

# **Rocky Mountain Population Trumpeter Swan Focal Species Action Plan**



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## I. Executive Summary

Trumpeter swans (*Cygnus buccinator*) are native only to North America. Although no historical estimates of their abundance are available, by 1900 they had been eliminated from most of their historical range in the U.S. and Canada. Through habitat conservation, protection from illegal shooting, supplemental winter feeding, and re-introduction and translocation efforts, trumpeter swans increased from a few hundred birds to nearly 35,000 by 2005 (Moser 2006). To facilitate monitoring and management, the U.S. Fish and Wildlife Service (USFWS) and Canadian Wildlife Service (CWS) designated 3 populations: the Pacific Coast (PCP), the Rocky Mountain (RMP), and Interior (IP). The Rocky Mountain Population (RMP) increased from less than 200 in the early 1930s to 5,712 in February 2011 (USFWS 2011). Even though distribution patterns have changed since the late 1980s, about 40% of the population ( $n = 2,294/5,789$  in winter 2011) continues to winter in the core Tri-state Area of southeast Idaho, southwest Montana, and northwest Wyoming. This restricted winter range distribution is still a priority concern for managers of the RMP, although there has been a gradual shift to the southern half of the core Tri-state Area and sites further south since hazing and winter translocations began at Harriman State Park (HSP) in Idaho and Red Rock Lakes National Wildlife Refuge (RRLNWR) in Montana in 1990 (Shea and Drewien 1999). Coincident with summer releases of captive-raised swans in Wyoming (1994-2002) and at Bear Lake in Idaho (2001-2004), and winter translocations in Idaho (2001-2004), an increasing percentage of swans is wintering south of the core Tri-state Area in the Green, Salt, and Bear river drainages of Idaho and Wyoming. In winter 2011, 36% ( $n = 436/1,208$ ) of swans in Wyoming and 76% in Idaho ( $n = 3,034/3,896$ ) were south of the core area (U.S. Fish and Wildlife Service 2011). A small number of swans have been reported from Utah, Colorado, Nevada, Arizona, and California as well.

The RMP is comprised of 2 important breeding groups; a relatively sedentary U.S. segment and a migratory segment from interior Canada. In addition, a few very small groups of breeding swans established outside of primary nesting and wintering areas by transplanting birds of RMP stock are included because of their ancestry. By the late 1980s, the increasing number of Canadian swans clearly exceeded the carrying capacity and degraded habitat for sport fisheries on the Henrys Fork of the Snake River in and near HSP. Over-winter foraging by swans and other waterfowl in combination with low river flows and extensive ice formation significantly reduced the submerged macrophyte plant communities in HSP and vicinity. Although swan winter distribution has expanded in recent years, available habitat in Idaho, Montana, and Wyoming is far from optimal due to high elevations, short growing seasons, and extended periods of sub-zero temperatures.

In the 1980s, increasing numbers of migrant Canadian swans were wintering at RRLNWR, 20 miles northwest of HSP in the Centennial Valley of Montana. Little natural winter habitat exists in the Centennial Valley, a supplemental winter feeding program, initiated in the 1930s, had sustained a nesting flock that grew to over 400 by the 1950s. The utility of this feeding program was questioned because it served to attract an

increasing number of Canadian migrants to winter sympatrically with the relatively sedentary Centennial Valley swans on an extremely limited habitat base.

Aggressive winter trapping and hazing efforts began in 1990-1991 to disperse swans from HSP/RRLNWR to: (1) reduce the potential for high winter mortality from disease or starvation; (2) prevent further damage to aquatic vegetation and fish habitat at HSP; and (3) force RMP swans to use other more suitable winter habitats, broaden their wintering and nesting distribution, and increase population security. Feeding at RRLNWR was phased out and finally terminated in winter 1992-1993 to further discourage birds from wintering on the refuge. The number of breeding swans in the core Tri-state Area declined sharply between winter 1992 and fall 1993, presumably as a result of a combination of factors including the termination of winter feeding, a very severe winter, the deliberate summer translocation of resident swans out of the Centennial Valley, and the disruptive nature of several years of winter trapping and hazing efforts.

Although a slowly increasing percentage of RMP swans are using new wintering areas and migration routes and swans from nesting areas in the U.S. have established several new breeding areas, growing numbers of Canadian swans continue to return each autumn to winter in the core Tri-state Area. Increased numbers of wintering swans not only increase the competition for limited winter habitat, but likely also impact the spring and summer habitat important for swans that breed in the core Tri-state Area. In addition, the area has experienced prolonged drought conditions and increased human development and recreation. The continued growth of Canadian flocks and the ability of U.S. flocks to achieve breeding pair objectives could be jeopardized if increasing numbers of swans continue to winter in restricted habitat.

The goal of the management plan for RMP trumpeter swans is to restore the RMP as a secure and primarily migratory population, sustained by naturally-occurring and agricultural food resources in diverse breeding and wintering sites. Management objectives are to: (1) continue to encourage swans to use wintering areas outside of the core Tri-state Area while reducing the number of wintering swans in the core Tri-state Area to a maximum of 1,500; (2) rebuild U.S. nesting flocks by year 2013 to at least 165 nesting pairs (birds that display evidence of nesting) and 718 adults and subadults (white birds) that use natural, diverse habitats and; (3) monitor the population during nesting, post-breeding, and mid-winter periods. Important management strategies to achieve the objectives include: (1) reduce the attractiveness of HSP to wintering swans by manipulating water levels; (2) provide sufficient nesting and wintering habitat to attain population objectives; (3) identify potential breeding and winter expansion areas.

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## II. Introduction

Trumpeter swans once ranged across North America from the Atlantic to the Pacific. Fur traders and homesteaders eliminated the species from most of its ancestral range by 1900. Some trumpeters survived in Canada and the U.S. Territory of Alaska. The only surviving flocks in the U.S. wintered in the core Tri-state Area (Figure 1). Protected by the region's remoteness, these birds survived in isolated sites where geothermal runoff created small ice-free areas regardless of winter severity (Banko 1960). In 1933, this wintering remnant included about 70 resident swans and a similar number that migrated to Canadian nesting sites. Migrations to wintering areas outside of the core Tri-state Area apparently ceased as all other flocks were extirpated (Gale et al. 1987). Presumably, pioneering birds that left the core area were at much higher risk. The U.S. nesting swans that survived are the ancestors of today's more sedentary U.S. flocks, which together with the Canadian flocks comprise the RMP. Trumpeters that nest primarily in Alaska and winter south to western Oregon comprise the PCP (Figure 2). Those that nest east of the RMP belong to the IP. Concern about the status of trumpeter swans led to substantial conservation efforts that included land acquisition, supplemental feeding, closed hunting seasons, law enforcement, public education, translocations, and the release of genetically suitable captive-reared swans.

RRLNWR was established in 1935 to protect important nesting habitat in the Centennial Valley of Montana for trumpeter swans and other waterfowl. From 1935 through winter 1992-1993, supplemental feeding enabled trumpeters to winter at RRLNWR despite the absence of natural winter habitat. By providing grain, managers probably contributed to minimizing migration to wintering sites in eastern Idaho and elsewhere where mortality from illegal shooting was feared (Banko 1960). The number of swans in the Centennial Valley increased and approached 600 birds in some years. Over 530 swans from this area were provided for restoration efforts in other states from 1938-1983 (Gale et al. 1987). Swans from RRLNWR were used to establish new breeding flocks at several National Wildlife Refuges and other sites. Translocation efforts were accelerated during the late 1980s and early 1990s as attempts were made to disperse an increasing number of wintering swans from RRLNWR and HSP to relieve pressure on winter habitats.

In addition to supplemental feeding at RRLNWR, the establishment of a wildlife sanctuary by Idaho State law at HSP and creation of ice-free habitat below dams built in the 1920s and 1930s on the Henrys Fork of the Snake River increased the core Tri-state Area's winter carrying capacity for swans and, perhaps, discouraged them from migrating to habitats farther south. In response, swans wintering in the Tri-state Area increased from about 150-200 in the early 1930s to 2,709 by 1996; numbers declined to 2,586 in 1997 and 2,063 in 1998, as measured by the Midwinter Trumpeter Swan Survey (Table 1). Since then, the number has increased to a high of 5,587 in 2011..

After peaking in the 1950s and 1960s at approximately 550, core Tri-state Area adults and subadults counted during the Fall Survey declined by 40% to a 36-year low of 331 in 1986 (Table 2). This decline centered at RRLNWR and was accompanied by a decline in nesting swans in YNP.

