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## Trends in Duck Breeding Populations, 1955-2000

Khristi Wilkins

*U.S. Fish and Wildlife Service, Khristi\_Wilkins@fws.gov*

Mark Otto

*U.S. Fish and Wildlife Service, mark\_otto@fws.gov*

G.W. Smith

*U.S. Fish and Wildlife Service*

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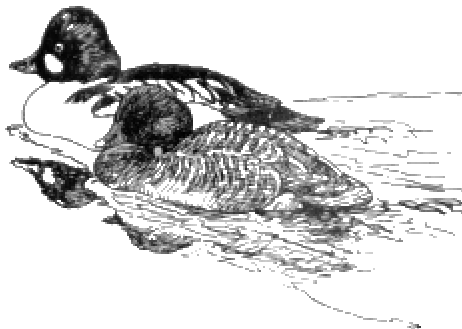
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# TRENDS IN DUCK BREEDING POPULATIONS, 1955-2000

K.A. Wilkins, M.C. Otto, and G.W. Smith

U.S. Fish and Wildlife Service  
Office of Migratory Bird Management  
11500 American Holly Drive  
Laurel, MD 20708-4016

Administrative Report<sup>a</sup> – June 30, 2000



This report summarizes preliminary information about the status of duck populations and their habitats during spring 2000, focuses on areas encompassed by the Breeding Waterfowl and Habitat Survey. These numbers are preliminary, and do not include survey information from state or provincial surveys. The traditional survey area includes strata 1-18, 20-50, and 75-77. In the traditional survey area, total duck abundance was  $41.8 \pm 0.7$  million birds, excluding scoters [*Melanitta* spp.], eiders [*Somateria* and *Polysticta* spp.], oldsquaws [*Clangula hyemalis*], mergansers [*Mergus* and *Lophodytes* spp.], and wood ducks [*Aix sponsa*]. This was similar ( $P=0.12$ ) to last year's record estimate of  $43.4 \pm 0.7$  million birds, and is still 27% above the 1955-99 average ( $P<0.01$ ). Mallard (*Anas platyrhynchos*) abundance was  $9.5 \pm 0.3$  million, which is 12% below last year's record  $10.8 \pm 0.3$  million ( $P<0.01$ ) estimate but still 27% above the 1955-99 average ( $P<0.01$ ). Blue-winged teal (*Anas discors*) abundance was a record-high  $7.4 \pm 0.4$  million. This was similar to last year's estimate of  $7.1 \pm 0.4$  million ( $P=0.61$ ), and 69% above the 1955-99 average ( $P<0.01$ ). Gadwall (*Anas strepera*;  $3.2 \pm 0.2$  million, +100%), green-winged teal (*Anas crecca*;  $3.2 \pm 0.2$  million, +80%), northern shovelers (*Anas clypeata*;  $3.5 \pm 0.2$  million, +73%), and redheads (*Aythya americana*;  $0.9 \pm 0.1$  million, +50%) were all above their long-term averages ( $P<0.01$ ), while northern pintails (*Anas acuta*;  $2.9 \pm 0.2$  million, -33%) and scaup (*Aythya marila* and *A. affinis* combined;  $4.0 \pm 0.2$  million, -25%) were again below their long-term averages ( $P<0.01$ ). Green-winged teal was the only duck species that increased over 1999 estimates (+21%;  $P=0.03$ ). American wigeon (*Anas americana*) and canvasback (*Aythya valisineria*) estimates were similar to those last year ( $P>0.42$ ) and to long-term averages ( $P>0.07$ ).

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The eastern survey area comprises strata 51-56 and 62-69. This year, duck abundances from strata 63-69 (Central Quebec, Newfoundland, Labrador, Prince Edward Island, New Brunswick, and Nova Scotia, Fig. 2) have been included in the eastern survey area estimates. In addition, we have redefined the total duck composition in the eastern survey area to include scoters and mergansers, because they are abundant breeding species in this survey area. We also have excluded canvasbacks, redheads, and ruddy ducks (*Oxyura jamaicensis*) from the eastern total-duck estimate because these species rarely breed there. Because of the added survey areas and change in total duck composition, estimates for the eastern survey area published here are not comparable to those published previously. The 2000 total duck population estimate for the eastern survey area was  $3.2 \pm 0.3$  million birds. This was similar to last year's total duck estimate of  $3.2 \pm 0.2$  million birds. Abundances of individual species were similar to last year, with the exception of scaup ( $116 \pm 32$  thousand, +296%,  $P=0.01$ ), scoters ( $182 \pm 59$  thousand, +288%,  $P=0.03$ ), and green-winged teal ( $202 \pm 29$  thousand, -52%,  $P<0.01$ )).

This year in the traditional survey area, conditions were much drier than the previous 6 years. These dry conditions are reflected decrease in the estimate of May ponds (Prairie Canada and U.S. combined) of  $3.9 \pm 0.1$  million, down 41% from 1999 ( $P<0.01$ ) and 20% below the 1974-99 average ( $P<0.01$ ). Conditions ranged from poor in much of Alberta, parts of Montana, and western Saskatchewan to fair-to-good in most other areas. Only portions of northern Manitoba and the Dakotas had excellent habitat conditions. In mid- to late June, much of the prairies received heavy rains. This may have increased breeding habitat quantity and quality, especially for late nesting species, and enhanced brood-rearing habitats. However, heavy rains in the Dakotas may have caused flooding and loss of nests. In Alaska, a significant cooling trend resulted in ice breakup 2-3 weeks later than normal. In this area, late springs generally result in lower production. Overall, habitat conditions in the traditional survey area in May were poor to good, improving to the north and east. July surveys of broods will help determine if the June rains came in time to help duck production.

