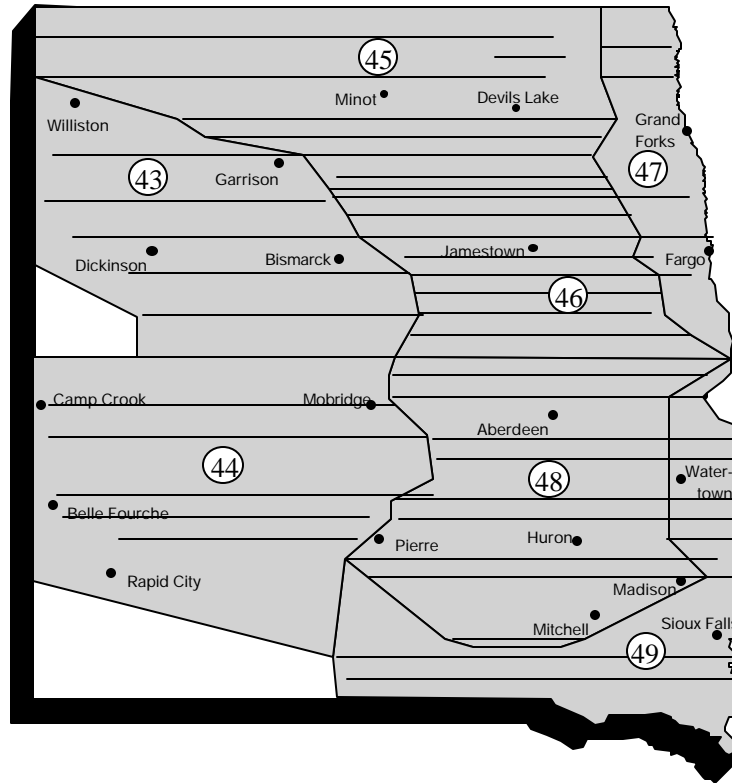


2001
WATERFOWL PRODUCTION SURVEY
FOR
SOUTH DAKOTA AND NORTH DAKOTA



TITLE: Waterfowl Production and Habitat Survey for South and North Dakota

STRATA SURVEYED: 44, 48, 49 (South Dakota)
43, 45, 46, 47, 48 (North Dakota)

DATES: 3 - 18 July 2001

DATA SUPPLIED BY: United States Fish and Wildlife Service

Strata 45, 46, 47, 48, 49

Observer/Pilot - John W. Solberg, Flyway Biologist,
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Observer - Sue Thomas, Secretary, MBHP, USFWS, Portland, OR

Strata 43 and 44

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ABSTRACT: The 2001 Waterfowl Production and Habitat Survey for eastern South and North Dakota was conducted during 3 - 18 July. Survey procedures in 2001 were unchanged but traditional coverage was incomplete. Weather patterns in June and July encouraged excellent stands of wetland basin and upland cover. June precipitation was more beneficial to North Dakota habitat than that in South Dakota. Wetland counts were similar or decreased slightly in the Dakotas compared to July of 2000 (SD 6%, ND -16%) but remain significantly above long-term averages (SD 30%, ND 52%). The Duck Brood Index (DBI) in South Dakota (89.7) is the seventh highest of record and is similar to the ten-year average. In North Dakota, the 2001 DBI (173.8) is fourth highest of record and although decreased (-20%) compared to 2000, is above the ten-year mean (46%). The 2001 brood indices are well above the long-term averages in both states (SD 99%, ND 192%). The total duck late nesting index (LNI) in South Dakota increased 132% compared to 2000, is below (-18%) the ten-year average, and similar to the long-term mean (10%). LNI in North Dakota was below the respective 2000, ten-year, and long-term figures (-23%, -45%, and -56%).

METHODS: The procedures followed in conducting the 2001 waterfowl production survey are described in the Standard Operating Procedures (SOP) for Aerial Waterfowl Breeding Ground Population and Habitat Surveys in North America, Section IV, revised 1987. Initially, aerial observations were recorded using two laptop computers which were interfaced with the aircraft GPS. On the fifth day of the survey, one of the units failed, forcing the observer to revert to a tape recorder for recording observations. No other changes occurred this year in operational procedures but survey coverage was incomplete. Due to a tape recorder malfunction, observations from three segments in Stratum 45 were missing from the right side of the aircraft. Additionally, a post survey examination of Stratum 48 data revealed eight segments missing

from the left side of the aircraft. Improper computer file management disallowed retrieval of the missing data. To adjust the expansion factor, those segments with incomplete data (one side of the aircraft missing) were removed from the data set and new expansion factors were calculated. These adjustments are indicated in Tables 4 and 8. In the crew area, 2001 marked the first waterfowl production survey for the right seat observer. Sue Thomas had assisted in conducting the Waterfowl Breeding Population survey earlier in the year. All survey data reported in 2001 are considered comparable to earlier years. Transects in the Western Dakotas (strata 43 and 44) were completed by the Montana survey crew led by James Voelzer. Our appreciation is extended to the Montana crew for their help. Transect flying began in eastern South Dakota on 3 July and was completed in North Dakota on 18 July. One day of survey flying was lost to inclement weather (thunderstorm/hail/wind) and on another day, only one segment was completed because of fog. Survey time parameters, outlined in the SOP, were violated during five days of sampling. On these days, foggy conditions lasting into the late morning forced us to survey later than the noon cut-off specified in the SOP. All survey flights were completed in N-761, a wheeled Cessna 185. Required flight time was about 65 hours.

WEATHER AND HABITAT CONDITIONS:

June began in South Dakota with cooler temperatures (1-3 degrees below normal) and rainy weather throughout most of the state. In fact, soil and crop conditions were reported as favorably to abnormally moist throughout South Dakota in June. The second week brought scattered severe weather. Most stations reported an inch or more precipitation with Huron reporting the least of .44 inches. Severe weather increased during the third week of June with hail, damaging winds and thunderstorms. Huron received the opposite extreme in precipitation than the rest of the state with 4.13" reported. Again, most stations received an inch of rain. Warmer conditions and sunshine brought the month to a close, increasing cover growth but promoted the drying of wetlands. Precipitation levels dropped to a minimum with some stations reporting zero precipitation.

North Dakota experienced similar weather patterns with soil and crop conditions remaining at favorably to abnormally moist throughout the month. Temperatures during the first week of June averaged 5 degrees below normal and precipitation levels were considered moderate. A strengthening low situated over the central plains produced approximately 10 days of unsettled weather including: severe thunderstorms, damaging hail and high winds. Temperatures remained below normal and precipitation continued through the third week. Overall, temperatures for the first three-quarters of the month were 2-7 degrees below normal. In late June, temperatures moderated, encouraging rapid development of crops and upland/basin cover.

