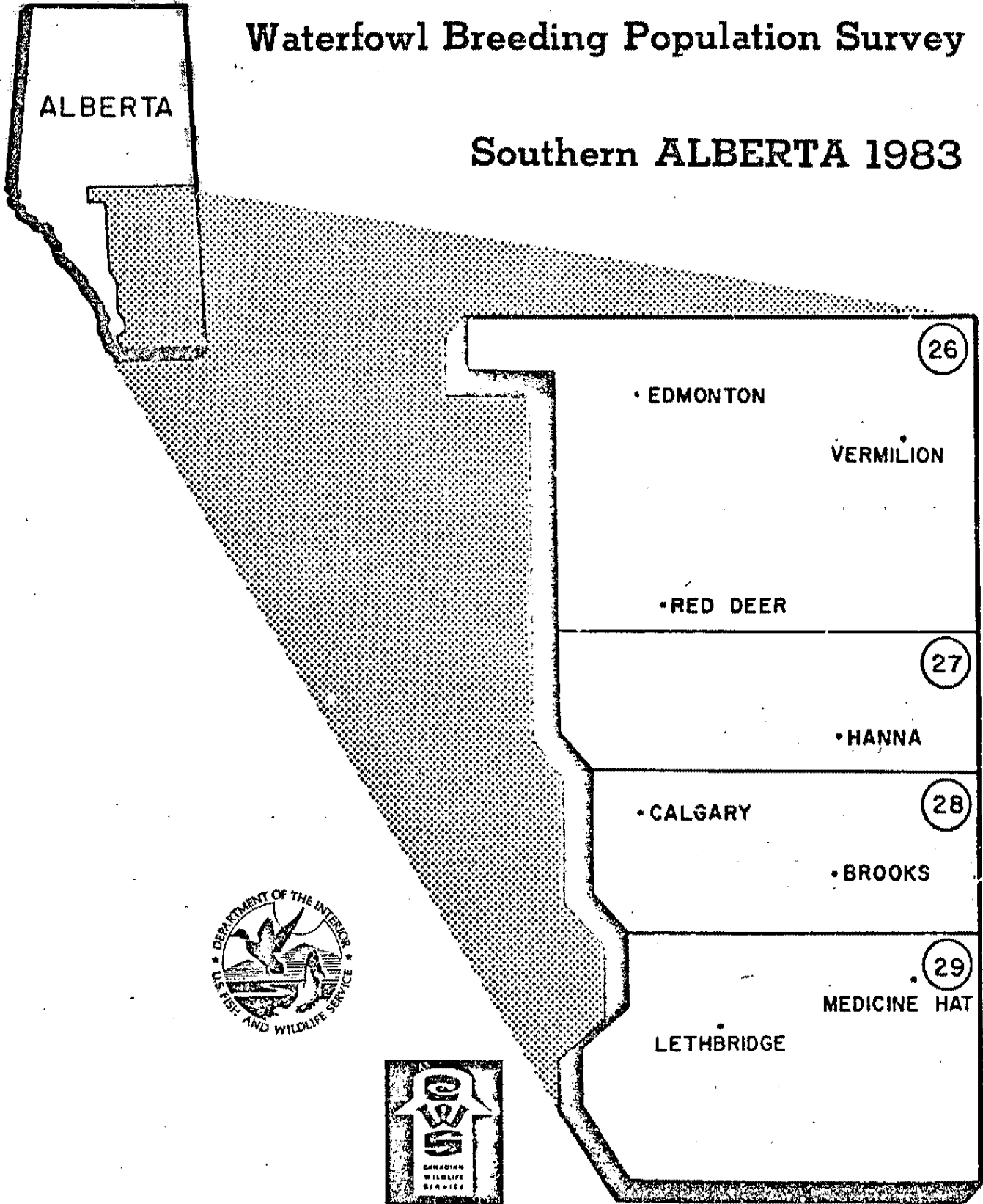


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Waterfowl Breeding Population Survey

Southern ALBERTA 1983



TITLE: Waterfowl Breeding Population Survey for Southern Alberta

STRATA SURVEYED: 26, 27, 28, 29

DATES: May - 4-12, 1983

DATA SUPPLIED BY: United States Fish and Wildlife Service and
Canadian Wildlife Service

Aerial Crew

Pilot/Observer - James R. Goldsberry, Flyway Biologist, USFWS
Observer - James M. Nissen, Biologist, USFWS

Ground Crew

Crew Leaders - Bruce Turner, Biologist, CWS
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Assistants

- James Allen, Technician, Alberta Fish and Wildlife
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ABSTRACT: Dry conditions have remained in southern Alberta in 1983 because of continued lack of precipitation in most areas throughout the year. Adequate nesting cover will not be available throughout many portions of the survey area. May pond numbers decreased from last year and from the long-term average. Total duck numbers declined from 1982 and remained well below the 10-year average. Low water levels and a shortage of nesting habitat suggest reduced levels of production in southern Alberta again in 1983.

Survey results for selected waterfowl species are listed below:

| | <u>Estimate in Thousands</u> | <u>% Change from 1982</u> | <u>% Change from 1973-82 Average</u> |
|-------------------|----------------------------------|-------------------------------|--|
| Mallard | 845.4 | +10.4 | -26.6 |
| Gadwall | 142.3 | -44.0 | -56.8 |
| Green-winged Teal | 211.5 | +65.9 | -20.8 |
| Blue-winged Teal | 419.8 | -15.8 | -49.4 |
| N. Shoveler | 159.6 | -50.2 | -61.8 |
| Pintail | 379.4 | -34.3 | -64.7 |
| Redhead | 140.8 | +143.2 | -19.8 |
| Canvasback | 55.5 | -24.7 | -36.6 |
| Scaup | 484.7 | -7.2 | -5.0 |
| Total Ducks | 3181.3 | -11.0 | -40.6 |
| May Ponds | 495.3 | -21.5 | -46.6 |

NARRATIVE:

I. Methods: The procedures followed in conducting the survey are contained in the Standard Operating Procedures for Aerial Breeding Ground and Habitat Surveys, Section IV (A), revised 1977. There were no changes made this year in operational procedures and the survey coverage was identical to previous years (Table 7). Some minor changes were made in the 1982 waterfowl and pond indices as the result of errors detected during a final audit of the survey data. The corrected values are used in this report.

Three ground crew observers and the aerial observer participated in the survey for the first time this year. However, we feel that their data are comparable to information from earlier years because of intensive field training and periodic checks of field data throughout the surveys.

