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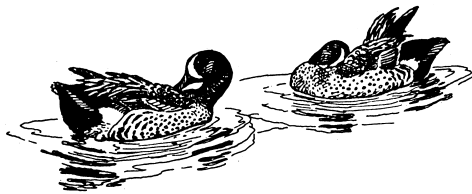
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TRENDS IN DUCK BREEDING POPULATIONS, 1955-2007

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Division of Migratory Bird Management
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Administrative Report – July 11, 2007



This report summarizes information about the status of duck populations and wetland habitats during spring 2007, focusing on areas encompassed by the U.S. Fish and Wildlife (USFWS) and Canadian Wildlife Services' (CWS) Waterfowl Breeding Population and Habitat Survey. This report does not include information from surveys conducted by State or Provincial agencies. In the traditional survey area, which includes strata 1-18, 20-50, and 75-77 (Fig. 1), the total duck population estimate (excluding scoters [*Melanitta* spp.], eiders [*Somateria* and *Polysticta* spp.], long-tailed ducks [*Clangula hyemalis*], mergansers [*Mergus* and *Lophodytes* spp.], and wood ducks [*Aix sponsa*]) was 41.2 ± 0.8 [SE] million birds. This was 14% greater than last year's estimate of 36.2 ± 0.6 million birds and 24% above the 1955-2006 long-term average^a (Tables 1-12). Mallard (*Anas platyrhynchos*) abundance was 8.0 ± 0.3 million birds, which was 10% above last year's estimate of 7.3 ± 0.2 million birds and 7% above the long-term average (Appendix A). Blue-winged teal (*A. discors*) abundance was 6.7 ± 0.4 million birds. This value was the third highest estimate since 1955, 14% greater than last year's estimate of 5.9 ± 0.3 million birds, and 48% above the long-term average. Estimated abundances of gadwall (*A. strepera*; 3.4 ± 0.2 million) and Northern shovelers (*A. clypeata*; 4.6 ± 0.2 million) were also above those of last year (+19% and +24%, respectively) and well above their long-term averages (+96% and +106%, respectively). Estimated abundance of American wigeon (*A. americana*; 2.8 ± 0.2 million) was 29% greater than last year but similar to the long-term average. Estimated abundances of green-winged teal (*A. crecca*; 2.9 ± 0.2 million), redheads (*Aythya americana*; 1.0 ± 0.08 million), and canvasbacks (*A. valisineria*; 0.9 ± 0.09 million) were similar to last year's, but were each >50% above their long-term averages. Abundances of Northern shovelers, redheads, and canvasbacks were the highest ever estimated in this survey area, and the

^a Populations are considered to have changed from the previous year or long-term average if observed significance value associated with change is ≤ 0.10 . Actual p-values are given in tables.

abundance of green-winged teal was the second highest estimated for this region. Estimates for Northern pintails (*Anas acuta*; 3.3 ± 0.2 million) and scaup (*Aythya affinis* and *A. marila* combined; 3.5 ± 0.2 million) were unchanged from those of 2006, and remained below long-term averages (-19% and -33%, respectively).

Overall, habitat conditions for breeding waterfowl in 2007 were similar or slightly improved compared to conditions in 2006. The total pond estimate (Prairie Canada and U.S. combined) was 7.0 ± 0.3 million ponds. This was 15% greater than last year's estimate of 6.1 ± 0.2 million ponds and 44% higher than the long-term average of 4.9 ± 0.03 million ponds. For the third year in a row, habitat conditions were good or excellent in the northern grasslands and parklands of southern Saskatchewan and southern Manitoba. Three years of plentiful precipitation has generally maintained or improved the quality of the wetland and upland vegetation in this region. The 2007 estimate of ponds in Prairie Canada was 5.0 ± 0.3 million. This was a 13% increase from last year's estimate (4.4 ± 0.2 million), 49% above the 1955-2006 average (3.4 ± 0.03 million), and the fourth highest number of Canadian ponds on record (Table 12; Figure 2). However, some areas of the parklands of southern Saskatchewan experienced severe flooding resulting from record amounts of spring runoff and some nests may have flooded. The southern grasslands of Saskatchewan and Manitoba remained dry, and were in fair to poor condition. Conditions in southern Alberta, which have generally been either fair or poor for much of the last decade, improved for the second consecutive year, largely due to melting of large snowpacks and wet soil conditions.

Habitat conditions in U.S. prairies were highly variable, ranging from good to poor. The 2007 pond estimate for the north-central U.S. of 2.0 ± 0.1 million was 19% greater than last year's estimate (1.6 ± 0.09 million) and 29% above the long-term average (1.5 ± 0.02 million). The drought conditions seen last year in the Eastern Dakotas were improved by abundant fall and winter precipitation, especially in eastern South Dakota. Exceptionally heavy rain events during May helped to improve conditions in eastern Montana and parts of the Dakotas. Unfortunately, the area affected by this rain did not include the high quality duck habitat of the Missouri Coteau region in the Eastern Dakotas. Although this precipitation occurred after many ducks had moved through the survey area, it probably benefited renesting birds and improved vegetation quality in wetlands and uplands, thereby aiding brood survival.

Habitat in the bush regions of the traditional survey area (Alaska, Northern Manitoba, Northern Saskatchewan, Western Ontario) was mostly classified as good due to a normal spring ice break-up and generally good water conditions in the beaver ponds, river deltas, and small lakes and ponds that are characteristic of this region. Spring phenology and water levels varied slightly in local areas. For example, spring was slightly late in the Old Crow Flats, slightly early in the Yukon Delta, and slightly drier in the Yukon Flats compared to other regions in Alaska, but habitat conditions were still generally good across the bush region. The exceptions were the somewhat drier conditions in northwest Saskatchewan and central Alberta and the potential for some flooding in northern Saskatchewan and Manitoba.

The boreal forests of the eastern survey area were generally in good or excellent condition this spring, except for a few drier patches in Northern Quebec that were in fair condition. Spring arrived early in the James and Hudson Bay Lowlands for the 3rd consecutive year, and habitat conditions were classified as excellent. In eastern and southern Ontario, the winter snowpack was below normal; however, a good frost seal, spring runoff, and spring storms left this region in good condition at the time of the survey. Storms following the survey period produced local flooding of some nesting habitat. Wetland basins in Quebec were adequately charged and spring temperatures were near normal. There was some potential for flooding of nests in Maine and the Maritimes due to heavy rain during mid-May, but this was not as problematic as it had been during the past few years. Newfoundland and Labrador experienced a late spring compared to the last 5 years, with the northernmost part of the survey region in Labrador still frozen in late May. However, this region was still considered in good condition.

In 2005, the USFWS and CWS began to integrate several previously-independent waterfowl surveys of eastern North America. Specifically, new analytical methods were used to generate composite estimates from USFWS and CWS survey data, total indicated bird definitions for American black ducks were modified to provide a common index across the surveys, and adjustments were made to the geographic stratification of eastern North America. Additional refinements to analytical methods are incorporated in the estimates presented in this report. For these reasons, population estimates presented in this report for the eastern survey area (that encompasses strata 51-72) are not directly comparable with estimates presented in reports presented prior to 2006. Specifically, composite estimates are presented for only a portion of the eastern survey area and include data only from strata 51, 52, 63, 64, 66, 67, 68, 70, 71, and 72. These strata were chosen for composite estimation because at least one survey (i.e., that is either the CWS or USFWS survey) was conducted for each of these strata for the full period of record of the eastern survey (1990-2007). In cases where the USFWS has traditionally not recorded observations to the species level, estimates are provided only for multiple-species groupings (i.e., scoters, mergansers, goldeneyes, scaup). As soon as possible, we intend to produce species-specific estimates based solely on CWS plot survey data for: surf scoter (*Melanitta perspicillata*) black scoter (*M. nigra*), hooded merganser (*Lophodytes cucullatus*), common merganser (*Mergus merganser*), red-breasted merganser (*M. serrator*), common goldeneye (*Bucephala clangula*), Barrow's goldeneye (*B. islandica*), and greater and lesser scaup. Analytical methods applied to eastern survey area data and results will be presented in greater detail in the 2007 Waterfowl Status Report. We anticipate additional refinements to composite estimates for the eastern survey area in the coming years as the USFWS and CWS work toward a final integrated survey design and analytical approach. Population estimates for all species were similar to last year and to the 1990-2006 averages (Table 13; Figures 6-7). The exceptions were American black ducks (*Anas rubripes*; 539,000 ducks, +16%) and ring-necked ducks (*Aythya collaris*; 617,000 ducks, +20%), which increased over the 1990-2006 averages.

The data in this report were contributed by the following individuals:

Alaska, Yukon Territory, and Old Crow Flats (Strata 1-12): E. Mallek and D. Groves

Northern Alberta, Northeastern British Columbia, and Northwest Territories (Strata 13-18, 20, and 77): C. Ferguson and D. Benning^d

Northern Saskatchewan and Northern Manitoba (Strata 21-24): F. Roetker and P. Yakupzack

Southern and Central Alberta (Strata 26-29, 75, and 76):

Air E. Huggins and J. Mitchell
Ground J. Leafloor^a, F. Baldwin^a, K. Froggatt^b, E. Hofman^b, M. Barr^c, D. Chambers^c,
N. Clements^a, C. Downie^a, T. Gunderson^a, S. Leach^a, T. Matthews^c,
I. McFarlane^c, B. Peers^c, J. Pierce^c, C. Twerdoelib^a, and N. Wiebe^a

Southern Saskatchewan (Strata 30-35):

Air P. Thorpe, T. Lewis, B. Larned, and G. Zimmerman
Ground D. Nieman^a, K. Dufour^a, K. Warner^a, A. Williams^a, D. Caswell^a, M. Schuster^a,
G. Ball^b, J. Caswell^c, P. Rakowski^a, B. Bartzen^a, L. Brennan^c, A. Crosby^a,
P. Nieman^a, D. Paslowski^a, L. Sitter^a, K. Wilkins, N. Astleford^a, M. Gillespie^b,
C. Meuckon^a, D. Routhier^a, and D. Walker^a

Southern Manitoba (Strata 25 and 36-40):

Air B. Larned and G. Zimmerman
Ground D. Caswell^a, M. Schuster^a, G. Ball^b, J. Caswell^c, P. Rakowski^a, N. Astleford^a,
M. Gillespie^b, C. Meuckon^a, D. Routhier^a, and D. Walker^a

Montana and Western Dakotas (Strata 41-44):

Air R. Bentley and P. Fashbender
Ground P. Garrettson, K. Fleming, and E. Silverman

Eastern Dakotas (Strata 45-49):

Air J. Solberg and R. Cox^d
Ground K. Kruse, S. Beauchaine, J. Gleason, M. Grovijahn^b, and J. Hoskins

Western Ontario and Central Quebec (Strata 50, 68-69):

Air J. Wortham, G. Boomer, and D. Fronczak
Helicopter D. Holtby^b, G. Boomer, and P. Padding

Central and Eastern Ontario, Hudson and James Bay Lowlands of Ontario, and Southern Quebec (Strata 51-54, 56-59): M. Koneff, D. Forsell, and R. Raftovich

Maine and Maritimes (Strata 62-67, 70): J. Bidwell and J. Goldsberry^d

Canadian Wildlife Service helicopter plot survey

Quebec: D. Bordage^a, C. Lepage^a, and S. Orichefsky^a

Ontario: R. Ross^a, D. Fillman^a, D. McNicol^a, and J. Bionda^d

New Brunswick and Nova Scotia: B. Pollard^a

Labrador and Newfoundland: S. Gilliland^a

Habitat information was provided by U.S. Fish and Wildlife Service and Canadian Wildlife Service biologists.

