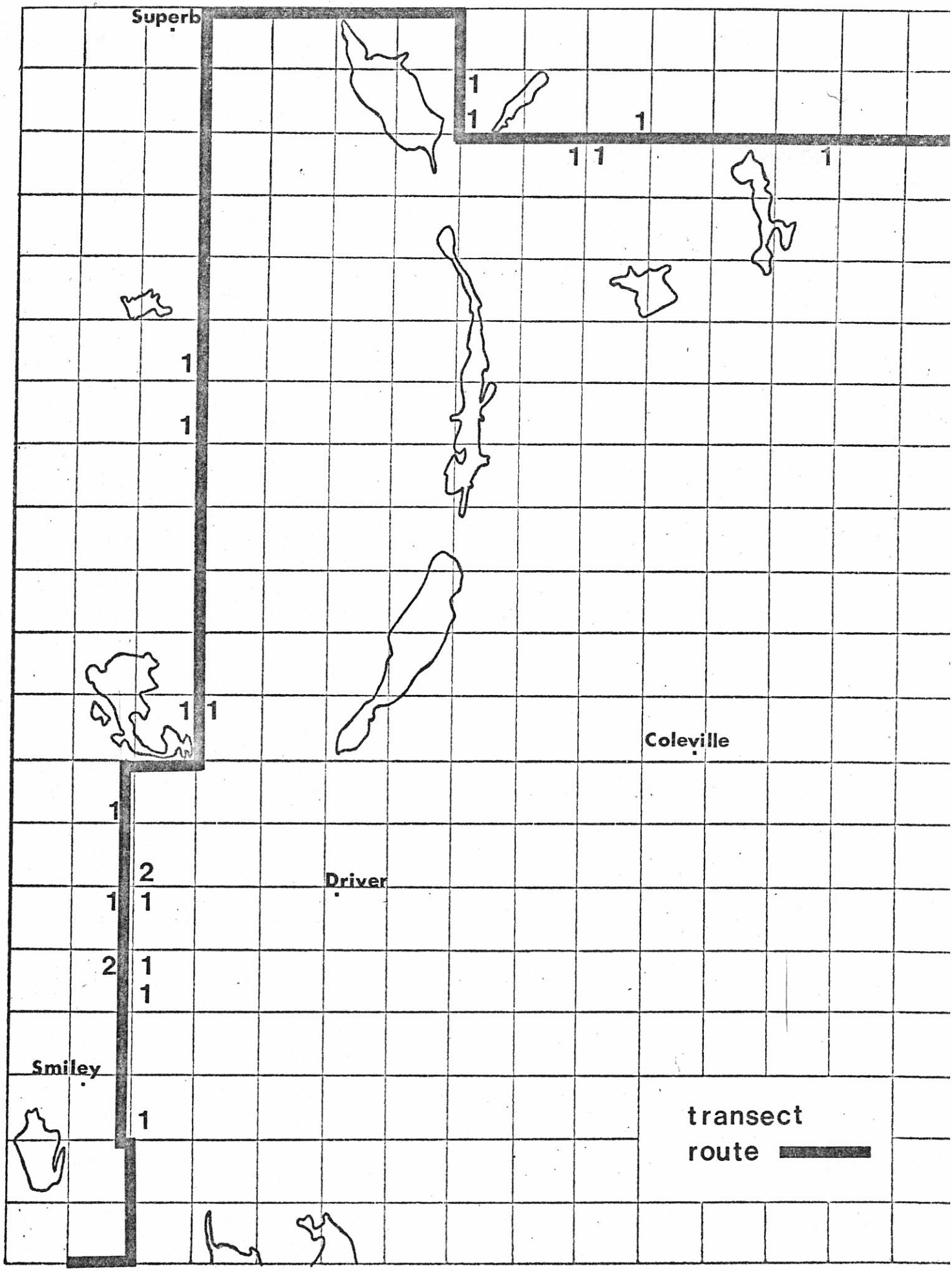

Figure 4 .Frequency of field-feeding waterfowl near Kindersley.

Table 5. Comparison of the frequency at which waterfowl were observed during census in four regions in agro-Saskatchewan

Region	Transect Route	No. 1/4 Sec. Censused	No. 1/4 Sec. With Flocks	No. of Flocks	Flocks/Mi./Day
Waterhen Marsh	29 mi.	99	31	47	0.16
Lake Lenore-Ranch Lake	69 mi.	267	37	47	0.07
Ponass Lake	40 mi.	155	25	31	0.08
Kindersley	36 mi.	---[1]	18	20	0.18

[1] only "fields" bordering route were examined.

observed were composed of geese, which are more visible. Relatively few flocks of geese were observed in the other regions.

Of the other three regions intensively studied, field-feeding waterfowl were most frequently encountered near the Waterhen Marsh staging area. At Waterhen Marsh, the lure crop was utilized more frequently than any two fields. Fields bordering the Waterhen Marsh transect route contained 0.16 flocks per mile per day censused. The other two regions extensively studied had 50 per cent fewer flocks per mile, and it would appear that the presence of the Waterhen Marsh lure crop has resulted in holding waterfowl in the vicinity of the marsh. It should be noted, however, that the relative lengths of transect routes and the distance between routes and waterbodies may have influenced the number of sightings to some extent. Aerial surveys indicated that there was a higher density of waterfowl at Waterhen Marsh than at Lake Lenore or Ranch Lake, and it was expected that more flocks would be observed in the former area. Ponass Lake had higher densities than Waterhen Marsh and possibly more field-feeding flocks would have been reported if the Ponass Lake transect route had been shorter and restricted to the immediate vicinity of the lake.

Figures 5 to 8 illustrate the numbers of waterfowl observed on various quarter sections near the four staging areas. By referring back to Figure 1 to 4, one can determine the number of flocks contributing to the total numbers of waterfowl observed on each quarter section.