Normal temperatures arrived in both states during the first week of July. Generally, little precipitation was received over the region with one exception. Reporting stations in south central Stratum 48 and 49 received .5 to over 2" of rain during that period. The second week of July, temperatures elevated to above normal. Precipitation in "east river" areas was light. During the remainder of the survey, above normal temperatures and high humidity caused early morning fog which usually "improved" to haze. These conditions were conducive for cumulus build-up with thunderstorms occurring mid-morning and through the remainder of the day.

Considering the fact that wet conditions returned to the Dakota prairies in July of 1993, 2001 marks the ninth consecutive year of above average, statewide wetland counts. The duration of this wet cycle must certainly have nutrient and invertebrate levels below maximum potential in many basins.

SOUTH DAKOTA (St. 48/49: 3 - 9 July)

Wetland counts statewide increased slightly (6%) in South Dakota compared to 2000 (Table 3). The July index decreased -55% since the May survey and the ten-year average (-13%), but is 30% wetter than the long-term average (LTA).

Stratum 44 - The west river crew reported that precipitation received since the May survey resulted in lush and extensive upland and riparian cover. All habitat in the stratum was considered good except a small area in the central portion (considered fair) which apparently received less rain. Stratum 44 was the only South Dakota survey unit where wetland counts increased (39%) since the May survey. The 2001 index (146.8) was similar to the July 2000 figure (-9%), fell short (-16%) of the ten-year mean, and was 16% above the long-term average.

Stratum 48 - Wetland counts in Stratum 48 declined -65% since May. The stratum index was similar to the July 2000 figure (8%), slightly drier than the ten-year mean (-12%), but 42% above the LTA. In the Prairie Coteau, the Leola Hills, and a narrow area running from Mitchell to just west of Huron, we considered nesting/brooding habitat excellent. Here, semi-permanent and permanent basins were full to overflowing and some seasonal wetlands still existed. Throughout the remainder of the stratum, seasonal water was absent. Type IV and V wetlands along with dugouts were nearly full to slightly recessional. In these areas, we considered the habitat good. Wetland basin and upland cover was excellent in all areas.

Stratum 49 - In Stratum 49, wetland numbers dropped -68% since the May survey. Although the 2001 figure was slightly below the ten-year average (-9%), conditions were 29% wetter than July 2000 and 32% on the positive side of the LTA. In the Prairie Coteau region of the north, and a small area in south central Stratum 49, some Type III water did exist. Coupled with brimming water levels in Type IV and Type V basins, we considered conditions in these areas excellent. As in May, the south east region (surrounding Sioux Falls) was a bit drier than other areas of the state and considered in fair condition. Because of drier conditions agriculture had their typically strong foothold and some basins had been tilled or hayed. The remainder of the stratum exhibited little or no seasonal water but the more permanent basins, for the most part, were nearly full or only slightly recessional.

NORTH DAKOTA (St. 45/46/47: 10 - 18 July)

Total wetland counts in North Dakota decreased only -15% since the May 2001 survey. The 2001 index dropped -16% compared to the July 2000 figure and is unchanged from the ten-year average. The index is 52% above the long-term mean (Table 7).

Stratum 43 - West river North Dakota too, benefitted from June rainfall. Again, upland and emergent vegetation growth was lush and extensive, but not as thick as in South Dakota. Conditions in the majority of Stratum 43 were considered good except for the extreme north west

portion which was only fair. The wetland index for July 2001 increased 52% since the May survey and is 31%, 18%, and 51% above last July's index, the ten-year mean, and the long-term average.

Stratum 45 - Wetland counts in Stratum 45 decreased a mere -19% since May. The 334,200 wetlands fell short of the July 2000 index (-20%), but was similar to the ten-year average (5%) and well above the LTA (59%). Beneficial June precipitation actually improved conditions (from good to excellent) in northern and southern reaches of the Missouri Coteau and maintained the excellent conditions that surrounded Devils Lake in May. Some drying did occur in the northwest, increasing the size of the "fair" area reported in May. Additionally, a small area in the extreme north east corner was considered only fair. The remainder of the stratum was considered in good condition.

Stratum 46 - Wetlands recorded during the survey in 46 decreased -28% since May of this year. The 2001 July figure was below that of 2000 (-27%) and the ten-year average (-16%) but 48% above the long-term average. As in Stratum 45, conditions in the Missouri Coteau portions of Stratum 46 improved to excellent as a result of June precipitation. The area in the south east region also maintained its excellent habitat condition. The remainder of the stratum was classed as good brood rearing and late nesting habitat.

Stratum 47 - The wetland index in Stratum 47 decreased compared to May (-54%), the 2000 index (-37%), and the ten-year average (-36%). The 2001 figure was similar to the LTA (-8%). All four habitat condition classifications occurred in Stratum 47 this July. The northern 1/3 is in fair/poor condition. More than half (eastern) of nearly all of the southern 2/3rds is also considered fair. A tiny portion in the southern tip, protruding in from Stratum 46, was excellent. This area was south of the historic Lake Agassiz lake bed. The remainder of 47 was considered good.

Production Indices: Perfect correlation between waterfowl breeding population and brood indices seldom occur. It is logical though that trends should be somewhat similar. In May of 2001, South Dakota held its second highest waterfowl breeding population of record and in North Dakota, the breeding population was third highest. Brood indices do not rank exactly with breeding populations but production, compared to over forty years of survey, was again strong.

The DBI in South Dakota ranks seventh highest of record at 89,700 broods. The index decreased -22% compared to last year, is similar to the ten-year average (5%), and well above (99%) the long-term mean (Table 2). Examination of DBI's by stratum since 2000 (see report) reveals the most significant decrease in production (-47%) in Stratum 44. The brood index in Stratum 49 decreased -23% but with the small sample, the decrease represents only 2,600 broods. Production in Stratum 48 was unchanged since last year (-2%). Production figures in 48 and 49 might be explained by the larger than "normal" decrease in wetland numbers (-65% to -68%) since May, but in 44 the large decrease in the DBI is somewhat baffling. July 2001 wetland counts were similar to those from last year (-9%), yet from May to July of 2001, wetland numbers actually increased 39%. The statewide DBI for 2001 is similar though to those indices recorded during the current wet cycle. Average brood size in South Dakota in 2001 is similar to the three standard time comparisons (2%, -5%, and 6%). Coot production rebounded from last

year (up 50%), fell short of the ten-year mean (-22%), and is above the LTA (72%).

