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TRUMPETER SWAN SURVEY of the ROCKY MOUNTAIN POPULATION, U.S. BREEDING SEGMENT FALL 2011

Dave Olson

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U.S. Fish and Wildlife Service

Trumpeter Swan Survey of the Rocky Mountain Population, U.S. Breeding Segment

Fall 2011



ACKNOWLEDGMENTS

We would like to especially thank the personnel who conducted the surveys, a list of whom is provided in Appendix B. The survey was a collaborative effort among Red Rock Lakes NWR, Migratory Birds and State Programs -- Mountain-Prairie Region of the U.S. Fish and Wildlife Service, Southeast Idaho National Wildlife Refuge Complex, National Elk Refuge, Harriman State Park, Idaho Department of Fish and Game, Grand Teton National Park, Yellowstone National Park, Montana Fish Wildlife and Parks, Wyoming Game and Fish Department, Ruby Lake NWR, Oregon Department of Fish and Wildlife, Malheur NWR, and the Shoshone-Bannock Tribes.

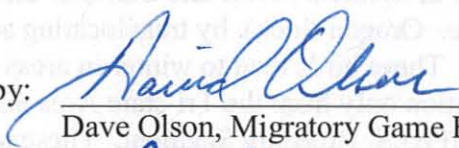
TRUMPETER SWAN SURVEY of the ROCKY MOUNTAIN POPULATION, U.S. BREEDING SEGMENT

FALL 2011

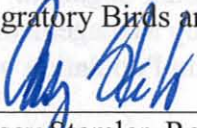
U.S. Fish and Wildlife Service
Migratory Birds and State Programs
Mountain-Prairie Region
Lakewood, Colorado

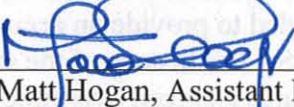
November 30, 2011


Prepared by:


Dave Olson, Migratory Game Bird Specialist
Migratory Birds and State Programs

Approved:


Casey Stemler, Regional Chief, Division of Migratory Bird Management
Migratory Birds and State Programs


Matt Hogan, Assistant Regional Director
Migratory Birds and State Programs


Richard A. Coleman, Assistant Regional Director
National Wildlife Refuge System

Abstract – Observers counted 480 swans (white birds and cygnets) in the U.S. Breeding Segment of the Rocky Mountain Population of trumpeter swans during fall of 2011, 4.3% decrease from last year's count (484). The number of white birds in the Tri-state region (354) decreased from last year's count of 375. The total number of cygnets decreased 16.8%, from 107 in 2010 to 89 in 2011. Cygnet counts decreased from 2010 by 58.6% and 22.9% for Idaho and Wyoming respectively, while Montana cygnet production increased by 33%. Malheur National Wildlife Refuge (NWR) accounted for 5 swans this year which was up from last year. Seventeen swans were observed at the Summer Lake Wildlife Management Area, and increase from 11 last year. Nevada counted 15 swans on this year's survey. Precipitation throughout most of the Tri-state Area was average during winter 2010 - 2011. During the summer months, temperatures were slightly below average and precipitation was above average, especially during June - August. Palmer Drought Indices for areas within the Tri-state region improved again for the second year in a row.

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 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 RMP/Canadian and Tri-state Area flocks winter sympatrically primarily in the Tri-state area. In addition, efforts have been made to establish several restoration flocks, such as those at Ruby Lake 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. This report contains information only from the Tri-state Area and restoration flocks, collectively referred to as the RMP/U.S. Breeding Segment. These terms for the various groups of swans are consistent with the Pacific Flyway Management Plan for the RMP of Trumpeter Swans (Subcommittee on the Rocky Mountain Population of Trumpeter Swans 2008).

The Fall Trumpeter Swan Survey is conducted annually in September. The survey is conducted cooperatively by several administrative entities and is intended to provide an accurate count of the number of RMP trumpeter swans that summer in the U.S. The history of the survey dates back to the 1930s, although methods and survey coverage have changed over time as the number of swans increased and new technologies became available. To be consistent with previous reports, only data from 1967 to present were analyzed for this report. The data are used by managers to assess the annual status of the Tri-state Area Flocks and restoration flocks.



Fig. 1. Approximate ranges of trumpeter swans during summer (from Moser 2006).

Greater Yellowstone Ecosystem

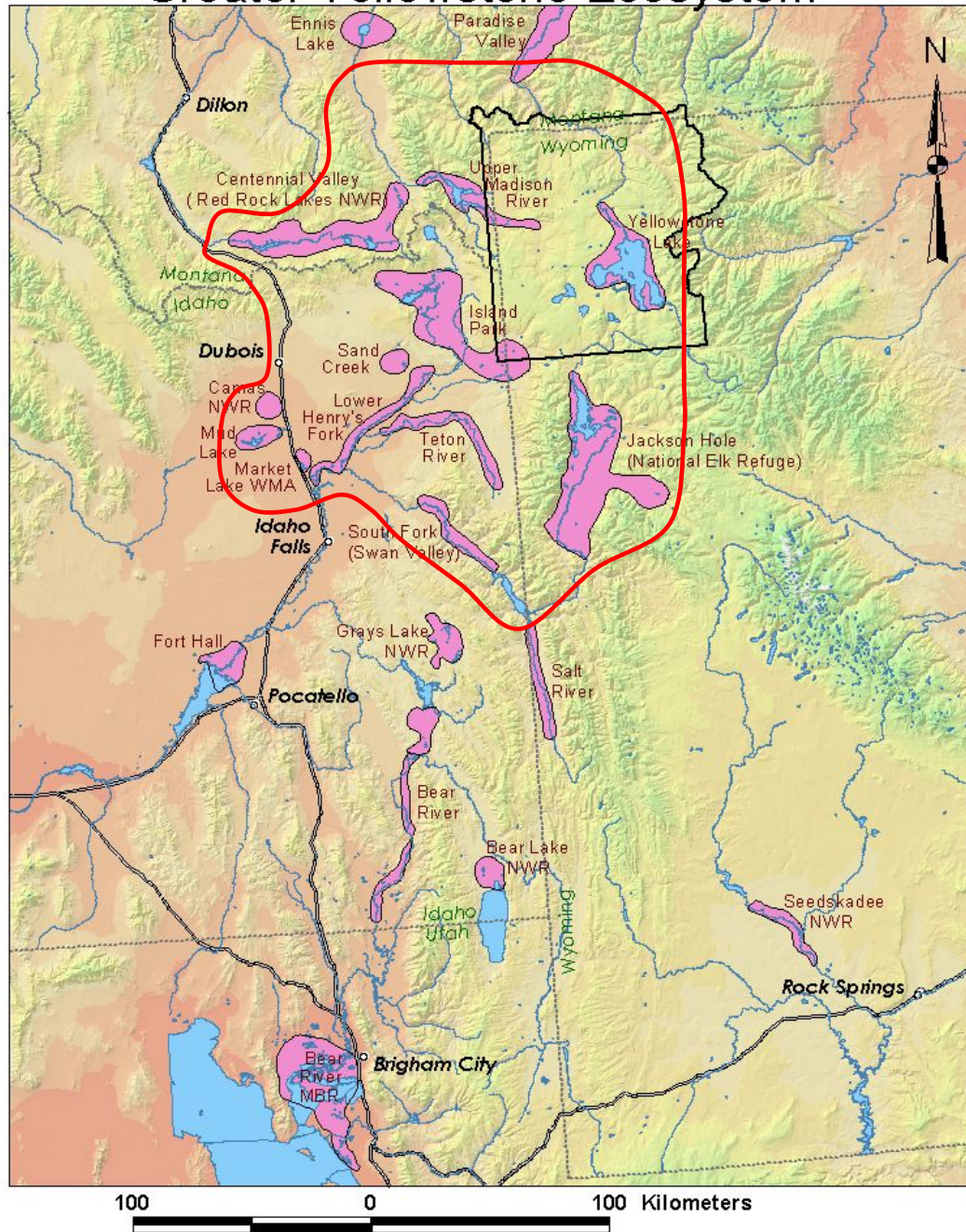


Fig. 2. Map showing the 'core' tri-state area (inside of red line) of southeast Idaho, southwest Montana, and northwest Wyoming (Dr. Rick Sodja and Lisa Landenburger, USGS, NRMSC, Bozeman, Montana).

METHODS

The survey is conducted within a relatively short time frame to reduce the possibility of counting swans more than once due to movements of birds among areas. Aerial cruise surveys and ground surveys are used to count numbers of swans in the Tri-state Area, in Nevada, Malheur NWR, and at the Summer Lake WMA and vicinity; ground surveys also are used to count the number of swans 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 summer 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.

During fall 2011, all areas within the Tri-state region were surveyed during 13-30 September. Approximately 23 h of flight time and additional ground survey time were required to complete the survey. Weather conditions during surveys consisted of sunny skies, light winds, periods of slight haze and temperatures ranging from the low 50s to about 80°F.

We used least-squares regression on log-transformed counts to assess changes in growth rates for each of the swan flocks comprising the RMP/U.S. Breeding Segment. The regression analysis was only done on data within the traditional surveyed areas. Counts from the current fall survey (2011) were compared to results from the earlier time frames, a practice used in U.S. Fish and Wildlife Service survey reports for other waterfowl (e.g., U.S. Fish and Wildlife Service 2011, Zimpfer et al. 2011).

RESULTS AND DISCUSSION

Overall during winter 2010-11, areas within the summer range of the Tri-state Area Flocks received average precipitation. The northern half of the area received 75% of normal precipitation while the southern half received 150% of normal precipitation. For the winter period, the temperature for much of the survey region was about 1 °F above average (Joint Agricultural Weather Facility 2011a). For the fourth year in a row, cold conditions continued in April and May, with temperatures averaging 4 - 6 °F below normal (Joint Agricultural Weather Facility 2010b). Cold and wet conditions occurred throughout the region during late spring and summer with the area receiving 100 - 125% of normal precipitation. Above average (100% - 125%) precipitation amounts continued through mid summer and temperatures were about average (Joint Agricultural Weather Facility 2011c). During mid-June, drought conditions were minimal to non-existent across the survey area (Fig. 3). In Montana, wetland conditions continued to improve with more basins containing water. The Palmer Drought Index for southwestern Montana (near the north-central portion of the core tri-state area) during summer continued to improve for the fourth year in a row (Fig. 4).

