2004

Trends in Duck Breeding Populations, 1955-2004

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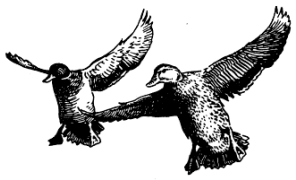

This report summarizes information about the status of duck populations and wetland habitats during spring 2004, focusing on areas encompassed by the U.S. Fish and Wildlife and Canadian Wildlife Services' Waterfowl Breeding Population and Habitat Survey. The estimates do not include information from surveys conducted by State or Provincial agencies. In the traditional survey area, which includes strata 1-18, 20-50, and 75-77 (Fig. 2), 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 32.2 ± 0.6 [SE] million birds, 11% below ($P < 0.001$) last year's estimate of 36.2 ± 0.7 million birds and 3% below the 1955-2003 long-term average ($P = 0.053$). Mallard (*Anas platyrhynchos*) abundance was 7.4 ± 0.3 million birds, which was similar to last year's estimate of 7.9 ± 0.3 million birds ($P = 0.177$) and the long-term average ($P = 0.762$). Blue-winged teal (*A. discors*) abundance was 4.1 ± 0.2 million birds. This value was 26% below last year's estimate of 5.5 ± 0.3 million birds ($P < 0.001$) and 10% below the long-term average ($P = 0.073$). Of the other duck species, only estimates of northern shovelers (*A. clypeata*; 2.8 ± 0.2 million) and American wigeon (*A. americana*; 2.0 ± 0.1 million) were significantly different from 2003 estimates ($P < 0.003$), and both were 22% below 2003 estimates. Compared to the long-term averages, gadwall (*A. strepera*; 2.6 ± 0.2 million; +56%), green-winged teal (*A. crecca*; 2.5 ± 0.1 million; +33%) and shovelers (+32%) were above their 1955-2003 averages ($P < 0.001$), as they were in 2003. In 2004, northern pintails (*A. acuta*; 2.2 ± 0.2 million; -48%) and scaup (*Aythya affinis* and *A. marila* combined; 3.8 ± 0.2 million; -27%) remained well below their long-term averages ($P < 0.001$). Wigeon also were below their long-term average in 2004 (-25%; $P < 0.001$). Estimates of redheads (*A. americana*) and canvasbacks (*A. valisineria*) were unchanged from their previous year and long-term averages ($P \geq 0.396$).

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The eastern survey area is comprised of strata 51-56 and 62-69 (Fig. 2). The 2004 total-duck estimate for this area was 3.9 ± 0.3 million birds. This estimate was similar to that of last year and the 1996-2003 average ($P \geq 0.102$). Estimates for most individual species were similar to last year and to 1996-2003 averages. Only numbers of ring-necked ducks (*A. collaris*) were significantly different from 2003 estimates, increasing by 67% to 0.7 ± 0.2 million birds ($P = 0.095$). Wigeon (0.1 ± 0.1 million; -61%) and goldeneye (*Bucephala clangula* and *B. islandica* combined; 0.4 ± 0.1 million; -42%) were below their 1996-2003 averages ($P \leq 0.052$). All other species were similar to 2003 estimates and 1996-2003 averages.

Most of the U.S. and Canadian prairies were much drier in May 2004 compared to May 2003. Unfortunately, good water conditions in the short-grass prairie of southern Alberta and Saskatchewan seen last year did not carry over to this year, and habitat in these areas deteriorated from good last year to fair or poor this year. Habitat conditions in Manitoba ranged from poor in the east to good in the west, similar to conditions observed last year. The Dakotas have experienced a slow drying trend over the past few years, and much of eastern South Dakota was in poor condition. Habitat conditions in North Dakota improved in northern regions. Eastern Montana was a mosaic of habitat conditions ranging from poor to good. Although many areas of the southern prairies received considerable snowfall during the winter and spring of 2003-2004, including a late spring snowstorm, the snowmelt was absorbed by the parched ground. As a consequence, fewer ponds were counted in the prairies this spring. The estimate of May ponds for the northcentral U.S. and Prairie Canada combined was 3.9 ± 0.2 million. This was 24% lower than last year ($P < 0.001$) and 19% below the long-term average ($P < 0.001$). Numbers of ponds in Canada (2.5 ± 0.1 million) and the U.S. (1.4 ± 0.1 million) both were below 2003 estimates (-29% in Canada and -16% in the U.S.; $P \leq 0.033$) and the number of Canadian ponds was 25% below the long-term average ($P < 0.001$). Snowy and cold conditions present during May probably adversely impacted early nesting species and young broods.

This year, the Northwest Territories, Northern Alberta, Northern Saskatchewan, and Northern Manitoba were exceptionally late in thawing; birds that over-flew the dry prairies encountered winter-like conditions and nesting may have been curtailed. This is especially true for early nesting species such as mallards and pintails. Unlike the northern areas of Canada, Alaska had excellent habitat conditions for breeding waterfowl this spring. Areas south of Alaska's Brooks Range experienced a widespread, record-setting early spring breakup, and only minor flooding.

Breeding habitat conditions were generally good to excellent in the eastern U.S. and Canada. Although spring was late in most areas, biologists believed that nesting was not significantly affected because of abundant spring rain and mild temperatures.

WATERFOWL POPULATION SURVEYS

50 Years & Still Counting

Next year is the 50th anniversary of the May Waterfowl Breeding Population and Habitat survey.