# Greater Yellowstone Ecosystem

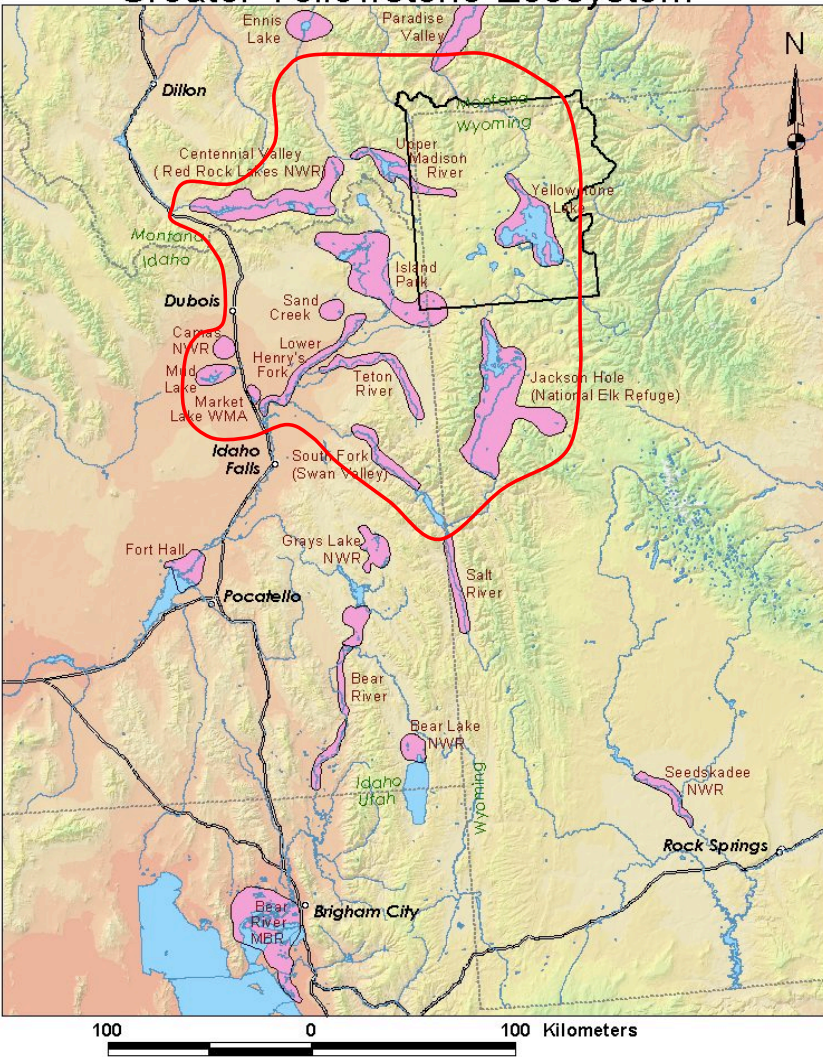


Fig. 1. Map showing the 'core' tri-state area (inside of red line) of southeast Idaho, southwest Montana, and northwest Wyoming (Dr. Richard Sodja and Lisa Landenburger, USGS, NRMSC, Bozeman, Montana).

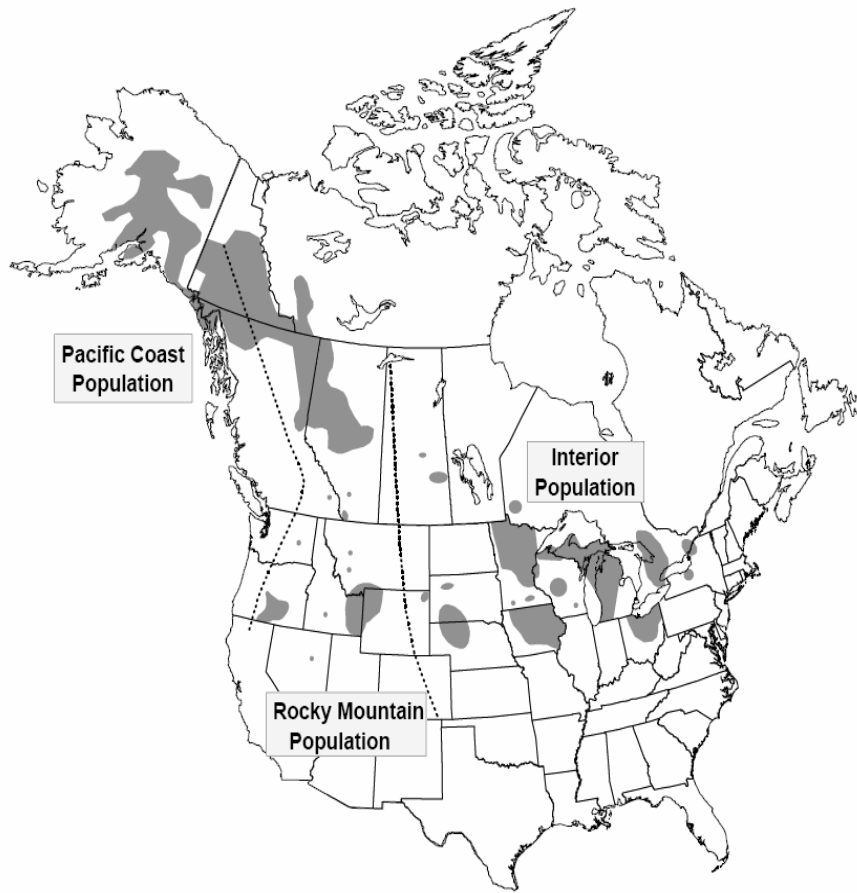


Figure 2. Approximate ranges of Pacific Coast, Rocky Mountain, and Interior populations of trumpeter swans during late summer, 2005 (Moser 2006).

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

Year	Tri-state area			Oregon and Nevada <sup>a</sup>			Total RMP		Total
	White birds	Cygnets	Total	White birds	Cygnets	Total	White birds <sup>b</sup>	Cygnets <sup>b</sup>	
1972	c	c	616			91			707
1973	c	c	581 <sup>d</sup>			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 <sup>e</sup>	1756	307	2063	64	29	93	1820	336	2156
1999	2698	772	3470	45 <sup>f</sup>	10 <sup>f</sup>	71	2743 <sup>f</sup>	782 <sup>f</sup>	3541
2000	2694	746	3440	50 <sup>f</sup>	15 <sup>f</sup>	84	2744 <sup>f</sup>	761 <sup>f</sup>	3524
2001	3198	719	3917	47 <sup>f</sup>	11 <sup>f</sup>	90	3245 <sup>f</sup>	730 <sup>f</sup>	4007
2002	3814	546	4360	48 <sup>f</sup>	7 <sup>f</sup>	67	3862 <sup>f</sup>	553 <sup>f</sup>	4427
2003 <sup>g</sup>	3365	532	3897	62	15	77	3427	547	3974
2004 <sup>g</sup>	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 <sup>h</sup>	3604	893	4619	56	26	82	3660	919	4701
2008 <sup>h</sup>	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

<sup>a</sup> Total counts not separated into white birds and cygnets prior to 1992.

<sup>b</sup> Not calculated prior to 1992 because of no counts for Oregon and Nevada.

<sup>c</sup> Not provided because counts for Yellowstone National Park not separated into white birds and cygnets.

<sup>d</sup> In Wyoming only Yellowstone National Park surveyed.

<sup>e</sup> 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.

<sup>f</sup> Counts biased low because white-bird and cygnet counts for Malheur NWR not available.

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

<sup>h</sup> 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.



Table 2. Counts of trumpeter swans of the Rocky Mountain Population U.S. Breeding Segment during fall, 1967-2010.

Year	Tri-state Area Flocks			Restoration flocks			RMP/U.S. Breeding Segment		
	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
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 <sup>b</sup>	7 <sup>b</sup>	45 <sup>b</sup>	311 <sup>b</sup>	60 <sup>b</sup>	371 <sup>b</sup>
2003	291	95	386	30 <sup>b</sup>	1 <sup>b</sup>	31 <sup>b</sup>	321 <sup>b</sup>	96 <sup>b</sup>	417 <sup>b</sup>
2004	291	94	385	27 <sup>b</sup>	5 <sup>b</sup>	32 <sup>b</sup>	318 <sup>b</sup>	99 <sup>b</sup>	417 <sup>b</sup>
2005	355	98	453	49	8	57	404	106	510
2006	377	82	459	39 <sup>c</sup>	9 <sup>c</sup>	48 <sup>c</sup>	416 <sup>c</sup>	91 <sup>c</sup>	507 <sup>c</sup>
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 <sup>c,d</sup>	0	2 <sup>c,d</sup>	377	107	484

<sup>a</sup> Blank denotes value not calculated because of incomplete survey.

<sup>b</sup> Data for only Malheur NWR and the Nevada flock included; Summer Lake WMA survey not completed.

<sup>c</sup> Count biased low; only a portion of Summer Lake WMA surveyed.

<sup>d</sup>Ruby Lake NWR did not provide data

This declining adult component, accompanied by very low cygnet production, caused the USFWS and the Pacific Flyway to initiate a 3-year study of the causes and potential remedies (Gale et al. 1987). Recommended management changes were implemented and by 1989, Tri-state Area adults once again exceeded 500 (Table 2). Since 1993, following termination of feeding at RRLNWR and other activities that may have negatively impacted the birds, the counts for the RMP have shown a sustained increase (WSFWS 2010, Figure 3). The number of birds in Canadian flocks have continued to expand and in 2011 comprised approximately 91% of the total RMP (Figure 4). This compares to 83% in 1997.

Conservation efforts have enabled the RMP to increase 10-fold and expand the breeding distribution of the Canadian flocks. Despite this growth, RMP swans have not significantly increased their dispersal to winter habitats outside of the core Tri-state Area.

A range-wide genetics survey of trumpeter swans completed in 2006 (Oyler-McCance et al. 2006, 2007) showed that the PCP and RMP had dissimilar haplo-types indicating genetic distinctness. However, the Tri-state Area flocks and RMP/Canadian flocks are not significantly different genetically. The study results suggest that trumpeter swans have a much lower mitochondrial DNA variability than other waterfowl studied to date. The results further suggest that trumpeters experienced a species-wide bottleneck well before the more recent one that occurred in the Twentieth Century. Samples analyzed from the area where PCP and RMP trumpeter breeding ranges are converging (western Yukon Territory) indicated that some genetic exchange has occurred between the populations in that area

### **III. Description of Target Species**

The trumpeter swan is in the avian Order Anseriformes, Family Anatidae and is one of three swan species, all in the genus *Cygnus*, found in North America. It is the largest North American swan, with adults reaching a total length of 1.4 to 1.6 m, wing spans of 2.0 to 2.4 m, and weights of 9.5 to 13.5 kg; males are slightly larger than females (Mitchell 1994, Sibley 2000). Age classes are distinguished by plumage characteristics and coloration of bill, tarsi, and feet, but sexes are monomorphic. Adults (> 2 years old) are entirely white but often have head and neck feathers that are stained a rust color from foraging in mud or iron-rich waters. Their tarsi and webbed feet are black, as is their bill except for a red border on the lower mandible (Banko 1960, Mitchell 1994).