U.S. Drought Monitor

June 21, 2011

Valid 8 a.m. EDT

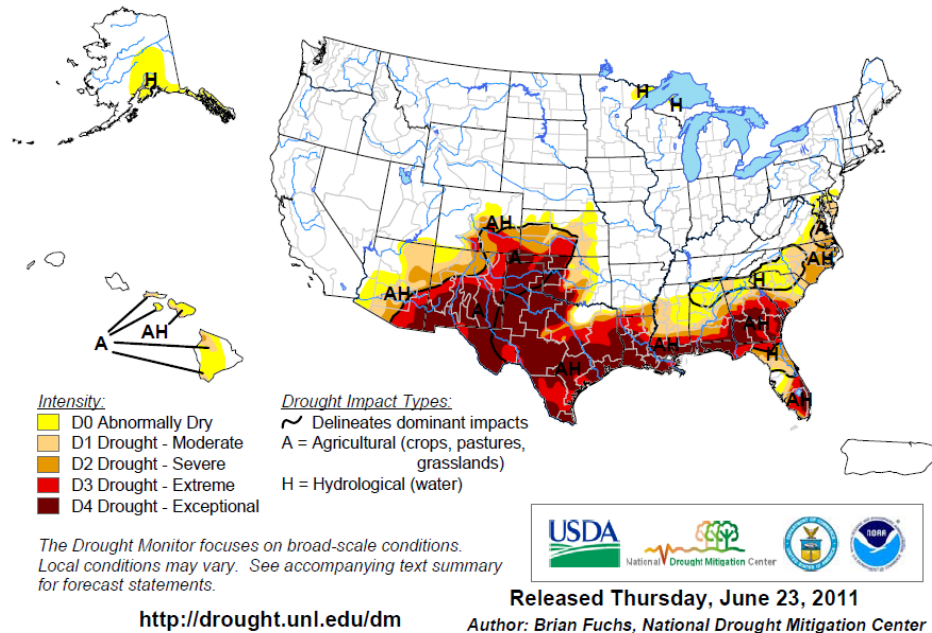


Fig. 3. Palmer Drought Index map for June 21, 2011 (Joint Agricultural Weather Facility 2011d).

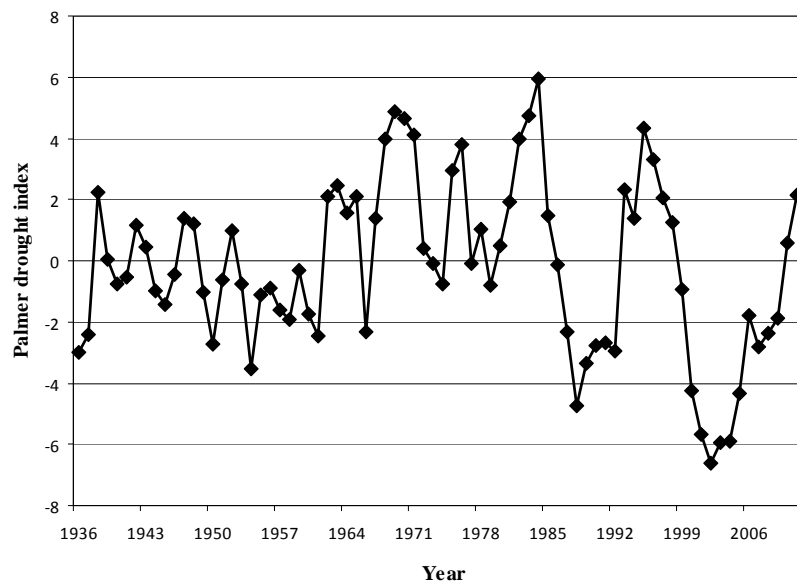


Fig. 4. Monthly Palmer Drought Indices for climate division 2 in southwest Montana (data from the National Climatic Data Center [<http://www1.ncdc.noaa.gov/pub/data/cirs/drd964x.pdsi.txt>]).

Historical Trends

Historical (i.e., 1967 to the early 1990s) trends in abundance for the U.S. Breeding Segment of RMP trumpeter swans were described in a previous report (U.S. Fish and Wildlife Service 2003), and the details of those analyses will not be reiterated here. Briefly, regression analyses suggested that the growth rate for total swans of the entire U.S. Breeding Segment did not change ($P = 0.27$) during 1967-88 (Table 1, Fig. 5). The rate for white birds appeared to decline slightly (-0.8% per year, $P [\beta < 0] = 0.16$), while that for cygnets showed no trend ($P = 0.50$). Patterns for regression statistics for the Tri-state Area Flocks were similar to those for the RMP/U.S. Breeding Segment (Fig. 6), because the vast majority of birds comprising the RMP/U.S. Breeding Segment summer in the Tri-state Area (Table 1). However, the counts of white swans appeared to decline at a somewhat greater rate (-1.0% per year, $P = 0.09$) during 1967-88, compared to those for white birds in the entire RMP/U.S Breeding Segment.

Birds summering in Montana (Table 2) had patterns of change relatively similar to that of the Tri-state Area Flocks as a whole, because historically the swans in Montana comprised the majority of birds in the Tri-state Area Flocks. Total swans in Montana appeared to decline slightly (-1.2% per year) during 1967-88 (Fig. 7), although the value for the slope parameter was only marginally significant ($P = 0.16$). The decline existed only for white birds; counts for cygnets suggested no trend ($P = 0.95$). In Idaho, no trends in total or white swan counts were evident, but the counts for cygnets increased ($P = 0.03$) (Fig. 8). No trends in swan counts were evident in Wyoming (Fig. 9).

For restoration flocks, we analyzed data only for Malheur NWR (Oregon flock) and Ruby Lake NWR. Swans were translocated to Summer Lake WMA (Oregon flock) beginning in winter 1991; therefore, data for that area prior to that time are not available. Plots of the swan counts for total birds and white birds at Malheur NWR suggested that a piecewise regression with a breakpoint at 1983 would fit the data better than a simple linear regression. For the period 1967-1983, no trend was evident in counts of total swans or white birds ($P \geq 0.17$) (Fig. 10). During 1984-1991, rates for total birds and white birds were negative but not statistically significant ($P \geq 0.15$). No trend in the rate for cygnets was evident for either time period ($P \geq 0.45$). Counts for the Nevada flock ranged between 6 and 42 birds (Table 2), with no apparent long-term trends (Fig. 11).

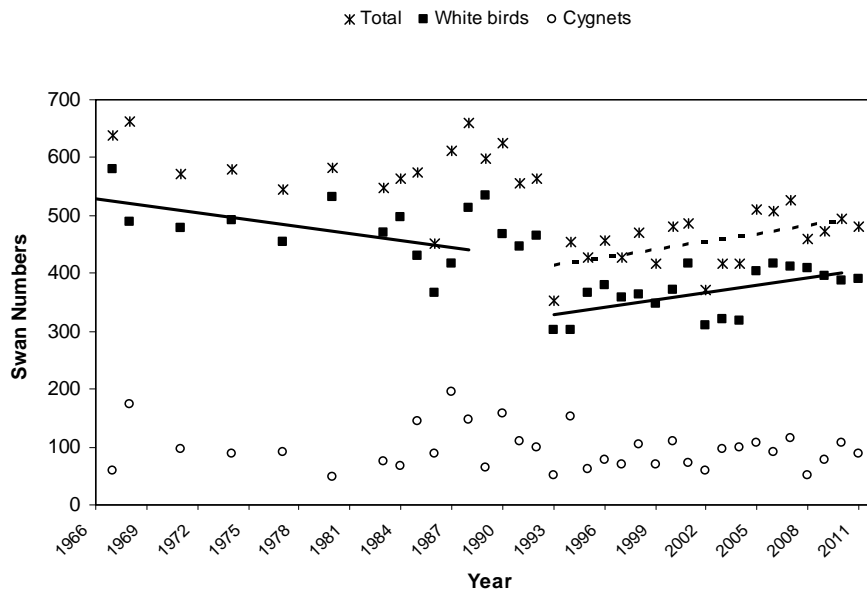


Fig. 5. Counts of swans in the RMP/U.S. Breeding Segment during the Fall Trumpeter Swan Survey, 1967-2011 (dotted and solid lines depict trends for total swans and white birds, respectively).

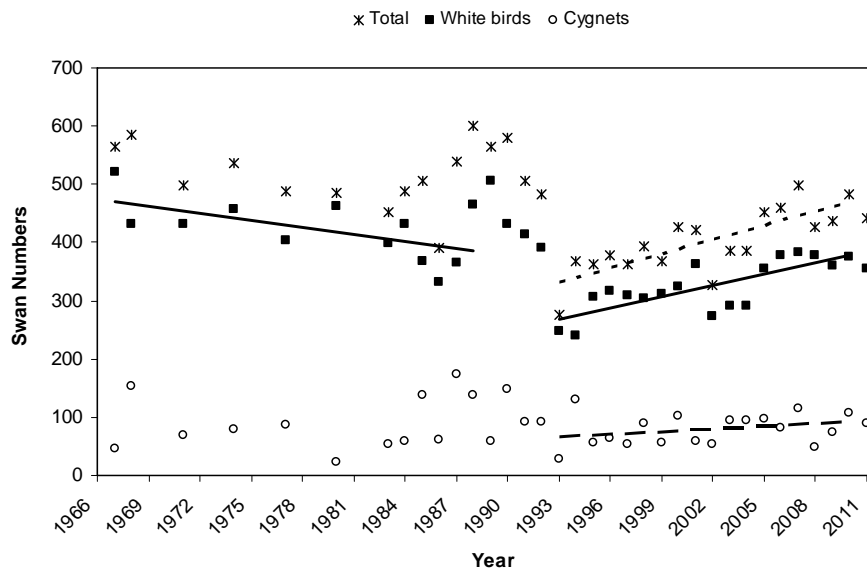


Fig. 6. Counts of swans in the Tri-state Area Flocks during the Fall Trumpeter Swan Survey, 1967-2011 (dotted, solid and dashed lines depict trends for total swans, white birds, and cygnets, respectively).

