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TRUMPETER SWAN SURVEY of the ROCKY MOUNTAIN POPULATION WINTER 2004

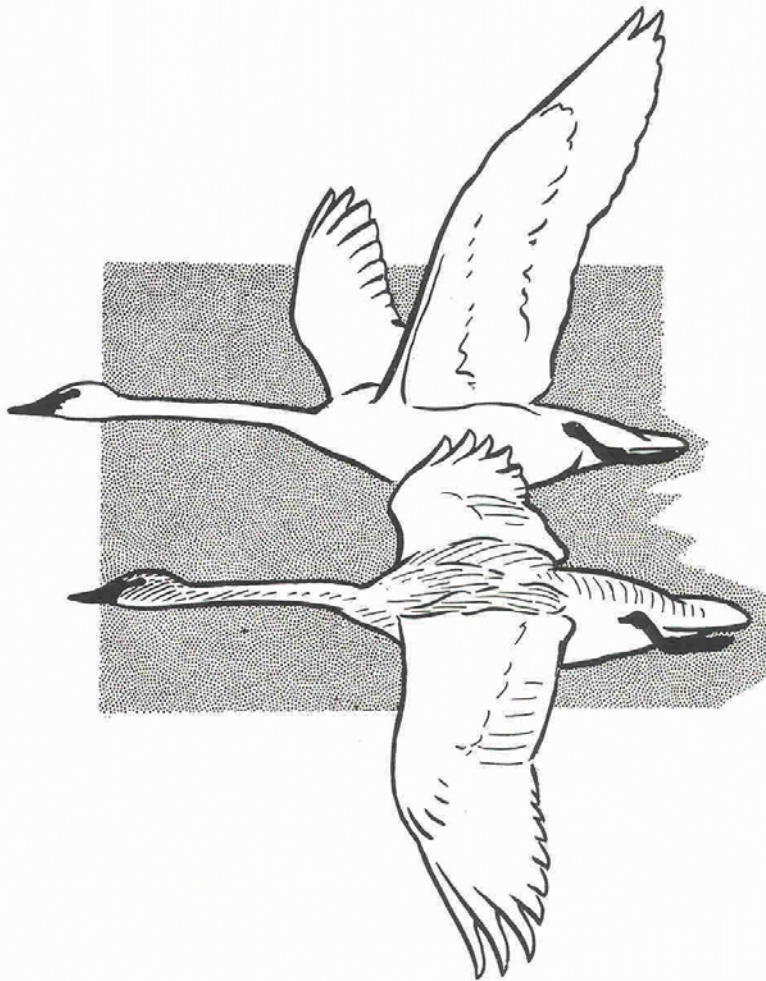
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Migratory Birds and State Programs

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ROCKY MOUNTAIN POPULATION
WINTER 2004**

U.S. Fish and Wildlife Service
Migratory Birds and State Programs
Mountain-Prairie Region
Lakewood, Colorado

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Abstract.— Observers counted 4,584 swans (white birds and cygnets) in the Rocky Mountain Population of trumpeter swans during February 2004, an increase of 15% from the 3,974 counted in February 2003 and a record-high count for the Mid-winter Survey. The numbers of white birds (3,831) and cygnets (753) increased 12% and 38%, respectively, from counts last year. In the tri-state area, increases in total swans occurred in all 3 states (Montana +56%; Idaho +10%; Wyoming +19%). The number of birds wintering in areas near restoration flocks was somewhat lower than counts in recent years, but much lower than during the early 1990s. Drought conditions persisted in much of the tri-state area, and reservoir levels in early February were among the lowest recorded for that time of year. Temperatures during winter 2003-04 were somewhat colder than average, and were punctuated by several days of extremely cold temperatures in some locales. Precipitation in primary winter areas was above average from December 2003 through February 2004.

The Rocky Mountain Population (RMP) of trumpeter swans (*Cygnus buccinator*) consists of birds that nest primarily from western Canada southward to Nevada and Wyoming (Fig. 1). The population is comprised of several flocks that nest in different portions of the overall range. The RMP/Canadian Flocks consist of birds that summer primarily in southeastern Yukon Territory, southwestern Northwest Territories, northeastern British Columbia, Alberta, and western Saskatchewan. The RMP/Tri-state Area Flocks summer in areas at the juncture of the boundaries of Montana, Wyoming, and Idaho (hereafter termed the tri-state area) and nearby areas (Fig. 2). The Canadian and Tri-state Area flocks winter sympatrically primarily in the tri-state area. In addition, efforts have been made to establish several RMP restoration flocks, such as those at Ruby Lake National Wildlife Refuge (NWR) in Nevada (i.e., Nevada flock) and those at Malheur NWR and Summer Lake Wildlife Management Area (WMA) and vicinity (i.e., Oregon flock), by translocating adult swans and cygnets from other portions of the RMP. These birds tend to winter in areas near those where they nest. These terms for the various groups of swans are consistent with the RMP Trumpeter Swan Implementation Plan (Pacific Flyway Study Committee 2002).

Although counts of swans wintering in the tri-state area have been conducted since at least the 1950s (Banko 1960), many early efforts were not well-coordinated and were variable. In an attempt to better coordinate the survey, in 1972 the U.S. Fish and Wildlife Service (Service) began the annual Mid-winter Trumpeter Swan Survey in the tri-state region. During the next decade, the area surveyed increased substantially, and by 1981 it was believed all known occupied wintering sites were included (Gale et al. 1988). Recent attempts to expand the wintering range of RMP trumpeter swans has resulted in the inclusion of yet more areas to the survey. Also, some areas may not be surveyed in a particular year due to weather or resource limitations (e.g., staff, money). Such survey modifications make individual counts from year-to-year less comparable, but the data are sufficient to reasonably depict trends in abundance.

The Mid-winter Trumpeter Swan Survey is conducted annually in February. The survey is conducted cooperatively by several administrative entities and is intended to provide an annual assessment of the number of RMP trumpeter swans. Only data from 1972 to present, the time frame during which the Service has coordinated the survey, were analyzed for this report. The numbers



Fig. 1. Approximate ranges of trumpeter swans during summer (from Caithamer 2001).

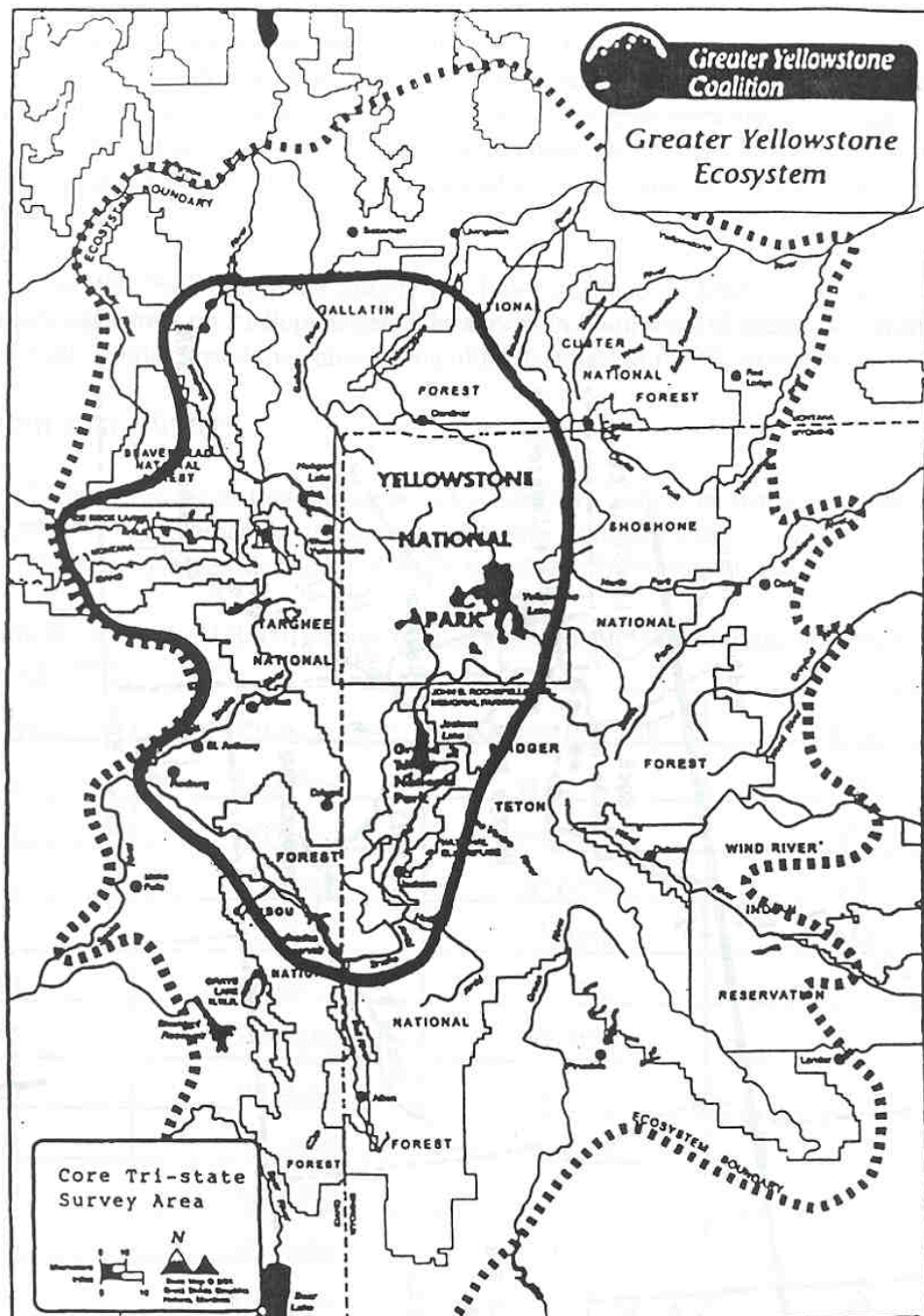


Fig. 2. Map showing the 'core' tri-state area of southeast Idaho, southwest Montana, and northwest Wyoming (provided by the Greater Yellowstone Coalition, Bozeman, Montana).

presented this year are different from those in previous reports, because counts from Oregon were in review last year and were not included in tables and analyses of the 2003 report. Biologists conducting the surveys have verified all numbers presented in the tables of this report from their data files (Appendix A).