In North Dakota, the DBI (173.8) decreased -20% since 2000 (Table 6). Increases occurred when compared to the ten-year average (46%) and the long-term average (192%). Comparing 2001 DBI's by stratum to the indices from 2000 (see report), suggest similar production from stratum 43 (-5%) and 45 (-2%), but a significant decline (-42%) in Stratum 46 (where wetland counts were nearly -30% lower than last year). A 67% increase in the DBI occurred in Stratum 47, but again the sample size is small and the increase represents only 1,400 broods. Average brood size in North Dakota was similar to last year (-6%) and the long-term mean (-7%) but was -15% below the ten-year average. The coot brood index in North Dakota decreased -50% compared to 2000 and -29% compared to the ten-year average. Coot broods for 2001 were 85% above the LTA.

As always, we believe our DBI's are conservative. The right seat observer was inexperienced conducting brood surveys prior to this effort. Wetland vegetation was extremely heavy and greatly reduced our ability to see broods. This condition was further aggravated at wetland basins in recession condition, where lower water levels increased the amount of exposed vegetation and created more "hiding places." Although winds were generally light during survey, we were forced to violate established sampling time parameters because of late morning fog which delayed our departure. Lastly, the proportion of observed/actual broods present remains unknown without the luxury of ground truthing. To put 2001 production in perspective, during the dry years of 1990 and 1991, 30 broods recorded by the aerial crew during an average day of sampling (16 - 18 segments) was a "good" day. This year our highest one day brood counts were 196 in South Dakota and 212 in North Dakota.

It appears that again, above average waterfowl breeding populations have experienced production well above long-term levels.

Late Nesting Indices: The Late Nesting Index is intended as a relative measure of late or secondary nesting effort. (Tables 1 and 5). In South Dakota, total LNI increased 132% compared to last year. The indicated effort by Mallards was particularly strong in all strata. This indication seems logical in Stratum 44 where wetland counts increased since May. In 48 and 49, wetland numbers diminished more than "normal" since the May survey, yet the Mallard LNI increased significantly since last year (see 2000 report).

Conversely, in North Dakota total LNI was below last year's level (-23%), and the ten-year (-45%) and long-term (-56%) averages. North Dakota benefitted more from June precipitation as reflected in the comparison of May and July wetland counts. It is possible that because of more stable water conditions (compared to South Dakota), initial nesting attempts in North Dakota were more successful. A reduced LNI could result from this scenario.

Conclusions:

1. July wetland counts were similar in South Dakota (6%) and decreased in North Dakota (-16) compared to July 2000. Although both states were wetter than long-term averages (SD 30%, ND 52%), South Dakota decreased -13% and North Dakota was nearly

identical to the ten-year average. June rains benefitted habitat conditions more so in North Dakota than in South Dakota. Generally, habitat conditions were good to excellent through much of the crew area with limited areas of fair and/or poor conditions occurring in the north west, the south east, and the north east. Upland and wetland basin cover was lush throughout the region with negative impacts from farming observed only in fair and poor areas. Those areas harboring good or excellent habitat should remain as such through the brooding period.

2. The DBI in South Dakota decreased -22% compared to 2000 and is the seventh highest index of record. The 2001 index is similar to the ten-year average and 99% above the long-term average. In North Dakota, the 2001 DBI (173,800) decreased -20% since last year but is 46% and 192% above the respective ten-year and long-term averages., Average brood sizes were similar to last year in both states. Statewide waterfowl production in North and South Dakota is above average this year
3. Total LNI increased in South Dakota (132%) and decreased in North Dakota (-23%) compared to 2000. The difference may be attributed to beneficial June rains in North Dakota which caused more stability in wetland conditions and a more successful first nesting effort. Both states were below the ten-year average (SD -18%, ND -45%) LNI. Compared to the long-term average, South Dakota LNI was similar (10%) and North Dakota was -56% below the LTA. Depending on precipitation during the next four to six weeks, those late and second nesting birds in the good and excellent areas will have the best chance for success

John W. Solberg and Sue Thomas
July 2001

Table 1. Long-term trend in waterfowl brood and late-nesting indices by species in South Dakota, 1959-2001 (index in thousands).^a

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Broods										
Duck brood index	130.2	115.4	89.7							
Average brood size ^b	5.8	5.3	5.4							
Coot brood index	20.7	5.4	8.1							
Late-nesting index ^c										
Ducks										
Dabblers										
Mallard	13.6	6.0	18.6							
Am. black duck	0.0	0.0	0.0							
Gadwall	6.9	2.1	6.3							
Am. wigeon	1.5	1.1	1.0							
Green-winged teal	0.0	0.0	0.5							
Blue-winged teal	4.8	1.0	3.9							
N. shoveler	0.3	1.1	1.0							
N. pintail	<u>0.5</u>	<u>2.2</u>	<u>0.5</u>							
Subtotal	27.6	13.5	31.8							
Divers										
Redhead	1.1	0.2	1.8							
Canvasback	0.0	0.0	0.2							
Scaups	0.2	0.8	0.5							
Ring-necked duck	0.0	0.0	0.2							
Goldeneyes	0.0	0.0	0.0							
Bufflehead	0.0	0.0	0.0							
Ruddy duck	<u>0.9</u>	<u>0.9</u>	<u>1.9</u>							
Subtotal	2.2	1.9	4.6							
Miscellaneous										
Oldsquaw	0.0	0.0	0.0							
Eiders	0.0	0.0	0.0							
Scoters	0.0	0.0	0.0							
Mergansers	<u>0.0</u>	<u>0.3</u>	<u>0.0</u>							
Subtotal	0.0	0.3	0.0							
Total ducks	29.8	15.7	36.4							

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 1 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in South Dakota, 1959-2001 (index in thousands).^a

Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Broods										
Duck brood index	25.7	18.9	27.5	14.3	36.4	110.9	68.5	114.4	118.8	119.5
Average brood size ^b	4.9	4.3	4.4	5.8	5.9	6.2	6.2	5.4	5.9	5.9
Coot brood index	2.6	1.9	1.5	5.0	4.7	15.6	12.9	15.3	12.6	10.6
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	11.1	38.0	30.2	21.7	25.4	5.2	30.8	17.9	8.0	7.6
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	6.6	23.7	16.8	11.3	17.4	4.3	24.1	9.5	4.9	4.7
Am. wigeon	1.8	3.0	2.7	1.8	2.2	1.5	4.8	3.5	1.5	3.0
Green-winged teal	0.0	0.3	0.0	0.3	0.2	0.0	0.7	0.5	0.0	0.0
Blue-winged teal	3.8	21.5	17.4	15.8	10.7	1.8	14.5	3.7	2.5	2.6
N. shoveler	0.4	2.2	2.4	1.5	3.5	0.3	0.8	1.0	0.5	1.0
N. pintail	4.5	1.9	6.2	1.3	4.4	1.8	4.9	2.5	1.0	1.8
Subtotal	28.3	90.5	75.7	53.7	63.8	14.9	80.6	38.6	18.4	20.7
Divers										
Redhead	1.6	1.1	1.6	2.0	5.5	0.3	3.5	0.0	0.6	0.2
Canvasback	0.2	0.5	0.3	0.3	0.0	0.0	0.8	0.0	0.0	0.0
Scaups	0.2	0.2	0.2	0.3	1.6	0.0	1.2	0.2	0.5	0.2
Ring-necked duck	0.0	0.5	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruddy duck	1.6	2.8	1.6	3.1	2.4	1.1	1.7	0.8	0.5	0.7
Subtotal	3.5	5.0	3.7	5.7	9.5	1.4	7.5	1.2	1.6	1.1
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	32.0	95.7	79.4	59.4	73.3	16.3	88.1	39.8	20.0	21.8

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 1 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in South Dakota, 1959-2001 (index in thousands).^a

Species	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Broods										
Duck brood index	28.7	16.3	6.5	41.4	41.3	58.6	23.4	65.0	56.8	20.8
Average brood size ^b	5.0	4.6	4.7	4.6	4.5	4.3	4.2	4.5	5.0	4.3
Coot brood index	1.2	3.3	0.8	3.5	5.2	8.6	2.7	8.3	8.0	1.1
Late-nesting index ^c										
Ducks										
Dabblers										
Mallard	6.7	3.9	4.5	10.7	14.4	21.6	8.8	13.4	6.3	4.4
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	2.0	1.0	2.5	5.1	12.6	14.1	2.8	6.8	3.5	2.5
Am. wigeon	1.6	0.2	1.2	2.1	2.2	5.4	2.7	1.9	1.9	0.3
Green-winged teal	0.3	0.5	0.0	0.0	0.0	0.2	0.3	0.5	0.5	0.5
Blue-winged teal	0.7	1.2	1.7	5.1	8.9	19.8	2.6	8.7	3.5	2.9
N. shoveler	0.3	0.3	0.2	1.1	0.7	4.9	0.2	1.6	1.2	1.4
N. pintail	<u>0.7</u>	<u>0.5</u>	<u>2.0</u>	<u>4.0</u>	<u>4.2</u>	<u>10.2</u>	<u>1.2</u>	<u>5.0</u>	<u>2.3</u>	<u>1.5</u>
Subtotal	12.2	7.6	11.9	28.0	42.9	76.1	18.4	38.0	19.2	13.6
Divers										
Redhead	0.0	0.0	0.5	2.4	2.1	3.6	1.0	1.0	1.1	0.0
Canvasback	0.0	0.0	0.2	0.3	0.0	0.2	0.0	0.2	0.3	0.2
Scaups	0.0	0.0	0.0	0.3	0.8	0.0	0.2	0.3	0.7	0.0
Ring-necked duck	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Ruddy duck	<u>0.8</u>	<u>1.5</u>	<u>1.6</u>	<u>1.5</u>	<u>2.0</u>	<u>2.8</u>	<u>0.8</u>	<u>2.4</u>	<u>1.6</u>	<u>0.4</u>
Subtotal	0.8	1.5	2.3	4.6	5.1	6.6	1.9	3.8	3.7	0.6
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	13.0	9.1	14.2	32.7	48.0	82.8	20.3	41.8	22.9	14.2

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 1 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in South Dakota, 1959-2001 (index in thousands).^a

Species	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Broods										
Duck brood index	41.5	38.7	26.3	58.8	42.3	18.8	21.1	10.9	20.7	45.3
Average brood size ^b	5.5	5.7	5.5	5.4	4.4	4.8	5.0	4.8	4.7	5.0
Coot brood index	4.7	3.3	1.0	6.6	1.8	0.3	0.0	0.3	0.3	0.9
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	12.6	11.9	5.9	13.8	11.0	9.1	12.3	5.2	4.7	8.5
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	9.0	4.6	3.8	8.1	3.4	8.2	8.0	2.4	1.8	6.3
Am. wigeon	1.3	2.4	0.0	2.5	2.3	1.0	1.5	1.2	2.2	2.3
Green-winged teal	0.9	2.1	0.0	0.0	0.0	0.7	0.2	0.0	0.0	0.6
Blue-winged teal	6.8	3.3	3.7	7.6	4.1	5.0	7.5	0.6	2.8	4.1
N. shoveler	1.1	1.6	0.0	0.3	1.2	0.0	0.0	0.0	0.4	0.8
N. pintail	<u>2.4</u>	<u>2.0</u>	<u>1.0</u>	<u>2.8</u>	<u>4.3</u>	<u>1.7</u>	<u>1.5</u>	<u>2.5</u>	<u>1.1</u>	<u>3.4</u>
Subtotal	34.1	27.9	14.4	35.0	26.3	25.7	31.0	11.9	13.0	26.1
Divers										
Redhead	1.0	0.8	0.0	0.8	0.0	0.2	0.5	0.0	0.0	2.9
Canvasback	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.5
Scaups	0.0	1.0	0.0	0.0	0.5	0.0	0.0	0.0	0.3	0.4
Ring-necked duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruddy duck	<u>1.4</u>	<u>2.2</u>	<u>0.9</u>	<u>3.4</u>	<u>2.0</u>	<u>1.3</u>	<u>2.7</u>	<u>0.0</u>	<u>0.2</u>	<u>1.8</u>
Subtotal	2.4	3.9	0.9	4.2	2.5	1.5	3.1	0.3	0.4	5.5
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>1.7</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Subtotal	0.0	0.4	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	36.5	32.2	15.3	40.9	28.8	27.2	34.1	12.2	13.4	31.6

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 1 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in South Dakota, 1959-2001 (index in thousands).^a