^a Canadian Wildlife Service

^b State, Provincial, or Tribal Conservation Agency

^c Ducks Unlimited - Canada

^d Other organization

All others – U.S. Fish and Wildlife Service

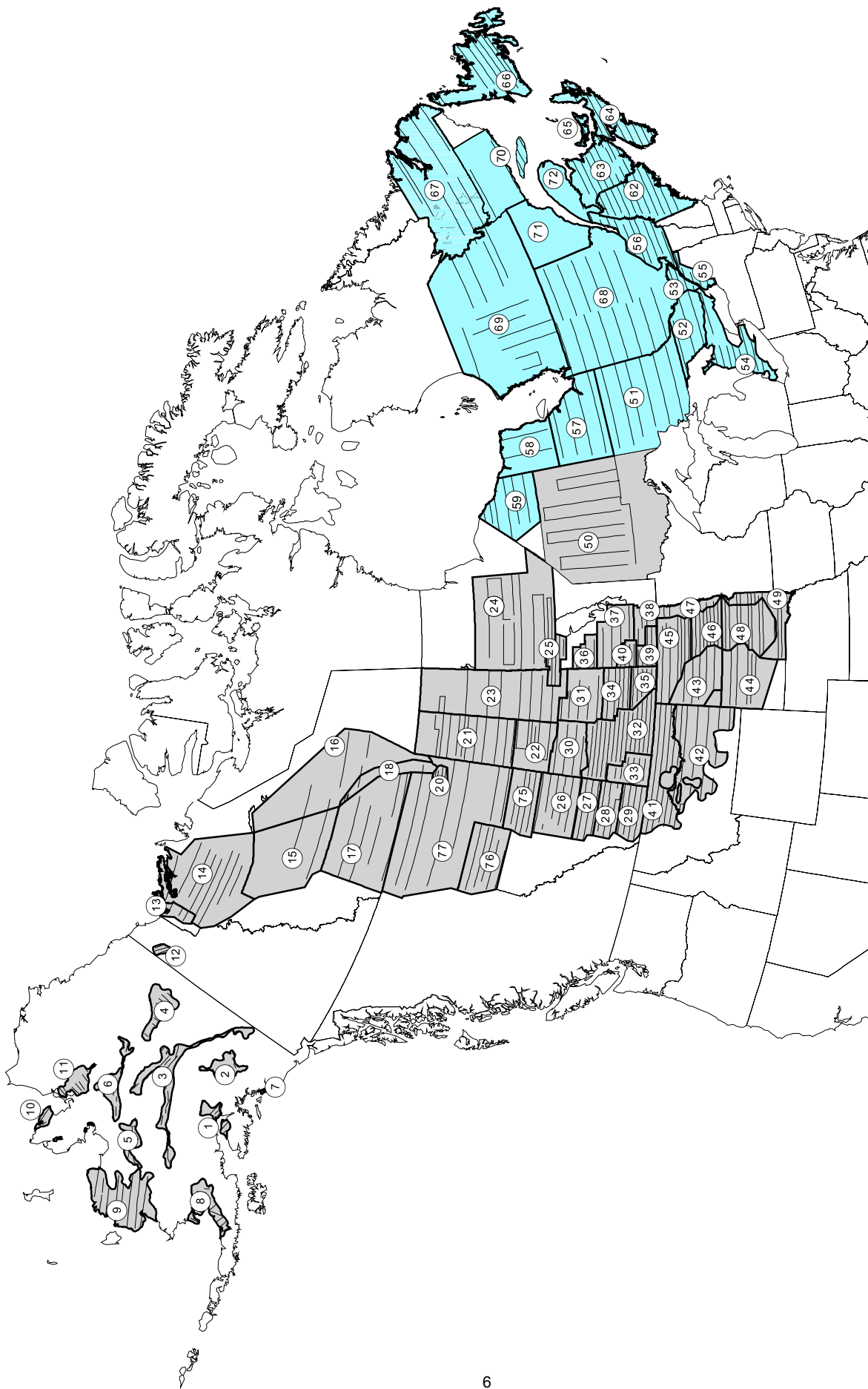


Table 1. Duck breeding population estimates (in thousands) for regions in the traditional survey area.

| Region | 2007 | Change from 2006 | | | Change from LTA | | |
|--|--------|------------------|-----|----------|------------------|-----|----------|
| | | 2006 | % | <i>P</i> | LTA ^a | % | <i>P</i> |
| Alaska-Yukon Territory – Old Crow Flats | 5,690 | 4,755 | +20 | <0.001 | 3,574 | +59 | <0.001 |
| C. & N. Alberta – N.E. British Columbia - Northwest Territories | 6,137 | 5,132 | +20 | 0.006 | 7,114 | -14 | 0.001 |
| N. Saskatchewan- N. Manitoba - W. Ontario | 3,197 | 2,711 | +18 | 0.280 | 3,541 | -10 | 0.415 |
| S. Alberta | 4,293 | 4,581 | -6 | 0.290 | 4,289 | 0 | 0.983 |
| S. Saskatchewan | 11,036 | 10,096 | +9 | 0.128 | 7,401 | +49 | <0.001 |
| S. Manitoba | 1,322 | 1,796 | -26 | <0.001 | 1,549 | -15 | 0.001 |
| Montana and Western Dakotas | 1,625 | 1,910 | -15 | 0.036 | 1,619 | 0 | 0.951 |
| Eastern Dakotas | 7,857 | 5,181 | +52 | <0.001 | 4,220 | +86 | <0.001 |
| Total ^b | 41,157 | 36,160 | +14 | <0.001 | 33,307 | +24 | <0.001 |

^a Long-term average, 1955-2006.

^b Includes 10 species in Appendix A plus American black duck, ring-necked duck, goldeneyes, bufflehead, and ruddy duck; excludes eiders, long-tailed duck, scoters, mergansers, and wood duck.

Table 2. Mallard breeding population estimates (in thousands) for regions in the traditional survey area.

| Region | 2007 | Change from 2006 | | | Change from LTA | | |
|--|-------|------------------|-----|----------|-----------------|------|----------|
| | | 2006 | % | <i>P</i> | LTA | % | <i>P</i> |
| Alaska-Yukon Territory – Old Crow Flats | 581 | 516 | +13 | 0.364 | 360 | +61 | <0.001 |
| C. & N. Alberta – N.E. British Columbia - Northwest Territories | 887 | 558 | +59 | 0.002 | 1,075 | -17 | 0.025 |
| N. Saskatchewan- N. Manitoba - W. Ontario | 588 | 656 | -10 | 0.538 | 1,149 | -49 | <0.001 |
| S. Alberta | 830 | 901 | -8 | 0.364 | 1,095 | -24 | <0.001 |
| S. Saskatchewan | 2,155 | 1,832 | +18 | 0.076 | 2,067 | +4 | 0.567 |
| S. Manitoba | 387 | 511 | -24 | 0.038 | 381 | +2 | 0.870 |
| Montana and Western Dakotas | 553 | 679 | -19 | 0.124 | 503 | +10 | 0.413 |
| Eastern Dakotas | 2,049 | 1,624 | +26 | 0.050 | 861 | +138 | <0.001 |
| Total | 8,032 | 7,277 | +10 | 0.033 | 7,491 | +7 | 0.053 |

Table 3. Gadwall breeding population estimates (in thousands) for regions in the traditional survey area.

| Region | 2007 | Change from 2006 | | | Change from LTA | | |
|--|-------|------------------|-----|----------|-----------------|------|----------|
| | | 2006 | % | <i>P</i> | LTA | % | <i>P</i> |
| Alaska-Yukon Territory – Old Crow Flats | 3 | 2 | +71 | 0.556 | 2 | +71 | 0.508 |
| C. & N. Alberta – N.E. British Columbia - Northwest Territories | 100 | 135 | -26 | 0.336 | 49 | +106 | 0.003 |
| N. Saskatchewan- N. Manitoba - W. Ontario | 14 | 16 | -16 | 0.674 | 27 | -50 | <0.001 |
| S. Alberta | 343 | 455 | -25 | 0.081 | 311 | +10 | 0.307 |
| S. Saskatchewan | 1,317 | 1,202 | +10 | 0.580 | 568 | +132 | <0.001 |
| S. Manitoba | 110 | 125 | -12 | 0.562 | 68 | +63 | 0.034 |
| Montana and Western Dakotas | 266 | 216 | +23 | 0.365 | 194 | +37 | 0.129 |
| Eastern Dakotas | 1,201 | 673 | +78 | <0.001 | 494 | +143 | <0.001 |
| Total | 3,355 | 2,825 | +19 | 0.050 | 1,714 | +96 | <0.001 |

Table 4. American wigeon breeding population estimates (in thousands) for regions in the traditional survey area.

| Region | 2007 | Change from 2006 | | | Change from LTA | | |
|--|-------|------------------|-----|----------|-----------------|------|----------|
| | | 2006 | % | <i>P</i> | LTA | % | <i>P</i> |
| Alaska-Yukon Territory – Old Crow Flats | 1,113 | 822 | +35 | 0.004 | 517 | +115 | <0.001 |
| C. & N. Alberta – N.E. British Columbia - Northwest Territories | 843 | 570 | +48 | 0.050 | 906 | -7 | 0.579 |
| N. Saskatchewan- N. Manitoba - W. Ontario | 139 | 105 | +32 | 0.314 | 250 | -44 | <0.001 |
| S. Alberta | 170 | 189 | -10 | 0.574 | 294 | -42 | <0.001 |
| S. Saskatchewan | 325 | 282 | +15 | 0.455 | 422 | -23 | 0.023 |
| S. Manitoba | 9 | 16 | -47 | 0.063 | 61 | -86 | <0.001 |
| Montana and Western Dakotas | 121 | 120 | +1 | 0.965 | 109 | +11 | 0.598 |
| Eastern Dakotas | 83 | 67 | +23 | 0.462 | 49 | +70 | 0.047 |
| Total | 2,803 | 2,171 | +29 | 0.001 | 2,608 | +7 | 0.205 |

Table 5. Green-winged teal breeding population estimates (in thousands) for regions in the traditional survey area.

| Region | 2007 | Change from 2006 | | | Change from LTA | | |
|--|--------------|------------------|------------|--------------|-----------------|------------|------------------|
| | | 2006 | % | <i>P</i> | LTA | % | <i>P</i> |
| Alaska-Yukon Territory – Old Crow Flats | 823 | 780 | +5 | 0.670 | 366 | +125 | <0.001 |
| C. & N. Alberta – N.E. British Columbia - Northwest Territories | 862 | 751 | +15 | 0.541 | 752 | +15 | 0.448 |
| N. Saskatchewan- N. Manitoba - W. Ontario | 328 | 303 | +8 | 0.659 | 199 | +65 | 0.006 |
| S. Alberta | 283 | 178 | +59 | 0.179 | 193 | +46 | 0.176 |
| S. Saskatchewan | 495 | 401 | +24 | 0.347 | 233 | +113 | 0.001 |
| S. Manitoba | 33 | 65 | -49 | 0.007 | 52 | -36 | <0.001 |
| Montana and Western Dakotas | 44 | 34 | +30 | 0.356 | 40 | +10 | 0.650 |
| Eastern Dakotas | 43 | 75 | -43 | 0.192 | 46 | -7 | 0.810 |
| Total | 2,911 | 2,587 | +13 | 0.199 | 1,881 | +55 | <0.001 |

Table 6. Blue-winged teal breeding population estimates (in thousands) for regions in the traditional survey area.