METHODS

The survey generally is conducted within a relatively short time frame (i.e., 1 week) to reduce the possibility of counting swans more than once due to movements of birds among areas. Aerial cruise surveys are used to count numbers of swans in the tri-state area and in the Summer Lake WMA and vicinity; ground surveys are used to count the number of swans at Malheur NWR, in Nevada, and in isolated pockets of habitat not covered by aerial surveys. During aerial surveys, data are collected by observers seated in a single-engine, fixed-winged aircraft. Flying altitude varies with changes in terrain and surface winds, but generally averages 30-60 m above ground level, and flight speed is between 135-155 kph. One to two observers and the pilot count white (i.e., adults and subadults) and gray (i.e., cygnets) swans in known or suspected habitats. Counts are not adjusted for birds present but not seen by aerial crews, and have an unknown and unmeasured sampling variance associated with them. Ground surveys are used to verify species composition of some swan flocks, because trumpeter and tundra (*C. columbianus*) swans are difficult to differentiate during aerial surveys. Efforts are made to identify and exclude tundra swans from the survey counts.

For the second consecutive year, a complete survey of the Summer Lake WMA was not conducted due to resource limitations. However, the few birds counted there (<1% of totals) have little influence on total RMP results. Although the incomplete surveys cause a slight downward bias in the total counts, we included them in the total RMP count for analyses.

Estimates of abundance for Canadian Flocks are determined by subtracting the count of the RMP/U.S. Breeding Segment in the previous fall (e.g., U.S. Fish and Wildlife Service 2003a) from the Mid-winter count. For the estimate of the size of the Canadian Flocks to be accurate, several conditions must be met. First, all swans must be correctly identified to species. Second, the Mid-winter count and the fall count of swans in the RMP/U.S. Breeding Segment must be accurate. Additionally, we must assume that mortality in the RMP/U.S. Breeding Segment between the time of the fall and winter surveys is negligible. Because of problems inherent in surveying biological populations, these conditions probably are seldom met. Thus, this methodology for estimating the size of the RMP/Canadian Flocks likely leads to somewhat biased estimates of the composition of the RMP. However, we assume that these possible inaccuracies, if they occur, are random. We believe the estimates provided in this report are reasonable indices to flock-specific abundances.

To assess production for the RMP, we calculated the percentage of annual total swan counts that were cygnets. However, surveys in Nevada and Oregon did not separate counts into white birds and cygnets until 1992. Therefore, to allow an assessment over a longer time frame with data that are relatively comparable from year-to-year, we used only information from birds counted in the tri-state region. This subset contained a large majority (range = 91%-99%, \bar{x} = 97%) of the total RMP counts during 1972-2003. Counts used for analyses in this report are provided in Appendix A.

RESULTS AND DISCUSSION

The 2004 Mid-winter survey was conducted during 9-20 February, with most areas covered during 9-13 February. However, much of the Montana survey area was not flown until 20 February due to poor atmospheric conditions for flying (i.e., fog). Surveys in Idaho were delayed until midmorning due to low temperatures and fog. Conditions were unseasonably mild for Yellowstone National Park. Heavy overcast conditions prevailed during the survey in Wyoming (outside of YNP). Survey conditions in Nevada were good with clear skies. Approximately 30 h of flight time and additional ground survey time were required to complete the survey. Most of the areas typically visited during the Mid-winter survey were surveyed this year, with the exception of the Summer Lake WMA.

Habitats continued to be quite dry during winter, and much of the tri-state area remained in a drought. Water levels at 5 reservoirs (American Falls, Island Park, Jackson Lake, Palisades, and Minidoka Dam/Lake Walcott) cumulatively were at only 34% of storage capacity on February 1 (data from U.S. Bureau of Reclamation 2004a), the lowest level since 1972 (Fig. 3). Together, these reservoirs comprise about 98% of the reservoir capacity for reservoirs listed in the Snake River Basin in eastern Idaho and extreme western Wyoming (U.S. Bureau of Reclamation 2004b). However, precipitation was above-average in much of the tri-state area during winter 2003-04, and snowpack as of 1 February was about 90-129% of normal (U.S. Department of Agriculture 2004).

The flow rate in the Henrys Fork River at Harriman State Park in eastern Idaho was about 200 cfs during early winter, because flow from the Island Park Dam was shut off for repairs to the facility. During that time, all the flow through Harriman State Park was attributed to the Buffalo River. At the end of December, repairs were completed and flows through the dam were allowed, increasing the flow through the Park to about 400 cfs during mid-winter (C. Whitman, personal communication). Streamflow below Island Park Reservoir was only 205 cfs during mid-February, compared to average winter flows of about 300 cfs (Pacific Flyway Study Committee 2002). Temperatures during winter were somewhat colder than average (Fig. 4), and some areas experienced extremely cold temperatures for short periods. Many wetlands were frozen throughout the tri-state area (Appendix B), typical for the region.

Historical Trends

Methods used to estimate trends in rates of change in RMP abundance were detailed in a previous report (U.S. Fish and Wildlife Service 2003b), and will not be reiterated here. Briefly, however, we used least-squares regression on log-transformed counts to assess rates of change in counts of swans over time. Counts from the current Mid-winter survey (2004) were compared to results from 1972-2003, a practice used in Service survey reports for other waterfowl (e.g., Wilkins and Otto 2003, U.S. Fish and Wildlife Service 2003c). Because Nevada and Oregon did not separate total counts



Fig. 3. Water storage for 5 reservoirs (see text) in the tri-state region on 1 February.

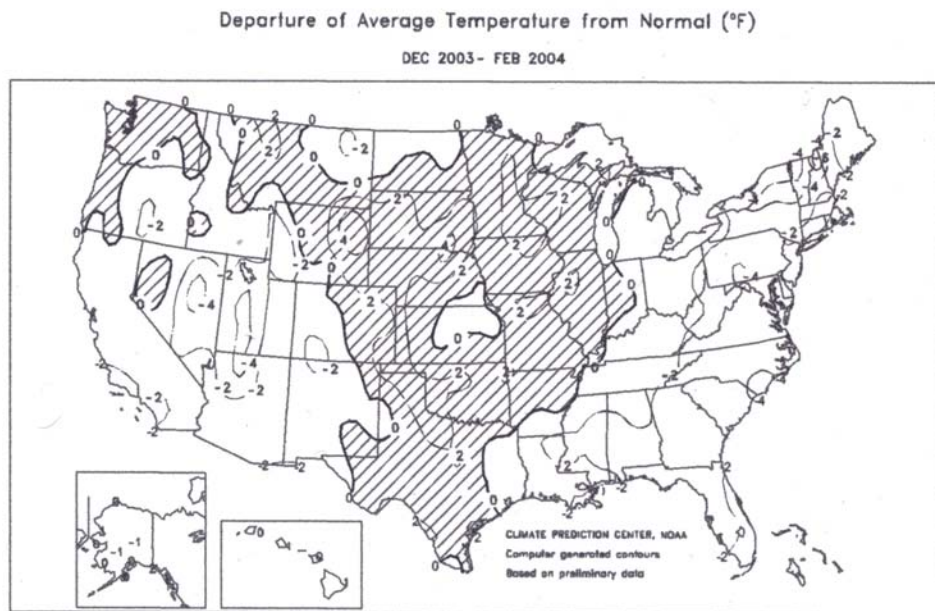


Fig. 4. Departure of temperatures from normal during winter 2003-04 (Joint Agricultural Weather Facility 2004).

of swans into white birds and cygnets prior to 1992 (see above), analyses to assess trends for white birds and cygnets used only counts from the tri-state area.

The counts for total swans of the RMP suggested an increase ($P < 0.01$) of about 5.8% per year during 1972-2003 (Table 1, Fig. 5). The number of white birds (+5.9% per year) and cygnets (+5.8% per year) counted in the tri-state region increased ($P < 0.01$) at similar rates. Counts of birds in Montana (white birds + cygnets) increased slightly (+1.5% per year, $P [\beta > 0] = 0.03$), whereas rates of growth for birds wintering in Idaho and Wyoming were much higher (+7.5% and +7.6% per year, respectively)(Table 2, Fig. 6). Although the number of birds wintering in each of the 3 states in the tri-state region generally have increased since 1972, the distribution of birds among the states has changed substantially. Whereas during the 1970s and early 1980s about 36% of wintering swans were counted in Montana, only about 13% of the birds wintering in the tri-state area have been counted there during the last decade (Fig. 7). In contrast, the percentage of birds in Idaho has increased from about 53% to about 68% during that same time period. The percentage of birds counted in Wyoming during winter also has increased slightly, from about 11% to 19%.

Counts of total swans wintering in Nevada have fluctuated over time, but suggest an increase ($P = 0.07$) of about 1.3% per year during 1972-2003 (Table 2, Fig. 8). Counts in Nevada during recent winters have been near historic highs. Trumpeter swans in Oregon primarily occur in 2 areas, Malheur NWR and the Summer Lake WMA and vicinity. Introductions of trumpeter swans to Malheur NWR began in the late 1930s, whereas birds were not translocated to Summer Lake WMA until 1992. Analyzing trends for the Oregon Flock as a whole (Table 2) could lead to inappropriate inferences. Therefore, data for Malheur NWR (1972-2003) and Summer Lake WMA (1992-2003) were analyzed separately. Results suggest a nonsignificant (-5.8% per year, $P = 0.21$) rate of decline for birds wintering at Malheur NWR (Fig. 8, Appendix A). In contrast, the rate for birds at Summer Lake WMA declined sharply (-23.1% per year, $P < 0.01$). As discussed in previous reports (e.g., U.S. Fish and Wildlife Service 2003b), perhaps some or most of the translocated birds did not survive or did not remain in the area during winters, resulting in the steep rate of decline for this area.