Species	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
Broods										
Duck brood index	11.2	33.5	41.2	42.2	62.8	11.6	18.8	45.1	22.7	23.3
Average brood size ^b	4.4	5.2	5.2	5.1	5.0	6.4	4.5	7.2	4.6	4.9
Coot brood index	0.3	0.6	2.2	2.7	1.0	1.1	0.4	15.2	2.6	2.4
Late-nesting index ^c										
Ducks										
Dabblers										
Mallard	6.6	11.1	7.4	14.0	3.5	6.1	19.1	8.4	14.3	6.6
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	0.0	1.4	0.1	5.9	3.3	2.5	7.2	6.0	7.3	2.6
Am. wigeon	0.0	0.1	0.3	0.3	0.0	0.0	0.0	0.0	2.3	1.3
Green-winged teal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Blue-winged teal	1.3	2.6	4.5	21.7	2.2	7.6	9.2	1.0	6.2	1.0
N. shoveler	0.0	0.0	0.0	0.9	0.0	0.4	0.0	2.2	0.8	0.3
N. pintail	0.3	2.4	1.9	4.5	0.9	0.0	0.0	0.6	0.5	0.0
Subtotal	8.2	17.6	14.1	47.3	9.9	16.7	35.5	18.1	31.6	11.8
Divers										
Redhead	0.0	0.3	0.1	1.7	0.3	0.6	3.0	0.0	0.2	0.0
Canvasback	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.6	0.0
Scaups	0.0	0.4	0.5	0.9	0.0	0.0	0.0	0.1	0.3	0.0
Ring-necked duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruddy duck	0.0	1.1	4.7	1.9	2.4	0.4	6.0	4.7	1.6	0.8
Subtotal	0.0	1.8	5.3	4.5	2.7	1.1	9.0	4.9	2.7	0.8
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	8.2	19.5	19.4	51.8	12.6	17.8	44.4	22.9	34.4	12.5

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 2. Status of waterfowl brood and late-nesting indices by stratum in South Dakota, comparing 2001 with 2000, the 1991-2000 previous 10-year mean, and the 1959-2000 long-term mean (index in thousands).^a

Species	Strata (2001)			2001 Total	2000 Total	10-year Mean	Long-term Mean	Percent change from		
	44	48	49					2000	10-year Mean	Long-term Mean
Broods										
Duck brood index	24.1	57.1	8.5	89.7	115.4	85.6	45.1	-22%	5%	99%
Average brood size ^b	5.2	5.5	5.3	5.4	5.3	5.7	5.1	2%	-5%	6%
Coot brood index	0.0	7.2	0.9	8.1	5.4	10.4	4.7	50%	-22%	72%
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	7.0	7.9	3.7	18.6	6.0	16.6	12.0	210%	12%	55%
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Gadwall	0.8	4.2	1.3	6.3	2.1	10.2	6.6	200%	-38%	-5%
Am. wigeon	0.8	0.2	0.0	1.0	1.1	2.4	1.6	-9%	-58%	-38%
Green-winged teal	0.3	0.2	0.0	0.5	0.0	0.2	0.2	+	150%	150%
Blue-winged teal	1.6	1.9	0.4	3.9	1.0	7.5	6.1	290%	-48%	-36%
N. shoveler	0.8	0.2	0.0	1.0	1.1	1.2	0.9	-9%	-17%	11%
N. pintail	0.0	0.5	0.0	0.5	2.2	2.7	2.3	-77%	-81%	-78%
Subtotal	11.3	15.1	5.4	31.8	13.5	40.8	29.8	136%	-22%	7%
Divers										
Redhead	0.0	1.4	0.4	1.8	0.2	1.5	1.0	800%	20%	80%
Canvasback	0.0	0.2	0.0	0.2	0.0	0.1	0.1	+	100%	100%
Scaups	0.3	0.2	0.0	0.5	0.8	0.5	0.3	-38%	NC	67%
Ring-necked duck	0.0	0.2	0.0	0.2	0.0	0.1	0.0	+	100%	+
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Ruddy duck	0.0	1.2	0.7	1.9	0.9	1.4	1.7	111%	36%	12%
Subtotal	0.3	3.2	1.1	4.6	1.9	3.6	3.2	142%	28%	44%
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Mergansers	0.0	0.0	0.0	0.0	0.3	0.0	0.1	-	NC	-
Subtotal	0.0	0.0	0.0	0.0	0.3	0.0	0.1	-	NC	-
Total ducks	11.6	18.3	6.5	36.4	15.7	44.4	33.0	132%	-18%	10%

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 3. Long-term trend in July pond indices by stratum in South Dakota, comparing 2001 with 2000, the 1991-2000 previous 10-year mean, the 1970-2000 long-term mean, and comparison of May with July ponds in 2001 (estimates in thousands).^a

Year	Strata			Total
	44	48	49	
1970	77.6	98.3	52.6	228.5
1971	115.1	117.7	70.5	303.3
1972	145.6	129.0	59.4	334.0
1973	119.3	76.0	54.8	250.2
1974	62.7	61.0	38.1	161.9
1975	105.4	80.7	39.4	225.5
1976	95.3	64.0	43.5	202.8
1977	93.8	43.2	25.5	162.6
1978	99.3	100.5	43.9	243.8
1979	114.6	61.4	37.4	213.3
1980	52.3	33.3	18.1	103.7
1981	75.8	37.5	31.7	145.0
1982	122.3	88.2	55.7	266.3
1983	74.6	134.3	125.9	334.7
1984	102.9	341.7	184.8	629.4
1985	120.1	93.2	71.8	285.1
1986	139.0	175.8	99.1	413.9
1987	133.7	102.1	60.2	296.0
1988	92.0	59.3	46.5	197.8
1989	119.6	74.2	46.3	240.0
1990	117.5	81.2	52.6	251.3
1991	113.2	130.8	64.4	308.4
1992	93.8	128.8	72.0	294.6
1993	406.4 ^b	224.3	129.4	760.1
1994	143.8	194.7	94.1	432.6
1995	186.0	252.0	105.0	543.0
1996	112.5	223.9	100.2	436.6
1997	109.2	263.4	114.2	486.8
1998	170.4	248.5	110.0	528.9
1999	246.4	394.6	250.7	891.7

Table 3 (cont). Long-term trend in July pond indices by stratum in South Dakota, comparing 2001 with 2000, the 1991-2000 previous 10-year mean, the 1970-2000 long-term mean, and comparison of May with July ponds in 2001 (estimates in thousands).^a

Year	Strata			Total
	44	48	49	
2000	160.7	182.5	78.5	421.7
2001	146.8	197.0	101.5	445.3
2002				
2003				
2004				
2005				
2006				
2007				
2008				
2009				
10-year mean	174.2	224.4	111.9	510.4
Long-term mean	126.5	138.6	76.7	341.7
<u>Percent Change</u>				
2001 from 2000	-9%	8%	29%	6%
2001 from 10-year mean	-16%	-12%	-9%	-13%
2001 from long-term mean	16%	42%	32%	30%
May ponds 2001 (adjusted)	105.3	562.9	320.9	989.1
<u>Percent change</u>				
May to July 2001 (adjusted) (unadjusted)	39%	-65%	-68%	-55%

^aJuly ponds unadjusted for visibility bias.

