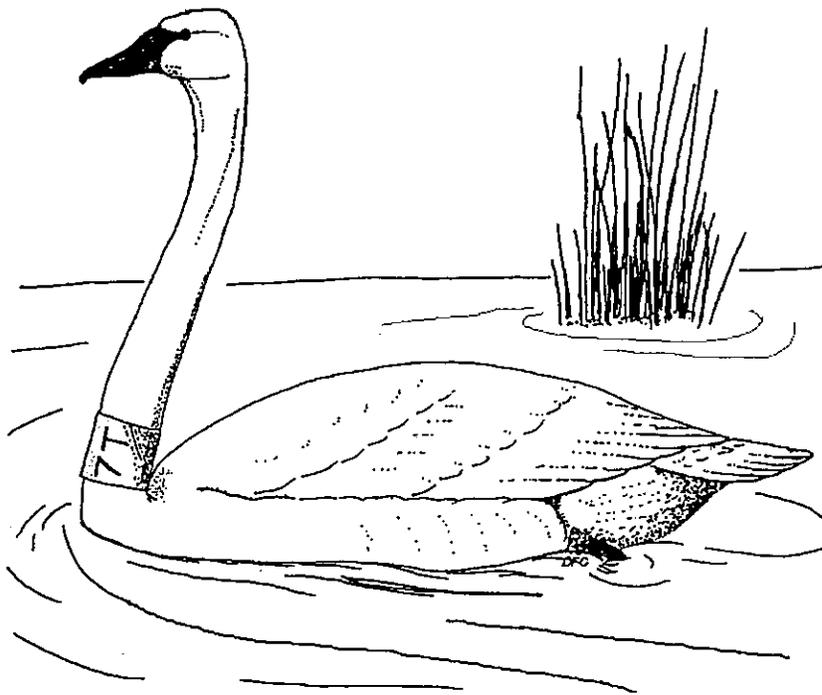


1995 SURVEY OF TRUMPETER SWANS IN NORTH AMERICA



Compiled by: David F. Caithamer

U.S. Fish and Wildlife Service
Office of Migratory Bird Management

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Introduction and Methods

This report summarizes results of a trumpeter swan (*Cygnus buccinator*) survey that was conducted during 1995 across the entire range of wild trumpeter swans in North America. The last comparable survey was conducted in 1990. Similar surveys also were conducted in 1968, 1975, and then every 5 years. This report compares findings from 1995 to those of previous quinquennial surveys (U.S. Fish and Wildlife Service et al. 1994).

The 1995 survey was a coordinated effort of numerous agencies and persons. Most areas were surveyed aerially or by a network of ground observers. Surveys were believed to be complete censuses in all but 3 areas. A partial census was conducted in Oregon, and random samples were collected in northwestern British Columbia and the Yukon Territory. Estimates from all areas were treated as though they were complete counts that were measured without error. No efforts were directed at surveying captive swans, in contrast to the 1990 survey. The median starting and ending date for surveys were 30 August and 7 September, respectively. However, survey efforts began as early as 1 April and lasted until 25 January.

Population and subpopulation names used in this report are the same as those used previously (U.S. Fish and Wildlife Service et al. 1994), with 1 exception. Swans in South Dakota, Nebraska, eastern Wyoming, eastern Saskatchewan, and western Manitoba were referred to as the *High Plains Subpopulation*, rather than the *Lacreek Subpopulation*. Wildlife managers appear to have not reached consensus on this name and possibly those of 2 other subpopulations (*Interior Canada* and *Mississippi Flyway*). Discussions are needed by the appropriate scientific and management communities in order to reach consensus on the names used to label subpopulations of trumpeter swans.

