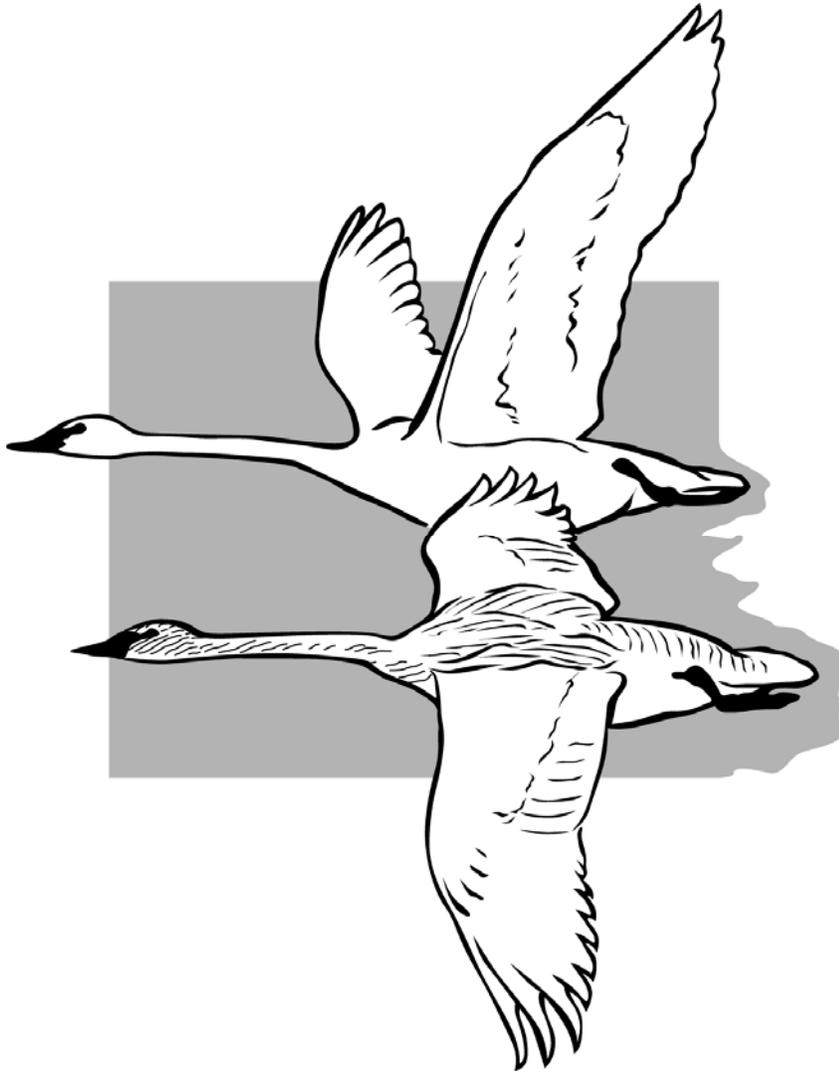




U.S. Fish and Wildlife Service

Trumpeter Swan Survey of the Rocky Mountain Population

Winter 2011



Acknowledgements

Personnel who conducted the survey are listed in Appendix C. The survey is 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, Wyoming Game and Fish Department, Ruby Lake NWR, Malheur NWR, and the Shoshone-Bannock Tribes. Additionally, R. Cavallaro, M. Wackenhut, B. Waterbury, D. Christopherson, K. Cameron, R. Holman, R. Lonsinger, T. Ferguson, and C. Mitchell assisted with counts in Idaho. M. Fisher, J. Mackay, S. Patla, N. Cadwell, D. Smith, M. St. Louis, and K. Cutting provided information and narratives used to develop this document; conclusions are attributable only to the author.

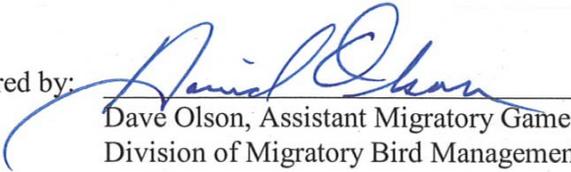
**TRUMPETER SWAN SURVEY
of the
ROCKY MOUNTAIN POPULATION**

WINTER 2011

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

April 12, 2011

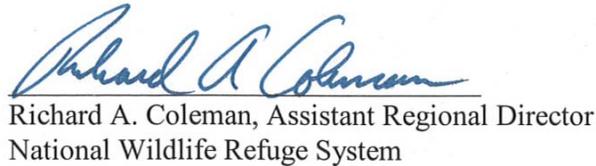
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Abstract.— Observers counted 5,712 swans (white birds and cygnets) in the Rocky Mountain Population of trumpeter swans during February 2011, which was a 33% increase from the 4,290 counted during winter 2010. The number of white birds (4,384) and the number of cygnets (1,328) increased 22% and 92% respectively from last year. The cygnet count this year was the highest since 1972. In the tri-state area, the number of total swans increased for Montana (25%), Idaho (27%) and Wyoming (55%) from counts in 2010. The number of birds wintering in areas near restoration flocks increased from last year and was the highest count since 1995. The numbers of birds at Ruby Lake National Wildlife Refuge (NWR) (37), Malheur NWR (10) and Summer Lake Wildlife Management Area (WMA) (78) increased 42%, 11% and 200% respectively from 2010. Reservoir levels in early February were lower than during winter 2010 but 6% above the long term average. Temperatures in the tri-state area during winter 2010-11 were about average or just below average, and precipitation was about 90% of average.

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 Pacific Flyway Management Plan for the RMP of Trumpeter Swans (Subcommittee on the Rocky Mountain Population of Trumpeter Swans 2008).

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 have 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 late January or early February. The survey is conducted cooperatively by several administrative entities and is intended to provide



