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TITLE: Waterfowl Breeding Pair Survey for Southern Manitoba

Library

STRATA COVERED: 24 and 25

U.S. Fish &amp; Wildlife Service

DATES: May 14 through May 31, 1970

1011 E. Tudor Road

Anchorage, Alaska 99503

DATA SUPPLIED BY: Bureau of Sport Fisheries and Wildlife  
and Canadian Wildlife ServiceARLIS  
ANCHORAGE, ALASKA  
Est. 1967Air - Morton M. Smith  
Donald N. FrickieGround - James H. Hogue  
Joseph P. Ruzic  
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ABSTRACT: The good water conditions of 1969 plus this year's wet spring have combined to produce excellent water conditions for waterfowl in southern Manitoba this May. The May 1970 index for total ducks, unadjusted for visibility, is up 17 percent over that of 1969 but 25 percent below the 1956-62 average. The mallard unadjusted index this May was 19 percent above 1969 but remains 47 percent below the 1956-62 average. The 1970 index for total ducks, adjusted for visibility, is 31 percent higher than that of 1969. The 1970 adjusted mallard index is 49 percent higher than that of 1969. The nesting effort was late this year and May was cold and wet. We are optimistic, however, that 1970 will be a good production year in southern Manitoba.

NARRATIVE:

I. Methods: The aerial surveys were conducted in accordance with instructions provided in the Standard Procedures for Waterfowl Population and Habitat Surveys, The Prairies, revised 1969 and as amended by a memorandum dated June 2, 1969 (copies attached to Addendum). The strata surveyed were the same as in previous years and include 24(A) and 25(B) in Manitoba and 20(AE) in Saskatchewan.

Seven air/ground comparison transects were completed in stratum 20 and four in stratum 24 in cooperation with the ground crew of Jim Hogue and Joe Ruzic of the Bureau and Gary Kaiser for the Canadian Wildlife Service.

The amount of air/ground comparison data that can be gathered in any year is limited. Since it is desirable to have the best estimate available of what the air crew sees in a given year, all 11 air/ground transects in strata 20 and 24 were used to calculate the 1970 aerial visibility rates for the southern Manitoba crew.

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There were changes this year in the survey operations and these are noted below and in the Addendum attached.

1. Crew - Flyway Biologist Donald Frickie replaced Richard Droll on the air crew this season. Don Frickie served as pilot on a majority of the flights this May with M. M. Smith as observer.

2. Transect Location - A portion of the transects were flown on 1/4 and 1/2 mile lines this May in an attempt to improve the representativeness of the sample. The reason for the relocation of selected transects is provided in the Addendum.

3. Duck Population Averages - In Tables 2 and 4, the 1970 data is compared with an average from the 1956-62 period instead of the long-term averages used in previous reports. This was done to provide an unchanging and uniform comparison for the various prairie survey units. In southern Manitoba, the 1956-62 averages are considerably higher than the long-term averages used previously.

4. Strata Area and Number of Transects - There was no change in the survey in stratum 20 in Saskatchewan and these data were delivered to R. C. Hanson for analysis and report. There were changes in strata 24 and 25 as follows:

a. The number of transects in stratum 24 were reduced from 18 to 9. It is expected there will be little change in the estimated duck population in stratum 24 as a result of the reduced sample. An analysis of the effect of the 9 versus 18 transect sample is provided in the Addendum.

b. In stratum 25, transects 6 through 8 were extended to the eastern boundary of the stratum and two more transects were added in the northern part of the stratum. The number of segments was increased from 32 to 54 as a result of these additions. An estimate of the effect of the increased sample is provided in the Addendum.

c. The area in stratum 24 was determined to be 11,038 square miles instead of 10,360 square miles. The boundary between stratum 25 and CW was shifted to more nearly exclude areas of muskeg and black spruce (see map). As a result, the area of 25 decreased from 28,600 to 27,640 square miles. The "new" area in the southern Manitoba unit is 38,728 square miles--virtually no change from the total of 38,960 square miles used previously.

