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## Trends In Duck Breeding Populations, 1955-2001

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# TRENDS IN DUCK BREEDING POPULATIONS, 1955-2001

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11500 American Holly Drive  
Laurel, MD 20708-4016

Administrative Report<sup>a</sup> – June 29, 2001



This report summarizes preliminary information about the status of duck populations and their habitats during spring 2001, and focuses on areas encompassed by the Breeding Waterfowl and Habitat Survey. These numbers are preliminary, and do not include information from state or provincial surveys. The traditional survey area includes strata 1-18, 20-50, and 75-77. In the traditional survey area, 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  $36.1 \pm 0.6$  million birds, 14 % below ( $P < 0.001$ ) last year's estimate of  $41.8 \pm 0.7$  million birds, but still 9% above ( $P < 0.001$ ) the 1955-2000 average. Mallard abundance was  $7.9 \pm 0.2$  million, which is 17% below ( $P < 0.001$ ) last year's estimate but similar to ( $P = 0.08$ ) the 1955-2000 average. Blue-winged teal abundance was estimated at  $5.8 \pm 0.3$  million. This is 23% below ( $P = 0.001$ ) last year's record estimate of 7.4 million, but 29% above ( $P < 0.001$ ) the 1955-2000 average. Gadwall ( $2.7 \pm 0.1$  million, +66%), green-winged teal ( $2.5 \pm 0.2$  million, +39%), and northern shovelers ( $3.3 \pm 0.2$  million, +60%) all remained above ( $P < 0.05$ ) their long-term averages, while American wigeon ( $2.5 \pm 0.1$  million), redheads ( $0.7 \pm 0.07$  million), and canvasbacks ( $0.6 \pm 0.05$  million) were similar to ( $P > 0.2$ ) their long-term averages. Scaup numbers ( $3.7 \pm 0.2$  million, -31%) were again below the long-term average ( $P < 0.001$ ). The northern pintail was unchanged compared to 2000 ( $3.3 \pm 0.3$  million), but their numbers remained below the 1955-2000 average ( $P < 0.001$ ).

The eastern survey area is comprised of strata 51-56 and 62-69. The 2001 total duck population estimate for the eastern survey area was  $3.3 \pm 0.2$  million birds, similar to last year's total duck estimate of  $3.2 \pm 0.3$  million birds ( $P = 0.76$ ), and to the 1996-2000 average ( $P = 0.35$ ). Abundances of individual species were similar to those of last year,

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with the exception of ring-necked ducks ( $0.35 \pm 0.04$  million,  $P=0.001$ ) and buffleheads ( $0.10 \pm 0.02$  million,  $P=0.05$ ). Buffleheads ( $P=0.03$ ), goldeneyes ( $P=0.08$ ), and lesser scaup ( $P=0.08$ ) were above their 1996-2000 averages in the east. Green-winged teal ( $P=0.03$ ) and ring-necked ducks ( $P=0.002$ ) were below their 1996-2000 averages, and all other species were similar to their long-term averages ( $P>0.14$ ).

Habitat conditions in the traditional survey area were variable. The estimate of May ponds (U. S. and Prairie Canada combined) is up 18% ( $4.6 \pm 0.1$  million,  $P=0.001$ ) compared to 2000, but not statistically different from the long-term average (-6%,  $P=0.07$ ). Continued drought produced fair to poor conditions in most of Alberta, central and southern Saskatchewan, and eastern Montana. By contrast, North and South Dakota generally had good to excellent water conditions, with the best conditions in the eastern portions of these states, and drier conditions to the north and west. Nesting cover in the Dakotas was in above-average condition. Southern Manitoba and extreme southeastern Saskatchewan have had higher than normal water conditions for the past two years, and this water, along with above normal precipitation due to an early, snowy winter, produced excellent habitat for breeding ducks. Average to above-average precipitation also made for excellent wetland conditions across northern Manitoba and Saskatchewan. The northernmost portion of Alberta was the exception to the record drought and poor wetland conditions in the rest of the province, as above-average winter and spring precipitation filled nearly all available wetland basins. Good conditions for breeding ducks prevailed in the Northwest Territories, except for a small northern area that was rated only fair due to late spring ice conditions that reduced available breeding habitat for early-nesting species. In Alaska, breeding conditions depend largely on the timing of spring, as wetland conditions are less variable than on the prairies. Although winter temperatures were mild, spring was late, and waterfowl production will likely be below average to the north and west, and average to the south and east. Overall, conditions were good in the traditional survey area, and average to above-average waterfowl production is expected.

In the eastern survey area, conditions were variable but generally good. Southern Ontario and northern New York enjoyed an early spring, and with wetland basins nearly full, the outlook for breeding ducks is good. Spring was also early in Quebec, with good to excellent habitat in the central and northern portions. However, southern Quebec was drier, and conditions there ranged from fair to poor. In Maine and the Maritime provinces spring was late, with lower than normal temperatures, but above-average precipitation, and habitat conditions were rated good throughout the region. Overall, eastern habitats were in good condition, with average to above-average waterfowl production expected.

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

Alaska and Yukon Territory (Old Crow Flats): B. Conant and D. Groves

Northern Alberta, Northeastern British Columbia, and Northwest Territories: C. Ferguson and P. Corr

Northern Saskatchewan and Northern Manitoba: F. Roetker and J. Kreilich, Jr.

Southern and Central Alberta:

Air	E. Buelna and A. Davenport
Ground	D. Duncan <sup>a</sup> , P. Pryor <sup>a</sup> , K. Froggatt <sup>b</sup> , S. Barry <sup>a</sup> , E. Hofman <sup>b</sup> , R. Russell <sup>b</sup> , B. Peers <sup>c</sup> , T. Matthews <sup>c</sup> , M. Johnson <sup>a</sup> , L. Crowe <sup>a</sup> , C. Procter <sup>a</sup> , J. Spenst <sup>b</sup> , S. Witham <sup>c</sup> , M. Barr <sup>c</sup>

Southern Saskatchewan:

Air	P. Thorpe, K. Bollinger, R. King, and H. Bell
Ground	D. Nieman <sup>a</sup> , J. Smith <sup>a</sup> , K. Warner <sup>a</sup> , C. Downie <sup>a</sup> , M. Hosegood <sup>a</sup> , C. Lévesque <sup>a</sup> , P. Nieman <sup>a</sup> , C. Park <sup>a</sup> , A. Williams <sup>a</sup> , D. Caswell <sup>a</sup> , M. Schuster <sup>a</sup> , P. Rakowski <sup>a</sup> , D. Pisiak <sup>b</sup> , M. Van Osch <sup>c</sup> , M. Blanchard <sup>a</sup> , J. Galbraith <sup>a</sup> , F. Baldwin, Jr. <sup>a</sup> , A. Dupuis <sup>a</sup> , B. Carles <sup>b</sup>

Southern Manitoba:

Air	R. King, and H. Bell
Ground	D. Caswell <sup>a</sup> , M. Schuster <sup>a</sup> , P. Rakowski <sup>a</sup> , D. Pisiak <sup>b</sup> , M. Van Osch <sup>c</sup> , G. Ball <sup>b</sup> , M. Blanchard <sup>a</sup> , J. Galbraith <sup>a</sup> , F. Baldwin, Jr. <sup>a</sup> , A. Dupuis <sup>a</sup> , G. Hochbaum <sup>a</sup> , B. Carles <sup>b</sup>

Montana and Western Dakotas

Air	J. Voelzer and R. Bentley
Ground	A. Arnold <sup>d</sup> and V. Griego

Central and Eastern Dakotas

Air	J. W. Solberg and S. Thomas
Ground	G. T. Allen, M. Ellingson, P. R. Garrettson, D. M. Prellwitz

Northern Quebec: J. Wortham and M. Francke

New York, Eastern Ontario, and Southern Quebec: M. Koneff, C. Kitchens-Hayes, D. Holtby<sup>b</sup>, M. Miller<sup>b</sup>

Central and Western Ontario: W. Butler, B. Fisher, D. Holtby<sup>b</sup>, J. Drahota, B. Raftovich

Maine and Maritimes: J. Bidwell and M. Drut

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<sup>a</sup> Canadian Wildlife Service

<sup>b</sup> State, Provincial, or Tribal Conservation Agency

<sup>c</sup> Ducks Unlimited - Canada

<sup>d</sup> 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.

Survey Area	2000	2001	Change from 2000		LTA <sup>a</sup>	Change from LTA	
			%	<i>P</i>		%	<i>P</i>
Prairie Canada							
S. Alberta	553	426	-23	0.032	736	-42	<0.001
S. Saskatchewan	1404	1536	+9	0.277	2004	-23	<0.001
S. Manitoba	466	786	+69	<0.001	685	+15	0.089
Subtotal	2422	2747	+13	0.031	3425	-20	<0.001
Northcentral U.S.							
Montana and Western Dakotas	429	346	-19	0.040	536	-35	<0.001
Eastern Dakotas	1095	1548	+41	<0.001	982	+58	<0.001
Subtotal	1524	1893	+24	0.006	1518	+25	<0.001
Grand Total	3947	4640	+18	0.001	4916	-6	0.071

<sup>a</sup>Long-term average. Prairie Canada, 1961-2000; northcentral U.S. and Grand Total, 1974-2000.

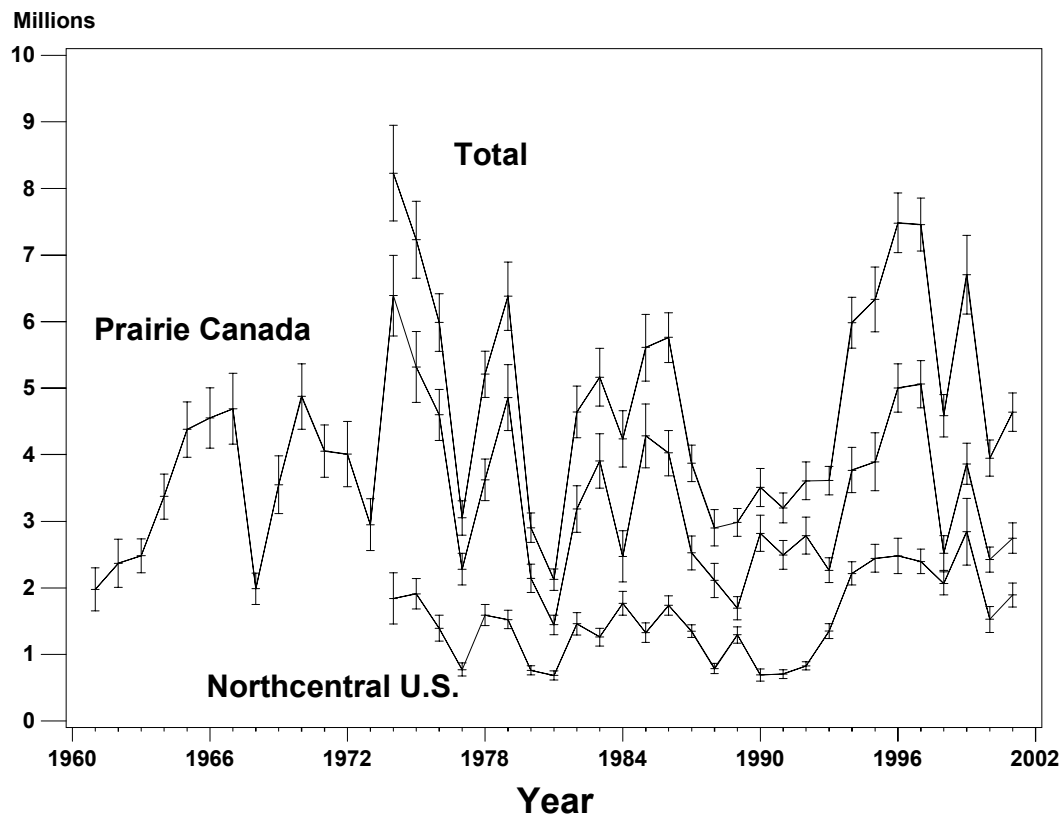


Figure 1. Number of ponds in May and 95% confidence intervals for Prairie Canada and the Northcentral U.S.

Table 2. Duck breeding population estimates <sup>a</sup> (in thousands) for regions in the traditional survey area.