Second-year trumpeters are mostly white but retain some pale gray to brown feathers on head, neck, and body, and their tarsi and feet are yellowish-gray to dull black; their bill is entirely black (Banko and Schorger 1976). Finally, first-year birds, termed “cynets”, are dull gray at hatching, with slightly darker feathers dorsally than ventrally. Their feet and tarsi are gray-pink. Their bills are gray-black distally, becoming dull pink proximally; bills turn black during their first winter. In the Tri-state area (Montana, Idaho, Wyoming), 1.8 to 13 percent of cynets are leucistic with a pale gray wash (Banko 1960, Mitchell 1994).

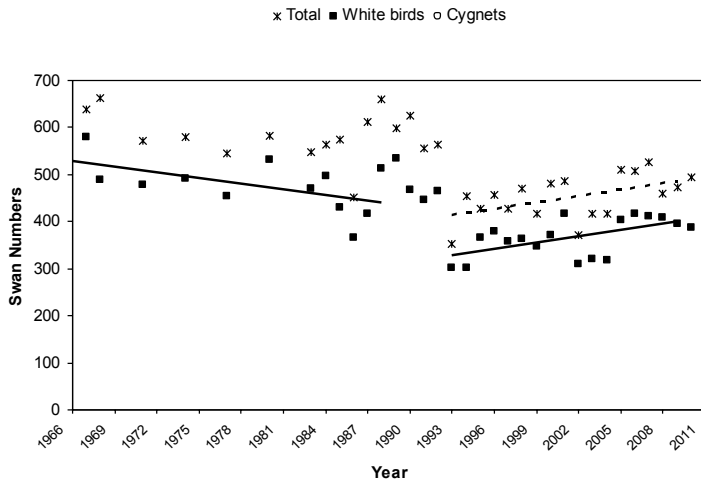


Figure 3. Counts of swans in the RMP/U.S. Breeding Segment during the Fall Trumpeter Swan Survey, 1967-2010 (dotted and solid lines depict trends for total swans and white birds, respectively).

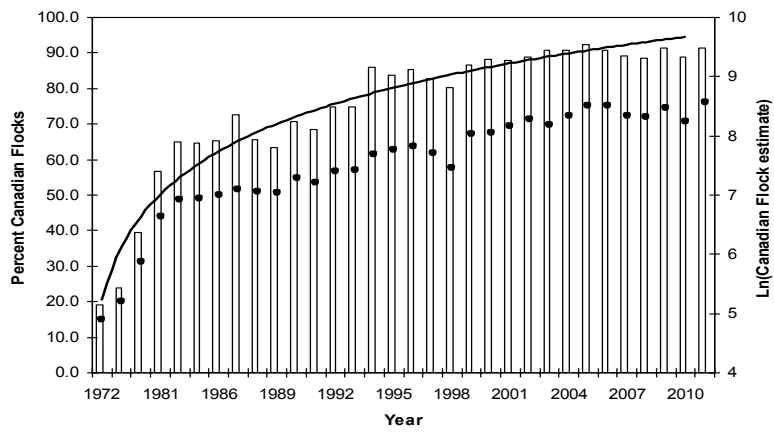


Figure 4. Percent (bars and solid line) and counts (solid dots) of the entire RMP estimated to be comprised of Canadian Flocks during the Mid-winter Trumpeter Swan Survey, 1972-2011.

Trumpeter swans may be difficult to differentiate from tundra swans (*Cygnus columbianus*) in the field if both species are not present, but they can be distinguished by vocal, physical, and behavioral characteristics. Trumpeter swans are best discriminated by voice, with trumpeters having a resonant, loud, low-pitched bugle-like call, while tundra swan vocalizations are high-pitched and often quavering. Trumpeter swans have a longer bill with a straight profile and pointed forehead, as opposed to the concave bill and rounded forehead of the tundra swan (Mitchell 1994). Tundra swans also have yellow lores, but this physical characteristic is variable among individuals. Trumpeter swans frequently bob their head and neck up and down, often giving a variety of vocalizations. This activity becomes especially pronounced when birds are disturbed and just prior to taking flight. Tundra swans do not bob their head and exhibit no pre-flight display.

### **A. Range and Distribution**

#### Historical Range and Distribution

From brief and scattered historical notes and other literary sources, Banko (1960) pieced together the historical distribution of trumpeter swans, and it appears that the trumpeter swan was geographically widespread and abundant across most of North America prior to the 19th century (Figure 5). However, because trumpeter swans disappeared from much of their historic range prior to the period when an interest in the natural history of wildlife species was developing, information from many areas of the trumpeter's breeding range is lacking. Thus, some uncertainty exists in our knowledge of historical swan distribution and abundance. The core of their former breeding range included shallow lake, marsh, and slough wetlands from Alaska east across western Canada to the Hudson Bay lowlands of Manitoba, Ontario, Quebec, and east to Nova Scotia, New Brunswick, and Newfoundland (Hansen et al. 1971, Alison 1975, Lumsden 1984, 1992). At the southern limit of their breeding range, which likely reached from central California across the United States to the Carolinas, populations appear to have been more localized and patchily distributed (Banko 1960, Mitchell 1994). The former wintering range of trumpeter swans included southeastern Alaska down the Pacific coast to southern California, across southern United States through Texas and the Gulf coast to central Florida (Mitchell 1994, Matteson et al. 1995). The northern limit of their wintering range was constrained by access to ice-free waters.

Historical estimates of the size of trumpeter swan populations are lacking, but early accounts from naturalists and records of swan skin sales from trading companies indicate that this species was numerous. In 1709, John Lawson, the Surveyor General of North Carolina, reported that great flocks of trumpeters arrived in the winter and inhabited the freshwater rivers (Banko 1960). John Audubon also wrote about substantial numbers of wintering swans using habitats along the Mississippi River and its tributaries from Ohio to the Gulf of Mexico.

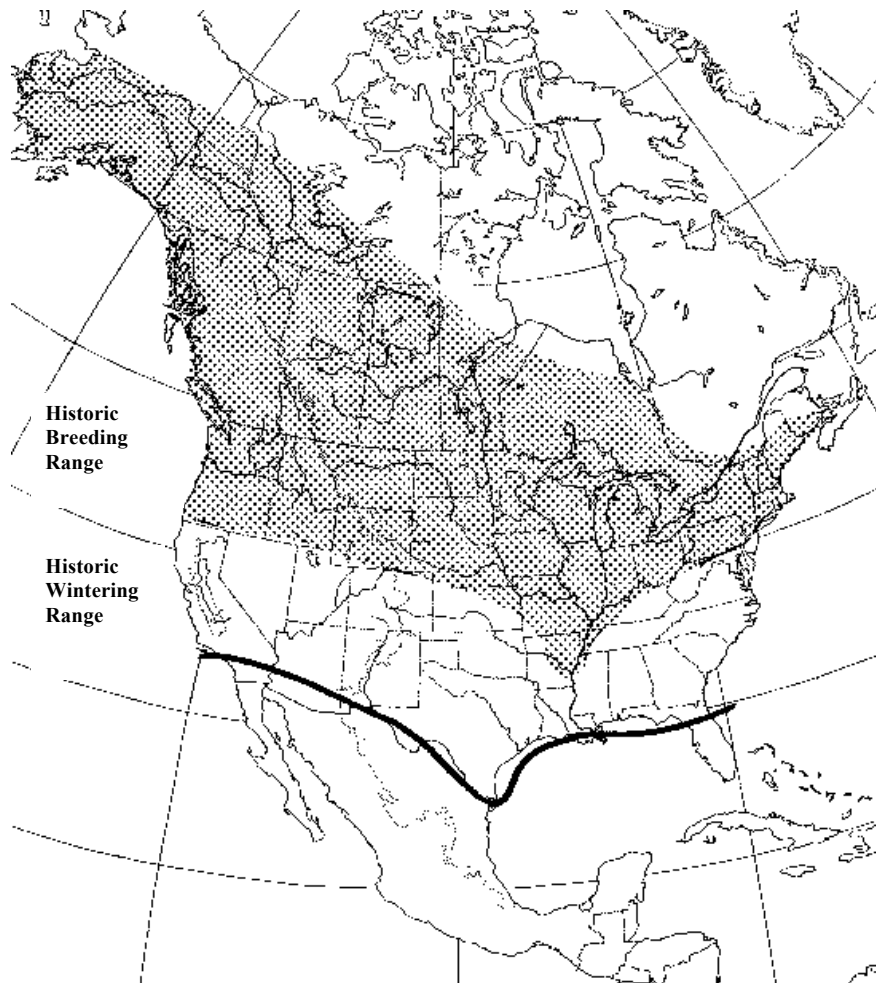


Figure 5. Historic breeding and wintering ranges of trumpeter swans (Matteson et. al. 1995)

The Hudson Bay Company sold thousands of trumpeter swan skins annually, particularly to the London Fur Market, during the late 1800's (Banko 1960). Swan feathers and skins were important commerce items and used for the manufacture of powder puffs, the adornment of women's headwear, and quill pens.

Human exploitation and persecution of trumpeter swans during the 1800's resulted in the extirpation of swan flocks over vast areas of its range (Banko 1960). By the late 1800's, populations were so low that trade in swan skins had become nearly nonexistent; for

example, only 57 swan skins were sold by the Hudson Bay Company to London during the period from 1888-1897 (Banko 1960). In 1932, less than 100 swans remained within the contiguous United States, secluded in the remote high mountain valleys of Montana, Idaho, and Wyoming. Undocumented flocks of unknown size also occurred in uninhabited areas of Alaska and western Canada (Hansen et al. 1971).

In response to the trumpeter swan's precarious status, the United States government established the Red Rock Lakes National Wildlife Refuge (NWR) in Montana's Centennial Valley in 1935. With increased habitat protection and management in Red Rocks NWR and in adjacent Yellowstone National Park, populations increased in this region, and translocations to other NWR's were conducted. By the 1950's, the contiguous United States population had increased to more than 500 birds (Banko 1960).