The percentage of the entire RMP estimated to be comprised of Canadian Flocks increased from about 19% during February of 1972 to almost 91% during February 2003 (Table 3). The data fit a 2nd-order logarithm model ($P < 0.01$, adjusted $R^2 = 0.96$), suggesting that the percentage may be approaching a plateau value near 90% (Fig. 9). The number of swans estimated to be from Canadian Flocks exhibited a fairly steady increase since the early 1980s, and approached 4,000 birds in 2002 before declining slightly in 2003 (Table 3, Fig. 9).

Results from the 2004 survey

During February 2004, observers counted 4,584 trumpeter swans in the RMP, an increase of 15% from the count of last February (3,974) and a record-high count for the Mid-winter Survey (Table 1). The number of white birds and cygnets increased 12% and 38%, respectively, from counts last year. The number of swans wintering in the tri-state area increased 16%, and also was a record-high

Table 1. Counts of trumpeter swans of the Rocky Mountain Population during winter, 1972-2004.

Year	Tri-state area			Oregon and Nevada ^a			Total RMP		
	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds ^b	Cygnets ^b	Total
1972	c	c	616			91			707
1973	c	c	581 ^d			60			641
1974	553	156	709			61			770
1975	595	128	723			40			763
1976	623	102	725			55			780
1977	839	178	1017			46			1063
1978	695	179	874			27			901
1979	743	123	866			62			928
1980	767	172	939			86			1025
1981	1000	247	1247			98			1345
1982	952	266	1218			105			1323
1983	1025	207	1232			90			1322
1984	1128	332	1460			98			1558
1985	1326	190	1516			82			1598
1986	1304	299	1603			59			1662
1987	1196	386	1582			77			1659
1988	1314	408	1722			51			1773
1989	1452	291	1743			54			1797
1990	1591	416	2007			38			2045
1991	1589	342	1931			49			1980
1992	1642	397	2039	99	58	157	1741	455	2196
1993	1659	419	2078	121	36	157	1780	455	2235
1994	1753	543	2296	127	101	228	1880	644	2524
1995	2012	668	2680	93	30	123	2105	698	2803
1996	2129	580	2709	163	64	227	2292	644	2936
1997	2179	407	2586	77	18	95	2256	425	2681
1998 ^e	1756	307	2063	64	29	93	1820	336	2156
1999	2698	772	3470	45 ^f	10 ^f	71	2743 ^f	782 ^f	3541
2000	2694	746	3440	50 ^f	15 ^f	84	2744 ^f	761 ^f	3524
2001	3198	719	3917	47 ^f	11 ^f	90	3245 ^f	730 ^f	4007
2002	3814	546	4360	48 ^f	7 ^f	67	3862 ^f	553 ^f	4427
2003 ^g	3365	532	3897	62	15	77	3427	547	3974
2004 ^g	3785	746	4531	46	7	53	3831	753	4584

^a Total counts not separated into white birds and cygnets prior to 1992.

^b Not calculated prior to 1992 because of no counts for Oregon and Nevada.

^c Not provided because counts for Yellowstone National Park not separated into white birds and cygnets.

^d In Wyoming only Yellowstone National Park surveyed.

^e 1998 counts for the Tri-state area and Total RMP are biased low because aerial survey of Yellowstone National Park not conducted due to hazardous weather; counted by snowmobile with incomplete coverage.

^f Counts biased low because white-bird and cygnet counts for Malheur NWR not available.

^g Oregon/Nevada and Total RMP counts biased low due to incomplete surveys at Summer Lake WMA.

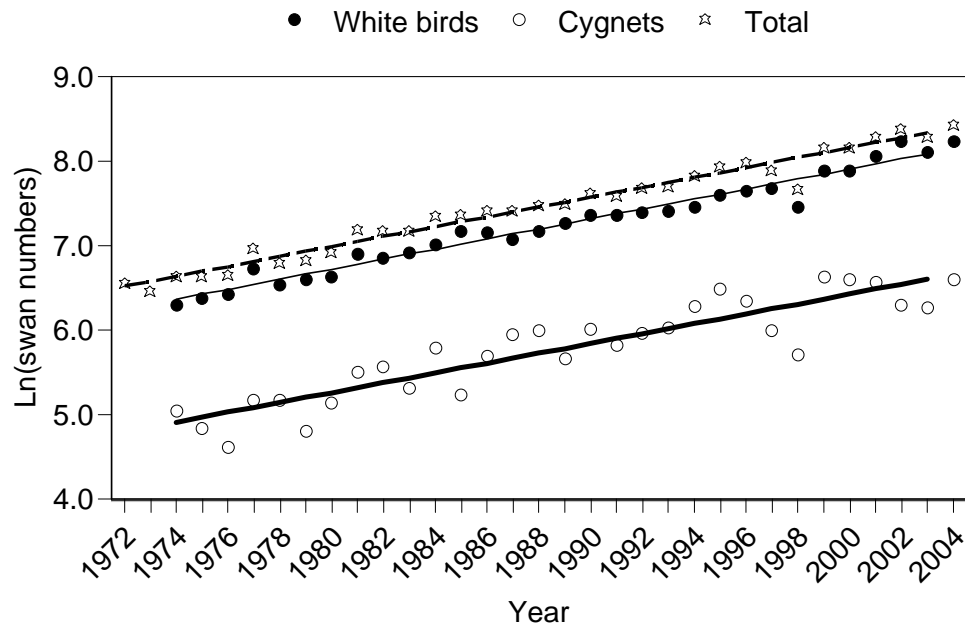


Fig. 5. Rates of change for counts of swans in the RMP during the Mid-winter Trumpeter Swan Survey, 1972-2004 (thin and thick lines depict trends for white birds and cygnets, respectively, for swans counted in the tri-state region [see text]; dashed line depicts total RMP swans).

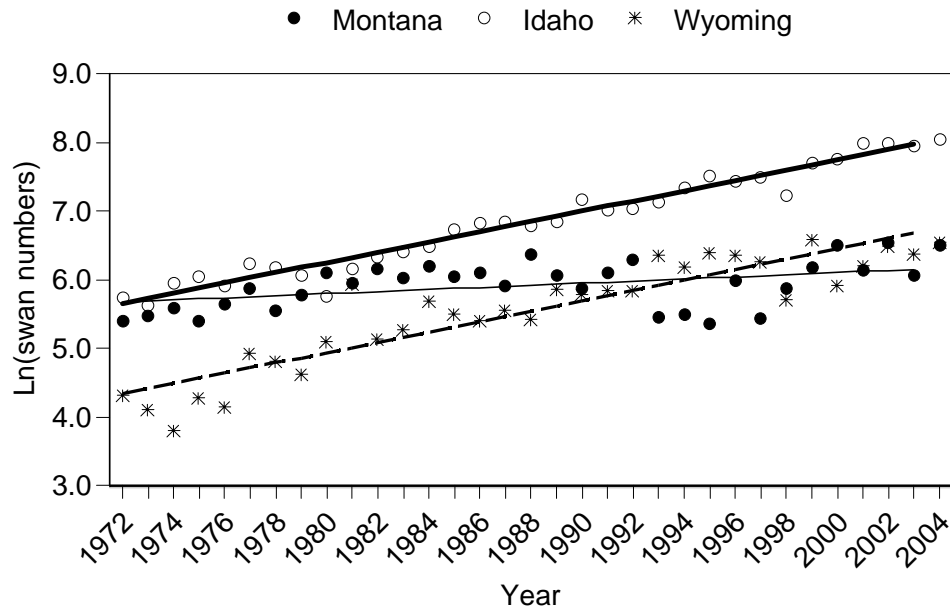


Fig. 6. Rates of change for counts of total swans in states of the tri-state region during the Mid-winter Trumpeter Swan Survey, 1972-2004.

Table 2. Counts of trumpeter swans of the Rocky Mountain Population in individual states during winter, 1972-2004.

Year	Montana			Idaho			Wyoming			Oregon ^a			Nevada ^a		
	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds	Cygnets	Total
1972	209	14	223	303	14	317	b	b	76			50			41
1973	212	28	240	222	58	280	b	b	61 ^c			32			28
1974	233	40	273	282	109	391	38	7	45			36			25
1975	192	32	224	333	94	427	70	2	72			15			25
1976	253	34	287	308	67	375	62	1	63			30			25
1977	315	43	358	395	126	521	129	9	138			17			29
1978	194	68	262	392	96	488	109	15	124			7			20
1979	304	26	330	353	81	434	86	16	102			41			21
1980	374	80	454	250	70	320	143	22	165			65			21
1981	352	36	388	370	110	480	278	101	379			77			21
1982	390	90	480	429	137	566	133	39	172			65			40
1983	363	59	422	493	122	615	169	26	195			52			38
1984	389	109	498	503	162	665	236	61	297			63			35
1985	393	31	424	701	144	845	232	15	247			51			31
1986	380	73	453	744	183	927	180	43	223			33			26
1987	314	63	377	690	255	945	192	68	260			49			28
1988	438	153	591	694	209	903	182	46	228			24			27
1989	342	90	432	817	141	958	293	60	353			36			18
1990	319	38	357	1025	300	1325	247	78	325			23			15
1991	385	70	455	918	211	1129	286	61	347			31			18
1992	438	114	552	892	249	1141	312	34	346	67	56	123	32	2	34
1993	168	70	238	1020	246	1266	471	103	574	91	36	127	30	0	30
1994	199	48	247	1164	397	1561	390	98	488	114	94	208	13	7	20
1995	153	61	214	1391	475	1866	468	132	600	72	27	99	21	3	24
1996	319	82	401	1336	390	1726	474	108	582	140	49	189	23	15	38
1997	204	30	234	1555	272	1827	420	105	525	46	9	55	31	9	40
1998	290	68	358	1200	200	1400	266 ^d	39 ^d	305 ^d	31	7	38	33	22	55
1999	335	153	488	1754	500	2254	609	119	728	16 ^e	2 ^e	34	29	8	37
2000	519	155	674	1881	513	2394	294	78	372	15 ^e	6 ^e	40	35	9	44
2001	373	96	469	2404	549	2953	421	74	495	16 ^e	7 ^e	55	31	4	35
2002	600	104	704	2636	357	2993	578	85	663	7 ^e	5 ^e	24	41	2	43
2003	375	58	433	2490	382	2872	500	92	592	28 ^f	8 ^f	36 ^f	34	7	41
2004	583	92	675	2591	563	3154	611	91	702	8 ^f	0 ^f	8 ^f	38	7	45

^a Counts for Oregon and Nevada were not separated into white birds and cygnets until 1992.