Region	2000	Change from 2000			LTA	Change from LTA	
		2001	%	<i>P</i>		%	<i>P</i>
Alaska-Yukon Territory – Old Crow Flats	6727	6427	-4	0.449	3335	+93	<0.001
C. & N. Alberta – N.E. British Columbia – Northwest Territories	6900	5489	-20	<0.001	7297	-25	<0.001
N. Saskatchewan- N. Manitoba – W. Ontario	3468	2656	-23	0.014	3552	-25	<0.001
S. Alberta	3485	2521	-28	<0.001	4460	-43	<0.001
S. Saskatchewan	7665	6442	-16	0.001	7429	-13	<0.001
S. Manitoba	1486	1793	+21	0.016	1543	+16	0.007
Montana and Western Dakotas	1726	1588	-8	0.271	1625	-2	0.692
Eastern Dakotas	10382	9261	-11	0.049	3983	+133	<0.001
<b>Total</b>	<b>41838</b>	<b>36177</b>	<b>-14</b>	<b>&lt;0.001</b>	<b>33224</b>	<b>+9</b>	<b>&lt;0.001</b>

<sup>a</sup> Includes black duck, ring-necked duck, goldeneye, bufflehead, and ruddy duck; excludes eider, long-tailed duck, wood duck, scoter, merganser, and wood duck.

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

Region	2000	Change from 2000			LTA	Change from LTA	
		2001	%	<i>P</i>		%	<i>P</i>
Alaska-Yukon Territory – Old Crow Flats	770	718	-7	0.489	315	+128	<0.001
C. & N. Alberta – N.E. British Columbia – Northwest Territories	1288	979	-24	0.029	1110	-12	0.103
N. Saskatchewan- N. Manitoba – W. Ontario	1049	603	-42	0.001	1175	-49	<0.001
S. Alberta	833	744	-11	0.386	1143	-35	<0.001
S. Saskatchewan	2267	1650	-27	<0.001	2117	-22	<0.001
S. Manitoba	368	446	+21	0.141	371	+20	0.090
Montana and Western Dakotas	622	463	-26	0.035	504	-8	0.381
Eastern Dakotas	2273	2301	+1	0.897	759	+203	<0.001
<b>Total</b>	<b>9470</b>	<b>7904</b>	<b>-17</b>	<b>&lt;0.001</b>	<b>7494</b>	<b>+5</b>	<b>0.078</b>

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

Region	2000	Change from 2000			LTA	Change from LTA	
		2001	%	<i>P</i>		%	<i>P</i>
Alaska-Yukon Territory – Old Crow Flats	3	7	+140	0.360	2	+281	0.199
C. & N. Alberta – N.E. British Columbia – Northwest Territories	100	111	+12	0.672	40	+179	0.001
N. Saskatchewan- N. Manitoba – W. Ontario	12	15	+25	0.696	28	-47	0.034
S. Alberta	311	257	-17	0.320	311	-17	0.041
S. Saskatchewan	650	715	+10	0.541	538	+33	0.045
S. Manitoba	85	106	+25	0.141	61	+75	<0.001
Montana and Western Dakotas	289	403	+39	0.084	189	+113	<0.001
Eastern Dakotas	1709	1066	-38	0.001	443	+141	<0.001
Total	3158	2679	-15	0.048	1610	+66	<0.001

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

Region	2000	Change from 2000			LTA	Change from LTA	
		2001	%	<i>P</i>		%	<i>P</i>
Alaska-Yukon Territory – Old Crow Flats	1141	1106	-3	0.769	459	+141	<0.001
C. & N. Alberta – N.E. British Columbia – Northwest Territories	722	728	+1	0.963	937	-22	0.055
N. Saskatchewan- N. Manitoba – W. Ontario	147	100	-32	0.174	262	-62	<0.001
S. Alberta	225	187	-17	0.593	315	-41	0.002
S. Saskatchewan	253	177	-30	0.031	450	-61	<0.001
S. Manitoba	19	18	-6	0.768	66	-73	<0.001
Montana and Western Dakotas	122	88	-28	0.252	114	-23	0.257
Eastern Dakotas	104	90	-13	0.632	45	+100	0.010
Total	2733	2494	-9	0.240	2649	-6	0.307

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

Region	2000	Change from 2000			LTA	Change from LTA	
		2001	%	<i>P</i>		%	<i>P</i>
Alaska-Yukon Territory – Old Crow Flats	946	1029	+9	0.490	305	+238	<0.001
C. & N. Alberta – N.E. British Columbia - Northwest Territories	1282	742	-42	0.005	753	-2	0.911
N. Saskatchewan- N. Manitoba - W. Ontario	189	181	-4	0.856	186	-2	0.870
S. Alberta	308	190	-38	0.164	199	-4	0.846
S. Saskatchewan	295	202	-31	0.061	231	-12	0.394
S. Manitoba	61	31	-48	0.026	53	-41	0.003
Montana and Western Dakotas	60	64	+6	0.890	35	+81	0.109
Eastern Dakotas	52	69	+32	0.465	44	+56	0.205
<b>Total</b>	<b>3194</b>	<b>2509</b>	<b>-21</b>	<b>0.007</b>	<b>1806</b>	<b>+39</b>	<b>&lt;0.001</b>

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

Region	2000	Change from 2000			LTA	Change from LTA	
		2001	%	<i>P</i>		%	<i>P</i>
Alaska-Yukon Territory – Old Crow Flats	0	0	-	-	1	-100	<0.001
C. & N. Alberta – N.E. British Columbia - Northwest Territories	275	119	-57	0.011	270	-56	<0.001
N. Saskatchewan- N. Manitoba - W. Ontario	126	148	+18	0.565	276	-46	<0.001
S. Alberta	578	368	-36	0.045	632	-42	<0.001
S. Saskatchewan	1622	1267	-22	0.081	1207	+5	0.639
S. Manitoba	355	484	+36	0.097	385	+26	0.050
Montana and Western Dakotas	238	158	-34	0.055	261	-40	<0.001
Eastern Dakotas	4238	3212	-24	0.021	1433	+124	<0.001
<b>Total</b>	<b>7431</b>	<b>5757</b>	<b>-23</b>	<b>0.001</b>	<b>4465</b>	<b>+29</b>	<b>&lt;0.001</b>