The above changes in number of transects and square miles in strata 24 and 25 result in an estimated duck population for the southern Manitoba unit that is directly comparable to population estimates from previous years (see Addendum).

III. Weather and Habitat Conditions: The fall of 1969 was mild and wet in southern Manitoba. The winter of 1969-1970 was relatively dry with normal temperatures until late winter and early spring which were cold and wet.

Precipitation - The last half of April and the month of May were very wet in southern Manitoba. A snowstorm on May 11 deposited five to seven inches of wet snow across the entire southern half of the survey unit. As of May 28, the 1970 growing season precipitation (that since April 1) from ten stations scattered throughout the survey unit was 86 percent above normal (see Table 8).

Temperature - May 1970 was characterized by cold cloudy weather. From April 1 through May 28, mean temperatures for the survey unit were 2 to 5 degrees below normal. May was a raw, miserable month in southern Manitoba.

Phenology - This season was a late one for waterfowl in southern Manitoba. When we arrived on May 5, most of the lakes in the Turtle Mountains were ice covered. Whitewater Lake and Oak Lake were about 25 percent ice covered, and all the lakes on the south slope of the Riding Mountains were still frozen. On May 11, ponds in the Minnedosa area were still frozen on the bottom and no aquatic emergent vegetation was noted during ground work there. May 18 brought the first definite signs of leafing on aspen. The phenology this May was ten days to two weeks behind that of 1969.

Agriculture - Agricultural operations will be very late in Manitoba this year. During the first half of May, no farmers were seen plowing fields and very little burning was noted. Because of flooding and continued rain, some lowland areas will not be worked at all in 1970. Swathed grain from last year still remains in some areas, and a few fields from 1969 were still uncut this May. As of May 28, it was reported only 5 percent of the Manitoba grain areas had been seeded.

Habitat - There are many ponds in southern Manitoba and water levels are high. In our mid-May report we noted the survey area was very wet. The May 1970 pond count was 74 percent higher than 1969 (a good year) and 26 percent higher than the 1956-62 average. There are a lot of ponds in southern Manitoba and brood water should be available when needed. The wet fall and spring hindered the usual clearing and burning operations and upland cover is good. Although overwater cover appears flooded and sparse in some areas, it should be adequate. The waterfowl habitat is good this year in southern Manitoba, and better than that of 1969.

**III. Breeding Population Indexes:** Waterfowl breeding population indexes for southern Manitoba (not adjusted for visibility) are given in Table 1. Table 2 provides the unadjusted population indexes by stratum and compares these with indexes from earlier years. Breeding duck numbers (unadjusted for visibility) in southern Manitoba in May 1970 are 17 percent higher than the 1969 counts but are still 25 percent below the 1956-62 average.

The serial counts, unadjusted for visibility bias, increased for most species in Manitoba this May. The important mallard was up 19 percent over 1969, yet remains 47 percent below the 1956-62 average. Blue-winged teal numbers were up substantially compared to 1969 and pintails increased slightly. Aerial counts for both of these species were the highest since the 1960-61 period. The 1970 aerial indexes show an increase in redheads and a decrease in canvasbacks when compared to the 1969 figures.

Table 6 provides the waterfowl breeding population figures adjusted by this season's visibility rates. The adjusted mallard population for 1970 was 49 percent higher than that of 1969. The adjusted blue-wing teal population this May was 40 percent higher than that of 1969. The adjusted count for total ducks in 1970 was near 2-1/4 million and is 31 percent above last year's count.

Coot numbers (unadjusted) increased greatly in both stratum 2<sup>a</sup> and 2<sup>b</sup> resulting in a 70 percent increase in coots in 1970 over 1969.

**IV. Lone Drake Index:** The lone drake index is considered an indicator of the progress and intensity of the nesting effort. The 1970 lone drake index is lower than that of 1969 and agrees with our observation that the nesting effort this spring was delayed. Ground studies in southern Manitoba support the view that duck nesting in 1970 was later than in 1969.

**V. Conclusions:** The line graph provides a single figure appraisal of the 1970 season in the form of a forecast index. The forecast is based on the unadjusted aerial data for breeding pairs and ponds. The May 1970 index for southern Manitoba is 118 compared to the 1956-62 average of 124 and the 1969 rating of 112.