^b Not provided because counts for Yellowstone National Park not separated into white birds and cygnets.

^c Counts for Yellowstone National Park only; remainder of Wyoming not surveyed.

^d Counts for Wyoming biased low because aerial survey of Yellowstone National Park not conducted due to hazardous weather; counted by snowmobile with incomplete coverage.

^e Counts biased low because white-bird and cygnet counts for Malheur NWR not available.

^f Counts biased low due to incomplete surveys at Summer Lake WMA.

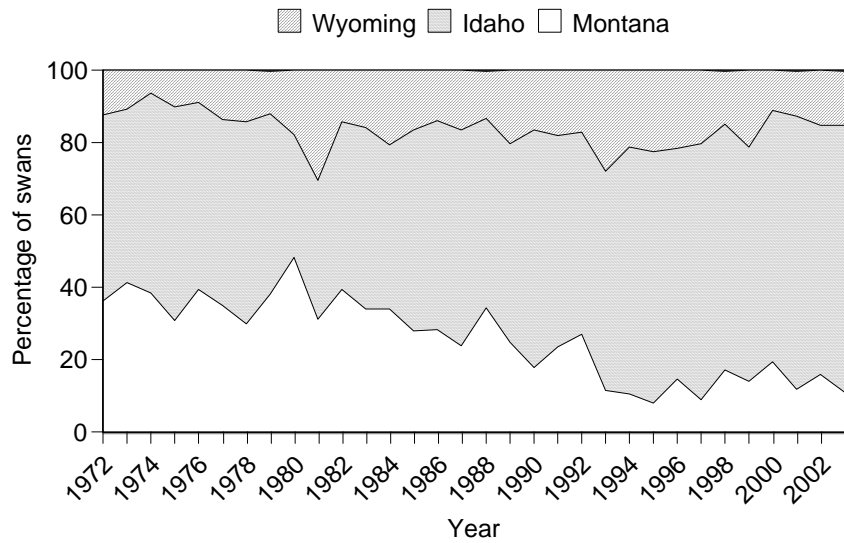


Fig. 7. Proportions of total swans counted in each of the states comprising the tri-state region during the Mid-winter Trumpeter Swan Survey, 1972-2003.

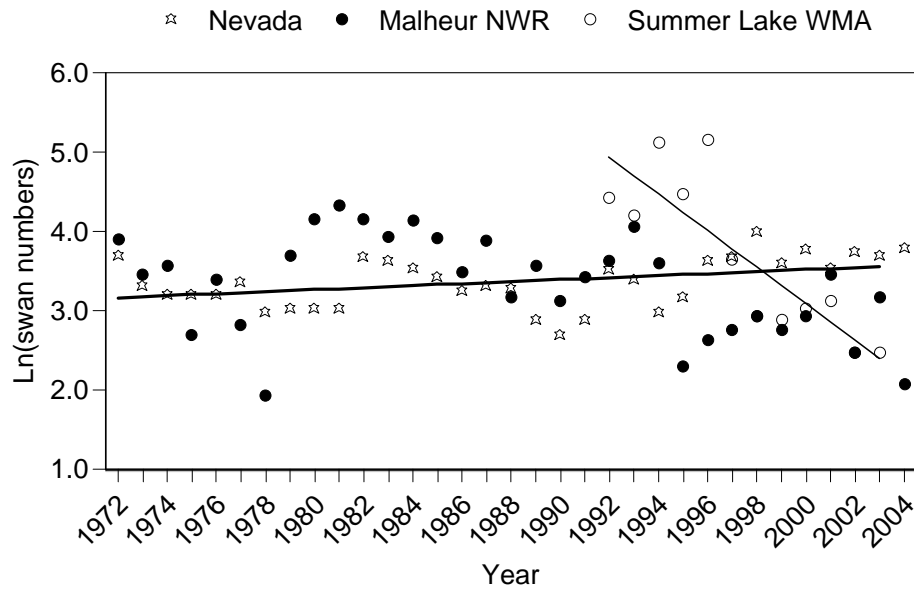


Fig. 8. Rates of change in counts of total swans in Nevada (stars and thick line) and Oregon (Malheur NWR [closed circles] and Summer Lake WMA [open circles and thin line]) during the Mid-winter Trumpeter Swan Survey, 1972-2004.

Table 3. Estimates of swan abundance for flocks comprising the Rocky Mountain Population of Trumpeter swans, 1972-2004.

Year	Mid-winter count	U.S. Breeding Flocks ^a	Canadian Flocks	Percent Canadian Flocks
1972	707	572	135	19.1
1975	763	581	182	23.9
1978	901	544	357	39.6
1981	1345	582	763	56.7
1984	1558	547	1011	64.9
1985	1598	563	1035	64.8
1986	1662	575	1087	65.4
1987	1659	452	1207	72.8
1988	1773	611	1162	65.5
1989	1797	659	1138	63.3
1990	2045	598	1447	70.8
1991	1980	626	1354	68.4
1992	2196	555	1641	74.7
1993	2235	563	1672	74.8
1994	2524	354	2170	86.0
1995	2803	454	2349	83.8
1996	2936	427	2509	85.5
1997	2681	458	2223	82.9
1998	2156	427	1729	80.2
1999	3541	469	3072	86.8
2000	3524	417	3107	88.2
2001	4007	481	3526	88.0
2002	4427	487	3940	89.0
2003	3974	371	3603	90.7
2004	4584	417	4167	90.9

^a From U.S. Fish and Wildlife Service 2003*a*. Counts are from the previous calendar year (i.e., the 2004 value is from the Fall 2003 survey).

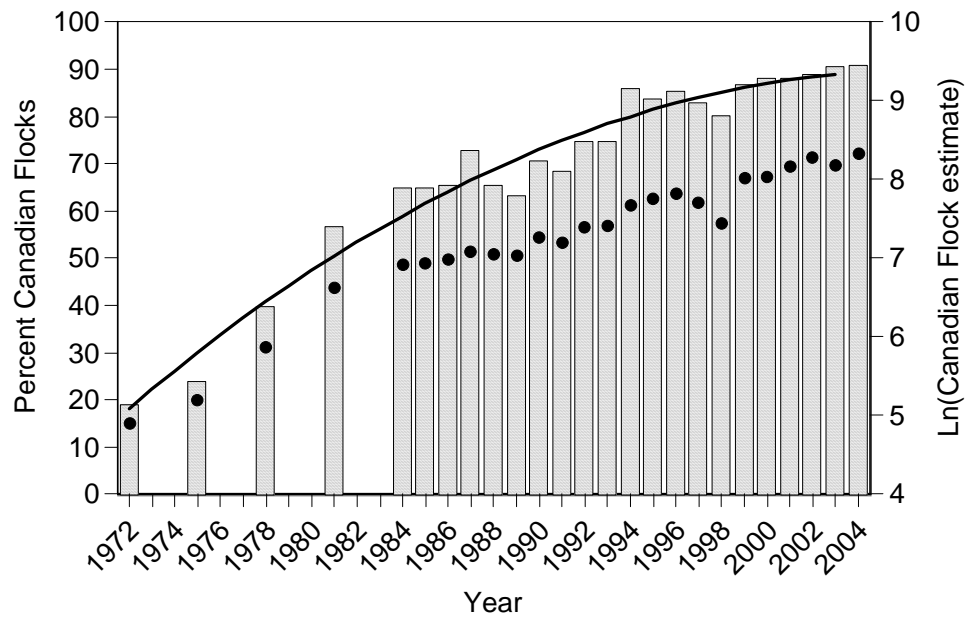


Fig. 9. Percent (bars and solid line) and counts (solid dots) of the entire RMP estimated to be comprised of Canadian Flocks during the Mid-winter Trumpeter Swan Survey, 1972-2004.