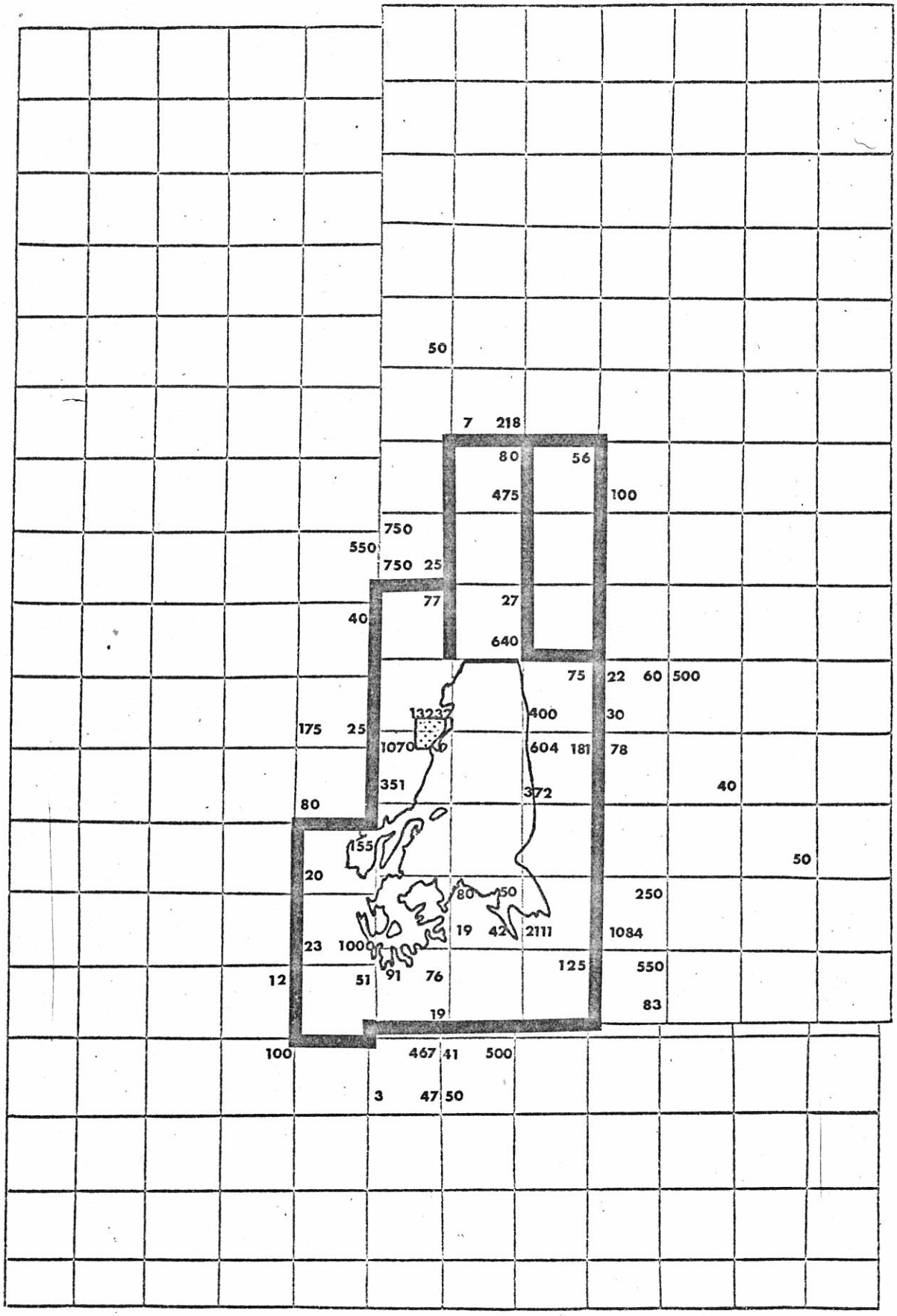

Figure 5 . Locations and numbers of field-feeding waterfowl at Waterhen Marsh .

lure crop

transect

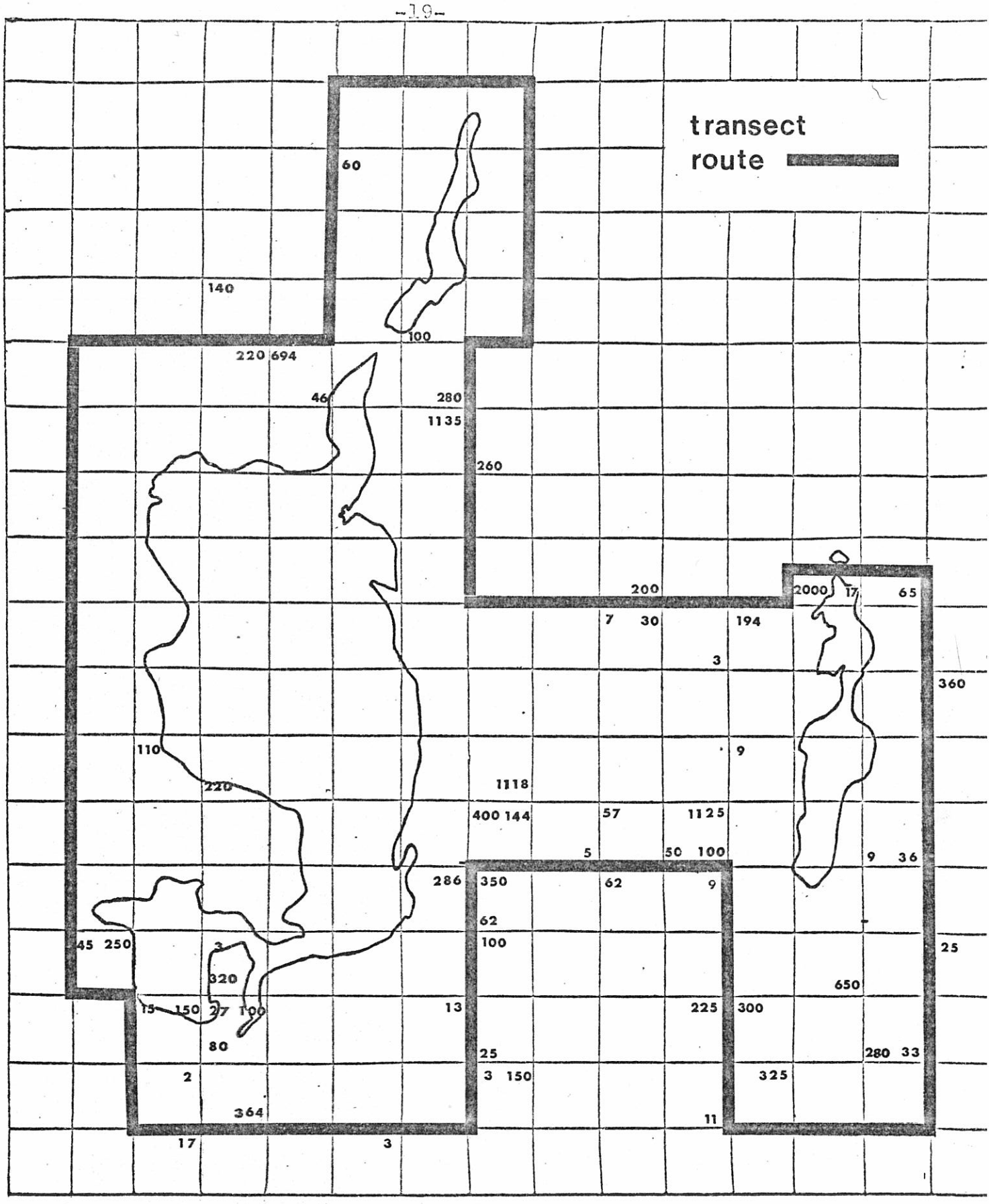

Figure 6 . Locations and numbers of field-feeding waterfowl in the Lake Lenore-Ranch Lake Region.