Winter and spring also were warm and dry in the eastern survey area. A seemingly early spring cooled down markedly, especially in Labrador, Newfoundland, and eastern Quebec. In these easternmost regions, spring was 2-3 weeks behind normal. Water levels in lakes and ponds in southwestern Ontario, Maine, Nova Scotia, and New Brunswick were higher this year than last year, when the east was entering a drought. However, drier-than-normal conditions persisted in southern Ontario and southern Quebec. In southwest Ontario, Maine, and the Maritimes, heavy thunderstorms in May caused severe flooding and may have caused destroyed nests. Overall, habitat conditions in the east are generally good, with the exception of some areas of southern Ontario and southern/central Quebec, where low water levels resulted in fair-to-poor habitat conditions. Overall, habitats in the eastern survey area generally were in good condition, and production is expected to be average to above-average this year.

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

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

Northern Alberta, Northeastern British Columbia, and Northwest Territories: C. Ferguson and P. Corr<sup>d</sup>

Northern Saskatchewan and Northern Manitoba: F.H. Roetker and S.R. Sheffield

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> , B. Ilnicki <sup>c</sup> , E. Hofman <sup>b</sup> , S. Barry <sup>a</sup> , R. Russell <sup>b</sup> , K. Kaczanowski <sup>c</sup> , I. McFarlane <sup>c</sup> , M. Barr <sup>c</sup> , B. Peers <sup>c</sup> , R. Hunka <sup>c</sup> , M. Johnson <sup>a</sup> , J. Gonek <sup>a</sup> , B. Meagher <sup>a</sup> , J. Heese <sup>a</sup> , G. Yanicki <sup>b</sup> , D. High <sup>b</sup>

Southern Saskatchewan:

Air	P. Thorpe, R. Bentley, R. King, and H. Bell
Ground	D. Nieman <sup>a</sup> , J. Smith <sup>a</sup> , K. Warner <sup>a</sup> , A. Williams <sup>a</sup> , M. Collingwood <sup>a</sup> , M. Hosegood <sup>a</sup> , M. Nieman <sup>c</sup> , P. Nieman <sup>a</sup> , C. Park <sup>a</sup> , J. Peterson, D. Caswell <sup>a</sup> , R. Bazin <sup>a</sup> , P. Rakowski <sup>a</sup> , M. Schuster <sup>a</sup> , D. Pisiak <sup>b</sup> , J. Caswell <sup>a</sup> , M. Van Osh <sup>c</sup> , F. Baldwin <sup>a</sup> , J. Galbraith <sup>a</sup> , M. Blanchard <sup>a</sup>

Southern Manitoba:

Air	R. King, and H. Bell
Ground	R. Bazin <sup>a</sup> , D. Caswell <sup>a</sup> , P. Rakowski <sup>a</sup> , M. Schuster <sup>a</sup> , D. Pisiak <sup>b</sup> , J. Caswell <sup>a</sup> , M. Van Osh <sup>c</sup> , F. Baldwin <sup>b</sup> , J. Galbraith <sup>b</sup> , M. Blanchard <sup>b</sup>

Montana and Western Dakotas

Air	J. Voelzer and K. Bollinger
Ground	A. Arnold <sup>d</sup> , P.R. Garrettson, and V. Griego

Central and Eastern Dakotas

Air	J. W. Solberg and M.S. Laws
Ground	G.T. Allen, M.A. Ellingson, M.L. Gutowski, and M.L. Meade

Northern Quebec: J. Wortham and M. Francke

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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	1999	2000	Change from 1999		LTA <sup>a</sup>	Change from LTA	
			%	<i>P</i>		%	<i>P</i>
Prairie Canada							
S. Alberta	716	553	-23	0.071	741	-25	<0.001
S. Saskatchewan	2535	1404	-45	<0.001	2019	-30	<0.001
S. Manitoba	611	466	-24	0.008	690	-33	<0.001
Subtotal	3862	2422	-37	<0.001	3450	-30	<0.001
Northcentral U.S.							
Montana and Western Dakotas	672	429	-36	0.001	540	-21	0.001
Eastern Dakotas	2170	1095	-50	<0.001	978	+12	0.221
Subtotal	2842	1524	-46	<0.001	1518	0	0.947
Grand Total	6704	3947	-41	<0.001	4953	-20	<0.001

<sup>a</sup> Long-term average. Prairie Canada, 1961-1999; northcentral U.S. and Grand Total, 1974-99.