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

Region	2000	Change from 2000			LTA	Change from LTA	
		2001	%	<i>P</i>		%	<i>P</i>
Alaska-Yukon Territory – Old Crow Flats	846	666	-21	0.152	225	+196	<0.001
C. & N. Alberta – N.E. British Columbia - Northwest Territories	248	204	-18	0.482	207	-2	0.934
N. Saskatchewan- N. Manitoba - W. Ontario	36	28	-23	0.547	45	-38	0.027
S. Alberta	380	268	-30	0.208	357	-25	0.161
S. Saskatchewan	900	718	-20	0.182	619	+16	0.275
S. Manitoba	176	199	+13	0.542	102	+95	0.001
Montana and Western Dakotas	161	152	-5	0.799	146	+4	0.819
Eastern Dakotas	774	1079	+39	0.022	371	+191	<0.001
Total	3521	3314	-6	0.423	2073	+60	<0.001

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

Region	2000	Change from 2000			LTA	Change from LTA	
		2001	%	<i>P</i>		%	<i>P</i>
Alaska-Yukon Territory – Old Crow Flats	1452	1426	-2	0.924	902	+58	0.020
C. & N. Alberta – N.E. British Columbia - Northwest Territories	220	175	-21	0.255	401	-56	<0.001
N. Saskatchewan- N. Manitoba - W. Ontario	16	10	-38	0.296	44	-78	<0.001
S. Alberta	189	66	-65	<0.001	782	-92	<0.001
S. Saskatchewan	464	680	+47	0.070	1281	-47	<0.001
S. Manitoba	45	97	+117	0.014	118	-18	0.267
Montana and Western Dakotas	169	161	-5	0.787	285	-43	<0.001
Eastern Dakotas	353	680	+93	0.001	474	+43	0.017
Total	2908	3296	+13	0.220	4289	-23	<0.001

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

Region	2000	Change from 2000			LTA	Change from LTA	
		2001	%	<i>P</i>		%	<i>P</i>
Alaska-Yukon Territory – Old Crow Flats	1	0	-100	0.345	1	-100	<0.001
C. & N. Alberta – N.E. British Columbia – Northwest Territories	26	26	+2	0.955	38	-30	0.119
N. Saskatchewan- N. Manitoba – W. Ontario	41	8	-80	0.069	29	-72	<0.001
S. Alberta	107	54	-49	0.104	120	-55	<0.001
S. Saskatchewan	324	224	-31	0.064	190	+18	0.294
S. Manitoba	88	117	+34	0.557	70	+67	0.198
Montana and Western Dakotas	10	13	+30	0.711	9	+46	0.485
Eastern Dakotas	331	269	-19	0.336	168	+60	0.035
<b>Total</b>	<b>926</b>	<b>712</b>	<b>-23</b>	<b>0.041</b>	<b>624</b>	<b>+14</b>	<b>0.218</b>

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

Region	2000	Change from 2000			LTA	Change from LTA	
		2001	%	<i>P</i>		%	<i>P</i>
Alaska-Yukon Territory – Old Crow Flats	187	89	-52	0.182	89	0	0.997
C. & N. Alberta – N.E. British Columbia – Northwest Territories	83	63	-25	0.345	70	-10	0.621
N. Saskatchewan- N. Manitoba – W. Ontario	37	32	-14	0.744	58	-45	0.018
S. Alberta	73	32	-56	0.054	66	-52	0.024
S. Saskatchewan	232	232	0	1.000	185	+25	0.210
S. Manitoba	64	56	-12	0.673	56	+1	0.968
Montana and Western Dakotas	7	6	-15	0.800	8	-24	0.368
Eastern Dakotas	24	70	+191	0.008	32	+120	0.019
<b>Total</b>	<b>707</b>	<b>580</b>	<b>-18</b>	<b>0.189</b>	<b>563</b>	<b>+3</b>	<b>0.756</b>

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

Region	2000	Change from 2000			LTA	Change from LTA	
		2001	%	<i>P</i>		%	<i>P</i>
Alaska-Yukon Territory – Old Crow Flats	1219	1148	-6	0.661	909	+26	0.034
C. & N. Alberta – N.E. British Columbia – Northwest Territories	1621	1476	-9	0.447	2739	-46	<0.001
N. Saskatchewan- N. Manitoba – W. Ontario	293	267	-9	0.785	609	-56	<0.001
S. Alberta	292	202	-31	0.234	375	-46	0.004
S. Saskatchewan	273	321	+18	0.567	434	-26	0.108
S. Manitoba	60	74	+23	0.635	144	-49	0.010
Montana and Western Dakotas	41	42	+3	0.928	56	-24	0.197
Eastern Dakotas	227	164	-28	0.233	88	+85	0.039
<b>Total</b>	<b>4026</b>	<b>3694</b>	<b>-8</b>	<b>0.264</b>	<b>5353</b>	<b>-31</b>	<b>&lt;0.001</b>

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

Region	2000	Change from 2000			LTA <sup>b</sup>	Change from LTA	
		2001	%	<i>P</i>		%	<i>P</i>
Mergansers	400	429	+7	0.729	496	-14	0.435
Mallard	212	286	+35	0.153	306	-7	0.661
American Black Duck	397	422	+6	0.730	485	-13	0.271
American Wigeon	42	77	+86	0.192	61	+28	0.442
Green-winged teal	202	220	+9	0.671	314	-30	0.032
Lesser Scaup	116	204	+75	0.371	41	+392	0.080
Ring-necked duck	619	353	-43	0.001	533	-34	0.002
Goldeneye (common & Barrow's)	947	1032	+9	0.820	643	+61	0.075
Bufflehead	49	95	+93	0.054	47	+100	0.029
Scoters	182	179	-2	0.963	100	+78	0.137
Total	3204	3337	+4	0.757	3075	+9	0.351

<sup>a</sup> Includes gadwall, northern shoveler, northern pintail, and scaup. Excludes eider, long-tailed duck, wood duck, redhead, canvasback, and ruddy duck.

<sup>b</sup> Long-term average from 1996.

