CANADIAN WILDLIFE SERVICE

AN EXPERIMENT

TO ALLEVIATE CROP LOSSES DUE

TO SANDHILL CRANES IN SASKATCHEWAN

1960

By J. Bernard Gollop, October 28, 1960.

OBJECTIVE

To reduce damage to cereal crops caused by sandhill cranes with special emphasis on aircraft herding and the use of automatic exploders.

LOCATION & DURATION

All of the experimentation and most of the observations were made in a 456-square-mile block of land around the north end of Last Mountain Lake, Saskatchewan. The north part of the lake itself is a federal bird sanctuary. Most of this sanctuary and an additional eight square miles of land are included in a provincial game preserve (see map). The area was bounded by #2 Highway on the west, #20 Highway on the east, and extended from near Lockwood (nine miles north of Nokomis) to Govan (14 miles south of Nokomis). Crane censuses were conducted for another ten miles further south in September.

Field work extended from August 12 to October 23rd. Two to four workers were present continuously from August 15th to September 5th, and for one or two days per week thereafter.

PERSONNEL & EQUIPMENT

Canadian Wildlife Service: R.H. Mackay, Edmonton; J.B. Gollop and W.J.D. Stephen, Saskatoon; J.B. Millar, Winnipeg; D.A. Munro and V.E.F. Solman, Ottawa; K.S. Shearman and J.D. Heyland, summer assistants.

National Audubon Society: H.S. Peters, Georgia (September 6 - 16).

Saskatchewan Museum of Natural History: R.W. Nero and R. Carson, Regina (September 26 and 27).

Saskatchewan Natural History Society: G.F. Ledingham, Regina (October 4-5).

Fourteen "Zon" automatic acetylene exploders were contributed by Ducks Unlimited and three by the Wildlife Branch, Saskatchewan Department of Natural Resources. Fourteen tanks of acetylene were loaned by the Wildlife Branch and one by Ducks Unlimited. Seven Canadian Wildlife Service tanks were also used.

SUMMARY

The objective of this investigation was to discover means of alleviating damage caused by sandhill cranes to privately-owned cereal crops. A block of land, 456 square miles in size, was selected around the north end of Last Mountain Lake, Saskatchewan. Because of the earliest harvest on record in this district in 1960, cranes had little opportunity to cause damage and, consequently, experiments could not be evaluated on the basis of damage prevented.

Attempts to herd cranes southward out of the area by means of aircraft were unsuccessful. Cranes could be herded from grain fields to water areas by aircraft, but this technique was only partially successful because aeroplanes cannot be safely flown on this type of work for a two-hour period before and after sunrise when the birds are first going out to the fields.

Automatic acetylene exploders, although plagued by mechanical defects, appeared to be effective in keeping cranes off small roosting areas. These exploders, once modified, also seem to offer the best possibilities for keeping cranes out of unharvested fields.

Ground and air surveys showed that cranes were present on August 12th, that they reached peak populations of 25,000± by mid-September, and that there were still at least 1,000 present on October 23rd. Analysis of a small sample indicated that grain was the birds' main food. Cranes were not an important factor in grasshopper control.

Photographs, a map, and copies of four newspaper articles relating to sandhill cranes are included.

RECOMMENDATIONS

1. It is recommended that research be conducted to determine (a) the effectiveness of automatic exploders in preventing crane damage to individual fields and (b) the effectiveness of these exploders in preventing overall damage in a block of at least 200 square miles.

2. It is recommended that our Department investigate the possibility of entering into a cooperative project with the Saskatchewan Department of Natural Resources whereby the effectiveness of planting crops for cranes as a method of depredation control can be evaluated.

3. It is recommended that our Department immediately sponsor research into the development of a foolproof automatic exploder that can be recommended to farmers for the control of depredations by ducks now and for cranes (we hope) after next year.

The first and second recommendations, if adopted, should be carried out at the north end of Last Mountain Lake.

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IN SASKATCHEWAN

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BY J. BERNARD GOLLOP
CANADIAN WILDLIFE SERVICE

OCTOBER 28, 1960.

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1960

by J.B. Collop
Canadian Wildlife Service

INTRODUCTION

Crane damage to cereal crops is nothing new to Canadian farmers. Taverner, writing in 1926, states: "In late summer, when the old birds (Greater Sandhills) and the season's young gather in flocks, together with migrant Little Brown Cranes (Lesser Sandhills), they frequent the grain fields and, occasionally when in great numbers, do considerable damage to stocks."

The increased outcry against cranes in the last few years may be the result of a combination of circumstances: a) a change from stooking to swathing, b) a late harvest in 1958 and an uncompleted one in 1959, c) possibly an increase in crane populations, d) the attributing of some duck damage to cranes because cranes feed conspicuously during the day (as opposed to the dawn and dusk feeding of ducks)and because large moulted crane feathers are much more obvious in fields than duck feathers, e) a greater awareness of the work of federal and provincial wildlife agencies in the field of duck depredations.

Whether or not crane damage itself has increased is not known. Sterling (1952) states that damage by cranes to unharvested crops around Last Mountain Lake in 1952 was "less than one percent of any crop touched" due to rapid harvesting(by straight combining) and little swathing. Determination of damage is a difficult project under any circumstances and the problems are multiplied when cranes and ducks feed in the same fields, as is sometimes the case in this district.

Prairie-wide there is no doubt that crane damage is small compared to duck damage. Even in the Last Mountain Lake district, most farmers agree that ducks normally cause much more damage than cranes.

In 1960 crops around the lake were harvested earlier and faster than in any of the previous sixteen years. Because of this, the project described below could not be evaluated on the basis of damage prevented.

OBJECTIVE

To reduce damage to cereal crops caused by sandhill cranes with special emphasis on aircraft herding and the use of automatic exploders.

LOCATION & DURATION

All of the experimentation and most of the observations were made in a 456-square-mile block of land around the north end of Last Mountain Lake, Saskatchewan. The north part of the lake itself is a federal bird sanctuary. Most of this sanctuary and an additional eight square miles of land are included in a provincial game preserve (see map). The area was bounded by #3 Highway on the west, #20 Highway on the east, and extended from near Lockwood (nine miles north of Nokomis) to Govan (14 miles south of Nokomis). Crane censuses were conducted for another ten miles further south in September.

Field work extended from August 18 to October 23rd. Two to four workers were present continuously from August 18th to September 5th, and for one or two days per week thereafter.

PERSONNEL & EQUIPMENT

Canadian Wildlife Service: R.H. Mackay, Edmonton; J.B. Gollop and W.J.D. Stephen, Saskatoon; J.B. Miller, Winnipeg; D.A. Munro and V.E.F. Solman, Ottawa; K.G. Shearman and J.D. Hayland, summer assistants.

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TAXONOMY & DISTRIBUTION

The bird involved in this project is the most numerous of the three subspecies of sandhill crane occurring in North America -- Grus canadensis canadensis, the lesser sandhill crane. This determination is based on the known distribution of this subspecies and on the measurements of eight birds collected near Last Mountain Lake in 1947 and in 1958 and on four from Kindersley, Sask., in 1960.

Canada: It is likely that more than half of the estimated continental population of lesser sandhills (300,000±) occurs in Saskatchewan some time during September and October. Manitoba and Alberta also have high populations in the fall and some birds migrate through British Columbia.

Saskatchewan: There are two major concentration areas in this province of which the Kindersley - South Saskatchewan River area is the larger. This includes 8,000± square miles mostly north, west and south of Kindersley, plus a 285-mile stretch of the river east of the Alberta border. The maximum recorded population in the first

segment has been 50,000 (1958); along the river, 34,000 (1956).

The second concentration area is in the Last Mountain Lake - Quill Lakes district. In a 625-square-mile area around the north end of Last Mountain Lake, a maximum of 25,000 - 30,000 cranes was recorded in 1960. In the 300-square-mile strip of low-lying land to the northeast and in the 1000 square miles around Big and Little Quill Lakes, populations may exceed 10,000 cranes.

Cranes occur locally in smaller numbers, probably in flocks of less than 500, across the province from the latitude of Prince Albert to the U.S. border.

Last Mountain Lake: Some cranes are known to have spent at least part of their roosting periods on some of the 32 water areas present this year within a 12-mile radius of the north end of the lake. However, the major overnight roosting areas were the shores of the two eastern finger-like bays at the northern tip of the sanctuary. During September cranes also used some of the islands and sheltered bays south to Arlington Beach on the east side of the lake and to Lewis Creek on the west. Later in the season, the southern roosting areas were apparently abandoned.