| Region | 2007 | Change from 2006 | | | Change from LTA | | |
|--|--------------|------------------|------------|--------------|-----------------|------------|------------------|
| | | 2006 | % | <i>P</i> | LTA | % | <i>P</i> |
| Alaska-Yukon Territory – Old Crow Flats | 9 | 0 | +- | - | 1 | +588 | 0.264 |
| C. & N. Alberta – N.E. British Columbia - Northwest Territories | 369 | 316 | +17 | 0.597 | 271 | +36 | 0.191 |
| N. Saskatchewan- N. Manitoba - W. Ontario | 108 | 82 | +32 | 0.396 | 262 | -59 | <0.001 |
| S. Alberta | 669 | 864 | -23 | 0.263 | 613 | +9 | 0.697 |
| S. Saskatchewan | 2,380 | 2,228 | +7 | 0.652 | 1,237 | +92 | <0.001 |
| S. Manitoba | 274 | 426 | -36 | 0.005 | 383 | -28 | 0.001 |
| Montana and Western Dakotas | 277 | 346 | -20 | 0.235 | 265 | +4 | 0.790 |
| Eastern Dakotas | 2,610 | 1,598 | +63 | <0.001 | 1,494 | +75 | <0.001 |
| Total | 6,694 | 5,860 | +14 | 0.077 | 4,527 | +48 | <0.001 |

Table 7. Northern shoveler breeding population estimates (in thousands) for regions in the traditional survey area.

| Region | 2007 | Change from 2006 | | | Change from LTA | | |
|--|--------------|------------------|------------|--------------|-----------------|-------------|------------------|
| | | 2006 | % | <i>P</i> | LTA | % | <i>P</i> |
| Alaska-Yukon Territory – Old Crow Flats | 580 | 409 | +42 | 0.027 | 269 | +115 | <0.001 |
| C. & N. Alberta – N.E. British Columbia - Northwest Territories | 346 | 193 | +80 | 0.044 | 213 | +62 | 0.062 |
| N. Saskatchewan- N. Manitoba - W. Ontario | 28 | 12 | +137 | 0.161 | 42 | -34 | 0.200 |
| S. Alberta | 977 | 701 | +39 | 0.009 | 367 | +167 | <0.001 |
| S. Saskatchewan | 1,656 | 1,612 | +3 | 0.880 | 666 | +149 | <0.001 |
| S. Manitoba | 116 | 178 | -35 | 0.007 | 109 | +6 | 0.569 |
| Montana and Western Dakotas | 169 | 163 | +3 | 0.887 | 150 | +13 | 0.547 |
| Eastern Dakotas | 682 | 414 | +65 | 0.001 | 390 | +75 | <0.001 |
| Total | 4,553 | 3,680 | +24 | 0.011 | 2,206 | +106 | <0.001 |

Table 8. Northern pintail breeding population estimates (in thousands) for regions in the traditional survey area.

| Region | 2007 | Change from 2006 | | | Change from LTA | | |
|--|--------------|------------------|-----------|--------------|-----------------|------------|------------------|
| | | 2006 | % | <i>P</i> | LTA | % | <i>P</i> |
| Alaska-Yukon Territory – Old Crow Flats | 1,135 | 1,041 | +9 | 0.473 | 915 | +24 | 0.018 |
| C. & N. Alberta – N.E. British Columbia - Northwest Territories | 234 | 126 | +86 | 0.056 | 374 | -37 | 0.006 |
| N. Saskatchewan- N. Manitoba - W. Ontario | 5 | 6 | -7 | 0.899 | 40 | -87 | <0.001 |
| S. Alberta | 324 | 611 | -47 | <0.001 | 719 | -55 | <0.001 |
| S. Saskatchewan | 960 | 1,024 | -6 | 0.724 | 1,214 | -21 | 0.011 |
| S. Manitoba | 15 | 57 | -74 | <0.001 | 111 | -87 | <0.001 |
| Montana and Western Dakotas | 118 | 264 | -55 | <0.001 | 269 | -56 | <0.001 |
| Eastern Dakotas | 544 | 257 | +111 | <0.001 | 455 | +19 | 0.187 |
| Total | 3,335 | 3,386 | -2 | 0.841 | 4,098 | -19 | <0.001 |

Table 9. Redhead breeding population estimates (in thousands) for regions in the traditional survey area.

| Region | 2007 | Change from 2006 | | | Change from LTA | | |
|--|--------------|------------------|------------|--------------|-----------------|------------|------------------|
| | | 2006 | % | <i>P</i> | LTA | % | <i>P</i> |
| Alaska-Yukon Territory – Old Crow Flats | 2 | 10 | -83 | 0.176 | 2 | +10 | 0.886 |
| C. & N. Alberta – N.E. British Columbia - Northwest Territories | 80 | 59 | +35 | 0.345 | 39 | +106 | 0.016 |
| N. Saskatchewan- N. Manitoba - W. Ontario | 10 | 5 | +93 | 0.326 | 28 | -64 | <0.001 |
| S. Alberta | 179 | 154 | +16 | 0.571 | 117 | +53 | 0.051 |
| S. Saskatchewan | 414 | 435 | -5 | 0.831 | 195 | +113 | 0.001 |
| S. Manitoba | 72 | 102 | -30 | 0.273 | 72 | -1 | 0.962 |
| Montana and Western Dakotas | 6 | 12 | -51 | 0.249 | 9 | -39 | 0.260 |
| Eastern Dakotas | 247 | 139 | +78 | 0.013 | 168 | +47 | 0.021 |
| Total | 1,009 | 916 | +10 | 0.443 | 630 | +60 | <0.001 |

Table 10. Canvasback breeding population estimates (in thousands) for regions in the traditional survey area.

| Region | 2007 | Change from 2006 | | | Change from LTA | | |
|--|------------|------------------|------------|--------------|-----------------|------------|--------------|
| | | 2006 | % | <i>P</i> | LTA | % | <i>P</i> |
| Alaska-Yukon Territory – Old Crow Flats | 92 | 73 | +25 | 0.615 | 91 | +1 | 0.980 |
| C. & N. Alberta – N.E. British Columbia - Northwest Territories | 139 | 109 | +27 | 0.487 | 73 | +89 | 0.048 |
| N. Saskatchewan- N. Manitoba - W. Ontario | 34 | 13 | +167 | 0.109 | 55 | -37 | 0.123 |
| S. Alberta | 127 | 76 | +67 | 0.141 | 64 | +99 | 0.039 |
| S. Saskatchewan | 324 | 287 | +13 | 0.642 | 184 | +76 | 0.029 |
| S. Manitoba | 77 | 87 | -12 | 0.739 | 57 | +37 | 0.220 |
| Montana and Western Dakotas | 17 | 12 | +36 | 0.503 | 8 | +113 | 0.069 |
| Eastern Dakotas | 54 | 33 | +66 | 0.141 | 33 | +66 | 0.090 |
| Total | 865 | 691 | +25 | 0.117 | 565 | +53 | 0.001 |

Table 11. Scaup (greater and lesser combined) breeding population estimates (in thousands) for regions in the traditional survey area.

| Region | 2007 | 2006 | Change from 2006 | | LTA | Change from LTA | |
|--|-------|-------|------------------|----------|-------|-----------------|----------|
| | | | % | <i>P</i> | | % | <i>P</i> |
| Alaska-Yukon Territory – Old Crow Flats | 1,191 | 884 | +35 | 0.022 | 914 | +30 | 0.014 |
| C. & N. Alberta – N.E. British Columbia - Northwest Territories | 1,261 | 1,169 | +8 | 0.603 | 2,599 | -51 | <0.001 |
| N. Saskatchewan- N. Manitoba - W. Ontario | 271 | 335 | -19 | 0.288 | 582 | -53 | <0.001 |
| S. Alberta | 182 | 214 | -15 | 0.538 | 351 | -48 | <0.001 |
| S. Saskatchewan | 302 | 391 | -23 | 0.339 | 416 | -27 | 0.079 |
| S. Manitoba | 50 | 97 | -48 | 0.064 | 134 | -63 | <0.001 |
| Montana and Western Dakotas | 15 | 19 | -20 | 0.535 | 53 | -72 | <0.001 |
| Eastern Dakotas | 179 | 138 | +30 | 0.256 | 98 | +83 | 0.003 |
| Total | 3,452 | 3,247 | +6 | 0.424 | 5,147 | -33 | <0.001 |

Table 12. Estimated number (in thousands) of May ponds in portions of prairie and parkland Canada and the northcentral U.S.

| Survey area | 2007 | 2006 | Change from 2006 | | LTA ^a | Change from LTA | | |
|-----------------------------|-------|-------|------------------|----------|------------------|-----------------|----------|--|
| | | | % | <i>P</i> | | % | <i>P</i> | |
| Prairie Canada | | | | | | | | |
| S. Alberta | 1,225 | 996 | +23 | 0.175 | 728 | +68 | 0.001 | |
| S. Saskatchewan | 3,000 | 2,719 | +10 | 0.318 | 1,980 | +52 | <0.001 | |
| S. Manitoba | 815 | 735 | +11 | 0.413 | 674 | +21 | 0.054 | |
| Subtotal | 5,040 | 4,450 | +13 | 0.085 | 3,382 | +49 | <0.001 | |
| Northcentral U.S. | | | | | | | | |
| Montana and Western Dakotas | 740 | 615 | +20 | 0.147 | 531 | +39 | 0.004 | |
| Eastern Dakotas | 1,223 | 1,030 | +19 | 0.058 | 995 | +23 | 0.002 | |
| Subtotal | 1,963 | 1,644 | +19 | 0.017 | 1,525 | +29 | <0.001 | |
| Grand total | 7,003 | 6,094 | +15 | 0.014 | 4,869 | +44 | <0.001 | |

^aLong-term average. Prairie and parkland Canada, 1961-2006; northcentral U.S. and Grand total, 1974-2006.

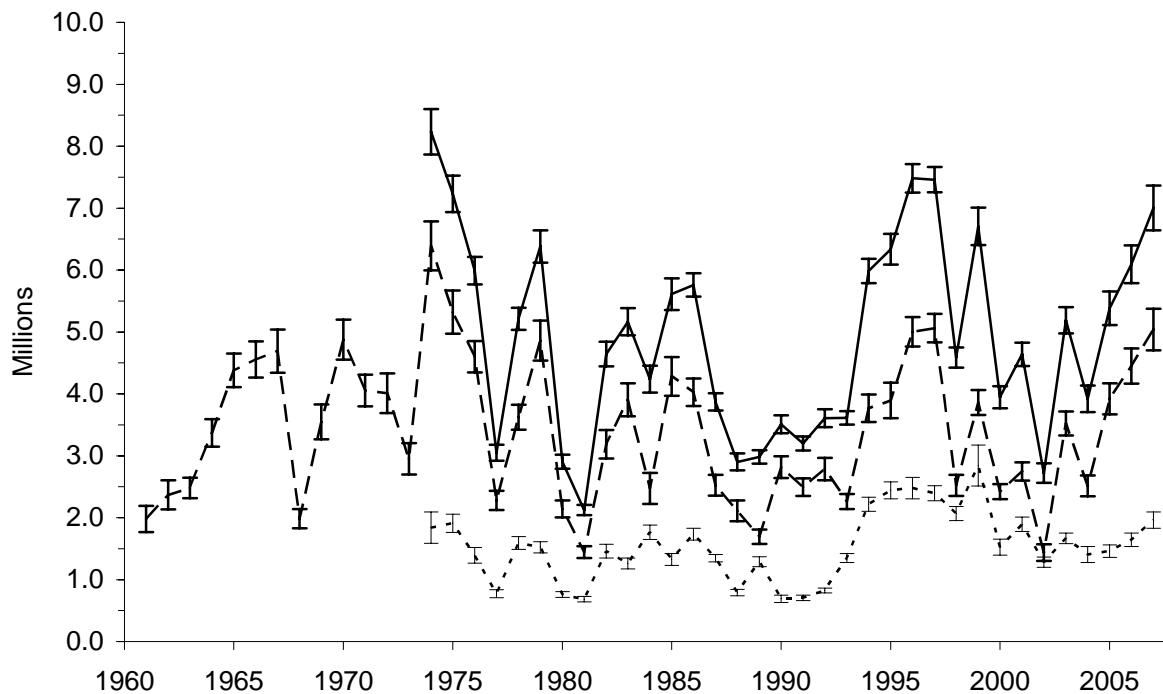


Figure 2. Number of ponds in May and 90% confidence intervals in prairie Canada and the northcentral U.S.