Table 1. Counts of trumpeter swans of the Rocky Mountain Population U.S. Breeding Segment during fall, 1967-2011.

Year	<u>Tri-state Area Flocks</u>			<u>Restoration flocks</u>			<u>RMP/U.S. Breeding Segment</u>		
	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds	Cygnets	Total
1967	520	45	565	60	13	73	580	58	638
1968	431	154	585	58	20	78	489	174	663
1969	a			69	23	92			
1970				45	16	61			
1971	431	68	499	46	27	73	477	95	572
1972				42	16	58			
1973				42	7	49			
1974	457	80	537	35	9	44	492	89	581
1975				41	9	50			
1976				31	9	40			
1977	403	86	489	51	4	55	454	90	544
1978				39	15	54			
1979				41	42	83			
1980	462	23	485	71	26	97	533	49	582
1981				77	14	91			
1982				56	20	76			
1983	398	54	452	73	22	95	471	76	547
1984	431	58	489	65	9	74	496	67	563
1985	368	139	507	63	5	68	431	144	575
1986	331	61	392	34	26	60	365	87	452
1987	365	175	540	52	19	71	417	194	611
1988	464	137	601	49	9	58	513	146	659
1989	505	60	565	30	3	33	535	63	598
1990	432	147	579	36	11	47	468	158	626
1991	414	91	505	32	18	50	446	109	555
1992	390	92	482	75	6	81	465	98	563
1993	248	29	277	55	22	77	303	51	354
1994	239	130	369	63	22	85	302	152	454

Table 1. (cont.)

Year	<u>Tri-state Area Flocks</u>			<u>Restoration flocks</u>			<u>RMP/U.S. Breeding Segment</u>		
	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds	Cygnets	Total
1995	307	55	362	58	7	65	365	62	427
1996	316	63	379	64	15	79	380	78	458
1997	310	54	364	48	15	63	358	69	427
1998	304	90	394	60	15	75	364	105	469
1999	312	56	368	35	14	49	347	70	417
2000	324	102	426	48	7	55	372	109	481
2001	362	59	421	54	12	66	416	71	487
2002	273	53	326	38 ^b	7 ^b	45 ^b	311 ^b	60 ^b	371 ^b
2003	291	95	386	30 ^b	1 ^b	31 ^b	321 ^b	96 ^b	417 ^b
2004	291	94	385	27 ^b	5 ^b	32 ^b	318 ^b	99 ^b	417 ^b
2005	355	98	453	49	8	57	404	106	510
2006	377	82	459	39 ^c	9 ^c	48 ^c	416 ^c	91 ^c	507 ^c
2007	383	115	498	28	1	29	411	116	527
2008	379	48	427	29	3	32	408	51	459
2009	361	75	436	35	2	37	396	77	473
2010	375	107	482	2 ^{c, d}	0	2 ^{c, d}	377	107	484
2011	354	89	443	37	0	37	391	89	480

^a Blank denotes value not calculated because of incomplete survey.

^b Data for only Malheur NWR and the Nevada flock included; Summer Lake WMA survey not completed.

^c Count biased low; only a portion of Summer Lake WMA surveyed.

^d Ruby Lake NWR did not provide data.

Table 2. Counts of trumpeter swans of the Rocky Mountain Population U.S. Breeding Segment during fall, 1967-2011.

Year	<u>Montana</u>			<u>Idaho</u>			<u>Wyoming</u>			<u>Malheur NWR</u>			<u>Summer Lake WMA</u>			<u>Nevada</u>		
	White			White			White			White			White			White		
	birds	Cygnets	Total	birds	Cygnets	Total	birds	Cygnets	Total	birds	Cygnets	Total	birds	Cygnets	Total	birds	Cygnets	Total
1967	334	25	359	87	8	95	99	12	111	33	12	45	a			27	1	28
1968	242	123	365	88	6	94	101	25	126	34	11	45				24	9	33
1969	b									36	14	50				33	9	42
1970										37	13	50				8	3	11
1971	297	49	346	60	6	66	74	13	87	38	22	60				8	5	13
1972										32	13	45				10	3	13
1973										36	4	40				6	3	9
1974	296	49	345	71	17	88	90	14	104	29	9	38				6	0	6
1975										33	7	40				8	2	10
1976										23	8	31				8	1	9
1977	267	64	331	60	7	67	76	15	91	33	0	33				18	4	22
1978										24	13	37				15	2	17
1979	324	63	387							31	33	64				10	9	19
1980	315	6	321	73	11	84	74	6	80	53	15	68				18	11	29
1981										53	9	62				24	5	29
1982										38	17	55				18	3	21
1983	228	32	260	92	6	98	78	16	94	55	17	72				18	5	23
1984	268	22	290	80	21	101	83	15	98	40	6	46				25	3	28
1985	212	87	299	83	27	110	73	25	98	38	2	40				25	3	28
1986	174	28	202	83	14	97	74	19	93	19	24	43				15	2	17
1987	210	133	343	63	15	78	92	27	119	38	14	52				14	5	19
1988	268	77	345	87	28	115	109	32	141	33	8	41				16	1	17
1989	294	23	317	101	16	117	110	21	131	20	3	23				10	0	10
1990	245	108	353	92	28	120	95	11	106	27	7	34				9	4	13
1991	176	60	236	138	26	164	100	5	105	22	14	36	2	0	2	8	4	12
1992	156	74	230	109	8	117	125	10	135	28	6	34	34	0	34	13	0	13
1993	60	16	76	94	6	100	94	7	101	22	12	34	25	5	30	8	5	13

Table 2. (cont)

	<u>Montana</u>			<u>Idaho</u>			<u>Wyoming</u>			<u>Malheur NWR</u>			<u>Summer Lake WMA</u>			<u>Nevada</u>		
<u>Year</u>	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds	Cygnets	Total
1994	70	48	118	79	49	128	90	33	123	15	7	22	33	6	39	15	9	24
1995	84	17	101	118	21	139	105	17	122	11	3	14	34	3	37	13	1	14
1996	95	36	131	127	20	147	94	7	101	17	5	22	32	5	37	15	5	20
1997	88	18	106	112	19	131	110	17	127	16	7	23	15	2	17	17	6	23
1998	105	35	140	110	37	147	89	18	107	22	5	27	17	3	20	21	7	28
1999	120	21	141	103	23	126	89	12	101	11	3	14	8	6	14	16	5	21
2000	127	24	151	102	40	142	95	38	133	10	5	15	12	0	12	26	2	28
2001	140	9	149	124	23	147	98	27	125	11	12	23	12	0	12	31	0	31
2002	76	18	94	103	14	117	94	21	115	14	7	21	2 ^c	0 ^c	2 ^c	24	0	24
2003	89	29	118	100	27	127	102	39	141	11	1	12	2 ^c	0 ^c	2 ^c	19	0	19
2004	89	32	121	112	23	135	90	39	129	10	5	15	b			17	0	17
2005	112	40	152	136	22	158	107	36	143	20	5	25	12	3	15	17	0	17
2006	117	17	134	132	39	171	128	26	154	17	5	22	6	0	6	16	4	20
2007	157	41	198	113	15	128	113	59	172	11	0	11	0	0	0	17	1	18
2008	140	7	147	112	5	117	127	36	163	9	3	12	0	0	0	20	0	20
2009	138	21	159	122	21	143	101	33	134	4 ^c	2 ^c	6 ^c	9	0	9	22	0	22
2010	129	30	159	101	29	130	145	48	193	2 ^c	0 ^c	2 ^c	11 ^a	0	11 ^a			
2011	123	40	163	98	12	110	133	37	170	5	0	5	17	0	17	15	0	15

^aSwans translocated to Summer Lake WMA beginning in winter 1991; count from 1991 and 2010 not used in analyses.

^bBlank denotes survey was not conducted.

^cIncomplete count; data not used in analyses.

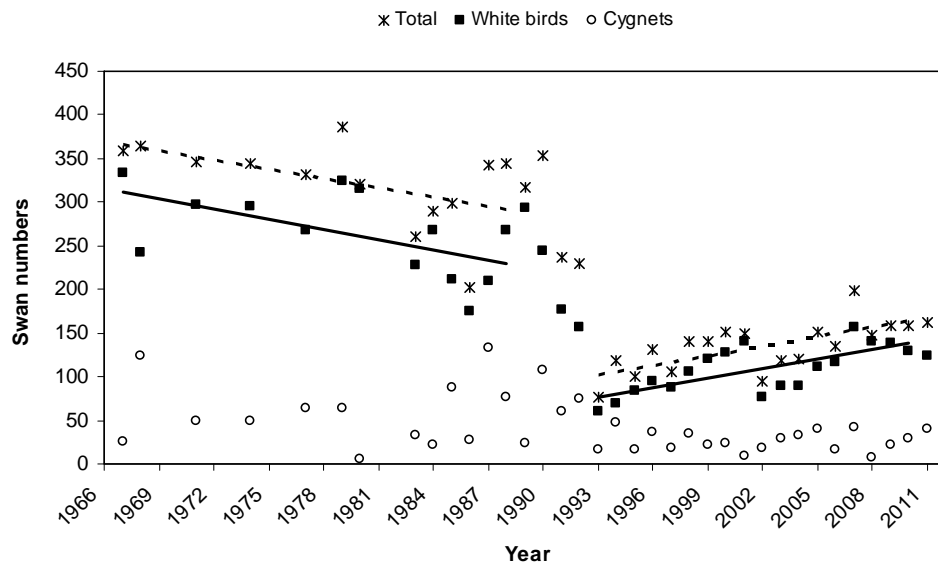


Fig. 7. Numbers of swans counted in Montana during the Fall Trumpeter Swan Survey, 1967-2011 (dotted and solid lines depict trends for total swans and white birds, respectively).