Transect flights within Strata 26-29 were flown using N783, a Cessna 185. The survey was initiated on May 4 and completed on May 12. Flight data from individual strata are as follows: (1) Stratum 29, May 4-5; (2) Stratum 28, May 6-7; (3) Stratum 27, May 7-8; and Stratum 26, May 10-12. The only delay in survey time occurred on May 9 as the result of a spring snowstorm.

II. Weather and Habitat Conditions: Precipitation records for 14 selected locations in Alberta and 2 locations in British Columbia, for the months of September through April, are shown in Table 6. Despite an early frost in September, autumn temperatures and precipitation in southern Alberta were above normal. Colder than normal temperatures were recorded in November throughout Alberta and precipitation in the form of snow was patchy throughout the survey area. Temperatures during the winter months (December, January, February) remained above average while snowfall did not attain normal levels at most reporting stations. Warm temperatures continued into March and April. However, little or no precipitation accumulated throughout the survey area, particularly in the southeastern portion of the Province. The survey period was warm and dry, with one day of mixed rain and snow that affected only the extreme southeast.

Overall, the drought conditions that began in 1980 continued this year in southern Alberta. Significant decreases in adjusted pond numbers from last year's levels were observed in all survey strata (Table 4). The largest change (-38%) occurred in Stratum 29, the southeastern portion of the Province, followed by Stratum 27 (-35%), Stratum 26 (-15%), and Stratum 28 (-13%), respectively. Large decreases from the 10-year average (1973-82) were also noted during the 1983 survey, with Stratum 27 showing the most substantial reduction (-62%). Other changes from the long-term level includes Stratum 28 (-49%), Stratum 29 (-45%), and Stratum 26 (-42%). The total adjusted pond index for southern Alberta was 495.3, down 22% from 1982 and 47% from the 10-year average. Because of the continued dry conditions, farming activities will not be delayed throughout most of the survey area in 1983. In general, habitat conditions were very poor throughout the survey area, and adequate overwater and upland nesting habitat will be critical this year.

III. Breeding Population Estimates: The 10-year trend in adjusted waterfowl breeding population estimates by species is presented in Table 1 for southern Alberta. The 1983 breeding population data are listed by stratum in Table 2 along with comparisons to 1982 and the 1973-82 averages. Total ducks continued to decline in the survey area in 1983. Breeding populations decreased 11% from last year and 41% from the long-term average.

Dabbling ducks were reduced significantly from 1982 (-14%) and from the average (-47%). Only mallards (+10%) and green-winged teal (+66%) increased above 1982 levels, while all other dabblers declined over the year. All species in this group decreased substantially in numbers from the long-term average. Diving ducks increased slightly (+5%) above 1983 survey results but declined from the 10-year average (-11%). However, only redheads (+143%) and buffleheads (+36%) contributed to the overall increase in numbers from 1983, while all other species declined or showed no change. All diving duck species except the bufflehead decreased from average levels in 1983.

In the miscellaneous group, all species combined showed a decrease from 1982. However, both ruddy ducks (+12%) and mergansers (+67%) increased above long-term numbers. The coot index in southern Alberta continued to decline again this year. The 1983 estimate was 28% below the 1982 level and 36% below the average. Canada geese decreased slightly (-3%) from last year but numbers were above (+34%) the 1973-82 average.

IV. Lone Drake Index: The lone drake index (Table 3) is intended as a general measure of survey timing in relation to the progress of the breeding season for 3 early-nesting species, mallards, pintails, and canvasbacks. The mallard LNI (78.39) was the highest since 1979, while the pintail value (76.50) exceeded all those since 1970. However, the canvasback index (35.61) was the lowest since 1980. The overall lone drake index of 75.26 suggests that the nesting season was generally well advanced at the time of the survey.

V. Conclusions:

1. Drought conditions continued in southern Alberta in 1983 and significant decreases were observed in pond numbers throughout all 4 survey strata.
2. Total duck numbers also continued to decline in 1983 and remained well below the long-term average.
3. Agricultural activities were generally advanced in most areas and nesting cover will be critical again this year.
4. Without high hen and nest success, the outlook for production in southern Alberta will continue to be below normal.

Submitted by: James R. Goldsberry
June 6, 1983

Table 1. Southern Alberta - ten-year trend in adjusted waterfowl breeding population estimates by species, 1974-1983 (estimates in thousands).

| Species | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 |
|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|
| Ducks: | | | | | | | | | | |
| Dabblers: | | | | | | | | | | |
| Mallard | 1,576.3 | 1,398.4 | 1,453.5 | 853.1 | 823.5 | 983.2 | 975.2 | 947.0 | 765.8 | 845.4 |
| Black Duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gadwall | 495.7 | 303.6 | 347.7 | 392.3 | 279.7 | 346.5 | 319.6 | 309.5 | 215.4 | 142.3 |
| Wigeon | 514.5 | 384.4 | 355.6 | 194.9 | 303.5 | 402.4 | 403.9 | 179.8 | 199.9 | 169.5 |
| G.W. Teal | 404.8 | 230.8 | 315.5 | 328.0 | 222.3 | 256.9 | 224.0 | 248.7 | 127.5 | 211.5 |
| B.W. Teal | 1,209.7 | 1,108.2 | 833.2 | 750.9 | 393.3 | 592.9 | 834.5 | 1,148.1 | 498.2 | 419.8 |
| Shoveler | 588.0 | 550.4 | 337.5 | 220.8 | 407.2 | 391.4 | 388.8 | 503.9 | 320.4 | 159.6 |
| Pintail | 2,123.0 | 1,553.1 | 1,058.8 | 345.7 | 1,087.6 | 1,456.3 | 842.2 | 657.3 | 576.9 | 379.4 |
| Subtotal | 6,912.0 | 5,528.9 | 4,701.8 | 3,085.7 | 3,512.5 | 4,429.6 | 3,988.2 | 3,994.3 | 2704.1 | 2,327.5 |
| Divers: | | | | | | | | | | |
| Redhead | 155.3 | 269.7 | 379.3 | 175.4 | 133.8 | 100.8 | 268.3 | 111.1 | 57.9 | 140.8 |
| Canvasback | 100.2 | 78.9 | 124.8 | 105.8 | 88.2 | 53.4 | 91.7 | 49.4 | 73.7 | 55.5 |
| Scaup | 368.7 | 383.5 | 666.5 | 477.6 | 463.0 | 687.5 | 473.0 | 469.3 | 522.0 | 484.7 |
| Ringneck | 4.8 | 8.3 | 4.4 | 7.7 | 16.3 | 6.8 | 2.9 | 9.4 | 7.6 | 4.1 |
| Goldeneye | 19.9 | 17.4 | 31.9 | 4.4 | 37.5 | 8.6 | 33.3 | 5.2 | 7.7 | 7.7 |
| Bufflehead | 24.4 | 52.6 | 44.3 | 32.9 | 56.9 | 62.9 | 30.3 | 51.9 | 39.5 | 53.7 |
| Subtotal | 673.3 | 810.4 | 1,251.2 | 803.8 | 795.7 | 920.0 | 899.5 | 696.3 | 708.5 | 746.5 |
| Miscellaneous: | | | | | | | | | | |
| Oldsquaw | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.1 | 0.0 |
| Eider | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Scoter | 9.6 | 8.7 | 29.0 | 16.2 | 31.2 | 43.5 | 24.5 | 9.2 | 14.2 | 7.6 |
| Ruddy Duck | 91.3 | 180.7 | 32.9 | 99.2 | 85.9 | 41.1 | 42.0 | 61.6 | 135.2 | 90.0 |
| Merganser | 0.0 | 10.4 | 0.0 | 3.0 | 10.2 | 3.6 | 11.3 | 8.6 | 9.8 | 9.7 |
| Subtotal | 100.9 | 199.8 | 61.9 | 118.4 | 127.3 | 88.2 | 77.8 | 79.4 | 161.3 | 107.3 |
| TOTAL DUCKS | 7,686.2 | 6,539.1 | 6,014.9 | 4,007.9 | 4,435.4 | 5,437.8 | 4,965.5 | 4,770.0 | 3573.9 | 3131.3 |
| Geese | 534.0 | 483.4 | 505.4 | 285.4 | 168.3 | 418.0 | 501.1 | 405.1 | 349.7 | 252.0 |