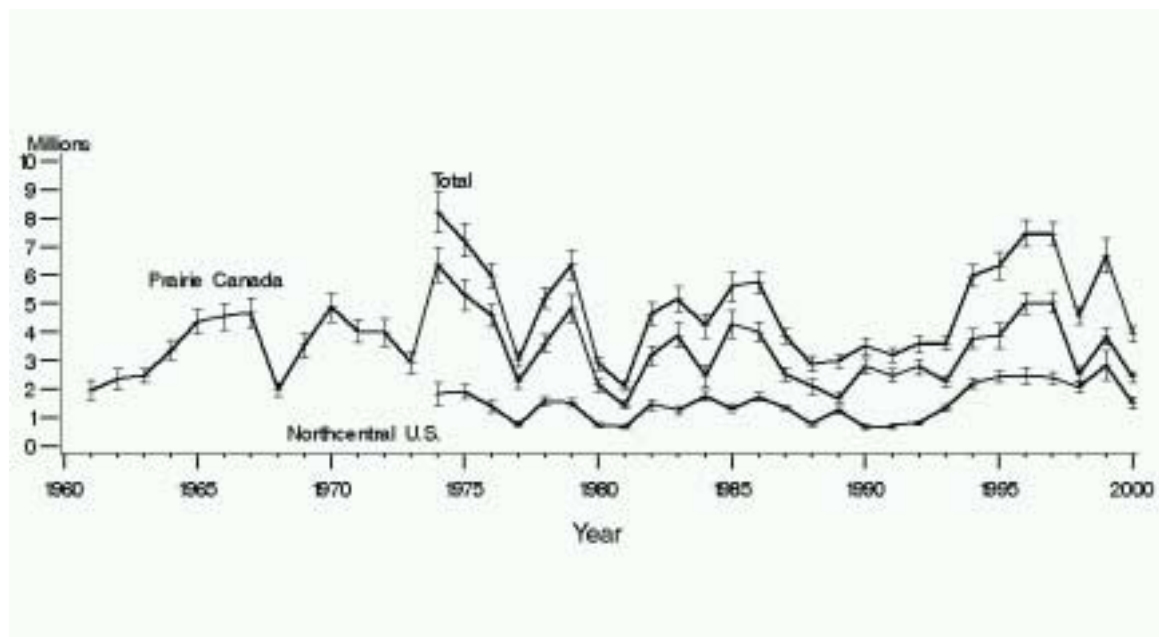


Figure 1. Number of ponds in May and 95% confidence intervals for Prairie Canada and the Northcentral U.S.

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

Region	1999	2000	Change from 1999		LTA	Change from LTA	
			%	<i>P</i>		%	<i>P</i>
Alaska - Yukon Territory - Old Crow Flats	5185	6727	+30	<0.001	3260	+106	<0.001
C. & N. Alberta - N.E. British Columbia - Northwest Territories	8316	6900	-17	0.001	7306	-6	0.170
N. Saskatchewan - N. Manitoba - W. Ontario	3839	3468	-10	0.239	3554	-2	0.732
S. Alberta	3315	3485	+5	0.507	4482	-22	<0.001
S. Saskatchewan	9687	7665	-21	<0.001	7423	+3	0.370
S. Manitoba	1682	1486	-12	0.110	1544	-4	0.518
Montana and Western Dakotas	2505	1726	-31	<0.001	1622	+6	0.251
Eastern Dakotas	8907	10382	+17	0.014	3841	+170	<0.001
Total <sup>a</sup>	43436	41838	-4	0.125	33033	+27	<0.001

<sup>a</sup> Excludes eiders, oldsquaws, wood ducks, scoters, and mergansers.

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

Region	1999	2000	Change from 1999		LTA	Change from LTA	
			%	<i>P</i>		%	<i>P</i>
Alaska - Yukon Territory - Old Crow Flats	713	770	+8	0.510	305	+153	<0.001
C. & N. Alberta - N.E. British Columbia - Northwest Territories	2041	1288	-37	<0.001	1106	+16	0.135
N. Saskatchewan - N. Manitoba - W. Ontario	1151	1049	-9	0.529	1178	-11	0.291
S. Alberta	1032	833	-19	0.158	1150	-28	<0.001
S. Saskatchewan	2529	2267	-10	0.202	2113	+7	0.257
S. Manitoba	514	368	-29	0.013	372	-1	0.902
Montana and Western Dakotas	689	622	-10	0.478	502	+24	0.049
Eastern Dakotas	2137	2273	+6	0.562	726	+213	<0.001
Total	10806	9470	-12	0.003	7450	+27	<0.001

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

Region	1999	2000	Change from 1999		LTA	Change from LTA	
			%	<i>P</i>		%	<i>P</i>
Alaska - Yukon Territory - Old Crow Flats	5	3	-45	0.616	2	+61	0.574
C. & N. Alberta - N.E. British Columbia - Northwest Territories	139	100	-28	0.266	38	+159	<0.001
N. Saskatchewan - N. Manitoba - W. Ontario	10	12	+19	0.746	28	-58	<0.001
S. Alberta	333	311	-7	0.731	311	0	0.994
S. Saskatchewan	1029	650	-37	<0.001	535	+21	0.063
S. Manitoba	116	85	-26	0.043	60	+41	0.004
Montana and Western Dakotas	379	289	-24	0.114	187	+55	0.002
Eastern Dakotas	1227	1709	+39	0.026	415	+312	<0.001
Total	3235	3158	-2	0.766	1576	+100	<0.001

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

Region	1999	2000	Change from 1999		LTA	Change from LTA	
			%	<i>P</i>		%	<i>P</i>
Alaska - Yukon Territory - Old Crow Flats	932	1141	+22	0.123	444	+157	<0.001
C. & N. Alberta - N.E. British Columbia - Northwest Territories	1046	722	-31	0.032	942	-23	0.008
N. Saskatchewan - N. Manitoba - W. Ontario	216	147	-32	0.103	265	-45	<0.001
S. Alberta	180	225	+25	0.501	317	-29	0.126
S. Saskatchewan	346	253	-27	0.176	454	-44	<0.001
S. Manitoba	20	19	-3	0.920	67	-71	<0.001
Montana and Western Dakotas	104	122	+17	0.453	114	+7	0.689
Eastern Dakotas	78	104	+34	0.344	44	+138	0.011
Total	2920	2733	-6	0.420	2647	+3	0.545

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

Region	1999	2000	Change from 1999		LTA	Change from LTA	
			%	<i>P</i>		%	<i>P</i>
Alaska - Yukon Territory - Old Crow Flats	679	946	+39	0.007	290	+226	<0.001
C. & N. Alberta - N.E. British Columbia - Northwest Territories	984	1282	+30	0.172	742	+73	0.001
N. Saskatchewan - N. Manitoba - W. Ontario	272	189	-30	0.057	186	+2	0.923
S. Alberta	191	308	+62	0.158	197	+57	0.126
S. Saskatchewan	342	295	-14	0.424	229	+28	0.078
S. Manitoba	41	61	+50	0.127	53	+15	0.490
Montana and Western Dakotas	68	60	-12	0.730	34	+75	0.110
Eastern Dakotas	54	52	-3	0.930	44	+19	0.504
Total	2631	3194	+21	0.034	1776	+80	<0.001