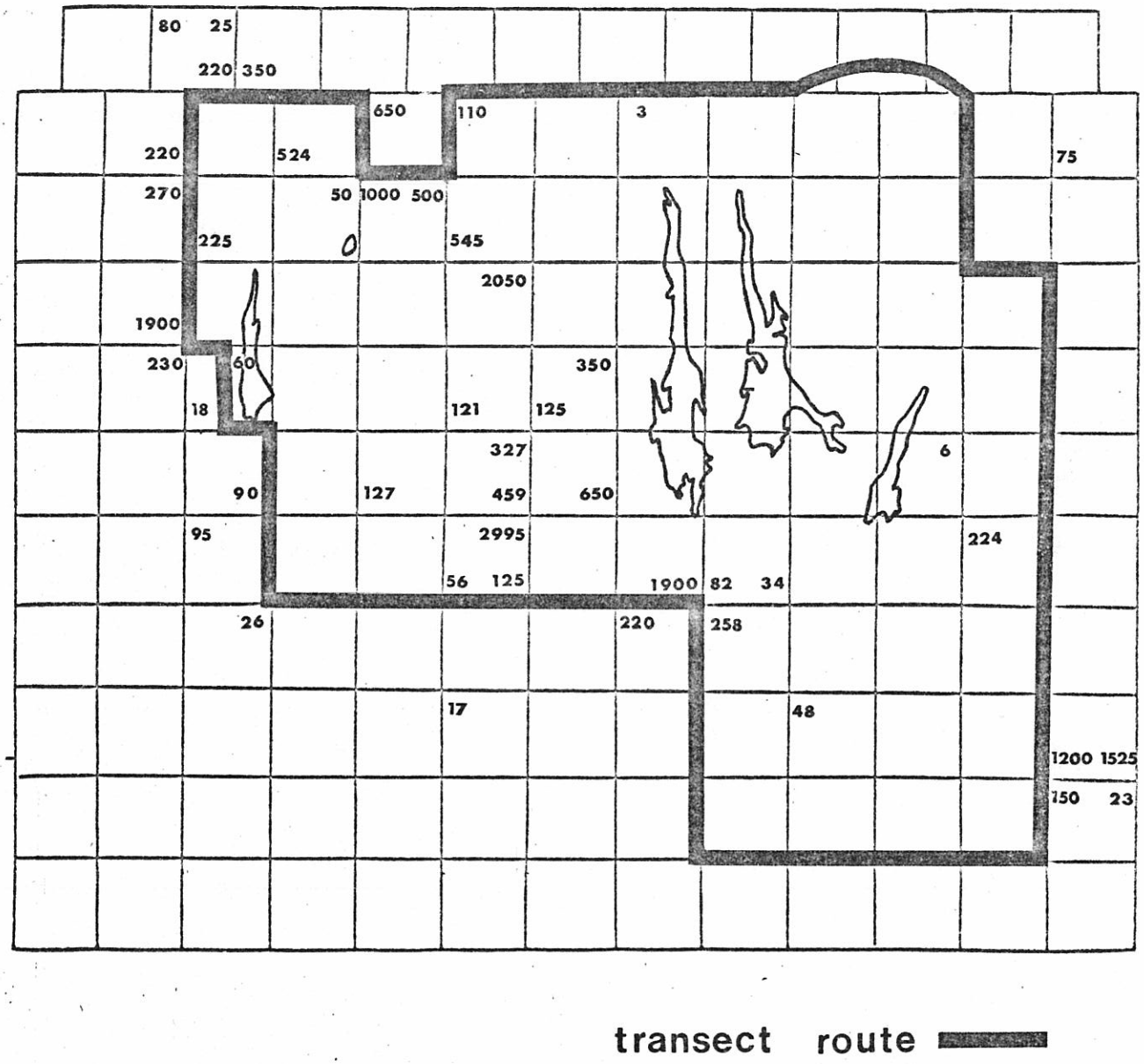

Figure 7 . Locations and numbers of field-feeding waterfowl at Ponass Lake .

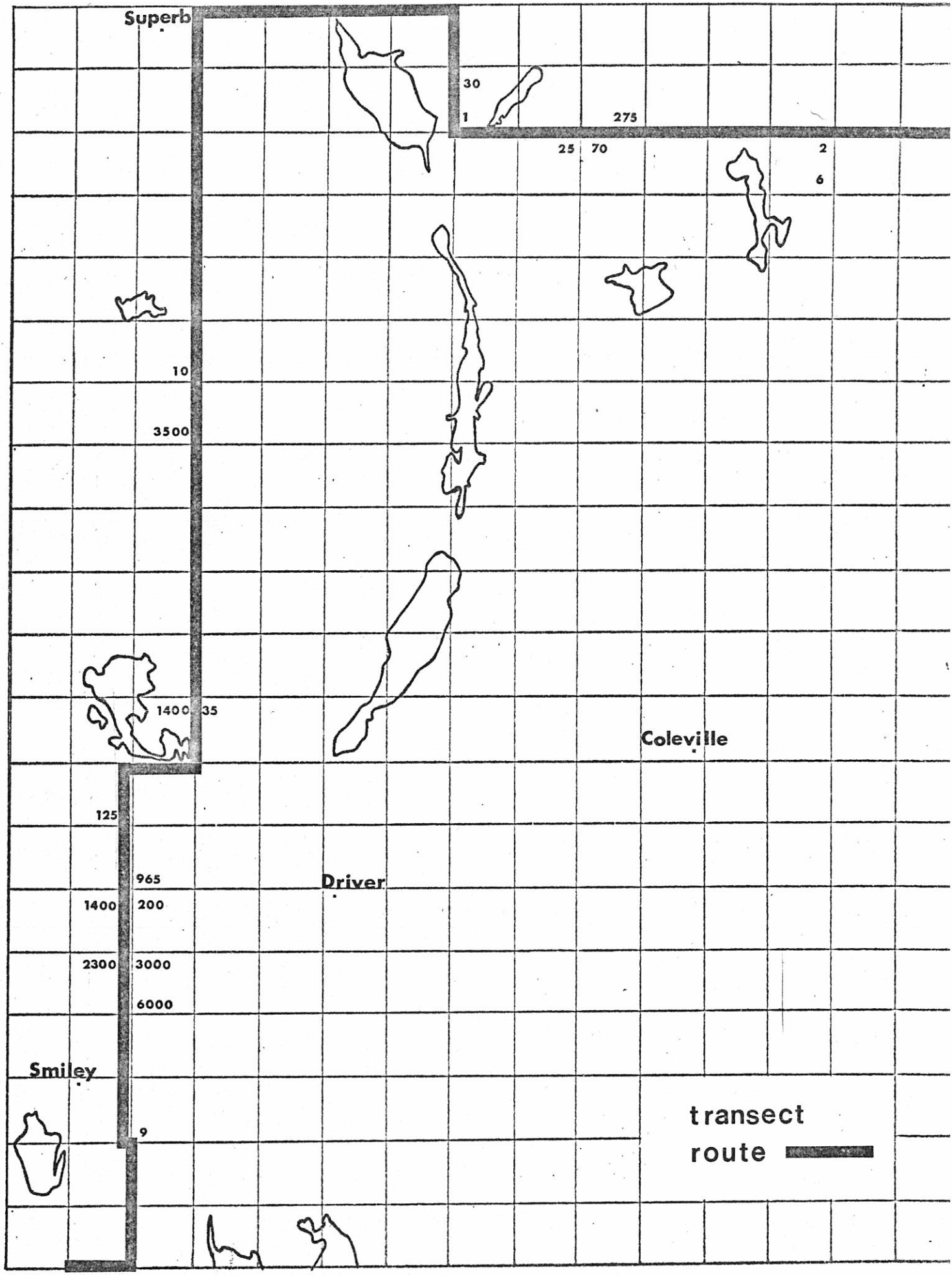

Figure 8 . Numbers of field-feeding waterfowl near Kindersley.

The two most apparent observations arising from Figures 5 to 8 are: (1) flock sizes in the Kindersley District were much greater than in other regions, and (2) the Waterhen Marsh lure crop was extensively utilized. At Kindersley, 20 flocks contained 19,347 waterfowl for an average flock size of 967 birds. The average sizes of flocks observed along the other transect routes were as follows: Ponass Lake, 319; Lake Lenore - Ranch Lake, 170; and Waterhen Marsh, 148. The flocks near Kindersley were chiefly comprised of geese, whereas flocks in the other areas were largely composed of mallards.

Over 13,000 ducks, geese and cranes were observed on the Waterhen Marsh lure crop. As indicated in Table 6, large numbers of waterfowl frequented the lure crop until September 23, then it was abandoned until October 9. At first it was thought that hunting activity in fields adjacent to the lure crop was responsible for driving the birds away. Examination of the crop by a Saskatchewan Government crop adjustor, however, indicated that the barley crop was of poor quality and incapable of providing feed for a prolonged period of time. The adjustor speculated that the lure crop was comprised of approximately 95 per cent wild oats, and he estimated that it would have yielded only three to five bushels of barley per acre prior to waterfowl damage. Although the lure crop contract requires the lessee to sow 100 acres of lure crop, it appeared that only approximately 60 acres of lure crop were present. The adjustor found that the crop present was completely destroyed by waterfowl. As

Table 6. Average daily number of waterfowl on the Waterhen Marsh lure crop.