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

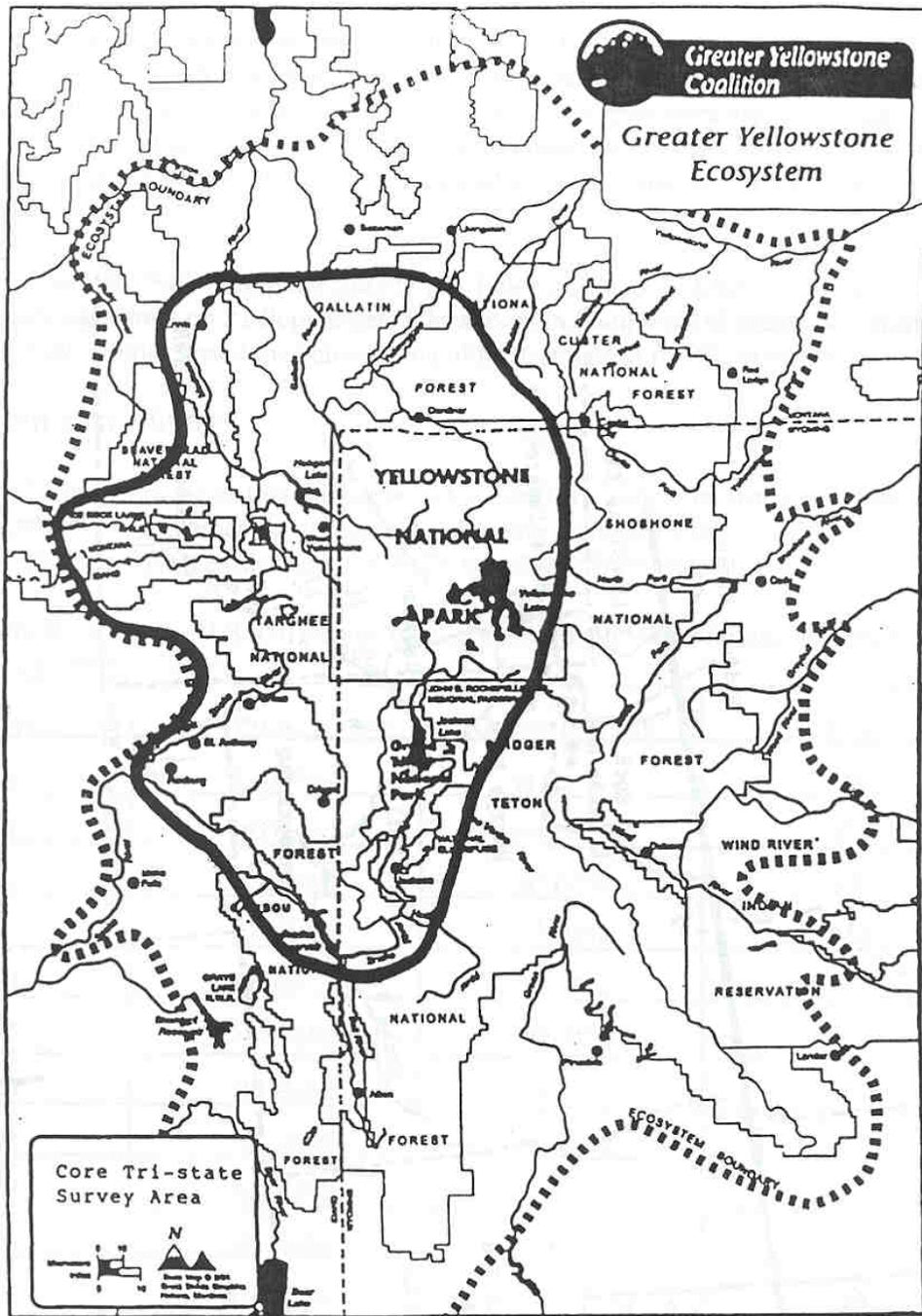


Fig. 2. Map showing the 'core' tri-state area of southeast Idaho, southwest Montana, and northwest Wyoming (provided by the Greater Yellowstone Coalition, Bozeman, Montana).

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.

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 generally are used to count numbers of swans in the tri-state area, Nevada, Malheur NWR, and in the Summer Lake WMA and vicinity; ground surveys 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 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. Generally about 30 hours of flight time and additional time spent conducting surveys on the ground are required to complete the survey.

Annual 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 2008a) 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, the historic counts using this methodology generally track those from the quinquennial trumpeter swan survey (U.S. Fish and Wildlife Service 2006), suggesting it produces a useful index to annual abundance for the Canadian Flocks.

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 = 87%-98%, mean = 95%) of the total RMP counts during 1972-2011. Counts used for analyses in this report are provided in Appendix A.

RESULTS AND DISCUSSION

The 2011 Mid-winter survey was conducted between 31 January and 11 February. Aerial surveys in the tri-state area were completed by 11 February and required about 28 hours to complete. Across most of the areas weather conditions were very favorable for flying with clear skies and calm winds. Ice conditions were consistent over the survey area with low temperatures freezing many of the open water bodies and concentrating swans in the remaining ice-free waters.

Precipitation during December to February was 75% to 125% of average throughout much of the tri-state area (Joint Agricultural Weather Facility 2011). Water levels at 5 reservoirs (American Falls, Island Park, Jackson Lake, Palisades, and Minidoka Dam/Lake Walcott) cumulatively were at 66% of storage capacity on 1 February (data from U.S. Bureau of Reclamation 2011a), 14% below the level of last year but, 6% above the 1972-2010 average (Fig. 3). Together, these reservoirs comprise about 97% of the water-storage capacity for reservoirs listed in the Snake River Basin in eastern Idaho and extreme western Wyoming (U.S. Bureau of Reclamation 2011b). Snowpack as of 1 February throughout much of the tri-state area was generally 100-120% of normal, about 50-100% of normal in south-central Oregon, and about 90-110% of normal in northeastern Nevada (U.S. Department of Agriculture 2011).

The average streamflow on the Henrys Fork near Island Park Reservoir, Idaho during 15 January to 15 February 2011 was 370 cfs, which is near the 1972-2010 average for that recording station (U.S. Bureau of Reclamation 2011a) (Fig. 3). The December-February temperatures were near or just below average throughout much of the primary wintering area in the tri-state region (Fig. 4).

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 2003), 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 (2011) were compared to results from 1972-2010, a practice used in Service survey reports for other waterfowl (e.g., Zimpfer et al. 2010, U.S. Fish and Wildlife Service 2010b). Because Nevada and Oregon did not separate total counts 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 5.5% per year during 1972-2010 (Table 1, Fig. 5). The number of white birds and cygnets counted in the tri-state region both increased ($P < 0.01$) at 5.7% per year. Counts of birds in Montana (white birds + cygnets) increased slightly (+1.2% per year, $P = 0.06$), whereas average annual rates of growth for birds

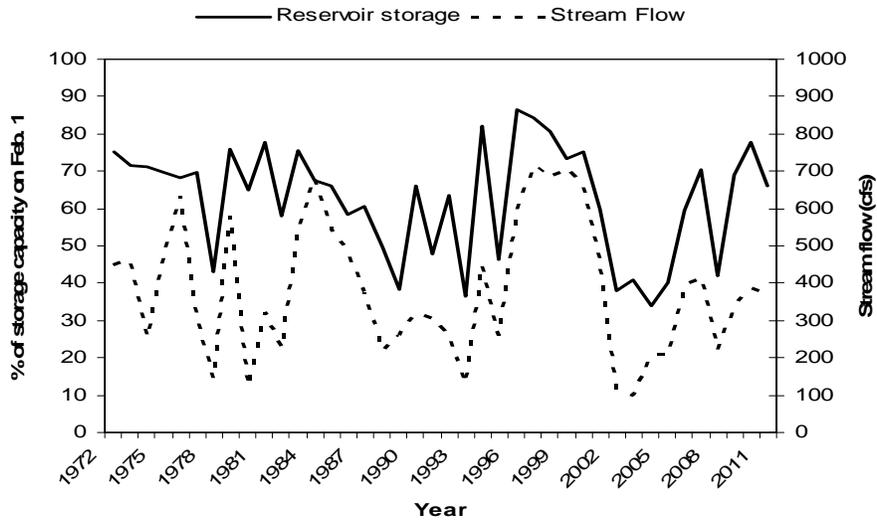


Fig. 3. Water storage for 5 reservoirs (see text) in the tri-state region on 1 February, and average streamflow between 15 January and 15 February on the Henrys Fork, 1972-2011.

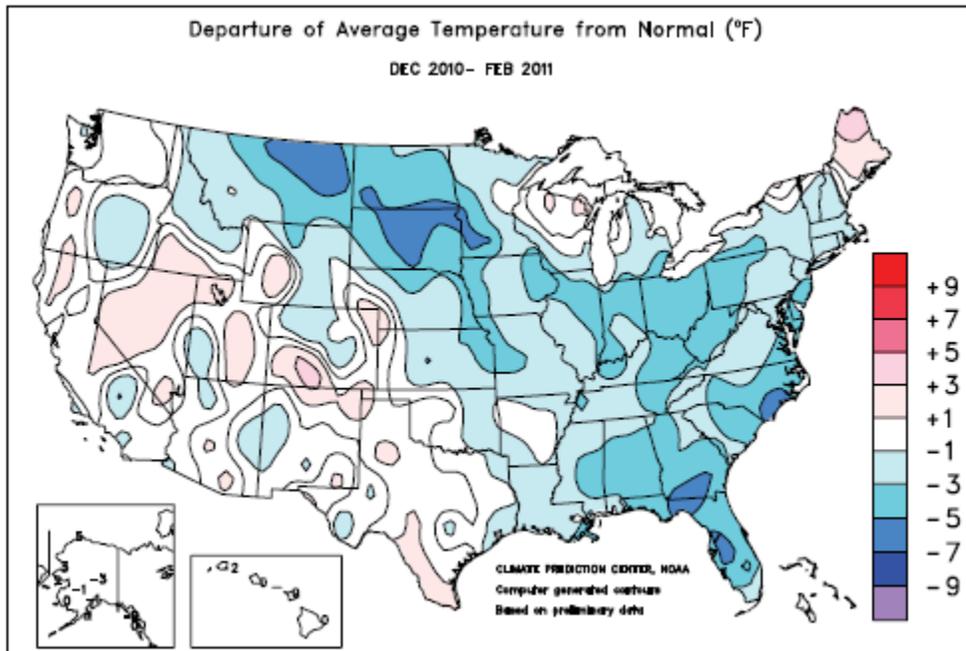


Fig. 4. Departure of average temperature from normal ($^{\circ}\text{F}$) during December 2010 to February 2011 (Joint Agricultural Weather Facility 2011).