Results and Discussion

Waterfowl managers currently recognize 3 populations of trumpeter swans in North America (Fig. 1): Pacific Coast Population (PCP), Rocky Mountain Population (RMP), and

Interior Population (IP). The late-summer ranges of each population have changed since 1990. New occurrences were noted in California and Iowa, and at new areas in Alaska, Yukon Territory, Northwest Territories, British Columbia, Oregon, Washington, Idaho, Montana, Wyoming, Alberta, Saskatchewan, Ontario, Minnesota, Iowa, Wisconsin, and Michigan. Swans were not observed in Missouri and at several other specific locations where they previously occurred. No surveys were conducted in Manitoba, although swans are believed to occur there.

A total of 19,756 trumpeter swans were present in late-summer 1995 (Table 1, Appendices A and B). All populations increased since 1990 to record-highs (Fig. 2). The total North American population increased approximately 26% since 1990 and >400% since 1968. The PCP increased 21% since 1990 and remained numerically larger than the RMP and IP combined. Since 1990, the RMP increased 44% while the IP increased 120%. Most of the growth in the RMP occurred in Canada, where production was relatively high in several years since 1990 (G. Beyersbergen, Canadian Wildl. Serv., pers. commun.). At least some of the large increases in the IP were due to extensive relocation and restoration programs. During the period 1991-1995, 525 swans were released into the IP while 959 cygnets were fledged in the wild (J. Johnson, Michigan State Univ., pers. commun.).

The RMP and IP are composed of several subpopulations. The Tri-State Subpopulation of the RMP decreased 38% since 1990 to 364 swans (Table 2). Compared to results from the 5 previous surveys, the size of the Tri-State Subpopulation in 1995 was approximately 33% lower than average ($\bar{x}=541$, $sd=41$) and was the smallest on record. Much of this decrease can be attributed to a 71% decline that has occurred since 1990 in Montana (Gomez 1995). Decreases in the Tri-State Subpopulation may be due to (1) removal and relocation of swans to other areas of the RMP; (2) reduced productivity of swans caused by the disruption of pair-bonds during relocation efforts; and (3) reduced productivity or survival of swans because of termination of artificial feeding during the winter (B. Reiswig, U.S. Fish and Wildl. Serv., pers. commun.). Relocation of swans and the termination of winter feeding are recent efforts to disperse swans from the Tri-State area during winter (Subcommittee on Rocky Mountain Trumpeter Swans 1992). The Interior Canada and Restoration subpopulations of the RMP each increased >85% since 1990; the Interior Canada Subpopulation increased by 959 birds since 1990 to a record high in 1995. The Mississippi Flyway Subpopulation of the IP nearly tripled in size to a record high in 1995. The High Plains (Lacreek) Subpopulation also increased to a new high in 1995.

The 3 swan populations were composed of 25-28% cygnets, which was within ranges recorded during previous surveys (U.S. Fish and Wildlife Service et al. 1994). Average brood

sizes ranged from 2.9 to 3.2 for these 3 populations in 1995 (Table 1). Approximately 66% of all adult trumpeter swans were paired in late-summer (Table 3). The proportion of adults that were paired was slightly lower in the Mississippi Flyway and restoration areas of the RMP. The lower proportion of pairs may be related to the active relocation and restoration programs that are continuing in these 2 regions.

Field surveys of swans across North America lasted >900 hours (Table 4). The entire survey, including planning, data collection, and data compilation, cost about \$291,000 and utilized about 5,300 man-hours. About two-thirds of the expenditures occurred in Alaska, where 80% of the swans were observed.

The data were collected by numerous individuals working for various agencies (Appendix C), and others who reported incidental observations. B. Bales, J. C. Bartonek, B. Bortner, J. Cornely, B. Reiswig, and R. West assisted with survey coordination. G. Beyersbergen, B. Conant, B. Leedy, J. Johnson, R. Kraft, B. Reiswig, and G. W. Smith provided helpful comments on earlier drafts of the report. W. L. Kendall provided analytical advice and M. A. McKeogh provided clerical support. Surveys in Ontario were partially supported by Scott Paper Limited and World Wildlife Fund Canada. Surveys of the RMP were partially supported by a grant from the U.S. National Biological Service.