#### Current Range and Distribution

The USFWS recognizes three regional management groups, based on the geographic areas in which they nest: Pacific Coast Population, Rocky Mountain Population, and Interior Population (Mitchell 1994). Although termed populations, they were not delineated based on biological criteria such as reproductive isolation or genetic differences; rather they were loosely defined by flyways for management purposes (Trost et al. 2000). However, recent genetic analyses identified significant differentiation between the Pacific Coast and Rocky Mountain populations, supporting current management designations (Oyler-McCance et al. 2006). Within each region, management is frequently directed toward subgroups or "flocks" of swans based on a variety of delineations including state and other administrative boundaries.

Trumpeter swans of the Pacific Coast population comprise 72 percent of the total individuals found in North America (Moser 2006). Individuals from this population mainly breed in interior Alaska and coastal areas of south-central Alaska. Trumpeters nesting in western Yukon Territory and northwestern British Columbia are considered part of this population (Moser 2006). The Pacific Coast population is migratory and winters primarily in coastal and interior British Columbia, southeastern Alaska, and along the coast in Washington and northern Oregon (Subcommittee on Pacific Coast Trumpeter Swans 1993).

In the RMP, three subgroups, delineated by breeding areas, are generally recognized. These consist of the Canadian flocks, which includes the Canadian breeding segment; the Tri-state Area flocks, which includes swans nesting in the Greater Yellowstone region of Idaho, Montana, and Wyoming (also referred to as the Tri-state Area or Tri-state Region); and the Restoration flocks, which includes reintroduced flocks in and around Malheur NWR and the Summer Lake Wildlife Management Area in Oregon and Ruby Lakes NWR in Nevada. The Canadian flocks are the largest breeding segment of the Rocky Mountain population, totaling approximately 4,806 individuals (Table 3). Individuals from this flock breed in the central and eastern regions of the Yukon and Northwest Territories south to eastern British Columbia and Alberta, but migrate primarily to the tri-state area for the winter. The Tri-state Area flocks are largely non-migratory and currently numbers around 480 individuals

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 <sup>a</sup>	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

<sup>a</sup> From U.S. Fish and Wildlife Service 2010a. Counts are from the previous calendar year (e.g., the 2009 value is from the Fall 2008 survey).

(Table 3). The Restoration flocks in Oregon and Nevada were established through translocation of Tri-state Area individuals and are non-migratory. These flocks increased to 80 individuals in the 1990's, but they currently number around 40 individuals (Table 2).

#### Current RMP Winter Status

RMP swans can best be counted in midwinter because Canadian and Tri-state flocks largely winter sympatrically in the Tri-state Area. The ability of cooperating agencies to monitor the entire RMP has become more difficult and costly. The population is dispersing to new sites scattered across their winter range, including most western states, and survey costs have increased. Although survey efforts have been conducted since the late 1930s, the USFWS's Midwinter Trumpeter Swan Survey was initiated in 1972 (Figures 6-8) (Table 4). Because Canadian flocks are difficult to survey on their widely dispersed breeding grounds, annual winter estimates of Canadian birds are derived by subtracting the counts from the previous Fall Survey of the U.S. Breeding Segment from the total number of swans counted during the Midwinter Survey (Figures 9) (Table 3).

During the 1980s, a few trumpeters, including marked RMP swans, wintered in California, Colorado, New Mexico, Nevada, Oregon, and Utah (Gale et. al. 1987). Efforts to reduce the number of wintering swans at HSP and RRLNWR in the late 1980s and early 1990s resulted in 1,477 swans from the RMP being translocated to sites in Oregon, southern Idaho, Utah, and southwestern Wyoming. With the exception of Fish Springs NWR, UT and Turnbull NWR in WA, these releases show some signs of swans using new wintering areas and migration routes that may divert swans away from the core Tri-state Area; moderate increases have occurred on American Falls Reservoir in southeastern Idaho, which includes part of the Fort Hall Indian Reservation.

In Wyoming, translocations of wild and captive-raised swans resulted in the establishment of new wintering areas along the Salt River and Green River drainages. While the Salt River remains open in most winters, the winter habitat along the Green River is limited to the 25-30 mile stretch below Fontenelle Dam to Seedskafee NWR that generally remains ice-free. The number of wintering swans on the Salt River increased from 18 in 1990 to 182 in 2011, and in the Green River from 20 in 1998 to 192 in 2011 (Patla 1999-2011).

The majority of Canadian swans continue to migrate south along the East Front of the Rocky Mountains to the core Tri-state Area (Figures 1, 2). A very small number may be migrating southwest across northern Idaho to California; a few others may be migrating southwest across southern Idaho (following the Snake River) to California. The importance of northern Nevada and Utah in providing migration linkages to wintering sites outside the core Tri-state Area currently is unclear.



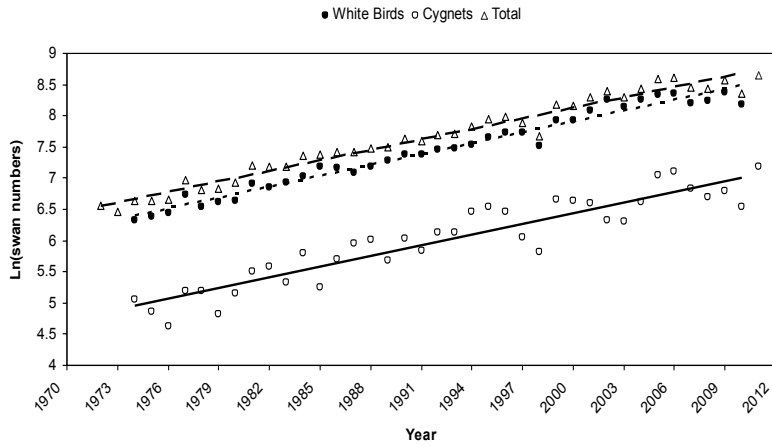


Figure 6. Results of Midwinter Surveys of the Rocky Mountain Population of trumpeter swans in Idaho, Montana, Nevada, Oregon, Utah, and Wyoming, 1967-2011. YNP was not surveyed in 1998 due to weather. (From 2011 Winter Survey, Rocky Mountain Population of Trumpeter Swans, April 2011, USFWS, MBSP, Lakewood, Colorado).

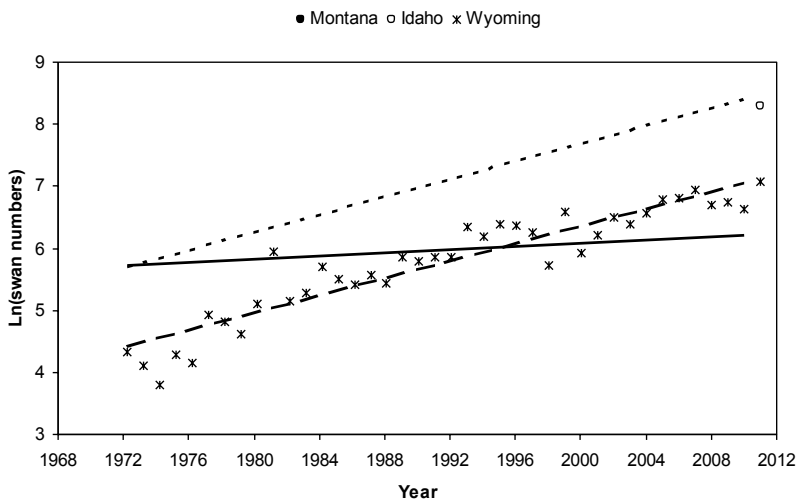


Figure 7. Results of Midwinter Surveys of the Rocky Mountain Population of Trumpeter Swans in Idaho, Montana, and Wyoming, 1972-2011. YNP was not surveyed in 1998 due to weather. (From 2011 Winter Survey, Rocky Mountain Population of Trumpeter Swans, April 2011, USFWS, MBSP, Lakewood, Colorado).

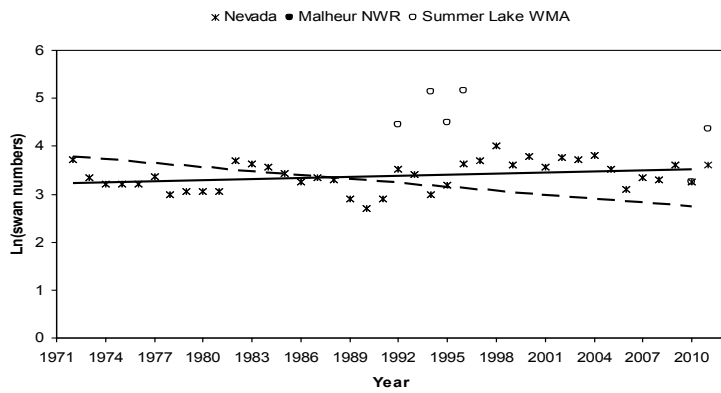


Figure 8. Results of Midwinter Surveys of the Rocky Mountain Population of Trumpeter Swans in Nevada, Malheur NWR, Oregon, and Summer Lake WMA, Oregon, 1972-2011. (From 2011 Winter Survey, Rocky Mountain Population of Trumpeter Swans, April 2011, USFWS, MBSP, Lakewood, Colorado).

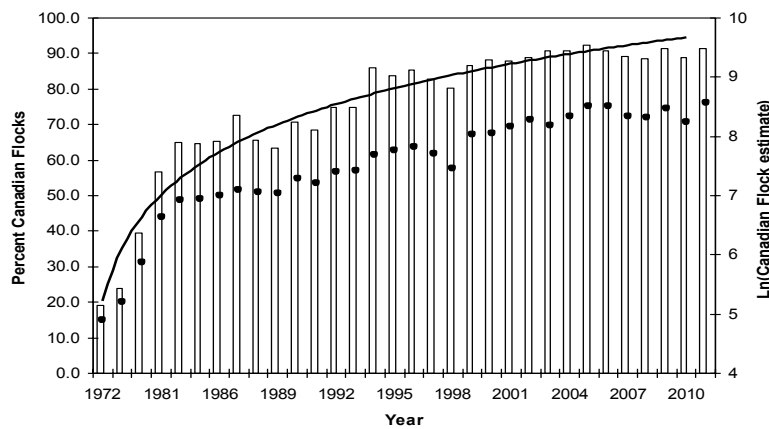


Fig. 9. Percent (bars and solid line) and counts (solid dots) of the entire RMP estimated to be comprised of Canadian Flocks during the Mid-winter Trumpeter Swan Survey, 1972-2011.