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

Region	1999	2000	Change from 1999		LTA	Change from LTA	
			%	<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	206	275	+33	0.323	269	+2	0.920
N. Saskatchewan - N. Manitoba - W. Ontario	175	126	-28	0.290	279	-55	<0.001
S. Alberta	392	578	+48	0.070	634	-9	0.495
S. Saskatchewan	2111	1622	-23	0.077	1197	+35	0.008
S. Manitoba	440	355	-19	0.298	386	-8	0.609
Montana and Western Dakotas	559	238	-57	<0.001	261	-9	0.515
Eastern Dakotas	3267	4238	+30	0.032	1371	+209	<0.001
Total	7149	7431	+4	0.615	4399	+69	<0.001



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

Region	1999	2000	Change from 1999		LTA	Change from LTA	
			%	<i>P</i>		%	<i>P</i>
Alaska - Yukon Territory - Old Crow Flats	658	846	+29	0.164	212	+300	<0.001
C. & N. Alberta - N.E. British Columbia - Northwest Territories	219	248	+13	0.646	206	+20	0.391
N. Saskatchewan - N. Manitoba - W. Ontario	27	36	+36	0.513	45	-19	0.478
S. Alberta	408	380	-7	0.755	357	+7	0.710
S. Saskatchewan	1281	900	-30	0.013	613	+47	0.005
S. Manitoba	161	176	+9	0.632	101	+75	0.003
Montana and Western Dakotas	425	161	-62	<0.001	146	+10	0.576
Eastern Dakotas	710	774	+9	0.652	362	+114	<0.001
Total	3890	3521	-9	0.192	2041	+73	<0.001

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

Region	1999	2000	Change from 1999		LTA	Change from LTA	
			%	<i>P</i>		%	<i>P</i>
Alaska - Yukon Territory - Old Crow Flats	1022	1452	+42	0.051	890	+63	<0.001
C. & N. Alberta - N.E. British Columbia - Northwest Territories	183	220	+21	0.332	405	-46	<0.001
N. Saskatchewan - N. Manitoba - W. Ontario	9	16	+81	0.219	45	-65	<0.001
S. Alberta	115	189	+64	0.029	795	-76	<0.001
S. Saskatchewan	875	464	-47	<0.001	1299	-64	<0.001
S. Manitoba	62	45	-27	0.254	120	-63	<0.001
Montana and Western Dakotas	207	169	-18	0.356	288	-41	<0.001
Eastern Dakotas	586	353	-40	0.084	477	-26	0.004
Total	3058	2908	-5	0.600	4320	-33	<0.001

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

Region	1999	2000	Change from 1999		LTA	Change from LTA	
			%	P		%	P
Alaska - Yukon Territory - Old Crow Flats	0	1	-	-	1	-54	0.315
C. & N. Alberta - N.E. British Columbia - Northwest Territories	95	26	-73	0.001	38	-32	0.040
N. Saskatchewan - N. Manitoba - W. Ontario	30	41	+35	0.627	29	+42	0.499
S. Alberta	181	107	-41	0.078	120	-11	0.657
S. Saskatchewan	288	324	+12	0.563	187	+73	0.002
S. Manitoba	57	88	+53	0.419	70	+26	0.602
Montana and Western Dakotas	13	10	-25	0.660	9	+13	0.840
Eastern Dakotas	309	331	+7	0.688	164	+101	<0.001
Total	973	926	-5	0.652	618	+50	<0.001

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

Region	1999	2000	Change from 1999		LTA	Change from LTA	
			%	P		%	P
Alaska - Yukon Territory - Old Crow Flats	89	187	+110	0.198	87	+115	0.151
C. & N. Alberta - N.E. British Columbia - Northwest Territories	151	83	-45	0.259	69	+20	0.433
N. Saskatchewan - N. Manitoba - W. Ontario	45	37	-20	0.688	58	-37	0.094
S. Alberta	56	73	+30	0.347	66	+11	0.640
S. Saskatchewan	253	232	-8	0.635	184	+26	0.098
S. Manitoba	71	64	-10	0.725	56	+14	0.587
Montana and Western Dakotas	7	7	0	0.996	8	-11	0.816
Eastern Dakotas	43	24	-44	0.199	32	-25	0.222
Total	716	707	-1	0.935	560	+26	0.072

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

Region	1999	2000	Change from 1999		LTA	Change from LTA	
			%	<i>P</i>		%	<i>P</i>
Alaska - Yukon Territory - Old Crow Flats	956	1219	+28	0.086	902	+35	0.007
C. & N. Alberta - N.E. British Columbia - Northwest Territories	2134	1621	-24	0.025	2764	-41	<0.001
N. Saskatchewan - N. Manitoba - W. Ontario	545	293	-46	0.001	616	-52	<0.001
S. Alberta	228	292	+28	0.384	377	-22	0.089
S. Saskatchewan	287	273	-5	0.818	437	-38	0.001
S. Manitoba	72	60	-17	0.541	146	-59	<0.001
Montana and Western Dakotas	39	41	+6	0.837	56	-26	0.083
Eastern Dakotas	150	227	+51	0.089	85	+166	<0.001
Total	4412	4026	-9	0.209	5383	-25	<0.001

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

Region	1999	2000	Change from 1999		1996-99 Average	Change from Average	
			%	<i>P</i>		%	<i>P</i>
Mergansers	290	400	+38	0.100	520	-23	0.185
Mallard	281	212	-24	0.172	330	-36	0.005
American Black Duck	489	397	-19	0.218	507	-22	0.086
American Wigeon	121	42	-66	0.112	65	-36	0.337
Green-winged teal	422	202	-52	0.001	342	-41	0.002
Blue-winged teal	45	20	-56	0.264	30	-34	0.378
Ring-necked duck	453	619	+37	0.112	511	+21	0.219
Goldeneye (common & Barrow's)	920	947	+3	0.941	567	+67	0.244
Bufflehead	71	49	-30	0.368	47	+5	0.862
Scoters	47	182	+288	0.028	80	+128	0.097
Total <sup>a</sup>	3214	3204	0	0.981	3043	+5	0.661

<sup>a</sup> Includes above species and gadwall, northern shovelers, northern pintail, and scaup. Excludes eiders, oldsquaws, wood ducks, redhead, canvasback, and ruddy duck.