The total duck index in southern Manitoba for May 1970 has improved substantially over that of 1969.

Habitat conditions in southern Manitoba were generally good this spring. May was cold and wet with a major snowstorm on May 11. We are uncertain now as to what effect the poor May weather had on nest success but we are optimistic that 1970 will be a good duck year in southern Manitoba.

DATE: June 10, 1970

SUMMITTED BY: M. M. Smith  
D. N. Frickie

TABLE NO. 1 Southern Manitoba - Annual trend in waterfowl breeding population indexes by species STRATA 24(A) and 25(B)

(Index numbers in thousands) UNADJUSTED FOR VISIBILITY BIAS

SPECIES	1953	1954	1955	1956	1957	1958*	1959*	1960	1961
<b>DABBLERS:</b>									
Mallard	150.1	252.5	355.7	491.0	500.0	490.5	303.6	322.1	211.1
Black Duck	-	-	-	1.0	-	-	-	-	-
Gadwall	8.1	8.3	8.2	5.0	5.5	7.7	4.9	4.2	9.9
Am. Widgeon	12.9	17.1	27.7	26.7	24.7	53.0	29.6	12.7	19.6
G.W. Teal	-	7.9	3.9	1.7	3.4	7.2	4.5	2.2	5.3
B.W. Teal	38.8	66.7	87.8	53.2	62.7	124.9	140.8	94.9	84.1
Shoveler	3.6	18.8	25.1	27.8	38.3	28.2	36.0	53.6	38.6
Pintail	46.0	62.4	129.5	150.0	99.3	73.1	40.8	97.5	43.3
Wood Duck	-	-	-	-	-	.2	-	-	-
<b>SUBTOTAL</b>	<b>259.5</b>	<b>443.7</b>	<b>637.9</b>	<b>756.4</b>	<b>733.9</b>	<b>784.8</b>	<b>560.2</b>	<b>587.2</b>	<b>411.9</b>
<b>DIVERS:</b>									
Redhead	12.0	17.6	25.2	20.9	16.9	26.6	23.3	25.8	9.9
Canvasback	11.6	30.3	28.4	39.2	31.4	56.6	17.9	37.4	31.3
Scaup	77.9	40.3	54.0	73.8	60.2	70.5	48.0	145.9	114.8
Ringneck	-	4.1	1.5	7.0	3.8	5.6	9.9	4.6	5.5
Goldeneye	-	6.4	4.0	4.5	5.4	2.3	9.3	4.6	3.9
Bufflehead	-	7.9	5.7	1.9	.4	3.4	3.9	4.1	3.3
Ruddy	-	4.5	12.3	6.7	7.0	6.2	8.7	15.8	18.3
<b>SUBTOTAL</b>	<b>101.5</b>	<b>111.1</b>	<b>131.1</b>	<b>159.0</b>	<b>125.1</b>	<b>171.2</b>	<b>121.0</b>	<b>238.2</b>	<b>187.0</b>
<b>MISCELLANEOUS:</b>									
Scoters	-	.3	.2	1.4	1.3	.7	-	-	1.5
Mergansers	-	.3	.1	..	-	-	-	-	.1
Other	-	-	-	..	-	-	-	-	-
<b>SUBTOTAL</b>	<b>-</b>	<b>.6</b>	<b>.3</b>	<b>1.4</b>	<b>1.3</b>	<b>.7</b>	<b>-</b>	<b>-</b>	<b>1.6</b>
<b>TOTAL DUCKS</b>	<b>361.0</b>	<b>545.4</b>	<b>769.3</b>	<b>916.8</b>	<b>860.3</b>	<b>956.7</b>	<b>681.2</b>	<b>825.4</b>	<b>600.5</b>
<b>TOTAL COOTS</b>	<b>4.8</b>	<b>13.4</b>	<b>28.5</b>	<b>40.0</b>	<b>20.8</b>	<b>80.9</b>	<b>166.0</b>	<b>96.0</b>	<b>80.4</b>
<b>GRAND TOTAL</b>	<b>365.8</b>	<b>558.8</b>	<b>797.8</b>	<b>956.8</b>	<b>881.1</b>	<b>1037.6</b>	<b>847.2</b>	<b>921.4</b>	<b>680.9</b>