Table 4. Counts of trumpeter swans of the Rocky Mountain Population in individual states 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 <sup>h</sup>	664 <sup>h</sup>	3080	700	155	855
2008	382	25	407	2694 <sup>h</sup>	616 <sup>h</sup>	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

<sup>a</sup> Counts not available.

<sup>b</sup> Total counts not separated into white birds and cygnets prior to 1992.

<sup>c</sup> Swans first translocated to Summer Lake WMA in 1992.

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

<sup>e</sup> Count biased low due to incomplete survey coverage.

<sup>h</sup> Counts biased low because 122 birds in 2007 and 11 birds in 2008 not classified as white birds or cygnets.

In response to the range expansion efforts, the Midwinter Survey and the Fall Survey have been expanded to include Gray's Lake NWR and the Snake River from Idaho Falls to Bruneau Dunes State Park (Idaho); the Salt River, Green River, and some sites in the Wind River drainage (Wyoming); Malheur NWR and Summer Lake Wildlife Area and vicinity (southeast Oregon); and Ruby Lake NWR and vicinity (Nevada).

#### Current RMP Summer Status

The RMP/U.S. Breeding Segment is monitored by a coordinated USFWS Fall Survey in the Tri-state Area, along with surveys at Malheur NWR, Ruby Lake NWR and vicinity, and Summer Lake WMA and vicinity (Table 1). In addition, Bear Lake NWR, Grays Lake NWR, Malheur NWR, Ruby Lake NWR, and RRLNWR, and the states of Idaho and Wyoming each year conduct one or more spring/summer surveys and additional ground surveys to document nesting effort and hatching success; the state of Oregon conducts an annual waterfowl breeding population survey that includes swans.

RMP/Canadian flocks in Grand Prairie were surveyed annually in June and September by the CWS from 1959 to 1994. After 1994 and until 2001, the surveys were conducted only in September to determine production estimates for the flock and to identify potential cygnets for relocation to Elk Island National Park (Appendix 1). Regular surveys have been conducted in Elk Island National Park to monitor the reintroduction efforts through 2007. Surveys have been conducted by Alberta Sustainable Resource Development, Fish and Wildlife Division, in selected locations most years during September; these surveys included the Peace River region, the Edson/Whitecourt region, the High Prairie region, the Lac La Biche region, and the Cardston/Pincher Creek/Waterton National Park region (up to and including 2005). These sites as well as others, including Nahanni National Park, are currently surveyed as part of the quinquennial survey (Beyersbergen 2007).

The range-wide North American Trumpeter Swan Survey was initiated in 1968, was completed again in 1975 and has been completed at 5-year intervals since by the USFWS, CWS, cooperating states and provinces, and other partners. This survey is the official range-wide status assessment for trumpeter swans. In most areas, this survey is completed in late summer or fall.

#### RMP Production

During the past 20 years, cygnet production among the Tri-state Area flocks has fluctuated markedly (Figure 10). Production appears to be lower during cool, wet springs or following harsh winters, and higher in warm, dry springs or following mild winters. Since monitoring began in the 1940s, the migratory RMP/Canadian flocks have been more productive per nest attempt than the Tri-state Area flocks (Gale et al. 1987). The Midwinter Survey provides the best annual opportunity to assess total RMP productivity. Annual cygnet recruitment in the RMP/Canadian flocks now exceeds the total size of all Tri-state Area flocks combined. Because most of these birds winter with the Tri-state Area flocks, there is concern that continued growth of the

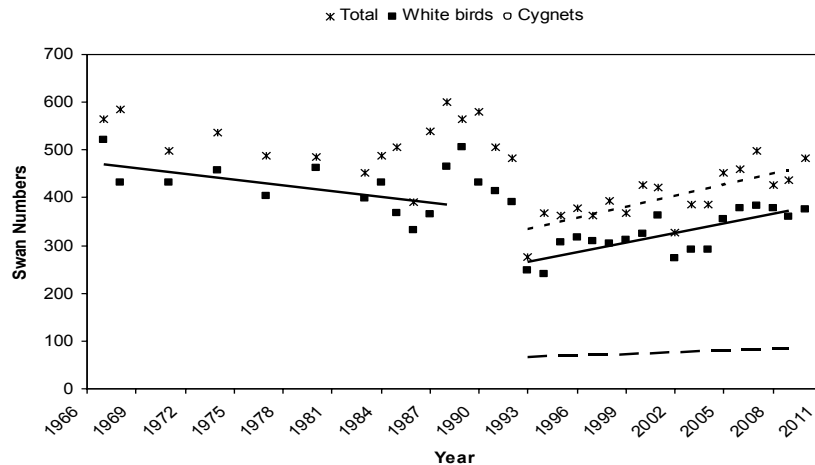


Fig. 10. Counts of swans in the Tri-state Area Flocks during the Fall Trumpeter Swan Survey, 1967-2010 (dotted, solid and dashed lines depict trends for total swans, white birds, and cygnets, respectively).

RMP/Canadian flocks may have an adverse impact on the relatively sedentary Tri-state birds. The RMP/Canadian flocks depart on their northward spring migration during March for lower elevation wetlands to the north, while the resident swans must often wait until May for substantial wetland habitat to become available. If RMP population growth continues, demands on winter and early spring habitat will likely increase without significant redistribution of swans. In 2006, the number of breeding pairs in the RMP/U.S. Breeding Segment exceeded the 1998 plan revision objective by about 15%, but was 49% below the 2013 objectives established in the 2008 Pacific Flyway Plan revision (Subcommittee on Rocky Mountain Population of Trumpeter Swans, 2008).

#### RMP Breeding Distribution

In the U.S., potential breeding habitat has been identified in western Montana and Wyoming; southeastern, western, and northern Idaho; eastern Washington; eastern Nevada; and south-central and southeastern Oregon. In recognition of the need to broaden the distribution of swans nesting in the Tri-state Area and other U.S. locations, cooperative efforts are underway to establish nesting flocks in more areas. An important long-term goal in these efforts is to establish connectivity between existing flocks to increase genetic exchange among flocks. Swans are now nesting at Bear Lake NWR, Grays Lake NWR, and the Fort Hall Indian Reservation (American Falls Reservoir), Idaho; the Flathead Indian Reservation and the Blackfoot River Valley in western Montana; the upper Green River south to and including Seedskadee NWR, Wyoming;

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wetland areas of south-central Oregon; and on the Franklin Lake WMA and Ruby Lake NWR, Nevada.

In Canada during the last decade, distribution has expanded northward and into areas of east-central Alberta, northeastern British Columbia, southeastern Yukon Territory, and Southwestern Northwest Territories. Swans around Cypress Hills Provincial Park in southwestern Saskatchewan were last seen in 1995. Restoration efforts at Elk Island National Park, Alberta, resulted in some yearlings following the tundra swan migration through the Flathead Valley, Montana, and into southern Oregon and northern California. However, the linkage apparently no longer exists. Opportunities to develop other breeding flocks that would winter outside the core Tri-state Area may exist in British Columbia, Alberta, and possibly northwestern Saskatchewan. Currently, swans in eastern Saskatchewan and western Manitoba are considered part of the Interior Population. In British Columbia and the Yukon Territory, the breeding distributions of the RMP and PCP trumpeter swans are converging. The range-wide genetics survey (Oyler-McCance et al. 2006, 2007) suggests some genetic exchange has taken place in the area of convergence.

Some pioneering into vacant breeding habitat may have occurred as swans dispersed from winter release sites. Release of swans into summer habitats which link to wintering areas outside of the core Tri-state Area provide an additional way to disperse RMP swans as successfully demonstrated by the Wyoming Green River and the Idaho Bear Lake expansion projects.

As the RMP/Canadian flocks continue to grow, the numerical importance of the core Tri-state flocks to the entire population will continue to decrease. Additionally, the need for RRLNWR to provide swans for restoration efforts has declined as swans have become available from Canadian and Alaskan flocks. This plan recognizes, however, that current social, historical, and esthetic values of breeding swans in the Tri-state Area, particularly at RRLNWR, YNP, and Grand Teton National Park (GTNP), and in Idaho and Wyoming, likely equal or surpass their biological importance and will continue to do so in the future. The general public, state agencies, and nongovernmental organizations have a very high interest in their local breeding flocks and are determined to preserve them. Management strategies will attempt to maintain nesting trumpeters at RRLNWR and elsewhere in the Tri-state Area where they can exist on natural food sources.

#### **B. Spatial extent of action plan**

The RMP trumpeter swan Focal Species Action Plan is a range-wide plan. It includes the areas of southwestern Montana, northwestern Wyoming and northeastern and southeastern Idaho as well as potential habitats in Nevada, south-central Oregon, eastern Washington, northwestern Montana, and Utah.

### **IV. Population Status**

#### **A. Legal or Priority status**

The trumpeter swan is listed as a “high priority” level I species for Partners in Flight (PIF), Northern Rockies Bird Conservation Region 10, which includes the states of Montana, Wyoming, and Idaho. The swan has been listed as a species of concern in State Wildlife Action Plans for Montana, Wyoming, and Idaho. Specifically for Idaho, the swan is listed as “critically imperiled” for its breeding status and “imperiled” as a non-breeding bird. Both U.S. Forest Service and Bureau of Land Management plans in Montana, Wyoming, and Idaho list the swan as a sensitive species or species of special concern.