During September most of the cranes roosting on Last Mountain Lake fed within five miles to the west, north and east of it. They apparently fly out farther later in the season.

CRANE POPULATIONS

Cranes were censused periodically in the Last Mountain Lake study area from August 12th to October 23rd. Two types of aerial surveys were attempted: a sampling method and a total count.

On August 24th and 31st, two observers flew six east-west lines between the two highways at a height of about 300 feet. The lines were four miles apart and all cranes seen along a mile-wide strip (one-half mile each side of plane) were counted (see map). This 114-square-mile sample covered 25% of the land area in the 456-square-mile block.

Because of the widening and uneven distribution of cranes, the number of transects was increased to ten and the interval between transects was reduced to three miles for eight transects and kept at four miles for the most northern and southern lines. This 192-square-mile sample gave a 31% coverage of the ground in a 625-square-mile block on September 15th, 20th and 27th.

The above transects were flown in the mornings shortly after the cranes had left for the fields and required up to two and one-half hours. A second type of aerial survey involved a count of all birds on water areas within the block. This was done from a height of 600 to 800 feet (to avoid flushing birds) shortly after mid-day, when, it was thought, most cranes had returned to water to rest. One observer flew for one hour and twenty minutes on September 27th and October 4th.

Nine counts were made from the ground on the northern part of Last Mountain Lake during the ten-week period. These counts were made during the half to one and one-half hours that the cranes arrived at the lake about sunset or left it about sunrise.

Two to four observers were stationed at different points to count birds associated with different roosting areas. The evening counts for one or two flight routes were then added to the morning counts on different routes to obtain the totals used.

Birds were either actually counted or their numbers estimated by 10's and in a few cases by 100's for both ground and air surveys. The detailed data from these surveys are presented in Tables 1 and 2A.

Population estimates are based mainly on ground counts because of the statistical inadequacy of the aerial transect method and the failure of significant numbers of cranes to return to water areas at mid-day. These estimates are as follows:

August 12	300+
August 18	1000
August 25	5000
September 2	15,000
September 15	23,000
September 20	25,000+
September 27	14,000
October 5	12,000
October 12	6000
October 25	1000+

Munro (1950) indicated that the maximum population occurred about August 27th, 1947, when an estimated 10,000 to 12,000 birds were present. The population estimate for this date in 1960 was about the same but the peak was more than twice that figure and occurred more than two weeks later. However, Munro's observations ceased on September 14th and it may not be correct to infer that there are now twice as many cranes on the lake at the peak of migration as there were 13 years ago.

Sterling (1952) estimated that there were 7,000+ cranes on August 28th and states that peak populations were present from September 10th to 30th. There were still 1,000+ cranes in the district at the end of October. On September 23rd, 1952, J.D. Collop, E.C. Hammond and E.F. Rossenmair estimated that 12,000 cranes flew north from the lake to feed.

As early as August 16th, 1950, F.W. Lahrman reported 7,000 cranes "at Regina" (north end of Last Mountain Lake?) (Krause, 1959).

CROP CONDITIONS

To determine crop conditions within the 456-square-mile block an eighty-two-mile road survey of 280 fields was made on August 17th, 25th and 31st. Wheat fields made up 74% of the total, oats 15% and barley 11%. The progress of harvest was as follows:

	Standing	Swathed[1]	Harvested[1]	Summerfallow	Cranes[2]
August 17	64%	24%	12%	-	0
August 25	40%	21%	31%	164	223
August 31	24%	9%	69%	-	-
September 9	Practically all harvested.				

1 Or partly so.

2 Seen during crop surveys but excluding those on prairie and water and in the air.

Historical information on harvesting in the study area itself is not available. The next best information is for a group of 23 Rural Municipalities known as Saskatchewan Crop District #6A. The study area occupies the central one and one-half municipalities (R.M. #280 and the northern parts of #250 and #251).

The stages of cutting and threshing for the years 1944 to 1960 are presented in Table 3. Based on crop conditions in 1960, the study area was at least a week earlier than the crop district as a whole.

From this table, it would appear that threshing in 1960 was earlier than in any of the previous sixteen years. Data for Districts 6A and 6B combined show that harvest was 95% completed by September 12th this year; the earliest date for harvest completion in District 6A previously (1950-1959) was October 4th.

Yields of spring wheat for Crop Districts 6A and 6B combined have fluctuated from 7.8 bushels per acre (1954) to 26.7 bushels (1953) and have averaged 18.1 bushels, all data for the period 1949-1958. This average is higher than the four crop districts to the south and lower than the remaining four districts in the province to the east, west and north.

Swathing has usually reached the stage described as "general" during the third or fourth weeks of August. Threshing has usually been "general" by the first week in September although it has seldom been completed before the second week in October. In two years (1951 and 1959) of the past ten, crops remained out over winter.

In an average year it would seem that cranes occur in sufficient numbers and unharvested crop is present in sufficient quantity to be vulnerable from the last week in August to the first week in October -- approximately a six-week period.

Apparently this clash between crops and cranes does not occur so often in western Saskatchewan and Alberta because harvesting is earlier and the crane build-up is later than at Last Mountain Lake.

FOOD & FEEDING HABITS

Usually, sandhill cranes left the roosting areas for the grain fields about sunrise. Some, at least, went back to water areas late in the morning and flew out again late in the afternoon. They returned to overnight roosting areas at sunset or shortly after. (See table 2B). It appeared that few birds went to water areas at mid-day when it was overcast. The birds may fly farther late in the season than earlier. Casual observations, however, indicate that the reason is not lack of food in nearby fields, as farmers have suggested.

Analysis of the food found in nine cranes indicated that grain was the dominant item in the diet. Four of these birds were collected returning to a roost at Arlington Beach, Last Mountain Lake, in 1947 (by Munro); three were shot over unharvested fields a few miles north of the lake on September 1st, 1958 (by hunters), and three were taken returning to a roosting area near Kindersley, Sask., on September 30th, 1960 (by Dzubin).

Identifiable kernels of grain in the last three birds averaged 1.3 ounces (dry weight) with a maximum of 1.6 ounces. If the 1.3-ounce figure for identifiable kernels could be considered a valid average, it would probably be safe to raise it to 1.5 ounces for all grain for the feeding period involved, and to raise it to 3.0

ounces of grain eaten per bird per day (two feeding periods). It is impossible to convert this to harvestable grain eaten or to grain destroyed by cranes because it is not possible to determine how much of this grain might have come from standing or swathed crops, from between swaths or from harvested fields. There is also the problem of determining how much more grain was threshed out in dry weather or trampled into the mud in wet weather. In addition, there is the potential damage to swaths resulting from wind and rain after cranes have broken into and scattered swaths.

Grasshoppers averaged 51% of the stomach contents (by volume) of Munro's four birds, with the number of grasshoppers varying from three to forty per bird. Possibly fifteen grasshoppers (of five species) had been eaten by two of the three cranes collected by Dzubin. It has been suggested that cranes may have a positive value in controlling grasshoppers and thereby reducing crop losses. This was apparently not the case in 1960.

Dr. P.W. Riegert, supervisor of grasshopper surveys for the Dominion Entomology Laboratory at Saskatoon, reports that populations of grasshoppers (the two economically-important species) around the north end of Last Mountain Lake were predicted as light for 1960, meaning that significant damage was not expected. 1960 surveys of adults and eggs for the 1961 prediction confirmed the previous years' work and resulted in another forecast of light grasshopper populations.

Furthermore, most individuals of these two grasshoppers have finished laying eggs by the end of August and practically all have finished by mid-September. Therefore, cranes, which in 1960 did not reach peak numbers until mid-September, could not have had a significant effect on next year's crop of grasshoppers.

It has been suggested that research into crane feed habits should be undertaken. An adequate feed habit study is a detailed and complicated project. It requires the facilities and time for controlled feeding of captive birds to determine (1) the daily pattern of feeding activity for individuals, (2) the overall metabolic rate, (3) the rate of deterioration of different food items, etc. In the field it would require the collection of adequate samples of birds that have fed on seeded fields, on summerfallow and on pasture for the morning and evening feeding periods, early and late in the season. Even if only 25 cranes were collected for each segment of this sample, the total would be up to 75 for the three different types of fields, 150 to satisfy the two feeding periods and 300 for the early and late season groups. If age were considered a factor, the sample would again be doubled.

If determination of food preferences were an added objective, there would have to be measures of the availability of the various food items involved to compare with rates that they are eaten. Through this method a food might conceivably be found which is more attractive to cranes than grain and which could then be used in feeding management programs.