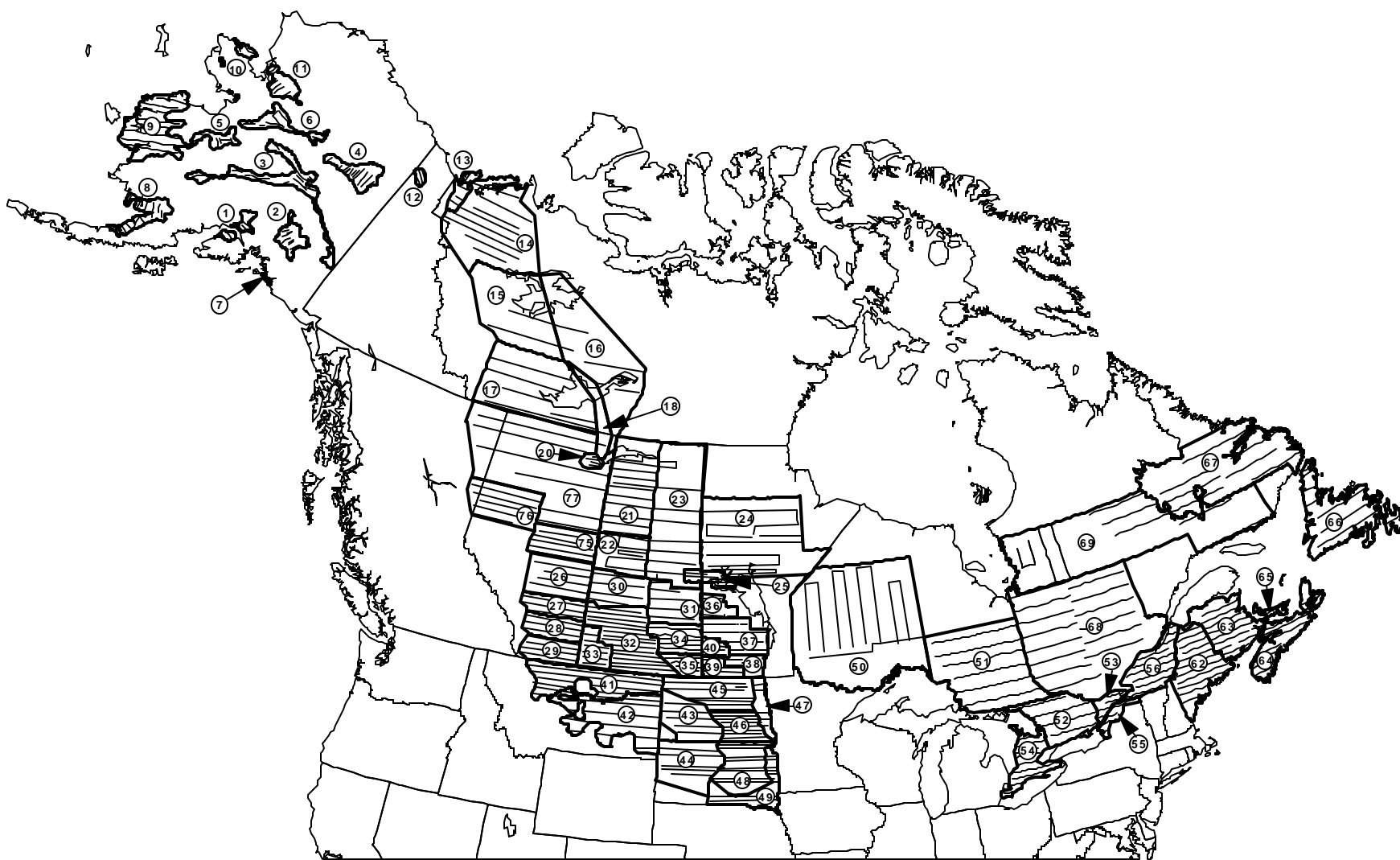


Fig. 2. Transects and strata for areas of the Breeding Waterfowl and Habitat Survey.