Table 13. Duck breeding population estimates ^a (in thousands) for the 10 most abundant species in the eastern survey area.

| Species | 2007 | 2006 | % Change from 2006 | Average ^b | % Change from average |
|---|------|------|--------------------|----------------------|-----------------------|
| Mergansers (common, red-breasted, and hooded) | 394 | 315 | +25 | 328 | +20 |
| Mallard | 446 | 415 | +7 | 408 | +9 |
| American black duck | 539 | 493 | +9 | 463 | +16 ^c |
| American wigeon | 12 | 12 | +7 ^d | 20 | -38 |
| Green-winged teal | 251 | 229 | +10 | 227 | +10 |
| Scaup (greater and lesser) | 25 | 30 | -17 | 36 | -31 |
| Ring-necked duck | 617 | 551 | +14 | 509 | +20 ^c |
| Goldeneyes (common and Barrow's) | 318 | 215 | +48 | 259 | +23 |
| Bufflehead | 15 | 13 | +19 | 25 | +38 |
| Scoters (black, white-winged , and surf) | 126 | 79 | +61 | 81 | +56 |

^a Estimates for mallard, American black duck, green-winged teal, and ring-necked duck from Bayesian hierarchical analysis using FWS and CWS data from strata 51, 52, 63, 64, 66-68, 70-72. All others were computed as the variance-weighted means of FWS and CWS estimates for strata 51, 52, 63, 64, 66-68, 70-72.

^b Average for 1990-2006.

^c Significance ($P < 0.10$) determined by non-overlap of Bayesian credibility intervals or confidence intervals.

^d Rounded values mask change in estimates.

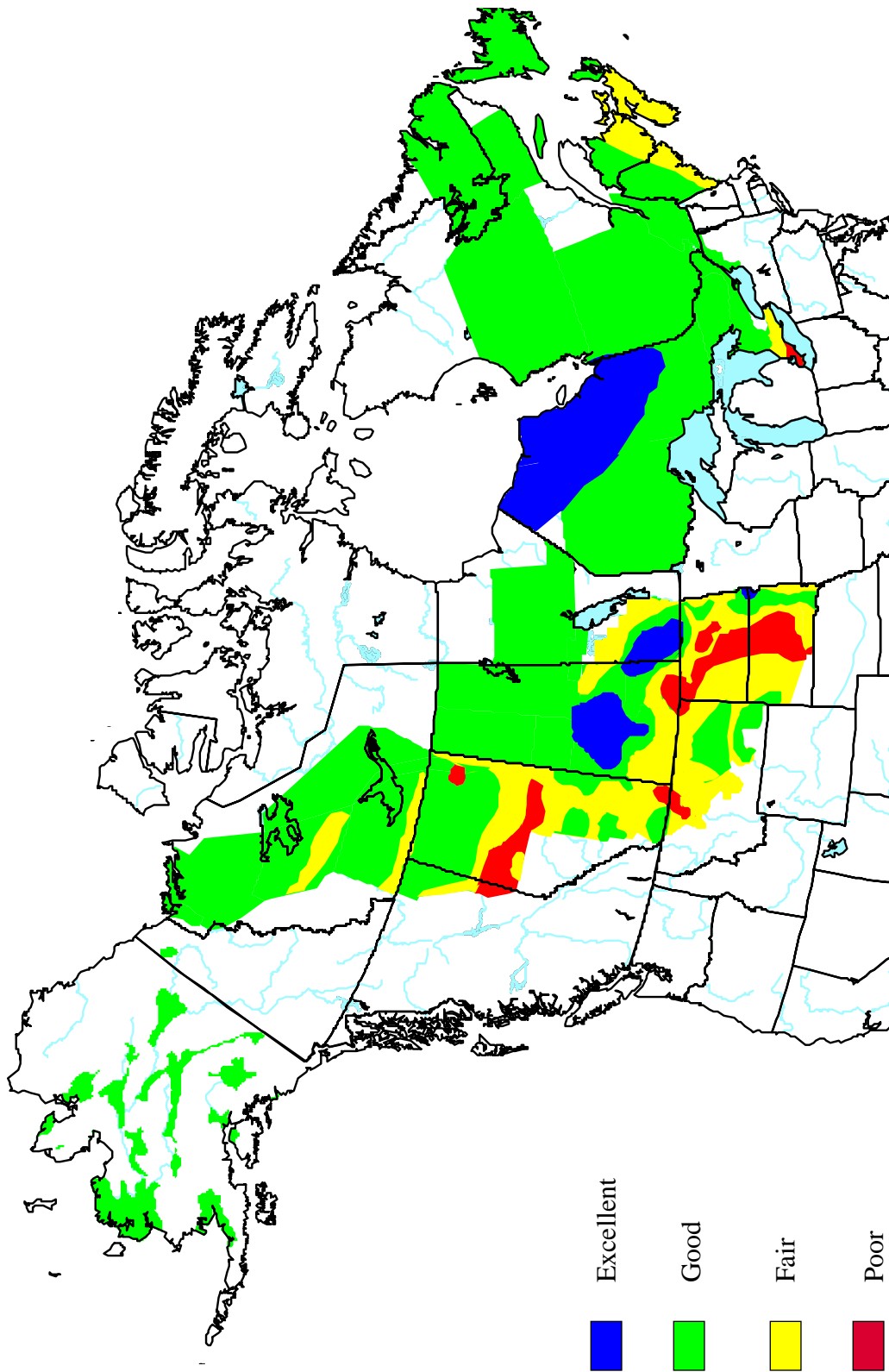


Figure 4. Breeding waterfowl habitat conditions during the 2006 Waterfowl Breeding Population and Habitat Survey, as judged by U.S. Fish and Wildlife Service Flyway Biologists.

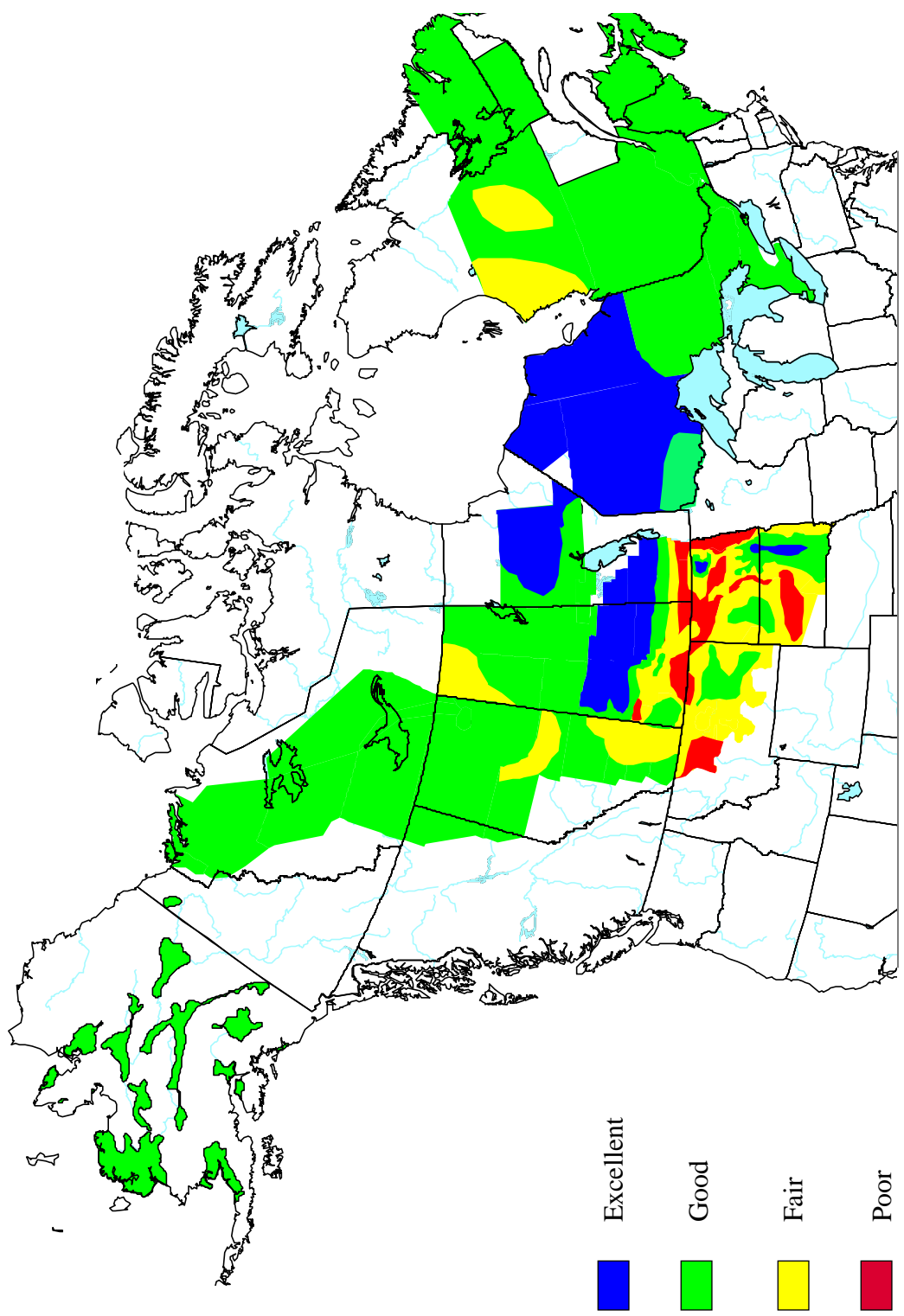


Figure 3. Breeding waterfowl habitat conditions during the 2007 Waterfowl Breeding Population and Habitat Survey, as judged by U.S. Fish and Wildlife Service Flyway Biologists.