The prospects do not justify the manpower and facilities required for such a project at this time. Any less elaborate program will only result in larger samples of the type already available.

The question has been raised as to whether cranes prefer to feed in one type of habitat (field) or another. It would seem that the answer to this query does not have sufficient practical application to warrant the effort required to determine it.

First of all, the areas of each type of habitat -- seeded fields, summer-fallow, pasture, etc. -- must be calculated. This probably requires suitable aerial photographs of current land use. (These were not available for this project and we do not have the ratio of prairie to cultivated land.) Secondly, the relative acreages of each type of land that are suitable (available) to cranes must be determined. Buildings, towns, highways, hunting, etc., may remove a greater percentage of one type than another from use by cranes. Thirdly, an adequate number of randomly distributed feeding observations must be made. These must be observations of actual feeding, not simply occurrences in particular areas.

Between August 19th and 30th, 12,400 crane occurrences were recorded on seeded and fallow fields. Because these observations were recorded in the course of other work, they may not be representative of crane occurrences throughout the block where the crop transects were conducted. The following comparison emerges:

	Fallow	Seeded
Crane occurrences on	24%	76%
Fields present	37%	63%

This might indicate a preference for seeded fields over fallow prior to September 1st.

Determination of crane preference between harvested and unharvested fields is more difficult, if only because of the rapid change in ratio between the two groups, particularly this year. There were insufficient data in 1960 for a comparison. Only 7,150 useable crane observations (21% in unharvested fields, 79% in stubble) were recorded between August 23rd and 30th., when harvested fields increased from less than 30% of the total to 70%. A preference for stubble fields is indicated, if the data are valid.

EXPERIMENTS

A - Herding By Aircraft

A single aircraft was used in herding attempts on August 27th and 30th and on September 1st and 21st. Two planes were used together on August 31st and September 1st and three planes were used on September 2nd. Cessnas 150, 172 and 175 were chartered from Saskatoon. Each plane was usually used for about one hour on each occasion.

The technique was to locate a flock of cranes, dive close enough to it to raise the birds, turn as fast as possible, remaining low (100± feet), to encourage them to take on altitude. Staying behind the flock was not enough, the plane had to keep the birds from dispersing to the left and right over too wide a front. It was usually possible for a single plane to make one to three passes per minute at a flock.

When working over grain fields a few birds in each flock would usually rise and fly toward the nearest water on the first pass. There would also be a few birds that would fly over fields parallel to the water and turn back inland when the plane had to leave them in order to concentrate on the main flock. Most birds, however, would land within 100 - 400 yards from where they were first flushed. This dive-flush-land procedure would be repeated two or more times before the birds reached water two or three miles away. This operation would require five to twenty minutes depending on the size of the flock (up to 600± birds), time of day and probably other factors.

When a thousand or more cranes had been concentrated on one of the peninsulas on the lake they became more difficult to move. With the approach of one or more planes, some birds would rise and leave for the grain fields. Most of the birds would move toward the southern tip of a peninsula and land either on the shore or on the middle of the point. From here a few would not rise at all, some would rise and land in the same place or a few yards away within a few seconds, and the main body might attempt to head east for another point of land, attempt to make a U-turn and break north or start flying back to fields on the west. The longer that they were harassed, the more stubborn they became.

Throughout such an operation small flocks of two to twenty cranes would be moving away from the area of activity. Several hundred birds might eventually start soaring upward but these would have such a vertical distribution that they could not be kept under control. In the end birds would be moving north above, below, to the left and right of the aircraft, while some would still be sitting on the ground. Under such circumstances, flying became doubly hazardous for the personnel. Add to this two or more aircraft operating in the same area and the operation could not be justified, if only because of the danger to human life.

Specific herding operations are described in the appendix.

B - Automatic Exploders

"Zon" automatic exploders operating from 40-cu-ft. acetylene tanks were the only type used in this project. The exploders were used mainly on the smaller resting areas around the north end of Last Mountain Lake, the objective being to concentrate birds on one area before attempting to herd them out of the district. Exploders were set up on six water areas north and east of the lake between August 15th and September 4th. These were as follows:

Resting Slough	Area	Maximum Number of Exploders
Axe Lake	300± acres	8
Slough west of Axe Lake	300± acres	3
Bank Lake	500± acres	1
P.F.R.A. Pasture:		
North Slough	150± acres	4
South Slough	150± acres	3
Windmill Slough	75± acres	3

For the most part exploders were operated only from shortly before sunset to shortly after sunrise so that waterfowl in the area would not be disturbed. When first started the explosions were usually set for one- to three-minute intervals. By morning when the tanks had cooled off considerably the interval would vary from slightly slower to an interval of twenty minutes.

Before being set up, flocks of 50 to 400± cranes were observed on these areas. After operations started, so long as the machines operated, there was only one occasion when more than 25 cranes were reported on a slough.

More exploders than were probably necessary were used on several sloughs. This was because of defective operation in twelve of the fourteen machines used. Lack of sparking (for several reasons) and jamming of the mechanism were the most frequent faults.

Two exploders were used on two unharvested fields. Their role in preventing further damage could not be determined because harvesting operations began shortly after they were installed.

6 - Other Methods

From August 14 to September 17, 1952, Mr. E.T. Sterling, Ducks Unlimited (Canada), with assistance from two conservation officers of the Saskatchewan Department of Natural Resources, worked on the control of ducks and cranes around the north end of Last Mountain Lake. His conclusions concerning cranes are as follows:

"3. Seek-type scarecrows were effective in preventing cranes from feeding in grain fields.

"4. Although the above methods were successful in scaring the birds concerned, damage was not prevented as they fed in other fields where such devices were not in use. Thus the experiment did not indicate the devices would meet with such success if they were more widely used.

"5. Cranes were easily frightened by several other means, such as farm machinery, gunfire from both shotguns and rifles, and slow travelling cars.

"6. It was found possible to herd cranes with a car.

"11. Cranes usually fed on the available crop nearest to their resting areas.

"12. Cranes fed on the lure crop of barley at the north end of Last Mountain Lake until it was completely gone.

"13. Cranes prefer swathed grain but will feed on standing grain, while ducks fed on the lure crop only until the swathed portion had been eaten. This indicates that lure crops can be managed for cranes alone or for ducks and cranes together.

"14. The control attempts resulted in a dispersal of damage rather than its prevention. It is believed that if the control efforts were combined with some attracting devices the ducks and cranes could be induced to feed in substitute areas where they would do no harm. These areas may be fallow fields with some grain available, harvested fields, or crops planted purposely for such a scheme. Burning, decoys and calls are some methods that could be used for attracting birds to the areas."

CONCLUSIONS

1. Inasmuch as attempts to herd flocks of 300 to 1000 sandhill cranes southward out of the district by one, two and three conventional aircraft were unsuccessful, it is concluded that such a project would be impossible with larger flocks.

2. Aerial herding of sandhill cranes from fields to roosting areas was only partly successful. At Last Mountain Lake, it would probably require at least three

aircraft (west, north and east) flying six to ten hours a day for five to eight weeks to attain this partial success (unless the cranes departed much earlier than normal because of the continued harassment). This assumes that there would be feeding areas to herd the birds to.

3. Automatic exploders were apparently successful in keeping cranes off small roosting areas. These exploders seem to offer the best potential for keeping cranes off unharvested fields.

4. The "Zon" acetylene exploder used in this project had too many mechanical defects to be recommended for general use. Either this machine will have to be modified or a much better-operating automatic exploder developed.

5. Ground censuses of cranes gave more reliable population figures than aerial censuses of two types.

SUMMARY

The objective of this investigation was to discover means of alleviating damage caused by sandhill cranes to privately-owned cereal crops. A block of land, 456 square miles in size, was selected around the north end of Last Mountain Lake, Saskatchewan. Because of the earliest harvest on record in this district in 1960, cranes had little opportunity to cause damage and, consequently, experiments could not be evaluated on the basis of damage prevented.

Attempts to herd cranes southward out of the area by means of aircraft were unsuccessful. Cranes could be herded from grain fields to water areas by aircraft, but this technique was only partially successful because aeroplanes cannot be safely flown on this type of work for a two-hour period before and after sunrise when the birds are first going out to the fields.

Automatic acetylene exploders, although plagued by mechanical defects, appeared to be effective in keeping cranes off small roosting areas. These exploders, once modified, also seem to offer the best possibilities for keeping cranes out of unharvested fields.

Ground and air surveys showed that cranes were present on August 12th, that they reached peak populations of 25,000± by mid-September, and that there were still at least 1,000 present on October 23rd. Analysis of a small sample indicated that grain was the birds' main food. Cranes were not an important factor in grasshopper control.