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- Subcommittee on Rocky Mountain Trumpeter Swans. 1992. Pacific Flyway management plan for the Rocky Mountain Population of trumpeter swans. Pacific Flyway Study Comm. Unpubl. rep. 41pp.
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Table 1. Demographics of Pacific Coast, Rocky Mountain, and Interior populations of trumpeter swans in late-summer, 1995.

Population	Subpopulation	Total Swans	Adult Swans	Cygnets	% Cygnets	Broods	Brood Size	
							\bar{x}^1	SD ²
Pacific Coast	Alaska	15,823	11,989	3,834	24	1,218	3.2	1.4
	Yukon and Northwestern British Columbia	489	300	189	39	44	3.6	1.4
	Pacific Coast Total	16,312	12,289	4,023	25	1,262	3.2	1.4
Rocky Mountain	Interior Canada	2,076	1,445	631	30	183	3.3	1.3
	Tri-State	364	309	55	15	21	2.6	1.3
	Restoration Areas	77	66	11	14	4	2.8	2.1
	Rocky Mountain Total	2,517	1,820	697	28	208	3.2	1.3
Interior	High Plains	240	189	51	21	18	2.8	1.1
	Mississippi Flyway	687	509	178	26	62	2.9	1.6
	Interior Total	927	698	229	25	80	2.9	1.4
North American Total		19,756	14,807	4,949	25	1,550	3.2	1.4

¹Weighted average based on number of broods observed in each census area.
²Weighted average of standard deviations based on number of broods observed in each census area.

Table 2. Sizes of trumpeter swan populations, and the percentage that were cygnets, 1968-1995¹.

Population	Subpopulation	1968		1975		1980		1985		1990		1995	
		Total	% cygnets	Total	% cygnets	Total	% cygnets	Total	% cygnets	Total	% cygnets	Total	% cygnets
Pacific Coast	Alaska	2,847	32	4,170	28	7,696	32	9,459	18	13,337	27	15,823	24
	Yukon and Northwestern British Columbia							45		119	37	489	39
	Pacific Coast Total	2,847	32	4,170	28	7,696	32	9,504	18	13,456	27	16,312	25
Rocky Mountain	Interior Canada ²	106	29	131	33	379	27	614	30	1,117	32	2,076	30
	Tri-State ²	585	26	537	15	485	5	507	27	589	25	364	15
	Restoration Areas	120	18	131	18	111	31	74	8	41	27	77	14
	Rocky Mountain Total ²	811	25	799	18	975	16	1,195	28	1,747	30	2,517	28
Interior	High Plains	64	33	116	30	164	27	158	40	185	34	240	21
	Mississippi Flyway	0		0		12	0	51	14	237	27	687	26
	Interior Total	64	33	116	30	176	25	209	33	422	30	927	25
North American Total ²	3,722	31	5,085	27	8,847	30	10,908	19	15,625	27	19,756	25	

¹Estimates for 1968-1990 were sums of estimates reported for individual areas in Appendices 1, 2, and 3 of U.S. Fish and Wildlife Service et al. (1994).

²Estimates reported in 1975 were obtained in 1974 or 1975.

Table 3. Numbers of adult trumpeter swans that were singles, paired, and in flocks during late-summer, 1995.

Population	Subpopulation	Single ¹		Paired		Flocked		Total N
		N	%	N	%	N	%	
Pacific Coast	Alaska	859	7	7946	66	3184	27	11,989
	Yukon and Northwestern British Columbia ²	16	5	186	62	99	33	300
	Pacific Coast Total	875	7	8132	66	3283	27	12,289
Rocky Mountain	Interior Canada	69	5	960	66	416	29	1,445
	Tri-State	24	8	192	62	93	30	309
	Restoration Areas	9	14	32	49	25	38	66
	Rocky Mountain Total	102	6	1184	65	534	29	1,820
Interior	High Plains	10	5	112	59	67	35	189
	Mississippi Flyway ³	8	9	48	52	36	39	92
	Interior Total ³	18	6	160	57	103	37	281
North American Total ³	995	7	9476	66	3920	27	14,390	

¹Includes single adults with a brood.