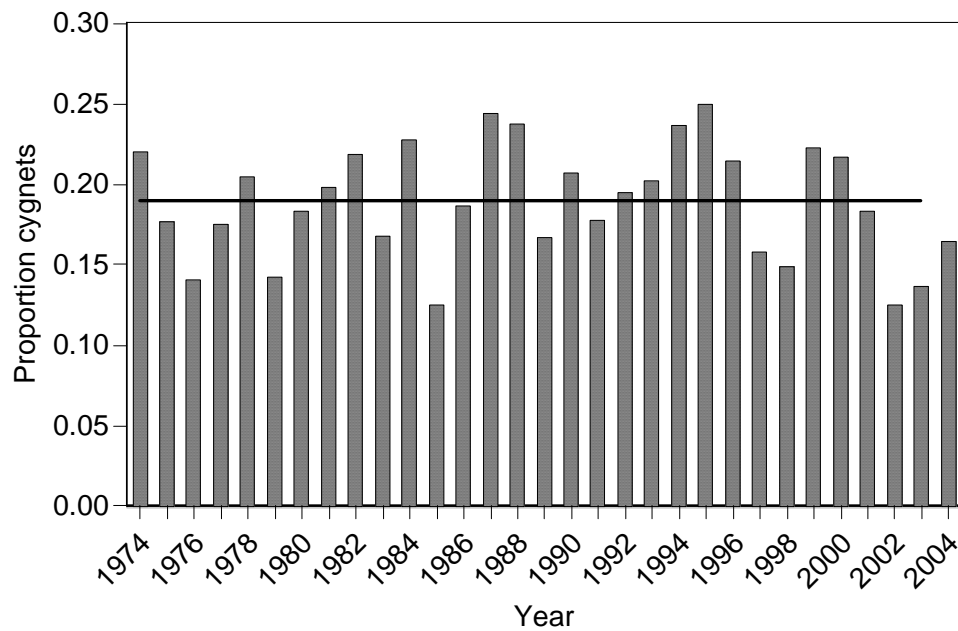


Fig. 10. Proportion of cygnets counted in the tri-state region during the Mid-winter Trumpeter Swan Survey, 1974-2004. The solid line depicts the 1974-2003 average.

count. Increases of total swans from counts in 2003 occurred throughout the tri-state area (Montana +56%; Wyoming +19%; Idaho +10%) (Table 2). In Idaho, the number of birds this year was a record-high count, and the counts in Montana and Wyoming were the second highest recorded. Above-average counts in Yellowstone National Park were likely due to mild weather conditions in that area. Of the birds wintering in the tri-state area during February 2004, about 15% were in Montana, 70% were in Idaho, and 15% inhabited Wyoming. Additionally, 16 birds were observed by private individuals in Idaho, and 11 birds were sighted outside of the survey area in Montana. However, because these 27 birds were observed outside of the survey protocols, they were not included in the tables or analyses. This winter, the first observation of a whooper swan (*C. cygnus*) was documented in Wyoming (McEneaney 2004).

Field feeding by swans, observed on a large scale in Idaho last winter (C. Whitman, personal communication), essentially was not observed during the survey this winter. Last winter, below-average precipitation and warm temperatures afforded swans the opportunity to feed in harvested agricultural fields, which were mostly snow-free. This winter, cold temperatures and snow-covered fields largely precluded swans from field feeding, and they were observed primarily near rivers and other wetlands with open water.

Several dead swans were encountered in the tri-state area during winter 2003-04. In Wyoming, biologists noted 6 dead swans in 1 week at one location. However, because there is no coordinated monitoring effort to collect information on the extent of winter mortality of trumpeter swans, we are unsure as to whether such instances were localized phenomena or more widespread. In recent years, biologists monitoring movements of swans marked with neck collars have noted about 30 mortalities per winter (Whitman 2002; Southeast Idaho National Wildlife Refuge Complex, unpublished memo).

The number of swans in Nevada (45) was similar to counts in recent winters (Table 2). Due to below-average temperatures, Ruby Lake and associated spring pools were almost completely frozen, and available open water was limited. The number of swans counted at Malheur NWR (8) was much lower than that of last year, and was the lowest recorded in 25 years (Appendix A).

Our index suggested about 91% of the RMP counted in February 2004 was comprised of swans from Canadian Flocks (Table 3, Fig. 9). This value is essentially the same as those from the last few years (~89%). The estimated number of swans from Canadian Flocks was 4,167 birds, a value 16% higher than that of 2003.

The proportion of cygnets for swans counted in the tri-state region during February 2004 was 0.1646. This value was above the value for February 2003 and the highest in 3 years, but was 13% below the 1974-2003 average (0.1895) (Fig. 10). The 2004 Mid-winter count was the fourth consecutive year suggesting below-average production for the RMP.

In summary, RMP trumpeter swans appeared to increase by about 5.8% annually between 1972 and 2003. Most of the increase over that time was attributable to increases in the number of birds in the Canadian Flocks, which now comprise slightly more than 90% of the population. The number of

RMP swans appeared to increase 15% between the winters of 2002-03 and 2003-04, but the count at Malheur NWR was the lowest recorded since 1978. The production rate during spring and summer 2003 appeared to improve from the previous 2 years, but was below the long-term average for the fourth consecutive year. The distribution of birds in Idaho differed markedly from that of last year, possibly due to the availability of agricultural fields in which they could feed. This winter, cold temperatures and snow-covered fields may have precluded field-feeding by swans. Several dead swans were found this winter over short time periods in a few locales. However, the extent of winter mortality and its possible effects on the entire RMP remain unclear.

ACKNOWLEDGMENTS

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Appendix A. Counts of trumpeter swans of the Rocky Mountain Population during winter, 1972-2004.

Year	Montana			Idaho			Wyoming (outside Yellowstone NP)		
	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds	Cygnets	Total
1972	209	14	223	303	14	317	16	4	20
1973	212	28	240	222	58	280	a	a	a
1974	233	40	273	282	109	391	7	0	7
1975	192	32	224	333	94	427	40	2	42
1976	253	34	287	308	67	375	30	1	31
1977	315	43	358	395	126	521	86	0	86
1978	194	68	262	392	96	488	63	4	67
1979	304	26	330	353	81	434	15	3	18
1980	374	80	454	250	70	320	63	6	69
1981	352	36	388	370	110	480	37	10	47
1982	390	90	480	429	137	566	76	19	95
1983	363	59	422	493	122	615	81	12	93
1984	389	109	498	503	162	665	87	11	98
1985	393	31	424	701	144	845	78	8	86
1986	380	73	453	744	183	927	91	25	116
1987	314	63	377	690	255	945	85	18	103
1988	438	153	591	694	209	903	115	28	143
1989	342	90	432	817	141	958	197	39	236
1990	319	38	357	1025	300	1325	169	46	215
1991	385	70	455	918	211	1129	225	47	272
1992	438	114	552	892	249	1141	204	30	234
1993	168	70	238	1020	246	1266	293	64	357
1994	199	48	247	1164	397	1561	253	74	327
1995	153	61	214	1391	475	1866	327	91	418
1996	319	82	401	1336	390	1726	344	84	428
1997	204	30	234	1555	272	1827	346	102	448
1998	290	68	358	1200	200	1400	109	15	124
1999	335	153	488	1754	500	2254	317	71	388
2000	519	155	674	1881	513	2394	207	65	272
2001	373	96	469	2404	549	2953	368	63	431
2002	600	104	704	2636	357	2993	447	72	519
2003	375	58	433	2490	382	2872	354	58	412
2004	583	92	675	2591	563	3154	462	58	520

^a Counts not available.

^b Total counts not separated into white birds and cygnets prior to 1992.

^c Swans first translocated to Summer Lake WMA in 1992.

^d Count biased low because aerial survey not conducted due to hazardous weather; snowmobile count with incomplete coverage only.

Appendix A. (cont.)

Year	Yellowstone NP			Malheur NWR ^b			Summer Lake WMA ^c			Nevada ^b		
	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds	Cygnets	Total
1972	a	a	56			50						41
1973	a	a	61			32						28
1974	31	7	38			36						25
1975	30	0	30			15						25
1976	32	0	32			30						25
1977	43	9	52			17						29
1978	46	11	57			7						20
1979	71	13	84			41						21
1980	80	16	96			65						21
1981	241	91	332			77						21
1982	57	20	77			65						40
1983	88	14	102			52						38
1984	149	50	199			63						35
1985	154	7	161			51						31
1986	89	18	107			33						26
1987	107	50	157			49						28
1988	67	18	85			24						27
1989	96	21	117			36						18
1990	78	32	110			23						15
1991	61	14	75			31						18
1992	108	4	112	25	13	38	42	43	85	32	2	34
1993	178	39	217	44	15	59	47	21	68	30	0	30
1994	137	24	161	30	7	37	84	87	171	13	7	20
1995	141	41	182	9	1	10	63	26	89	21	3	24
1996	130	24	154	11	3	14	129	46	175	23	15	38
1997	74	3	77	11	5	16	35	4	39	31	9	40
1998	157 ^d	24 ^d	181 ^d	13	6	19	18	1	19	33	22	55
1999	292	48	340	a	a	16	16	2	18	29	8	37
2000	87	13	100	a	a	19	15	6	21	35	9	44
2001	53	11	64	a	a	32	16	7	23	31	4	35
2002	131	13	144	a	a	12	7	5	12	41	2	43
2003	146	34	180	19	5	24	9	3	12	34	7	41
2004	149	33	182	8	0	8	a	a	a	38	7	45

^a Counts not available.

^b Total counts not separated into white birds and cygnets prior to 1992.

^c Swans first translocated to Summer Lake WMA in 1992.

^d Count biased low because aerial survey not conducted due to hazardous weather; snowmobile count with incomplete coverage only.

Appendix B. Site-specific counts of trumpeter swans of the Rocky Mountain Population during the Mid-winter Trumpeter Swan Survey, 2004.