Photographs, a map, and copies of four newspaper articles relating to sandhill cranes are included.

DISCUSSION

Individual and area permits to protect crops against cranes have been issued in the three Prairie Provinces for many years. It is likely that damage will continue to occur in the Big Grass Marsh area of Manitoba, and around Last Mountain and the Quill Lakes as well as the Lucky Lake and Kindersley districts in Saskatchewan. Isolated cases will continue to occur across the Prairies. Where, when and how often cannot be known.

At present there appears to be only one technique with the potential for meeting a problem that is so widespread and unpredictable. This is the automatic exploder. There are at least three problems connected with this apparatus that require investigation:

1) Will automatic exploders keep cranes off unharvested fields? If so, what density of exploders is needed under different conditions?

2) Will exploders alone significantly reduce the overall damage caused by cranes (if they are effective in reducing or preventing damage to individual fields?). The birds must have some place to eat. The question is: will harvested fields suffice or is supplementary feeding, specifically for cranes, required? If required, can it be made effective?

3) Can an exploder free of mechanical difficulties be developed and operated at a reasonable price? The Zon acetylene exploder, while adequate with sufficient manpower to determine whether this type of machine will scare cranes, cannot be recommended for general use. Its numerous operating difficulties almost remove it from the realm of the automatic.

Assuming that a foolproof exploder has been developed and that it is effective in protecting individual fields, where are the cranes going to eat? At the north end of Last Mountain Lake the sequence of events is usually as follows: Crops start to be swathed, cutting becomes general, crane populations start to build up, threshing begins. In 1960, there were an estimated 1,000 cranes around the north end of the lake on August 16th and on August 17th our crop surveys showed 15% of the seeded fields to be harvested or partly so. By August 25th there were 5,000 cranes and 30% of the crop harvested. This relationship may not hold every year, but if it does, there are stubble fields available for the cranes to feed in before the birds reach serious proportions. The question remains as to whether or not, if kept out of unharvested fields, the birds will use these few harvested areas.

We feel that this aspect should be investigated before it is decided that land acquisition and farming for cranes is necessary as a solution to the depredation problem.

Another investigation that should be undertaken before land is acquired for this purpose is whether or not cranes will, in the first place, accept a crop provided for them and, secondly, whether or not they can be kept on it as long as is required.

The Saskatchewan Department of Natural Resources has had a lure crop at the north end of the lake but close check has apparently not been kept of its effectiveness.

Sterling (1952) states that part of this 50-acre barley crop was cut on August 15th and had about 200 cranes in it. One-third of the crop was then straight-combined and 1,400 cranes were using it on August 19th. By August 26th "the crop was completely eaten and the cranes and ducks were feeding elsewhere".

This year within the Provincial Game Preserve there was a private 50-acre field at the base of the longest peninsula reaching into the north end of the lake; it was little used by cranes throughout the fall. A few ducks were using it on October 23rd and there was no difficulty finding kernels of wheat in it on that date.

It would not seem necessary to acquire land for such an experiment. The Department of Natural Resources controls most of the southern two miles of this peninsula. A cooperative project with them might allow us to break and seed this land (if they are not in a position to do so) and to evaluate it as a method of reducing crane damage to private crops.

RECOMMENDATIONS

1. It is recommended that research be conducted to determine (a) the effectiveness of automatic exploders in preventing crane damage to individual fields and (b) the effectiveness of these exploders in preventing overall damage in a block of at least 200 square miles.

2. It is recommended that our Department investigate the possibility of entering into a cooperative project with the Saskatchewan Department of Natural Resources whereby the effectiveness of planting crops for cranes as a method of depredation control can be evaluated.

3. It is recommended that our Department immediately sponsor research into the development of a foolproof automatic exploder that can be recommended to farmers for the control of depredations by ducks now and for cranes (we hope) after next year.

The first and second recommendations, if adopted, should be carried out at the north end of Last Mountain Lake.

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TABLE 1

AERIAL CRANE TRANSECTS

Number		Length(miles) East half	Length(miles) West half	August(25%) 24*	August(25%) 31*	September(31%) 15 East - West	September(31%) 20 East - West	September(31%) 27 East - West
1	North side	10	9	80	0	0 - 0	0 - 0	0 - 0
	South side				38	0 - 7	9 - 0	0 - 0
2	North side	10	9	0	178	5 - 258	11 - 0	95 - 0
	South side				300	4 - 0	336 - 0	70 - 0
3	North side	10	9	98	8	78 - 28	63 - 0	182 - 5
	South side				28	68 - 164	978 - 80	162 - 0
4	North side	10	9	105	167	409 - 510	426 - 40	39 - 0
	South side				98	265 - 155	104 - 1	71 - 18
5	North side	8	11	256	657	80 - 80	59 - 24	110 - 156
	South side				574	60 - 1293	214	598 - 900
6	North side	9	10	140	48	437 - 91	945 - 171	575 - 15
	South side				90	980 - 50	795 - 1856	401 - 80
7	North side	10	9		118	63 - 180	44 - 0	757 - 5
	South side				4	6 - 92	320 - 200	696 - 38
8	North side	10	9			102 - 250	109 - 8	0 - 100
	South side					100 - 50	9 - 2	88 - 0
9	North side	12	7			20 - 2	0 - 0	0 - 0
	South side					0 - 0	0 - 24	0 - 0
10	North side	12	7			0 - 0	0 - 0	0 - 0
	South side					0 - 0	0 - 0	0 - 0
Sub total				-	-	3403 - 3087	4227 - 1810	3755 - 1274
GRAND TOTAL **				643	2252	5450	6351	4009
Observers				Mackay Gollop	Munro Mackay	Peters Gollop	Holman Gollop	Nero Gollop
Time (M.S.T.)				0650-0835	0720-0914	0757-1014	0822-1040	0820-1052

* Division not made between east and west halves of transects.

** August totals are not comparable with each other nor with September totals because of different coverages.

TABLE 2 A

CRANE SURVEYS

Date	Expanded Air Sample	Actual Ground Count
Aug. 18	800[1]	-
Aug. 19	-	1,000
Aug. 24	8,600	-
Aug. 25	-	2,800
Aug. 31	10,400	-
Sept. 1 - 2	-	10,900
Sept. 14 - 15	17,800	20,600
Sept. 20	19,000	-
Sept. 26	-	9,000
Sept. 27	15,000	9,900
Oct. 4 - 5	-	9,800
Oct. 12 - 15	-	4,881
Oct. 25	-	700

[1]Random flight; remaining figures are expanded from transects.

Mid-day Roosting Count

	Sept.27		Oct. 4	
Last Mt. Lake	3,432		755	
Area #5	50		60	
#6	300		175	
#7	900		0	
#10	800		250	
#13	800		0	
#15	65		25	
#20	1,300		300	
15 other areas	0		0	
Totals	7,692		1,550	
Stubble		(Few)		967
8 other areas	Not done		0	
Stubble		(Few)		808
Weather	Sunny		Overcast	

TABLE 2 B

SAMPLE COUNTS OF SANDHILL CRANES ON ROOSTING SECTIONS OF LAST MOUNTAIN LAKE

Date	Time of Flight M.S.T.	Sunrise or Sunset	Cranes Before	Cranes After
	Morning Observations of Cranes Leaving Lake			
Aug. 31	4.45 - 5.57	5.16 a.m.	1,975	1,960
Sept. 2	4.40 - 5.40	5.19 a.m.	1,997	1,020
Sept. 27	5.33 - 6.54	5.56 a.m.	1,760	2,170
Oct. 5	5.44 - 6.30	6.10 a.m.	2,980	720
	Evening Observations of Cranes coming to Lake			
Aug. 29	6.20 - 7.18	7.01½ p.m.	4,668	117
Sept. 1	5.50 - 7.17	6.56½ p.m.	2,339	6,886
Sept. 14	5.40 - 7.15	6.16 p.m.	188	8,608
Sept. 21	5.25 - 6.30	5.59½ p.m.	604	6,360
Sept. 26	5.45 - 6.25	5.47 p.m.	10	3,510
Oct. 4	5.42 - 6.25	5.29 p.m.	0	1,280
Oct. 12	5.20 - 5.48	5.15 p.m.	0	660