## **B. Known or suspected limiting factors**

### Winter Distribution and Habitat

Although the winter distribution of the RMP has expanded somewhat since 1998, managers believe it too restrictive to provide for continued population growth. Studies to date have not been able to identify factors that are limiting the birds’ ability to expand their distribution. Restricted winter distribution may contribute to high winter cygnet mortality and could depress productivity in adults, particularly for resident swans that remain on these sites until immediately prior to nesting (Gale et al. 1987). High concentrations of swans and other waterfowl in the Henrys Fork area continue to have the potential to damage both aquatic vegetation and, thus, fish habitat by their intense feeding on submerged macrophytes during the winter. RMP swans are doing well overall, increasing at an annual rate of 5.5% from 1972 to 2010 (USFWS 2011). However, the trend for the RMP/U.S. flocks was only a 1.6% average annual increase from 1993-2009 (USFWS 2010 – Fall Report). Without a concomitant increase in winter habitats to allow greater dispersion of the wintering swans, these habitats will likely limit overall growth of the population. An assessment of the availability of additional suitable wintering areas continues to be a priority need.

### RMP Winter Mortality

There is no consistent monitoring program to detect mortality across the Tri-state Area. Wyoming documented 176 swan mortalities from 1991 through April 2006 (Sue Patla, pers. comm.). Most mortalities have occurred during winter and early spring. Of the mortalities that could be aged ( $n = 165$ ), 59% were adults, 11% were yearlings, and 30% were cygnets. Cause of death could not be determined on 72% of the birds. When cause of death could be determined, most swans died from collisions or predation. Body condition was generally poor, suggesting difficulty in finding food. Observations of 99 trumpeter swan mortalities during the winters of 2000-2001 through 2002-2003 in southwestern Montana, eastern Idaho, and northwestern Wyoming were summarized by C. Whitman (unpublished report). Of the 99 swans, 36 died of undetermined causes. Of the remaining 63, 43% ( $n = 27$ ) died as the results of collisions. Nineteen were adults and 8 were cygnets. The next most significant mortality factor was lead poisoning, to which the deaths of 9 (14%) were attributed. Three of the dead swans had lead shot pellets in their gizzards. Another 11% ( $n = 7$ ) of swan mortalities was attributed to predation by coyotes: All were cygnets. Other causes of swan deaths reported included

emaciation, bumble foot, aspergillosis, gunshot wounds, sarconema, fish-hook ingestion, cancer, aflotoxicosis, neck collar injury, and unknown disease.

Documented losses of high numbers of RMP swans have not been common. One exception was a significant mortality event that occurred during winter 1991-1992 at Fish Springs NWR, Utah. Of 36 swans wintering on the refuge, 28 died. Necropsies by the National Wildlife Health Center, USFWS (now a part of U.S. Geologic Survey) identified a systemic protozoan infection by an organism similar to *Histomonas* sp. to be the apparent cause. In February 1992, the 8 remaining swans were euthanized to prevent their dispersal from Fish Springs. At least 5 of these also were infected and showed evidence that they were recovering. Because of this event, additional translocations of trumpeter swans to Fish Springs NWR have not been attempted.

#### RMP/U.S. Breeding Segment Breeding Distribution

The current breeding distribution of RMP/U.S. Breeding Segment remains restricted. Because most swans do not migrate out of the core Tri-state Area, they contribute to the problems at principal wintering areas in eastern Idaho and provide one of the main justifications for desiring to develop a migratory population. A significant increase in the tendency of swans to migrate has not been observed. Expanding nesting and migration areas in a stepwise fashion to maintain or improve connectivity among breeding flocks would facilitate genetic diversity within the RMP and hopefully result in nesting aggregations that are more likely to winter outside of the core Tri-state Area.

Assessment of suitable breeding habitat within the range of the RMP/U.S. Breeding Segment and development of new partnerships is needed. Assessment work could be initiated in Idaho, Montana, Wyoming, Oregon, Nevada, Utah, Washington, and Colorado. As additional breeding areas are developed, some additional pioneering by swans is expected.

#### Yellowstone National Park

Since 1977, the park has supported relatively low and decreasing numbers of nesting pairs (median = 7, range = 2-17) and fledglings (median = 3, range = 0-12), while the abundance of the Rocky Mountain population has increased from <1,000 to >5,000 swans (McEneaney 2006, U.S. Fish and Wildlife Service 2011). Thus, it does not appear that the improved status of the RMP in general has benefited YNP. The YNP provides limited and temporary winter habitat for migrant swans due to limited sections of ice-free water that diminish as winter progresses (McEneaney 2006).

Counts of resident, adult trumpeter swans in YNP decreased from a high of 69 in 1961 to only 2 in 2010. Causes of this relatively consistent decrease are unknown, but may include decreased immigration, competition with migrants, and effects of sustained drought and predation on productivity (McEneaney 2006).



The general principles for managing biological resources in national parks direct managers to rely upon natural processes to maintain native species and influence natural fluctuations in populations of those species (National Park Service 2006). Thus, managers may intervene to manage individuals or populations of native species only when such intervention will not cause unacceptable effects to the populations or other components and processes of the ecosystems that support them. Managers at YNP identified the trumpeter swan as a native Species of Special Concern, listed them as a priority in the YNP's Strategic Plan, and established a Government Performance and Results Act goal to improve or stabilize the status of trumpeter swans from the 20 resident adults, 7 nesting pairs, and 2 cygnets fledged in 2000 (National Park Service 2000).

#### Grand Teton National Park

In recent years, GTNP has continued to provide habitat for nesting and wintering swans. From 1996-2007, nesting pairs in GTNP comprised 30-40% of the total number of occupied nest sites in the core Snake River area (Patla 1999-2007) or 23% of all occupied sites in western Wyoming outside of YNP ( $n = 4-7$  occupied nesting territories per year). Over the same period, pairs in GTNP have fledged an average of 3.2 cygnets per year, accounting for 14% of production in western Wyoming. Production is highly variable, ranging from 0 to 9 cygnets fledged. Numbers of subadult swans that utilize Jackson Lake and reaches of the Snake River in the summer have been increasing in recent years, indicating a potential need for additional nest sites in the future. Between 40 and 80 swans winter in GTNP along the main Snake River channel as well.

Although 11 different nest sites have been used over the last 14 years, and a few new sites have been established, swan pairs are no longer using some traditional sites that had been occupied for decades. Water levels have decreased substantially at some sites due to drought or undetermined causes. In addition, increased human activities and predation may be affecting occupancy and productivity at some sites. Site-specific assessments need to be completed for historic sites that are now unoccupied and sites with low productivity to identify limiting factors. Once those factors are determined, management actions should be implemented where possible to improve occupancy and production (Pacific Flyway Council 2002).

Because of the historic significance of trumpeter swans in the Greater Yellowstone Area, the number of swans using GTNP, and the great interest by park visitors in swans, GTNP considers the trumpeter swan a Species of Special Concern. The park listed them as a priority species in their resource management plan (National Park Service 1995), and has established a Government Performance and Results Act (GPRA) goal to maintain, if not improve, trumpeter swan productivity in GTNP. Other GTNP goals for swan management include protection of known nest sites from human disturbance, educating the public about swans, and monitoring nest occupancy and productivity.

#### Spring Pre-breeding Habitat and Summer Habitat for Non-breeders

The requirements for and availability of these habitats is poorly understood. If there are deficiencies, they may adversely impact productivity and recruitment. Due to their migratory movements, the RMP/Canadian flocks apparently have better access to these habitats after they leave wintering grounds, which may be an important factor in their being more productive than the RMP/U.S. flocks.

#### Habitat Loss and Disturbance

Rapid increases in human populations and development in the Greater Yellowstone Area and elsewhere in the RMP swan range are a growing concern. Habitat destruction and fragmentation are threatening swan habitats. Protection of core nesting, migration, and winter habitats is becoming more and more important.

#### Power Line Collisions, Lead Poisoning, other Contaminants, Illegal Shooting, and Disease

A consistent approach to risk assessment and mitigation of swan collisions with power lines, wind turbines, communications towers, and other structures should be developed and be included in any swan management project.

Losses of swans to lead poisoning continue. Increased emphasis on investigation of losses and sources is desirable. Assessment of potential hazards due to lead poisoning or other contaminants, such as mercury, should be included in any habitat assessment or habitat project.

Although significant losses of swans to avian diseases such as botulism and cholera have not been reported in RMP range, they remain a concern. West Nile Virus has resulted in the mortality of a number of migratory bird species in recent years, but the impact on trumpeter swans is unknown. In other parts of the world, avian influenza has killed individuals of some swan species, suggesting they are susceptible to the H5N1 strain.

Although documentation is limited, illegal shooting with rifles appears to be more common than with shotguns and is not typically associated with hunting of migratory birds. Reporting and compilation of swan mortality from all sources should be improved.

#### Genetic Diversity

Trumpeter swans appear to have much lower mitochondrial DNA variability than other waterfowl studied thus far (Oyler-McCance et al. 2006, 2007). Genetic diversity and relationships should be a planning consideration for all restoration projects and a consideration for captive breeding stocks.

### **V. Population Objectives**

The management goal is to restore the RMP as a secure and primarily migratory population, with a 5% average annual growth in numbers of wintering birds, sustained by naturally-occurring and agricultural food resources in diverse breeding and wintering

sites with a long range goal of achieving connectivity between flocks. The annual growth rate was 5.4% for the period 1968-2005 for the entire RMP and 7.4% from 2000-2005 for the RMP/Canadian flocks.

## **VI. Information Needs**

### **A. Adequacy of existing monitoring programs**

The ability to monitor the entire RMP and assess progress toward achieving the goal and objectives of this plan is becoming more difficult as (1) the population is dispersing to new sites in both breeding and wintering areas and is scattered across a broader geographic area in Canada and most western states, and (2) funding for surveys has been reduced in Canada and the U.S. survey costs continue to increase in both countries so that maintenance of surveys in breeding and wintering areas is increasingly more difficult.

## **VII. Priority Action Items**

**Goal 1: Expand distribution of wintering swans to areas outside of the core Tri-state Area, while maintaining the habitat quantity and quality in traditional core areas.**

**Objective 1.1.** Encourage swans to migrate to wintering areas outside of the core Tri-State Area, especially outside of HSP.