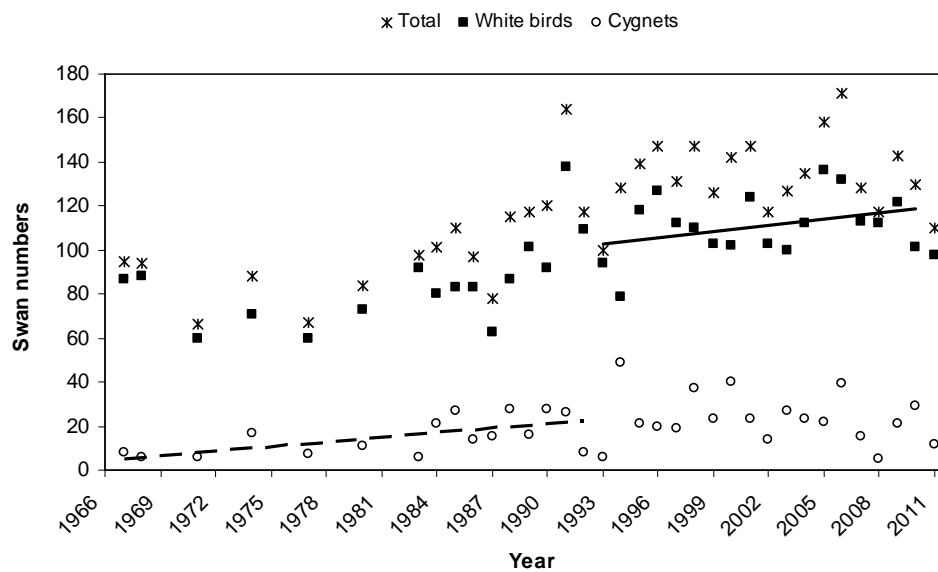


Fig. 8. Numbers of swans counted in Idaho during the Fall Trumpeter Swan Survey, 1967-2011 (solid and dashed lines depict trend for white birds and cygnets, respectively).

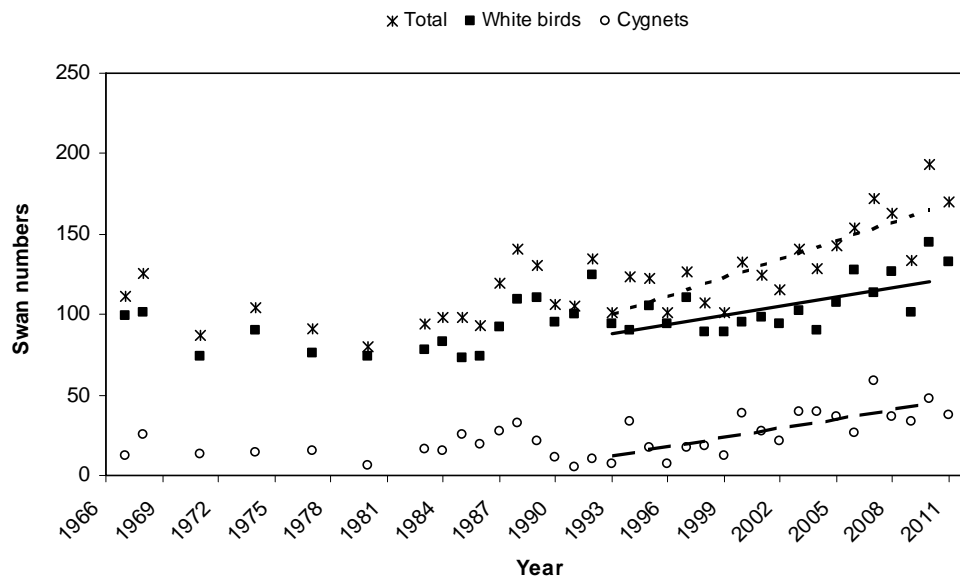


Fig. 9. Numbers of swans counted in Wyoming during the Fall Trumpeter Swan Survey, 1967-2011 (dotted, solid, and dashed lines depict trends for total swans, white birds, and cygnets, respectively).

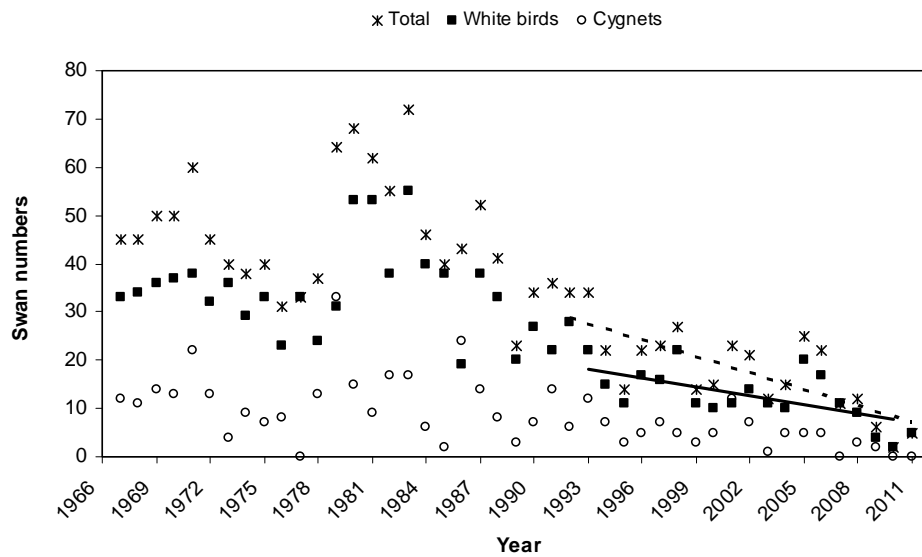


Fig. 10. Numbers of swans counted at Malheur NWR during the Fall Trumpeter Swan Survey, 1967-2011 (dotted and solid lines depict trends for total swans and white birds, respectively).

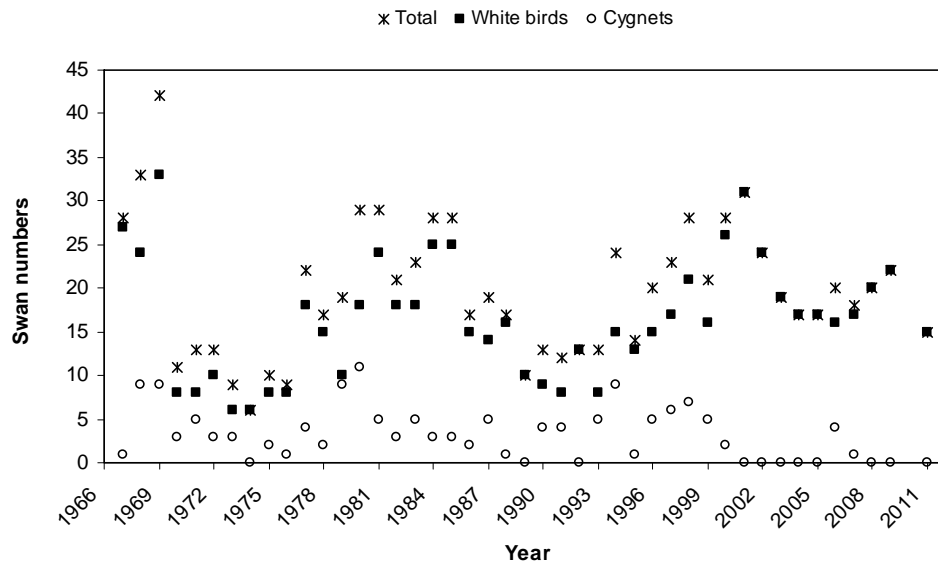


Fig. 11. Numbers of swans counted in the Nevada flock during the Fall Trumpeter Swan Survey, 1967-2011 (No report for 2010).

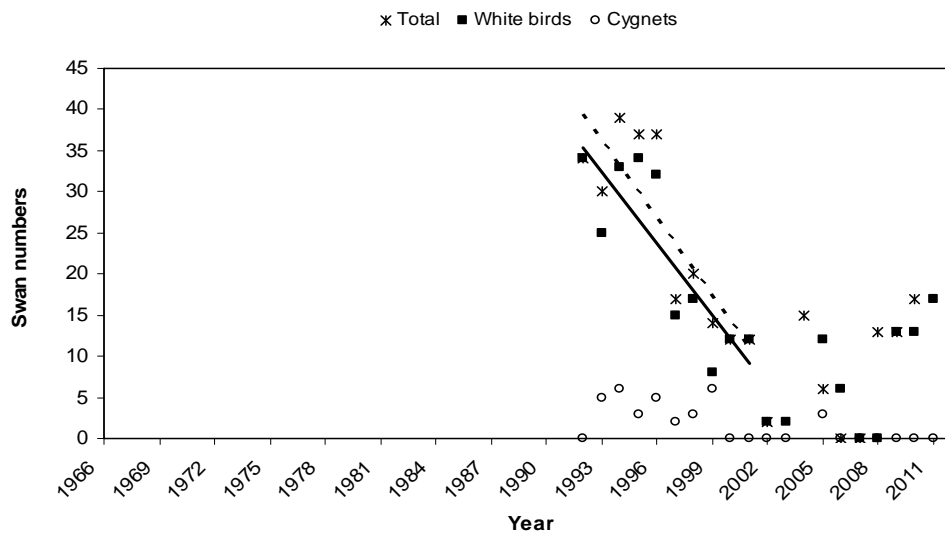


Fig. 12. Numbers of swans counted at Summer Lake WMA during the Fall Trumpeter Swan Survey, 1992-2011 (dotted and solid lines depict trends for total swans and white birds, respectively).