Table 1. Counts of trumpeter swans of the Rocky Mountain Population during winter, 1972-2011.

| Year | <u>Tri-state area</u> | | | <u>Oregon and Nevada^a</u> | | | <u>Total RMP</u> | | |
|-------------------|-----------------------|---------|------------------|--------------------------------------|-----------------|-------|-------------------|----------------------|-------|
| | White | Cygnets | Total | White | Cygnets | Total | White | 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 |

Table 1. (cont.)

| Year | <u>Tri-State Area</u> | | | <u>Oregon and Nevada^a</u> | | | <u>Total RMP</u> | | |
|-------------------|-----------------------|---------|-------|--------------------------------------|---------|-------|------------------|---------|-------|
| | White | Cygnets | Total | White | Cygnets | Total | White | Cygnets | Total |
| 2003 ^g | 3365 | 532 | 3897 | 62 | 15 | 77 | 3427 | 547 | 3974 |
| 2004 ^g | 3785 | 746 | 4531 | 46 | 7 | 53 | 3831 | 753 | 4584 |
| 2005 | 4147 | 1143 | 5290 | 59 | 12 | 71 | 4206 | 1155 | 5361 |
| 2006 | 4203 | 1209 | 5412 | 58 | 14 | 72 | 4261 | 1223 | 5484 |
| 2007 ^h | 3604 | 893 | 4619 | 56 | 26 | 82 | 3660 | 919 | 4701 |
| 2008 ^h | 3744 | 790 | 4545 | 74 | 18 | 92 | 3818 | 808 | 4637 |
| 2009 | 4287 | 873 | 5160 | 90 | 15 | 105 | 4377 | 888 | 5265 |
| 2010 | 3553 | 676 | 4229 | 47 | 14 | 61 | 3600 | 690 | 4290 |
| 2011 | 4285 | 1302 | 5587 | 99 | 26 | 125 | 4384 | 1328 | 5712 |

^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.

^h White bird and cygnet counts for Tri-state area and Total RMP biased low because 122 birds in 2007 and 11 birds in 2008 in Idaho were not classified as white birds or cygnets.

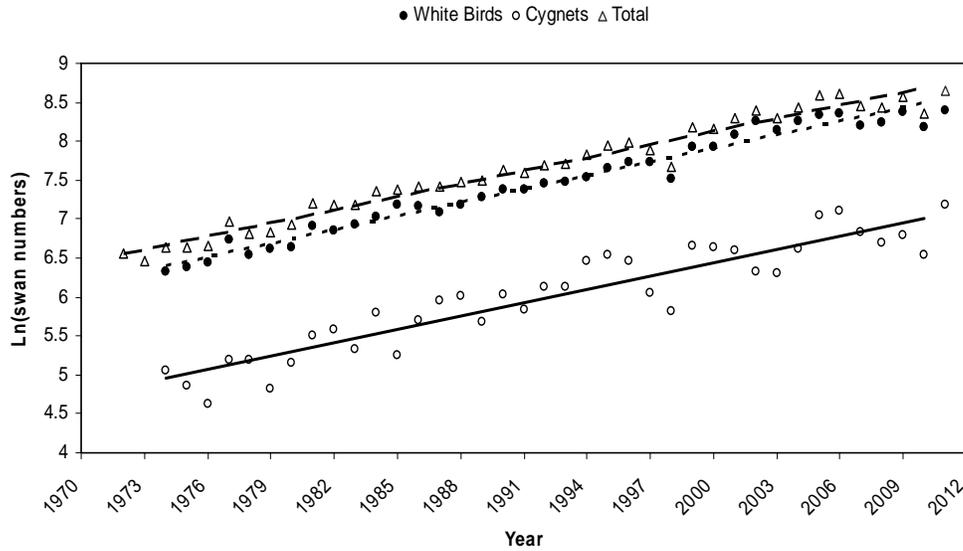


Fig. 5. Rates of change for counts of swans in the RMP during the Mid-winter Trumpeter Swan Survey, 1972-2011 (dotted and solid lines depict trends for white birds and cygnets, respectively, for swans counted in the tri-state region [see text]; dashed line depicts total RMP swans).

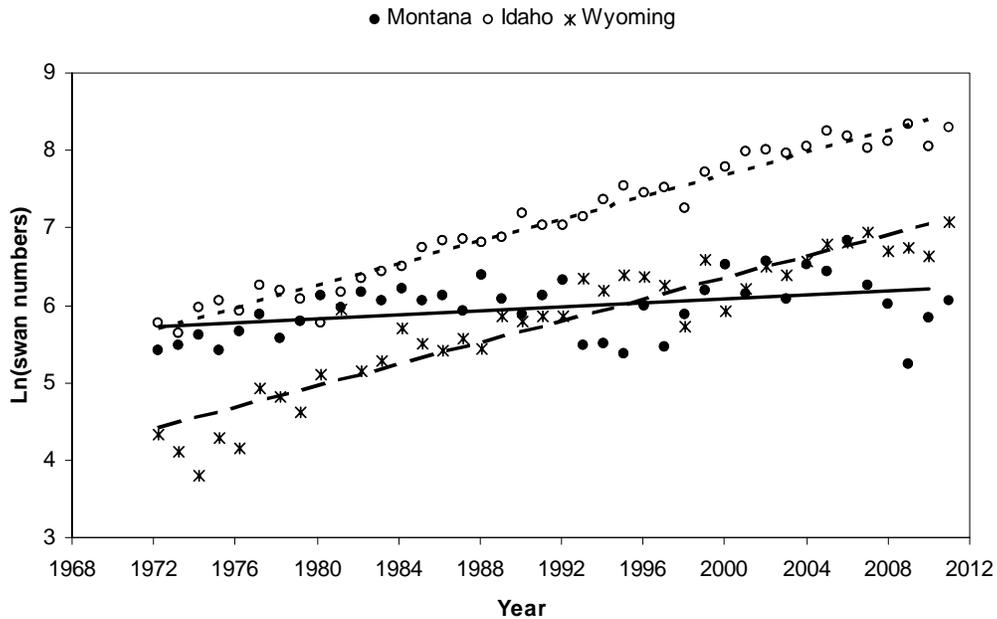


Fig. 6. Rates of change for counts of total swans in states of the tri-state region during the Mid-winter Trumpeter Swan Survey, 1972-2011 (solid, dotted, and dashed lines represent trends for Montana, Idaho, and Wyoming, respectively).

Table 2. Counts of trumpeter swans of the Rocky Mountain Population in individual states during winter, 1972-2011.

| 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 |

Table 2. (cont.)

| 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 |
| 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 |
| 2005 | 508 | 119 | 627 | 2954 | 828 | 3782 | 685 | 196 | 881 | 27 | 10 | 37 | 32 | 2 | 34 |
| 2006 | 713 | 211 | 924 | 2714 | 873 | 3587 | 776 | 125 | 901 | 36 | 14 | 50 | 22 | 0 | 22 |
| 2007 | 466 | 49 | 515 | 2294 ^g | 664 ^g | 3080 | 844 | 180 | 1024 | 38 | 16 | 54 | 18 | 10 | 28 |
| 2008 | 382 | 25 | 407 | 2694 ^g | 616 ^g | 3321 | 668 | 149 | 817 | 49 | 16 | 65 | 25 | 2 | 27 |
| 2009 | 168 | 21 | 189 | 3393 | 740 | 4133 | 726 | 112 | 838 | 53 | 15 | 68 | 37 | 0 | 37 |
| 2010 | 274 | 64 | 338 | 2631 | 501 | 3132 | 648 | 111 | 759 | 21 | 14 | 35 | 26 | 0 | 26 |
| 2011 | 307 | 121 | 428 | 3068 | 918 | 3986 | 910 | 263 | 1173 | 66 | 22 | 88 | 33 | 4 | 37 |

^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.