\*NOTE: Figures for 1958 and 1959 do NOT include "Flocked Ducks"

TABLE NO. 1 Southern Manitoba - Annual trend in waterfowl breeding population  
 (Cont'd) indexes by species STRATA 24(A) and 25(B)

(Index numbers in thousands) UNADJUSTED FOR VISIBILITY BIAS

SPECIES,	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
<b>DABBLERS:</b>										
Mallard	129.2	182.0	167.0	147.0	192.1	193.0	133.4	158.5	189.1	
Black Duck	-	1.4	.2	-	.1	-	.5	-	.1	
Gadwall	9.2	14.3	10.8	8.0	14.8	21.3	14.0	7.3	12.9	
Am. Widgeon	10.8	15.2	20.0	23.2	24.1	30.7	23.5	24.5	11.8	
G.W. Teal	.4	4.7	.3	3.1	3.7	5.7	4.5	14.3	7.6	
B.W. Teal	43.9	47.0	38.2	32.5	26.1	60.2	33.6	46.8	80.4	
Shoveler	17.4	33.3	38.0	32.2	28.9	42.5	22.9	41.1	40.1	
Pintail	41.3	61.7	41.6	51.2	38.6	57.1	20.3	63.9	68.5	
Wood Duck	-	-	-	-	-	-	-	-	-	
<b>SUBTOTAL</b>	<b>252.2</b>	<b>359.6</b>	<b>316.1</b>	<b>297.2</b>	<b>328.4</b>	<b>410.5</b>	<b>252.7</b>	<b>356.4</b>	<b>410.5</b>	
<b>DIVERS:</b>										
Redhead	13.5	33.8	31.9	45.4	43.3	29.4	16.0	22.1	24.4	
Canvasback	23.0	30.5	38.0	40.7	37.3	33.8	18.1	28.0	20.5	
Scaup	76.1	55.7	72.3	67.1	72.9	79.5	55.9	41.3	70.8	
Ringneck	2.4	6.8	1.8	2.9	.5	4.1	1.6	1.5	2.4	
Goldeneye	2.9	1.1	1.8	3.7	.5	4.7	1.5	1.6	3.8	
Bufflehead	1.5	5.4	3.9	7.8	6.2	12.3	4.5	10.0	3.4	
Ruddy	8.2	14.6	11.6	13.6	19.8	14.2	16.2	8.4	13.1	
<b>SUBTOTAL</b>	<b>127.6</b>	<b>147.9</b>	<b>161.3</b>	<b>181.2</b>	<b>180.5</b>	<b>178.0</b>	<b>113.8</b>	<b>112.9</b>	<b>138.4</b>	
<b>MISCELLANEOUS:</b>										
Scoters	-	.4	.6	1.0	1.8	1.6	.2	-	.2	
Mergansers	-	-	4.0	3.2	2.0	-	.2	.3	1.7	
Other	-	-	-	-	-	-	-	-	-	
<b>SUBTOTAL</b>	<b>-</b>	<b>.4</b>	<b>4.6</b>	<b>4.2</b>	<b>3.8</b>	<b>1.6</b>	<b>.4</b>	<b>.3</b>	<b>1.9</b>	
<b>TOTAL DUCKS</b>	<b>379.8</b>	<b>507.9</b>	<b>482.0</b>	<b>482.6</b>	<b>512.7</b>	<b>590.1</b>	<b>366.9</b>	<b>469.6</b>	<b>550.8</b>	
<b>TOTAL COOTS</b>	<b>34.0</b>	<b>54.4</b>	<b>56.2</b>	<b>35.3</b>	<b>26.5</b>	<b>35.2</b>	<b>44.3</b>	<b>55.3</b>	<b>93.9</b>	
<b>GRAND TOTAL:</b>	<b>413.8</b>	<b>562.3</b>	<b>538.2</b>	<b>513.9</b>	<b>539.2</b>	<b>625.3</b>	<b>411.2</b>	<b>524.9</b>	<b>644.7</b>	