State or Area	White birds	Cygnets	Total	Pilot/observer/notes
Montana				
<i>Hebgen Lake area</i>				P: B. Twist, O: S. Comeau, J. Warren 2/20
Cougar Creek	2	4	6	Poor light conditions
Between Quake Lake and Hebgen Lake	4	0	4	
Madison River Arm	317	33	350	
North Spring (Grayling Arm)	24	6	30	
South Fork Arm	64	13	77	
Subtotal	411	56	467	
<i>Madison River Valley</i>				
Odell Creek Area	3	0	3	95% open
Walsh Ponds (south)1	4	1	5	
Walsh Ponds (north)1	0	0	0	
Madison River, south of Ennis	10	2	12	100% open
Ennis Lake	49	7	56	15% open
Subtotal	66	10	76	
<i>Chain of Lakes</i>				
Cliff Lake	10	0	10	10% open
Wade Lake	4	0	4	10% open
Goose Lake	4	0	4	30% open
Smith Creek (Hidden Lake outlet)	0	0	0	
Subtotal	18	0	18	
<i>Centennial Valley/Red Rock Lakes NWR</i>				
Red Rock River below Lower Lake Dam	0	0	0	Pockets of open water
MacDonald Pond	43	5	48	80% open
Culver Pond	10	6	16	25% open
Elk Springs Creek	0	0	0	100% open
Swan Lake	0	0	0	Frozen
Shambow Pond	0	0	0	10% open
Red Rock River, Lima	0	0	0	Some open water by dam
Subtotal	53	11	64	
<i>Paradise Valley</i>				P: R. Stradley, O: T. McEneaney 2/13
Armstrong's Spring Creek	4	3	7	
Bailey's	0	0	0	
Brockway	0	0	0	
DePuys	5	4	9	
Brandis	8	1	9	
Nelson's Spring Creek	7	2	9	
Sacagawea Park	0	0	0	
Emigrant	0	0	0	
Beaver Creek	11	5	16	

Appendix B. (cont.)

Yellowstone River - 6 mile	0	0	0	
Yellowstone River - Pray	0	0	0	
Dana's	0	0	0	
Subtotal	35	15	50	
Wyoming				
<i>Upper Snake River (Flagg Ranch to Wilson Bridge)</i>				P: G. Lust, O: S. Patla 2/9-10
Polecat Creek area	4	0	4	
Flagg Ranch to Jackson Lake	2	0	2	Pair north of Tusker's Island
Jackson Lake	0	0	0	Lake frozen; river open south past Wilcox Point
Jackson Lake to Moran Junction	15	0	15	River frozen where swans found in past years
Moran Junction to Deadman's	8	0	8	2 coyotes near 4 swans south of Spread Creek
Deadman's to Moose	26	3	29	Group of 16 adults
Moose to Gros Ventre Junction	19	3	22	9 adults along Spring Creek east side of river
Gros Ventre Junction area	22	0	22	17 on pond John Dodge; 5 on old Mead place
Gros Ventre Junction to Wilson Bridge	14	3	17	6 swans on pond north of Tucker Ranch
Gros Ventre River, Highway 89 to Snake River	0	0	0	
Subtotal	110	9	119	
<i>Gros Ventre River upriver of Kelly</i>				
Kelly Springs, Teton Valley Ranch	0	0	0	
Kelly Warm Springs, Grand Teton National Park	0	0	0	
Lower Slide Lake	0	0	0	Ground check
Upper Gros Ventre	0	0	0	Ground check
Subtotal	0	0	0	
<i>Lower Snake River (Wilson Bridge to Alpine)</i>				
Wilson Bridge to South Park Bridge	5	1	6	
Evan's Gravel pit ponds	52	3	55	All on small open hole
South Park Bridge to Hoback	0	0	0	
North Wilson	9	0	9	New site: incl. Fish Creek and ponds west of river
Fish Creek, Wilson to Snake River	57	0	57	37 swans on ponds and creeks
Boyles Hill area	3	0	3	Wyoming Wetland Soc. ground count of winter pen
Ford's	0	0	0	
Spring Creek	8	1	9	
Crane Creek	14	3	17	
Lower Flat Creek, Snake River to Jackson	1	0	1	
Rafter J Ponds	7	0	7	
Valley Springs, Captive Swan Pond/Pen Highway 89	0	0	0	Construction; little water
Hoback to Astoria Bridge	0	0	0	
Astoria Bridge-Elbow	0	0	0	
Elbow to Alpine/Palisades Reservoir	4	1	5	3 counted from air; 2 others from ground same day
Bondurant pond near Hoback River	2	0	2	Surveyed day after flight; swans reported all winter
Subtotal	162	9	171	

Appendix B. (cont.)

<i>National Elk Refuge</i>				
Flat Creek main marsh	15	0	15	2 Miller's Springs; 3 Winnegar; 10 Lost Spring Pond
Gros Ventre River, Kelly to Highway 89	20	0	20	18 on Bill's Bayou; 2 on river near Pierre's Ponds
Romney pond area	0	0	0	
Subtotal	35	0	35	
<i>Salt River (Alpine to Afton)</i>				
Palisades Reservoir, WY Alpine	2	0	2	Only a few open areas
Palisades Reservoir to Freedom Road	18	2	20	Most in Etna area
Freedom Road to Narrows	0	0	0	
Thayne area	8	0	8	Flat Creek ponds
Narrows to Grover/Auburn Highway	17	13	30	One group of 9 cygnets and 4 adults
Grover/Auburn Highway to Swift Creek	49	8	57	Group of 45 adults and 5 cygnets on Orvis pond
Swift Creek to Headwaters	0	0	0	Frozen
Subtotal	94	23	117	
<i>Pinedale</i>				
New Fork Boulder to Pinedale	0	0	0	
Daniel Fish Hatchery/Forty Rod Creek	8	4	12	Cygnets group with collared Canadian swan J38
Subtotal	8	4	12	
<i>Green River (Warren Bridge to Highway 28 Bridge)</i>				
Fontenelle Dam-CCC Bridge	2	3	5	
CCC Bridge to Pilot Farm	44	9	53	
Pilot Farm-Refuge Headquarters	7	1	8	
Refuge to Big Sandy	0	0	0	
Flaming Gorge Reservoir	a			Frozen; squall over dam area in Utah
Seedskadee NWR	0	0	0	
Green at Big Sandy junction	0	0	0	
Subtotal	53	13	66	
<i>Dubois area</i>				
Wind River and spring ponds, Dubois	0	0	0	New category added 2004 5 swans week before flight; 0 during flight
Dinwoody Lake				
Subtotal	0	0	0	
<i>Yellowstone National Park</i>				
White Lake	3	0	3	P: R. Stradley, O: T. McEneaney 2/13
Tern Lake	5	3	8	
Indian Pond	2	1	3	
Shoshone Geyser Basin	3	0	3	
Lewis Lake outlet	1	0	1	
Buela Lake	2	0	2	
Yellowstone River	51	0	51	
Shoshone Geyser Basin	0	0	0	
Lewis - Shoshone Channel	0	0	0	

Appendix B. (cont.)

Shoshone Lake	0	0	0	
Bechler Lake	10	3	13	
Firehole River	12	2	14	
Madison River	56	21	77	
Gibbon Meadow	2	3	5	
Nymph Lake	2	0	2	
Upper Gibbon River	0	0	0	
North Twin Lake	0	0	0	
Subtotal	149	33	182	
Idaho				
<i>Island Park Area</i>				P: G. Lust, O: C. Whitman 2/11/2004
<i>Henrys Lake Area and Henrys Fork of the Snake River to Big Springs</i>				
Raynolds Pass Pond	2	0	2	1/10 acre open, 75% frozen
Targhee Pass Pond	2	0	2	1/2 acre open, 60% frozen
Henrys Lake, Staley Springs	0	0	0	1/4 acre open, lake frozen
Henrys Lake, IDFG Fish Hatchery	0	0	0	4 acres kept open by aerators
Henrys Fork, Henrys Lake Dam to Big Springs	2	3	5	90% frozen above Big Springs Loop Bridge
Jones Creek, mouth to head spring	0	0	0	Upper 1/2 open, lower 1/2 frozen
Subtotal	6	3	9	
<i>Henrys Fork, Big Springs to Island Park Dam</i>				
Big Springs to Mack's Inn Bridge	18	2	20	River open; good water levels
Mack's Inn Bridge to McCrea Bridge	20	6	26	River open; good water levels
McCrea Bridge to Island Park Reservoir inlet	31	0	31	Inlet completely frozen 1 mile below bridge
Subtotal	69	8	77	
<i>Island Park Reservoir and Shotgun Valley Ponds and Reservoirs</i>				
Island Park Reservoir	0	0	0	Completely frozen
Sheep Creek Reservoir, Jacobs I.P. Ranch	0	0	0	Completely frozen or dry
Trude Ranch Pond	0	0	0	Completely frozen or dry
Ice House Pond	0	0	0	Completely frozen
Sheridan Creek, mouth to Sheridan Reservoir	0	0	0	Completely frozen 1 mile below reservoir
Sheridan Reservoir	4	0	4	6 acres open; reservoir 80% frozen
Sheridan Creek, reservoir to upper ponds	0	0	0	Spring ponds and creek open
Subtotal	4	0	4	
<i>Buffalo River, Mouth to Headwaters</i>				
Buffalo River, mouth to Highway 20 Bridge	0	0	0	River and pool above dam open
Buffalo River, Highway 20 Bridge to headwater	13	4	17	River open
Tom's Creek, mouth to headwater	2	0	2	Creek 75% frozen on lower reaches
Elk Creek, mouth to Elk Creek Lake	0	0	0	Creek open
Elk Creek Lake	8	0	8	4 acres open, lake 70% frozen
Subtotal	23	4	27	

Appendix B. (cont.)