^bDue to an abnormally high visibility rate in May, 1993 July ponds for stratum 44 were calculated by applying % change from May to July raw data, to adjusted May ponds.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 4. Survey design for South Dakota, July 2001.

	44	Stratum 48	49	Total
<u>Survey design</u>				
Square miles in stratum	28,930	24,587	15,830	67,716
Square miles in sample - water	216	315	171	702
Square miles in sample - ducks	108	157.5	85.5	351.0
Linear miles in sample	864	1,260	684	2,808
Number of transects in sample	5	9	11	25
Number of segments in sample	48	70	38	156
Expansion factor - water	133.9370	78.0539	92.5731	-
Expansion factor - ducks	267.8740	156.1079	185.1462	-
 <u>Current year coverage</u>				
Square miles in sample - water	207	279	171	657
Square miles in sample - ducks	103.5	139.5	85.5	328.5
Linear miles in sample	828	1,116	684	2,628
Number of transects in sample	5	9	11	25
Number of segments in sample	48	62	38	148
Expansion factor - water	133.9370	88.1255	92.5731	-
Expansion factor - ducks	267.8740	176.2510	185.1462	-

Table 5. Long-term trend in waterfowl brood and late-nesting indices by species in North Dakota, 1958-2001 (index in thousands).^a

Species	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Broods										
Duck brood index	196.7	189.4	217.6	173.8						
Average brood size ^b	6.2	6.6	5.3	5.0						
Coot brood index	78.6	82.5	66.7	33.2						
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	3.3	5.1	3.9	4.7						
Am. black duck	0.0	0.0	0.0	0.0						
Gadwall	3.1	1.5	2.6	1.2						
Am. wigeon	0.9	0.5	0.0	0.8						
Green-winged teal	0.0	0.0	0.1	0.0						
Blue-winged teal	2.4	1.1	2.6	1.6						
N. shoveler	0.8	0.2	0.5	0.5						
N. pintail	<u>0.0</u>	<u>0.5</u>	<u>1.0</u>	<u>0.0</u>						
Subtotal	10.5	8.9	10.7	8.8						
Divers										
Redhead	0.7	0.4	0.5	0.3						
Canvasback	0.0	0.0	0.0	0.0						
Scaups	0.1	0.0	0.9	0.0						
Ring-necked duck	0.1	0.0	0.0	0.2						
Goldeneyes	0.0	0.0	0.0	0.0						
Bufflehead	0.0	0.0	0.0	0.0						
Ruddy duck	<u>4.7</u>	<u>2.6</u>	<u>2.8</u>	<u>2.2</u>						
Subtotal	5.6	3.0	4.2	2.7						
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0						
Eiders	0.0	0.0	0.0	0.0						
Scoters	0.0	0.0	0.0	0.0						
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>						
Subtotal	0.0	0.0	0.0	0.0						
Total ducks	16.1	11.9	14.9	11.5						

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 5 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in North Dakota, 1958-2001 (index in thousands).^a

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Broods										
Duck brood index	46.9	40.9	14.3	23.5	17.5	29.3	85.3	107.3	155.9	171.1
Average brood size ^b	4.8	4.8	4.5	5.3	5.7	6.1	5.7	6.1	6.0	5.7
Coot brood index	5.7	3.7	1.3	1.1	4.3	5.1	25.2	52.8	62.9	87.7
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	3.8	11.7	11.8	9.0	7.8	10.7	3.1	5.5	7.5	2.3
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	3.1	3.4	5.7	3.4	3.6	13.0	0.9	6.5	7.1	2.6
Am. wigeon	1.0	1.5	0.7	0.9	1.3	1.5	0.9	0.7	1.4	0.4
Green-winged teal	0.1	0.0	0.0	0.0	0.2	0.1	0.2	0.1	0.1	0.2
Blue-winged teal	2.8	3.3	6.2	5.0	4.0	4.1	0.5	4.5	2.4	2.3
N. shoveler	0.5	0.3	0.6	0.8	0.1	0.4	0.0	0.0	0.0	0.7
N. pintail	<u>2.2</u>	<u>3.9</u>	<u>0.8</u>	<u>1.5</u>	<u>1.1</u>	<u>0.8</u>	<u>0.7</u>	<u>0.3</u>	<u>1.7</u>	<u>0.0</u>
Subtotal	13.5	24.1	25.9	20.7	18.1	30.6	6.3	17.6	20.2	8.5
Divers										
Redhead	0.8	1.2	1.3	0.4	1.4	4.0	0.9	1.8	1.0	0.7
Canvasback	0.0	0.8	1.2	0.3	0.0	0.3	0.0	0.1	0.0	0.0
Scaups	0.3	0.3	0.5	0.0	0.2	0.0	0.2	0.1	0.3	0.0
Ring-necked duck	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Ruddy duck	<u>0.7</u>	<u>3.0</u>	<u>1.0</u>	<u>1.6</u>	<u>3.5</u>	<u>4.8</u>	<u>2.9</u>	<u>7.8</u>	<u>9.6</u>	<u>1.2</u>
Subtotal	1.8	5.5	4.1	2.4	5.1	9.3	4.2	9.8	10.9	2.0
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.2</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Subtotal	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Total ducks	15.2	29.6	29.9	23.1	23.2	40.1	10.5	27.4	31.1	10.5

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 5 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in North Dakota, 1958-2001 (index in thousands).^a