²N's are rounded estimates, so the sum of single, paired, and flocked swans does not equal the row-total.

³Data on social status of adults in Ontario, Minnesota, Wisconsin, and Iowa were incomplete and excluded.

Table 4. Duration and costs of the North American survey of trumpeter swans, 1995.

Population	Subpopulation	Survey Duration (hours)	Man-hours Expended	Costs (U.S. dollars)			Total
				Salaries	Other		
Pacific Coast	Alaska	710	3,472	\$50,000	\$150,000		\$200,000
	Yukon and Northwestern British Columbia	14	78	\$2,864	\$5,291		\$8,155
	Pacific Coast Total	724	3,550	\$52,864	\$155,291		\$208,155
Rocky Mountain	Interior Canada	116	384	\$11,415	\$32,810		\$44,225
	Tri-State	33	64	\$1,165	\$5,724		\$6,889
	Restoration Areas ¹	20	24	\$386	\$1,520		\$1,906
	Rocky Mountain Total ¹	169	472	\$12,966	\$40,054		\$53,020
Interior	High Plains	23	61	\$1,450	\$4,830		\$6,280
	Mississippi Flyway ²	12	1,146	\$10,600	\$10,420		\$21,020
	Interior Total ²	35	1,207	\$12,050	\$15,250		\$27,300
North American Total ^{1,2,3}		928	5,309	\$80,326	\$210,795		\$291,121

¹Statistics for Washington and California were not available.

²Estimates of duration were not available for Wisconsin, Michigan, and Iowa; estimates of man-hours and salaries were not available for Ontario.

³Includes expenditures by survey coordinator (man-hours=80, salaries=\$2,446, other costs=\$200, and total costs=\$2,646).