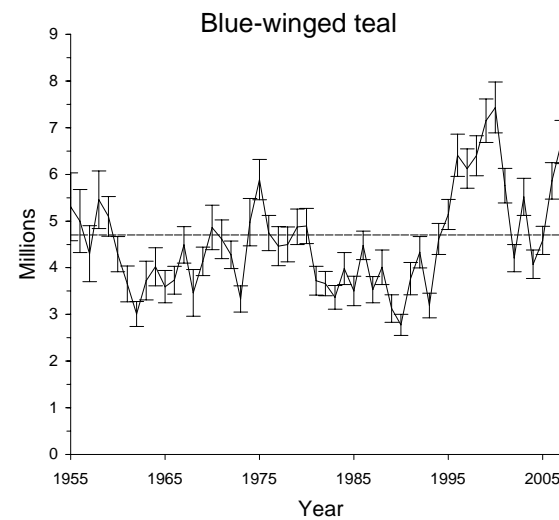
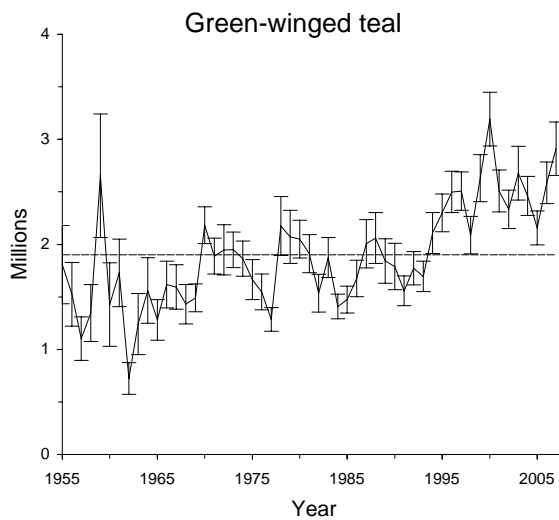
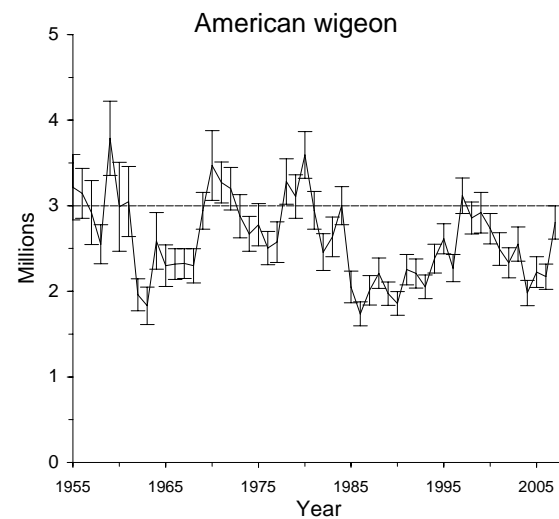
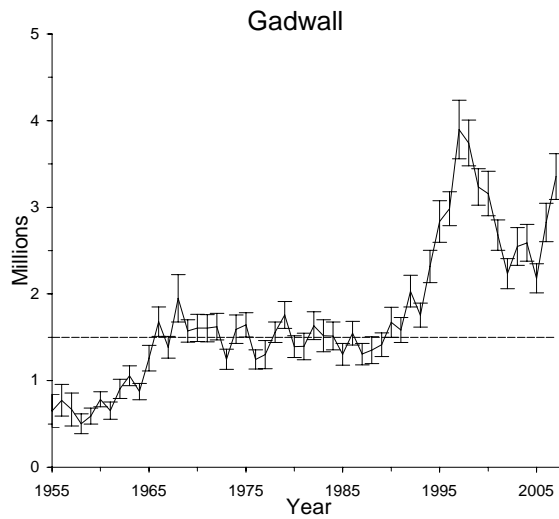
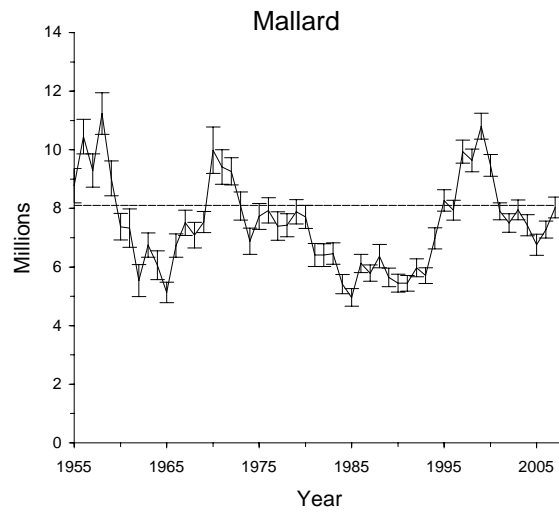
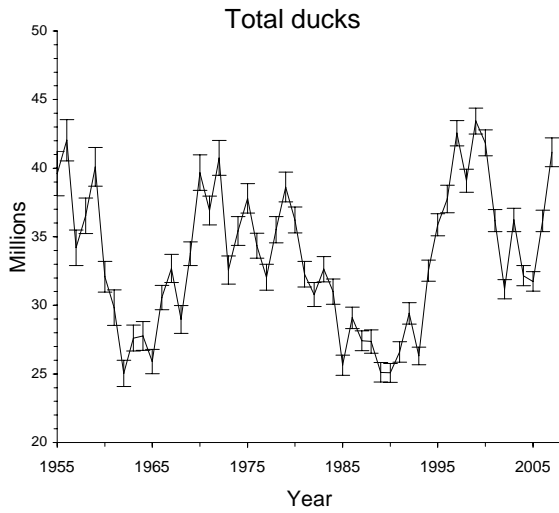


Figure 5. Breeding population estimates, 90% confidence intervals, and North American Waterfowl Management Plan population goal (dashed line) for selected species in the traditional survey area (strata 1-18, 20-50, 75-77).

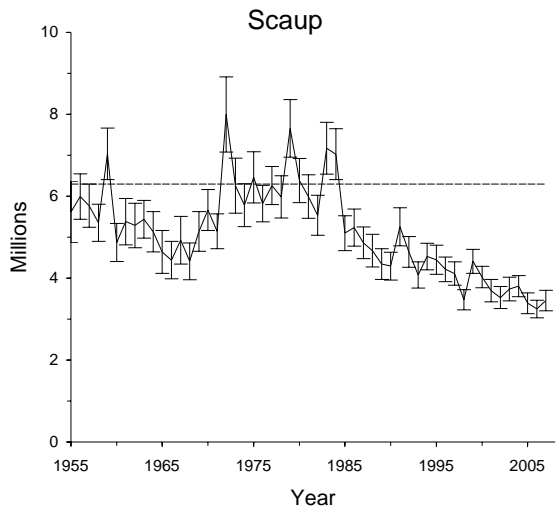
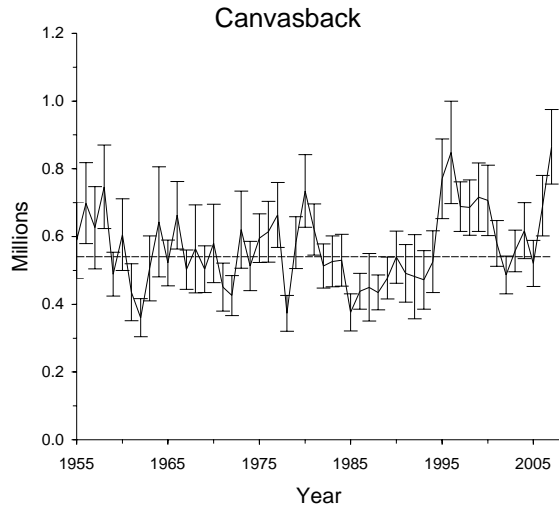
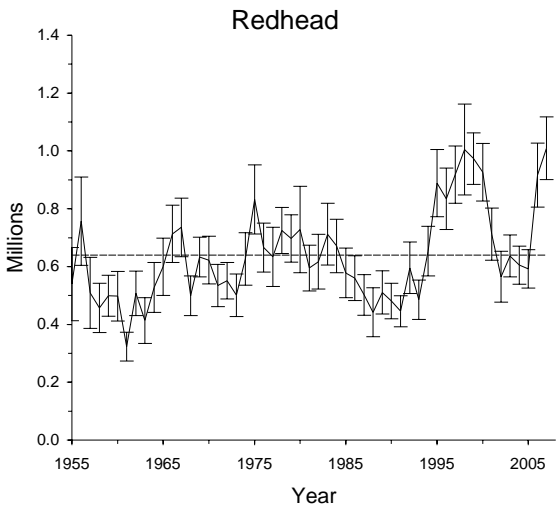
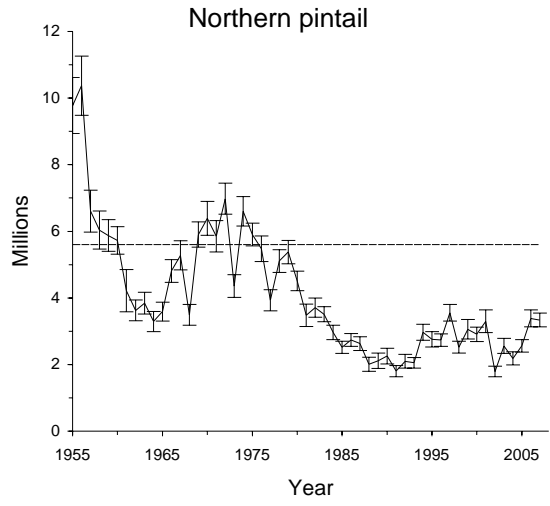
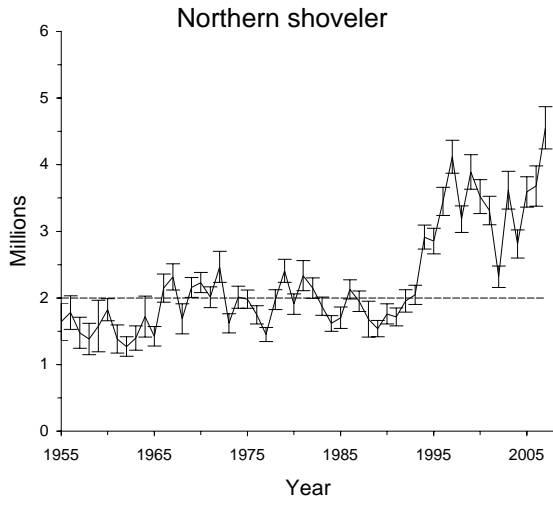


Figure 5 (continued).

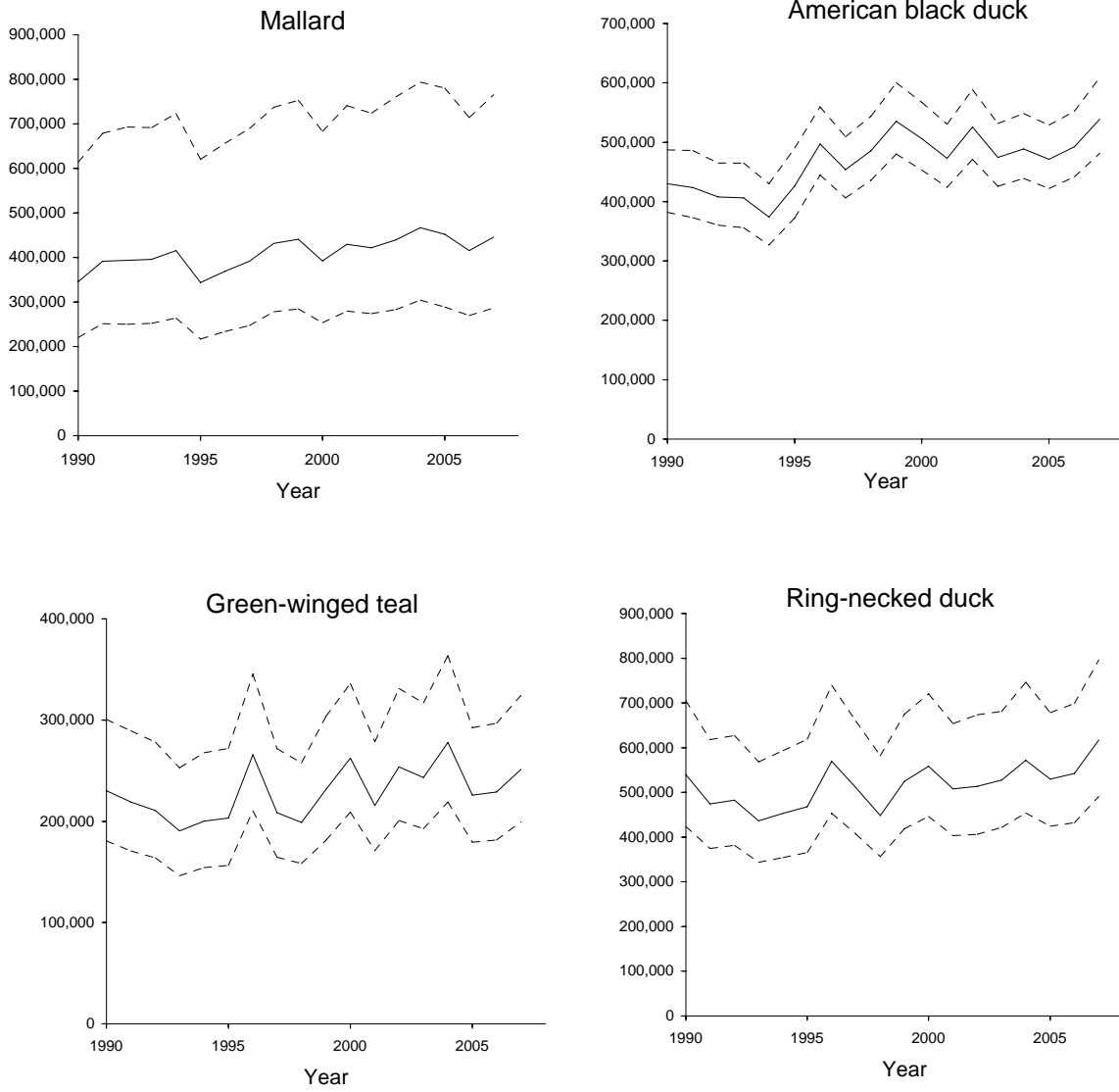


Figure 6. Breeding population estimates (from Bayesian hierarchical models) and 90% credibility intervals for selected species in the eastern survey area (strata 51, 52, 63, 64, 66-68, 70-72).