Weekly Interval	Mallards	Other Ducks	C. Geese	Cranes	Total
Sept. 11-17	4410	100	160	24	4694
Sept. 18-24	1280	0	6	0	1286
Sept. 25-Oct. 1	0	0	0	0	0
Oct. 2-8	0	0	0	0	0
Oct. 9-15	560	6	71	0	637
Total	6250	106	237	24	6617

(daily average based on two weekly counts)

Table 7. Average daily number of waterfowl on the Eyebrow Lake lure crop.

Weekly Interval	Mallards	Pintails	Total
Aug. 1-7	400	61	461
Aug. 8-14	1714	30	1744
Aug. 15-21	2857	40	2897
Aug. 22-28	3143	31	3174
Aug. 29-Sept. 5	4571	46	4617
Sept. 6-13	6857	69	6926
Sept. 14-16	14000	140	14140
Total	33542	417	33959

(daily averages based on daily counts except for the last week)

indicated in Table 6, it appeared that waterfowl utilized the lure crop until the few hundred bushels were depleated. Thereafter, they fed on other crops. Waterfowl did not return to the swathed lure crop until October 9, a time at which harvesting of other cereal crops in the region was 97 per cent complete (Table 8, page 26).

It was of interest to note that ground counts on both the Waterhen Marsh and Eyebrow Lake lure crops greatly exceeded numbers of waterfowl observed during aerial surveys of the respective staging areas (Tables 4, 6 and 7). Two explanations are proposed. First, waterfowl utilizing the lure crops may have staged on other nearby waterbodies and would therefore note be included in the aerial census. A second, and perhaps more accurate explanation is related to the field-feeding patterns of waterfowl. At both Waterhen Marsh and Eyebrow Lake (Grey pers. comm.), large numbers of waterfowl were observed leaving the staging area in the early morning, feeding some distance from the staging areas, spending the afternoon loafing on large sloughs near the feeding grounds, and then returning to the staging area at dusk. It was thought that discrepancies between aerial and ground counts were due to an absence of waterfowl on the staging areas during afternoon flights. It is possible that the absence of waterfowl during the afternoons in 1972 may account for some of the mentioned differences between 1972 aerial census and those conducted by Dzubin (in press).

(3) Harvest Chronology

Detailed harvest chronology data are presented in Appendix 4. A resume of this material appears in Table 8. At the onset of the study, 60 to 70 per cent of cereal grains were still in swath in the three eastern most regions, whereas harvest in the Kindersley District was somewhat advanced. Cold weather and precipitation arrested harvesting in eastern Saskatchewan for two weeks. As indicated in Table 8, this delay did not occur in western Saskatchewan, and harvesting near Kindersley was completed one week earlier. Much of the swathed cereal grain in the three eastern areas was combined during the week of October 2 to 8, as transects conducted the following week indicated that 95 per cent of cereal crops had been harvested. The harvest chronology data indicated that inclement weather delayed combining in eastern and central Saskatchewan, thus rendered cereal grain crops vulnerable to waterfowl damage for an additional two week period. Fortunately, the two week period was followed by a week of warm weather and strong winds which enabled farmers to combine much of their unharvested crops during the first week of October. Although the harvest was largely over by mid-October, it is predicted that the delay in harvesting will result in approximately one-half of a million dollars in waterfowl depredation claims. The three eastern regions extensively studied exhibited similar harvest patterns and any differences in the amount of crop depredation in 1972 are not the result of a later harvest in one or more of these regions.

Table 8. Percentage of cereal grain crops harvested near four staging areas in agro-Saskatchewan.

	Sept. 11-17		Sept. 18-24		Sept. 25-Oct. 1		Oct. 2-8		Oct. 9-16	
Region	Swath	Harvest	Swath	Harvest	Swath	Harvest	Swath	Harvest	Swath	Harvest
Waterhen Marsh	61.9	37.4	54.4	44.9	54.4	44.9	53.7	45.6	2.8	97.2
Lake Lenore-Ranch L.	56.8	41.8	56.8	41.8	56.8	41.8	33.6	65.9	1.8	98.2
Ponass Lake	69.9	27.5	69.9	27.5	69.9	27.5	60.1	39.9	5.2	94.8
Kindersley	----	----	17.2	81.7	8.0	90.9	5.7	94.3	---	----

(4) Economic Assessment of Lure Crops

The first expense incurred in establishing a lure crop is the cost of the land. At Waterhen Marsh, the 400 acres of cultivated land and 4.8 acres of pasture would have a value of approximately $36,000 ($90 per acre for cultivated land and $30 per acre for pasture). The 581 acres of cultivated land at Eyebrow Lake cost approximately $52,000 (Table 9).

The second expense arises through the cost of farming the lure crop. At Waterhen Marsh, direct costs are not incurred. A lessee is awarded 400 acres of crown land of which 100 acres must be sown in barley and swathed for lure crop, 100 acres must remain in summerfallow, and 200 acres may be farmed at the lessee's discretion. The lure crop, 100 acres of summerfallow, and the other 200 acres are rotated on an annual basis. An indirect assessment of the annual expenses could be determined by subtracting the costs of farming the lure crop, summerfallowing and the land taxes from the benefits derived from farming 200 acres; however, the benefits derived from the 200 acres would vary depending upon the crop sown. The Eyebrow Lake lure crop is farmed on a contract basis. Each year 162 acres of barley and 130 acres of durum wheat are sown. The cost of expenditures in 1972 was $3,200.00.

A Saskatchewan Government Insurance crop adjustor found the crop on the Waterhen Marsh lure crop to be completely destroyed. He estimated that the 60 acres of lure crop would have yielded three to five bushels per acre or 180 to 300 bushels. The Waterhen Marsh lure crop, therefore, avoided $180 to $300 of

Table 9. Economic assessment of two Saskatchewan lure crops based on the observed loss of produce

Lure Crop	Land Value	Operational Expense	No. Acres in Lure Crop	Estimated Value of Crop	Estimated Loss	Economic Benefit
Waterhen Marsh	$36,000	0	60	$240	$240	$240
Eyebrow Lake	$52,000	$3,200	292	$7,140	$7,140	$3,940

Table 10. Economic assessment of two Saskatchewan lure crops based on observed numbers of waterfowl and known rates of consumption and scattering of grain.

Lure Crop	No. Waterfowl-days Usage	Minimum Benefits (Grain Consumed)	Maximum Benefits (Feed plus Scattering Loss)
Waterhen Marsh	46,319	$622.71	$5,254.61
Eyebrow Lake	400,000	$7,187.50	$52,187.50

damage to crops in the surrounding vicinity. The Eyebrow Lake lure crop yielded approximately 20 bushels per acre for both Durum wheat and barley (Grey pers. comm.). All 292 acres of lure crop were completely destroyed. The 130 acres of wheat and 162 acres of barley maintained waterfowl long enough to prevent at least $7,140 of damage in the Eyebrow Lake area.

An indirect method of appraising the benefits derived from lure crops involves determining the total numbers of birds using a lure crop during a season and then calculating minimum and maximum savings based on the average daily consumption per bird and the average scattering rate per bird (Table 10). At Waterhen Marsh, totals of 44,492 duck days, 1,659 goose days and 168 crane days usage were determined. Using these data, a minimum beneficial value of $622.71 and a maximum beneficial value of $5,254.61 were calculated. At Eyebrow Lake, the lure crop received an estimated 400,000 duck days usage (Grey pers. comm.). The lure crop, therefore, had a minimum beneficial value of $7,187.50 and a maximum beneficial value of $52,187.50.