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

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

Northern Alberta, Northeastern British Columbia, and Northwest Territories (Strata 13-18, 20, and 77): C. Ferguson and W. Mullins

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

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

Air	E. Buelna Huggins and C. Pyle
Ground	P. Pryor [a], K. Froggatt [b], S. Barry [a], E. Hofman [b], C. Procter [a], M. Barr [c], N. Clements [a], N. Fontaine [c], J. Going [a], R. Hunka [c], T. Mathews [c], B. Peers [c], R. Russell [b], J. Spenst [c], and K. Zimmer [a]

Southern Saskatchewan (Strata 30-35):

Air	P. Thorpe, T. Lewis, R. King, and C. Reighn
Ground	D. Nieman [a], J. Smith [a], K. Warner [a], K. Dufour [a], C. Wilkinson [a], K. Cochrane [a], P. Nieman [a], A. Williams [c], M. Schuster [a], D. Caswell [a], J. Leafloor [a], P. Rakowski [a], F. Baldwin [a], R. Bazin [a], J. Caswell [a], J. Galbraith [a], C. Lindgren [c], C. Meuckon [a], and N. Wiebe [a]

Southern Manitoba (Strata 25 and 36-40):

Air	R. King and C. Reighn
Ground	M. Schuster [a], D. Caswell [a], J. Leafloor [a], P. Rakowski [a], F. Baldwin [a], G. Ball [b], J. Caswell [a], J. Galbraith [a], C. Lindgren [c], C. Meuckon [a], and N. Wiebe [a]

Montana and Western Dakotas (Strata 41-44):

Air	J. Voelzer and R. Bentley
Ground	K. Richkus and D. D'Auria

Eastern Dakotas (Strata 45-49):

Air	J. Solberg and M. Rich
Ground	P. Garrettson, A. Araya, K. Kruse, and T. Thorn

Central Quebec (Strata 68 and 69):

Air	J. Wortham, D. Fronczak, and J. Goldsberry [d]
Helicopter	D. Holtby [b], R. Raftovich, and G. Boomer

New York, Eastern Ontario, and Southern Quebec (Strata 52-56): M. Koneff, D. Forsell, and M. Jones

Central and Western Ontario (Strata 50 and 51): K. Bollinger and W. Butler

Maine and Maritimes (Strata 62-67): J. Bidwell and M. Drut

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[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. Estimated number (in thousands) of May ponds in portions of Prairie Canada and the northcentral U.S.

			Change from 2003			Change from LTA	
Survey Area	2003	2004	%	*P*	LTA[a]	%	*P*
Prairie Canada							
S. Alberta	888	511	-43	<0.001	726	-30	<0.001
S. Saskatchewan	2143	1461	-32	<0.001	1964	-26	<0.001
S. Manitoba	491	541	+10	0.280	674	-20	<0.001
Subtotal	3522	2513	-29	<0.001	3365	-25	<0.001
Northcentral U.S.							
Montana and western Dakotas	480	597	+25	0.018	521	+15	0.071
Eastern Dakotas	1188	810	-32	0.001	1006	-20	0.037
Subtotal	1668	1407	-16	0.033	1528	-8	0.243
Grand Total	5190	3920	-24	<0.001	4842	-19	<0.001

[a]Long-term average. Prairie Canada, 1961-2003; northcentral U.S. and Grand Total, 1974-2003.

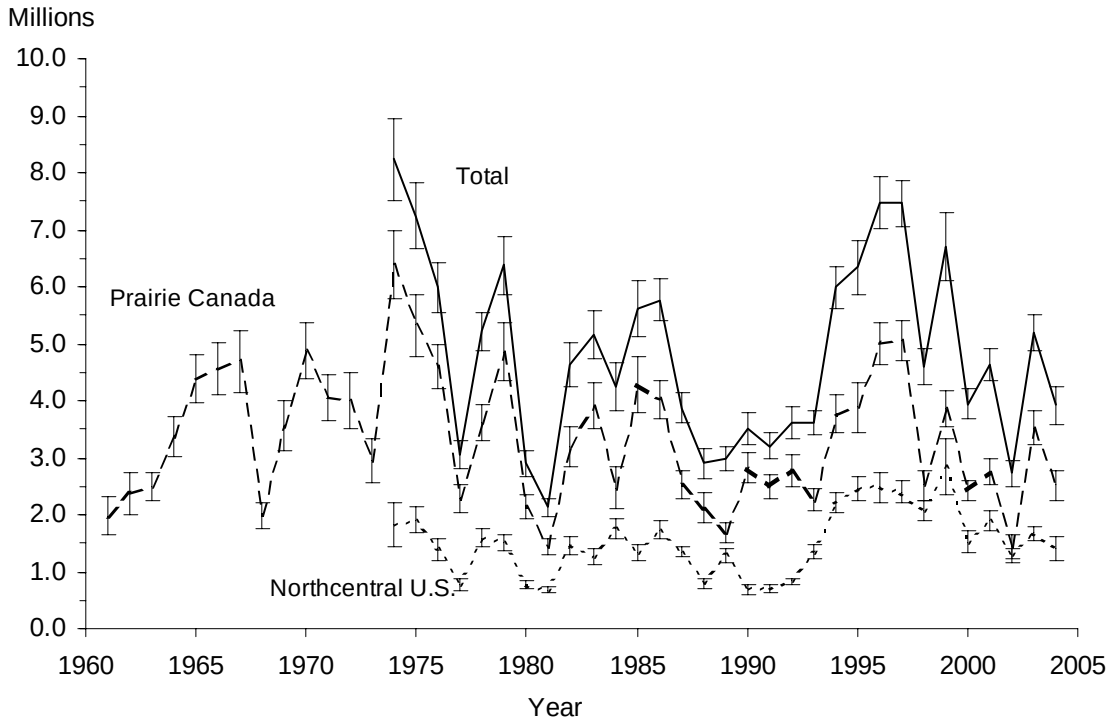


Figure 1. Number of ponds in May and 95% confidence intervals in Prairie Canada and the northcentral U.S.