TABLE 3

CUTTING AND HARVESTING DATES FOR SPRING WHEAT IN CROP DISTRICT 6A

	Cutting			Threshing		
	Begun	General	Completed	Begun	General	Completed
1944	Aug. 10	Aug. 17	Sept. 9	Aug. 28	Sept. 6	
1945	Aug. 15	Aug. 22	Sept. 11	Sept. 1	Sept. 8	
1946	Aug. 10	Aug. 16	Sept. 8	Aug. 24	Sept. 2	
1947	Aug. 15	Aug. 20	Sept. 16	Aug. 22	Aug. 30	
1948	Aug. 12	Aug. 19	Sept. 7	Aug. 24	Aug. 31	
1949	Aug. 10	Aug. 17	Sept. 6	Aug. 20	Aug. 31	
1950	Aug. 18	Aug. 25	Sept. 15	Aug. 29	Sept. 6	(Oct. 20%) *
1951	Aug. 21	Aug. 28	Standing	(Sept.10)*	(Sept.21)*	(50% Oct. 15)* (85% Dec.)*
1952	Aug. 16	Aug. 19	Sept. 1	Aug. 25	Sept. 6	(45% Sept.23)*
1953	Aug. 21	Aug. 29	Sept. 12	Aug. 26	Sept. 9	Oct. 6
1954	Aug. 28	Sept.13	Oct. 2	Sept. 9	Sept. 28	Oct. 25
1955	Aug. 18	Aug. 22	Sept. 8	Aug. 25	Sept. 2	Oct. 4
1956	Aug. 21	Aug. 25	Sept. 14	Sept. 1	Sept. 12	Oct. 11
1957	Aug. 15	Aug. 17	Sept. 9	Aug. 26	Sept. 3	Oct. 10
1958	Aug. 16	-	Sept. 6	Aug. 25	Aug. 30	(82% Oct. 15)*
1959	Aug. 17	-	(5% still standing Nov. 30)*	Aug. 26	Aug. 31	Not completed
1960	Aug. 15	-	-	Aug. 20	-	(95% Sept. 12)*

* Data in parenthesis refer to Districts 6A and 6B combined.

APPENDIX

Sample Accounts of Aircraft Herding Operations

August 27, 1960: An attempt was made to move 150± cranes from a Ducks Unlimited dam three miles south to Last Mountain Lake from 10.30 a.m. to 12.00 p.m. The birds would flush from the plane but would land again before we could get back to them. Several small groups finally took flight but the plane could not be manoeuvred fast enough to control their direction and they soon dispersed. (R.H.M.).

September 1: Beginning at 7.10 a.m., M.S.T., an attempt was made to move a flock of 100± cranes from fields to Bank Lake, 3/4 mile north. This was accomplished in a few minutes. We then attempted to move the birds from Bank Lake to Last Mountain Lake, 11 miles south. Most, but not all, birds could be flushed from Bank Lake and a few of these continued flying and were lost. Most of the cranes, however, went back to the fields within a mile of the water and settled down. They were again flushed but returned to the lake. After 20 minutes of this back-and-forth movement the herding was discontinued.

September 2: Three Cessna aircraft were used for approximately 30 minutes in an attempt to herd cranes south down the lake. Radio contact was possible only between two of the planes, but complete radio contact probably would not have altered the outcome.

For a while one plane herded birds down the center of the long peninsula which is less than a half-mile wide. The other two planes worked on each flank to keep this group from breaking east and west. As the birds became more difficult to move with increased harassment, the three planes followed each other in a [illegible] circular attack, the plan being that the second and third planes would keep cranes raised by the first plane in the air. After half an hour it did not appear that any birds had moved south beyond the peninsula. Small flocks at frequent intervals were noted breaking west to the grain fields, east to another peninsula, and north, both above and below the planes, away from the theater of action.

September 21: Most of [illegible] 600± cranes were moved two miles from fields to Last Mountain Lake between 8.00 and 8.20 a.m., M.S.T. A second flock of 300± and another of 200± were moved the same distance in about five minutes each. By 9.15 a.m., there were 600± cranes in the first field again; it took about five minutes to herd most of them to the lake. Most of a flock of 300± cranes, one mile further south was over the lake five minutes after herding started. About 400 of the 600± in a third flock a half-mile further south were pushed one mile to the lake by 9.32 a.m. The remaining 200 dispersed back to fields. The field that had two flocks of 600 in it within an hour had no birds in it an hour later.

At 12.15 p.m. an attempt was made to herd 175 cranes from a slough to Last Mountain Lake, four miles to the southwest. After eight minutes, 16 cranes were still under control at a height of 700± feet. The operation was terminated.

Twenty minutes were then spent in an unsuccessful attempt to herd several hundred cranes north from the lake.

APPENDIX

Copies of Four of At Least Eleven

Newspaper Articles Concerned

With Sandhill Cranes

1960

The Nokomis Times	September 7	By R.H. Mackay
Regina Leader Post	September 26	By Blythe Humphrey
The Nokomis Times	October 12	By Albert Greenfield
The Nokomis Times	October 26	By G.F. Ledingham

"The Hokomis Times, Sept. 7, 1960, Page 1 "

SANDHILL CRANES MANAGEMENT PROJECT COMPLETED AT LAKE

During the past three weeks, six biologists from the Department of Northern Affairs and National Resources' Canadian Wildlife Service have been investigating various possibilities for the management of sandhill cranes in the vicinity of Last Mountain Lake. The study has been concentrated in an area of some 400 square miles bounded by Highway 2 on the west, an east-west line through Lockwood on the north, Highway 20 on the east and a line from Govan to Stalwart on the south.

Several methods and techniques have been used to gather information on crane habits and movements and to explore the possibilities of controlling those movements.

Information on the numbers of cranes and their distribution in the area has been obtained from both ground and aerial observations. The crane population was estimated to number some 1000 odd birds when the survey was initiated. It increased to some 5000 birds at the end of the second week, and by the end of the third week, had reached at least 15,000 individuals.

Approximately 10,000 individual crane-feeding observations have been made -- 18 per cent on unharvested crops and 82 per cent on stubble, summerfallow and pasture. Good weather has allowed an unusually early harvest, but the figures do indicate a crane preference for stubble rather than standing or swathed crops. Crop surveys have also been carried out to correlate harvest conditions with crane observations. An eighty mile survey of some 365 seeded fields on August 31 showed 24 per cent standing crop, 7 per cent swathed and 69 per cent harvested.

Acetylene exploders have been used on several crane-roosting areas outside of the Last Mountain Lake Sanctuary to try to restrict roosting and thus feeding activity to the area adjacent to the sanctuary. The exploders fire automatically with a loud bang every five minutes or so. They were set for night operation only during the experiments and were shut off during daylight hours. The noise-makers were found effective in keeping the cranes off the test areas but a large number of the machines would be required to cover all roosting areas away from the sanctuary.

Attempts were made to herd cranes by the use of a single aircraft, also by two and by three aircraft. The experiments were planned to test the effectiveness of aerial herding of feeding cranes from crop areas to adjacent water-roosting grounds and also to see if the cranes could be pushed southward along their migration route. It was found that the cranes could be moved successfully from feeding areas, a distance of four or five miles to the roosting ground. However, attempts to move the birds from roosting areas along the lake shore, using as many as three aircraft, proved fruitless. It was possible to carry out the aerial observations this year with little danger of scaring birds from stubble into standing or swathed fields owing to the advanced nature of the harvest.

Again based on harvesting conditions, further operations this year will be restricted to regular censuses of the cranes to determine the peak population period and also to determine the duration of their stay in the area.

Much has been said locally of the economic loss caused by the cranes and of their nuisance value. However, there have also been a few local voices in the wilderness who can see some good in the birds whether it be their gobbling of grasshoppers or

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just their part in the aesthetic value in this particular region of Saskatchewan. While the material losses to cranes should not be underestimated, would it not be better for all interested parties to get together and lay plans on a constructive rather than a destructive basis? Not too many years ago some of our grandparents, yes, even some of our parents, had the foresight to establish Last Mountain Lake Sanctuary to give living space to creatures they enjoyed and wished us to enjoy. (Incidentally, that was the first such sanctuary in Canada). Now would seem the time to push their idea a little farther.

With comparatively little expense it would be possible to acquire adjoining acreage and make the sanctuary into a self-contained refuge similar to those operated by our neighbors to the south. Crops could be planted and marsh areas maintained for our wildfowl with little danger to farmers' crops. Such a scheme would be beneficial to the local economy inasmuch as it would attract a large number of visitors to the area. It would also be of benefit to bird-watchers and hunters alike. Perhaps, instead of seeing columns headed "Those Blankety-blank Cranes", we might even see the crane being chosen as a local emblem such as Grande Prairie, Alberta has done with the trumpeter swan.