The economic benefits estimated by crop loss and the minimum benefit based on waterfowl feeding rates were found to be relatively similar, which is not surprising as waterfowl returned to lure crops until nearly all of the available crop was devoured. The maximum benefit estimate also has merit, even though these values are several times the actual values of the respective lure crops. If waterfowl scatter four pounds of grain per day, it is highly desirable to have large numbers of

birds concentrating on a single field rather than feeding from field to field. As birds continue to return to a field and as more grain is consumed, the actual scattering rate will decrease, as less grain will be in the swaths.

Considering land value, operational expense, and economic benefits, it appears that the Waterhen Marsh lure crop is not economically sound, whereas the Eyebrow Lake lure crop appears to prevent several thousands of dollars in crop losses. The Waterhen Marsh lure crop has the potential to hold waterfowl and reduce depredation in the vicinity; however, this requires better farming techniques by the lessee and some degree of scrutiny by the lessor.

Summary and Conclusions:

1. Aerial census of 10 staging areas in agro-Saskatchewan indicated that there were fewer waterfowl present in 1972 than in previous years.
2. A review of aerial census failed to indicate increases in numbers of waterfowl in areas after lure crops had been established.
3. The largest number of waterfowl were observed in early September; a decline followed inclement weather in late September and much of the population emigrated from Saskatchewan between October 10 and October 17.
4. Of four areas in which ground transects were conducted, the Kindersley District had the highest number of flocks per mile of transect. Waterhen Marsh ranked second having 50 per cent more flocks per mile than the Lake Lenore - Ranch Lake and Ponass Lake areas.
5. The Kindersley District also had the largest average flock size of 967 birds per flock. Other regions had as follows: Ponass Lake, 319; Lake Lenore - Ranch Lake, 170; and Waterhen Marsh, 148. The flocks near Kindersley were comprised chiefly of geese, whereas flocks in other regions were primarily comprised of mallards.
6. The Waterhen March lure crop was utilized more than any other quarter section studied. Over 13,000 ducks, geese and cranes were observed during 10 days of censusing; however, the lure crop was devoid of waterfowl between September 23 and

October 9. The crop was only capable of yielding three to five bushels per acre of barley prior to being swathed, and it was soon devoured. Waterfowl returned to the lure crop on October 9 after all other cereal grain had been combined.

7. At the onset of the study, approximately 35 per cent of cereal grains had been harvested in the Waterhen Marsh, Lake Lenore-Ranch Lake and Ponass Lake areas. Harvest was advanced in the Kindersley District. Cold weather and precipitation delayed harvesting for two weeks in the three eastern areas, and it is thought that this will result in an -other record year in depredation claims. Approximately 95 per cent of cereal grains were harvested by mid-October.

8. An economic assessment based on produce loss to waterfowl indicated that the Waterhen Marsh lure crop prevented a loss of $240, and the Eyebrow Lake lure crop prevented a loss of $7,140 in their respective regions. The operational expenditures for the Eyebrow Lake lure crop totalled $3,200; therefore, a net saving of $3,940 was realized.

9. An economic assessment based on observed waterfowl usage indicated that the Waterhen Marsh lure crop received 46,319 waterfowl days usage, and the Eyebrow Lake lure crop received 400,000 waterfowl days usage. Minimum benefits based on the amount of grain required to feed these numbers of waterfowl indicated that the Waterhen Marsh lure crop had provided $622.71, and the Eyebrow Lake lure crop had provided $7,187.50

in feed; values comparable to those determined in the economic assessment based on crop loss. Maximum benefits considering both amount of grain consumed and amount scattered suggested that the Waterhen Marsh lure crop may have saved $5,254.61 in damage to surrounding fields, and the Eyebrow Lake lure crop may have prevented $52,187.50, the latter figure being equal to the original cost of the Eyebrow Lake lure crop.

10. All indications suggest that the Eyebrow Lake lure crop was successful in alleviating depredation in 1972. The Waterhen Marsh lure crop was an economic catastrophy solely because of the undesirable farming practises conducted by the lessee.

11. The lure crop system, if properly managed can be successful in reducing crop depredation, and this program should be expanded to other areas, particularly to the Quill Lakes and Ponass Lake areas. MacLennan (1972) has determined the areas that should be purchased. In addition to these areas, consideration should be given to the northeast quarter of section 3-38-15-2 in the Ponass Lake area, and to the west half of section 17-40-21-2 on the southwest corner of Lake Lenore.

Literature Cited

Biehm, E.R. 1951. Crop damage by wildlife in California. Game Bulletin No. 5, California Department of Fish and Game.

Bossenmaier, E.F. and W.H. Marshall. 1958. Field-feeding by waterfowl in Southeastern Manitoba. Wildlife Monograph No. 1. Wildlife Society, p. 24.

Brace, R.K. In press. A study of the nesting ecology, productivity and mortality of the Waterhen Marsh Canada goose flock. Unpub. M.Sc. thesis.

Dzubin, A. In press. Prairie Canada waterfowl inventories, autumn, 1956-1970: Tabulations of original autumn counts, 1956-1970.

MacLennan, R.R. 1970. A summary of waterfowl damage in Saskatchewan from 1965-69 and a proposed study to alleviate the problem. Department of Natural Resources. Unpublished report.

———. 1971. A study of waterfowl crop depredations and recommendations for control at Ponass Lake and Quill Lakes, Saskatchewan. Department of Natural Resources. Unpublished report.

———. 1972. A continuation of a study of waterfowl crop depredation in twelve areas of Saskatchewan. Department of Natural Resources. Unpublished report.

Paynter, E.L. 1955. Crop insurance against waterfowl depredation. Trans. 20th N. Am. Wildl. Conf. pp. 151-157.

Renewable Resources Consulting Services Limited. 1970. A preliminary study of waterfowl damage to grain crops in Saskatchewan. Edmonton, Alberta.

Stephen, W.J.D. 1967. Bionomics of the sandhill crane. Canadian Wildlife Monograph Series, No. 2.

Appendix 1.

FIELD SHEET

WEEKLY CENSUS OF STAGING AREAS

REGION: ____________ C.O. DISTRICT: ____________ DATE OF CENSUS ____________

TIME STARTED ____________ FINISHED ____________ TYPE OF AIRCRAFT ____________

COST PER HOUR ____________ OBSERVER ____________

WEATHER: Start Temp. ____________ Cloud ____________ Wind ____mph ____________ direction

Finish Temp. ____________ Cloud ____________ Wind ____mph ____________ direction

VISIBILITY START ____________ miles

FINISH ____________ miles

STAGING AREA # ____________ PER CENT OF AREA CENSUSED ____________ page ____________

OBSERVATIONS:

#	SPECIES	ACC.	#	SPECIES	ACC.	#	SPECIES	ACC.

Appendix 2.