Complete surveys of the Summer Lake WMA have not been conducted consistently since 2001. Therefore, analyses using post-1991 data for the RMP exclude counts for that area so that areas surveyed were comparable across years. As a consequence, some results may differ from previous reports.

During 1988-92, several significant management actions affecting the RMP/U.S. Breeding Segment occurred concurrently (e.g., termination of winter feeding, experimental translocations of swans [U.S. Fish and Wildlife Service 2003]), and may collectively have influenced the demographics of these birds. The number of swans in the RMP/U.S. Breeding Segment (excluding counts for Summer Lake WMA) declined markedly (-51%) between the falls of 1988 and 1993, and the 1993 count was 44% below the 1967-88 average (Fig. 5). No marked changes in abundance were apparent for restoration flocks (Figs. 10, 11).

Recent Trends

During 1993-2010, the growth rates for total swans and white birds in the RMP/U.S. Breeding Segment increased 1.6% and 1.7% annually, respectively ($P \leq 0.01$) (Fig. 5). However, no trend ($P = 0.39$) was evident for cygnets. Similar results were evident for swans in the Tri-state Area Flocks during the same period, but the rates for total swans (+2.0, $P < 0.01$) and white birds (+2.0, $P < 0.01$) were slightly greater (Fig. 6). For the Tri-state Area Flocks, the trend for cygnets also was increasing but not statistically significant (+2.6%, $P = 0.14$).

The rate of growth for total swans in Montana increased 2.8% per year during the 1993-2010 period ($P \leq 0.01$ Fig. 7), and the rate for white birds increased 3.6% per year ($P \leq 0.001$); the data for cygnets suggested a slight decrease of - 1.0% but was not statistically significant ($P = 0.74$). In Idaho, no trend ($P = 0.37$) was evident for total swans. There was a slight increase of 1.0% for white birds and a slight decrease of - 1.0% for cygnets however neither change was significant ($P = .13$ and $P = 0.80$, respectively) (Fig. 8). For Wyoming during 1993-2010, total swans (+2.8% per year, $P < 0.001$), white birds (+1.7% per year, $P < 0.01$), and cygnets (+8.3 % per year, $P < 0.001$) increased (Fig. 9).

Because complete surveys of the Summer Lake WMA were not conducted during 2002-2004, we analyzed data for the Oregon flock by region (i.e., Malheur NWR, Summer Lake WMA). As mentioned above, the data for total birds and white birds at Malheur NWR suggested a piecewise regression with a breakpoint at 1983 would fit the data better than a simple linear regression. The decline of swans that occurred from 1984-91 (see above) continued during 1992-2010 for both total swans (-9.0% per year, $P < 0.001$) and white birds (-7.9% per year, $P < 0.001$) (Fig. 10). The rate for cygnets was unchanged ($P = 0.11$). At Summer Lake WMA, swans were translocated to the area beginning in winter 1991, so data from fall 1992-2001 were analyzed. Regression analyses indicated large negative rates of growth for total birds (-15.7% per year, $P = 0.03$) and white birds (-19.9% per year, $P = 0.03$) (Fig. 12). No trend in the rate of cygnets produced was evident ($P = 0.62$), but few cygnets ever have been produced at this location (0-6 per year, $\bar{x} = 2.4$). However, most birds were translocated to Summer Lake WMA during winter, primarily to alleviate potential negative impacts of high swan concentrations on habitats in the

Harriman State Park area of eastern Idaho. Most swans remained in the area for only a few months after being translocated (M. St. Louis, personal communication). Thus, the steep decrease in the number of swans at Summer Lake WMA does not reflect the decline of an established nesting flock, but rather suggests only that few of the >600 swans translocated to this area during the early 1990s (Shea and Drewien 1999) survived, or that most moved elsewhere over time.

Core and Expansion Areas within the Tri-state Area

The Pacific Flyway Management Plan for the RMP Trumpeter Swans has as a management objective to expand both the breeding and wintering range outside of the Core Tri-state area by implementing a management strategy to identify potential breeding and wintering expansion areas (Subcommittee on the Rocky Mountain Population of Trumpeter Swans 2008). The Core area was important in the early stages of trumpeter swan management due to the protection afforded to the swans by all the Federal and state lands in that area. Those areas assisted in increasing the number of swans in the U.S. Breeding Segment of the Rocky Mountain Population. However, while the number of swans increased, the amount of habitat available to them did not. Expansion areas were identified and used to assist in redistributing swans across the Greater Yellowstone Ecosystem.

In 2006, the Mountain-Prairie Region Migratory Bird Program of the U.S. Fish and Wildlife Service requested information from biologists that manage swans in the RMP to identify areas that have been surveyed since 1930's as either within or outside the Core Area. The Core Area refers to the entire Island Park region, Teton River Drainage, Teton Basin, Henrys and South Forks of the Snake River, and Camas NWR of Idaho; Red Rock Lakes NWR, Centennial Valley, Hebgen Lake, and Madison River and tributaries of Montana; and Yellowstone National Park, Grand Teton National Park and the Snake River drainage in Wyoming including the Jackson Hole area south to Alpine (Fig. 2.) The Tri-state Expansion Area refers the portions of Montana, Idaho and Wyoming within the Pacific Flyway, with suitable habitat for trumpeter swans, but that are outside of the Core Area. A list of these locations is provided in Table 3.

Results from 2011 Swan Counts from Core versus Expansion Areas

Data (total swans counted) were taken from the Appendix in the Fall Reports from 1999 – 2011. Data were categorized as being from either the Core Area or the Expansion Area. Natural logarithms were calculated from the count data and were plotted over time for each state. Montana's Expansion Area, the Paradise Valley, has increased 3.9% over the last 12 years ($P = 0.11$). Although not statistically significant Montana's Core Area has increase 1.8% ($P = 0.24$) over a similar time frame (Fig. 13) and is the only state with a core area that has a positive trend. Both Idaho ($P = 0.38$) and Wyoming ($P = 0.19$) core areas show no trend, but appear to be declining (-1.0 %) over the past 12 years (Figs. 14 and 15). However, Wyoming's Expansion Area showed an increase of 10.6% ($P < 0.001$) while Idaho's Expansion Area has shown no trend ($P = 0.85$).

Results from the 2011 survey

During fall 2011, observers counted 480 in the RMP/U.S. Breeding Segment, a 1% decrease from the count last year (484) (Table 1, Fig. 5). The total count of swans in the Tri-state Area Flocks (443) was an 8.1 % decrease from the count last year (482) (Table 1). Idaho's total swan count has decreased 33% from their high in 2006. Neither Montana nor Wyoming has shown such a decline. The number of white birds in the tri-state region (354) decreased from last year's count of 375. The number of cygnets (89) decreased by 16.8% from last year's count of 107. The count of white birds decreased in Montana, Wyoming, and in Idaho. Montana increased 2.5% from last years total swan count while Wyoming and Idaho decreased by -11.9% and -15.4% respectively. Temperatures during spring were much cooler than average and precipitation was 100 - 125% above average through most of the summer (Joint Agricultural Weather Facility 2011b), which was not conducive to good cygnet production in many areas within the nesting range of U.S. swans.

The count for birds at Malheur NWR included 5 single adults this year. Seventeen swans were counted at Summer Lake Wildlife Management Area this year. Fifteen were seen at Summer Lake and 2 were at Thompson Valley Reservoir (M. St. Louis personal communication). Ruby Lake NWR conducted an aerial survey this year and counted 15 white birds and no cygnets. Ruby Lake has had no cygnet production in 8 of the last 10 years.

The cygnet counts decreased from 2010 by -5.9% and -22.9% for Idaho and Wyoming, respectively. However, Montana cygnet production increased by 33%. An index to production rate (i.e., cygnets/white birds) for Wyoming (0.278) was slightly higher for the fourth year in a row than its long-term (i.e., 1967-2010) average (0.232). The index for Montana (0.325) was higher than its long term average (0.258), while that for Idaho (0.127) was lower than its long-term average of 0.203.

Conclusions

Changes in point counts of animals can be influenced by several factors (i.e., mortality, animal movements, survey problems). As a result, attributing annual changes in abundance to a specific factor or even a suite of factors is inherently difficult. The Fall Trumpeter Swan Survey provides a good index to abundance, because managers and biologists have strived over the years to maintain consistency in areas surveyed and personnel who conduct the survey. Nonetheless, issues inherent in monitoring migratory birds can potentially affect the accuracy of a count. Also, no systematic surveys to detect swan mortality are conducted, nor are operational programs (e.g., banding, neck collaring) in place to estimate annual survival. Therefore, unless monitoring of these birds is increased, or well-designed research is conducted to examine their demographics, isolating causes for changes in annual counts will remain elusive.

The number of swans in the entire RMP/U.S. Breeding Segment decreased from 2010, as did the count for the Tri-state Area Flocks. Palmer Drought Indices suggest that June 2011 moisture conditions within the range of the RMP/U.S. Breeding Segment were above average and better

than those from 2010. The number of birds this fall remained below objectives stated in the management plan for this group of birds (Subcommittee on the Rocky Mountain Population of Trumpeter Swans 2008).

Table 3. Sites classified as either Core Area or Expansion Area for each state in the Rocky Mountain Population U.S. Breeding Segment, 1999 – 2011.