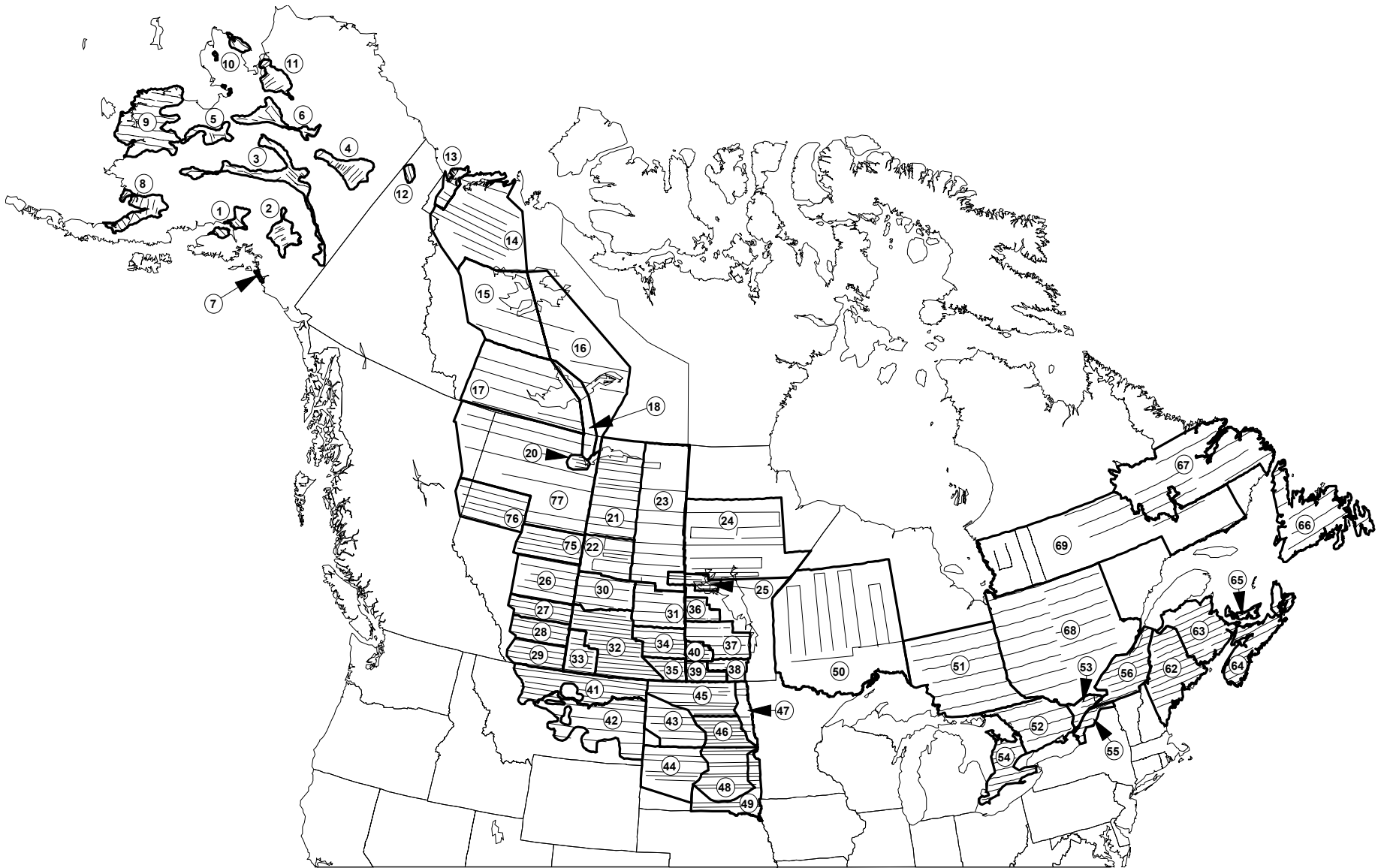


Figure 2. Transects and strata for areas of the Breeding Waterfowl and Habitat Survey.