Species	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Broods										
Duck brood index	37.6	30.7	37.8	25.5	72.7	52.2	84.3	46.6	62.0	91.9
Average brood size ^b	5.5	5.1	4.8	4.8	5.0	4.7	4.3	4.6	4.5	4.8
Coot brood index	1.2	3.4	3.6	3.5	30.6	12.1	11.9	11.9	14.4	28.8
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	5.2	2.7	2.3	3.8	13.1	9.3	13.9	5.3	4.8	4.7
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	1.9	2.0	0.3	1.6	6.7	14.2	10.4	2.7	1.3	4.2
Am. wigeon	0.5	0.4	0.1	1.0	3.0	2.1	1.5	1.2	1.1	0.9
Green-winged teal	0.0	0.0	0.2	0.2	0.2	0.9	0.1	0.1	0.3	0.3
Blue-winged teal	1.4	1.0	0.0	1.2	7.1	8.2	6.2	2.3	2.7	4.1
N. shoveler	0.0	0.5	0.0	0.2	1.7	1.0	1.1	0.7	0.6	1.1
N. pintail	3.5	1.9	0.2	1.1	1.6	6.3	2.8	1.5	1.2	3.0
Subtotal	12.5	8.4	3.1	9.1	33.4	42.0	36.0	13.8	12.0	18.2
Divers										
Redhead	2.7	0.7	0.0	0.0	3.4	2.4	1.6	0.9	0.3	2.3
Canvasback	0.4	0.1	0.2	0.3	0.7	0.2	1.0	0.1	0.2	0.2
Scaups	0.3	0.3	0.0	0.0	0.9	3.5	4.3	1.1	0.4	1.8
Ring-necked duck	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruddy duck	2.3	1.3	0.7	1.2	13.2	9.6	9.0	3.2	2.5	4.5
Subtotal	5.8	2.4	0.8	1.5	18.2	16.2	16.1	5.3	3.4	8.8
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	18.3	10.8	3.9	10.6	51.5	58.1	52.1	19.2	15.4	27.0

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 5 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in North Dakota, 1958-2001 (index in thousands).^a

Species	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Broods										
Duck brood index	27.3	50.0	57.6	39.0	51.9	36.9	34.1	41.1	28.3	29.9
Average brood size ^b	5.5	6.2	6.5	5.6	5.5	5.2	5.8	5.7	5.7	4.5
Coot brood index	5.2	14.2	19.5	15.0	16.0	8.1	12.6	6.4	5.4	1.2
Late-nesting index ^c										
Ducks										
Dabblers										
Mallard	7.9	9.4	9.7	9.0	9.6	7.7	8.5	33.1	8.6	3.6
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	4.9	9.6	5.9	6.3	10.7	2.0	15.1	31.4	3.2	2.0
Am. wigeon	0.6	0.9	0.0	0.3	1.0	1.6	0.4	1.1	0.6	0.4
Green-winged teal	0.0	1.0	2.6	0.5	0.2	0.2	0.3	0.0	0.4	0.2
Blue-winged teal	0.4	11.7	2.4	4.8	7.7	2.9	11.0	29.8	1.4	1.7
N. shoveler	0.0	0.7	0.1	0.0	0.2	0.0	0.0	0.8	1.0	0.0
N. pintail	<u>0.0</u>	<u>3.2</u>	<u>2.0</u>	<u>0.6</u>	<u>1.5</u>	<u>0.6</u>	<u>0.4</u>	<u>3.1</u>	<u>3.1</u>	<u>1.5</u>
Subtotal	13.8	36.6	22.7	21.5	30.8	15.0	35.7	99.3	18.3	9.3
Divers										
Redhead	0.2	1.4	1.6	0.1	0.7	0.5	0.6	3.4	0.3	0.3
Canvasback	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.0	0.2
Scaups	0.0	0.6	0.3	0.3	0.3	0.2	0.9	0.3	0.0	0.0
Ring-necked duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruddy duck	<u>3.1</u>	<u>4.7</u>	<u>5.0</u>	<u>1.4</u>	<u>5.6</u>	<u>1.6</u>	<u>4.8</u>	<u>8.4</u>	<u>4.0</u>	<u>0.5</u>
Subtotal	3.3	6.7	7.0	1.9	6.7	2.9	6.2	12.3	4.4	1.0
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	17.1	43.3	29.8	23.3	37.5	17.9	41.9	111.6	22.7	10.3

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 5 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in North Dakota, 1958-2001 (index in thousands).^a

Species	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Broods										
Duck brood index	68.7	13.5	42.5	26.7	24.3	31.6	15.6	15.9	41.6	49.5
Average brood size ^b	5.6	4.9	5.4	4.1	4.7	5.0	5.6	6.1	6.6	5.4
Coot brood index	13.3	1.3	4.8	1.1	1.4	1.4	3.1	4.0	21.7	14.9
Late-nesting index ^c										
Ducks										
Dabblers										
Mallard	4.5	4.2	9.4	3.5	19.9	6.7	5.5	6.0	9.9	17.4
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	1.7	0.6	2.7	2.3	6.2	0.6	2.8	6.5	3.2	14.0
Am. wigeon	1.1	0.0	0.0	0.0	0.0	0.8	0.0	0.3	0.0	0.9
Green-winged teal	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.2	0.5
Blue-winged teal	2.1	0.6	4.0	1.5	13.9	3.8	5.5	3.6	3.3	10.5
N. shoveler	0.2	0.0	0.2	0.0	0.9	0.0	1.0	0.0	1.3	0.2
N. pintail	<u>0.0</u>	<u>1.1</u>	<u>0.6</u>	<u>2.1</u>	<u>4.1</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>1.2</u>	<u>1.6</u>
Subtotal	9.6	6.4	16.9	9.7	45.0	12.1	14.7	16.3	19.0	45.0
Divers										
Redhead	0.0	0.0	1.3	0.2	3.8	0.2	0.0	0.3	0.7	0.8
Canvasback	0.3	0.6	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Scaups	0.0	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Ring-necked duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruddy duck	<u>0.0</u>	<u>1.9</u>	<u>3.8</u>	<u>1.7</u>	<u>4.3</u>	<u>2.4</u>	<u>0.6</u>	<u>1.5</u>	<u>5.7</u>	<u>4.4</u>
Subtotal	0.3	2.8	5.8	2.2	8.1	2.6	0.6	1.8	6.4	5.4
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	9.9	9.3	22.8	11.8	53.1	14.7	15.3	18.1	25.4	50.4

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 6. Status of waterfowl brood and late-nesting indices by stratum in North Dakota, comparing 2001 with 2000, the 1991-2000 previous 10-year mean, and the 1958-2000 long-term mean (index in thousands).^a