^g Counts biased low because 122 birds in 2007 and 11 birds in 2008 not classified as either white birds or cygnets.

wintering in Idaho (7.0%) and Wyoming (7.0%) ($P < 0.01$) were higher (Table 2, Fig. 6). Although the numbers 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 15% 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 69% during that same time period. The percentage of birds counted in Wyoming during winter also has increased, from about 11% to 16%.

Counts of total swans wintering in Nevada have fluctuated over time, but suggest an increase ($P = 0.04$) of about 1.0% per year during 1972-2010 (Table 2, Fig. 8). Counts in Nevada during the early 2000s generally were 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; however, birds were not translocated to Summer Lake WMA until the winter of 1992. Analyzing trends for the Oregon Flock as a whole (Table 2) could lead to inappropriate inferences. Therefore, we analyzed data for Malheur NWR (1972-2010) separate from those for Summer Lake WMA. Results suggest a decline (-3.5% per year, $P < 0.01$) for birds wintering at Malheur NWR (Fig. 8, Appendix A). At Summer Lake WMA, most birds were translocated to the area during winter and generally remained in the area for only a few months after being translocated (M. St. Louis, Oregon Department of Fish and Wildlife, personal communication). Thus, in 1997, the winter following the termination of translocations to Summer Lake WMA, the number counted during the survey dropped sharply (Fig. 8). From 1997-2011, an average of about 33 birds has been observed during winter surveys (excluding years with incomplete surveys).

The percentage of the entire RMP estimated to be comprised of Canadian Flocks increased from about 19% during February of 1972 to 92% during February 2005, and then decreased during 2006 to 2008 (Table 3). During 2009 the percentage rose to 91% but in 2010 dropped to 89%. As of 2011 91.5% of the RMP is comprised of Canadian Flocks. The data fit a 2nd-order logarithm model ($P < 0.01$, adjusted $R^2 = 0.94$), suggesting that the percentage may plateau near 90% (Fig. 9). The average percentage of the RMP being comprised of the Canadian Flock during 2001 – 2003 has been 90%. The number of swans estimated to be from Canadian Flocks exhibited a fairly steady increase since the early 1980s, and was nearly 5,000 birds in 2006, but declined to about 4,100 birds in 2008 (Table 3, Fig. 9). During the 2011 winter survey there were 5,228 birds were from the Canadian flock. This is the first time the estimate was above 5,000 birds since the survey began in 1972.

Results from the 2011 survey

During the 2011 winter survey, observers counted 5,712 trumpeter swans in the RMP, which was a 33% increase from the count of last winter (4,290) (Table 1). The number of white birds increased 22%, whereas the count for cygnets increased 92% from that of last year. The total number of swans

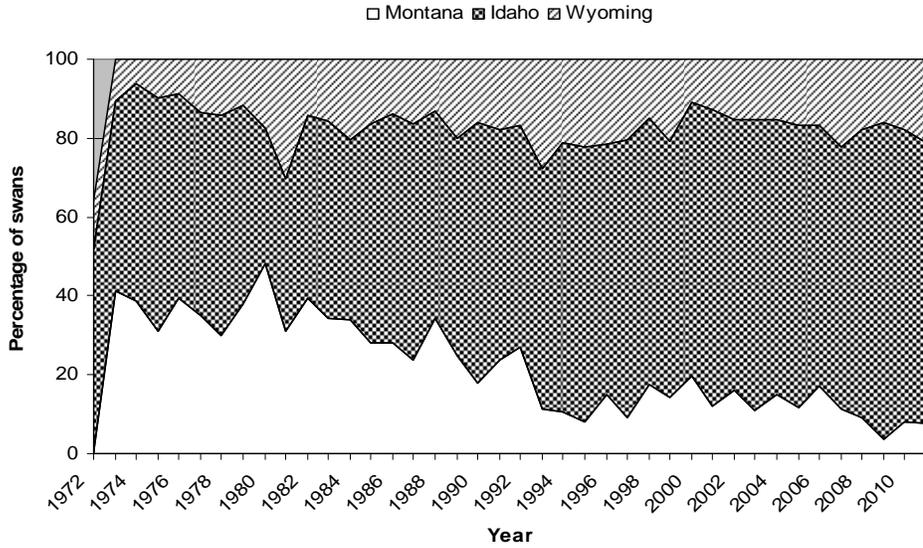


Fig. 7. Proportions of total swans counted in each of the states comprising the tri-state region during the Mid-winter Trumpeter Swan Survey, 1972-2011.

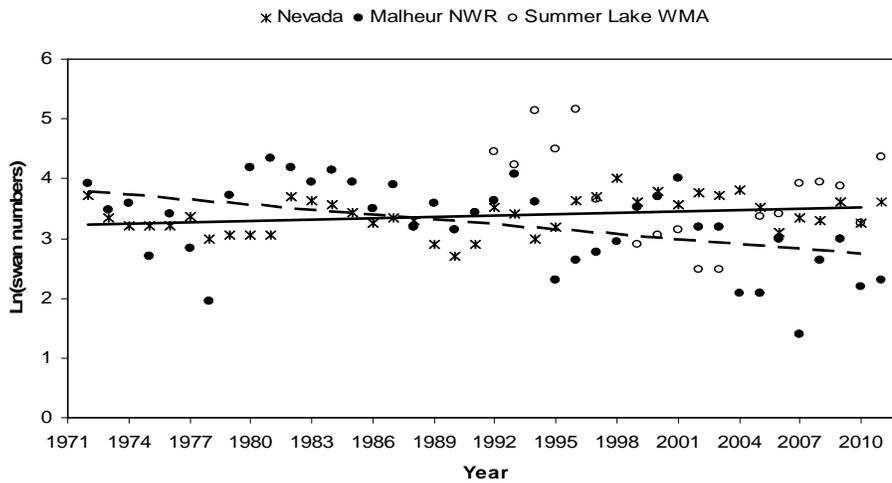


Fig. 8. Rates of change in counts of total swans in Nevada (stars and solid line) and Oregon (Malheur NWR [closed circles and dashed line] and Summer Lake WMA [open circles]) during the Mid-winter Trumpeter Swan Survey, 1972-2011. Data for Summer Lake WMA in 2002 and 2003 are from incomplete surveys.

Table 3. Estimates of swan abundance for flocks comprising the Rocky Mountain Population of Trumpeter swans, 1972-2011.

| 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 |
| 2005 | 5361 | 417 | 4944 | 92.2 |
| 2006 | 5484 | 510 | 4974 | 90.7 |
| 2007 | 4701 | 507 | 4194 | 89.2 |
| 2008 | 4637 | 527 | 4110 | 88.6 |
| 2009 | 5265 | 459 | 4806 | 91.3 |
| 2010 | 4290 | 473 | 3817 | 89.0 |
| 2011 | 5712 | 484 | 5228 | 91.5 |

^a From U.S. Fish and Wildlife Service 2010a. Counts are from the previous calendar year (e.g., the 2011 value is from the Fall 2010 survey).