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

			Change from 2003			Change from LTA	
Region	2003	2004	%	*P*	LTA [a]	%	*P*
Alaska-Yukon Territory – Old Crow Flats	5705	5456	-4	0.361	3480	+57	<0.001
C. & N. Alberta – N.E. British Columbia - Northwest Territories	6461	5882	-9	0.160	7229	-19	<0.001
N. Saskatchewan- N. Manitoba - W. Ontario	3564	4085	+15	0.106	3554	+15	0.033
S. Alberta	2696	2499	-7	0.309	4342	-42	<0.001
S. Saskatchewan	9296	5783	-38	<0.001	7367	-22	<0.001
S. Manitoba	1582	1474	-7	0.354	1544	-5	0.393
Montana and western Dakotas	1731	1615	-7	0.413	1620	0	0.955
Eastern Dakotas	5190	5370	+3	0.590	4169	+29	<0.001
Total [b]	36225	32164	-11	<0.001	33304	-3	0.053

[a] Long-term average, 1955-2003.
[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 3. Mallard breeding population estimates (in thousands) for regions in the traditional survey area.

			Change from 2003			Change from LTA	
Region	2003	2004	%	*P*	LTA	%	*P*
Alaska-Yukon Territory – Old Crow Flats	843	811	-4	0.726	341	+138	<0.001
C. & N. Alberta – N.E. British Columbia - Northwest Territories	852	776	-9	0.502	1103	-30	<0.001
N. Saskatchewan- N. Manitoba - W. Ontario	1103	1283	+16	0.417	1161	+11	0.482
S. Alberta	627	600	-4	0.766	1118	-46	<0.001
S. Saskatchewan	2111	1609	-24	0.011	2088	-23	<0.001
S. Manitoba	505	393	-22	0.032	376	+5	0.509
Montana and western Dakotas	506	495	-2	0.891	502	-1	0.911
Eastern Dakotas	1402	1456	+4	0.727	823	+77	<0.001
Total	7950	7425	-7	0.177	7512	-1	0.762

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

			Change from 2003			Change from LTA	
Region	2003	2004	%	*P*	LTA	%	*P*
Alaska-Yukon Territory – Old Crow Flats	5	2	-59	0.268	2	+1	0.991
C. & N. Alberta – N.E. British Columbia - Northwest Territories	76	138	+82	0.066	44	+211	0.003
N. Saskatchewan- N. Manitoba - W. Ontario	30	22	-27	0.524	28	-20	0.599
S. Alberta	241	290	+20	0.313	308	-6	0.636
S. Saskatchewan	1077	752	-30	0.071	549	+37	0.094
S. Manitoba	94	148	+57	0.075	64	+131	0.002
Montana and western Dakotas	206	205	0	0.987	194	+6	0.653
Eastern Dakotas	821	1033	+26	0.110	475	+117	<0.001
Total	2549	2590	+2	0.864	1664	+56	<0.001

Table 5. American wigeon breeding population estimates (in thousands) for regions in the traditional survey area.

			Change from 2003			Change from LTA	
Region	2003	2004	%	*P*	LTA	%	*P*
Alaska-Yukon Territory – Old Crow Flats	1020	897	-12	0.240	496	+81	<0.001
C. & N. Alberta – N.E. British Columbia - Northwest Territories	850	565	-34	0.053	926	-39	<0.001
N. Saskatchewan- N. Manitoba - W. Ontario	191	149	-22	0.378	256	-42	0.001
S. Alberta	132	117	-11	0.609	304	-62	<0.001
S. Saskatchewan	219	128	-41	0.019	434	-70	<0.001
S. Manitoba	16	3	-78	<0.001	63	-95	<0.001
Montana and western Dakotas	43	66	+52	0.101	111	-41	<0.001
Eastern Dakotas	81	56	-30	0.224	48	+18	0.500
Total	2551	1981	-22	0.003	2637	-25	<0.001

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

			Change from 2003			Change from LTA	
Region	2003	2004	%	*P*	LTA	%	*P*
Alaska-Yukon Territory – Old Crow Flats	1035	819	-21	0.068	341	+140	<0.001
C. & N. Alberta – N.E. British Columbia - Northwest Territories	767	835	+9	0.728	757	+10	0.486
N. Saskatchewan- N. Manitoba - W. Ontario	308	375	+22	0.303	191	+96	<0.001
S. Alberta	132	98	-25	0.384	196	-50	<0.001
S. Saskatchewan	273	124	-54	0.001	229	-46	<0.001
S. Manitoba	48	27	-44	0.023	52	-48	<0.001
Montana and western Dakotas	85	104	+22	0.403	38	+177	<0.001
Eastern Dakotas	30	79	+159	0.019	45	+76	0.059
Total	2678	2461	-8	0.378	1849	+33	<0.001

Table 7. Blue-winged teal breeding population estimates (in thousands) for regions in the traditional survey area.