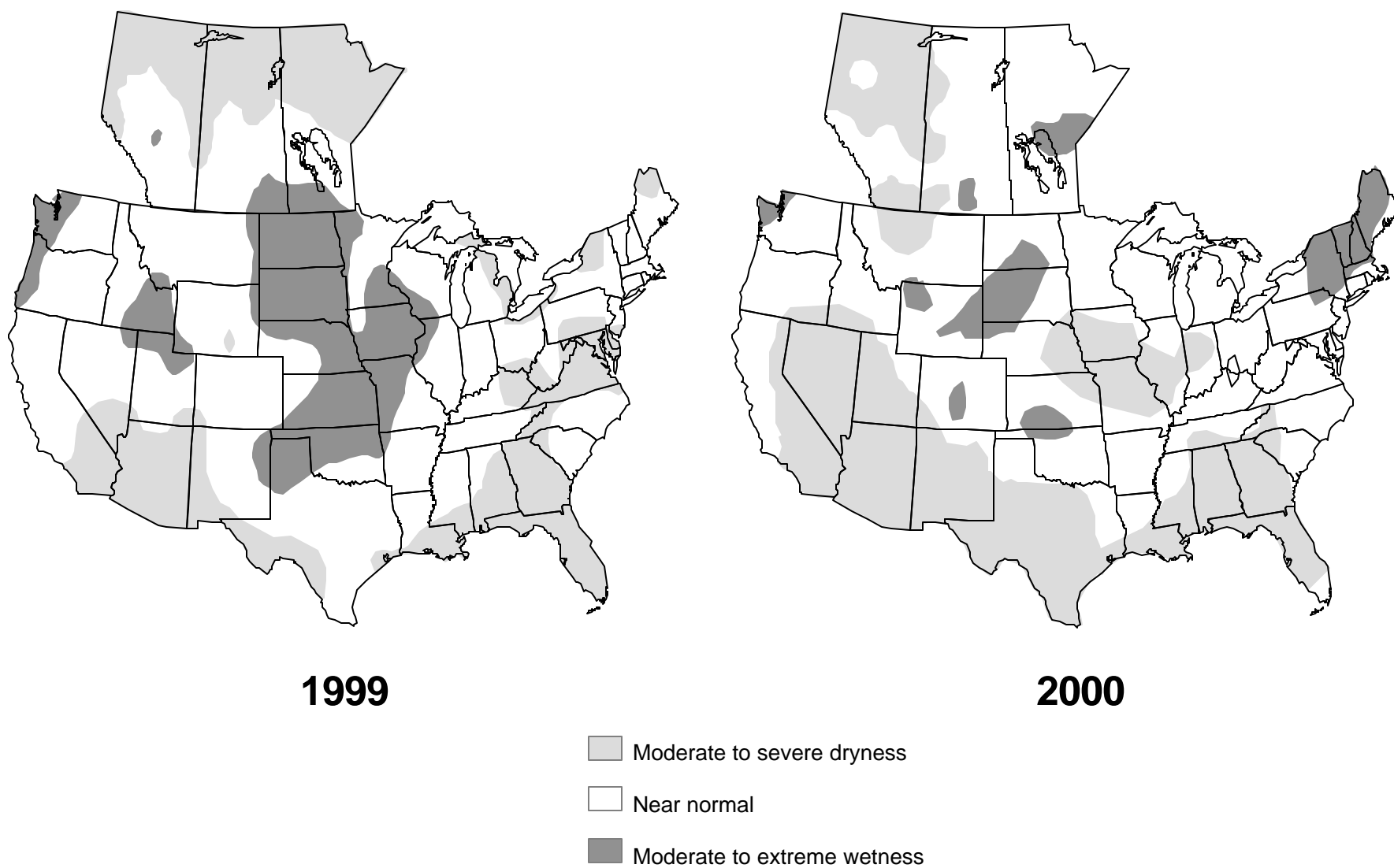


Fig. 3. Palmer long-term drought indices (PDI) for the month of May for the contiguous U.S. and Prairie Provinces of Canada. U.S. PDI map from Weekly Weather and Crop Bulletin May 31, 2000; Canadian PDI map from Environment Canada.

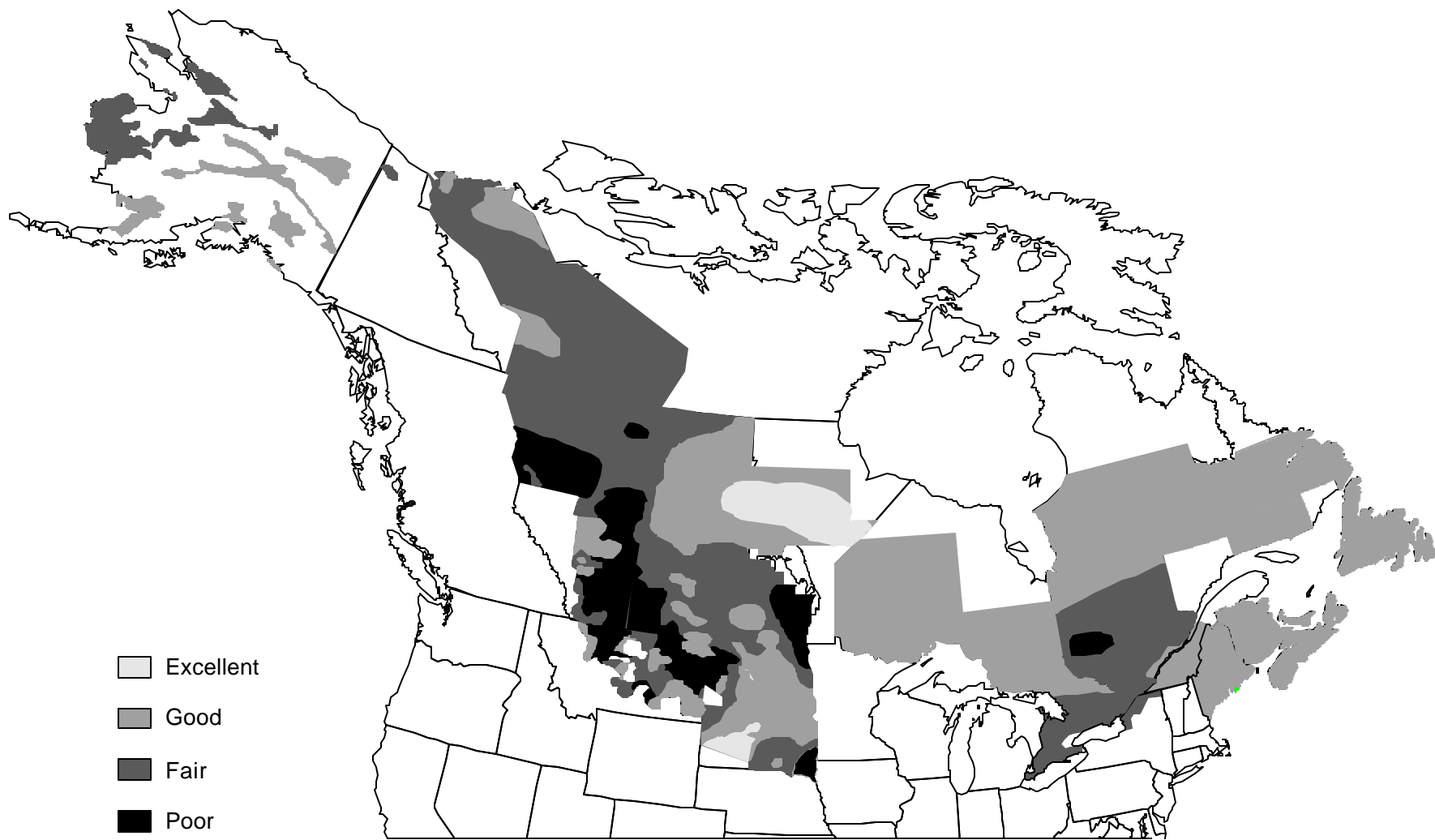


Fig. 4. Preliminary breeding waterfowl habitat conditions during May and June 2000, as judged by U.S. Fish & Wildlife Service Flyway Biologists.