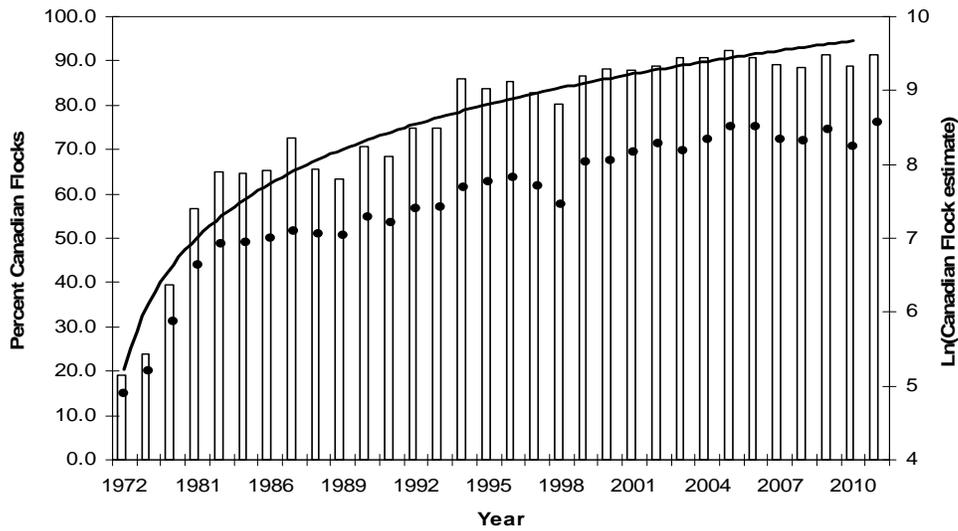


Fig. 9. Percent (bars and solid line) and counts (solid dots) of the entire RMP estimated to be comprised of Canadian Flocks during the Mid-winter Trumpeter Swan Survey, 1972-2011.

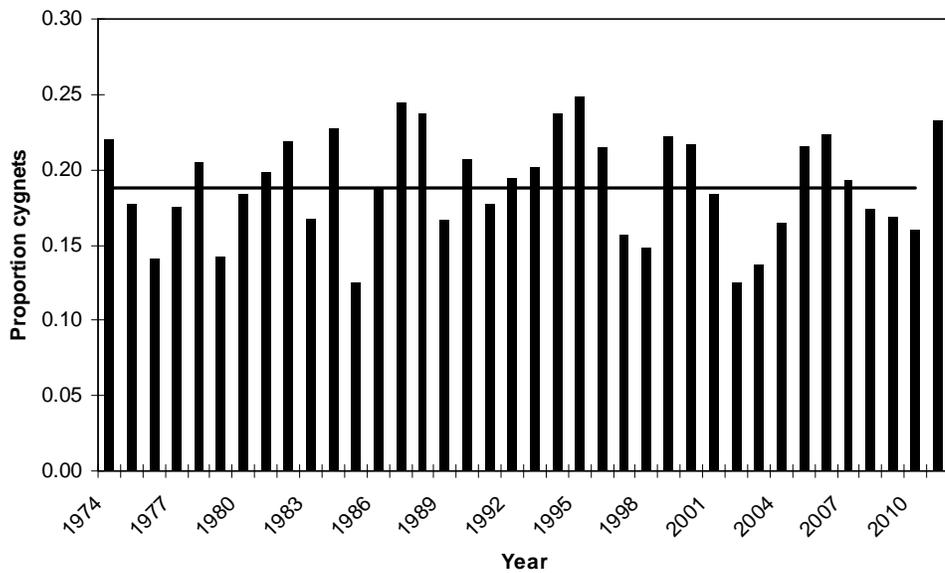


Fig. 10. Proportion of cygnets counted in the tri-state region during the Mid-winter Trumpeter Swan Survey, 1974-2011. The solid line depicts the 1974-2010 average.

in Montana increased (25%) for the second year in a row. The count in Wyoming increased by 55% from that of winter 2010, and the count of total swans in Idaho increased by 27% over the same time period. Of the birds wintering in the tri-state area during winter 2011, about 8% were in Montana, 71% were in Idaho, and 21% were counted in Wyoming.

The number of swans in Nevada (37) was 42% higher than that of last year (Table 2, Appendix A). A period of cold weather occurred prior to the survey, resulting in normal ice coverage on the marsh at Ruby Lake NWR. Open water was available on spring-fed ponds and spring outflow areas. The total count was near the long-term average (31 swans). The number of swans counted at Malheur NWR (10) was only 1 more than last year (Appendix A). The count at Summer Lake WMA (78) was a 200% increase from last year's count (26). The timing of the survey and weather conditions allowed for a more representative count which could account for the substantial increase (Marty St. Louis pers. comm.).

The estimated number of swans from Canadian Flocks was 5,228 birds, about 1,411 more swans compared to the estimate from winter 2010 and the highest count to date. The estimate indicated about 91.5% of the RMP counted in winter 2011 was comprised of swans from Canadian Flocks (Table 3, Fig. 9). After increasing steadily from the early 1970s to the late 1990s, the proportion has remained near 90% (range = 88.0%-92.2%) for the last 10 years.

The proportion of cygnets for swans counted in the tri-state region during winter 2011 was 0.233. This value was 22% higher than the 1974-2010 average (0.190) (Fig. 10). This marked the first time since 2007 that production was higher than the average.

In summary, RMP trumpeter swans appeared to increase by 5.5% annually between 1972 and 2010. Most of the increase over that time was attributable to increases in the number of birds in the Canadian Flocks, which estimates suggest comprise approximately 91.5% of the population. Although estimates of the size of the Canadian Flocks from the winter RMP surveys typically are greater than those from the quinquennial surveys, the estimates appear to track each other (U.S. Fish and Wildlife Service 2006). The results suggest that annual estimates of the size of the Canadian Flocks from the winter RMP surveys are reasonable, but may slightly overestimate their abundance.

The survey results from the 2011 Mid-winter survey suggest an increase of 1,411 birds from the count of last year. This was the highest count recorded since the survey began in 1972. Additionally the number of swans counted in Yellowstone National Park (167) was a 600% increase from last year's count of 23 and the highest count since 2007. This year, the Hebgen Lake area west of the Park had more ice than last year so the swans that normally winter on the lake may have pushed into the park (Doug Smith, Yellowstone National Park, pers. comm.).

The 5.5% increase in total swans this year, when compared, with the 19% decrease in the winter count between 2009 and 2010 suggest, that factors such as immigration and emigration into and out of the survey area, and potentially changes in annual survival, could influence large change increases and decreases in estimates of annual abundance. However, without additional information regarding

these factors, causes for these large and biologically unlikely annual changes will remain unexplained.

Collectively the restoration flocks (Oregon and Nevada) have had successive increases since 1997, and the count for 2011 represents the highest count since 1996. This increase was probably due to a more complete survey in Oregon which increased their 2011 count by 200% from 2010.

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Appendix A. Counts of trumpeter swans of the Rocky Mountain Population during winter, 1972-2011.

| 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 |
| 2005 | 508 | 119 | 627 | 2954 | 828 | 3782 | 561 | 166 | 727 |
| 2006 | 713 | 211 | 924 | 2714 | 873 | 3587 | 655 | 111 | 766 |
| 2007 | 466 | 49 | 515 | 2294 ^h | 664 ^h | 3080 | 700 | 155 | 855 |
| 2008 | 382 | 25 | 407 | 2694 ^h | 616 ^h | 3321 | 603 | 142 | 745 |
| 2009 | 168 | 21 | 189 | 3393 | 740 | 4133 | 638 | 110 | 748 |
| 2010 | 274 | 64 | 338 | 2631 | 501 | 3132 | 630 | 106 | 736 |
| 2011 | 307 | 121 | 428 | 3068 | 918 | 3986 | 785 | 221 | 1006 |

^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.

^e Count biased low due to incomplete survey coverage.

^h Counts biased low because 122 birds in 2007 and 11 birds in 2008 not classified as white birds or cygnets.