State	Core Area	Expansion Area
Montana	Red Rock Lakes NWR Centennial Valley Madison Valley	Paradise Valley
Idaho	Island Park Shotgun Valley Harriman State Park Upper Henry's Fork Lower Henry's Fork Camas NWR	Teton Basin Grays Lake NWR Soda Springs Area Bear Lake NWR Ft. Hall Bottoms Lower Snake River Minidoka NWR
Wyoming	Yellowstone National Park Upper Snake River/Targhee NF Bridger-Teton NF/Jackson Grand Teton National Park National Elk Refuge Jackson Area	Upper Green River New Fork River & Big Sandy Seedskaadee NWR Lower Green River Green River Fontennelle Reservoir North Hamm's Fork Salt River

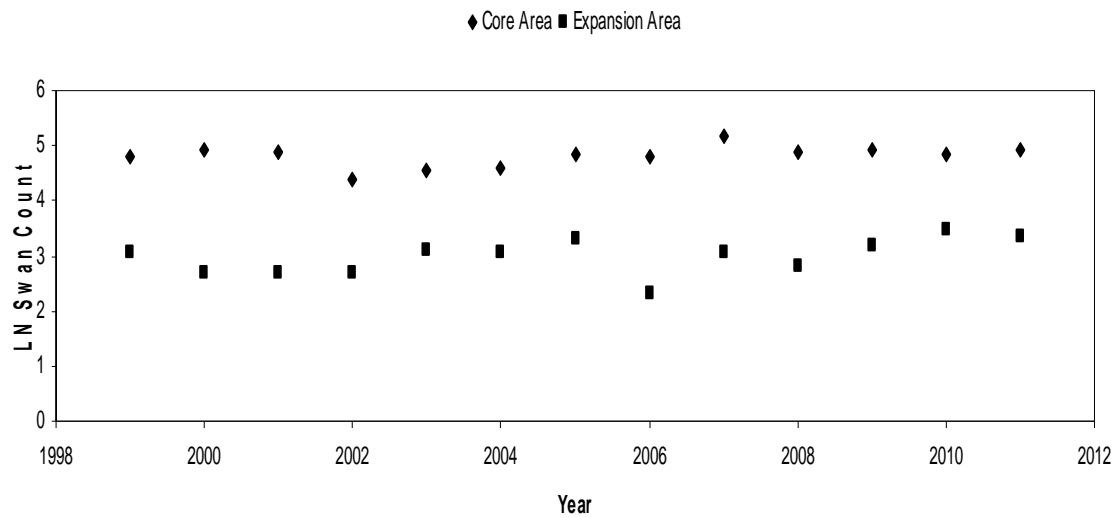


Figure 13. Number of swans counted in Montana for both the Core and Expansion Area, 1999 - 2011.

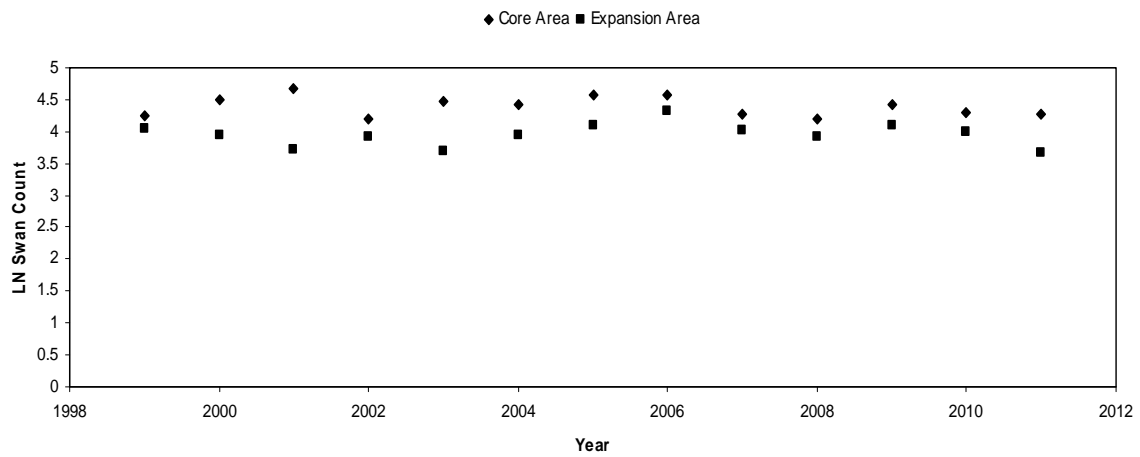


Figure 14. Number of swans counted in Idaho for both the Core and Expansion Area, 1999 - 2011.

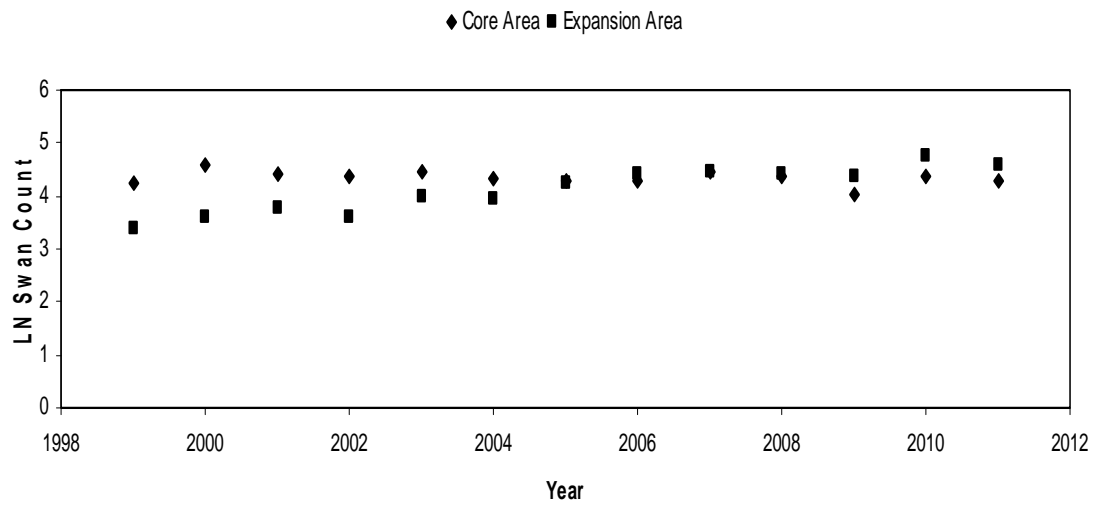


Figure 15. Number of swans counted in Wyoming for both the Core and Expansion Area, 1999 - 2011.

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Appendix A. Site-specific counts of trumpeter swans of the Rocky Mountain Population/U.S. Breeding Segment during the Fall Trumpeter Swan Survey, 2011.

Montana	White birds	Cygnets	Total	Pilot/observer/notes
<i>Red Rock Lakes NWR</i>				K Cutting, B. West, D. Chapman; 9/30/10;
Upper Red Rock Lake	15	4	19	
Upper Lake Outlet to River Marsh	0	0	0	
Swan Lake	6	3	9	
Shambo Pond	0	0	0	
River Marsh	11	2	13	
Lower Red Rock Lake	14	14	28	
West Pintail Ditch	0	0	0	
Widgeon Pond	2	3	5	
Sparrow Slough	0	0	0	
Sparrow Pond	2	0	2	
Shoveler Pond	2	0	2	
Culver Pond	0	0	0	
MacDonald Pond	0	0	0	
ElkSprings Creek	0	0	0	
Tucks Slough	7	3	10	
Red Rock Creek	0	0	0	
Antelope Pond	0	0	0	
Sora Pond	0	0	0	
Subtotal	59	29	88	
<i>Centennial Valley (CV)</i>				
Red Rock River	9	3	12	
Lima Reservoir	26	0	26	
Blake Slough	2	0	2	
Conklin Lake	2	0	2	
Elk Lake	0	0	0	
7L Wetland	2	2	4	
Mud Lake	0	0	0	
Sheepherder Pond	0	0	0	
Huntsman Pond	1	0	1	
Scheid Stock Pond	0	0	0	
Jones Pond	0	0	0	
Winslow Pond	0	0	0	
Winslow Creek	0	0	0	
Bean Creek Pond (tooth pond)	0	0	0	
Pond, T16 R39 S28 "Peet Creek"	0	0	0	
Sand Creek Wetland	0	0	0	
Subtotal	42	5	47	
<i>Madison Valley</i>				
Ennis Lake	0	0	0	
Walsh Ponds	0	0	0	
Madison River	0	0	0	
Hidden Lake	0	0	0	
Otter & Goose Lake	0	0	0	

Cliff Lake	0	0	0	
Wade Lake	0	0	0	
Tributary to Odell Creek	0	0	0	
Quake Lake	0	0	0	
Hebgen Lake (Madison Arm)	0	0	0	P: R. Stradley, O: L Henry (9/20)
Denny Creek (just south of Hebgen)	0	0	0	
Subtotal	0	0	0	
<i>Paradise Valley</i>				P: R. Stradley, O: L Henry (9/20)
Sacagawea Park	2	0	2	
DePuy's-South				
Beaver Creek				
DePuy's-Main Lake	2	3	5	
DePuy's-North	2	1	3	
Armstrong's	2	0	2	
Bailey's				
Brandis'				
Brandis' North Fish Ponds Slough				
Diamond B				
Dana's				
Nelson's				
Paradise Valley Airport				
Yellowstone River (south of Emigrant)	8	0	8	
Emigrant Creek	4	2	6	
Emigrant Pond	2	0	2	
Subtotal	22	6	28	
Montana Total	123	40	163	
Idaho				
<i>Island Park/Upper Henry's Fork</i>				P: C. Anderson; O: M. Fisher, P Johnson (9/13-14)
Henry's Lake	2	0	2	
Henry's Lake Flat	0	0	0	
Big Springs to Mack's Inn	0	0	0	
Henry's Fork	0	0	0	
Subtotal	2	0	2	
<i>Shotgun Valley</i>				
South Shore Island Park Reservoir	0	0	0	
Sheep Creek Reservoir	0	0	0	
Icehouse Reservoir	0	0	0	
Shotgun Reservoir	0	0	0	
North shoreline Island Park Reservoir	0	0	0	
Sheridan Reservoir	4	0	4	
Sheridan Creek (cabin with pond)	0	0	0	
Twin ponds on Icehouse creek				
Subtotal	4	0	4	
<i>Harriman State Park</i>				
Henry's Fork above Osbourne Bridge	0	0	0	
Henry's Fork below Osbourne Bridge	0	0	0	
Silver Lake	4	6	10	