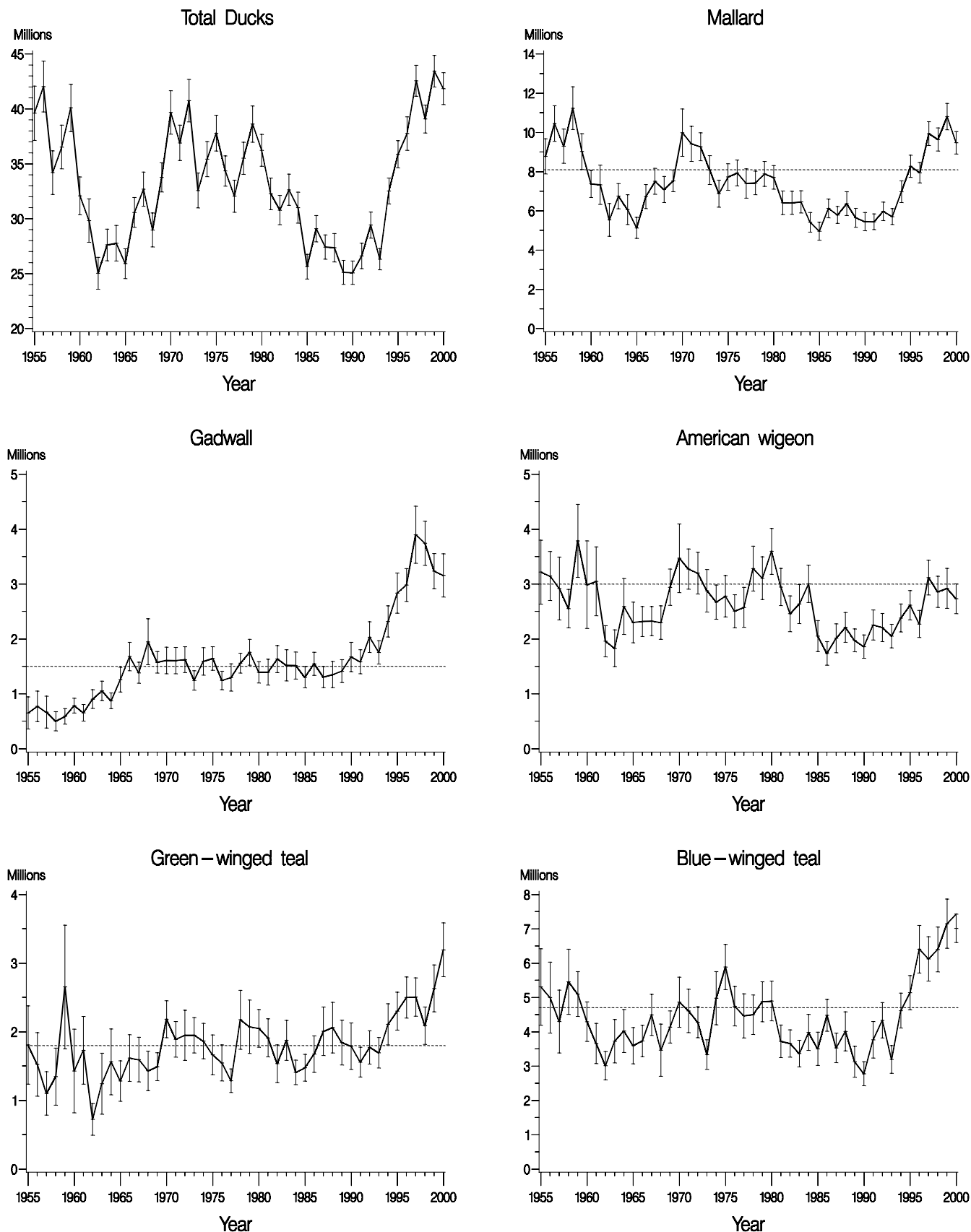


Fig. 5. Breeding population estimates, 95% confidence intervals, and North American Waterfowl Management Plan population goal (dashed line) for selected species for the traditional survey area (strata 1–18, 20–50, 75–77).