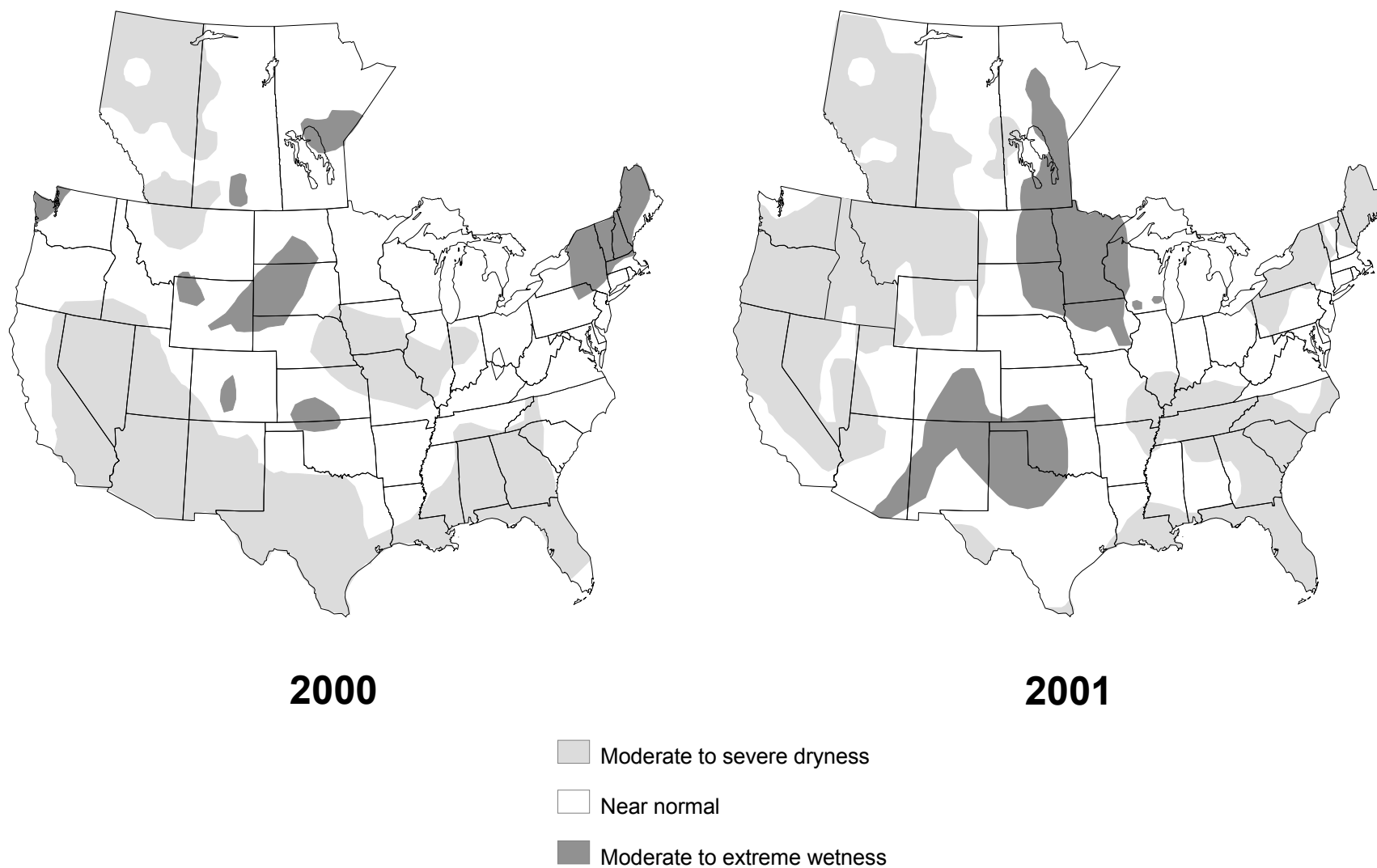


Figure 3. Palmer long-term drought indices for the contiguous U.S. and provinces of Canada for which data were available. U.S. PDI map from Weekly Weather and Crop Bulletin May 31, 2000 and May 30, 2001; Canadian PDI map from Environment Canada May 2000 and May 2001.

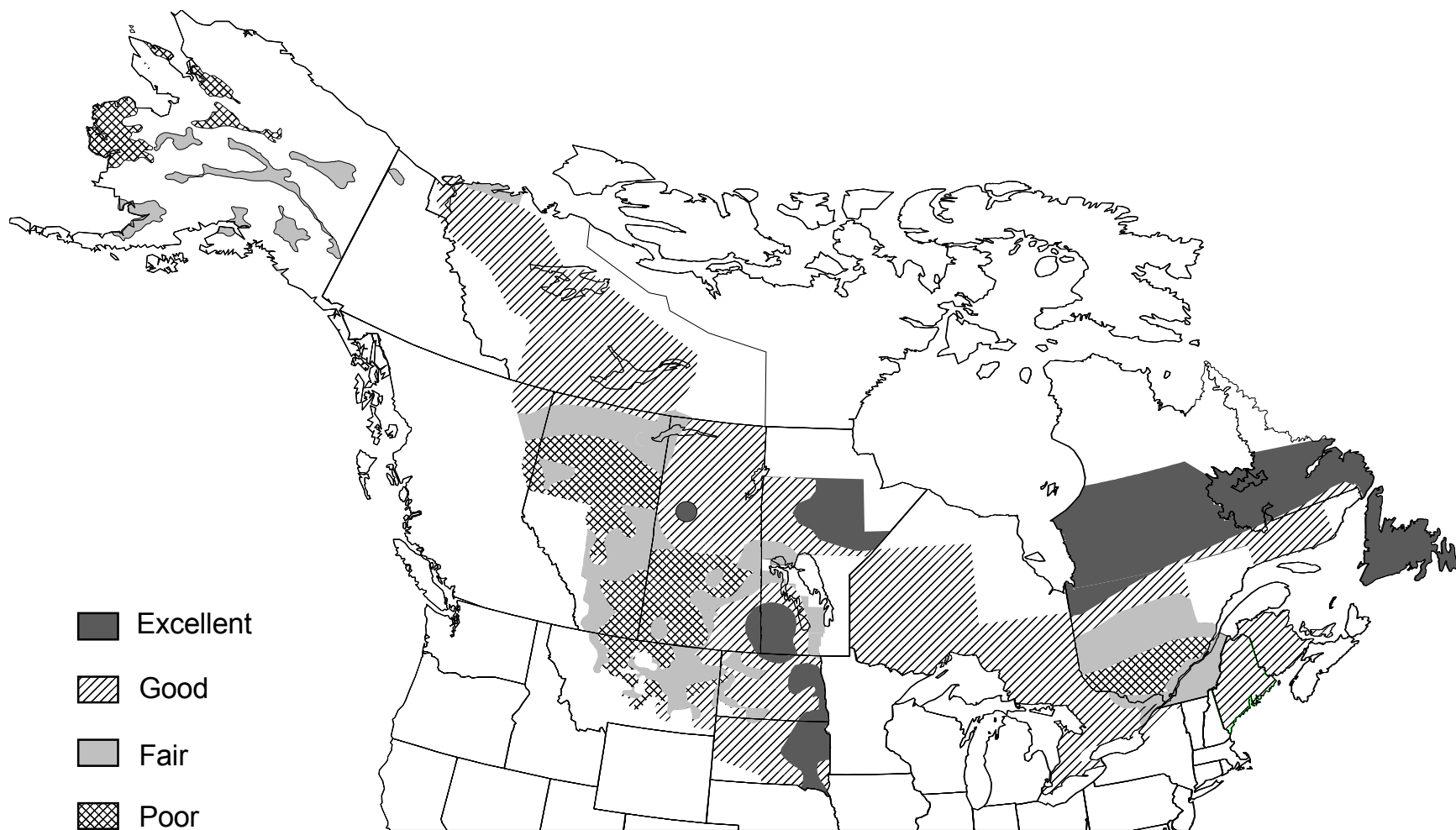


Figure 4. Preliminary breeding waterfowl habitat conditions during May 2001, as judged by U.S. Fish & Wildlife Service Flyway Biologists.