Species	Strata (2001)				2001 Total	2000 Total	10-year Mean	Long-term Mean	Percent change from			
	43	45	46	47					2000	10-year Mean	Long-term Mean	
Broods												
Duck brood index	20.6	92.2	57.5	3.5	173.8	217.6	119.4	59.6	-20%	46%	192%	
Average brood size ^b	4.8	5.1	5.0	4.2	5.0	5.3	5.9	5.4	-6%	-15%	-7%	
Coot brood index	1.1	24.6	7.2	0.3	33.2	66.7	46.7	17.9	-50%	-29%	85%	
Late-nesting index^c												
Ducks												
Dabblers												
Mallard	3.6	0.5	0.6	0.0	4.7	3.9	5.8	8.0	21%	-19%	-41%	
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC	
Gadwall	0.7	0.0	0.5	0.0	1.2	2.6	4.4	5.4	-54%	-73%	-78%	
Am. wigeon	0.7	0.0	0.1	0.0	0.8	0.0	0.9	0.8	+	-11	NC	
Green-winged teal	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	-	-	-	
Blue-winged teal	0.9	0.5	0.2	0.0	1.6	2.6	2.9	4.6	-38%	-45%	-65%	
N. shoveler	0.5	0.0	0.0	0.0	0.5	0.5	0.4	0.4	NC	25%	25%	
N. pintail	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>1.0</u>	<u>0.8</u>	<u>1.5</u>	-	-	-	
Subtotal	6.4	1.0	1.4	0.0	8.8	10.7	15.2	21.0	-18%	-42%	-58%	
Divers												
Redhead	0.0	0.0	0.3	0.0	0.3	0.5	1.2	1.1	-40%	-75%	-73%	
Canvasback	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	NC	-	-	
Scaups	0.0	0.0	0.0	0.0	0.0	0.9	0.2	0.4	-	-	-	
Ring-necked duck	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	+	+	+	
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC	
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC	
Ruddy duck	<u>0.9</u>	<u>0.9</u>	<u>0.4</u>	<u>0.0</u>	<u>2.2</u>	<u>2.8</u>	<u>4.2</u>	<u>3.7</u>	<u>-21%</u>	<u>-48%</u>	<u>-41%</u>	
Subtotal	0.9	0.9	0.9	0.0	2.7	4.2	5.7	5.5	-36%	-53%	-51%	
Miscellaneous												
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC	
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC	
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC	
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>NC</u>	<u>NC</u>	<u>NC</u>	
Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC	
Total ducks	7.3	1.9	2.3	0.0	11.5	14.9	20.9	26.4	-23%	-45%	-56%	

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 7. Long-term trend in July pond indices by stratum in North Dakota, comparing 2001 with 2000, the 1991-2000 previous 10-year mean, the 1970-2000 long-term mean, and comparison of May with July ponds in 2001 (estimates in thousands).^a

Year	Strata				Total
	43	45	46	47	
1970	46.1	286.1	80.4	23.2	435.7
1971	104.4	230.8	77.9	9.7	422.9
1972	71.9	191.1	57.5	10.4	330.9
1973	87.3	130.7	24.5	7.3	249.7
1974	42.0	194.7	44.5	15.6	296.8
1975	73.9	213.2	155.6	25.0	467.7
1976	74.0	215.2	63.4	8.7	361.3
1977	68.7	71.2	32.4	2.8	175.0
1978	59.4	104.3	64.4	2.1	230.2
1979	79.1	156.7	66.0	15.6	317.5
1980	38.7	51.1	30.3	2.4	122.5
1981	55.2	95.9	35.0	8.7	194.7
1982	97.6	175.6	73.8	10.8	357.9
1983	50.4	281.3	140.4	21.6	493.6
1984	75.0	265.0	143.6	15.6	499.3
1985	94.9	132.1	51.4	9.7	288.1
1986	101.9	182.8	94.1	18.8	397.6
1987	88.6	149.9	93.4	5.2	337.2
1988	63.3	79.2	34.1	4.2	180.8
1989	105.1	63.3	39.3	5.6	213.3
1990	99.5	75.3	36.2	5.6	216.5
1991	99.2	60.4	53.4	5.6	218.6
1992	76.2	70.0	44.6	9.7	200.5
1993	229.8 ^b	312.0	174.4	18.4	734.6
1994	97.6	211.8	156.4	19.1	484.9
1995	146.2	343.9	260.3	27.5	777.9
1996	73.2	330.1	206.9	15.6	625.8
1997	73.5	344.2	238.9	26.1	682.7
1998	78.0	274.4	218.3	25.0	595.7
1999	137.4	811.9	338.7	27.1	1315.1

Table 7 (cont). Long-term trend in July pond indices by stratum in North Dakota, comparing 2001 with 2000, the 1991-2000 previous 10-year mean, the 1970-2000 long-term mean, and comparison of May with July ponds in 2001 (estimates in thousands).^a

Year	Strata				Total
	43	45	46	47	
2000	99.8	416.8	219.9	19.8	756.3
2001	131.1	334.2	160.1	12.5	637.9
2002					
2003					
2004					
2005					
2006					
2007					
2008					
2009					
10-year mean	111.1	317.6	191.2	19.4	639.2
Long-term mean	86.7	210.4	108.1	13.6	418.8
<u>Percent Change</u>					
2001 from 2000	31%	-20%	-27%	-37%	-16%
2001 from 10-year mean	18%	5%	-16%	-36%	NC
2001 from long-term mean	51%	59%	48%	-8%	52%
May ponds 2001 (adjusted)	86.2	414.9	222.1	26.9	750.2
<u>Percent change</u>					
May to July 2001 (adjusted) (unadjusted)	52%	-19%	-28%	-54%	-15%

^aJuly ponds unadjusted for visibility bias.

^bDue to an abnormally high visibility rate in May, 1993 July ponds for stratum 43 were calculated by applying % change from May to July raw data, to adjusted May ponds.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 8. Survey design for North Dakota, July 2001.

	Stratum				Total
	43	45	46	47	
<u>Survey design</u>					
Square miles in stratum	19,835	26,625	14,238	7,821	68,519
Square miles in sample - water	175.5	310.5	270	45	801
Square miles in sample - ducks	87.75	155.25	135.0	22.5	400.5
Linear miles in sample	702	1,242	1,080	180	3,204
Number of transects in sample	5	7	8	6	26
Number of segments in sample	39	69	60	10	178
Expansion factor - water	113.0200	85.7488	52.7334	173.8000	-
Expansion factor - ducks	226.0399	171.4976	105.4667	347.6000	-
 <u>Current year coverage</u>					
Square miles in sample - water	175.5	297.0	270	45	787.5
Square miles in sample - ducks	87.75	148.5	135.0	22.5	393.75
Linear miles in sample	702	1,188	1,080	180	3,150
Number of transects in sample	5	7	8	6	26
Number of segments in sample	39	66	60	10	175
Expansion factor - water	113.0200	89.6465	52.7334	173.8000	-
Expansion factor - ducks	226.0399	179.2930	105.4667	347.6000	-