TABLE NO. 2. Southern Manitoba - comparative status of waterfowl breeding population indexes by species and stratum, 1970

(Index numbers in thousands)

Species	1970 Stratum		Totals (strata 24 & 25 combined)		Average 1956-62	Percent change from: 1956-62 average		
	24(A)	25(B)	1969	1970				
<b>Ducks:</b>								
<b>Dabblers:</b>								
Mallard	85.5	103.6	158.5	189.1	354.1	+ 19		
Black duck	--	.1	--	.1	.1	+		
Gadwall	8.1	4.8	7.3	12.9	6.6	+ 77		
American widgeon	4.8	7.0	24.5	11.8	25.7	- 52		
Green-winged teal	4.0	3.6	14.3	7.6	3.7	- 47		
Blue-winged teal	49.2	31.2	46.8	80.4	88.0	+ 72		
Shoveler	22.7	17.4	41.1	40.1	34.6	- 02		
Pintail	33.6	34.9	63.9	68.5	78.2	+ 07		
Wood duck	--	--	--	--	--	--		
Subtotal	207.9	202.6	356.4	410.5	591.0	+ 15		
<b>Divers:</b>								
Redhead	11.7	12.7	22.1	24.4	19.7	+ 10		
Canvasback	10.5	10.0	28.0	20.5	34.2	- 27		
Scaup	36.5	34.3	41.3	70.8	70.3	+ 71		
Ring-necked duck	2.1	.3	1.5	2.4	5.6	+ 60		
Goldeneye	.3	3.5	1.6	3.8	4.7	+138		
Bufflehead	1.9	1.5	10.0	3.4	2.7	- 66		
Ruddy duck	4.5	8.6	8.4	13.1	9.7	+ 56		
Subtotal	67.5	70.9	112.9	138.4	146.9	+ 23		
						- 06		

TABLE NO. 2. Southern Manitoba - comparative status of waterfowl breeding population indexes by species and stratum, 1970--continued

(Index numbers in thousands)

Species	Totals				Percent change from:		
	1970 Stratum 24(A)	25(B)	(strata 24 & 25 combined) 1969	1970	Average 1956-62	1969	1956-62 average
<b>Miscellaneous:</b>							
Scoter	.2	.3	.2	.7	- 33	- 71	
Merganser	.3	1.4	--	1.7	--	+	+
Other	--	--	--	--	--	--	--
<b>Subtotal</b>	<b>.3</b>	<b>1.6</b>	<b>.3</b>	<b>1.9</b>	<b>.7</b>	<b>+533</b>	<b>+171</b>
<b>Total ducks</b>	<b>275.7</b>	<b>275.1</b>	<b>469.6</b>	<b>550.8</b>	<b>738.7</b>	<b>+ 17</b>	<b>+25</b>
<b>Geese:</b>							
Canada goose	--	2.0	--	2.0	--	+	+
<b>Coots:</b>	<b>67.2</b>	<b>26.7</b>	<b>55.3</b>	<b>93.9</b>	<b>76.4</b>	<b>+ 70</b>	<b>+ 23</b>
<b>Grand total</b>	<b>342.9</b>	<b>303.8</b>	<b>524.9</b>	<b>646.7</b>	<b>814.1</b>	<b>+ 23</b>	<b>- 21</b>

TABLE NO. 3 Southern Manitoba - lone drake index: Long-term trend  
expressed as a percentage of total drakes, 1953-1970  
Unadjusted for visibility bias

Year	Mallard	Pintail	Canvasback	Percent lone drakes <sup>1</sup>
1953				70.1
1954				79.6
1955				87.5
1956	81.5	81.0	46.2	79.4
1957	91.2	85.5	68.5	88.9
1958	83.0	81.1	73.3	81.9
1959	71.8	69.7	41.7	70.0
1960	90.9	82.0	66.4	86.5
1961	71.5	65.0	33.7	67.5
1962	64.3	59.0	45.6	62.0
1963	85.2	80.7	79.0	83.7
1964	82.1	71.3	66.3	78.0
1965	79.1	63.6	68.0	73.8
1966	87.3	74.3	81.2	84.6
1967	86.7	74.6	78.6	83.4
1968	73.4	66.0	73.4	72.5
1969	89.6	84.6	93.4	91.3
1970	82.4	72.6	79.1	79.8

<sup>1</sup> Lone drakes include only mallards, pintails, and canvasback.