Golden Lake	11	0	11	
Pond east-northeast of Golden Lake	0	0	0	
Thurman Creek	0	0	0	
Fish Pond	0	0	0	
Subtotal	15	6	21	
<i>Upper Henry's Fork Area</i>				
Buffalo River	0	0	0	
Henrys Fork-Box Canyon to Harriman State Park	0	0	0	
Trude Siding-Pond/Elk Creek complex	0	0	0	
Tom's Creek	0	0	0	
Blue Spring	0	0	0	
Last Chance Pond-north	0	0	0	
Last Chance Pond-south	0	0	0	
Henry's Fork below Pine Haven	0	0	0	
Boy Scout (Boundary) Pond	0	0	0	
Boy Scout swimming lake	0	0	0	
Eccles Butte Northeast	0	0	0	
Eccles wetland #1	0	0	0	
Eccles wetland #2	0	0	0	
Eccles wetland #4	0	0	0	
Eccles wetland #5	1	0	1	
Swan Lake (west)	2	4	6	
Hatchery Butte Road ponds	0	0	0	
Lilypad Lake (Pineview)	0	0	0	
Hatchery Butte	0	0	0	
North of Hatchery Butte	0	0	0	
Beaver Pond (Gerrit)	0	0	0	
Railroad Pond	0	0	0	
Pond northeast of Gerrit	0	0	0	
Mesa Marsh	2	0	2	
Northwest of Mesa Marsh	0	0	0	
Bear Lake and Cub Lake	0	0	0	
Twin Lakes	0	0	0	
Porcupine Lake	0	0	0	
Beaver Lake	0	0	0	
Rock Creek and adjacent pond	0	0	0	
Lower Goose Lake	0	0	0	
Upper Goose Lake	2	0	2	
Long Meadows	0	0	0	
Swan Lake (east-Falls River)	0	0	0	
Steele Lake	0	0	0	
Putney Meadows	0	0	0	
Falls River Ridge complex-4 ponds	0	0	0	
Thompson's Hole	0	0	0	
Pond west of Thompson's Hole	0	0	0	
Chain Lakes	0	0	0	
Fall River Canyon	0	0	0	
Horseshoe Lake	0	0	0	
Tule Lake and adjacent ponds	0	0	0	
Subtotal	7	4	11	

<i>Teton Basin</i>				
McReynolds Reservoir	0	0	0	
Teton Basin	0	0	0	
Subtotal	0	0	0	
<i>Lower Henry's Fork</i>				
Upper Arcadia Reservoir	0	0	0	
Lower Arcadia Reservoir	0	0	0	
Marsh northwest of Upper Arcadia Reservoir	0	0	0	
Mikesell Reservoir 1	2	0	2	
Mikesell Reservoir 2	3	0	3	
Sand Creek Wildlife Management Area and springs	9	0	9	
Sand Creek below Wildlife Management Area	0	0	0	
Wetlands west of Ashton	1	0	1	
Willow Creek ponds	0	0	0	
Chester Reservoir	3	0	3	
West of Chester Dam	0	0	0	
Singleton Ponds	0	0	0	
Lemon Lake	0	0	0	
Mackerts Pond	0	0	0	
Pond +/- 1 mile north of St. Anthony	0	0	0	
Deer Park Wildlife Management Area	0	0	0	
Cartier Slough Wildlife Management Area	0	0	0	
Davis Lake	0	0	0	
Egin Lakes	0	0	0	
Quayle's Lake	0	0	0	
Henry's Fork above Menan Butte	0	0	0	
Lower Henry's Fork to east of Market Lake	0	0	0	
Snake River	0	0	0	
Subtotal	18	0	18	
<i>Camas NWR</i>				
Toomey Pond	2	0	2	
2-Way Pond	0	0	0	
Rays Lake	1	0	1	
Center Pond	0	0	0	
Big Pond	2	0	2	
First pond north of Sandhole Lake	0	0	0	
Sandhole Lake	2	0	2	
Mallard Slough	2	0	2	
Redhead Pond	0	0	0	
Camas Creek	5	0	5	
Mud Lake Wildlife Management Area	0	0	0	
Market Lake Wildlife Management Area	1	0	1	
Pond southeast of Market Lake	0	0	0	
Spring Pond	0	0	0	
Subtotal	15	0	15	
<i>Grays Lake NWR</i>				
Shorty's Cabin	0	0	0	

Buck Lake (west of Bear Island)	0	0	0	
Big Springs Area	2	2	4	
Bishop Island	2	0	2	
B Riley Point (northwest of Bear Island)	2	0	2	
Outlet (main)	4	0	4	
Big Bend Marsh	0	0	0	
Brockman Creek	0	0	0	
Outlet Creek (north of road)	0	0	0	
North Canal	0	0	0	
South Canal	0	0	0	
Lakefront ponds (west of Headquarters)	0	0	0	
Kackley/Gravel Creek	0	0	0	
Beavertail	14	0	14	
Crane Reservoir (Little Valley)	0	0	0	
Chubb Springs	0	0	0	
Reservoir south of Wayan	0	0	0	
Crane Creek	0	0	0	
Subtotal	24	2	26	
<i>Soda Springs Area</i>				
5-Mile Meadow	0	0	0	
Miller Pond	0	0	0	
Soda Creek - Miller > Cellan Reservoir	0	0	0	
Cellan Reservoir	0	0	0	
Soda Creek-spring creek west of Soda Springs	0	0	0	
Chester Basin	0	0	0	
Alexander Reservoir	0	0	0	
Alexander Siding	0	0	0	
Woodall Springs	0	0	0	
Blackfoot Reservoir	2	0	2	
Chesterfield Reservoir	1	0	1	
Chicken Creek wetlands	0	0	0	
Subtotal	3	0	3	
<i>Bear Lake NWR</i>				
Rainbow Unit	2	0	2	
Rainbow Subunit	2	0	2	
Alder Unit	0	0	0	Mostly Dry
Mud Lake Unit	0	0	0	
Salt Meadow Unit	0	0	0	
Dingle Unit	0	0	0	Mostly Dry
West Canal Unit	0	0	0	
Saint Charles Unit	0	0	0	
Bloomington Unit	2	0	2	
Subtotal	6	0	6	
<i>Fort Hall Bottoms</i>				
Head of Clear Creek	0	0	0	
American Falls Reservoir-northwest corner	0	0	0	
Kinney Creek	0	0	0	
Clear Creek above Sheepskin Road	0	0	0	

Cabin Creek	0	0	0	
Mouth of Portneuf River	2	0	2	
Flying Y	2	0	2	
Fisher Creek	0	0	0	
Sloughs along Broncho Road	0	0	0	
Diggie Creek	0	0	0	
Big Jimmy Creek	0	0	0	
Springfield Reservoir	0	0	0	
Sterling Wildlife Management Area	0	0	0	
Subtotal	4	0	4	
<i>Lower Snake River</i>				
American Falls Reservoir - Minidoka NWR	0	0	0	
C. J. Strike Reservoir	0	0	0	
Subtotal	0	0	0	
<i>Minidoka NWR</i>	0	0	0	
<i>Other Idaho</i>				
Pond near Bear River southwest of Grace	0	0	0	
Chesterfield Reservoir	0	0	0	
Wetland on Toponce Creek	0	0	0	
Wetlands east of Blackfoot	0	0	0	
Subtotal	0	0	0	
<i>Central and Western Idaho</i>				
White Arrow Ponds (Bliss)	0	0	0	checked by IDF&G
Fairfield Gravel Pit	0	0	0	checked by IDF&G
Clear Springs Pond	0	0	0	1/0 Tundra 3/4 Mute (IDFG)
Mormon Reservoir	0	0	0	
Silver Creek (Picabo)	0	0	0	checked by IDF&G
Kanaka Rapids	0	0	0	2/0 Mutes
Owsley Bridge - Upper Salmon Falls Dam	0	0	0	4/0 Mutes
Oxford Slough Waterfowl Production Area	0	0	0	
Swan Lake (Bannock County)	0	0	0	
Subtotal	0	0	0	
Idaho Total	98	12	110	
Wyoming				
<i>Yellowstone National Park</i>				P:Steve Ard; O:L. Baril (9/20)
Geode Lake	0	0	0	
Crescent Pond	0	0	0	
Slough Creek	0	0	0	
Tern Lake	0	0	0	
Yellowstone Lake west-northwest of Molly Island	0	0	0	
Yellowstone Lake south arm	0	0	0	
Yellowstone Lake - Yellowstone River delta (se arm)	0	0	0	
Beach Springs	0	0	0	
Heart Lake	0	0	0	
Yellowstone River, Alum-Grizzly Overlook	0	0	0	
Yellowstone River, north of Fishing Bridge	1	0	1	