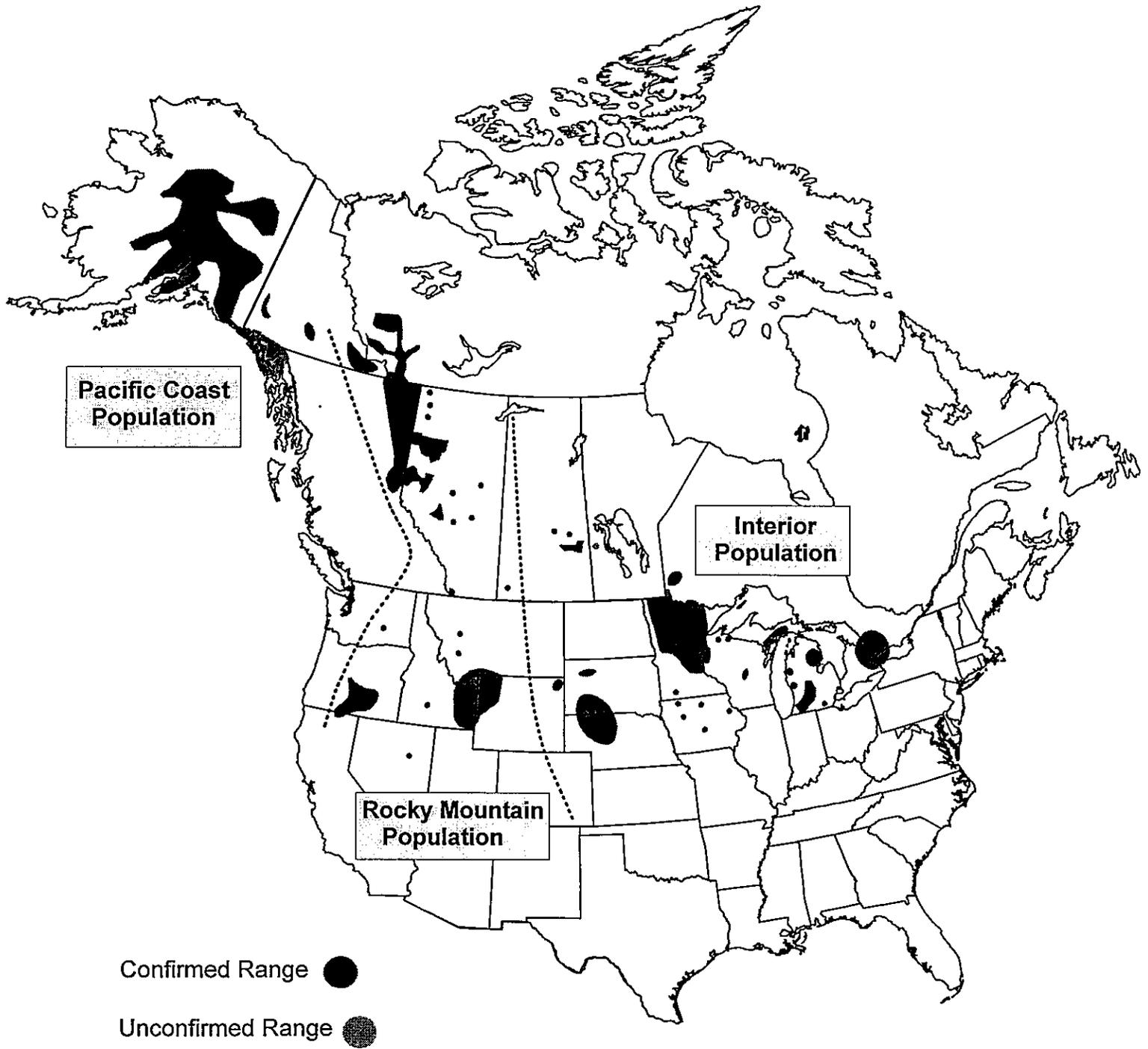


Fig. 1. Approximate ranges of Pacific Coast, Rocky Mountain, and Interior populations of trumpeter swans during late-summer of 1995.