--Contributed by Mr. Mackay of Wildlife Service--

"The Regina Leader Post, Sept. 26, 1960, Page. 2, Upper part of all eight columns."

Nokomis(Special) - Six biologists from the department of Northern Affairs and National Resources' Canadian Wildlife Service, headed by R.M. Mackay of Edmonton, have completed an extensive investigation into possibilities for the management of sandhill cranes in the vicinity of Last Mountain Lake.

The study has been concentrated on an area of some 400 square miles bounded by No. 2 Highway on the west, an east-west line through Lockwood on the north, No. 20 highway on the east and a line from Govan to Stalwart in the south.

At the same time as the wildlife service was carrying on its investigation, some farmers in the area were voicing concern over the damage to standing crops resulting from the concentration of sandhill cranes in grain fields near the north end of Last Mountain Lake.

Gerald Humphrey wrote in a "Here and There" item in the weekly Nokomis Times entitled: "Those Blankety-Blank Cranes": "Last year we saw from 500 to 1,500 cranes landing in fields, adjacent to Long Lake. Give them two days unmolested, and a 200 acre crop of wheat averaging 35 bushels to the acre would be at least half damaged if not entirely destroyed."

He made reference to a comment of noted naturalist Dr. Roger Tory Peterson, who visited Regina last August during the American Ornithological Union's convention, and journeyed to the north end of Long Lake on a field trip to observe a concentration of sandhill cranes.

Dr. Peterson said: "I do hope that the few stooks of grain they damage will be overlooked.....". Countered Mr. Humphrey, "If Dr. Peterson and some of the bird

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lovers who bend over backwards in trying to protect the cranes had $2,000 to $3,000 at stake, they might have a little different viewpoint."

As early as Aug. 19, cranes were active in Wakamis district this year. A farmer that day discovered an estimated 3,000 cranes had damaged one corner of a field of wheat. The insurance adjustors allowed him 100 per cent on four acres and a smaller amount on another four acres.

While some farmers are outraged by the destruction caused to their crops by the cranes, others merely consider them an occupational hazard, like hail or drought. The trouble dates back several weeks to an announcement concerning the issuance of kill permits for protecting crops. While permits to shoot or scare ducks are being issued by the Saskatchewan Natural Resources department and the RCMP in the same fashion as previous years, it was decided that Saskatchewan would not issue permits to kill sandhill cranes. Reason for this decision was the concern over the safety of the whooping cranes. D.J. Thiessen, executive assistant to Northern Affairs Minister Alvin Hamilton, said in a letter to N.M. Trischuk, Secretary-Treasurer of the Orford rural municipality: "Young whooping cranes look very much like adult sandhill cranes and they are often found in the same flocks during migration. As you know, there are fewer than 40 whooping cranes left in the world and there is a most vigorous campaign under way to protect those few birds. We would be most remiss in our responsibilities if we permitted one to be killed."

"As well, there are many people and conservation organizations who are keenly interested in every bit of news about the whooping crane and if one were to be killed by mistake we would, as Canadians, be censured far beyond our own boundaries." In an effort to bring about the reduction of lesser sandhill cranes without jeopardizing whooping cranes, the Canadian Wildlife service officially requested the United States fish and wildlife service to open a season on the species in the southern United States.

Further discussion between the Saskatchewan game branch, the Canadian Wildlife Service and the United States Wildlife service have resulted in the United States announcing a 30-day season on lesser sandhill cranes this winter, in Texas and New Mexico. "There will be no whooping cranes in that area during the open season. The federal department of Northern Affairs hopes this measure will prove effective in reducing the numbers of sandhill cranes and therefore the amount of damage they will cause in the future." He continues: "The Minister believes it would be almost impossible to prevent all damage to grain crops every year, unless the entire duck and crane population was wiped out. We don't think anyone would seriously suggest that."

According to Mr. Mackay who spent the past three weeks as a biologist in the area, several methods and techniques have been used to gather information on crane habits and movements and to explore the possibilities of controlling those movements. Information on the numbers of cranes and their distribution in the area has been obtained from ground and aerial observations. The crane population was estimated to number more than 1,000 when the survey was initiated. It increased to about 5,000 at the end of the second week and by the end of the third week, had reached at least 15,000. Mr. Mackay and his crew made approximately 18,000 individual crane-feeding observations -- 18 per cent on unharvested crops and 82 per cent on stubble, summerfallow and pasture. Good weather allowed an unusually early harvest, but the figures, the crew found, indicate a crane preference for stubble rather than standing or swathed crops.

Crop surveys have also been carried out to correlate harvest conditions with crane observations. An 80-mile survey of 285 seeded fields on Aug. 31 showed 84 percent

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standing crop, seven per cent swathed and 69 per cent harvested. Acetylene exploders have been used on several crane roosting areas outside the Last Mountain Lake sanctuary to try to restrict roosting and thus feeding activity to the area adjacent to the sanctuary. The exploders fire automatically with a loud bang every five minutes or so. They were set for night operation only during the experiment, and were shut off during daylight hours. The noise makers were found effective in keeping the cranes off the test areas but a large number of the machines would be required to cover all roosting areas away from the sanctuary.

Attempts were made to herd the cranes by use of a single aircraft, and by two and three aircraft. The experiments were planned to test the effectiveness of aerial herding of feeding cranes from crop areas to adjacent water-roosting grounds and also to see if the cranes could be pushed southward along their migration route. It was found that the cranes could be moved successfully from feeding areas, a distance of four or five miles to the roosting ground. However, attempts to move the birds from roosting areas along the lake shore, using as many as three aircraft, proved fruitless. It was possible to carry out the aerial observations this year with little danger of scaring birds from stubble into standing or swathed fields owing to the advanced nature of the harvest.

Further operations this year will be restricted to regular censuses of cranes to determine the peak population period and also to determine the duration of their stay in the area. Following three weeks of survey, Mr. Mackay urged further planning on a constructive basis. He pointed out that not too many years ago, some of our grandparents, and even some of our parents, had the foresight to establish the Last Mountain Lake Sanctuary to give living space to creatures they enjoyed and wished us to enjoy -- the first such sanctuary in Canada. "How would seem the time to push their idea a little farther" said Mr. Mackay.

"With comparatively little expense it would be possible to acquire adjoining acreage and make the sanctuary into a self-contained refuge similar to those operated by our neighbors to the south. "Crops could be planted and marsh areas maintained for our wildfowl with little danger to farmers' crops. Such a scheme would be beneficial to the local economy inasmuch as it would attract a large number of visitors to the area. It would also be of benefit to bird-watchers and hunters." And he added, "Perhaps instead of seeing columns headed: "Those Blenkety-blank Cranes", we might even see the crane being chosen as a local emblem, such as Grande Prairie, Alberta, has done with the trumpeter swan."

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The Nokomis Times, Nokomis, Sask. October 13, 1960. (Page 4).

"ON THE EDITOR'S DESK"

The Editor,
Open Letter to Bird-Watchers From a Farmer.

On September 19th, I attended a meeting to discuss the sandhill crane problem at the north end of Last Mountain Lake. Representatives of the Federal and Provincial Game Branches, the Museum, the Natural History Society, the Audubon Societies of Canada and the United States, the sportsmen and the farmers were present. There were about

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three hours of discussion and the outcome was that the private agencies agreed that the two governments, particularly the Federal, should do what was necessary, short of reducing the crane population to prevent serious damage to farmers' crops.

The major items discussed were the positive and negative values of "turkeys" as seen by each of these "special interest" groups. As with people generally, there are some farmers who like to see cranes (anywhere but in their crops) and those who could not care less about them. For the majority of farmers in certain districts they are an added worry -- a hazard to their crops that have cost a single farmer up to $1,000 in one year.

Among sportsmen there are also those who like to see cranes but probably more who have no interest at all or who consider them as pests when hunting. Each hunter is charged one dollar for each license he buys for an insurance fund against wildlife damage. This means that each hunter pays one, two, or more dollars per year for a provincial total of $30,000 which if necessary, could all be paid on crane damage.

Then there are the bird-watchers. Each and everyone of their group derives unbounded enjoyment at the sight of thousands of wild turkeys. There can be no doubt that they derive the greatest benefit of all people from these birds. What does it cost them? Nothing -- neither individually nor as a group. Farmers and sportsmen are forced to make a direct annual financial contribution to the perpetuation of sandhill cranes for the almost sole benefit of the bird-watchers. These people, in turn, not only contribute nothing, but do their best to prevent the farmer from trying to keep cranes out of his crops.