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 ^e | 5 ^e | 12 ^e | 41 | 2 | 43 |
| 2003 | 146 | 34 | 180 | 19 | 5 | 24 | 9 ^e | 3 ^e | 12 ^e | 34 | 7 | 41 |
| 2004 | 149 | 33 | 182 | 8 | 0 | 8 | a | a | a | 38 | 7 | 45 |
| 2005 | 124 | 30 | 154 | 8 | 0 | 8 | 19 | 10 | 29 | 32 | 2 | 34 |
| 2006 | 121 | 14 | 135 | 15 | 5 | 20 | 21 | 9 | 30 | 22 | 0 | 22 |
| 2007 | 144 | 25 | 169 | 4 | 0 | 4 | 34 | 16 | 50 | 18 | 10 | 28 |
| 2008 | 65 | 7 | 72 | 12 | 2 | 14 | 37 | 14 | 51 | 25 | 2 | 27 |
| 2009 | 88 | 2 | 90 | 17 | 3 | 20 | 36 | 12 | 48 | 37 | 0 | 37 |
| 2010 | 18 | 5 | 23 | 7 | 2 | 9 | 14 | 12 | 26 | 26 | 0 | 26 |
| 2011 | 125 | 42 | 167 | 7 | 3 | 10 | 59 | 19 | 78 | 33 | 4 | 37 |

^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.

^e Count biased low due to incomplete survey coverage.

Appendix B. Site-specific counts of trumpeter swans of the Rocky Mountain Population during the Mid-winter Trumpeter Swan Survey, 2011

| State or Area | White birds | Cygnets | Total | Pilot/observer/notes |
|---|--------------------|----------------|--------------|-----------------------------------|
| Montana | | | | |
| <i>Hebgen Lake area</i> | | | | P: N. Caldwell; O: D. Smith (2/2) |
| Cougar Creek | 0 | 0 | 0 | |
| Between Quake Lake and Hebgen Lake | 0 | 0 | 0 | |
| Madison River Arm | 48 | 11 | 59 | |
| North Spring (Grayling Arm) | 11 | 6 | 17 | |
| South Fork Arm | 77 | 27 | 104 | |
| South Fork Madison River/Buttermilk Creek | 0 | 0 | 0 | |
| Subtotal | 136 | 44 | 180 | |
| <i>Madison River Valley</i> | | | | P: D. Chapman; O: B. West (1/31) |
| Odell Creek Area | 108 | 64 | 172 | |
| Walsh Ponds (south)1 | 0 | 0 | 0 | |
| Walsh Ponds (north)1 | 0 | 0 | 0 | |
| Madison River, south of Ennis | 25 | 12 | 37 | |
| Madison River, north of Ennis | 0 | 0 | 0 | |
| Ennis Lake | 0 | 0 | 0 | |
| Subtotal | 133 | 76 | 209 | |
| <i>Chain of Lakes</i> | | | | |
| Cliff Lake | 0 | 0 | 0 | |
| Wade Lake | 0 | 0 | 0 | |
| Goose Lake | 0 | 0 | 0 | |
| Smith Creek (Hidden Lake outlet) | 0 | 0 | 0 | |
| Subtotal | 0 | 0 | 0 | |
| <i>Centennial Valley/Red Rock Lakes NWR</i> | | | | |
| Red Rock River below Lower Lake Dam | 0 | 0 | 0 | |
| MacDonald Pond | 0 | 0 | 0 | |
| Culver Pond | 11 | 0 | 11 | |
| Elk Springs Creek | 2 | 1 | 3 | |
| Swan Lake | 0 | 0 | 0 | |
| Shamow Pond | 0 | 0 | 0 | |
| Red Rock River, Lima | 0 | 0 | 0 | |
| Subtotal | 13 | 1 | 14 | |
| <i>Paradise Valley</i> | | | | P: N. Cadwell; O: none (2/2) |
| Armstrong's Spring Creek | 0 | 0 | 0 | |
| Bailey's | 0 | 0 | 0 | |
| Brockway | 0 | 0 | 0 | |
| DePuys | 12 | 0 | 12 | |
| Brandis | 0 | 0 | 0 | |

| | | | | |
|---|------------|------------|------------|---|
| Nelson's Spring Creek | 0 | 0 | 0 | |
| Sacagawea Park | 0 | 0 | 0 | |
| Yellowstone River 1 mile north of Emigrant | 0 | 0 | 0 | |
| Beaver Creek | 0 | 0 | 0 | |
| Yellowstone River - 6 mile | 0 | 0 | 0 | |
| Yellowstone River - Pray | 0 | 0 | 0 | |
| Yellowstone River - Pine Creek | 13 | 0 | 13 | |
| Dana's | 0 | 0 | 0 | |
| Emigrant Pond | 0 | 0 | 0 | |
| PMD Ranch | 0 | 0 | 0 | |
| Subtotal | 25 | 0 | 25 | |
| MONTANA TOTAL | 307 | 121 | 428 | |
| | | | | |
| Wyoming | | | | |
| <i>Upper Snake River (Flagg Ranch to Wilson Bridge)</i> | | | | P: D. Stinson; O: S. Patla (2/3 and 2/11) |
| Polecat Creek | 9 | 8 | 17 | |
| Flagg Ranch to Jackson Lake | 8 | 3 | 11 | |
| Jackson Lake | 0 | 3 | 3 | |
| Jackson Lake to Moran Junction | 16 | 3 | 19 | Dense pancake and shelf ice |
| Moran Junction to Deadman's | 8 | 2 | 10 | |
| Deadman's to Moose | 32 | 8 | 40 | |
| Moose to Gros Ventre Junction | 25 | 17 | 42 | |
| Gros Ventre Junction area | 47 | 2 | 49 | |
| Gros Ventre Junction to Wilson Bridge | 16 | 0 | 16 | |
| Gros Ventre River, Highway 89 to Snake River | 3 | 0 | 3 | |
| Subtotal | 164 | 46 | 210 | |
| | | | | |
| <i>Gros Ventre River upriver of Kelly</i> | | | | |
| Kelly Warm Springs, Grand Teton National Park | | | | |
| Lower Slide Lake | | | | |
| Upper Gros Ventre | | | | |
| Subtotal | 0 | 0 | 0 | |
| | | | | |
| <i>Lower Snake River (Wilson Bridge to Alpine)</i> | | | | |
| Wilson Bridge to South Park Bridge | 35 | 25 | 60 | |
| Evan's Gravel pit ponds | 0 | 0 | 0 | |
| South Park Bridge to Hoback | 2 | 4 | 6 | |
| North Wilson | 2 | 0 | 2 | |
| Fish Creek, Wilson to Snake River | 91 | 14 | 105 | |
| Boyles Hill area | 40 | 0 | 40 | |
| Spring Creek | 34 | 11 | 45 | |
| Crane Creek | 14 | 8 | 22 | |
| Lower Flat Creek, Snake River to Jackson | 18 | 6 | 24 | |
| Rafter J Ponds | 5 | 2 | 7 | |
| Valley Springs, Captive Swan Pond/Pen Highway 89 | 8 | 6 | 14 | |
| Hoback to Astoria Bridge | 0 | 0 | 0 | |