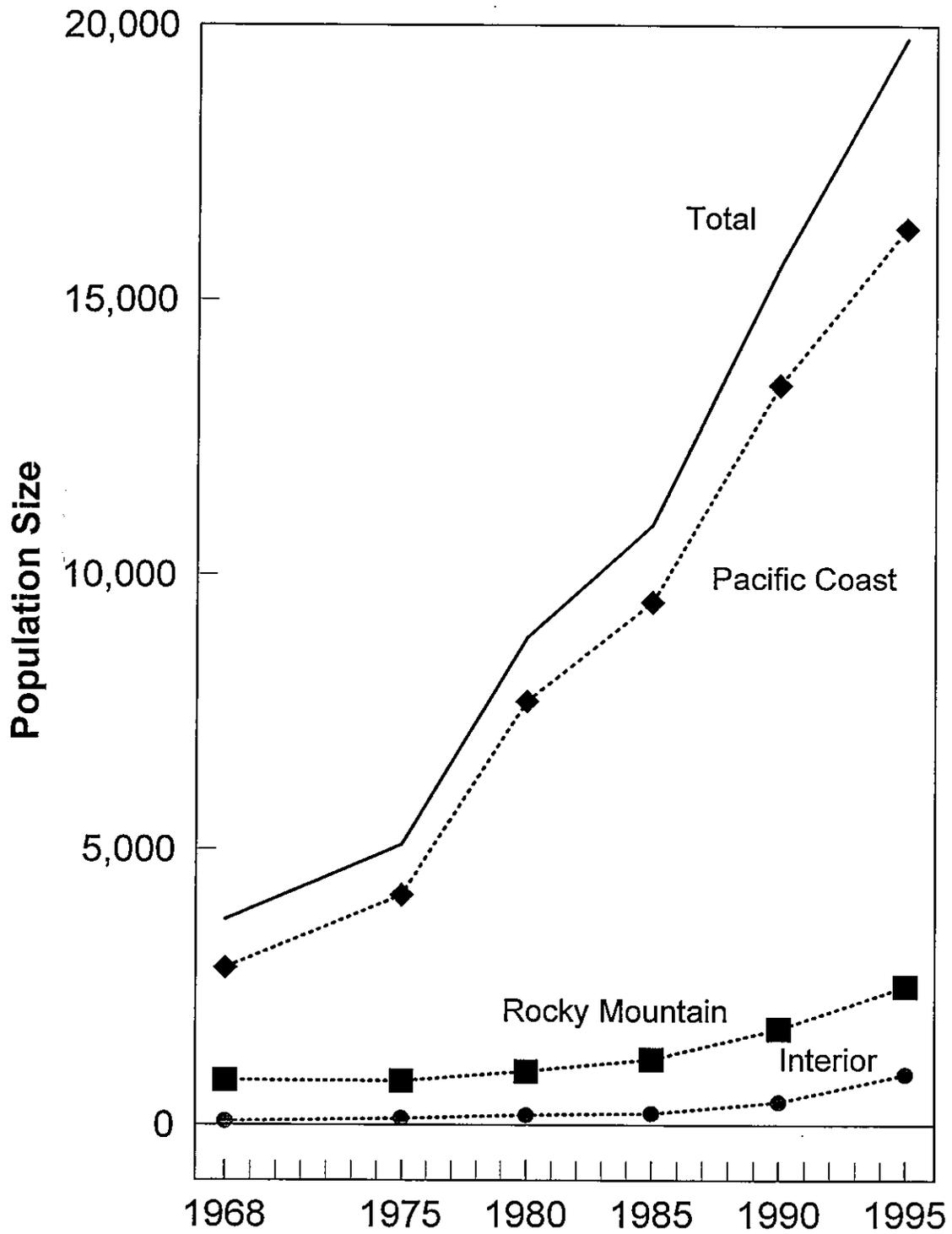


Fig. 2. Trends in sizes of the Pacific Coast, Rocky Mountain, Interior, and total populations of trumpeter swans in North America, 1968-1995.

Appendix A. Raw data from the 1995 trumpeter swan survey.

POP	SUBPOP	REGION	START	END	METHOD	COVERAGE	DURATION	MANPOWER	SALARIES	OTHERCST	TOTCOST
PACIFIC	PACIFIC	AK	31JUL	29AUG	1	1	710	3472	50000	150000	200000
PACIFIC	PACIFIC	YKBC	20AUG	24AUG	1	2	14	78	2864	5291	8155
ROCKY	YKBC	YKBC	20AUG	24AUG	1	2	27	154	5666	10465	16131
ROCKY	INTCAN	BC	28AUG	08SEP	1	1	23	35	2059	3235	5294
ROCKY	INTCAN	MCK	27AUG	05SEP	1	1	28	84	1660	12000	13660
ROCKY	INTCAN	AB	16AUG	07SEP	1	1	37	110	2000	7100	9100
ROCKY	INTCAN	SK	24JUL	24JUL	2	1	1	1	30	10	40
ROCKY	TRISTATE	MT	11SEP	11SEP	1	1	5	12	150	879	1029
ROCKY	TRISTATE	WY	14SEP	14SEP	1	1	11	14	275	1732	2007
ROCKY	TRISTATE	ID	12SEP	13SEP	1	1	17	38	740	3113	3853
ROCKY	RESTOR	COLUMBIA	15SEP	15SEP	.	.	.	.	.	.	.
ROCKY	RESTOR	RUBY	28SEP	28SEP	2	1	4	8	180	640	820
ROCKY	RESTOR	MALHEUR	30AUG	30AUG	1	1	4	4	10	540	550
ROCKY	RESTOR	SUMMER	06SEP	12SEP	5	1	6	6	98	170	268
ROCKY	RESTOR	OTHEOR	06SEP	12SEP	5	3	6	6	98	170	268
ROCKY	RESTOR	LKLAMCA	15SEP	15SEP	.	1	.	.	.	.	.
INTERIOR	HIPLAINS	SD	05SEP	07SEP	1	1	10	32	760	708	1468
INTERIOR	HIPLAINS	NE	05SEP	07SEP	1	1	16	20	480	447	927
INTERIOR	HIPLAINS	WY	05SEP	07SEP	1	1	1	3	80	75	155
INTERIOR	HIPLAINS	SK	24JUL	24JUL	1	1	6	6	130	3600	3730
INTERIOR	MISSFLY	ON	19JUL	01SEP	5	1	5	.	.	1700	.
INTERIOR	MISSFLY	MN	01APR	25JAN	5	1	7	134	1340	700	2040
INTERIOR	MISSFLY	WI	15MAY	01SEP	5	1	.	1000	9000	8000	17000
INTERIOR	MISSFLY	MI	01SEP	30NOV	3	1	.	10	200	20	220
INTERIOR	MISSFLY	IA	01AUG	30SEP	3	1	.	2	60	0	60
COORDIN	COORDIN	COORDIN	.	.	.	.	.	80	2446	200	2646