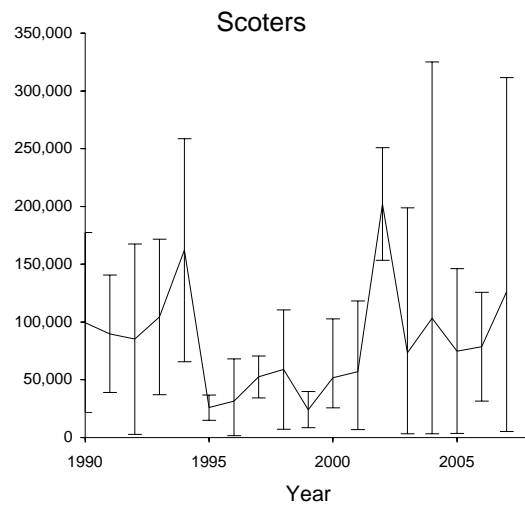
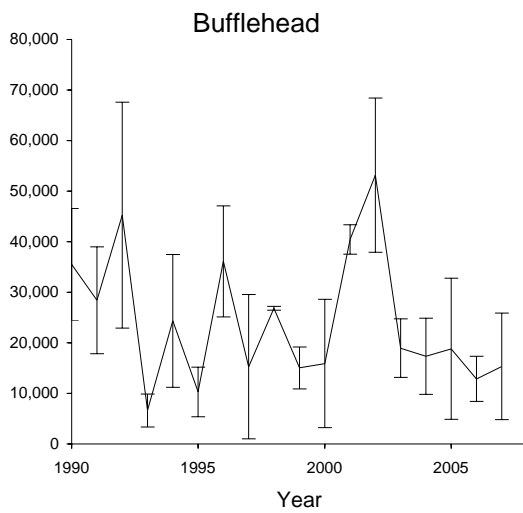
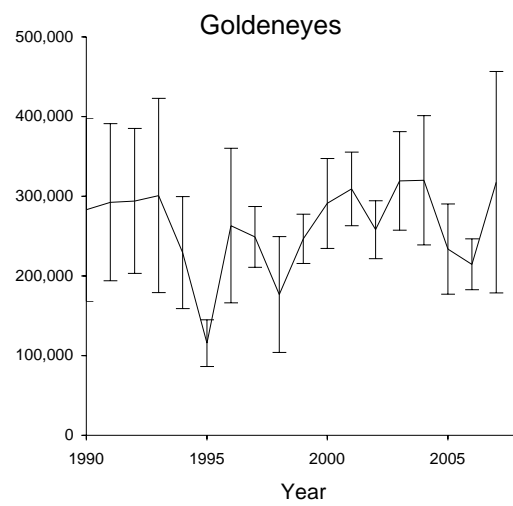
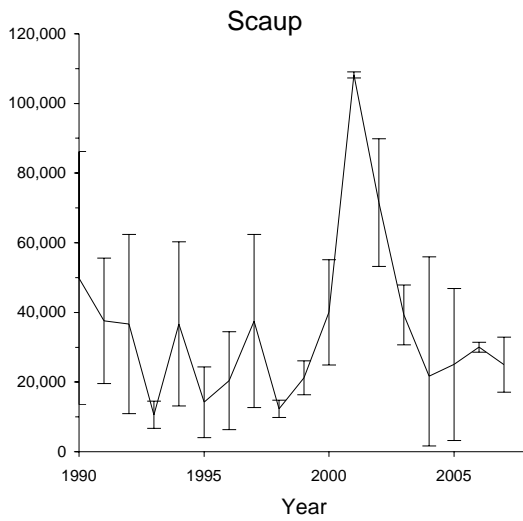
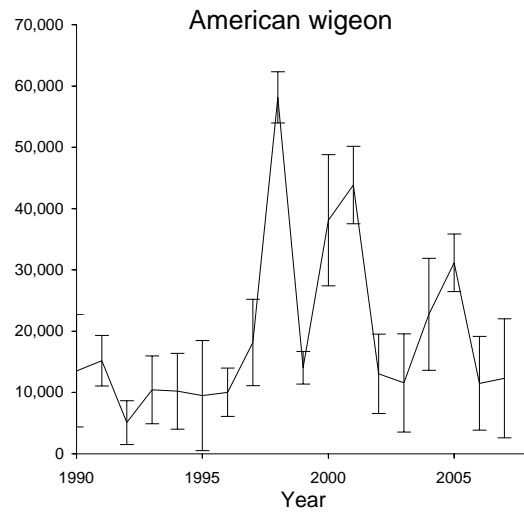
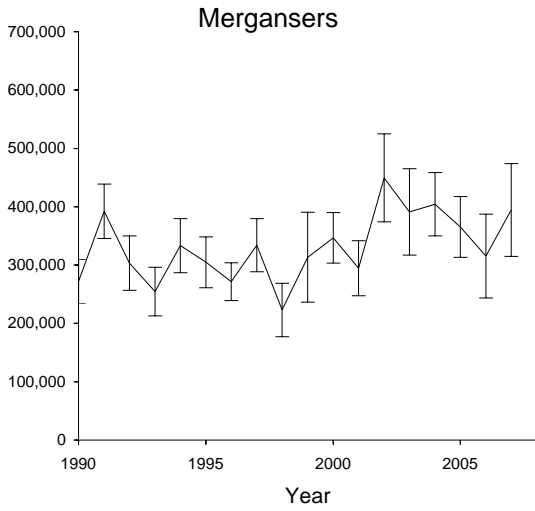


Figure 7. Breeding population estimates (variance-weighted means) and 90% confidence intervals for selected species in the eastern survey area (strata 51, 52, 63, 64, 66-68, 70-72).

Appendix A. Breeding population estimates and standard errors (in thousands) for 10 species of ducks from the traditional survey area (strata 1-18, 20-50, 75-77).

| Year | Mallard | | Gadwall | | American wigeon | | Green-winged teal | | Blue-winged teal | |
|------|-----------|------------|-----------|------------|-----------------|------------|-------------------|------------|------------------|------------|
| | \hat{N} | \hat{SE} | \hat{N} | \hat{SE} | \hat{N} | \hat{SE} | \hat{N} | \hat{SE} | \hat{N} | \hat{SE} |
| 1955 | 8777.3 | 457.1 | 651.5 | 149.5 | 3216.8 | 297.8 | 1807.2 | 291.5 | 5305.2 | 567.6 |
| 1956 | 10452.7 | 461.8 | 772.6 | 142.4 | 3145.0 | 227.8 | 1525.3 | 236.2 | 4997.6 | 527.6 |
| 1957 | 9296.9 | 443.5 | 666.8 | 148.2 | 2919.8 | 291.5 | 1102.9 | 161.2 | 4299.5 | 467.3 |
| 1958 | 11234.2 | 555.6 | 502.0 | 89.6 | 2551.7 | 177.9 | 1347.4 | 212.2 | 5456.6 | 483.7 |
| 1959 | 9024.3 | 466.6 | 590.0 | 72.7 | 3787.7 | 339.2 | 2653.4 | 459.3 | 5099.3 | 332.7 |
| 1960 | 7371.7 | 354.1 | 784.1 | 68.4 | 2987.6 | 407.0 | 1426.9 | 311.0 | 4293.0 | 294.3 |
| 1961 | 7330.0 | 510.5 | 654.8 | 77.5 | 3048.3 | 319.9 | 1729.3 | 251.5 | 3655.3 | 298.7 |
| 1962 | 5535.9 | 426.9 | 905.1 | 87.0 | 1958.7 | 145.4 | 722.9 | 117.6 | 3011.1 | 209.8 |
| 1963 | 6748.8 | 326.8 | 1055.3 | 89.5 | 1830.8 | 169.9 | 1242.3 | 226.9 | 3723.6 | 323.0 |
| 1964 | 6063.9 | 385.3 | 873.4 | 73.7 | 2589.6 | 259.7 | 1561.3 | 244.7 | 4020.6 | 320.4 |
| 1965 | 5131.7 | 274.8 | 1260.3 | 114.8 | 2301.1 | 189.4 | 1282.0 | 151.0 | 3594.5 | 270.4 |
| 1966 | 6731.9 | 311.4 | 1680.4 | 132.4 | 2318.4 | 139.2 | 1617.3 | 173.6 | 3733.2 | 233.6 |
| 1967 | 7509.5 | 338.2 | 1384.6 | 97.8 | 2325.5 | 136.2 | 1593.7 | 165.7 | 4491.5 | 305.7 |
| 1968 | 7089.2 | 340.8 | 1949.0 | 213.9 | 2298.6 | 156.1 | 1430.9 | 146.6 | 3462.5 | 389.1 |
| 1969 | 7531.6 | 280.2 | 1573.4 | 100.2 | 2941.4 | 168.6 | 1491.0 | 103.5 | 4138.6 | 239.5 |
| 1970 | 9985.9 | 617.2 | 1608.1 | 123.5 | 3469.9 | 318.5 | 2182.5 | 137.7 | 4861.8 | 372.3 |
| 1971 | 9416.4 | 459.5 | 1605.6 | 123.0 | 3272.9 | 186.2 | 1889.3 | 132.9 | 4610.2 | 322.8 |
| 1972 | 9265.5 | 363.9 | 1622.9 | 120.1 | 3200.1 | 194.1 | 1948.2 | 185.8 | 4278.5 | 230.5 |
| 1973 | 8079.2 | 377.5 | 1245.6 | 90.3 | 2877.9 | 197.4 | 1949.2 | 131.9 | 3332.5 | 220.3 |
| 1974 | 6880.2 | 351.8 | 1592.4 | 128.2 | 2672.0 | 159.3 | 1864.5 | 131.2 | 4976.2 | 394.6 |
| 1975 | 7726.9 | 344.1 | 1643.9 | 109.0 | 2778.3 | 192.0 | 1664.8 | 148.1 | 5885.4 | 337.4 |
| 1976 | 7933.6 | 337.4 | 1244.8 | 85.7 | 2505.2 | 152.7 | 1547.5 | 134.0 | 4744.7 | 294.5 |
| 1977 | 7397.1 | 381.8 | 1299.0 | 126.4 | 2575.1 | 185.9 | 1285.8 | 87.9 | 4462.8 | 328.4 |
| 1978 | 7425.0 | 307.0 | 1558.0 | 92.2 | 3282.4 | 208.0 | 2174.2 | 219.1 | 4498.6 | 293.3 |
| 1979 | 7883.4 | 327.0 | 1757.9 | 121.0 | 3106.5 | 198.2 | 2071.7 | 198.5 | 4875.9 | 297.6 |
| 1980 | 7706.5 | 307.2 | 1392.9 | 98.8 | 3595.5 | 213.2 | 2049.9 | 140.7 | 4895.1 | 295.6 |
| 1981 | 6409.7 | 308.4 | 1395.4 | 120.0 | 2946.0 | 173.0 | 1910.5 | 141.7 | 3720.6 | 242.1 |
| 1982 | 6408.5 | 302.2 | 1633.8 | 126.2 | 2458.7 | 167.3 | 1535.7 | 140.2 | 3657.6 | 203.7 |
| 1983 | 6456.0 | 286.9 | 1519.2 | 144.3 | 2636.2 | 181.4 | 1875.0 | 148.0 | 3366.5 | 197.2 |
| 1984 | 5415.3 | 258.4 | 1515.0 | 125.0 | 3002.2 | 174.2 | 1408.2 | 91.5 | 3979.3 | 267.6 |
| 1985 | 4960.9 | 234.7 | 1303.0 | 98.2 | 2050.7 | 143.7 | 1475.4 | 100.3 | 3502.4 | 246.3 |
| 1986 | 6124.2 | 241.6 | 1547.1 | 107.5 | 1736.5 | 109.9 | 1674.9 | 136.1 | 4478.8 | 237.1 |
| 1987 | 5789.8 | 217.9 | 1305.6 | 97.1 | 2012.5 | 134.3 | 2006.2 | 180.4 | 3528.7 | 220.2 |
| 1988 | 6369.3 | 310.3 | 1349.9 | 121.1 | 2211.1 | 139.1 | 2060.8 | 188.3 | 4011.1 | 290.4 |
| 1989 | 5645.4 | 244.1 | 1414.6 | 106.6 | 1972.9 | 106.0 | 1841.7 | 166.4 | 3125.3 | 229.8 |
| 1990 | 5452.4 | 238.6 | 1672.1 | 135.8 | 1860.1 | 108.3 | 1789.5 | 172.7 | 2776.4 | 178.7 |
| 1991 | 5444.6 | 205.6 | 1583.7 | 111.8 | 2254.0 | 139.5 | 1557.8 | 111.3 | 3763.7 | 270.8 |
| 1992 | 5976.1 | 241.0 | 2032.8 | 143.4 | 2208.4 | 131.9 | 1773.1 | 123.7 | 4333.1 | 263.2 |
| 1993 | 5708.3 | 208.9 | 1755.2 | 107.9 | 2053.0 | 109.3 | 1694.5 | 112.7 | 3192.9 | 205.6 |
| 1994 | 6980.1 | 282.8 | 2318.3 | 145.2 | 2382.2 | 130.3 | 2108.4 | 152.2 | 4616.2 | 259.2 |
| 1995 | 8269.4 | 287.5 | 2835.7 | 187.5 | 2614.5 | 136.3 | 2300.6 | 140.3 | 5140.0 | 253.3 |
| 1996 | 7941.3 | 262.9 | 2984.0 | 152.5 | 2271.7 | 125.4 | 2499.5 | 153.4 | 6407.4 | 353.9 |
| 1997 | 9939.7 | 308.5 | 3897.2 | 264.9 | 3117.6 | 161.6 | 2506.6 | 142.5 | 6124.3 | 330.7 |
| 1998 | 9640.4 | 301.6 | 3742.2 | 205.6 | 2857.7 | 145.3 | 2087.3 | 138.9 | 6398.8 | 332.3 |
| 1999 | 10805.7 | 344.5 | 3235.5 | 163.8 | 2920.1 | 185.5 | 2631.0 | 174.6 | 7149.5 | 364.5 |
| 2000 | 9470.2 | 290.2 | 3158.4 | 200.7 | 2733.1 | 138.8 | 3193.5 | 200.1 | 7431.4 | 425.0 |
| 2001 | 7904.0 | 226.9 | 2679.2 | 136.1 | 2493.5 | 149.6 | 2508.7 | 156.4 | 5757.0 | 288.8 |
| 2002 | 7503.7 | 246.5 | 2235.4 | 135.4 | 2334.4 | 137.9 | 2333.5 | 143.8 | 4206.5 | 227.9 |
| 2003 | 7949.7 | 267.3 | 2549.0 | 169.9 | 2551.4 | 156.9 | 2678.5 | 199.7 | 5518.2 | 312.7 |
| 2004 | 7425.3 | 282.0 | 2589.6 | 165.6 | 1981.3 | 114.9 | 2460.8 | 145.2 | 4073.0 | 238.0 |
| 2005 | 6755.3 | 280.8 | 2179.1 | 131.0 | 2225.1 | 139.2 | 2156.9 | 125.8 | 4585.5 | 236.3 |
| 2006 | 7276.5 | 223.7 | 2824.7 | 174.2 | 2171.2 | 115.7 | 2587.2 | 155.3 | 5859.6 | 303.5 |
| 2007 | 8031.6 | 275.2 | 3354.9 | 206.2 | 2803.2 | 151.8 | 2910.9 | 198.5 | 6694.2 | 361.7 |