<i>Henrys Fork, Island Park Dam to Last Chance</i>				
Island Park Dam to Buffalo River confluence	0	0	0	River open
Buffalo River confluence - Upper Last Chance	20	9	29	River open
Subtotal	20	9	29	
<i>Harriman State Park (HSP), Henrys Fork, and Golden and Silver Lakes</i>				
Upper Last Chance to HSP north Park Boundary	32	8	40	River open
HSP north Park Boundary to Osborne Bridge	180	7	187	River 10% frozen
Golden Lake	19	0	19	95% frozen, 1 acre open inlets & spillway
Thurmon Creek	0	0	0	Lower third completely frozen, upper open
Silver Lake	0	0	0	99.9% frozen, 50 sq. meters open at inlet
Osborne Bridge to south Park Boundary	45	1	46	River 20% frozen, pan ice in channel
HSP south Park Boundary to Lower Pine Haven	28	3	31	River 50% frozen, pan ice in channel
Fish Pond	0	0	0	100% frozen
Subtotal	304	19	323	
<i>Henrys Fork, HSP to Warm River Confluence</i>				
Lower Pine Haven to Warm River confluence	4	0	4	Upper third 80% frozen, lower half open
Subtotal	4	0	4	
<i>Lower Henrys Fork, Warm River Confluence to Menan Butte Bridge</i>				
<i>Henrys Fork, Warm River Confluence to Menan Butte Bridge</i>				
Warm River confluence to Highway 20 Bridge	0	0	0	River open, pan ice in channel
Ashton Dam, Highway 20 bridge to dam breast	30	5	35	Reservoir 99% frozen, 1 acre open water
Breast of Ashton Dam to Ora Bridge	26	6	32	River open
Ora Bridge to Verna Bridge	40	8	48	River open
Verna Bridge to head of Chester Dam	107	22	129	River open, 1 fisherman
Chester Dam	74	11	85	Dam 40% frozen
Chester Dam: security sites in fields	0	0	0	Fields snow covered
Breast Chester Dam to Twin Grove Bridge	146	61	207	Heavy pan ice in channel, swans on shore
Twin Grove Bridge to Del Rio Bridge	10	2	12	Heavy pan ice in channel, swans on shore
Del Rio Bridge to St. Anthony Bridge	6	0	6	Heavy pan ice in channel, swans on shore
St. Anthony Bridge to breast of St. Anthony Dam	7	0	7	River 10% frozen
St. Anthony Dam to Highway 33 Bridge	10	0	10	Upper 10% frozen; lower 95% frozen
Highway 33 Bridge to Menan Butte Bridge	119	24	143	Upper 85% frozen; lower open
Subtotal	575	139	714	
<i>Lower Henrys Fork Tributaries, Ponds and Sloughs</i>				
Warm River, mouth to upper narrows	0	0	0	River open
Ashton Ponds (Reid Richey)	0	0	0	Ponds 100% frozen
Willow Creek Pond (Seeley)	22	0	22	Pond 80% frozen; 1/2 acre open
Lemon Lake	0	0	0	Lake 100% frozen
Mikesell Reservoir, Upper	0	0	0	Reservoir 100% frozen
Mikesell Reservoir, Lower	0	0	0	Reservoir 100% frozen
Arcadia Reservoir, Upper	0	0	0	Reservoir 100% frozen
Arcadia Reservoir, Lower	0	0	0	Reservoir 100% frozen
Sand Creek WMA, Swan Pond	4	3	7	50% frozen; 1/2 acre open

Appendix B. (cont.)

Sand Creek WMA, Pond #4	10	0	10	Pond 90% frozen; 1/4 acre open
Sand Creek WMA, Pond #3	0	0	0	Pond 100% frozen
Sand Creek WMA, Pond #2	0	0	0	Pond 100% frozen
Sand Creek WMA, Pond #1	0	0	0	Pond 100% frozen
Sand Creek WMA, Beaver Pond	0	0	0	Pond open; 3 acres open water
Sand Creek WMA, Blue Creek Reservoir	0	0	0	Reservoir 100% frozen
Black Spring Creek, mouth to IDFG hatchery	2	0	2	Open
Fall River, mouth to Highway 20 bridge	0	0	0	River 80% frozen
Singleton Ponds, Chester Wetlands WMA	0	0	0	Ponds frozen
Warm Slough WMA	0	0	0	Sloughs frozen
Cartier Slough WMA	2	2	4	Sloughs 95% frozen
Texas Slough, fields	0	0	0	Fields snow covered
Texas Slough, water	19	3	22	Slough open
Bannock Jim Slough, fields	16	2	18	Fields snow covered
Bannock Jim Slough, water	19	11	30	Slough open
Crystal Ponds Rexburg	0	0	0	Frozen
Butte Slough, Deer Parks Slough WMA				
Subtotal	94	21	115	
Camas NWR, Mud Lake WMA, and Market Lake WMA				
<i>Market Lake WMA</i>				
East Springs Pond, north unit	0	0	0	Dry or snow-covered ice
East Springs Pond, spring and main pool	0	0	0	Pool 100% frozen; snow-covered ice
East Springs Pond, south unit	0	0	0	Dry or snow-covered ice
Marsh Unit #1	0	0	0	Completely frozen and snow-covered
Marsh Unit #2	0	0	0	95% frozen; 1/10 acre open water
Marsh Unit #3	0	0	0	Completely frozen and snow-covered
Marsh Unit #4	0	0	0	Completely frozen and snow-covered
Marsh Unit west of access road	0	0	0	Dry or snow-covered ice
Subtotal	0	0	0	
<i>Mud Lake WMA</i>				
Main body of lake	0	0	0	Lake 100% frozen
Camas Creek inlet	0	0	0	100% frozen
Subtotal	0	0	0	
<i>Camas Creek and Independent Ditch between Mud Lake WMA and Camas NWR</i>				
Mud Lake, Camas Creek inlet to 1800 N Road	0	0	0	Dry or snow-covered ice
1800 N Road to Camas NWR Boundary	0	0	0	Dry or snow-covered ice
Independent Ditch	0	0	0	Dry or snow-covered ice
Subtotal	0	0	0	
<i>Camas NWR</i>				
Rays Lake	0	0	0	Dry or snow-covered ice
Sand Hole Pond	0	0	0	Dry or snow-covered ice
Two Way Pond	0	0	0	Dry or snow-covered ice
Big Pond	0	0	0	Dry or snow-covered ice

Appendix B. (cont.)

Center Pond	0	0	0	Dry or snow-covered ice
Red Head Pond	0	0	0	Dry or snow-covered ice
Spring Pond	0	0	0	Dry or snow-covered ice
Subtotal	0	0	0	
Teton River, Headwaters to Henrys Fork Confluence				
<i>Teton Basin, Teton River Headwaters to Highway 33 Bridge</i>				
Paradise Spring Pond	4	0	4	Pond 50% frozen; 3/4 acre open
New pond southwest corner of Basin	4	3	7	Open
Teton River headwaters to White Bridge	7	0	7	Open
White Bridge to Bates Bridge	2	0	2	River 80% frozen
Fox Creek	6	0	6	Open
Klausman Wetland (newly constructed)	0	0	0	100% frozen
Bates Bridge to Burton Bridge	20	0	20	River 75% frozen; open at Big Bend
Burton Bridge to Cache Bridge	17	5	22	River frozen; swans up open side creeks
Cache Bridge to Highway 33 Bridge	0	0	0	River 98% frozen
Subtotal	60	8	68	
<i>Teton Canyon, Highway 33 Bridge to 1 mile above Hog Hollow Bridge</i>				
Highway 33 Bridge to Fell Dam Reservoir	0	0	0	River 95% frozen
Fell Dam Reservoir	0	0	0	Reservoir open; 30 acres
Fell Dam Reservoir to Bitch Creek	5	0	5	River open
Bitch Creek to Linderman Dam Site	13	1	14	River open
Linderman Dam Site to Teton Dam Site	120	21	141	River open; water at dam 80% frozen
Teton Dam Site to Beaver Dicks Grave	33	8	41	River open
Subtotal	171	30	201	
<i>Hog Hollow Bridge Area & Wilford Diversion Dam to Teton Bridge</i>				
Beaver Dicks Grave to Hog Hollow Bridge	9	3	12	River 50% frozen
Hog Hollow Bridge to Head Wilford Diversion Dam	3	0	3	River 30% frozen
Fields south of Hog Hollow Bridge	0	0	0	Fields snow-covered; no evidence of use
Fields north of Wilford Diversion	0	0	0	Fields snow-covered; no evidence of use
Wilford Diversion Dam	2	1	3	Dam 80% frozen; 6 acres open
Breast of Wilford Diversion Dam to Teton Bridge	0	0	0	River 75% frozen
Subtotal	14	4	18	
<i>South Fork Teton River, Teton Bridge to Henrys Fork Confluence</i>				
Teton Bridge to Highway 20 Bridge	0	0	0	Rivers and ponds 100% frozen
Fields west of Teton	0	0	0	Fields snow-covered; no evidence of use
Highway 20 Bridge to Mouth	0	0	0	River 50% frozen
Subtotal	0	0	0	
<i>North Fork Teton River, Teton Bridge to Henrys Fork Confluence</i>				
Teton Bridge to Highway 20 Bridge	0	0	0	River frozen
Fields northwest of Teton	0	0	0	Fields snow-covered; no evidence of use
Highway 20 Bridge to Mouth	7	0	7	River frozen; swans on slough at mouth
Subtotal	7	0	7	

Appendix B. (cont.)