**Priority:** High, Ongoing      **Estimated Objective Cost: \$30,000**

**Potential Partner(s):** Idaho Department of Fish and Game, Idaho Department of Parks and Recreation, USFWS, BOR

**Task 1.1.1** Monitor waterfowl use of HSP and other concentration areas on a routine basis during fall and winter months. **Estimated Task Cost: \$12,000.00**

Lead Agencies: Idaho Department of Fish and Game

**Task 1.1.2** Continue to maintain reduced fall and early winter swan habitat on HSP by manipulating water levels while giving consideration to fisheries, irrigation, and hydropower concerns. Manage water levels of Silver and Golden lakes to encourage early freezing and reduce the availability of feeding and resting sites. Refill both lakes by March 1 to maximize late-winter foraging habitat. **Estimated Task Cost: \$9,000.00**

Lead Agencies: Idaho Department of Parks and Recreation

**Task 1.1.3** Encourage the U. S. Bureau of Reclamation (BOR) to maintain lower flows on the Upper Henrys Fork in the fall to reduce habitat available for migrating swans and to store water for emergency mid-winter releases **Estimated Task Cost: \$9,000.00**

Lead Agencies: Idaho Department of Fish and Game

**Objective 1.2.** Work with partners to protect, enhance, and increase trumpeter swan winter habitat.

**Priority:** High, Ongoing      **Estimated Objective Cost: \$200,000.00**

**Potential Partner(s):** USFWS; Idaho Department of Fish and Game; Montana Department of Fish, Wildlife, and Parks; Wyoming Game and Fish Department  
The Trumpeter Swan Society, Intermountain West Joint Venture

**Task 1.2.1** Identify and prioritize additional areas outside the core Tri-state Area with suitable habitat to support wintering trumpeter swans.

**Estimated Task Cost: \$150,000.00**

Lead Agencies: USFWS; Idaho Department of Fish and Game; Montana Department of Fish, Wildlife, and Parks; Wyoming Game and Fish Department

**Task 1.2.2** Identify and address specific factors limiting swan use of winter habitats, including disturbance and site-specific mortality factors such as power lines, lead poisoning, fences, etc. **Estimated Task Cost: \$50,000**

Lead Agencies: USFWS; Idaho Department of Fish and Game; Montana Department of Fish, Wildlife, and Parks; Wyoming Game and Fish Department

**Goal 2: Rebuild U.S. breeding flocks by year 2013 to at least 165 nesting pairs (718 adults and subadults) that use natural, diverse habitats as follows:**

Location	Nesting pairs <sup>a</sup>	Adults and subadults <sup>b</sup>
Montana		
Centennial Valley	19	140
Madison, Paradise	15	65
Blackfoot, East Front	10	25
Flathead Drainage	15	60
Total	59	290
Wyoming		
Yellowstone National Park	10	40
Snake River core	18	60
Green River	16	53
Salt River	2	7

Location		Nesting pairs <sup>a</sup>	Adults and subadults <sup>b</sup>
	Total	46	160
Idaho			
Island Park		10	60
Henry's Fork Drainage		6	30
Teton Basin		2	10
Fort Hall Bottoms		3	15
Bear Lake NWR		5	25
Grays Lake NWR		10	30
Camas County		1	5
	Total	37	175
Oregon			
Malheur NWR/Harney County		5	25
Central Oregon		10	50
	Total	15	75
Nevada			
Ruby Lake NWR		8	18
	Total	8	18
	Grand Total	165	718

<sup>a</sup> The criterion nesting pair is defined as a swan pair that is displaying evidence of nesting (e.g., nest building, incubation, brooding posture, visible eggs); it may require on-the-ground verification. It provides more accurate information on reproductive activity than does breeding pairs, but it may not always be available because of the need for verification.

<sup>b</sup> White birds only, counted during the Fall Survey of the RMP/U.S. Breeding Segment.

**Objective 2.1** Increase the size and productivity of the Tri-state Area flocks by providing adequate nesting, brood-rearing, spring transitional habitats for breeding pairs, and summer habitat for subadults.

**Priority:** High, Ongoing      **Estimated Objective Cost:** \$280,000.00

**Potential Partner(s):** USFWS; Idaho Department of Fish and Game; Montana Department of Fish, Wildlife and Parks; Oregon Department of Fish and Wildlife; Nevada Department of Wildlife; Utah Division of Wildlife Resources; Washington Department of Fish and Wildlife; Wyoming Game and Fish Department, National Park Service, U.S. Forest Service, Bureau of Land Management, The Trumpeter Swan Society, Confederated Salish and Kootenai Tribes, Greater Yellowstone Trumpeter Swan Working Group.

**Task 2.1.1** Update current and potential pre-breeding and nesting habitat information and develop a state-by-state landscape-level planning strategy to facilitate prioritization and implementation of Objective 2.1.

**Estimated Task Cost:** \$270,000.00

The current priority areas by state are:

Idaho: Gray's Lake NWR, Bear Lake NWR, Camas NWR, Chester Wetlands WMA, Mud lake WMA, Fort Hall Bottoms, Sand Creek WMA, Minidoka NWR, Kootenai NWR, Boundary Creek WMA, Teton Valley  
Montana: Flathead Indian Reservation, Upper Blackfoot River Valley, Madison Valley, Bureau of Land Management (BLM) in the Centennial Valley  
Oregon: Malheur NWR, Summer Lake WMA, Klamath Marsh, Agency Lake  
Nevada: Ruby Lake NWR, Franklin Lake WMA, and assess other potential sites  
Utah: Assess potential at Ouray NWR, Fish Springs NWR, and other sites  
Washington: Assess potential in Eastern Washington  
Wyoming: YNP, Green River Basin including Seedskaadee NWR, Jackson Hole including the National Elk Refuge and GTNP, Salt River, Gros Ventre River, Hamm's Fork, Bear River and Cokeville Meadows NWR

Lead Agencies: USFWS; Idaho Department of Fish and Game; Montana Department of Fish, Wildlife and Parks; Oregon Department of Fish and Wildlife; Nevada Department of Wildlife; Utah Division of Wildlife Resources; Washington Department of Fish and Wildlife; Wyoming Game and Fish Department

**Task 2.1.2** Work cooperatively with all U.S. partners to standardize habitat evaluation procedures. **Estimated Task Cost: \$10,000.00**

Lead Agencies: Greater Yellowstone Trumpeter Swan Working Group

**Goal 3: Monitor the population during nesting, post-breeding, and mid-winter periods.**

**Objective 3.1** Continue existing monitoring programs to evaluate the status of the population and effectiveness of management actions.

**Priority:** High, Ongoing      **Estimated Objective Cost: \$315,000 (with Task 3.1.1)**  
**Estimated Objective Cost: \$65,000 (without Task 3.1.1)**

**Potential Partner(s):** Pacific Flyway Council, USFWS, CWS, Idaho Department of Fish and Game; Montana Department of Fish, Wildlife and Parks; Wyoming Game and Fish Department; Oregon Department of Fish and Wildlife; Nevada Department of Wildlife; Confederated Salish and Kootenai Tribes; Alberta Sustainable Resource Development; British Columbia Ministry of Environment

**Task 3.1.1** Conduct the RMP portion of the Continental Survey of breeding trumpeter swans at 5 year intervals and report the results within 9 months of the conclusion of the survey. **\*Estimated Task Cost: \$250,000**  
***\*Note, this cost will occur once every 5 years***

Lead Agencies: USFWS, CWS, NPS

**Task 3.1.2** Survey the RMP/U.S. Breeding Segment in mid-September to estimate the abundance of swans and to assess production. Report the results annually 60 days after completion of the survey. **Estimated Task Cost: \$25,000**

Lead Agencies: USFWS, Regions 6 (primary lead) and 1; National Park Service; Wyoming Game and Fish Department; Oregon Department of Fish and Wildlife

**Task 3.1.3** Survey the RMP during winter to estimate abundance of swans and assess production. Report the results annually 60 days after completion of the survey. **Estimated Task Cost: \$25,000**

Lead Agencies: USFWS, Regions 6 (primary lead) and 1; National Park Service; Wyoming Game and Fish Department; Oregon Department of Fish and Wildlife

**Task 3.1.4** Review the design of the quinquennial survey to evaluate the potential for a more cost efficient survey as breeding ranges continue to expand and costs increase. **Estimated Task Cost: \$15,000**

**Goal 4: The Pacific Flyway Council encourages member States, Provinces, and Territories, USFWS, CWS, and all other partners concerned or interested in RMP trumpeter swan conservation to actively pursue funding to address priority research and information needs.**

**Objective 4.1** Develop and maintain a prioritized list of research and information needs.

**Priority:** High, Ongoing      **Estimated Objective Cost: \$275,000**

**Potential Partner(s):** Pacific Flyway Council, USFWS, Idaho Department of Fish and Game; Montana Department of Fish, Wildlife and Parks; Wyoming Game and Fish Department; Oregon Department of Fish and Wildlife; Nevada Department of Wildlife; Confederated Salish and Kootenai Tribes;

**Task 4.1.1** Ascertain the seasonal movements of Canadian and Tri-state trumpeter swans using satellite tracking of transmitters. **Estimated Task**

**Cost: \$200,000.00**

**Task 4.1.2** Obtain and analyze genetic sample from RMP/restoration flocks and other groups of swans that were not included in the recent genetics study. **Estimated Task Cost: \$75,000.00**

**Task 4.1.3** Develop needs assessment and objectives for an operational banding program to capture, leg-band and mark a representative sample of RMP trumpeter swans. Develop, maintain, and enhance a comprehensive database of encounters that can be used to help assess management programs. **Estimated Task Cost: \$ 5,000.00 - \$12,000.00 annually for up to 7 years**

### **Agency Responsibilities**

The bulk of the funding for RMP conservation and range expansion has been provided by the USFWS. However, significant funding, both in cash payments and in-kind match, have been provided by the Wyoming Wetland Society, BOR, the Henrys Fork Watershed Council, the Henrys Fork Foundation, The Trumpeter Swan Society, the Confederated Salish and Kootenai Tribes, the Blackfoot Challenge, and the states of Wyoming, Oregon, and Idaho, with in-kind contributions provided by the states of California, Montana, Nevada, Utah, and Wyoming primarily for monitoring color-marked swans and assessing habitat.