Explanation of variables

POP	Population (Coordin=survey coordinator)
SUBPOP	Subpopulation
REGION	Geographic region
START	Starting date of survey
END	Ending date of survey
METHOD	Survey method (1=aerial, 2=ground, 3=other, 5=combination of methods)
COVERAGE	Extent of survey coverage (1=believed complete census, 2=sample of entire range, 3=census of part of range)
DURATION	Duration of survey in hours
MANPOWER	Person-hours expended to design survey, collect data, and summarize results
SALARIES	Dollars (U.S.) spent on salaries for survey (Canadian dollars/0.85=U.S. dollars)
OTHERCST	Dollars (U.S.) spent on other survey costs (e.g., flight-time, phone calls, supplies)
TOTCOST	Total cost of survey (SALARIES+OTHERCST)

Note: "."=missing information

Appendix C. Participants in the 1995 survey of trumpeter swans.

Anderson, L.	Ontario Ministry of Natural Resources
Andrews, R.	Iowa Department of Natural Resources
Attla, B.	U.S. Fish and Wildlife Service
Barten, N.	U.S. National Park Service
Beaulieu, R.	Saskatchewan Environment and Resource Management
Bertram, M.	U.S. Fish and Wildlife Service
Beyersbergen, G.	Canadian Wildlife Service
Bohman, B.	U.S. Fish and Wildlife Service
Bollinger, K.	U.S. National Biological Service
Bowman, T.	U.S. Fish and Wildlife Service
Bradbury, Z. M.	Canadian Parks Service
Broadbent, J.	Great Slave Helicopters (Canadian Park Service)
Brown, C.	U.S. Fish and Wildlife Service
Brown, I. S.	Canadian Parks Service
Bruce, P.	U.S. Army
Bryant, M.	U.S. Fish and Wildlife Service
Burton, R.	U.S. Fish and Wildlife Service
Butler, B.	U.S. Fish and Wildlife Service
Carlson, D.	U.S. Fish and Wildlife Service
Cassou, R.	U.S. Fish and Wildlife Service
Christensen, L.	U.S. National Park Service
Churchill, B.	Canadian Wildlife Service
Compton, D.	Hennepin Parks
Conant, B.	U.S. Fish and Wildlife Service
Denison, D.	Canadian Wildlife Service
DesRoberts, K. J.	U.S. Fish and Wildlife Service
Dickey, M. A.	U.S. Fish and Wildlife Service
Doyle, T.	U.S. Fish and Wildlife Service
Edmonds, J.	Alberta Fish and Wildlife Service
Eldridge, B.	U.S. Fish and Wildlife Service
Elliot, J.	Canadian Wildlife Service
Finley, P.	U.S. Fish and Wildlife Service
Fisher, M.	U.S. Fish and Wildlife Service
Fournier, M.	Canadian Wildlife Service
Fowler, G.	Ducks Unlimited
Frey, B. I.	U.S. Fish and Wildlife Service
Gardner, K.	Alberta Fish and Wildlife Service
Gilbert, D.	U.S. Fish and Wildlife Service
Gillette, L.	The Trumpeter Swan Society
Gomez, D.	U.S. Fish and Wildlife Service
Groves, D.	U.S. Fish and Wildlife Service
Guldager, N.	U.S. Fish and Wildlife Service
Hamilton, S.	Arctic Air Alaska, Incorporated

Appendix C. Continued.