| | | | | |
|---|------------|-----------|------------|--------------|
| Astoria Bridge-Elbow | 11 | 0 | 11 | |
| Elbow to Alpine/Palisades Reservoir | 0 | 0 | 0 | |
| Bailey Lake | 2 | 0 | 2 | |
| Kelly Swan Facility | 3 | 5 | 8 | |
| Bondurant pond near Hoback River | 2 | 0 | 2 | |
| Subtotal | 267 | 81 | 348 | |
| <i>National Elk Refuge</i> | | | | |
| Flat Creek main marsh | 20 | 1 | 21 | |
| Gros Ventre River, Kelly to Highway 89 | 6 | 2 | 8 | |
| Romney pond area | | | | |
| Lost Spring | 10 | 8 | 18 | |
| Subtotal | 36 | 11 | 47 | |
| <i>Salt River (Alpine to Afton)</i> | | | | |
| Palisades Reservoir, WY Alpine | 0 | 0 | 0 | |
| Palisades Reservoir to Freedom Road | 47 | 12 | 59 | |
| Freedom Road to Narrows | 9 | 0 | 9 | |
| Thayne area | 3 | 0 | 3 | |
| Narrows to Grover/Auburn Highway | 40 | 19 | 59 | |
| Grover/Auburn Highway to Swift Creek | 51 | 1 | 52 | |
| Swift Creek to Headwaters | 0 | 0 | 0 | |
| Subtotal | 150 | 32 | 182 | |
| <i>Pinedale</i> | | | | |
| New Fork Boulder to Pinedale | 0 | 0 | 0 | |
| Boulder Fish Hatchery | | | | |
| Daniel Fish Hatchery/Forty Rod Creek | 18 | 9 | 27 | |
| Warren Bridge to Kendall Bridge, Green River | 0 | 0 | 0 | Frozen |
| Kendall Bridge to Green River Lakes | 0 | 0 | 0 | Frozen |
| Subtotal | 18 | 9 | 27 | |
| <i>Green River (Warren Bridge to Highway 28 Bridge)</i> | | | | |
| Fontenelle Dam-CCC Bridge | 15 | 3 | 18 | |
| CCC Bridge to Pilot Farm | 120 | 31 | 151 | |
| Pilot Farm-Refuge Headquarters | 15 | 8 | 23 | |
| Refuge to Big Sandy | | | | Not surveyed |
| Big Sandy to Big Island | | | | Not surveyed |
| Flaming Gorge Reservoir | | | | Not surveyed |
| Subtotal | 150 | 42 | 192 | |
| <i>Dubois area</i> | | | | |
| Wind River and spring ponds, Dubois | 2 | 2 | 4 | |
| Dinwoody Lake | 23 | 6 | 29 | |
| Bull Lake | 2 | 0 | 2 | |
| Wind River, Dinwoody to Crowheart | | | | |

| | | | | |
|---|------------|------------|-------------|-------------------------------------|
| Subtotal | 27 | 8 | 35 | |
| <i>Yellowstone National Park</i> | | | | |
| Slough Creek | 0 | 0 | 0 | P: N. Cadwell; O: D. Smith (2/2) |
| Tern Lake | 0 | 0 | 0 | |
| Broad Creek, near White Lake | 0 | 0 | 0 | |
| White Lake | 8 | 4 | 12 | |
| Beach Springs Lagoon | 0 | 0 | 0 | |
| Shoshone Geyser Basin | 0 | 0 | 0 | |
| Lewis River | 0 | 0 | 0 | |
| Buela Lake | 0 | 0 | 0 | |
| Yellowstone River | 11 | 0 | 11 | |
| Lewis - Shoshone Channel | 0 | 0 | 0 | |
| Lewis Lake | 0 | 0 | 0 | |
| Falls River | 0 | 0 | 0 | |
| Shoshone Lake | 0 | 0 | 0 | |
| Bechler Lake | 0 | 0 | 0 | |
| Bourndary Creek | 0 | 0 | 0 | |
| Bechler River | 0 | 0 | 0 | |
| Firehole River | 0 | 0 | 0 | |
| Madison River (Madison Jct. to Park boundary) | 95 | 32 | 127 | |
| Richard's Pond | 0 | 0 | 0 | |
| Gibbon Meadow | 0 | 0 | 0 | |
| Nymph Lake | 11 | 6 | 17 | |
| Elk Park | 0 | 0 | 0 | |
| North Twin Lake | 0 | 0 | 0 | |
| Nez Perce Creek near Culex Basin | 0 | 0 | 0 | |
| Nez Perce Creek near Cowan Creek | 0 | 0 | 0 | |
| Alum Creek | 0 | 0 | 0 | |
| Gibbon River north of Madison Junction | 0 | 0 | 0 | |
| Mud Volcano | 0 | 0 | 0 | |
| Subtotal | 125 | 42 | 167 | |
| TOTAL WY outside YNP | 785 | 221 | 1006 | |
| TOTAL WY including YNP | 910 | 263 | 1173 | |
| Idaho | | | | |
| | | | | P: C. Anderson; O: M. Fisher(2/2-3) |
| <i>Island Park Area</i> | | | | |
| Warm Springs (west side of Henrys Lake) | | | | Frozen not flown |
| Henrys Lake flats | | | | Frozen not flown |
| Big Springs, North Fork, Mack's Inn Area | 5 | 2 | 7 | |
| Mack's Inn to Island Park Reservoir | 9 | 2 | 11 | |
| Island Park Reservoir | | | | Frozen |
| Island Park Reservoir inlet | | | | Frozen |
| Trude Ranch Pond | | | | Frozen |
| Icehouse Reservoir | | | | Frozen |
| Sheridan Creek, mouth to Sheridan Reservoir | 10 | 17 | 27 | Very little open water |
| Sheridan Reservoir | 0 | 0 | 0 | |

| | | | | |
|---|------------|-----------|------------|------------------|
| Sheridan Creek cabin and pond | 4 | 5 | 9 | |
| Subtotal | 28 | 26 | 54 | |
| <i>Buffalo River Area</i> | | | | |
| Buffalo River | 5 | 0 | 5 | |
| Tom's Creek | 0 | 0 | 0 | |
| Elk Creek/Trudes Siding pond | 11 | 4 | 15 | |
| Subtotal | 16 | 4 | 20 | |
| <i>Harriman State Park (HSP) Area</i> | | | | |
| Island Park Dam through Box Canyon | 22 | 1 | 23 | |
| Box Canyon - HSP north boundary | 58 | 3 | 61 | |
| HSP north bounday - Osborne bridge | 154 | 45 | 199 | |
| Golden Lake | 20 | 4 | 24 | Est 95% frozen |
| Thurmon Creek | 13 | 1 | 14 | Est 70% frozen |
| Silver Lake | | | | Frozen |
| Osborne Bridge - Pinehaven | 39 | 6 | 45 | |
| Pinehaven | 52 | 15 | 67 | |
| Fish Pond | | | | frozen |
| Henrys Fork below Pinehaven - Forest boundary | | | | |
| Subtotal | 358 | 75 | 433 | |
| <i>Henrys Fork, HSP to Warm River</i> | | | | |
| Warm River | 0 | 0 | 0 | |
| Subtotal | 0 | 0 | 0 | |
| <i>Lower Henrys Fork Area</i> | | | | |
| Warm River confluence to Ashton Dam | 0 | 0 | 0 | |
| Ashton Dam to Chester Dam | 214 | 34 | 248 | |
| Chester Dam to Highway 33 | 64 | 16 | 80 | |
| Highway 33 - Menan Buttes | 0 | 0 | 0 | |
| Ashton Ponds | | | | Frozen not flown |
| Willow Creek Area farmstead ponds | 0 | 0 | 0 | |
| Mikesell Reservoir 1 & 2 | | | | Frozen not flown |
| Arcadia Reservoir, Upper | | | | Frozen not flown |
| Arcadia Reservoir, Lower | | | | Frozen not flown |
| Sand Creek WMA and area | 4 | 0 | 4 | |
| Singleton Ponds | | | | Frozen not flown |
| Texas Slough | 99 | 14 | 113 | |
| Bannock Jim Slough | | | | Frozen not flown |
| Mud Lake WMA | | | | Frozen not flown |
| Camas NWR | | | | Frozen not flown |
| Camas Creek | | | | Frozen not flown |
| Subtotal | 381 | 64 | 445 | |
| <i>Teton River Basin</i> | | | | |