Table 2. Southern Alberta - status of adjusted waterfowl breeding population estimates by species and stratum, comparing 1983 with 1982 and the 1973-1982 average (estimates in thousands).

| Species | Stratum (1983) | | | | Total 1983 | Total 1982 | Average | % change from 1982 | % change from average |
|-----------------------|----------------|--------------|--------------|--------------|---------------|---------------|---------------|-----------------------|--------------------------|
| | 26 | 27 | 28 | 29 | | | | | |
| Ducks: | | | | | | | | | |
| Dabblers: | | | | | | | | | |
| Mallard | 579.8 | 94.1 | 87.9 | 83.6 | 845.4 | 765.8 | 1150.6 | + 10.4 | -26.6 |
| Black Duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | NC | NC |
| Gadwall | 89.8 | 12.5 | 14.1 | 25.9 | 142.3 | 215.4 | 329.1 | - 44.0 | -56.8 |
| Widgeon | 95.5 | 21.4 | 31.6 | 21.0 | 169.5 | 199.5 | 333.3 | - 15.3 | -49.2 |
| G.W. Teal | 157.7 | 31.9 | 15.6 | 6.3 | 211.5 | 127.5 | 267.0 | + 65.9 | -20.8 |
| B.W. Teal | 236.6 | 77.4 | 83.0 | 22.8 | 419.8 | 498.2 | 828.8 | - 15.8 | -49.4 |
| Shoveler | 76.4 | 29.6 | 27.9 | 25.7 | 159.6 | 320.4 | 417.5 | - 50.2 | -61.8 |
| Pintail | 147.5 | 71.1 | 94.9 | 65.9 | 379.4 | 576.9 | 1072.6 | - 34.3 | -64.7 |
| Subtotal | 1383.3 | 338.0 | 355.0 | 251.2 | 2327.5 | 2704.1 | 4398.9 | - 14.0 | -47.1 |
| Divers: | | | | | | | | | |
| Redhead | 117.7 | 11.9 | 6.2 | 5.0 | 140.8 | 57.9 | 175.5 | +143.2 | -19.8 |
| Canvasback | 39.4 | 9.7 | 3.3 | 3.1 | 55.5 | 73.7 | 87.5 | - 24.7 | -36.6 |
| Scaup | 421.3 | 26.7 | 26.8 | 9.9 | 484.7 | 522.0 | 510.0 | - 7.2 | - 5.0 |
| Ringneck | 3.8 | 0.1 | 0.0 | 0.2 | 4.1 | 7.6 | 6.9 | - 46.1 | -40.6 |
| Goldeneye | 7.7 | 0.0 | 0.0 | 0.0 | 7.7 | 7.7 | 18.8 | NC | -59.1 |
| Bufflehead | 51.9 | 0.9 | 0.5 | 0.4 | 53.7 | 39.5 | 42.4 | + 35.9 | +26.6 |
| Subtotal | 641.8 | 49.3 | 36.8 | 18.6 | 746.5 | 708.5 | 841.1 | + 5.4 | -11.3 |
| Miscellaneous: | | | | | | | | | |
| Oldsquaw | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.1 | 0.0 | - | NC |
| Eider | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | NC | NC |
| Scoter | 6.7 | 0.0 | 0.5 | 0.4 | 7.6 | 14.2 | 20.5 | - 46.5 | -73.0 |
| Ruddy Duck | 80.7 | 1.1 | 8.2 | 0.0 | 90.0 | 135.2 | 80.7 | - 33.5 | +11.5 |
| Merganser | 7.0 | 0.0 | 0.4 | 2.3 | 9.7 | 9.8 | 5.8 | - 1.1 | +67.2 |
| Subtotal | 94.4 | 1.1 | 9.1 | 2.7 | 107.3 | 161.3 | 107.2 | - 33.5 | + 0.1 |
| TOTAL DUCKS | 2119.5 | 388.4 | 400.9 | 272.5 | 3181.3 | 3573.9 | 5347.2 | - 11.0 | -40.6 |
| Coots | 172.7 | 27.7 | 32.0 | 19.6 | 252.0 | 349.7 | 394.1 | - 28.0 | -36.1 |
| Geese: | | | | | | | | | |
| Canada Geese: | 4.8 | 7.6 | 3.6 | 5.0 | 15.0 | 14.6 | 11.2 | - 3.0 | +33.9 |

Table 3. Southern Alberta - lone drake index: long-term trend
expressed as a percentage of total drakes, 1955-1983