FIELD SHEET

LOCATION AND ESTIMATION OF NUMBERS OF FEEDING WATERFOWL

ON THE LURE CROP AND ADJACENT FIELDS

REGION: ____________ C.O. DISTRICT: ____________ LURE CROP: ____________

DATE: ____________ OBSERVER: ____________

WEATHER: TEMP. ____________ CLOUD: ____________

WIND: ____________ mph DIRECTION: ____________

page ______

LEGAL LAND DESCRIPTION QT. SEC. TWP. RGE. M.	CROP	CONDITION	NUMBERS OF BIRDS X (A, B, C, OR D)					
			MALLARDS	PINTAILS	OTHER DUCKS	CRANES	GEESE	TOTAL BIRDS

Appendix 3. FIELD SHEET ON HARVEST CHRONOLOGY

REGION: ____________ C.O. DISTRICT: ____________ DATE: ____________

OBSERVER: ________________________ page ________

LEGAL LAND DESCRIPTION	CROP	STAGE OF HARVEST	LEGAL LAND DESCRIPTION	CROP	STAGE OF HARVEST

Appendix 4. Summary of Harvest Chronology Date

4.1 Waterhen Marsh (includes land between transect route and marsh as well as fields bordering the transect route)

	Sept. 11	Sept. 18	Sept. 25	Oct. 2	Oct. 9
	No.(%)	No.(%)	No.(%)	No.(%)	No.(%)
Cereal Crops					
Standing	1(0.7)	1(0.7)	1(0.7)	1(0.7)	0(-)
Swathed	91(61.9)	80(54.4)	80(54.4)	79(53.7)	4(2.8)
Harvested	55(37.4)	66(44.9)	66(44.9)	67(45.6)	143(97.2)
Totals	147(100)	147(100)	147(100)	147(100)	147(100)
Oil-seed Crops					
Standing	0(-)	0(-)	0(-)	0(-)	0(-)
Swathed	41(77.3)	28(52.8)	28(52.8)	20(37.7)	2(3.7)
Harvested	12(22.7)	25(47.2)	25(47.2)	33(62.3)	51(96.3)
Totals	53(100)	53(100)	53(100)	53(100)	53(100)
Cereal and Oil-seed Crops					
Standing	1(0.5)	1(0.5)	1(0.5)	1(0.5)	0(-)
Swathed	132(66.0)	108(54.0)	108(54.0)	99(49.5)	6(3.0)
Harvested	67(33.5)	91(45.5)	91(45.5)	100(50.0)	194(97.0)
Totals	200(100)	200(100)	200(100)	200(100)	200(100)

Surveys examined 117 quarter sections, upon which there were 275 cultivated fields, consisting of 80 wheat, 65 barley, 47 rape, 5 flax, 2 oat and 1 mustard crops, and 75 summerfallow fields.

4.2 Lake Lenore-Ranch Lake District (includes fields within ½ mile of transect route)

	Sept. 13	Sept. 20	Sept. 27	Oct. 4	Oct. 12
	No.(%)	No.(%)	No.(%)	No.(%)	No.(%)
Cereal Crops					
Standing	3(1.4)	3(1.4)	3(1.4)	1(0.5)	0(-)
Swathed	125(56.8)	125(65.8)	125(65.8)	74(33.6)	4(1.8)
Harvested	92(41.8)	92(41.8)	92(41.8)	145(65.9)	216(98.2)
Totals	220(100)	220(100)	220(100)	220(100)	220(100)
Oil-seed Crops					
Standing	1(2.1)	1(2.1)	1(2.1)	1(2.1)	0(-)
Swathed	38(79.2)	38(79.2)	38(79.2)	18(37.5)	2(4.2)
Harvested	9(18.7)	9(18.7)	9(18.7)	29(60.4)	46(95.8)
Totals	48(100)	48(100)	48(100)	48(100)	48(100)
Cereal and Oil-seed Crops					
Standing	4(1.5)	4(1.5)	4(1.5)	2(0.8)	0(-)
Swathed	163(60.8)	163(60.8)	163(60.8)	92(35.0)	6(2.2)
Harvested	101(37.7)	101(37.7)	101(37.7)	174(64.2)	262(97.8)
Totals	268(100)	268(100)	268(100)	268(100)	268(100)

Surveys examined 262 quarter sections, upon which were 423 cultivated fields, consisting of 134 wheat, 64 barley, 46 rape, 22 oat, and 2 flax crops and 155 summerfallow fields.

4.3 Ponass Lake District (includes fields within ½ mile of transect route)

	Sept. 14	Sept. 21	Sept. 28	Oct. 5	Oct. 13
	No.(%)	No.(%)	No.(%)	No.(%)	No.(%)
Cereal Crops					
Standing	4(2.6)	4(2.6)	4(2.6)	0(-)	0(-)
Swathed	107(69.9)	107(69.9)	107(69.9)	92(60.1)	8(5.2)
Harvested	42(27.5)	42(27.5)	42(27.5)	61(39.9)	145(94.8)
Totals	153(100)	153(100)	153(100)	153(100)	153(100)
Oil-seed Crops					
Standing	2(8.0)	2(8.0)	2(8.0)	2(8.0)	0(-)
Swathed	19(76.0)	19(76.0)	19(76.0)	13(52.0)	1(4.0)
Harvested	4(16.0)	4(16.0)	4(16.0)	10(40.0)	24(96.0)
Totals	25(100)	25(100)	25(100)	25(100)	25(100)
Cereal and Oil-seed Crops					
Standing	6(3.4)	6(3.4)	6(3.4)	2(1.1)	0(-)
Swathed	126(70.8)	126(70.8)	126(70.8)	105(59.5)	9(5.0)
Harvested	46(25.8)	46(25.8)	46(25.8)	71(39.4)	169(95.0)
Totals	178(100)	178(100)	178(100)	178(100)	178(100)

Surveys examined 170 quarter sections, upon which were 248 cultivated fields, consisting of 96 wheat, 41 barley, 22 rape, 16 oat and 3 flax crops, and 71 summerfallow fields.

4.4 Kindersley District (includes fields bordering transect route)

	Sept. 19	Sept. 26	Oct. 4
	No.(%)	No.(%)	No.(%)
Cereal Crops			
Standing	1(1.1)	1(1.1)	0(-)
Swathed	15(17.2)	7(8.0)	5(5.7)
Harvested	71(81.7)	79(90.9)	82(94.3)
Totals	87(100)	87(100)	87(100)
Oil-seed Crops			
Standing	3(60)	3(60)	3(60)
Swathed	0(-)	0(-)	0(-)
Harvested	2(40)	2(40)	2(40)
Totals	5(100)	5(100)	5(100)
Cereal and Oil-seed Crops			
Standing	4(4.3)	4(4.3)	3(3.2)
Swathed	15(16.2)	7(7.6)	5(5.4)
Harvested	73(79.5)	81(88.1)	84(91.4)
Totals	92(100)	92(100)	92(100)

Surveys examined 92 crops comprised of 52 wheat, 20 barley, 15 oat, 3 flax and 2 mustard crops

Stan Waynarski

Stan,

Attached are the distributions of waterfowl crippage policies and claims for the Waterhen Marsh, Lake Lenore-Ranch Lake and Porcupine Lake areas. Policies and claims are plotted by quarter section.