			Change from 2003			Change from LTA	
Region	2003	2004	%	*P*	LTA	%	*P*
Alaska-Yukon Territory – Old Crow Flats	3	2	-24	0.852	1	+66	0.683
C. & N. Alberta – N.E. British Columbia - Northwest Territories	314	401	+27	0.389	268	+49	0.087
N. Saskatchewan- N. Manitoba - W. Ontario	182	60	-67	0.006	272	-78	<0.001
S. Alberta	323	360	+12	0.647	613	-41	<0.001
S. Saskatchewan	1918	1155	-40	0.004	1211	-5	0.717
S. Manitoba	420	282	-33	0.032	385	-27	0.001
Montana and western Dakotas	419	320	-24	0.186	262	+22	0.160
Eastern Dakotas	1939	1493	-23	0.062	1496	0	0.984
Total	5518	4073	-26	<0.001	4508	-10	0.073

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

			Change from 2003			Change from LTA	
Region	2003	2004	%	*P*	LTA	%	*P*
Alaska-Yukon Territory – Old Crow Flats	671	643	-4	0.748	251	+156	<0.001
C. & N. Alberta – N.E. British Columbia - Northwest Territories	318	247	-23	0.168	213	+16	0.387
N. Saskatchewan- N. Manitoba - W. Ontario	10	33	+226	0.011	44	-25	0.219
S. Alberta	448	385	-14	0.465	356	+8	0.692
S. Saskatchewan	1438	784	-45	0.003	631	+24	0.166
S. Manitoba	123	143	+16	0.604	105	+37	0.264
Montana and western Dakotas	247	200	-19	0.394	148	+35	0.142
Eastern Dakotas	365	377	+3	0.836	388	-3	0.804
Total	3620	2810	-22	0.003	2135	+32	<0.001

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

			Change from 2003			Change from LTA	
Region	2003	2004	%	*P*	LTA	%	*P*
Alaska-Yukon Territory – Old Crow Flats	848	927	+9	0.440	913	+2	0.845
C. & N. Alberta – N.E. British Columbia - Northwest Territories	170	193	+14	0.613	388	-50	<0.001
N. Saskatchewan- N. Manitoba - W. Ontario	6	10	+84	0.236	42	-76	<0.001
S. Alberta	252	161	-36	0.117	742	-78	<0.001
S. Saskatchewan	993	474	-52	0.005	1241	-62	<0.001
S. Manitoba	39	40	+1	0.972	115	-65	<0.001
Montana and western Dakotas	122	132	+8	0.791	276	-52	<0.001
Eastern Dakotas	128	247	+92	0.020	467	-47	<0.001
Total	2558	2185	-15	0.110	4182	-48	<0.001

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

			Change from 2003			Change from LTA	
Region	2003	2004	%	*P*	LTA	%	*P*
Alaska-Yukon Territory – Old Crow Flats	3	2	-21	0.813	1	+69	0.376
C. & N. Alberta – N.E. British Columbia - Northwest Territories	29	73	+150	0.006	37	+97	0.015
N. Saskatchewan- N. Manitoba - W. Ontario	26	31	+19	0.774	28	+10	0.801
S. Alberta	97	79	-19	0.523	118	-33	0.065
S. Saskatchewan	271	131	-52	0.007	191	-31	0.026
S. Manitoba	71	102	+44	0.234	71	+44	0.129
Montana and western Dakotas	22	25	+13	0.845	9	+170	0.240
Eastern Dakotas	117	161	+38	0.133	170	-5	0.731
Total	637	605	-5	0.681	625	-3	0.705

Table 11. Canvasback breeding population estimates (in thousands) for regions in the traditional survey area.

			Change from 2003			Change from LTA	
Region	2003	2004	%	*P*	LTA	%	*P*
Alaska-Yukon Territory – Old Crow Flats	89	161	+81	0.164	90	+79	0.121
C. & N. Alberta – N.E. British Columbia - Northwest Territories	115	109	-5	0.873	72	+53	0.141
N. Saskatchewan- N. Manitoba - W. Ontario	13	50	+277	0.009	56	-11	0.670
S. Alberta	70	50	-28	0.421	64	-22	0.494
S. Saskatchewan	195	121	-38	0.022	184	-34	0.001
S. Manitoba	42	70	+68	0.184	56	+26	0.474
Montana and western Dakotas	11	12	+5	0.888	8	+55	0.190
Eastern Dakotas	23	44	+93	0.059	33	+34	0.230
Total	558	617	+11	0.458	562	+10	0.396

Table 12. Scaup (greater and lesser combined) breeding population estimates (in thousands) for regions in the traditional survey area.

			Change from 2003			Change from LTA	
Region	2003	2004	%	*P*	LTA	%	*P*
Alaska-Yukon Territory – Old Crow Flats	970	982	+1	0.925	913	+8	0.461
C. & N. Alberta – N.E. British Columbia - Northwest Territories	1736	1624	-6	0.643	2673	-39	<0.001
N. Saskatchewan- N. Manitoba - W. Ontario	354	582	+64	0.004	592	-2	0.860
S. Alberta	172	124	-28	0.340	363	-66	<0.001
S. Saskatchewan	251	185	-26	0.240	422	-56	<0.001
S. Manitoba	49	31	-35	0.176	139	-77	<0.001
Montana and western Dakotas	35	28	-21	0.628	55	-50	0.009
Eastern Dakotas	167	251	+50	0.145	93	+169	0.002
Total	3734	3807	+2	0.810	5249	-27	<0.001

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

			Change from 2003			Change from LTA	
Species	2003	2004	%	*P*	Average [a]	%	*P*
Mergansers (common, red-breasted, & hooded)	569	668	+17	0.439	537	+24	0.264
Mallard	383	368	-4	0.853	312	+18	0.358
American black duck	533	730	+37	0.234	498	+47	0.137
American wigeon	79	27	-66	0.133	68	-61	0.004
Green-winged teal	452	554	+22	0.558	356	+56	0.123
Lesser scaup	101	81	-20	0.629	81	0	0.996
Ring-necked duck	399	668	+67	0.095	479	+39	0.225
Goldeneye (common & Barrow's)	768	430	-44	0.191	746	-42	0.052
Bufflehead	66	44	-34	0.260	60	-27	0.183
Scoters (surf, black, & white-winged)	237	261	+10	0.822	154	+70	0.200
Total [b]	3635	3905	+7	0.533	3343	+17	0.102

[a] Average for 1996-2003.
[b] Includes species in table plus gadwall, northern shoveler, northern pintail, eiders, and blue-winged teal. Excludes long-tailed duck, wood duck, redhead, canvasback, and ruddy duck.