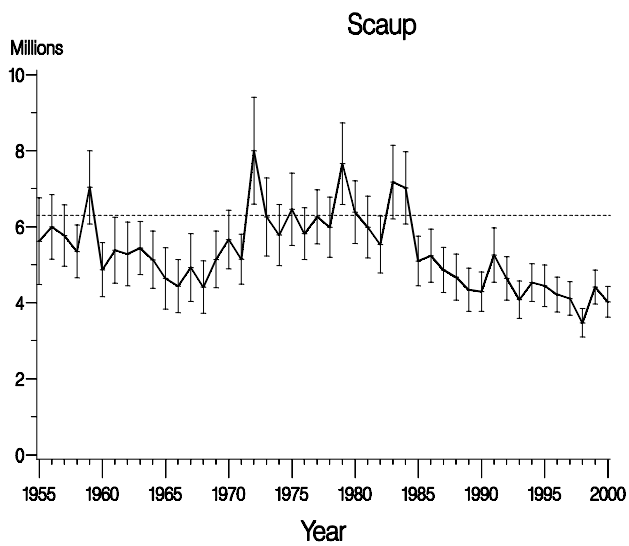
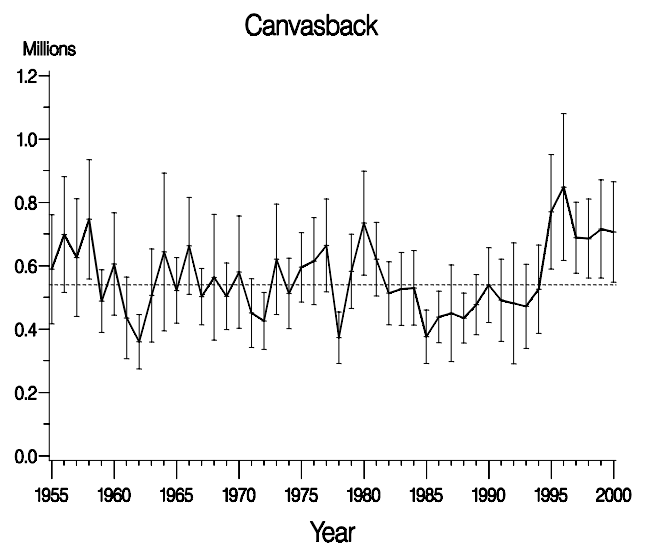
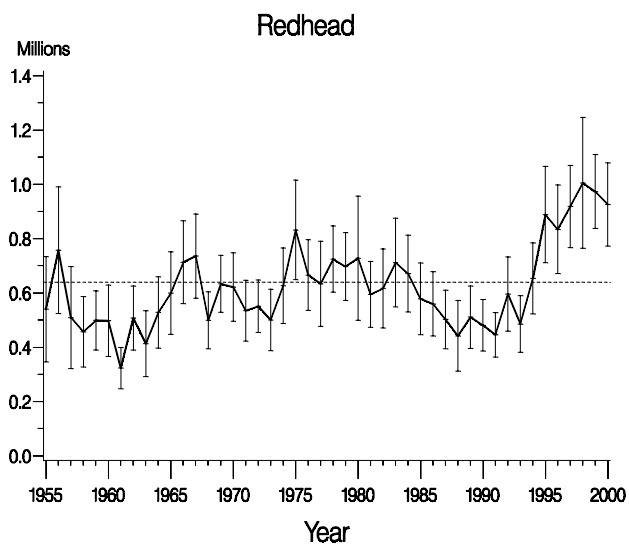
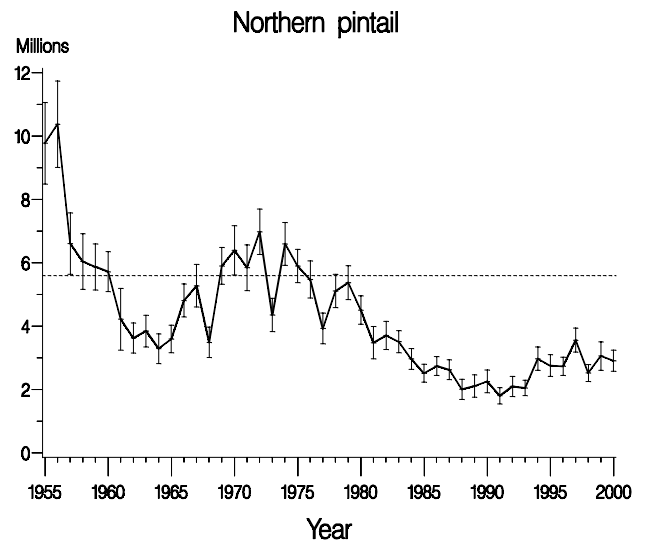
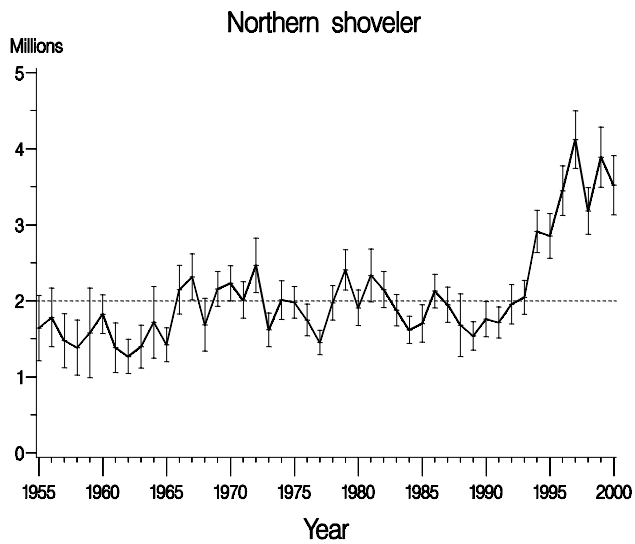


Fig. 5 (continued).

Appendix A. Breeding population estimates and standard errors (in thousands) for 10 species of ducks from the traditional survey area, 1955-2000.

Year	<u>Mallard</u>		<u>Gadwall</u>		<u>American Wigeon</u>		<u>Green-winged teal</u>		<u>Blue-winged teal</u>	
	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$
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

Appendix A. Continued.

Year	<u>Northern Shoveler</u>		<u>Northern Pintail</u>		<u>Redhead</u>		<u>Canvasback</u>		<u>Scaup</u>	
	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$	$\hat{N}$	$\hat{SE}$
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

Appendix B. Breeding population estimates and standard errors (in thousands) for the 10 most abundant species of ducks in the eastern survey area, 1990-2000 <sup>a</sup>.

	Mergansers		Mallards		American Black Duck		American Wigeon		Am. Green-winged teal		Blue-winged Teal		Ring-necked duck		Goldeneye spp.		Bufflehead		Scoter spp.	
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

<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.