Appendix A (continued).

| Year | Northern shoveler | | Northern pintail | | Redhead | | Canvasback | | Scaup | |
|------|-------------------|------------|------------------|------------|-----------|------------|------------|------------|-----------|------------|
| | \hat{N} | \hat{SE} | \hat{N} | \hat{SE} | \hat{N} | \hat{SE} | \hat{N} | \hat{SE} | \hat{N} | \hat{SE} |
| 1955 | 1642.8 | 218.7 | 9775.1 | 656.1 | 539.9 | 98.9 | 589.3 | 87.8 | 5620.1 | 582.1 |
| 1956 | 1781.4 | 196.4 | 10372.8 | 694.4 | 757.3 | 119.3 | 698.5 | 93.3 | 5994.1 | 434.0 |
| 1957 | 1476.1 | 181.8 | 6606.9 | 493.4 | 509.1 | 95.7 | 626.1 | 94.7 | 5766.9 | 411.7 |
| 1958 | 1383.8 | 185.1 | 6037.9 | 447.9 | 457.1 | 66.2 | 746.8 | 96.1 | 5350.4 | 355.1 |
| 1959 | 1577.6 | 301.1 | 5872.7 | 371.6 | 498.8 | 55.5 | 488.7 | 50.6 | 7037.6 | 492.3 |
| 1960 | 1824.5 | 130.1 | 5722.2 | 323.2 | 497.8 | 67.0 | 605.7 | 82.4 | 4868.6 | 362.5 |
| 1961 | 1383.0 | 166.5 | 4218.2 | 496.2 | 323.3 | 38.8 | 435.3 | 65.7 | 5380.0 | 442.2 |
| 1962 | 1269.0 | 113.9 | 3623.5 | 243.1 | 507.5 | 60.0 | 360.2 | 43.8 | 5286.1 | 426.4 |
| 1963 | 1398.4 | 143.8 | 3846.0 | 255.6 | 413.4 | 61.9 | 506.2 | 74.9 | 5438.4 | 357.9 |
| 1964 | 1718.3 | 240.3 | 3291.2 | 239.4 | 528.1 | 67.3 | 643.6 | 126.9 | 5131.8 | 386.1 |
| 1965 | 1423.7 | 114.1 | 3591.9 | 221.9 | 599.3 | 77.7 | 522.1 | 52.8 | 4640.0 | 411.2 |
| 1966 | 2147.0 | 163.9 | 4811.9 | 265.6 | 713.1 | 77.6 | 663.1 | 78.0 | 4439.2 | 356.2 |
| 1967 | 2314.7 | 154.6 | 5277.7 | 341.9 | 735.7 | 79.0 | 502.6 | 45.4 | 4927.7 | 456.1 |
| 1968 | 1684.5 | 176.8 | 3489.4 | 244.6 | 499.4 | 53.6 | 563.7 | 101.3 | 4412.7 | 351.8 |
| 1969 | 2156.8 | 117.2 | 5903.9 | 296.2 | 633.2 | 53.6 | 503.5 | 53.7 | 5139.8 | 378.5 |
| 1970 | 2230.4 | 117.4 | 6392.0 | 396.7 | 622.3 | 64.3 | 580.1 | 90.4 | 5662.5 | 391.4 |
| 1971 | 2011.4 | 122.7 | 5847.2 | 368.1 | 534.4 | 57.0 | 450.7 | 55.2 | 5143.3 | 333.8 |
| 1972 | 2466.5 | 182.8 | 6979.0 | 364.5 | 550.9 | 49.4 | 425.9 | 46.0 | 7997.0 | 718.0 |
| 1973 | 1619.0 | 112.2 | 4356.2 | 267.0 | 500.8 | 57.7 | 620.5 | 89.1 | 6257.4 | 523.1 |
| 1974 | 2011.3 | 129.9 | 6598.2 | 345.8 | 626.3 | 70.8 | 512.8 | 56.8 | 5780.5 | 409.8 |
| 1975 | 1980.8 | 106.7 | 5900.4 | 267.3 | 831.9 | 93.5 | 595.1 | 56.1 | 6460.0 | 486.0 |
| 1976 | 1748.1 | 106.9 | 5475.6 | 299.2 | 665.9 | 66.3 | 614.4 | 70.1 | 5818.7 | 348.7 |
| 1977 | 1451.8 | 82.1 | 3926.1 | 246.8 | 634.0 | 79.9 | 664.0 | 74.9 | 6260.2 | 362.8 |
| 1978 | 1975.3 | 115.6 | 5108.2 | 267.8 | 724.6 | 62.2 | 373.2 | 41.5 | 5984.4 | 403.0 |
| 1979 | 2406.5 | 135.6 | 5376.1 | 274.4 | 697.5 | 63.8 | 582.0 | 59.8 | 7657.9 | 548.6 |
| 1980 | 1908.2 | 119.9 | 4508.1 | 228.6 | 728.4 | 116.7 | 734.6 | 83.8 | 6381.7 | 421.2 |
| 1981 | 2333.6 | 177.4 | 3479.5 | 260.5 | 594.9 | 62.0 | 620.8 | 59.1 | 5990.9 | 414.2 |
| 1982 | 2147.6 | 121.7 | 3708.8 | 226.6 | 616.9 | 74.2 | 513.3 | 50.9 | 5532.0 | 380.9 |
| 1983 | 1875.7 | 105.3 | 3510.6 | 178.1 | 711.9 | 83.3 | 526.6 | 58.9 | 7173.8 | 494.9 |
| 1984 | 1618.2 | 91.9 | 2964.8 | 166.8 | 671.3 | 72.0 | 530.1 | 60.1 | 7024.3 | 484.7 |
| 1985 | 1702.1 | 125.7 | 2515.5 | 143.0 | 578.2 | 67.1 | 375.9 | 42.9 | 5098.0 | 333.1 |
| 1986 | 2128.2 | 112.0 | 2739.7 | 152.1 | 559.6 | 60.5 | 438.3 | 41.5 | 5235.3 | 355.5 |
| 1987 | 1950.2 | 118.4 | 2628.3 | 159.4 | 502.4 | 54.9 | 450.1 | 77.9 | 4862.7 | 303.8 |
| 1988 | 1680.9 | 210.4 | 2005.5 | 164.0 | 441.9 | 66.2 | 435.0 | 40.2 | 4671.4 | 309.5 |
| 1989 | 1538.3 | 95.9 | 2111.9 | 181.3 | 510.7 | 58.5 | 477.4 | 48.4 | 4342.1 | 291.3 |
| 1990 | 1759.3 | 118.6 | 2256.6 | 183.3 | 480.9 | 48.2 | 539.3 | 60.3 | 4293.1 | 264.9 |
| 1991 | 1716.2 | 104.6 | 1803.4 | 131.3 | 445.6 | 42.1 | 491.2 | 66.4 | 5254.9 | 364.9 |
| 1992 | 1954.4 | 132.1 | 2098.1 | 161.0 | 595.6 | 69.7 | 481.5 | 97.3 | 4639.2 | 291.9 |
| 1993 | 2046.5 | 114.3 | 2053.4 | 124.2 | 485.4 | 53.1 | 472.1 | 67.6 | 4080.1 | 249.4 |
| 1994 | 2912.0 | 141.4 | 2972.3 | 188.0 | 653.5 | 66.7 | 525.6 | 71.1 | 4529.0 | 253.6 |
| 1995 | 2854.9 | 150.3 | 2757.9 | 177.6 | 888.5 | 90.6 | 770.6 | 92.2 | 4446.4 | 277.6 |
| 1996 | 3449.0 | 165.7 | 2735.9 | 147.5 | 834.2 | 83.1 | 848.5 | 118.3 | 4217.4 | 234.5 |
| 1997 | 4120.4 | 194.0 | 3558.0 | 194.2 | 918.3 | 77.2 | 688.8 | 57.2 | 4112.3 | 224.2 |
| 1998 | 3183.2 | 156.5 | 2520.6 | 136.8 | 1005.1 | 122.9 | 685.9 | 63.8 | 3471.9 | 191.2 |
| 1999 | 3889.5 | 202.1 | 3057.9 | 230.5 | 973.4 | 69.5 | 716.0 | 79.1 | 4411.7 | 227.9 |
| 2000 | 3520.7 | 197.9 | 2907.6 | 170.5 | 926.3 | 78.1 | 706.8 | 81.0 | 4026.3 | 205.3 |
| 2001 | 3313.5 | 166.8 | 3296.0 | 266.6 | 712.0 | 70.2 | 579.8 | 52.7 | 3694.0 | 214.9 |
| 2002 | 2318.2 | 125.6 | 1789.7 | 125.2 | 564.8 | 69.0 | 486.6 | 43.8 | 3524.1 | 210.3 |
| 2003 | 3619.6 | 221.4 | 2558.2 | 174.8 | 636.8 | 56.6 | 557.6 | 48.0 | 3734.4 | 225.5 |
| 2004 | 2810.4 | 163.9 | 2184.6 | 155.2 | 605.3 | 51.5 | 617.2 | 64.6 | 3807.2 | 202.3 |
| 2005 | 3591.5 | 178.6 | 2560.5 | 146.8 | 592.3 | 51.7 | 520.6 | 52.9 | 3386.9 | 196.4 |
| 2006 | 3680.2 | 236.5 | 3386.4 | 198.7 | 916.3 | 86.1 | 691.0 | 69.6 | 3246.7 | 166.9 |
| 2007 | 4552.8 | 247.5 | 3335.3 | 160.4 | 1009.0 | 84.7 | 864.9 | 86.2 | 3452.2 | 195.3 |