Figure 2. Strata and transects for areas of the May Waterfowl Breeding Population and Habitat Survey (stratum 57 is experimental and survey counts are not included in this report).

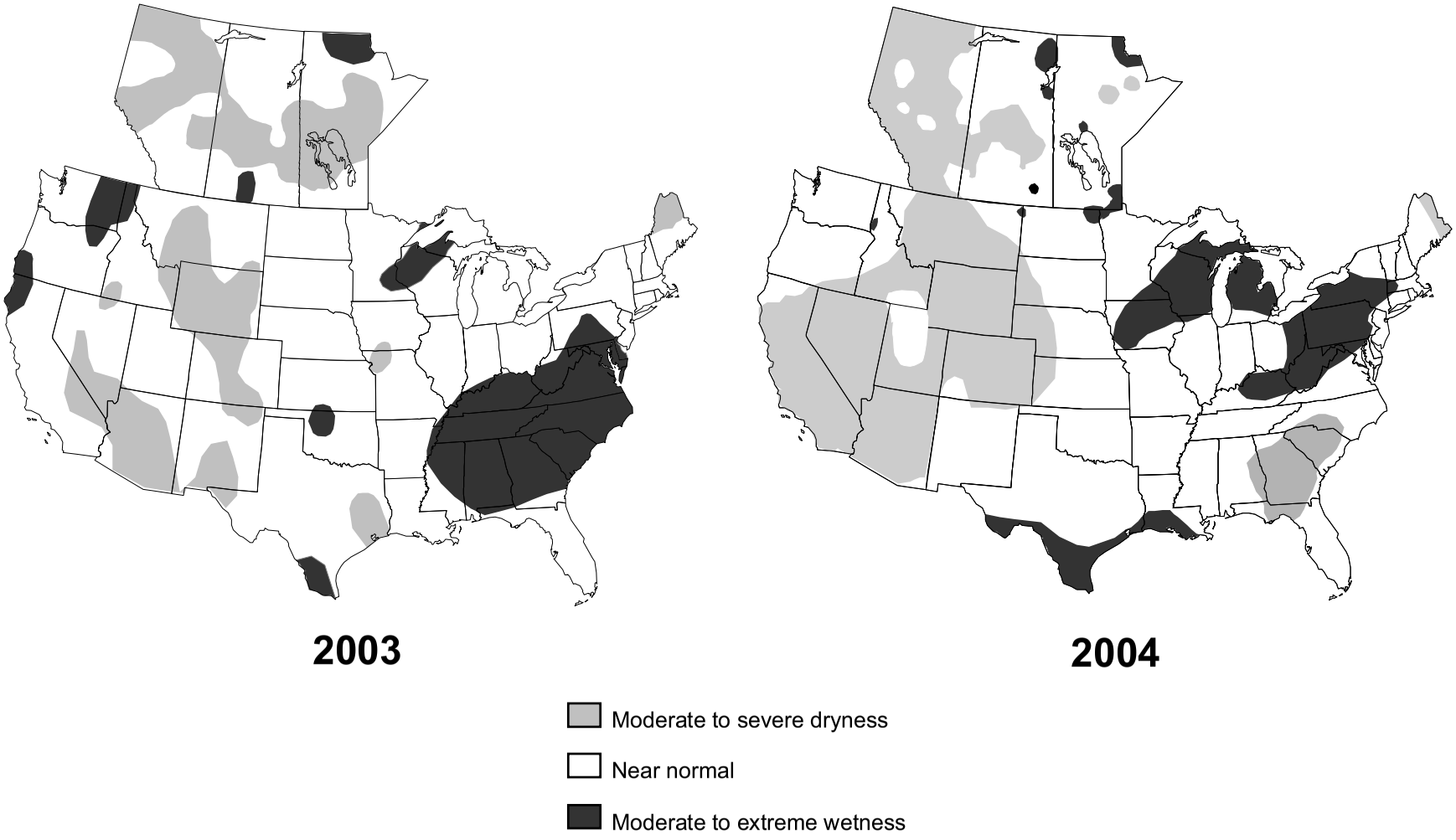


Figure 3. Palmer long-term drought indices (PDI) for the contiguous U.S. and provinces of Canada for which data were available. U.S. PDI map from Weekly Weather and Crop Bulletin - May 28, 2003 and May 29, 2004; Canadian PDI map from Environment Canada - May 2003 and May 2004.