<i>South Fork of the Snake River, Palisades Dam to Henrys Fork Confluence</i>				
Palisades Dam to Swan Valley Bridge	56	20	76	River open, no ice
Rainey Creek, mouth to Swan Valley, townsite	0	0	0	Creek open, no ice
Rainey Creek pond at Swan Valley, townsite	4	6	10	Pond 50% frozen
Security Site fields southwest of Swan Valley	214	43	257	Fields snow-covered
Swan Valley Bridge to west end of Conant Valley	95	44	139	River open, no ice
West end of Conant Valley to Black Canyon	186	56	242	River open, no ice
Black Canyon to Burns Canyon	0	0	0	River open, no ice
Black Canyon Spring Ponds	0	0	0	Ponds open
Burns Canyon to Table Rock Canyon	47	19	66	River open, no ice
Table Rock Canyon to Juniper Point	9	4	13	River open, no ice
Juniper Point to Heise Bridge	0	0	0	One fisherman
Heise Bridge to Twin Bridges	15	6	21	River open
Twin Bridges to Highway 20 Bridge at Lorenzo	14	8	22	River open
Lorenzo Pond and Bear World Pond	0	0	0	1 mute swan on Bear World Pond
Highway 20 Bridge, Lorenzo to Henrys Fork confluence	70	7	77	River open
Subtotal	710	213	923	
<i>Main Stem Snake River, Menan Butte Bridge to American Falls Reservoir</i>				P: G. Lust, O: C. Whitman 2/12
<i>Roberts Sloughs</i>				
Emigrant Slough, head to mouth	0	0	0	Slough open
Spring Creek Slough, head to mouth	27	0	27	Slough 80% frozen; 1.5 acre open
Dry Bed of Snake River, mouth to Lewisville	59	23	82	Slough 60% frozen
Roberts Slough east of Roberts	0	0	0	Slough 100% frozen
Slough northeast of Roberts Bridge	0	0	0	Slough 90% frozen; 1/2 acre open
Subtotal	86	23	109	
<i>Snake River</i>				
Menan Buttes Bridge to Roberts Bridge	79	17	96	Upper 30% frozen; lower 100% frozen
Roberts Bridge to Idaho Falls Highway 20 Bridge	2	0	2	River 99% frozen
Idaho Falls Highway 20 Bridge to Blackfoot Bridge	4	0	4	River 70% frozen
Blackfoot Marsh Equalizing Ponds	0	0	0	Ponds dry or snow-covered
Lower Blackfoot River	0	0	0	Lower river open
Blackfoot Bridge to Ferry Butte Bridge	0	0	0	River 70% frozen
Ferry Butte Bridge to mouth on American Falls Reservoir	0	0	0	River open
Subtotal	85	17	102	
<i>Fort Hall Bottoms, Springfield Bottoms and American Falls Reservoir</i>				
Springfield Lake Bird Preserve	0	0	0	Lake 50% frozen; 1 fisherman
Crystal Springs Creek and ponds	35	2	37	All swans on dewatered lake bottom reach
Danielson Creek	55	13	68	All swans on dewatered lake bottom reach
Caldwell Lane Ponds	0	0	0	Ponds open
Spring Creek, head spring to mouth	0	0	0	Creek open
Clear Creek, head springs to mouth	0	0	0	Creek open
Jimmy Creek	0	0	0	Creek open

Appendix B. (cont.)

Diggie Creek	0	0	0	Creek open
Flying Y Sloughs	0	0	0	Northern 75% frozen; 1/5 acre open
Kenny Creek	0	0	0	Creek open
Ross Fork	3	0	3	Creek open
Portneuf River Mouth Area	210	22	232	400+ acres open at mouth; reservoir frozen
Subtotal	303	37	340	
<i>Grays Lake NWR, Blackfoot Reservoir, and Soda Springs Area Ponds and Tributaries</i>				
<i>Grays Lake NWR</i>				
Big Bend Marsh	0	0	0	100% frozen
Big Springs	0	0	0	100% frozen
Shorty's Homestead	0	0	0	Small open stream 50m long on hillside
Southeast Corner ponds	0	0	0	100% frozen
Subtotal	0	0	0	
<i>Blackfoot Reservoir</i>				
Chub Springs	2	0	2	Spring pond open, 2 acres
Little Blackfoot River inlet, Utah Beach	6	0	6	30 acres open water; reservoir low
Warm Springs	0	0	0	No open water
Bay south of Warm Springs	2	1	3	Mile long narrow open lead; 3 acres open
Little Blackfoot River	0	0	0	Lower river open
Chicken Point	0	0	0	No open water
Poison Creek, Wilson Flats area				
Subtotal	10	1	11	
<i>Soda Springs Area Ponds and Tributaries</i>				
Woodall Springs	2	0	2	Pond 30% frozen; 2 acres open
Five Mile Meadows	0	0	0	Pond 80% frozen; 1/2 acre open
Miller Ponds	5	0	5	Pond 15% frozen; 6 acres open
Government Dam	0	0	0	Dam 100% frozen
Monsanto Cooling Pond, near Hooper Spring	0	0	0	Pond open
Soda Springs Creek, Government Dam to mouth	0	0	0	Creek and canal open
Soda Springs Canal	0	0	0	Creek and canal open
Barker Pond, west of Soda Springs	0	0	0	Pond 95% frozen; 1 mute swan
Chesterfield Reservoir				
Subtotal	7	0	7	
<i>Bear River Drainage and Laketown, Utah to Utah State Line south of Preston, Idaho</i>				
<i>Bear Lake and Laketown, Utah</i>				
Big Springs, Laketown, Utah	2	0	2	Spring ponds open
Big Creek, Laketown, Utah	6	0	6	Lower half frozen; upper half open
West side of Bear Lake, Swan Creek WMA	0	0	0	Lake frozen; 2 acres open at Swan Creek
East side of Bear Lake				
North shore of Bear Lake	0	0	0	Inlet Mud L. 6ac. open; outlet Bear L. 100% frozen
Subtotal	8	0	8	

Appendix B. (cont.)

<i>Bear Lake National Wildlife Refuge</i>				
Bear Lake canal	0	0	0	Canal 100% frozen
Bloomington Unit	0	0	0	Unit 100% frozen
Mud Lake Unit	0	0	0	Unit 100% frozen
Rainbow Unit	0	0	0	Unit 100% frozen
Salt Meadow Unit	0	0	0	Unit 100% frozen
Dingle Unit	0	0	0	Unit 100% frozen
Alder Unit	0	0	0	Unit 100% frozen
St. Charles Creek southwest of refuge	0	0	0	Open for 1 mile above refuge
Subtotal	0	0	0	
<i>Bear Lake Valley, Bear Lake NWR to Grace, Idaho</i>				
Bear Lake NWR to Georgetown Bridge	0	0	0	River 100% frozen
Georgetown Bridge to head of Alexander Reservoir	0	0	0	3 mile open lead at Georgetown
Alexander Reservoir Soda Creek Mouth	19	0	19	Reservoir frozen, 1.5 acres open at Soda Creek
Alexander Reservoir Siding Ponds	0	0	0	Ponds 100% frozen
Alexander Dam to head of Last Chance Dam	4	0	4	River open
Upper Last Chance Dam	0	0	0	Dam 2/3 frozen; 10 acres open at inlet
Lower Last Chance Dam	0	0	0	Frozen to inlet; 1/4 acre open at dam
Subtotal	23	0	23	
<i>Black Canyon, Grace Idaho to Grace Cove Power Plant</i>				
Last Chance Dam to Grace Cove Power Plant	0	0	0	Mostly frozen, no habitat
Grace Cove Power Plant Pond	0	0	0	Pool 80% frozen; 1/4 acre open water
Subtotal	0	0	0	
<i>Gentle Valley, Grace Cove Power Plant to Thatcher Bridge</i>				
Grace Cove Pond to Cheese Factory Bridge	0	0	0	River 10% frozen
Cheese Factory Bridge to Clemons Bridge	2	3	5	River 20% frozen
Clemons Bridge to Thatcher Bridge	0	0	0	River 70% frozen
Subtotal	2	3	5	
<i>Mound Valley, Thatcher Bridge to Head of Oneida Narrows Dam</i>				
Thatcher Bridge to Highway 34 Bridge	0	0	0	River 80% frozen; 1 tundra swan adult
Highway 34 Bridge to head of Oneida Narrows Dam	0	0	0	River 50% frozen
Subtotal	0	0	0	
<i>Oneida Narrows Canyon, Head Oneida Narrows Dam to south end of Canyon</i>				
Head Oneida Narrows to Maple Grove Spring	6	15	21	Reservoir 50% frozen; 2 tundra swan adults
Maple Grove Spring to Oneida Dam breast	0	0	0	Reservoir frozen, Maple Grove Spring to breast
Breast Oneida Narrows Dam to canyon mouth	0	4	4	River open
Treasureton Reservoir				
Strong Arm Reservoir				
Condie Reservoir				
Winder Reservoir				
Twin Lakes Reservoir				
Subtotal	6	19	25	

Appendix B. (cont.)

<i>Lower Bear River</i>				
Canyon mouth to Highway 34 Bridge at Riverdale	0	5	5	River open
Highway 34 Bridge, Riverdale to Highway 91 Bridge	0	0	0	River open, pan ice flowing in channel
Gravel pit ponds west of Riverdale				
Highway 91 Bridge to Highway 36 Bridge, Preston	0	0	0	River open, pan ice flowing in channel
Highway 36 Bridge, Preston to Utah State Line	0	0	0	River open, pan ice flowing in channel
Subtotal	0	5	5	
Nevada				
Ruby Lake NWR	38	7	45	J. Mackay 2/10
Oregon				
Malheur NWR	8	0	8	R. Roy 2/11
Summer Lake Wildlife Management Area				

^aBlank denotes area not surveyed.

Appendix C. Personnel who conducted the 2004 Mid-winter Trumpeter Swan Survey.

Montana (Red Rock Lakes NWR, Centennial Valley, Madison Valley)

Observers: S. Comeau, J. Warren (Red Rock Lakes NWR)

Pilot: B. Twist (Western Montana Aviation)

Montana (Paradise Valley)

Observer: T. McEneaney (Yellowstone National Park)

Pilot: R. Stradley (Yellowstone National Park)

Idaho

Observer: C. Whitman (Southeast Idaho Refuge Complex)

Pilot: G. Lust (Mountain Air Research)

Wyoming

Observer: S. Patla (Wyoming Game and Fish Department)

Pilot: G. Lust (Mountain Air Research)

Wyoming (Yellowstone National Park)

Observer: T. McEneaney (Yellowstone National Park)

Pilot: R. Stradley (Yellowstone National Park)

Ruby Lake NWR and vicinity

J. Mackay (Ruby Lake NWR)

Malheur NWR

R. Roy (Malheur NWR)