## SOUTHERN MANITOBA

TABLE NO. 4 LONG-TERM TREND AND COMPARATIVE STATUS OF MAY POND INDEXES  
(Index numbers in thousands)

UNADJUSTED FOR VISIBILITY BIAS

Year	Stratum		Total Strata 24 and 25
	24(A)	25(B)	
1953	187	312	499
1954	258	426	686
1955	315	428	743
1956	391	625	1,006
1957	262	404	666
1958	352	264	616
1959	160	482	642
1960	324	295	619
1961	158	263	421
1962	135	295	430
1963	298	331	629
1964	398	331	729
1965	327	478	805
1966	372	515	887
1967	315	547	862
1968	119	238	357
1969	208	246	454
1970	411	381	792
Average 1956 thru 1962	255	374	629
Percent change 1970 from 1969	+98	+55	+74
Percent change 1970 from 1956-62 average:	+61	+02	+26

TABLE NO. 5 AIR/GROUND VISIBILITY RATE CALCULATION FOR  
THE WATERFOWL BREEDING POPULATION

1950  
Province  
Stratum

Back and down  
20 and 24

Species											GRAND TOTAL	
	A/G	Rate	A/G	Rate								
Mallard											2.721.5	.335
Gadwall											844	
Widgeon											26.0	
G-w Teal											106	.245
B-w Teal											10.0	
Shoveler											11.0	
Pintail											186	.059
Misc.											139.0	
Total Dabblers											1086	.129
Redhead											65.0	
Canvasback											126	.349
Scaup											135.0	
Ringneck											372	.363
Ruddy											668.5	
Misc.											2,900	.231
Total Divers											14.0	
TOTAL DUCKS											14	.189
Coot											24.5	
Pond											74	.331
											60.5	
											84	.720
											14.5	
											14	.450
											84.0	
											58	.138
											4	
											117.5	
											308	.381
											786.0	
											32.08	.245
											234	
											82.5	.171
											1,516	
											1,895	.860

TABLE NO. 5 AIR/GROUND VISIBILITY RATE CALCULATION FOR  
THE WATERFOWL BREEDING POPULATION

Year : 1970  
Province : Manitoba  
Stratum : 24

Species	Boissevain		Griswold		Beulah-Decker		Oakburn		Total		Ponds	
	A/G	Rate	A/G	Rate	A/G	Rate	A/G	Rate	A/G	Rate	A/G	Rate
Mallard	6.5	.540	56	100	26.5	.72	18.0	.82	105.0	.339		
Cadwall	1	.25			2.5	.20	3.5	.22	8.5	.250		
Widgeon	6	.4			1.5	.6	10	.10	1.5	.058		
G-w Teal	1.5	.55	16	30	12		18		71.0	.092		
E-W Teal	33.0	22.5	150	200	8.5	.80	12.5	.108	76.5	.142		
Shoveler	3.5	10.5	4	42	8.5	.16	5.0	.20	27.5	.335		
Pintail	8.5	21.0	36	50	5.5	.24	6.0	.62	41.0	.238		
Misc.												
Total	53.0	117.5			51.5		45.0		267.0			
Dabblers	268	432			216		322		1238	.216		
Redhead	2.5		20	8	1.5		2.5		6.5			
Canvasback	5.0	2.5	20		2.5		5.0		15.0	.357		
Scaup	12.5	7.5	14	2	11.0		9.5		40.5			
Ringneck	1.5	1.5	6	2	6		18		36	.125		
Ruddy	1.5		22				5		2.0			
Misc.							14		36	.214		
Total	23.0	11.5			15.0		17.5		67.0			
Divers	82	12			14		60		168	.399		
TOTAL DUCKS	76.0	129.0	3501	444	66.5	230	62.5	3821	334.0	.238		
Coot	55.5	41.5	180	198	15.5	37	30.5	66	143.0	.297		
Ponds	42	174	157	309	12.8		1.5		55.9	.804		
									6.95			