| | | | | |
|--|------------|------------|------------|---|
| Teton River to Wilford Dam | 6 | 4 | 10 | |
| Wilford Dam to Newdale Bridge | 30 | 7 | 37 | |
| Newdale Bridge to Teton Dam site | 71 | 9 | 80 | |
| Teton River Canyon | 25 | 3 | 28 | |
| Teton Basin | 186 | 76 | 262 | |
| North Fork Teton River | | | | |
| South Fork Teton River | 0 | 0 | 0 | |
| Subtotal | 318 | 99 | 417 | |
| <i>South Fork of the Snake River</i> | | | | |
| Swan Valley (Palisades Reservoir to Conant Valley) | 230 | 71 | 301 | |
| Canyon (Conant to Heise) | 140 | 60 | 200 | |
| Delta (Heise to Menan Buttes) | 141 | 78 | 219 | |
| Dry bed (Heise to Menan) | 0 | 0 | 0 | |
| Subtotal | 511 | 209 | 720 | |
| <i>Main Stem of the Snake River</i> | | | | |
| Menan Buttes to Idaho Falls | 576 | 163 | 739 | |
| Dry Bed | | | | |
| Idaho Falls to Fort Hall (Ferry Butte) | 60 | 14 | 74 | |
| Blackfoot Marsh | 0 | 0 | 0 | |
| Subtotal | 636 | 177 | 813 | |
| <i>Fort Hall Bottoms to American Falls Reservoir</i> | | | | |
| American Falls Reservoir shoreline | 314 | 75 | 389 | |
| Kinney Creek | 0 | 0 | 0 | |
| Portneuf River (Am. Falls Res. to Hwy 86) | 56 | 13 | 69 | |
| Mouth of Portneuf River | | | | |
| Spring Creek to American Falls Reservoir | 111 | 28 | 139 | |
| Jimmie Creek | 0 | 0 | 0 | |
| Snake River - Tilden Bridge | 15 | 6 | 21 | |
| Clear Creek and Ross Fork | 0 | 0 | 0 | |
| Diggie Creek | 0 | 0 | 0 | |
| Jeff Cabin Creek | 6 | 2 | 8 | |
| Flying Y oxbows | 0 | 0 | 0 | |
| Field feeding, Vambaur Road | 8 | 5 | 13 | New 2011, IDFG grd srv 2/2 10:30-4:30 |
| Subtotal | 510 | 129 | 639 | |
| <i>Snake River below American Falls Dam</i> | | | | |
| Springfield Reservoir | 19 | 12 | 31 | IDFG grd srv, 2/2 10:30-4:30, 4/5 Trus, 0 TUSW |
| American Falls Reservoir (except Fort Hall) | | | | |
| American Falls Dam - Minidoka NWR | 5 | 5 | 10 | Flight data, open only to Mass Rocks SP, frozen below |
| Minidoka NWR | | | | Not counted, frozen |
| Minidoka Dam - C.J. Strike Reservoir | 13 | 6 | 19 | IDFG grd srv, 2/3, 5/2 TUSW, 4/2 MUTE (Clear Lk) |
| Hagerman National Fish Hatchery | | | | Not counted |
| Bruneau Dunes State Park | | | | Not counted |

| | | | | |
|--|------------|-----------|------------|---|
| Bruneau Dunes - C.J. Stike Reservoir | | | | Not counted |
| Faulkner Pond | | | | Not counted |
| White Arrow Pond (Bliss) | 15 | 10 | 25 | IDFG grd srv, 2/3, 0 TUSW |
| Pioneer Reservoir (King Hill) | 2 | 6 | 8 | IDFG grd srv, 2/3, 0 TUSW |
| Snake River at King Hill | | | | |
| Silver Creek (Picabo area) | 54 | 19 | 73 | IDFG grd srvy, 2/4 |
| Miracle Hot Springs | | | | Not counted |
| Dead Horse Lake | | | | Not counted |
| Butler Pond | 25 | 17 | 42 | 2011 addition, IDFG grd srvy, 2/3, 4/0 TUSW |
| Subtotal | 133 | 75 | 208 | |
| <i>Grays Lake NWR Area</i> | | | | |
| Big Springs | | | | Frozen not flown |
| Shorty's Homestead | | | | Frozen not flown |
| Blackfoot Reservoir | 17 | 4 | 21 | |
| Chub Springs, southwest of refuge | 7 | 3 | 10 | |
| Chesterfield Reservoir | | | | frozen |
| <i>Chesterfield Reservoir Canal (portneuf R. headwaters)</i> | 0 | 0 | 0 | |
| <i>Grimm Spring and channel</i> | 0 | 0 | 0 | |
| <i>U. Portneuf river: Toponce Rd - Pebble Cr Rd</i> | 0 | 0 | 0 | First bridge; includes IDFG's whiskey mike's access |
| <i>Pebble Cr Rd - Broxon Rd</i> | 13 | 2 | 15 | Second bridge: includes IDFG's U. Portneuf access |
| <i>Broxon Rd - Symons Rd</i> | 0 | 0 | 0 | Third bridge |
| <i>Symons Rd - Blazer Hwy. Bridge</i> | 3 | 0 | 3 | Fourth bridge; includes IDFG's Portneuf access |
| <i>Blazer Hwy. bridge - Hwy 30 Bridge</i> | 0 | 0 | 0 | |
| Subtotal | 40 | 9 | 49 | |
| <i>Soda Springs Area</i> | | | | |
| Woodall Springs | 7 | 1 | 8 | |
| Alexander Reservoir and Siding | | | | |
| Miller Ponds | 7 | 2 | 9 | |
| Government Dam | 0 | 0 | 0 | |
| Soda Creek | 3 | 1 | 4 | |
| Soda Canal | 0 | 0 | 0 | |
| Subtotal | 17 | 4 | 21 | |
| <i>Bear River Reaches</i> | | | | |
| Alexander Reservoir | 0 | 0 | 0 | |
| Alexander Reservoir - Gentile Valley Bridge | 65 | 34 | 99 | |
| Gentile Valley Bridge - old cheese factory | | | | Frozen, not flown |
| Gentile Valley Bridge to Oneida Dam | 41 | 7 | 48 | |
| Montpelier Reservoir (rearing pond) | | | | Frozen, not flown |
| Oneida Narrows | 0 | 0 | 0 | |
| Oneida Narrows to Riverdale Bridge | 0 | 0 | 0 | |
| Riverdale Bridge to Utah border | 0 | 0 | 0 | |
| Subtotal | 106 | 41 | 147 | |

| | | | | |
|---|-------------|------------|-------------|--------------------|
| <i>Bear Lake National Wildlife Refuge</i> | | | | |
| Bear Lake - Alexander Res. | 14 | 6 | 20 | |
| West Canal Unit | | | | |
| Rainbow Unit | | | | |
| Outlet Canal | | | | |
| Subtotal | 14 | 6 | 20 | |
| IDAHO TOTAL | 3068 | 918 | 3986 | |
| Nevada | | | | |
| Ruby Lake NWR | 25 | 2 | 27 | J. Mackay (2/3) |
| Franklin Lake | | | | Dry |
| Oregon | | | | |
| <i>Malheur NWR</i> | | | | |
| Refuge total | 7 | 3 | 10 | J. Dastyck (242) |
| <i>Summer Lake Wildlife Management Area</i> | | | | |
| Summer Lake WMA | 59 | 19 | 78 | M. St. Louis (2/9) |
| | | | | |
| | | | | |
| | | | | |

^aBlank denotes area not surveyed.

Appendix C. Personnel who conducted the 2011 Mid-winter Trumpeter Swan Survey.

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

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

Montana (Hebgen Lake Area and Paradise Valley)

Observer: D. Smith (Yellowstone National Park)
Pilot: N. Cadwell (Elkhorn Aviation)

Idaho

Observer: M. Fisher (Southeast Idaho National Wildlife Refuge Complex)
Pilot: C. Anderson (AvCenter)

Wyoming

Observer: S. Patla (Wyoming Game and Fish Department)
Pilot: D. Stinson (Sky Aviation)

Wyoming (Yellowstone National Park)

Observer: D. Smith (Yellowstone National Park)
Pilot: N. Cadwell (Elkhorn Aviation)

Ruby Lake NWR and vicinity

J. Mackay (Ruby Lake NWR)

Malheur NWR

J. Dastyck (Malheur NWR)

Summer Lake WMA

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