(unadjusted for visibility bias)

| Year | Mallard | Pintail | Canvasback | Total |
|------|---------|---------|------------|-------|
| 1955 | 77.30 | 81.16 | 67.37 | 59.80 |
| 1956 | 84.60 | 85.09 | 63.12 | 84.00 |
| 1957 | 92.03 | 88.82 | 81.60 | 90.00 |
| 1958 | 85.80 | 84.34 | 75.47 | 85.00 |
| 1959 | 70.66 | 73.26 | 42.84 | 71.00 |
| 1960 | 84.92 | 82.02 | 72.04 | 84.00 |
| 1961 | 77.10 | 74.22 | 63.89 | 76.00 |
| 1962 | 82.39 | 83.98 | 54.32 | 82.00 |
| 1963 | 84.99 | 85.25 | 80.08 | 84.86 |
| 1964 | 85.28 | 88.14 | 52.65 | 84.57 |
| 1965 | 82.07 | 75.17 | 65.02 | 77.85 |
| 1966 | 80.97 | 74.99 | 56.09 | 77.94 |
| 1967 | 83.60 | 64.14 | 70.60 | 79.63 |
| 1968 | 64.11 | 62.13 | 27.78 | 62.46 |
| 1969 | 86.71 | 82.48 | 68.58 | 84.14 |
| 1970 | 78.22 | 80.70 | 61.48 | 78.49 |
| 1971 | 80.69 | 74.95 | 65.52 | 77.66 |
| 1972 | 73.65 | 72.54 | 49.60 | 72.40 |
| 1973 | 66.80 | 62.99 | 44.11 | 64.64 |
| 1974 | 84.18 | 74.41 | 62.14 | 78.63 |
| 1975 | 75.58 | 57.02 | 31.01 | 64.61 |
| 1976 | 75.27 | 62.34 | 55.19 | 70.16 |
| 1977 | 67.54 | 60.90 | 36.18 | 63.91 |
| 1978 | 78.50 | 66.33 | 34.00 | 71.96 |
| 1979 | 79.71 | 69.34 | 54.10 | 74.54 |
| 1980 | 60.72 | 49.97 | 28.60 | 56.91 |
| 1981 | 67.74 | 52.28 | 40.15 | 61.74 |
| 1982 | 67.34 | 57.97 | 37.57 | 61.55 |
| 1983 | 78.39 | 76.50 | 35.61 | 75.26 |

Table 4. Southern Alberta - long-term trend adjusted pond estimates by stratum, comparing 1983 with 1982 and the 1973-1982 average (estimates in thousands).

| | Strata | | | | Total |
|-------------------------|--------|-------|-------|-------|--------|
| | 26 | 27 | 28 | 29 | |
| 1961 | 315.2 | 93.1 | 72.2 | 43.8 | 524.3 |
| 1962 | 394.9 | 84.7 | 73.2 | 52.5 | 605.4 |
| 1963 | 580.8 | 136.8 | 52.5 | 61.6 | 831.7 |
| 1964 | 366.2 | 97.0 | 62.1 | 118.4 | 643.7 |
| 1965 | 604.6 | 198.4 | 96.1 | 104.7 | 1004.1 |
| 1966 | 508.5 | 168.6 | 140.2 | 79.1 | 896.3 |
| 1967 | 394.2 | 162.7 | 225.4 | 177.4 | 959.7 |
| 1968 | 269.6 | 44.2 | 48.0 | 82.0 | 443.8 |
| 1969 | 482.7 | 156.1 | 125.2 | 94.5 | 858.5 |
| 1970 | 538.1 | 189.4 | 87.6 | 78.8 | 893.9 |
| 1971 | 587.7 | 198.5 | 122.6 | 78.8 | 987.7 |
| 1972 | 520.5 | 93.2 | 60.5 | 61.6 | 735.7 |
| 1973 | 697.1 | 139.0 | 123.6 | 85.2 | 1044.9 |
| 1974 | 1019.2 | 278.6 | 133.4 | 68.9 | 1500.1 |
| 1975 | 716.9 | 344.5 | 298.6 | 243.8 | 1603.8 |
| 1976 | 693.3 | 217.4 | 157.1 | 186.6 | 1254.3 |
| 1977 | 433.8 | 53.0 | 45.5 | 55.8 | 588.1 |
| 1978 | 295.8 | 89.8 | 88.7 | 145.6 | 620.0 |
| 1979 | 617.0 | 124.9 | 100.8 | 153.7 | 996.4 |
| 1980 | 281.2 | 68.1 | 59.1 | 52.1 | 460.5 |
| 1981 | 365.2 | 80.5 | 58.9 | 64.7 | 569.3 |
| 1982 | 374.5 | 86.4 | 66.8 | 103.4 | 631.1 |
| 1983 | 317.6 | 55.8 | 57.8 | 64.1 | 495.3 |
| Average 1973 to 1982 | 549.4 | 148.2 | 113.2 | 116.0 | 926.8 |
| <u>Percent Change:</u> | | | | | |
| 1983 from 1982 | -15.2 | -35.4 | -13.5 | -38.0 | -21.5 |
| 1983 from average | -42.2 | -62.3 | -49.0 | -44.7 | -46.6 |