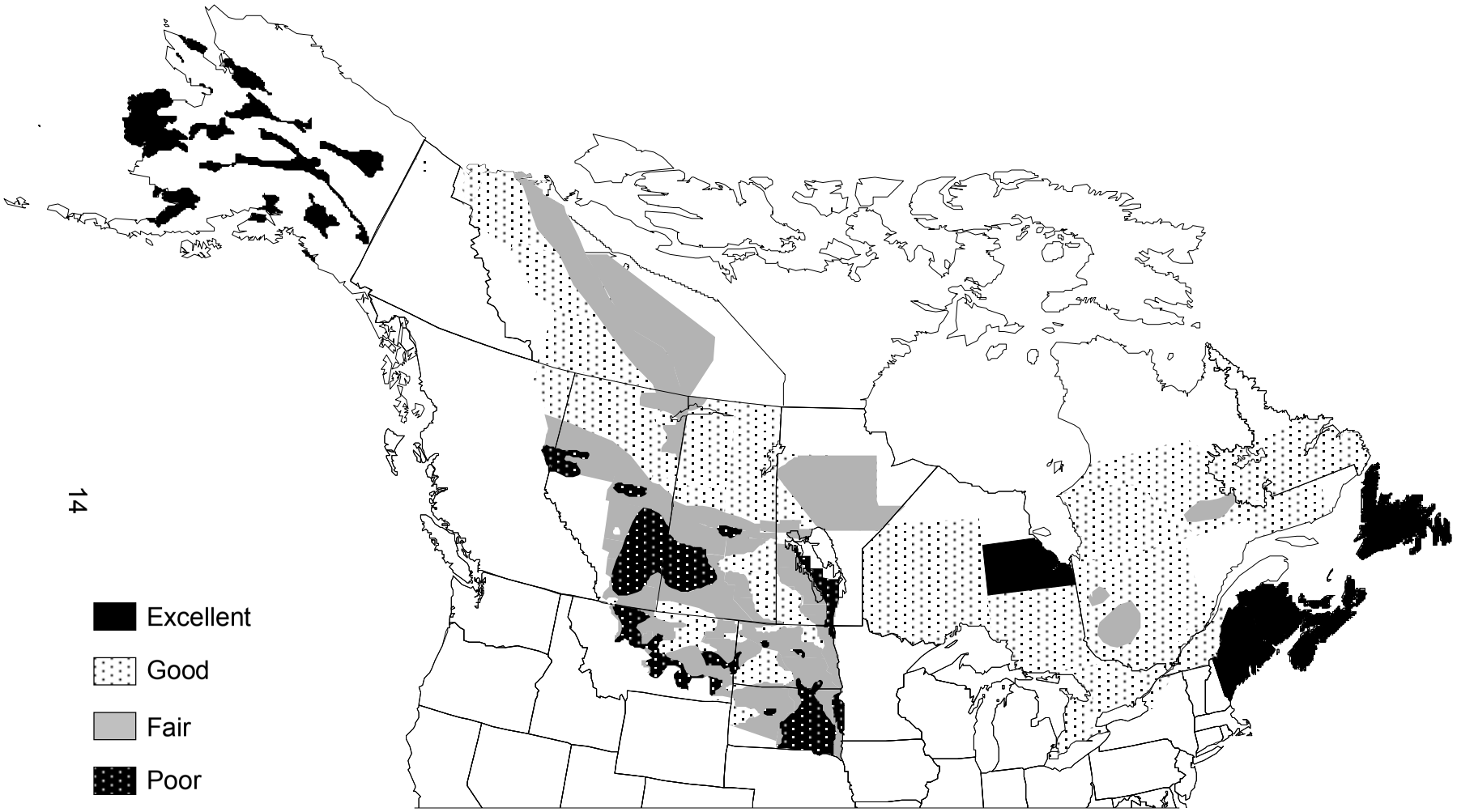


Figure 4. Breeding waterfowl habitat conditions during May and June 2004, as judged by U.S. Fish and Wildlife Service Flyway Biologists.