Perhaps the bird-watchers will claim that they pay taxes and therefore they are supporting the projects carried on by the provincial and federal governments to prevent crane damage. Let them not forget that farmers and sportsmen also pay taxes. Furthermore, this argument puts them in the position of paying no more for their dear cranes than the clerk in Regina or Halifax or the bank manager in Saskatoon or in Vancouver, neither of whom knows or cares a hoot about sandhill cranes. Think of how little the wildlife branches could do about crane control if they could only rely on their share of taxes from bird-watchers instead of from the millions of Canadians who have never heard of cranes.

It amazes me that your representatives could show up at such a meeting in any but an apologetic attitude. If I so thoroughly enjoyed a commodity which I knew was causing my neighbor considerable hardship, I would be ashamed to face him knowing that not only had I not done anything concrete to help him but that I had requested legislation to increase his hardship. But your representatives even told us we did not really have much to complain about.

First of all, the cranes did us a favour by supposedly eating grasshoppers. I say to you. We will look after the grasshoppers, you look after your cranes -- and don't tell us that they are ours also.

Secondly, your people told us we could buy exploders. These of course cost you nothing but they cost farmers $30 a piece or $150 for the two he would probably need as a minimum. Even if the farmer does go to this expense, will the bird-watchers pay the $1.00 per day needed to operate each machine or will the farmers be lucky enough to have to pay that also -- thanks to the cranes? In harvest time he is concerned mainly with harvesting work. So service your own machines, please.

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Thirdly, the bird-watchers told us that we could buy crop insurance. It does not matter to them that a farmer insuring 200 acres for $25 per acre has to pay a premium of $100 -- thanks to the cranes. Then if he loses only five per cent of this crop -- $250 in this example -- he does not get paid one cent. He would then be out $350 for that year -- thanks to the cranes.

When your Society and the Canadian and U.S. Audubon Societies were asked if they would take on a financial share in the control program proposed, it was interesting to note that there were no takers. Organized bird-watchers apparently never have gotten themselves into such a spot in Canada and have no intention of starting now.

The purpose of this letter was to put things a little more bluntly than they have been in the past. I hesitate to judge your Society by the impromptu answers given by your representatives at an informal meeting. I and other farmers will be interested to see just how sincere you are in your avowed love for birds -- whether you are a do-nothing organization that gives only lip-service or a live-wire outfit that backs up its words with deeds -- or money -- as the situation requires.

A. Greenfield.

The Nokomis Times, October 26th, 1950, Page 5.

" ON THE... EDITOR'S DESK"

The Editor,

In your October 12 paper Mr. A. Greenfield bluntly challenges the bird-watchers. I'm sure that Mr. Greenfield is thinking mainly of the Saskatchewan Natural History Society so perhaps as editor of the Blue Jay I might state our position as I see it. Mr. Greenfield charges us with causing economic hardship to the farmers at or near the north end of Last Mountain Lake by attempting to bring in legislation to protect the cranes. He charges us with enjoying the cranes but not being prepared to share the farmer's loss. He wants to know if we can back our interest in the birds with deeds and with money.

In the first place, how true is Mr. Greenfield's claim that "each and every one of their group (bird-watchers) derives unbounded enjoyment at the sight of thousands of wild turkeys"? Only those living in or frequently passing through such an area as yours has that pleasure. I myself became aware of the possibilities only recently when we were looking for a spectacular field trip for the American Ornithologists' Union which would attract people from all parts of the continent. We visited your area and got permission to go on private farms and then we bragged that we could show 10,000 cranes. This was enough, for the A.O.U. meeting in 1949 was the largest meeting ever held by the bird-watchers. The field trip into your area was so successful that one year later, at the A.O.U. meeting in Ann Arbor, Michigan, everyone was still exclaiming about the cranes of the year before. Michigan just had no natural beauty to compare with the sight of thousands of cranes soaring overhead.

With this experience fresh in our minds it was distressing to us, as it must have been to you, to have 1949 turn out to be such a wet harvest year that there was more damage from wildlife throughout the province than there ever had been before. We

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discussed the situation with particular reference to the cranes at our annual meeting in Moose Jaw, Oct. 17, 1959 and decided to write to the Minister of Natural Resources. Our letter had two parts. First we commended the government for marking the game preserve and bird sanctuary at the head of Last Mountain Lake. The government, we feel sure, appreciates the recreational value of the north end of Last Mountain Lake and knows that here in the oldest and first-known bird sanctuary in North America we have something unique, something which even now is worth coming thousands of miles to see. There were two parties from England visiting the area in late August, 1959.

The second part of our letter was as follows: BE IT RESOLVED THAT the Saskatchewan Natural History Society recommend that the Department of Natural Resources give greater recognition to the recreational potential of the Sandhill Crane populations in Saskatchewan by (a) increasing the area of full protection in the province, especially at the head of Last Mountain Lake; (b) planning grain crops to encourage cranes to keep within these areas; (c) and in addition to, or in advance of these developments spending further funds to recompense local grain-growers for damage done by cranes.

Our society is sympathetic to farmers, who are suffering crop damage. Notice that we did not ask for complete protection of cranes nor did we ask the farmers to suffer all the loss. We asked that further funds be spent to pay for the damage which cranes do, at least until some attempt has been made to solve the problem. Since this area was recognized as a bird sanctuary in 1887 more than 20 years before grain-growing commenced in this part of Saskatchewan we think that the bird sanctuary should be enlarged and that disturbance of the birds, even by bird-watchers, should be prohibited. Within this area there would still have to be controlled farming planned mainly with a view to keeping as many birds as possible in the area. Perhaps more people would be required to do this work than there are farmers now living in this area so we are not proposing that people be required to move from the area. Beyond the boundary of the enlarged sanctuary there would still be some damage by cranes but here farmers would be allowed to protect their crops or insure against damage. Personally, though I am not a hunter myself, I would not be against allowing hunting in the adjoining areas. It should, however, be pointed out that cranes are not like ducks and geese for they tend to have only one chick per family and so could not withstand as much hunting harvest.

Mr. Greenfield's October 13 attack on the Natural History Society is not the first. We have been accused of stopping the permit shooting of cranes this year. The society, I'm sure, had nothing to do with that but we are happy to learn that some study of the cranes has been made by the Canadian Wildlife Service this year. I think this means that the Canadian Government recognizes that the "clerk in Halifax or the bank manager in Vancouver" is interested in cranes. All wildlife is a part of our Canadian heritage and we, in this generation, must give to posterity the privilege of enjoying this heritage.

Like the farmer, I would question one conclusion of the study, quoted in Nokomis Times (September 7, 1960), "the figures do indicate a crane preference for stubble rather than standing or swathed crops". Surely cranes prefer a swathed crop to stubble where food is harder to pick up! Farmers have noticed that the cranes prefer light sandy soils where the crops tend to be poor. Do the cranes prefer certain fields or do they favor certain crop conditions? If the government is going to plant crops for cranes, as it is already doing on a limited scale, it is important to know which fields and what crops appeal to cranes and whether summerfallowing is necessary as part of the program.

....

But let's not squabble about details. Let's just get down to work to solve the problem together. Mr. Greenfield says that the bird-watchers who enjoy the cranes are not willing to spend any money for this enjoyment. This is not true. Proof of this is the fact that the A.O.U. meeting in 1959 was the largest in 76 years and that people came thousands of miles to see the cranes. And any number of bird-watchers would spend money to come to the north end of Last Mountain Lake every year if the area were properly publicized. The fact that this wonderful place has not been developed and that birdwatchers are not spending money there is entirely the fault of the Saskatchewan people: the government, the natural history society, and especially the people living in the area.

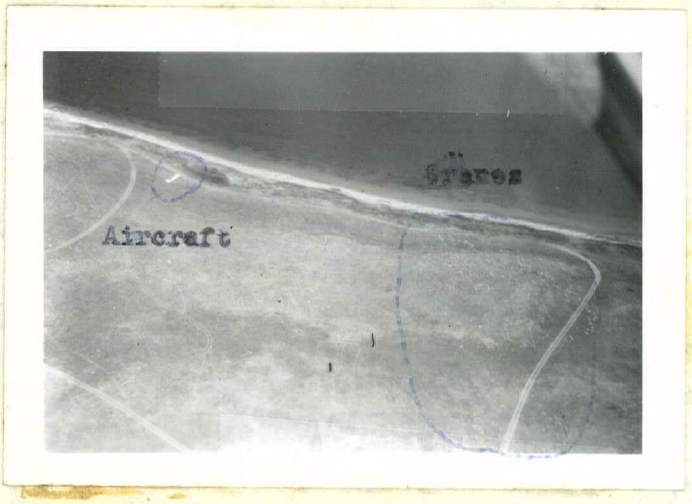
The Saskatchewan Natural History Society would be willing to help in the planning and publicity and the development of the area. When facilities are available in the area then we like birdwatchers all over North America, will spend our money in the area. If you would like to discuss the problem with us please feel free to join our group and attend our annual meeting in the museum, October 28, 1960. Please come and get acquainted with us and our point of view.