Table 5 WATERFOWL BREEDING POPULATION SURVEY, GROUND/AIR VISIBILITY RATE CALCULATION FORM

| Prov. / State: Alberta | | Strata: 26-29 | | | | May 4-12, 1983 | | | | Sheet 1 of 3 | | | | |
|------------------------|----------|---------------|----------|------|----------|----------------|----------|------|----------|--------------|----------|------|----------|------|
| Species | 26-01-02 | | 26-01-08 | | 26-03-05 | | 26-03-09 | | 26-03-09 | | 26-05-04 | | 26-07-05 | |
| | G/A | Rate | G/A | Rate | G/A | Rate | G/A | Rate | G/A | Rate | G/A | Rate | G/A | Rate |
| Mallard | 162 | | 44 | | 56 | | 96 | | 159 | | 125 | | 198 | |
| | 38 | | 14 | | 18 | | 58 | | 64 | | 26 | | 45 | |
| Gadwall | 26 | | 4 | | 8 | | 28 | | 10 | | 2 | | 16 | |
| | 4 | | 4 | | 2 | | 6 | | | | 2 | | | |
| Wigeon | 4 | | 12 | | 2 | | 26 | | 6 | | 4 | | 40 | |
| | 4 | | 2 | | 2 | | 4 | | 4 | | | | 8 | |
| G-w teal | 32 | | 14 | | 16 | | 30 | | 44 | | 22 | | 72 | |
| | 6 | | 2 | | 4 | | 2 | | 4 | | 6 | | | |
| B-w teal | 186 | | 30 | | 18 | | 104 | | 140 | | 100 | | 134 | |
| | 35 | | 2 | | 6 | | 18 | | 8 | | 18 | | 14 | |
| Shoveler | 50 | | 12 | | 20 | | 26 | | 30 | | 52 | | 76 | |
| | 12 | | 4 | | 2 | | 2 | | | | 6 | | 14 | |
| Pintail | 60 | | 42 | | 10 | | 26 | | 14 | | 74 | | 106 | |
| | 18 | | 5 | | 4 | | 6 | | 12 | | 37 | | 6 | |
| Redhead | 6 | | | | 8 | | 16 | | 2 | | 13 | | 11 | |
| | | | | | | | 1 | | | | | | 1 | |
| Canvasback | 8 | | | | 4 | | 14 | | | | 2 | | 2 | |
| | | | | | | | 2 | | | | | | 2 | |
| Scaup | | | | | 7 | | 95 | | 8 | | | | 9 | |
| | 7 | | | | 5 | | 46 | | | | | | 3 | |
| Ringneck | | | | | | | 3 | | | | | | | |
| Goldeneye | | | | | | | | | | | | | 2 | |
| Bufflehead | | | | | | | 10 | | | | | | | |
| Scoter | | | | | | | | | | | | | | |
| Ruddy | | | | | | | 2 | | | | | | | |
| | | | | | | | 21 | | 2 | | | | 9 | |
| Merganser | | | | | | | | | 1 | | 2 | | 2 | |
| | | | | | | | | | | | | | | |
| Total Ducks | 534 | | 158 | | 149 | | 495 | | 415 | | 394 | | 675 | |
| | 124 | | 33 | | 43 | | 147 | | 93 | | 97 | | 95 | |
| Coot | 44 | | | | 4 | | 43 | | 28 | | 57 | | 21 | |
| | 11 | | 1 | | | | 15 | | 12 | | 7 | | 1 | |
| Ponds | 62 | | 35 | | 28 | | 51 | | 63 | | 66 | | 77 | |
| | 88 | | 40 | | 64 | | 72 | | 92 | | 96 | | 88 | |

Table 5

WATERFOWL BREEDING POPULATION SURVEY, GROUND/AIR VISIBILITY RATE CALCULATION FORM

| Prov. / State : Alberta | | Strata : 26-29 | | | | May 4-12 , 19_83 | | | | Sheet 2 of 3 | | | | |
|-------------------------|----------|----------------|----------|------|----------|------------------|----------|------|----------|--------------|----------|------|----------|------|
| Species | 26-07-07 | | 26-09-06 | | 27-01-09 | | 27-05-05 | | 27-05-09 | | 28-02-02 | | 28-04-09 | |
| | G/A | Rate | G/A | Rate | G/A | Rate | G/A | Rate | G/A | Rate | G/A | Rate | G/A | Rate |
| Mallard | 250 | | 44 | | 82 | | 34 | | 48 | | 24 | | 20 | |
| | 100 | | 14 | | 24 | | 18 | | 18 | | 8 | | 4 | |
| Gadwall | 76 | | 2 | | 64 | | 6 | | 8 | | 2 | | 4 | |
| | 72 | | 2 | | 8 | | | | | | 4 | | | |
| Wigeon | 50 | | 4 | | 28 | | 4 | | 6 | | 2 | | 4 | |
| | 6 | | 2 | | 10 | | | | | | 8 | | | |
| G-w teal | 34 | | 4 | | 6 | | 4 | | 10 | | | | | |
| | 2 | | | | 4 | | | | 2 | | | | | |
| B-w teal | 156 | | 20 | | 105 | | 18 | | 32 | | 18 | | 2 | |
| | 47 | | 2 | | 38 | | 12 | | 2 | | 8 | | 4 | |
| Shoveler | 88 | | 4 | | 32 | | 6 | | 8 | | 10 | | | |
| | 10 | | 6 | | 16 | | 10 | | 2 | | 8 | | | |
| Pintail | 81 | | 2 | | 48 | | 12 | | | | 22 | | 26 | |
| | 35 | | 4 | | 37 | | | | 4 | | 17 | | 13 | |
| Redhead | 50 | | | | 37 | | | | | | | | 2 | |
| | 10 | | 2 | | 8 | | | | | | | | | |
| Canvasback | 28 | | | | 28 | | | | | | | | | |
| | 4 | | 6 | | 18 | | | | 2 | | 2 | | | |
| Scaup | 105 | | 76 | | 173 | | 2 | | 8 | | | | | |
| | 60 | | 22 | | 59 | | 3 | | | | | | | |
| Ringneck | 1 | | | | | | | | | | | | | |
| Goldeneye | | | | | | | | | | | | | | |
| Bufflehead | 4 | | 2 | | 6 | | | | | | | | | |
| | | | 2 | | 2 | | | | | | | | | |
| Scoter | 6 | | | | | | | | | | | | | |
| Ruddy | 48 | | | | 5 | | 1 | | | | | | | |
| | | | 1 | | | | | | | | | | | |
| Merganser | | | | | | | | | | | | | | |
| Total Ducks | 977 | | 158 | | 614 | | 87 | | 120 | | 78 | | 58 | |
| | 346 | | 63 | | 224 | | 43 | | 30 | | 55 | | 21 | |
| Coot | 324 | | | | 37 | | | | 3 | | 3 | | | |
| | 10 | | | | 51 | | | | 1 | | | | | |
| Ponds | 122 | | 38 | | 60 | | 29 | | 40 | | 21 | | 11 | |
| | 118 | | 50 | | 52 | | 18 | | 24 | | 22 | | 14 | |