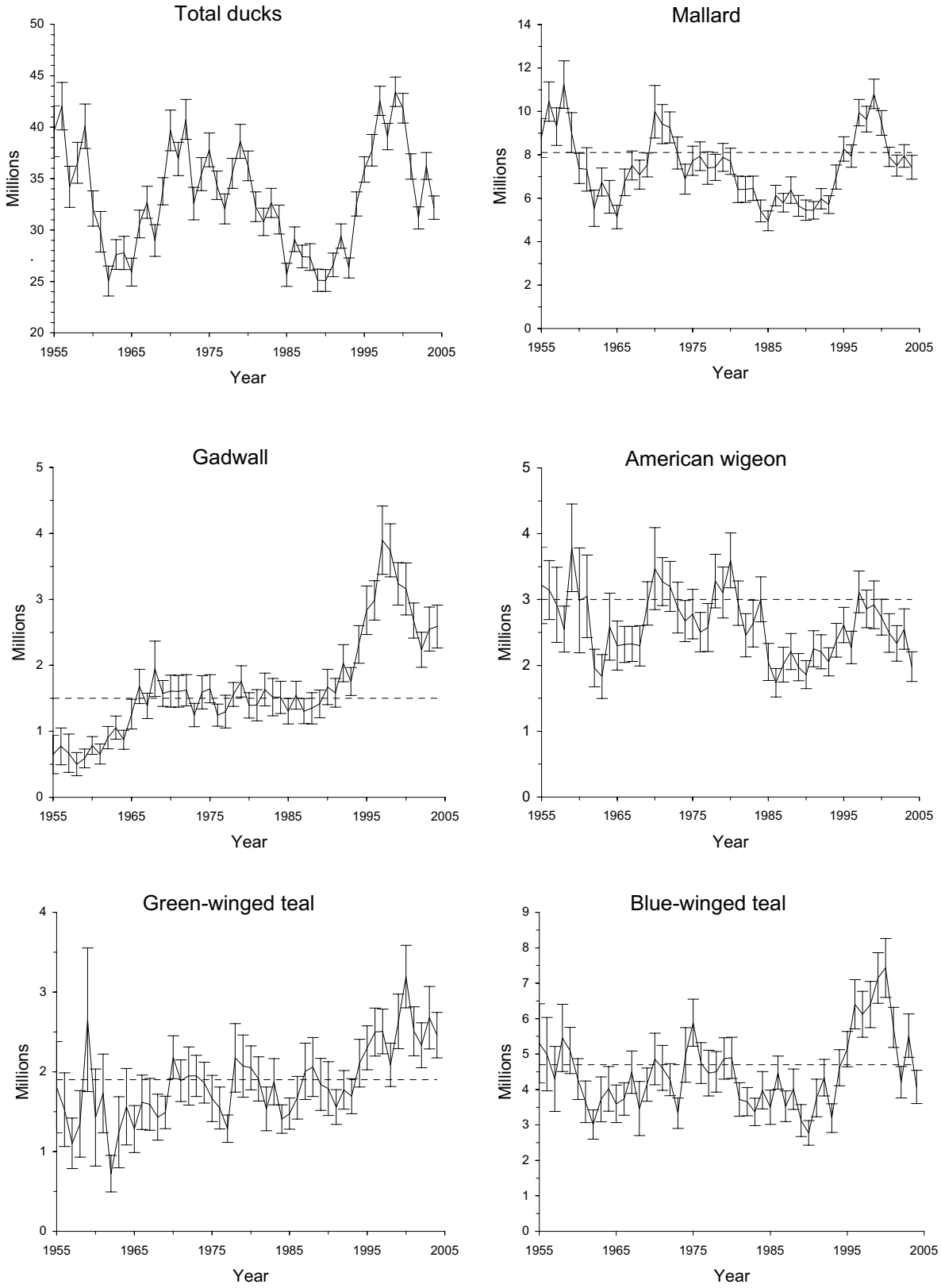
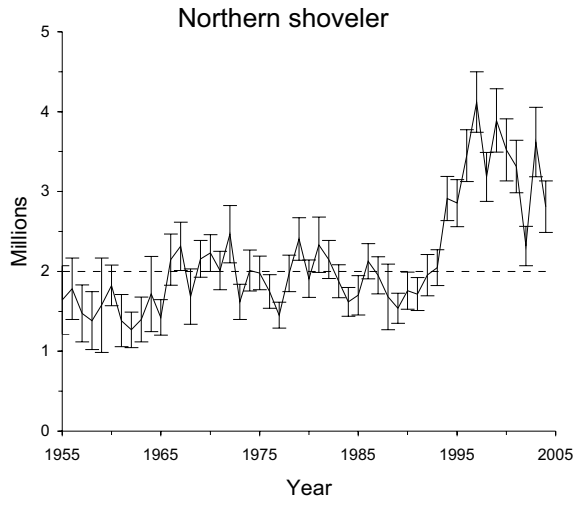
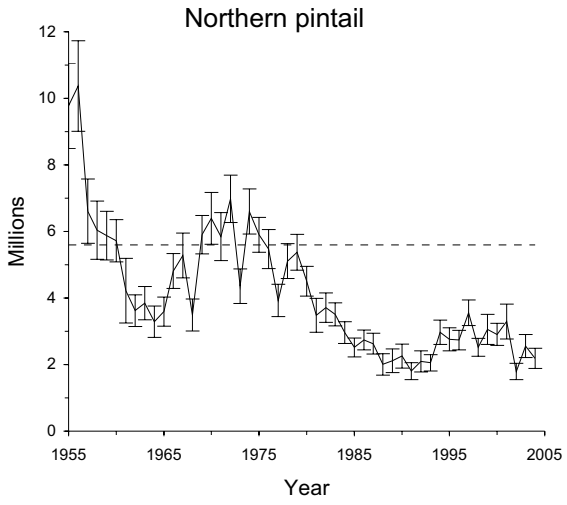
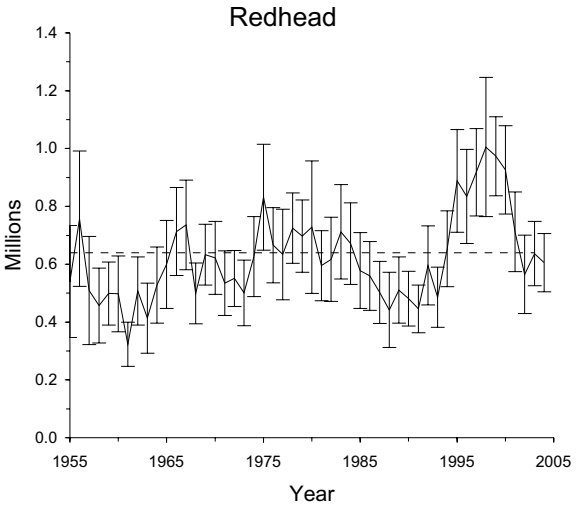
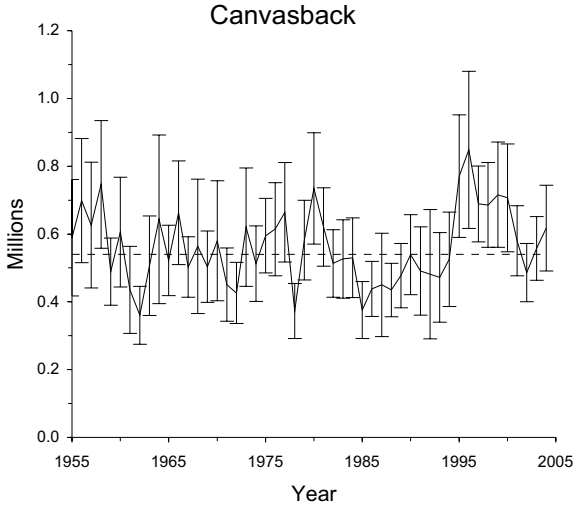


Figure 5. Breeding population estimates, 95% confidence intervals, and North American Waterfowl Management Plan population goal (dashed line) for selected species in the traditional survey area (strata 1-18, 20-50, 75-77).