All agencies concerned with the RMP should provide personnel and equipment to help implement management projects. This support is needed for, but not limited to, the capture and transport of swans to release sites, surveys, and monitoring of the population. The following are the major ongoing tasks (in order of priority) and recommended agency involvement:

1. **Monitoring** - Monitoring of the entire RMP during winter months is a high priority. Population size and winter distribution data are essential in order for the subcommittee to assess progress toward reaching the Management plan's goal and objectives.
2. **Surveys** - Several surveys have evolved for monitoring population trends and distribution of RMP trumpeter swans. The USFWS is responsible for coordinating efforts and reporting survey data. The following are ongoing surveys and participants.
  - a. Breeding Flock Surveys - USFWS coordinates nesting data gathered by states, federal agencies, and other cooperators.
  - b. Fall Survey of the RMP/U.S. Breeding Segment to estimate the total number of swans and production. This survey is coordinated by the USFWS with assistance from states with breeding flocks and other partners.



- c. Midwinter Survey of the RMP to estimate total number of swans and production. This survey is coordinated by the USFWS with assistance from the states and other partners.
  - d. Quinquennial North American Trumpeter Swan Survey to estimate the continental abundance of trumpeter swans. This survey is coordinated by the USFWS with assistance from the states, CWS, Canadian provinces and territories, The Trumpeter Swan Society, and other partners.
1. Captive breeding and releases – Recent efforts to hatch trumpeter swan eggs in captivity and to release birds produced as cygnets or yearlings has been successful in establishing trumpeter swans in several new areas. The USFWS and the Wyoming Wetland Society (WWS) have led this effort with birds being produced at the WWS facility near, Jackson, Wyoming. The areas below are currently receiving birds from this effort or are approved as release sites. They are listed in priority order. Additional locations must be assessed, endorsed by the Pacific Flyway RMP Trumpeter Swan Subcommittee and the Pacific Flyway Study Committee, and approved by the Council before swans may be released there.
- a. Flathead Reservation, Montana began releasing birds in 2002 and will continue to receive birds. Funding for this effort is being provided by the Salish-Kootenai Tribes.
  - b. Blackfoot River, Montana began receiving birds in 2005 and will continue to receive birds. Funding for this effort is being provided by the Blackfoot Challenge, Montana FWP, and USFWS.
  - c. Fort Hall Bottoms, Idaho began receiving birds in 2007 and will continue to receive birds. Funding for this effort is being provided by the USFWS.
  - d. Summer Lake, Oregon, was a translocation site in the early 1990s under a Pacific Flyway Council-approved plan to enhance Oregon's trumpeter swan population (Ivey and Carey 1989). This location was approved as a release site by the Council in March 2008.

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## VIII. Appendix

Appendix 1. Results of the Canadian Wildlife Service's late summer surveys of the Grand Prairie, Rocky Mountain Population trumpeter swan flock, 1959-2005.<sup>a</sup>

Year	Total no. lakes surveyed	Pairs with cygnets	Single and flocked			Total cygnets	Total flock
			Total pairs	adults	Total adults		
1959	37	10	18	51	87	40	127
1960	36	9	14	42	70	38	108
1961	38	12	16	57	89	41	130
1962	39	8	19	35	73	36	109
1963	41	9	14	62	89	27	116
1964	38	7	16	58	90	14	104
1965	42	2	23	18	64	5	69
1966	42	7	21	19	61	24	85
1967 <sup>b</sup>	42	7	20	4	44	24	68
1968	47	11	22	32	75	31	106
1969	43	6	13	47	73	13	86
1970	54	9	14	48	76	24	100
1971	55	11	24	31	78	36	114
1972	57	10	23	21	67	37	104
1973	60	19	29	11	68	55	123
1974	71	13	28	43	98	49	147
1975	79	12	31	22	84	37	121
1976	103	14	36	8	80	41	121
1977	113	25	31	26	88	80	168
1978	141 (14)	20 (0)	36 (3)	59 (0)	133 (6)	72 (0)	203 (6)
1979	123 (13)	17 (1)	41 (4)	15 (0)	97 (8)	58 (3)	155 (11)
1980	107 (13)	21 (2)	36 (3)	55 (5)	127 (11)	64 (8)	191 (19)
1981	110 (14)	21 (2)	39 (3)	80 (4)	158 (10)	74 (10)	232 (20)
1982	118 (13)	20 (1)	35 (6)	97 (0)	167 (12)	65 (2)	232 (14)
1983	159 (13)	23 (2)	58 (7)	38 (0)	154 (14)	68 (9)	222 (23)
1984	157 (0)	37 (0)	63 (0)	97 (0)	225 (0)	118 (0)	341 (0)
1985	174 (30)	25 (4)	53 (10)	85 (0)	191 (20)	93 (16)	284 (36)
1986	192 (79)	33 (8)	57 (14)	109 (3)	223 (31)	124 (24)	347 (55)
1987	194 (0)	29 (0)	52 (0)	178 (0)	282 (0)	101 (0)	383 (0)
1988	190 (0)	32 (0)	56 (0)	177 (0)	289 (0)	112 (0)	401 (0)
1989	190 (0)	28 (0)	63 (0)	161 (0)	287 (0)	81 (0)	368 (0)
1990	164 (70)	30 (5)	67 (20)	99 (6)	233 (46)	88 (21)	321 (67)
1991	170 (0)	34 (0)	56 (0)	57 (0)	169 (0)	98 (0)	267 (0)
1992	171 (19)	53 (5)	78 (7)	92 (0)	248 (14)	211 (20)	459 (34)
1993	142 (0)	37 (0)	62 (0)	141 (0)	265 (0)	128 (0)	393 (0)
1994	149 (0)	32 (0)	58 (0)	196 (0)	312 (0)	107 (0)	419 (0)
1995	191 (55)	32 (5)	71 (17)	202 (3)	344 (37)	103 (14)	447 (51)
1996	172 (0)	26 (0)	64 (0)	140 (0)	268 (0)	86 (0)	354 (0)
1997	128 (0)	20 (0)	52 (0)	80 (0)	184 (0)	69 (0)	253 (0)
1998	124 (0)	36 (0)	28 (0)	23 (0)	151 (0)	123 (0)	274 (0)
1999	182 (0)	46 (0)	80 (0)	117 (0)	277 (0)	136 (0)	413 (0)
2000	329 (81)	59 (12)	112 (27)	180 (8)	404 (62)	204 (39)	608 (101)
2001	43 (0)	12 (0)	22 (0)	205 (0)	249 (0)	41 (0)	290 (0)
2002	20 (0)	5 (0)	7 (0)	25 (0)	49 (0)	26 (0)	75 (0)
2003							
2004							
2005	259 (98)	96 (14)	112 (34)	267 (32)	703 (128)	310 (46)	1013 (174)

<sup>a</sup> Data were assembled by G. Beyersbergen, G. Holton, L. Shandruk, and B. Turner, from the original CWS flight reports. Since 1978, most surveys have included contiguous portions of British Columbia. Therefore, to aid between-year comparisons, the data since 1978 are presented in the format: Alberta survey results (British Columbia survey results).

<sup>b</sup> Incomplete/ partial surveys 2001 and 2002. No surveys 2003-2004.

Appendix 2. Status of Rocky Mountain Population trumpeter swan flocks as determined by summer, range-wide surveys in 1985, 1990, 1995, 2000, 2005 (Moser 2006).

Location	1985			1990			1995			2000			2005		
	Adults	Cygnets	Total	Adults	Cygnets	Total	Adults	Cygnets	Total	Adults	Cygnets	Total	Adults	Cygnets	Total
California (Lake Klamath)							2	0	2	0	0	0	0	0	0
Idaho	83	27	110	102	28	130	118	21	139	102	40	142	136	22	158
Montana	212	87	299	245	108	353	86	17	103	127	24	151	112	40	152
Nevada (Ruby Lakes NWR)	23	3	26	8	4	12	15	5	20	26	2	28	17	0	17
Oregon	36	2	38	19	7	26	47	6	53	22	5	27	32	8	40
Washington	9	1	10	3	0	3	2	0	2	1	0	1	0	0	0
Wyoming	73	25	98	95	11	106	105	17	122	95	38	133	107	36	143
U.S. flocks subtotal	436	145	581	472	158	630	375	66	441	373	109	482	404	106	510
Alberta	228	112	340	306	160	466	563	216	779	668	327	995	1173	558	1731
British Columbia	59	27	86	190	104	294	227	83	310	246	123	369	576	203	779
Northwest Territories	51	24	75	124	64	188	161	59	220	204	96	294	327	88	415
Saskatchewan	4	2	6	2	1	3	1	0	1	0	0	0	0	0	0
Yukon	87	20	107	136	30	166	<b>493<sup>a</sup></b>	<b>273<sup>a</sup></b>	<b>766<sup>a</sup></b>	1057	469	1526	1194	599	1793
Canadian flocks subtotal	429	185	614	758	359	1117	1445	631	2076	2175	1015	3184	3270	1448	4718
RMP summer total	865	330	1195	1230	517	1747	1820	697	2517	2548	1124	3666	3674	1554	5228

<sup>a</sup> A new survey was designed in 1995 with the following objectives: (1) allow estimation of the total number of trumpeter swans in the Yukon with 95% confidence limits of plus or minus 30%; (2) determine the growth of the population at 5-year intervals; (3) document the range expansion; and (4) achieve these objectives with a relatively stable amount of resources (i.e., not require resources to greatly increase as the population increases). A stratified random sample design was chosen patterned after the Alaska trumpeter swan survey, using National Topographic Survey 1:50,000 map sheets as the sample units. All suitable habitat was searched, if feasible, on each selected map sheet. The data collected were then used to produce an estimated population of trumpeter swans in the Yukon (Pacific Coast and Rocky Mountain Population separated). Therefore, the figures shown in bold represent an estimated population size rather than the actual number of birds observed and an exact comparison with previous years is not possible.