Yours truly

Kent

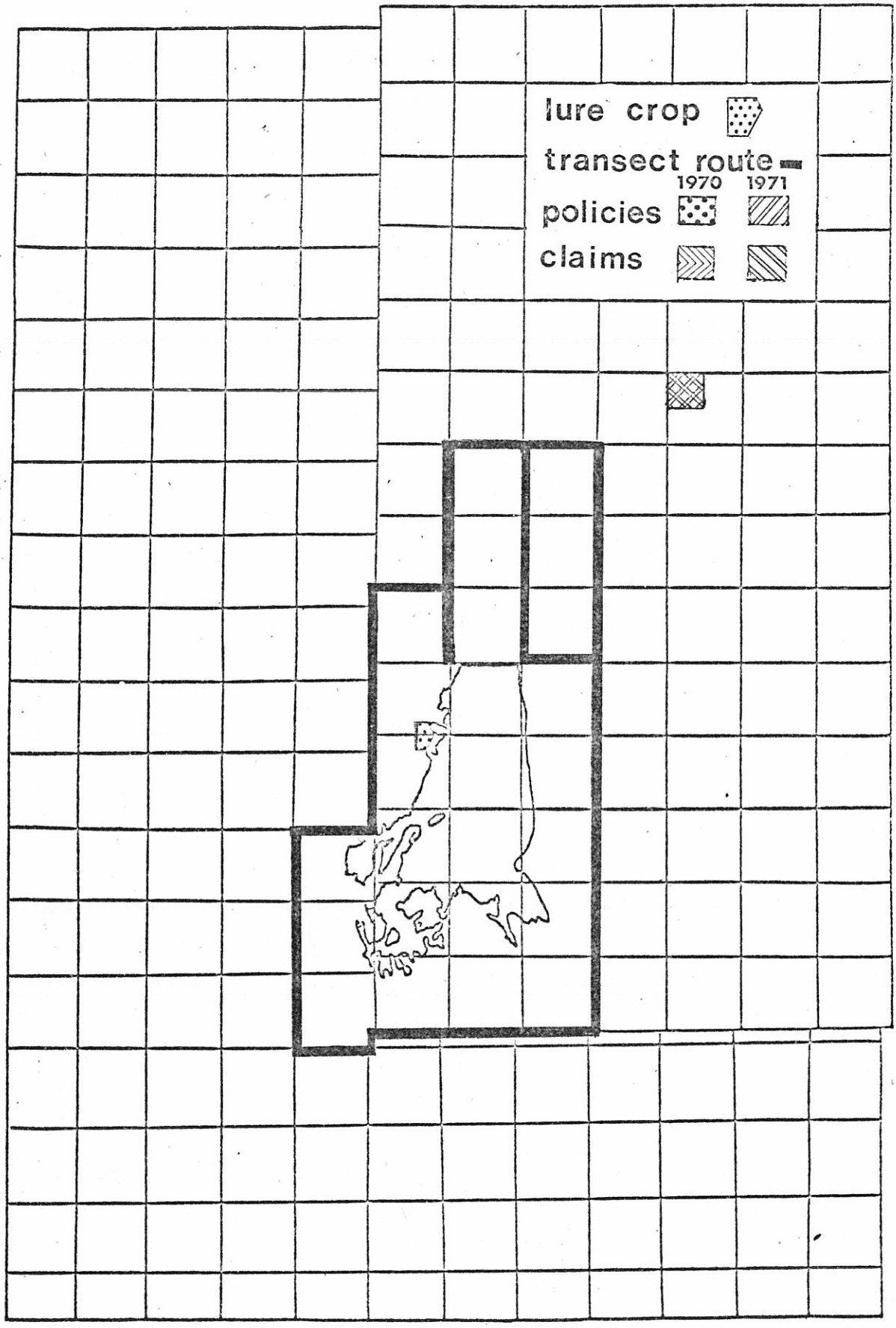

Figure .Location of waterfowl insurance policies and claims near Waterhen Marsh, 1970 and 1971.

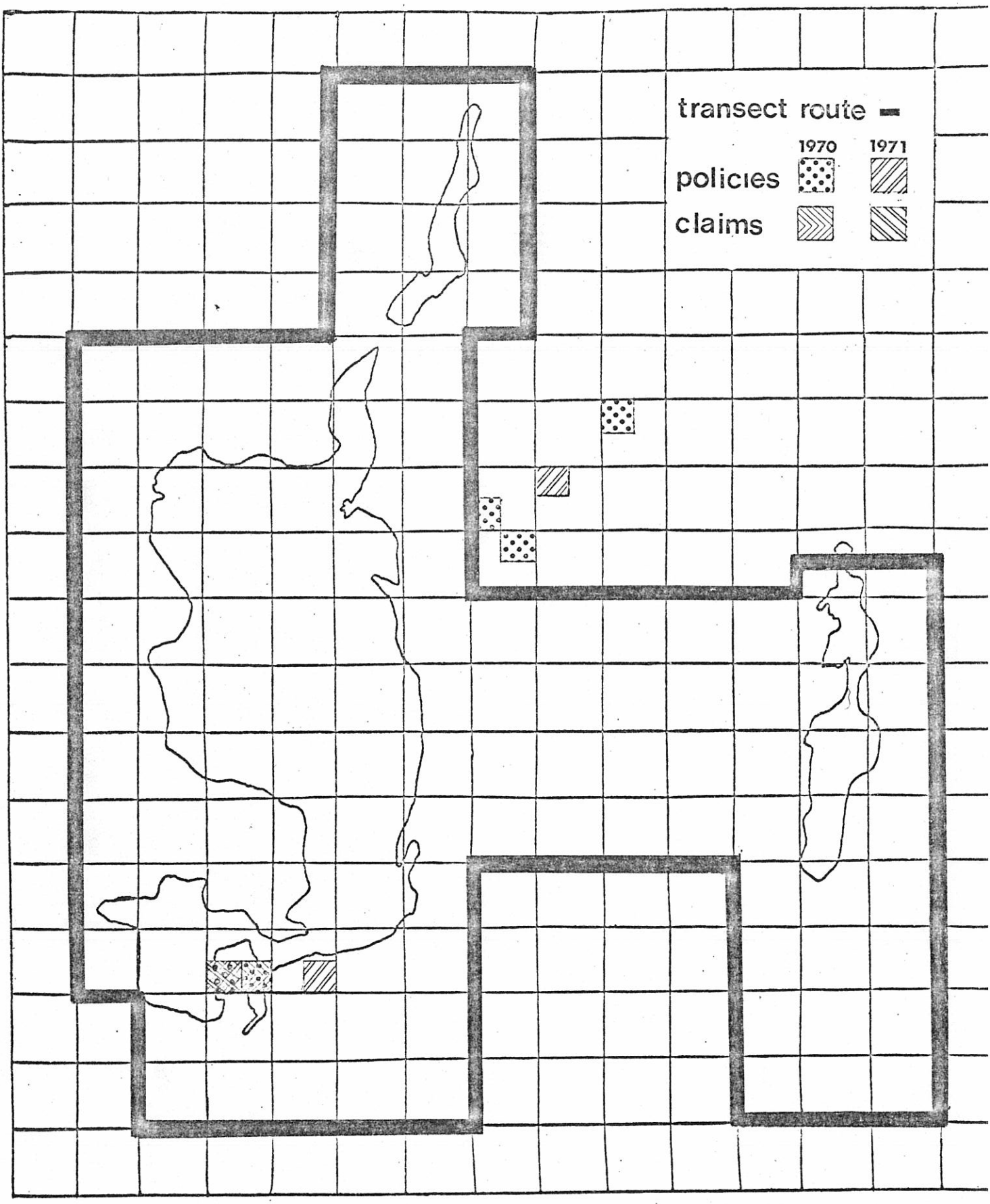

Figure .Locations of waterfowl insurance policies and claims in the Lake Lenore-Ranch Lake Region, 1970 and 1971.