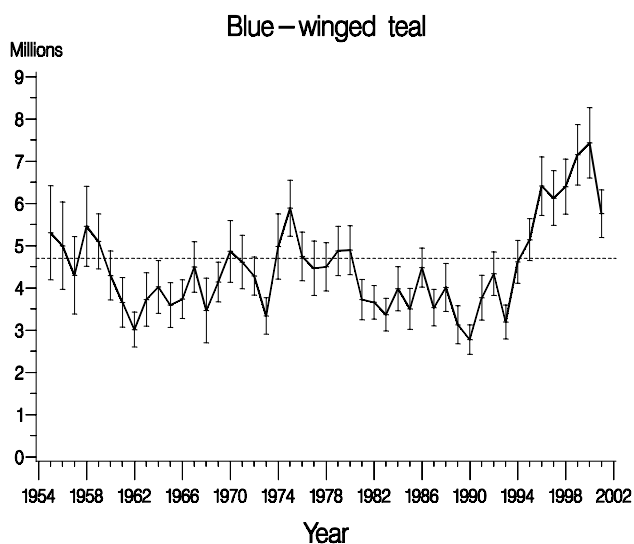
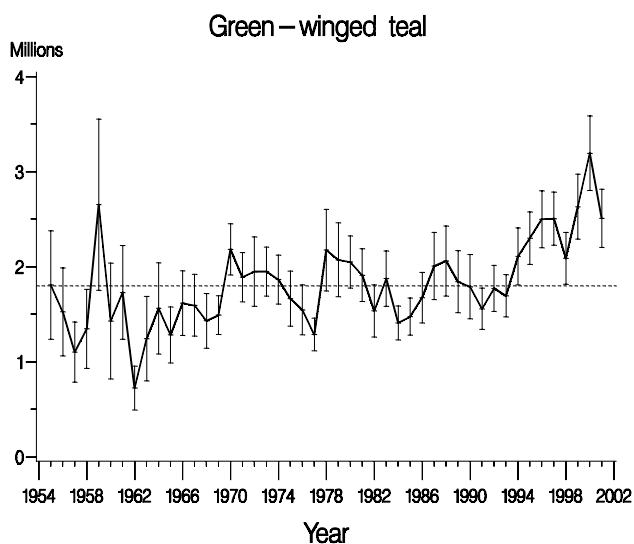
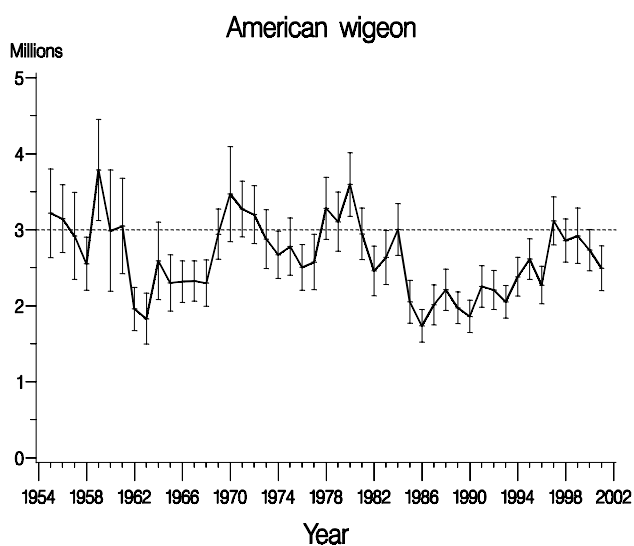
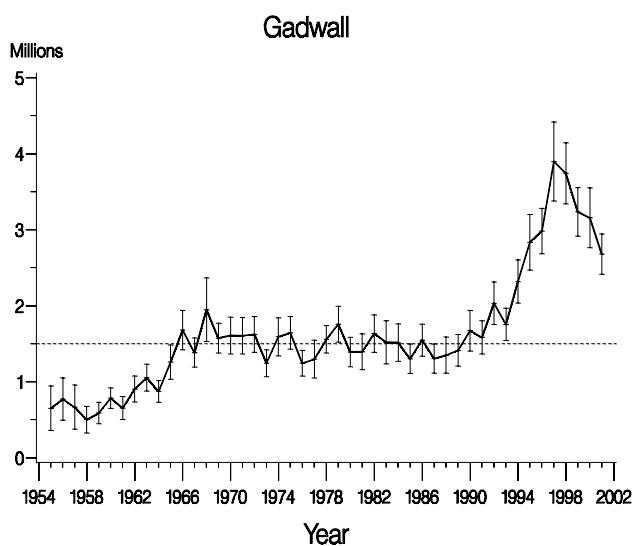
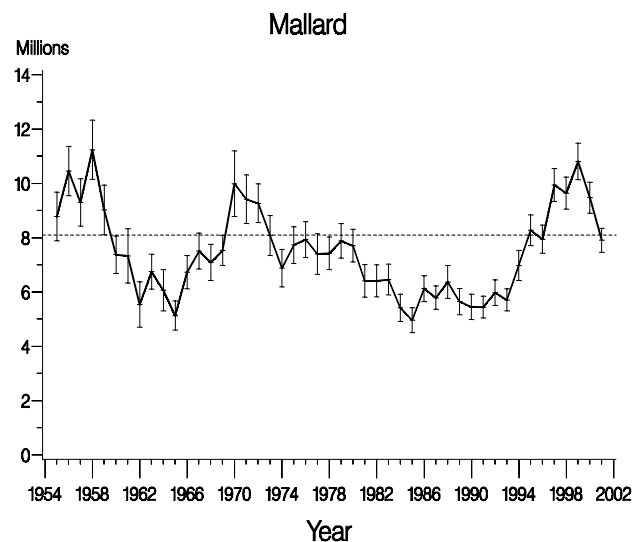
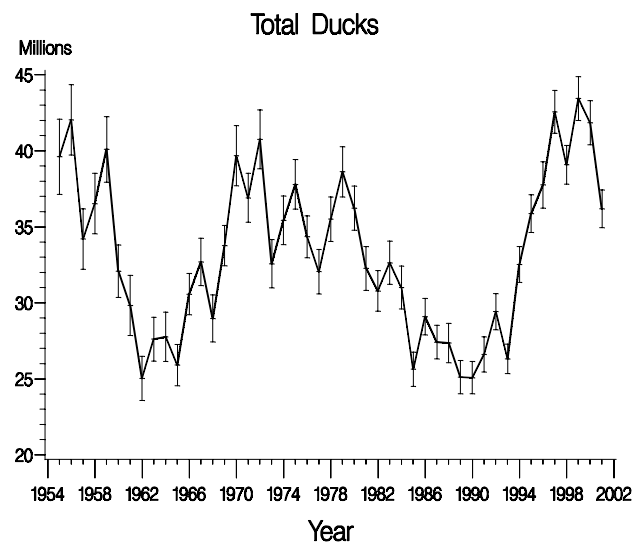


Fig. 5. Breeding population estimates, 95% confidence intervals, and North American Waterfowl Management Plan population goal (dashed line) for selected species for the traditional survey area (strata 1-18, 20-50, 75-77).