Table 5

WATERFOWL BREEDING POPULATION SURVEY, GROUND/AIR VISIBILITY RATE CALCULATION FORM

| Prov. / State : Alberta | | | Strata : 26-29 | | | | May 4-12 , 19 <u>83</u> | | | | Sheet 3 of 3 | |
|-------------------------|----------|------|----------------|------|----------|------|-------------------------|------|----------|------|--------------|--------|
| Species | 28-06-02 | | 29-01-07 | | 29-02-07 | | 29-03-03 | | 29-04-09 | | Total | |
| | G/A | Rate | G/A | Rate | G/A | Rate | G/A | Rate | G/A | Rate | G/A | Rate |
| Mallard | 56 | | 20 | | 86 | | 50 | | 10 | | 1564 | |
| | 30 | | 4 | | 28 | | 8 | | 2 | | 521 | 3.0019 |
| Gadwall | 44 | | 2 | | 24 | | 16 | | 4 | | 346 | 2.8361 |
| | 4 | | 4 | | 8 | | 2 | | | | 122 | |
| Wigeon | 18 | | 14 | | 18 | | 2 | | 2 | | 246 | 4.2414 |
| | 6 | | | | 2 | | | | | | 58 | |
| G-w teal | 14 | | | | 6 | | 2 | | | | 310 | 8.1579 |
| | 2 | | | | 2 | | 2 | | | | 38 | |
| B-w teal | 76 | | 4 | | 22 | | 24 | | 6 | | 1195 | 5.0851 |
| | 17 | | 2 | | | | 2 | | | | 235 | |
| Shoveler | 50 | | 8 | | 34 | | 16 | | | | 522 | 4.0781 |
| | 8 | | | | 22 | | 6 | | | | 128 | |
| Pintail | 92 | | 22 | | 54 | | 10 | | 14 | | 715 | 3.1637 |
| | 10 | | 4 | | 10 | | | | 4 | | 226 | |
| Redhead | 11 | | | | 12 | | 10 | | | | 178 | 8.0909 |
| | | | | | | | | | | | 22 | |
| Canvasback | 4 | | | | 2 | | 2 | | | | 94 | 2.4737 |
| | 2 | | | | | | | | | | 38 | |
| Scaup | 47 | | | | | | 9 | | | | 539 | 2.5070 |
| | 8 | | | | | | 2 | | | | 215 | |
| Ringneck | | | | | | | | | 1 | | 5 | |
| Goldeneye | | | | | | | | | | | 2 | |
| Bufflehead | | | | | | | | | | | 22 | 5.5000 |
| | | | | | | | | | | | 4 | |
| Scoter | | | | | | | | | | | 6 | 3.0000 |
| | | | | | | | | | | | 2 | |
| Ruddy | | | | | | | | | | | 86 | 9.5556 |
| | 3 | | | | | | | | | | 9 | |
| Merganser | | | | | | | | | | | | |
| Total Ducks | 412 | | 70 | | 258 | | 141 | | 37 | | 5830 | 3.6032 |
| | 90 | | 14 | | 72 | | 22 | | 6 | | 1618 | |
| Coot | 28 | | | | 10 | | 12 | | | | 614 | 5.1597 |
| | 8 | | | | 2 | | | | | | 119 | |
| Ponds | 35 | | 20 | | 36 | | 34 | | 5 | | 833 | .8552 |
| | 36 | | 16 | | 44 | | 32 | | 8 | | 974 | |

Table 6. Southern Alberta - precipitation received at selected locations between September 1982 and April 1983.

| | Sept. Oct. | Nov. Dec. | Jan. Feb. | Mar. *Apr. | Total 1983 | Total Normal | Difference |
|-------------------|---------------|--------------|--------------|---------------|----------------|-----------------|------------------------------|
| | 1982 | Norm | 1982 | Norm | 1983 | Norm | |
| <u>STRATUM 19</u> | | | | | | | |
| | | | | | (Mar. only) | | |
| Cold Lake | 26.8 | 61.8 | 23.5 | 45.1 | 17.1 | 37.9 | 17.4 20.1 84.8 164.9 - 80.1 |
| Ft. McMurray | 39.9 | 86.6 | 42.4 | 50.2 | 27.6 | 41.5 | 12.7 20.7 122.6 199.0 - 76.4 |
| Grande Prairie | 40.2 | 64.0 | 26.0 | 59.8 | 31.8 | 57.6 | 21.5 20.8 119.5 202.2 - 82.7 |
| Peace River | 43.9 | 58.6 | 28.3 | 41.6 | 15.9 | 43.1 | 13.6 17.2 101.7 160.5 - 58.8 |
| Slave Lake | 33.1 | 75.2 | 20.5 | 51.3 | 12.8 | 47.5 | 10.8 21.2 77.2 195.2 -118.0 |
| Whitecourt | 48.7 | 62.2 | 14.2 | 50.2 | 21.7 | 53.3 | 33.3 24.0 117.9 189.7 - 71.8 |
| Ft. Nelson | 41.0 | 65.9 | 39.0 | 44.1 | 23.7 | 44.4 | 7.2 24.4 110.9 178.8 - 67.9 |
| Ft. St. John | 47.0 | 66.9 | 42.0 | 67.3 | 39.4 | 62.9 | 6.1 29.7 134.5 226.8 - 92.3 |
| <u>STRATUM 26</u> | | | | | | | |
| Coronation | 45.4 | 47.7 | 21.6 | 34.6 | 14.0 | 38.6 | 15.0 20.7 96.0 141.6 - 45.6 |
| Edmonton | 51.2 | 55.7 | 19.8 | 40.4 | 17.0 | 43.4 | 18.6 18.5 106.6 158.0 - 51.4 |
| Red Deer | 75.6 | 64.5 | 14.4 | 35.3 | 28.4 | 41.4 | 16.8 19.5 135.2 160.7 - 25.5 |
| Lloydminster | 51.6 | 50.2 | 26.8 | 30.2 | 20.2 | 36.8 | 18.7 16.6 117.3 133.8 - 16.5 |
| <u>STRATUM 28</u> | | | | | | | |
| Brooks | 105.2 | 47.2 | 23.3 | 33.6 | 18.0 | 36.3 | 26.3 16.0 172.8 133.1 + 39.7 |
| Calgary | 65.5 | 55.8 | 14.7 | 28.7 | 14.4 | 31.7 | 22.6 16.1 118.2 132.3 - 14.1 |
| <u>STRATUM 29</u> | | | | | | | |
| Lethbridge | 63.9 | 55.0 | 28.3 | 38.7 | 19.2 | 42.5 | 24.9 24.2 136.3 160.4 - 24.1 |
| Medicine Hat | 81.4 | 48.6 | 22.0 | 30.9 | 17.9 | 39.3 | 29.4 18.5 150.7 137.3 + 13.4 |

Precipitation shown in mm.

*Weather for April not available at time report was prepared.