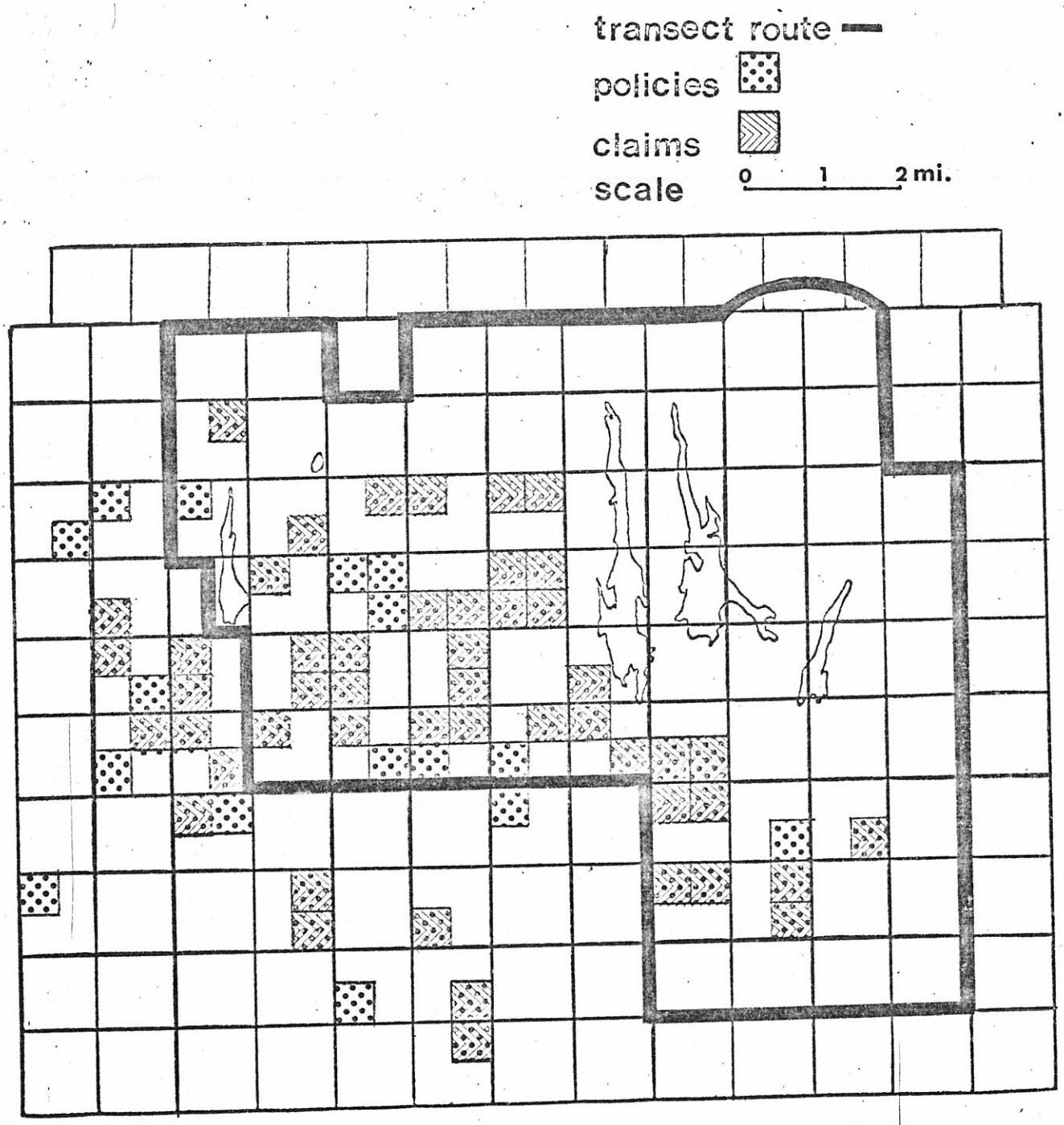

Figure . Location of waterfowl insurance policies and claims near Ponass Lake, 1970.

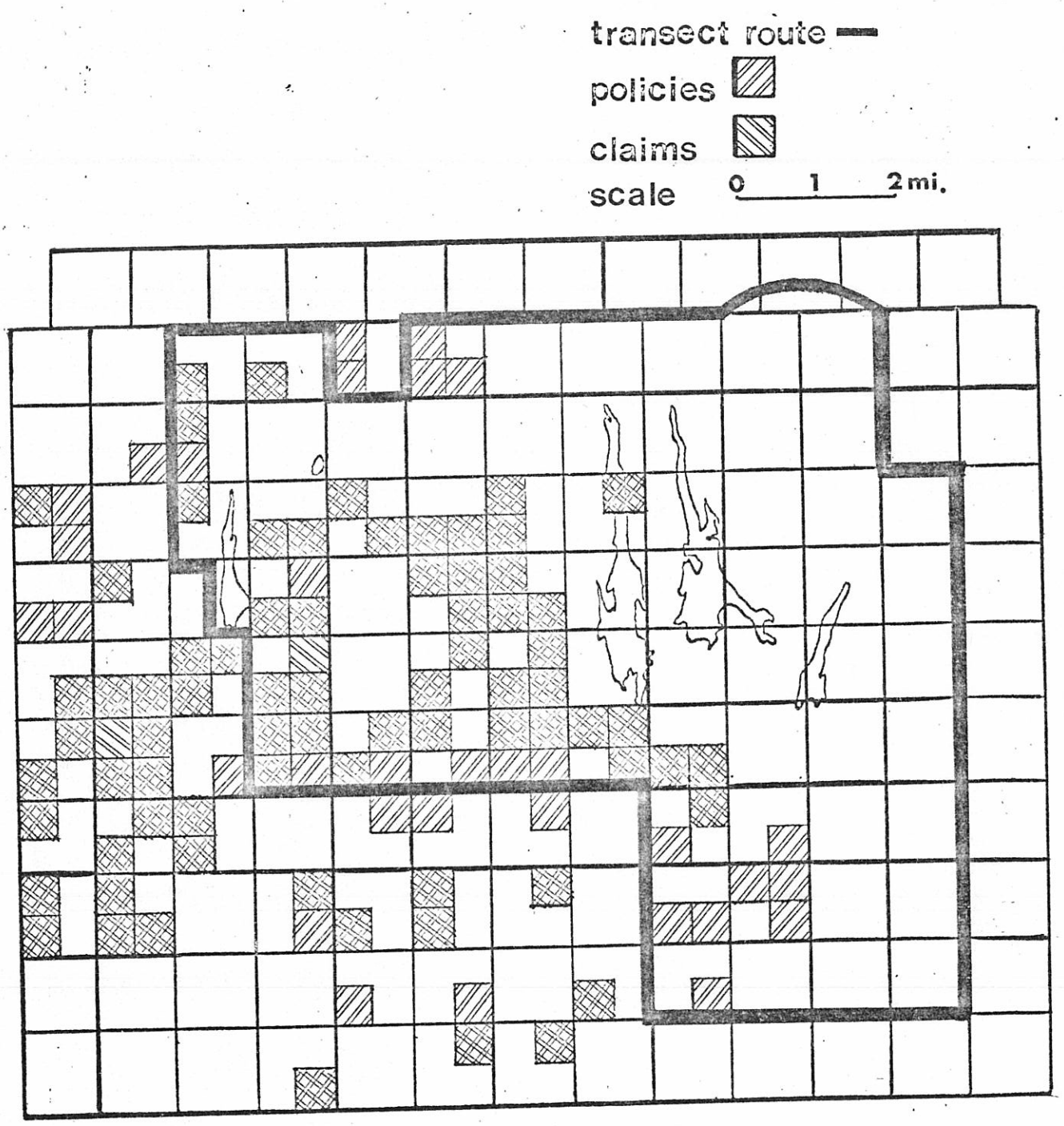

Figure .Location of waterfowl insurance policies and claims near Ponass Lake , 1971 .

Table Waterfowl insurance policies and claims near three Saskatchewan staging areas, 1970.

Staging Area	No. of policies	Acres insured	Acres damaged	Liability	Value of premiums	No. of claims	Value of claims
Waterhen Marsh	0	0	0	0	0	0	0
Lake Lenore	5	350	60	$ 8750.00	$ 178.00	2	$ 1450.00
Ponass Lake	75	4792	1438	$117,300.00	$2289.00	60	$ 12,320.50
Totals	80	5142	1498	$126,050.00	$2467.00	62	$ 13,770.00

Table Waterfowl insurance policies and claims near three Saskatchewan staging areas, 1971.

Staging Area	No. of policies	Acres insured	Acres damaged	Liability	Value of premiums	No. of claims	Value of claims
Waterhen Marsh	1	100	40	$ 2500.00	$ 50.00	1	$ 843.75
Lake Lenore	3	190	83	$ 4275.00	$ 67.50	1	$ 1660,00
Ponass Lake	125	8748	2433	$ 212,210.00	$4293.20	77	$36,856.25
totals	133	9038	2556	$ 217,985.00	$4410.70	79	$39,360.00