Appendix B. Breeding population estimates and 90% confidence intervals or credibility intervals (CIs; in thousands) for the 10 most abundant species of ducks in the eastern survey area, 1990-2007^a.

| Year | <u>Mergansers^b</u> | | <u>Mallard</u> | | <u>American black duck</u> | | <u>American wigeon</u> | | <u>Green-winged teal</u> | |
|------|-------------------------------|----------------|----------------|----------------|----------------------------|----------------|------------------------|--------------|--------------------------|----------------|
| | \hat{N} | 90% CI | \hat{N} | 90% CI | \hat{N} | 90% CI | \hat{N} | 90% CI | \hat{N} | 90% CI |
| 1990 | 272.3 | (234.7, 309.9) | 345.6 | (220.1, 614.4) | 430.1 | (381.8, 487.3) | 13.5 | (4.3, 22.7) | 230.1 | (180.6, 300.5) |
| 1991 | 392.2 | (345.6, 438.8) | 391.4 | (251.3, 678.9) | 423.5 | (372.9, 485.9) | 15.2 | (11.1, 19.3) | 219.1 | (170.8, 289.4) |
| 1992 | 303.2 | (256.6, 349.8) | 393.7 | (249.9, 692.8) | 407.8 | (360.4, 465.0) | 5.1 | (1.5, 8.7) | 210.7 | (163.8, 278.1) |
| 1993 | 254.7 | (212.8, 296.6) | 396.1 | (252.1, 691.5) | 406.1 | (356.3, 465.0) | 10.4 | (4.9, 15.9) | 190.4 | (146.2, 252.7) |
| 1994 | 333.4 | (286.9, 379.9) | 415.5 | (263.9, 723.2) | 374.3 | (327.2, 429.9) | 10.2 | (4.1, 16.3) | 200.3 | (154.4, 267.6) |
| 1995 | 304.8 | (261.4, 348.2) | 343.8 | (216.8, 620.5) | 426.4 | (372.4, 490.1) | 9.5 | (0.5, 18.5) | 203.1 | (156.6, 272.0) |
| 1996 | 271.6 | (239.1, 304.1) | 369.3 | (233.6, 656.4) | 497.0 | (444.7, 559.4) | 10.0 | (6.0, 14.0) | 265.9 | (210.5, 345.5) |
| 1997 | 334.0 | (288.6, 379.4) | 391.2 | (247.2, 689.3) | 453.8 | (406.3, 509.4) | 18.2 | (11.2, 25.2) | 208.4 | (164.6, 271.6) |
| 1998 | 223.1 | (177.4, 268.8) | 431.9 | (277.9, 737.5) | 485.4 | (436.0, 543.5) | 58.2 | (54.0, 62.4) | 199.0 | (158.4, 257.8) |
| 1999 | 313.4 | (236.3, 390.5) | 441.1 | (284.4, 752.6) | 535.4 | (480.3, 600.2) | 14.0 | (11.3, 16.7) | 231.5 | (181.1, 303.7) |
| 2000 | 346.7 | (303.4, 390.0) | 392.1 | (253.3, 683.4) | 506.3 | (453.2, 567.3) | 38.1 | (27.3, 48.9) | 262.3 | (209.2, 336.1) |
| 2001 | 294.7 | (247.6, 341.8) | 429.6 | (279.6, 741.0) | 472.6 | (424.0, 530.5) | 43.9 | (37.6, 50.2) | 215.8 | (171.1, 278.6) |
| 2002 | 449.4 | (374.0, 524.8) | 421.9 | (274.1, 723.9) | 525.4 | (471.2, 588.6) | 13.1 | (6.6, 19.6) | 253.9 | (200.7, 331.1) |
| 2003 | 391.1 | (317.0, 465.2) | 439.7 | (283.0, 760.3) | 474.5 | (425.6, 531.7) | 11.6 | (3.5, 19.7) | 243.2 | (192.6, 316.9) |
| 2004 | 404.3 | (350.2, 458.4) | 466.8 | (304.1, 793.9) | 488.8 | (438.9, 548.2) | 22.8 | (13.7, 31.9) | 277.9 | (219.1, 363.8) |
| 2005 | 365.5 | (313.3, 417.7) | 451.8 | (288.7, 780.1) | 471.2 | (422.0, 529.0) | 31.2 | (26.5, 35.9) | 226.0 | (179.3, 292.5) |
| 2006 | 315.5 | (243.7, 387.3) | 415.2 | (269.8, 713.8) | 492.6 | (441.4, 551.9) | 11.5 | (3.8, 19.2) | 229.0 | (181.5, 296.9) |
| 2007 | 394.4 | (314.8, 474.0) | 445.9 | (286.8, 765.3) | 539.1 | (481.5, 609.0) | 12.3 | (2.6, 22.0) | 251.3 | (199.4, 324.4) |

| Year | <u>Scaup^c</u> | | <u>Ring-necked duck</u> | | <u>Goldeneyes^d</u> | | <u>Bufflehead</u> | | <u>Scoters^e</u> | |
|------|--------------------------|----------------|-------------------------|----------------|-------------------------------|----------------|-------------------|--------------|----------------------------|----------------|
| | \hat{N} | 90% CI | \hat{N} | 90% CI | \hat{N} | 90% CI | \hat{N} | 90% CI | \hat{N} | 90% CI |
| 1990 | 49.8 | (13.4, 86.2) | 539.2 | (423.8, 705.2) | 283.1 | (168.3, 397.9) | 35.5 | (24.5, 46.5) | 99.5 | (21.5, 177.5) |
| 1991 | 37.6 | (19.6, 55.6) | 474.1 | (374.6, 618.1) | 292.6 | (194.0, 391.2) | 28.4 | (17.8, 39.0) | 89.8 | (39.0, 140.6) |
| 1992 | 36.7 | (11.0, 62.4) | 482.3 | (381.5, 627.1) | 294.1 | (203.1, 385.1) | 45.3 | (23.0, 67.6) | 85.2 | (2.9, 167.5) |
| 1993 | 10.6 | (6.8, 14.4) | 436.4 | (343.5, 568.5) | 300.9 | (179.0, 422.8) | 6.6 | (3.3, 9.9) | 104.4 | (37.2, 171.6) |
| 1994 | 36.7 | (13.1, 60.3) | 453.4 | (354.4, 593.2) | 229.5 | (159.2, 299.8) | 24.3 | (11.1, 37.5) | 162.2 | (65.7, 258.7) |
| 1995 | 14.2 | (4.1, 24.3) | 467.9 | (365.8, 618.5) | 115.6 | (86.3, 144.9) | 10.3 | (5.4, 15.2) | 25.9 | (14.9, 36.9) |
| 1996 | 20.4 | (6.3, 34.5) | 569.8 | (453.3, 739.4) | 263.2 | (166.3, 360.1) | 36.1 | (25.1, 47.1) | 31.6 | (0.0, 68.0) |
| 1997 | 37.5 | (12.7, 62.3) | 510.4 | (406.8, 659.2) | 248.9 | (210.9, 286.9) | 15.3 | (1.0, 29.6) | 52.5 | (34.5, 70.5) |
| 1998 | 12.3 | (9.9, 14.7) | 448.5 | (356.2, 582.0) | 176.7 | (104.0, 249.4) | 26.8 | (26.4, 27.2) | 58.9 | (7.3, 110.5) |
| 1999 | 21.2 | (16.3, 26.1) | 524.4 | (419.1, 675.1) | 246.7 | (215.7, 277.7) | 15.0 | (10.8, 19.2) | 24.2 | (8.7, 39.7) |
| 2000 | 40.1 | (25.0, 55.2) | 558.6 | (445.8, 720.3) | 291.0 | (234.4, 347.6) | 15.9 | (3.2, 28.6) | 51.7 | (0.6, 102.8) |
| 2001 | 108.2 | (107.3, 109.1) | 507.6 | (403.6, 654.1) | 309.2 | (263.1, 355.3) | 40.5 | (37.6, 43.4) | 57.0 | (0.0, 118.1) |
| 2002 | 71.5 | (53.2, 89.8) | 513.8 | (406.4, 673.1) | 258.1 | (221.7, 294.5) | 53.2 | (38.0, 68.4) | 202.1 | (153.3, 250.9) |
| 2003 | 39.3 | (30.7, 47.9) | 527.8 | (421.5, 681.0) | 319.3 | (257.5, 381.1) | 18.9 | (13.1, 24.7) | 73.3 | (0.0, 198.7) |
| 2004 | 21.7 | (0.0, 56.0) | 571.7 | (454.1, 746.2) | 320.0 | (238.8, 401.2) | 17.3 | (9.7, 24.9) | 103.3 | (0.0, 325.3) |
| 2005 | 25.0 | (3.2, 46.8) | 529.9 | (424.3, 678.3) | 233.7 | (176.9, 290.5) | 18.8 | (4.8, 32.8) | 74.8 | (3.5, 146.1) |
| 2006 | 30.0 | (28.6, 31.4) | 542.5 | (432.3, 698.4) | 214.6 | (182.6, 246.6) | 12.9 | (8.4, 17.4) | 78.7 | (31.6, 125.8) |
| 2007 | 25.0 | (17.1, 32.9) | 617.1 | (491.2, 796.3) | 317.6 | (178.6, 456.6) | 15.3 | (4.8, 25.8) | 126.3 | (0.0, 311.6) |

^a Estimates for mallards, American black ducks, green-winged teal, and ring-necked duck from Bayesian hierarchical analysis using FWS and CWS data from strata 51, 52, 63, 64, 66-68, 70-72. All others were computed as variance-weighted means of FWS and CWS estimates for strata 51, 52, 63, 64, 66-68, 70-72.

^b Common, red-breasted, and hooded.

^c Greater and lesser.

^d Common and Barrow's.

^e Black, white-winged, and surf.