Table 7. Southern Alberta - Stratum data sheet, May 1983

| Survey Design | stratum | | | | Total |
|-------------------------------|---------|---------|---------|---------|--------|
| | 26 | 27 | 28 | 29 | |
| Square miles in stratum | 26,448 | 11,724 | 12,890 | 13,235 | 64,297 |
| Square miles in sample | 544.5 | 288.0 | 310.5 | 171.0 | 1,314 |
| Lineal miles in sample | 2,178 | 1,152 | 1,242 | 684 | 5,256 |
| Number of transects in sample | 11 | 6 | 7 | 4 | 28 |
| Number of segments in sample | 121 | 64 | 69 | 38 | 292 |
| Expansion factor | 48.5730 | 40.7083 | 41.5137 | 77.3977 | --- |

| Current Year Design | stratum | | | | Total |
|-------------------------------|---------|---------|---------|---------|-------|
| | 26 | 27 | 28 | 29 | |
| Square miles in sample | 265.5 | 144.0 | 135.0 | 171.0 | 715.5 |
| Lineal miles in sample | 1,062 | 576 | 540 | 684 | 2,862 |
| Number of transects in sample | 6 | 3 | 3 | 4 | 16 |
| Number of segments in sample | 59 | 32 | 30 | 38 | 159 |
| Expansion factor | 99.6158 | 81.4167 | 95.4815 | 77.3977 | --- |

WATERFOWL BREEDING POPULATION SURVEY

STRATUM SUMMARY FORM

Stratum 26 Dates: 5 / 10 / 83 Thru 5 / 12 / 83

| SPECIES | DRAKES | PAIRS | GROUPED BIRDS | INDICATED TOTAL BIRDS (T) | VISIBILITY RATIO (V) | POPULATION INDEX (P) |
|---------------------------------|--------|-------|---------------|---------------------------|----------------------|----------------------|
| MALLARD | 729 | 169 | 143 | 1939 | 3.0019 | 579832 |
| BLACK DUCK | | | | | | |
| GADWALL | 36 | 84 | 78 | 318 | 2.8361 | 89841 |
| AMERICAN WIGEON | 24 | 78 | 22 | 226 | 4.2414 | 95487 |
| GREEN - WINGED TEAL | 22 | 70 | 10 | 194 | 8.1579 | 157655 |
| BLUE - WINGED TEAL | 45 | 132 | 113 | 467 | 5.0851 | 236562 |
| SHOVELER | 42 | 76 | | 236 | 3.2494 | 76391 |
| PINTAIL | 130 | 51 | 106 | 468 | 3.1637 | 147492 |
| REDHEAD ^U | 19 | 58 | 11 | 146 | 8.0909 | 117673 |
| CANVASBACK | 27 | 53 | | 160 | 2.4737 | 39427 |
| SCAUP ^U | 155 | 318 | 896 | 1687 | 2.5070 | 421306 |
| RING - NECKED DUCK ^U | 4 | 13 | 5 | 35 | 1.0893 | 3798 |
| GOLDENEYE | 1 | 3 | 6 | 14 | 5.5000 | 7670 |
| BUFFLEHEAD | 28 | 51 | 35 | 193 | 2.7000 | 51910 |
| OLDSQUAW | | | | | | |
| SCOTER | 13 | 13 | | 52 | 1.3000 | 6734 |
| RUDDY DUCK ^U | 14 | 17 | 75 | 123 | 6.5846 | 80679 |
| MERGANSE | 2 | 3 | 25 | 35 | 2.0000 | 6973 |
| | | | | | | |
| SUB - TOTAL | 1291 | 1189 | 1525 | 6293 | | 2119430 |
| COOT | | | 336 | 336 | 5.1597 | 172700 |
| GRAND TOTAL | 1291 | 1189 | 1861 | 6629 | | |
| CANADA GEESE | 14 | 10 | | 48 | 1.0000 | 4782 |

| | |
|--|--|
| COMPUTATION OF THE POPULATION INDEX | |
| P = POPULATION INDEX | |
| A = SQUARE MILES IN THE STRATUM | |
| T = INDICATED TOTAL BIRDS | |
| S = SQUARE MILES IN THE SAMPLE | |
| V = VISIBILITY RATIO | |
| $P = A \cdot T / S \cdot V$ | |

| | |
|---------------------------------|---------|
| NUMBER OF OBSERVED PONDS (x2) | 3728 |
| POND INDEX | 317594 |
| SQUARE MILES IN THE STRATUM (A) | 26448 |
| SQUARE MILES IN THE SAMPLE (S) | 265.5 |
| NUMBER OF SEGMENTS | 59 |
| EXPANSION FACTOR | 99.6158 |

^U Drakes not doubled in arriving at indicated total birds (T).

WATERFOWL BREEDING POPULATION SURVEY

STRATUM SUMMARY FORM

Stratum 27 Dates: 05 / 07 / 83 Thru 05 / 08 / 83

| SPECIES | DRAKES | PAIRS | GROUPED BIRDS | INDICATED TOTAL BIRDS (T) | VISIBILITY RATIO (V) | POPULATION INDEX (P) |
|----------------------|--------|-------|---------------|---------------------------|----------------------|----------------------|
| MALLARD | 135 | 42 | 31 | 385 | 3.0019 | 94096 |
| BLACK DUCK | | | | | | |
| GADWALL | 10 | 17 | | 54 | 2.8361 | 12469 |
| AMERICAN WIGEON | 10 | 21 | | 62 | 4.2414 | 21410 |
| GREEN - WINGED TEAL | 8 | 16 | | 48 | 8.1579 | 31881 |
| BLUE - WINGED TEAL | 22 | 43 | 57 | 187 | 5.0851 | 77420 |
| SHOVELER | 16 | 35 | 10 | 112 | 3.2494 | 29630 |
| PINTAIL | 74 | 19 | 90 | 276 | 3.1637 | 71092 |
| REDHEAD ♪ | 4 | 7 | | 18 | 8.0909 | 11857 |
| CANVASBACK | 7 | 17 | | 48 | 2.4737 | 9667 |
| SCAUP ♪ | 17 | 36 | 42 | 131 | 2.5070 | 26739 |
| RING - NECKED DUCK ♪ | 1 | | | 1 | 1.0893 | 89 |
| GOLDENEYE | | | | | 5.5000 | |
| BUFFLEHEAD | 2 | | | 4 | 2.7000 | 879 |
| OLDSQUAW | | | | | | |
| SCOTER | | | | | | |
| RUDDY DUCK ♪ | | 1 | | 2 | 6.5846 | 1072 |
| MERGANSEER | | | | | | |
| SUB - TOTAL | 306 | 254 | 230 | 1328 | | 388301 |
| COOT | | | 66 | 66 | 5.1597 | 27726 |
| GRAND TOTAL | 306 | 254 | 296 | 1394 | | 416027 |
| CANADA GEESE | 5 | 5 | | 20 | 1.0000 | 1628 |

| |
|-------------------------------------|
| COMPUTATION OF THE POPULATION INDEX |
| P = POPULATION INDEX |
| A = SQUARE MILES IN THE STRATUM |
| T = INDICATED TOTAL BIRDS |
| S = SQUARE MILES IN THE SAMPLE |
| V = VISIBILITY RATIO |
| $P = A \cdot T / S \cdot V$ |

| | |
|---------------------------------|---------|
| NUMBER OF OBSERVED PONDS (x2) | 802 |
| POND INDEX | 55841 |
| SQUARE MILES IN THE STRATUM (A) | 11724 |
| SQUARE MILES IN THE SAMPLE (S) | 144.0 |
| NUMBER OF SEGMENTS | 32 |
| EXPANSION FACTOR | 81.4167 |

♪ Drakes not doubled in arriving at indicated total birds (T).