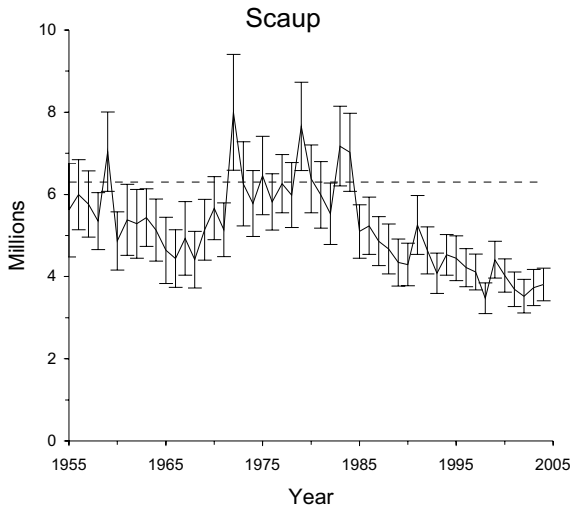


Figure 5, continued.

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).

	Mallard		Gadwall		American wigeon		Green-winged teal		Blue-winged teal	
Year	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$
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

Appendix A. Continued.

	Northern shoveler		Northern pintail		Redhead		Canvasback		Scaup	
Year	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$
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

Appendix B. Breeding population estimates and standard errors (in thousands) for the 10 most abundant species of ducks in the eastern survey area, 1990-2004 [a].

	Mergansers		Mallard		American black duck		American wigeon		Am. green-winged teal		Lesser scaup		Ring-necked duck		Goldeneyes		Bufflehead		Scoters	
Year	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$
1990	157.5	48.3	208.6	47.7	160.9	33.5	31.0	22.6	47.1	8.6	135.7	56.2	92.1	28.3	73.3	22.2	99.9	22.9	1.9	1.9
1991	263.9	78.6	169.8	34.5	126.0	35.3	45.4	21.8	42.2	14.4	43.5	16.4	158.1	30.2	138.4	44.3	94.1	32.1	6.4	5.3
1992	128.1	24.3	362.2	54.1	160.3	33.1	15.4	9.3	43.8	13.9	65.6	23.2	251.6	62.3	241.0	55.2	59.0	13.7	3.0	2.3
1993	164.9	23.7	333.8	49.7	124.6	25.6	9.4	7.4	47.4	9.9	288.6	235.3	248.1	65.1	90.2	32.6	13.1	3.6	0.0	0.0
1994	358.4	91.8	238.6	28.8	116.3	20.7	18.9	9.6	169.2	24.0	81.9	31.7	163.5	62.6	55.0	17.4	33.4	14.0	18.3	9.7
1995	376.3	89.7	212.6	41.1	234.5	46.6	13.8	7.9	96.2	14.1	62.0	20.5	195.6	51.0	9.2	3.7	26.5	8.8	5.0	4.8
1996	1083.1	279.6	387.6	63.6	562.2	97.1	34.7	17.0	436.2	86.9	38.5	15.1	611.9	98.7	410.3	169.7	50.6	12.5	23.6	10.5
1997	379.1	53.0	287.6	44.8	434.5	63.1	22.5	11.2	211.5	31.3	16.7	7.2	617.6	151.1	220.6	54.8	22.3	6.7	88.9	50.2
1998	327.4	38.8	363.2	71.3	542.1	55.4	83.6	24.6	299.5	81.1	20.1	10.6	361.8	53.8	715.7	124.7	44.6	10.3	159.4	47.1
1999	290.0	39.4	280.8	39.2	488.7	51.3	121.1	45.6	422.4	62.3	44.9	20.5	453.2	76.0	920.0	167.3	70.5	20.8	47.0	17.7
2000	400.0	54.0	212.3	31.3	396.9	53.9	41.7	20.4	201.6	28.7	19.8	9.1	618.8	71.3	946.5	318.7	49.3	11.3	182.1	59.0
2001	428.7	62.8	285.7	40.8	422.0	48.8	77.5	18.2	220.3	33.5	203.5	92.2	352.8	39.6	1032.2	202.4	95.0	20.9	178.6	49.4
2002	815.2	97.9	295.1	38.1	602.8	86.1	86.6	25.5	604.1	129.0	136.1	48.2	416.0	57.8	954.9	209.2	83.6	21.2	314.4	76.4
2003	569.1	63.9	383.1	57.8	532.6	60.2	79.0	32.8	452.3	120.1	101.2	21.2	399.3	50.3	767.9	212.1	66.3	17.0	237.1	66.9
2004	668.0	110.5	367.9	58.2	729.8	154.3	27.0	11.0	553.8	125.1	81.1	35.7	667.6	152.6	429.9	147.4	43.8	11.1	260.9	81.5

[a] Maine estimates were included beginning in 1995. Quebec estimates were included beginning in 1996. Therefore, estimates are only comparable within year groups 1990-94, and 1996-present.