TABLE NO.: 5 AIR/GROUND VISIBILITY RATE CALCULATION FOR  
THE WATERFOWL BREEDING POPULATION

Year: 1970  
Province: Saskatchewan  
Stratum: 20

Species	Fertile	Moose Valley	Kipling	Odessa	Grayson	Tuna	Springside					
	A/G	Rate	A/G	Rate	A/G	Rate	A/G	Rate	A/G	Rate	A/G	Rate
Mallard	14.5	46.5		18.0	89.5	8.5		22.5	38.0			
	116	136		58	64	74		64	22			
Cadwall	2.5	7.0		1.5	6.5				1.6		4	
	6	14		10	2.6				1.0			
Widgeon	1.0	3.0		1.0	14	8		3.5			4	
	4	22		105	215			22				
G-w Teal	2.0	22		18	10	18						
B-w Teal	17.0	12.5		5.5	4.0	8.5		12.0	3.0			
	154	136		64	62	74		48	20			
Shoveler	4.5	3.0		8.5	6.5	8.5		3.5	3.0			
	14	8		12	40	6		14	10			
Pintail	5.5	12.5		15.5	22.5	5.0		17.5	15.5			
	24	26		46	58	22		8	16			
Misc.												
Total	45.0	84.5		50.5	71.5	31.5		59.0	59.5			
Dabblers	338	364		218	274	202		184	76			
Redhead		3.0			1.5	1.0		2.0				
	2	14		6	2	6		4				
Canvasback				3.0		5.0		1.5				
	4	4		10	2	12						
Scaup	2.5	5.5		3.0	5.0	2.5		1.5				
	6	.20		6	14			2				
Ringneck	4.5				1.0			2.0				
Ruddy				4.0								
		20		2								
Misc.								2				
Total	7.0	8.5		10.0	7.5	8.5		9.0				
Divers	14	58		24	18	20		6				
TOTAL	52.0	93.0		60.5	79.0	40.0		68.0	59.5			
DUCKS	3521	4202		2922	292	288		190	176			
	3912	115		115	1410	3.0		50	20			
	17	71		69	59	10		3				
Fonds	191	113		160	110	134		131	118			
	268	177		291	184	162		96	112			

TABLE NO. 5 AIR/GROUND VISIBILITY RATE CALCULATION FOR THE WATERPOWL BREEDING POPULATION

Year  
Proceedings  
Baptists

1879

## SOUTHERN MANITOBA

TABLE NO. 6 SPRING INLAND DUCK POPULATIONS

(Index numbers in thousands)  
ADJUSTED FOR VISIBILITY BIAS\*

Species	Aerial Index	24(A)	25(B)	Adjusted Index
		Strata A(24) and AE(25) combined	Vis. Rate	
Mallard	189.1	.335		564.5
Pintail	65.5	.363		186.7
Blue-winged teal	80.4	.127		633.1
Other ducks	212.8	--		861.9
Total ducks	550.8	.245		2248.2

\* No A/G transects located in stratum B. Strata A(24) and AE(25) indexes combined and adjusted based on visibility rates resulting from 10 A/G transects in stratum A and AE.