WATERFOWL BREEDING POPULATION SURVEY

STRATUM SUMMARY FORM

Stratum 28 Dates: 05 / 06 / 83 Thru 05 / 07 / 83

| SPECIES | DRAKES | PAIRS | GROUPED BIRDS | INDICATED TOTAL BIRDS (T) | VISIBILITY RATIO (V) | POPULATION INDEX (P) |
|-----------------------------|--------|-------|---------------|---------------------------|----------------------|----------------------|
| MALLARD | 108 | 37 | 17 | 307 | 3.0019 | 87994 |
| BLACK DUCK | | | | | | |
| GADWALL | 12 | 14 | | 52 | 2.8361 | 14081 |
| AMERICAN WIGEON | 12 | 27 | | 78 | 4.2414 | 31588 |
| GREEN - WINGED TEAL | 1 | 6 | 6 | 20 | 8.1579 | 15579 |
| BLUE - WINGED TEAL | 11 | 40 | 69 | 171 | 5.0851 | 83026 |
| SHOVELER | 19 | 26 | | 90 | 3.2494 | 27923 |
| PINTAIL | 93 | 19 | 90 | 314 | 3.1637 | 94851 |
| REDHEAD <u>‡</u> | | 4 | | 8 | 8.0909 | 6180 |
| CANVASBACK | 6 | 1 | | 14 | 2.4737 | 3307 |
| SCAUP <u>‡</u> | 5 | 18 | 71 | 112 | 2.5070 | 26810 |
| RING - NECKED DUCK <u>‡</u> | | | | | 1.0893 | |
| GOLDENEYE | | | | | 5.5000 | |
| BUFFLEHEAD | | 1 | | 2 | 2.7000 | 516 |
| OLDSQUAW | | | | | | |
| SCOTER | 2 | | | 4 | 1.3000 | 497 |
| RUDDY DUCK <u>‡</u> | 5 | 4 | | 13 | 6.5846 | 8173 |
| MERGANSE | 1 | | | 2 | 2.0000 | 382 |
| SUB - TOTAL | 275 | 197 | 253 | 1187 | | 401404 |
| COOT | | | 65 | 65 | 5.1597 | 32023 |
| GRAND TOTAL | 275 | 197 | 318 | 1252 | | 433427 |
| CANADA GEESE | 8 | 11 | | 38 | 1.0000 | 3628 |

| COMPUTATION OF THE POPULATION INDEX | |
|-------------------------------------|-----------------------------|
| P = | POPULATION INDEX |
| A = | SQUARE MILES IN THE STRATUM |
| T = | INDICATED TOTAL BIRDS |
| S = | SQUARE MILES IN THE SAMPLE |
| V = | VISIBILITY RATIO |
| P = | $A \cdot T / S \cdot V$ |

‡ Drakes not doubled in arriving at indicated total birds (T).

| | |
|---------------------------------|---------|
| NUMBER OF OBSERVED PONDS (x2) | 708 |
| POND INDEX | 57812 |
| SQUARE MILES IN THE STRATUM (A) | 12890 |
| SQUARE MILES IN THE SAMPLE (S) | 135.0 |
| NUMBER OF SEGMENTS | 30 |
| EXPANSION FACTOR | 95.4815 |

WATERFOWL BREEDING POPULATION SURVEY

STRATUM SUMMARY FORM

Stratum 29 Dates: 05 / 04 / 83 Thru 05 / 05 / 83

| SPECIES | DRAKES | PAIRS | GROUPED BIRDS | INDICATED TOTAL BIRDS (T) | VISIBILITY RATIO (V) | POPULATION INDEX (P) |
|----------------------|--------|-------|---------------|---------------------------|----------------------|----------------------|
| MALLARD | 118 | 62 | | 360 | 3.0019 | 83642 |
| BLACK DUCK | | | | | | |
| GADWALL | 16 | 43 | | 118 | 2.8361 | 25902 |
| AMERICAN WIGEON | 10 | 22 | | 64 | 4.2414 | 21010 |
| GREEN - WINGED TEAL | | 5 | | 10 | 8.1579 | 6314 |
| BLUE - WINGED TEAL | 2 | 12 | 30 | 58 | 5.0851 | 22827 |
| SHOVELER | 11 | 40 | | 102 | 3.2494 | 25653 |
| PINTAIL | 84 | 29 | 43 | 269 | 3.1637 | 65868 |
| REDHEAD ♪ | | 4 | | 8 | 8.0909 | 5010 |
| CANVASBACK | 4 | 4 | | 16 | 2.4737 | 3063 |
| SCAUP ♪ | 13 | 16 | 6 | 51 | 2.5070 | 9896 |
| RING - NECKED DUCK ♪ | 2 | | | 2 | 1.0893 | 169 |
| GOLDENEYE | | | | | | |
| BUFFLEHEAD | | 1 | | 2 | 2.7000 | 418 |
| OLDSQUAW | | | | | | |
| SCOTER | 1 | 1 | | 4 | 1.3000 | 402 |
| RUDDY DUCK ♪ | | | | | | |
| MERGANSE | 2 | 2 | 7 | 15 | 2.0000 | 2322 |
| | | | | | | |
| SUB - TOTAL | 263 | 241 | 86 | 1079 | | 272496 |
| COOT | | | 49 | 49 | 5.1597 | 19568 |
| GRAND TOTAL | 263 | 241 | 135 | 1128 | | 292064 |
| CANADA GEESE | 8 | 19 | 11 | 65 | 1.000 | 5031 |

| | |
|--|--|
| COMPUTATION OF THE POPULATION INDEX | |
| P = POPULATION INDEX | |
| A = SQUARE MILES IN THE STRATUM | |
| T = INDICATED TOTAL BIRDS | |
| S = SQUARE MILES IN THE SAMPLE | |
| V = VISIBILITY RATIO | |
| $P = A \cdot T / S \cdot V$ | |

| | |
|---------------------------------|---------|
| NUMBER OF OBSERVED PONDS (x2) | 968 |
| POND INDEX | 64072 |
| SQUARE MILES IN THE STRATUM (A) | 13235 |
| SQUARE MILES IN THE SAMPLE (S) | 171 |
| NUMBER OF SEGMENTS | 38 |
| EXPANSION FACTOR | 77.3977 |

♪ Drakes not doubled in arriving at indicated total birds (T).