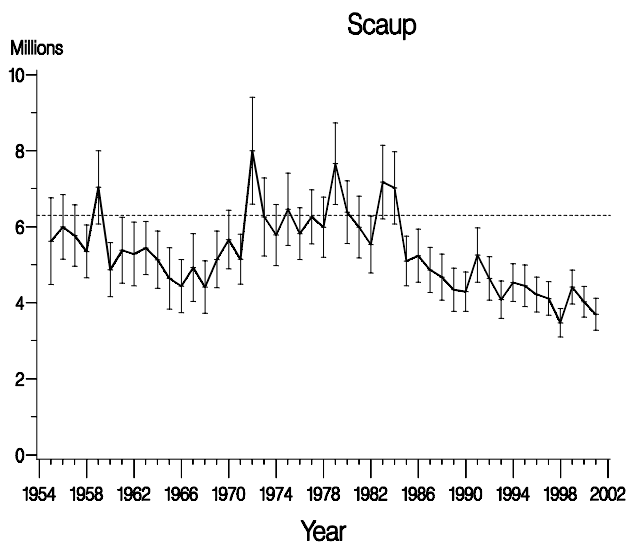
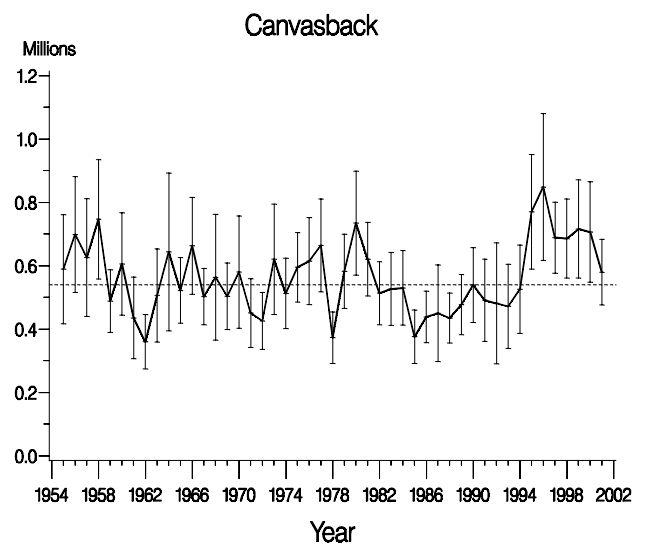
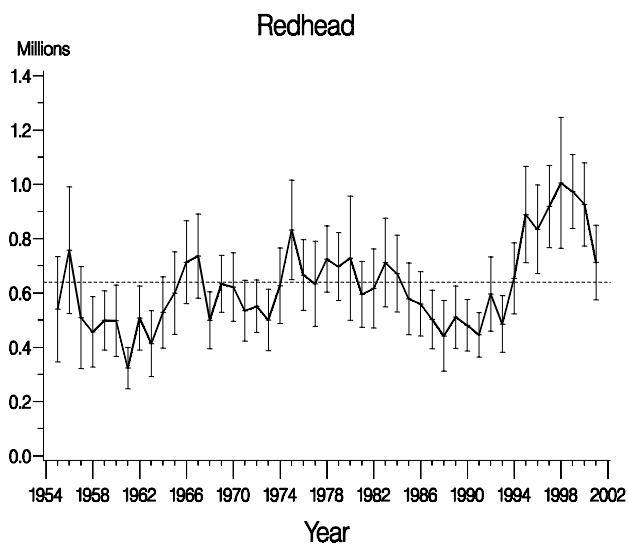
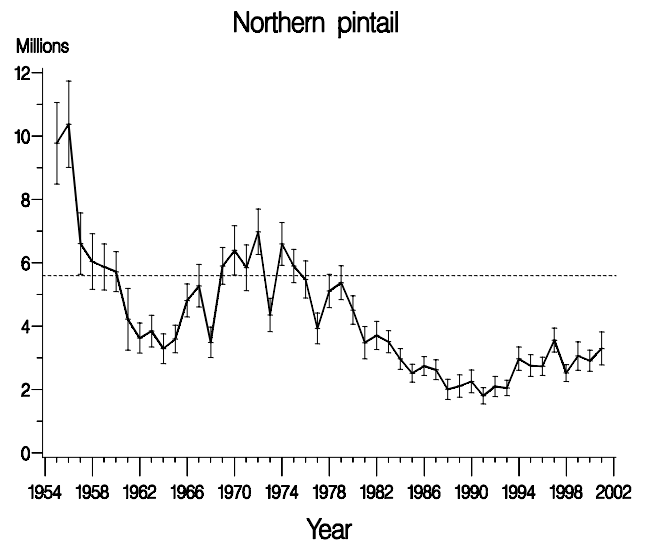
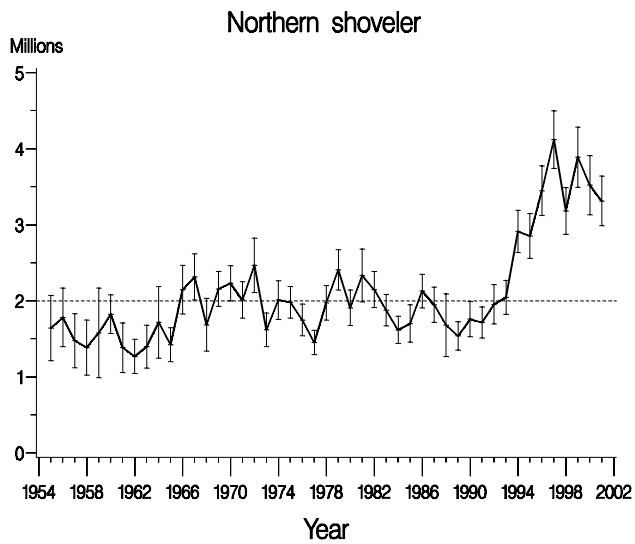


Fig. 5 (continued).

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).

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

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

Appendix B. Breeding population estimates and standard errors (in thousands) for the 10 most abundant species of ducks in the eastern survey area, 1990-2001 <sup>a</sup>.

Year	Mergansers		Mallards		American Black Duck		American Wigeon		Am. Green-winged teal		Lesser Scaup		Ring-necked duck		Goldeneye spp.		Bufflehead		Scoter spp.	
	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$
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

<sup>a</sup> 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.