24(A) 20(AE)

TABLE NO. 7 SAMPLING ERROR ANALYSIS AT THE 95 PERCENT LEVEL OF CONFIDENCE FOR  
TOTAL DECKS

	1966	1967	1968	1969	1970
Stratum 24 (A)	(18 Trans) (81 seg)	(9 Trans) (42 seg)	(18 Trans) (81 seg)	(18 Trans) (81 seg)	(9 Trans) (42 seg)
% Sampling Error	15.1	18.2	22.9	11.0	13.9
No. Seg for 20% Error	46	35	106	24	20
Index (thous)	251	286.3	183.9	204.3	275.7
Range	213-289	234.2-333.4	145.6-232.2	181.8-226.8	257.4-314.0
Stratum 25 (B)	(8 Trans) (32 seg)	(8 Trans) (32 seg)	(8 Trans) (32 seg)	(8 Trans) (32 seg)	(10 Trans) (54 seg)
% Sampling Error	45.2	38.5	52.1	36.1	29.7
No. Seg for 20% Error	163	119	218	104	119
Index (thous)	262	303.8	178.0	265.3	275.1
Range	144-380	186.8-420.8	85.3-270.7	169.5-361.1	193.4-356.8

## SOUTHERN MANITOBA

TABLE NO. 3 1970 GROWING SEASON PRECIPITATION AND TEMPERATURE SUMMARY  
FOR SELECTED STATIONS (AS OF MAY 23, 1970).

Station	Precipitation		Temperature difference from normal since April 1
	From April 1 (inches of water)	Normal	
Emerson	8.98	2.81	-2
Boissevain	5.24	2.86	-3
Pierson	5.65	2.48	-3
Virden	3.92	2.24	-3
Brandon	3.03	2.70	-5
Winnipeg	5.54	2.85	-3
Dauphin	3.73	2.62	-3
Russell	3.05	1.87	-3
Swan River	3.21	2.20	-3
Arborg	4.05	2.37	-4
Average	4.64	2.50	-3.2 F

## SOUTHERN MANITOBA

TABLE NO. 9 MAY WATERFOWL POPULATION SUMMARY - 1970  
 (index numbers in thousands)

	STRATUM A	STRATUM B	TOTAL
Area in Square Miles	11,038	27,640	38,728
Linear Miles in Sample	816	1,021	1,837
Square Miles in Sample	204	255.25	459.25
Expansion Factor	54.353	108.29	---
Lone Males Seen	1,010	566	1,576
Pairs of Ducks Seen	783	284	1,067
Flocked Ducks Seen	453	152	605
Unidentified Seen	1,027	545	1,572
Coots Seen	984	180	1,164
Breeding Ducks Index*	244.8	252.4	497.2
Breeding Ducks per Square Mile	22.1	9.1	12.8
Flocked Ducks Index	30.9	22.7	53.6
Flocked Ducks per Square Mile	2.8	.8	1.4
GRAND TOTAL DUCK INDEX	275.7	275.1	550.8
GRAND TOTAL DUCKS PER SQ. MILE	24.9	9.9	14.2
Coot Index	67.2	26.7	93.9
Coots per square mile	6.1	1.0	2.4
Ponds Seen (doubled)	7,554	3,514	11,068
Pond Index	410.6	380.5	791.1
Ponds per square mile	37.0	13.8	20.4
Percent Lone Drakes**	---	---	79.8

Note: \* Total does NOT include flocked ducks.

\*\* Refers only to mallards, pintails, and canvasback.

MAY WATERFOWL CROP OUTLOOK - SOUTHERN MANITOBA, 1970

BREEDING POPULATION		WATER CONDITIONS		PROGRESS OF NESTING		FORECAST INDEX
Dx.	Value sq.mi. (x5)	Ponds sq. mi.	Value (x2)	% lone males	Value (x3)	
35	20	90	20	100	20	150
33	19	80	19	95	19	145
31	18	70	18	90	18	140
29	17	60	17	85	17	135
27	16	50	16	80	16	130
25	15	40	15	75	15	125
23	14	30	14	70	14	120
21	13	25	13	65	13	115
19	12	20	12	60	12	110
17	11	17	11	55	11	105
15	10	15	10	50	10	100
13	9	13	9	45	9	95
11	8	11	8	40	8	90
9	7	9	7	35	7	85
7	6	7	6	30	6	80
5	5	5	5	25	5	75
4	4	4	4	20	4	70
3	3	3	3	15	3	65
2	2	2	2	10	2	60
1	1	1	1	5	1	55
0	0	0	0	0	0	50

1956-62 Average

1969

1970

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