Yellowstone River, Hayden Valley	0	0	0	
Boundary Creek	0	0	0	
Boundary Creek Pond	0	0	0	
Buela Meadow (Lake)	0	0	0	
Lillypad Lake	0	0	0	
Junco Lake	0	0	0	
Riddle Lake	0	0	0	
Falls River	0	0	0	
Upper Boundary Lake	0	0	0	
7-Mile Bridge	0	0	0	
Swan Lake	0	0	0	
Robinson Lake	0	0	0	
Little Robinson	0	0	0	
West Robinson Lake	0	0	0	
Bechler Meadow	2	0	2	
Lower Madison River	0	0	0	
Nymph Lake	0	0	0	
Grizzly Lake	0	0	0	
Obsidian Lake	0	0	0	
Floating Island Lake	0	0	0	
Trumpeter Lake	0	0	0	
North Kidney Lake	0	0	0	
Grebe Lake	0	0	0	
Yellowstone Delta	6	0	6	
Winnegar Lake	0	0	0	
South Arm - Grouse	0	0	0	
East end of Mary Bay	0	0	0	
Delusion Pond	0	0	0	
Northwest of Winegar Lake	0	0	0	
Fern Lake	0	0	0	
Cascade Lake	0	0	0	
Pelican Creek (mouth)	0	0	0	
Goose Lake	0	0	0	
Tanager Lake	0	0	0	
Subtotal	9	0	9	
<i>Upper Snake River/Targhee National Forest</i>				P: D. Stinson; O: A. Orabona (9/14, 15, 16)
Ernest Lake	0	0	0	
Bergman Reservoir	0	0	0	Extremely drawn down
Indian Lake	2	0	2	Loafing
Squirrel Meadows	0	0	0	
Boone Creek	0	0	0	
Winegar Creek (new 2009)	2	0	2	Loafing
Widget Lake	0	0	0	
Junco Lake	0	0	0	
Moose Lake	0	0	0	
Loon Lake	0	0	0	Outfitter present in camp on lakeshore
Rock Lake	0	0	0	
Fish Lake	0	0	0	
Grassy Lake Reservoir	0	0	0	Raining; lake partially fogged over
Subtotal	4	0	4	

<i>Bridger-Teton National Forest-Jackson</i>				
Arizona Lake	0	0	0	
Blackrock Ranger Station pond/sloughs	0	0	0	Looked at all sloughs behind compound building
Enos Lake	0	0	0	
Bridger Lake	2	0	2	Loafing
Atlantic Creek	0	0	0	
Lily Lake	0	0	0	
Pinto Pond	2	1	3	Loafing
Half Moon Lake	2	4	6	Loafing
Tracy Lake	0	0	0	
Hatchet Pond	0	0	0	
Burnt Fork Potholes				Water low; not surveyed
Upper Slide Lake	2	0	2	Loafing
Goose Lake	0	0	0	
Lower Slide Lake	0	0	0	
Soda Lake				not surveyed in closed fire area
Bradley Lake (Snake River Canyon)	0	0	0	
Subtotal	8	5	13	
<i>Grand Teton National Park</i>				
Polecat Slough	0	0	0	
Flagg Ranch gravel pits				
Elk Ranch Reservoir	2	0	2	
Hedrick Pond				Not surveyed; very little open water
Swan Lake	2	5	7	
Christian Pond				Not surveyed; very little open water
Glade Creek north	0	0	0	
Glade Creek south (north of Tusker's Island)	0	0	0	
Glade Creek cliff slough	0	0	0	
Steamboat Mountain	0	0	0	
Jackson Lake north	4	0	4	Loafing
Jackson Lake south	9	0	9	Loafing; no cranes observed
Two Ocean Lake	0	0	0	
Emma Matilda Lake	0	0	0	
Dam to Moran, Snake River	1	0	1	
Moran to Moose, Snake River	0	0	0	Fogged over just before Moose
Subtotal	18	5	23	
<i>National Elk Refuge</i>				
Visitor Center ponds	0	0	0	
Southwest Main Marsh	2	0	2	
Northwest Main Marsh (near overlook)	2	0	2	
Southeast Main Marsh	2	0	2	
Northeast Main Marsh	2	0	2	
Miller/Winnegar Springs	0	0	0	
Shop pond	0	0	0	
Pierre Pond east	0	0	0	
Pierre Pond west	0	0	0	
Romney Pond #2	0	0	0	
Nowlin Ponds	0	0	0	

Flat Creek north	4	0	4	Loafing and foraging
Subtotal	12	0	12	
<i>Jackson Area</i>				
Tucker Pits	0	0	0	
Skyline Pond (Puzzleface Ranch)	1	0	1	
Boyles Hill area	0	0	0	
Highway 89 winter pen	4	0	4	
South Park Unit, Wyoming Game & Fish Dept.	0	0	0	
Treatment Plant ponds	2	4	6	
Hillwood Pond, Bar BC (added 2010)	0	0	0	
Subtotal	7	4	11	
<i>Upper Green River (north of Warren Bridge)</i>				
Potholes north of Mosquito Lake	0	0	0	
Mosquito Lake	0	0	0	
Wagon Creek Lake	0	0	0	
Rock Crib Lake	0	0	0	
Mud Lake	0	0	0	
Roaring Fork Pond	2	0	2	Loafing
Dollar Lakes	2	0	2	Loafing on river near lake
Upper Green River above Big Bend	1	0	1	
Circle S/Jensen Pond (added 2010)	0	0	0	
Carney Slough	2	0	2	Loafing
Carney Fish Pond	0	0	0	
Green River Big Bend to Black Butte	2	0	2	Loafing
QY Bar Reservoir	0	0	0	
Green River Black Butte to Warren Bridge	0	0	0	
Spade Slough	0	0	0	
New Fork Potholes/Marsh Creek	0	0	0	
Kendal Wetland	2	0	2	Loafing
New Fork River (north of highway 191)	0	0	0	
Kitchen Reservoir north	2	3	5	Loafing
Kitchen Ranch Reservoir main	2	2	4	Loafing
Soda Lake area	0	0	0	
Fayette Ranch ponds	0	0	0	
Pape Ranch pond (added 2010)	0	0	0	
Webb Draw, Horse Creek (added 2010)	2	0	2	Loafing on shore
Subtotal	17	5	22	
<i>New Fork River & Big Sandy to Farson area</i>				
New Fork River Pinedale to Boulder	0	0	0	
Fayette Ranch New Fork ponds	0	0	0	
Boulder Sloughs	2	3	5	Loafing
Sloughs south of Boulder to East Park	2	0	2	Loafing
Swift Reservoir	2	0	2	Loafing
Jensen slough, Anticline (added 2010)	2	0	2	Loafing
New Fork to confluence with Green	0	0	0	
East Fork until it narrows	1	0	1	Loafing
East Fork Gun Club Ponds (added 2010)	2	1	3	Loafing
Big Sandy/Big Bend	0	0	0	

Big Sandy/Eden reservoirs	1	0	1	
Farson area	2	0	2	Loafing
Subtotal	14	4	18	
<i>Seedskaadee NWR (SNWR) and lower Green River</i>				
Green River, north of refuge HQ	1	0	1	
Main Marsh Hawley, Pool 1, SNWR	2	0	2	
Main Marsh Hawley, Pool 2, SNWR	2	4	6	
Main Marsh Hawley, Pool 3, SNWR	2	3	5	
Main Marsh Hawley, Pool 4, SNWR	2	4	6	
Main Marsh Hawley, Pool 5, SNWR	0	0	0	
Main Marsh Hawley Unit, Pool 6, SNWR	0	0	0	
Main Marsh Hawley, Pool 7, SNWR	0	0	0	
Main Marsh Hawley, channel, SNWR	2	0	2	
Headquarters Marsh, SNWR	0	0	0	
North Marsh Hamp, SNWR	2	0	2	
Sagebrush Wetland, SNWR	3	2	5	
Dunkle Wetland, SNWR	2	0	2	
Green River south of Highway 28, SNWR	2	0	2	
Green River Highway 28 to dam, SNWR	0	0	0	
Green River city area (added 2010)				not flown
Subtotal	20	13	33	
<i>Green River Fontenelle Reservoir north to Daniel</i>				
Fontenelle Reservoir	9	0	9	7 at north end, 2 at Causeway Crk
Big Piney cutoff, Green River	4	0	4	2 Reardon Draw, 2 Long Island along Green River
Dry Piney Creek area, Green River	0	0	0	
La Barge pond (private)	2	0	2	
Ferry Island Slough	0	0	0	
Sommers Ranch, pond west of River	2	0	2	
Soapholes, Cottonwood Creek (added 2010)	2	0	2	
Subtotal	19	0	19	
<i>Hamm's Fork</i>				
McNaughton Reservoir, Hamm's Fork			0	NOT FLOWN
Hamm's Fork north of Kemmerer			0	
Subtotal	0	0	0	
<i>Salt River</i>				
Palisades Reservoir, Alpine wetland	2	1	3	
Swan Cove SD Marsh	3	0	3	
Salt River, Alpine to Freedom	0	0	0	
Salt River, Freedom to Afton	0	0	0	
Subtotal	5	1	6	
<i>Other Wyoming</i>				
Swamp Lake, Sunlight Basin	0	0	0	
Colony Site, eastern Wyoming	0	0	0	
Trail Lake, Dubois	0	0	0	
Dinwoody Lake (added 2010)	0	0	0	
Lake Julia (added 2010)	1	0	1	

Subtotal	0	0	0	
TOTAL WY outside YNP	124	37	161	
Nevada				
Ruby Lake NWR	10	0	10	P: O: N. Saake (9/13)
Franklin Lake	5	0	5	Dry
Oregon				
Malheur NWR	5	0	5	J. Dastyck
Summer Lake Wildlife Management Area	15	0	15	M. St. Louis:
Warner Valley				
Sycan Marsh				
Thompson Reservoir	2	0	2	
Deschutes River				

^aBlank denotes area not surveyed.

Appendix B. Personnel who conducted the 2011 Fall Trumpeter Swan Survey in the U.S.

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

Observer: K. Cutting, B. West (Red Rock Lakes NWR)
Pilot: D. Chapman (Montana Aircraft, Inc.)

Montana (Paradise Valley)

Observer: L. Henry
Pilot: S. Ard (Yellowstone National Park)

Idaho

Observer: P. Anderson, M. Fisher (Southeast Idaho NWR Complex)
Pilot: C. Anderson (AvCenter)

Wyoming

Observer: A. Orabona (Wyoming Game and Fish Department)
Pilot: D. Stinson (Sky Aviation)

Wyoming (Yellowstone National Park)

Observer: L. Baril (Yellowstone National Park)
Pilot: S. Ard (Yellowstone National Park)

Ruby Lake NWR and vicinity

Pilot/Observer: N. Saake

Malheur NWR

Jim Dastyck, Refuge Biologist

Summer Lake WMA

M. St. Louis (Oregon Department of Fish and Wildlife)