Hannah, J.	U.S. National Park Service
Harke, V.	U.S. Forest Service
Hartman, L.	Wisconsin Department of Natural Resources
Hawkings, J.	Canadian Wildlife Service
Haws, K.	Minnesota Department of Natural Resources
Herbert, J.	Montana Department of Fish, Wildlife, and Parks
Hervieux, D.	Alberta Fish and Wildlife Service
Hill, T.	Ontario Ministry of Natural Resources
Hodges, J.	U.S. Fish and Wildlife Service
Ivey, G.	U.S. Fish and Wildlife Service
Jackson, D.	Alberta Fish and Wildlife Service
James, S.	U.S. Fish and Wildlife Service
Johnson, B.	U.S. Fish and Wildlife Service
Johnson, B.	Alberta Fish and Wildlife Service
Johnson, J.	Michigan State University
Kaye, R.	Canadian Parks Service
King, J.	U.S. Fish and Wildlife Service
King, R.	U.S. Fish and Wildlife Service
Kittelson, S.	Minnesota Department of Natural Resources
Kraft, R.	U.S. Fish and Wildlife Service
Lafferty, C. W.	Canadian Parks Service
Laing, K.	U.S. Fish and Wildlife Service
Larned, B.	U.S. Fish and Wildlife Service
Latour, P.	Canadian Wildlife Service
Leedy, B.	U.S. Fish and Wildlife Service
Liedberg, P.	U.S. Fish and Wildlife Service
Linneman, S. M.	U.S. Fish and Wildlife Service
Lucas, L.	U.S. Fish and Wildlife Service
Lumsden, H. G.	Retired from Ontario Ministry of Natural Resources
Mackay, J.	U.S. Fish and Wildlife Service
Martin, P.	U.S. Fish and Wildlife Service
Matteson, S.	Wisconsin Department of Natural Resources
McEneaney, T.	U.S. National Park Service
McKelvey, R.	Canadian Wildlife Service
Moermond, J.	U.S. Fish and Wildlife Service
Moore, G.	U.S. Fish and Wildlife Service
Mosscrop, G.	Peace Air (Canadian Wildlife Service)
Mossman, M.	Wisconsin Department of Natural Resources
Moyles, D.	Alberta Fish and Wildlife Service
Nordstrom, W.	Alberta Fish and Wildlife Service
Oates, R.	U.S. Fish and Wildlife Service
Ranta, B.	Ontario Ministry of Natural Resources

Appendix C. Continued.

Reiswig, B.	U.S. Fish and Wildlife Service
Sarvis, J.	U.S. Fish and Wildlife Service
Schafer, T.	U.S. Fish and Wildlife Service
Schulz, R. A.	U.S. Fish and Wildlife Service
Snow, P.	U.S. Fish and Wildlife Service
Spindler, M.	U.S. Fish and Wildlife Service
St. Louis, M.	Oregon Department of Fish and Wildlife
Stevenson, D.	Wyoming Game and Fish Department
Timm, H.	U.S. Fish and Wildlife Service
Todd, A.	Alberta Fish and Wildlife Service
Twist, B.	Minuteman Aviation
Vivion, M.	U.S. Fish and Wildlife Service
Warbelow, C.	40 Mile Air
Watt, R.	Canadian Parks Service
Wells, D.	Minnesota Department of Natural Resources
Woods, R.	Canadian Wildlife Service