Yours truly,

O.F. Ledingham, Editor
BLUE JAY.

AIRCRAFT HERDING - LAST MOUNTAIN LAKE

Ground Photograph of Cessna 172 Herding Cranes



Aerial Photograph of Cessna 175 Banking Behind Flock Of Cranes.

(Enlargements from 35 mm. films).

AERIAL HERDING - LAST MOUNTAIN LAKE

Cranes in Air. (Photographed Through Front Window.)

Cranes in Air. (Photographed Through Side Window.)

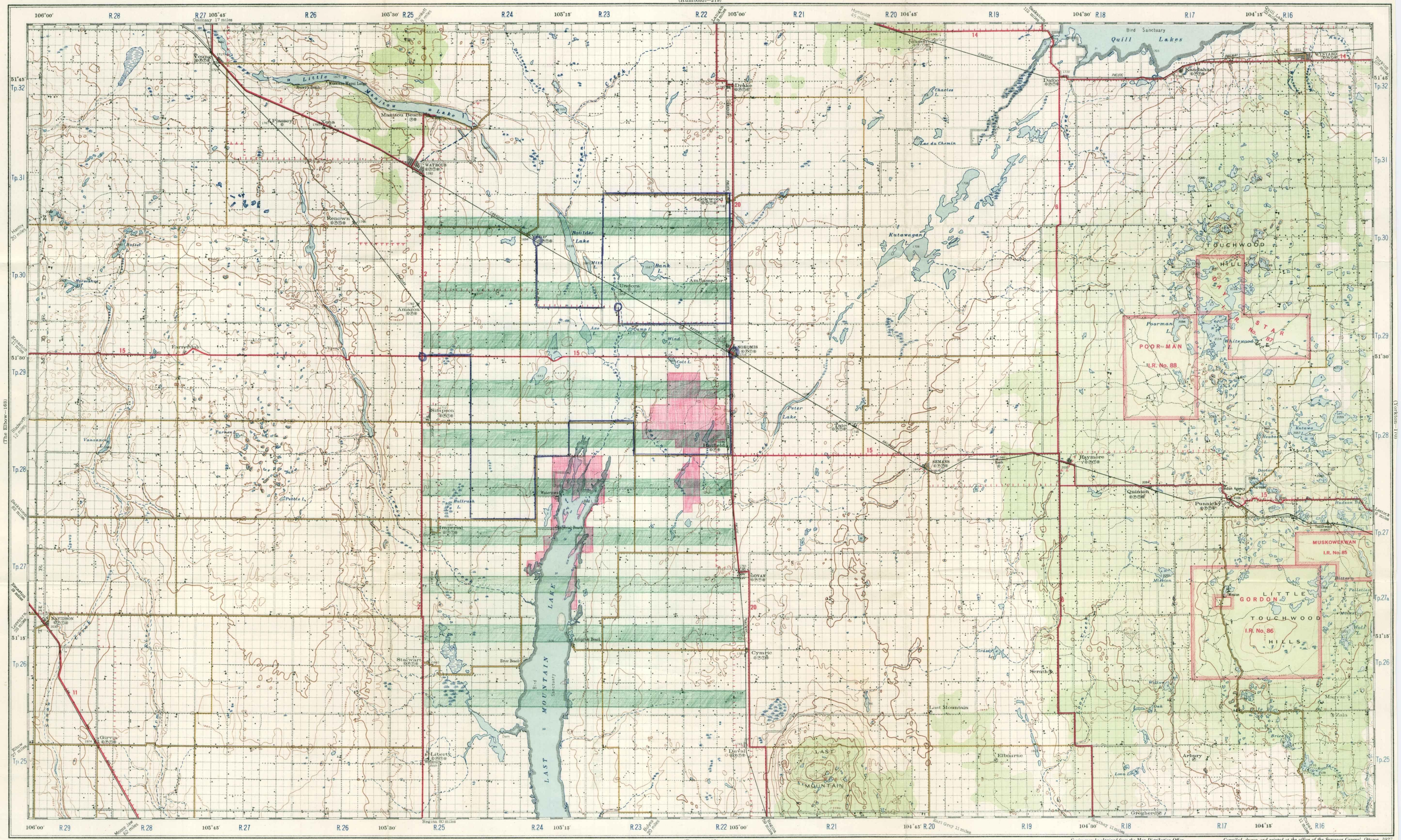
Cranes Remaining on Ground, While Aircraft Is Diving At Them.

(Enlargements from 35 mm. film)

Canada
DEPARTMENT OF
Mines and Technical Surveys
SURVEYS AND MAPPING BRANCH
(Humboldt—219)

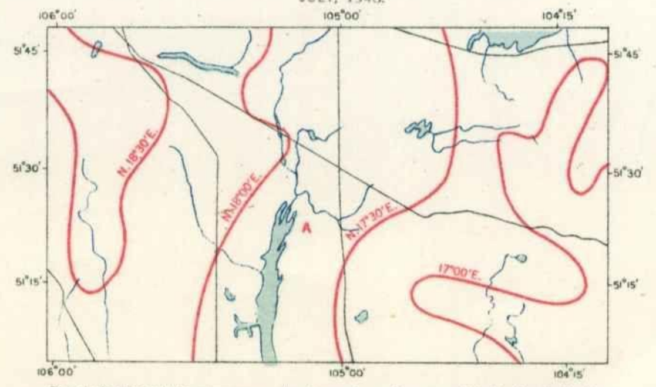
SASKATCHEWAN, CANADA

SECTIONAL SHEET No 169



(Regina—119)

THE DECLINATION OF THE COMPASS NEEDLE
JULY, 1948.



The declination of the compass needle at any place along a red line is the declination

Reference

- Railway, steam, double track
- „ „ single track (Station, Siding or stop)
- „ electric
- Road, class 1, trunk road
- „ „ 2, secondary thoroughfare
- „ „ 3, local road well travelled
- „ „ 4, „ „ slightly travelled
- Pack trail or path
- Telegraph or telephone
- „ „ „ along road
- Power transmission line
- Non-perennial stream
- Canal, irrigation
- Drainage ditch

Aerial Transects - September

Provincial Game Preserves

Crop Survey Route

TOUCHWOOD

WEST OF SECOND MERIDIAN

Scale 3 miles to 1 inch or 1:190,080

Miles 1 0 5 10 Miles

Contour interval 50 feet

Datum is mean sea level.

DIAGRAM OF TOWNSHIP

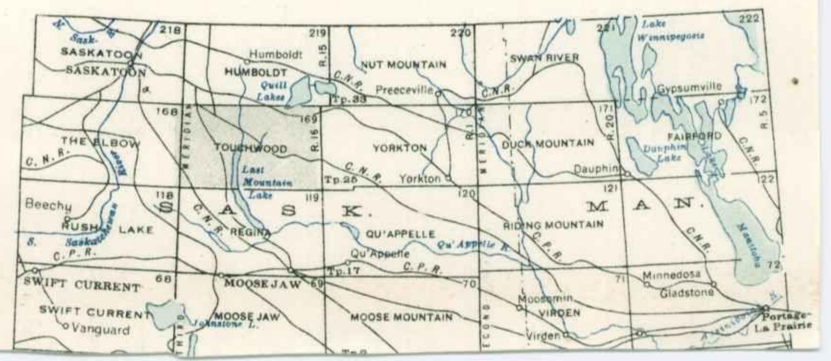
31	32	33	34	35	36
30	29	28	27	26	25
19	20	21	22	23	24
18	17	16	15	14	13
7	8	9	10	11	12
6	5	4	3	2	1

Reference

- Marsh
- Muskeg
- Non-permanent lake
- Sand
- Heavy woods
- Light woods, park lands, bluffs and scrub
- Post office
- Telegraph office
- Building
- Church
- School
- Elevator
- Mine or quarry
- Contours

Copies may be obtained from the Map Distribution Office, Department of Mines and Technical Surveys, Ottawa.

Compiled, drawn and printed at the office of the Surveyor General, Ottawa, 1927. Reprinted with corrections at the Surveys and Mapping Branch, Ottawa, 1950.



TITLE

DATE LOANED	BORROWER'S NAME