

June 22, 1992

TO: MANAGERS/BIOLOGISTS CONCERNED WITH RMP TRUMPETER SWAN
FROM: TIM BRITT, RMP TRUMPETER SWAN SUBCOMMITTEE *AB*
SUBJECT: REVIEW OF RMP TRUMPETER SWAN PLAN

ENCLOSED IS THE REVISED DRAFT RMP TRUMPETER SWAN PLAN FOR YOUR REVIEW. THIS DRAFT INCORPORATES COMMENTS RECEIVED ON THE ORIGINAL DRAFT PLAN. WE WOULD APPRECIATE RECEIVING YOUR COMMENTS ON THIS DRAFT AS SOON AS POSSIBLE. PLEASE CALL OR FAX ANY COMMENTS ON THIS DRAFT TO TIM BRITT, (307) 856-1290 OR FAX (307) 856-1108 OR RUTH SHEA (208) 754-8756 OR FAX (208) 523-7604. WE NEED TO RECEIVE COMMENTS BY JULY 3 IN ORDER TO FINALIZE THE DRAFT FOR REVIEW AT THE JULY FLYWAY MEETINGS. IF YOU HAVE QUESTIONS CALL RUTH OR MYSELF.

THANKS FOR YOUR EFFORTS IN REVIEWING THIS DOCUMENT.

MANAGEMENT PLAN FOR THE
ROCKY MOUNTAIN TRUMPETER SWAN POPULATION

REVISED JULY 1992

Prepared by the RMP Trumpeter Swan Subcommittee of the
Pacific Flyway Study Committee:

Prepared for the:
Pacific Flyway Council
Canadian Wildlife Service
U.S. Fish and Wildlife Service

Approved by:

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ABSTRACT

By 1900, trumpeter swans (Cygnus buccinator) had been eliminated from most of their historic range in the U.S. and Canada. Through habitat protection, protection from illegal shooting, and artificial winter feeding, the Rocky Mountain Population (RMP) increased from <200 in the early 1930's to approximately 2200 in 1992. Over 90% of the population currently winters in the Tristate area of Montana, Idaho and Wyoming. In summer the RMP disperses; some 500 swans remain year-around in the Tristate area and 1700 swans migrate to breeding habitats in Alberta, British Columbia, Yukon, Northwest Territories and Saskatchewan. Since the mid-1970's, the Tristate flocks have remained relatively stable, while the Canadian flocks have grown.

The foremost problem facing the RMP is its restricted winter distribution. The continued growth of the Canadian flocks and the security of the population is at risk if increasing numbers of swans continue to attempt to winter in inadequate habitat. The Canadian flocks have exceeded the carrying capacity of aquatic vegetation at Harriman State Park, Idaho (HSP) and moved in increasing numbers to Red Rock Lakes National Wildlife Refuge (RRLNWR), 20 miles northwest of HSP in the Centennial Valley of Montana. No natural winter habitat exists in the Centennial Valley, however artificial feeding of resident swans at RRLNWR has attracted Canadian trumpeters and caused up to 40% of the RMP to congregate on Refuge feeding ponds.

Aggressive winter trapping and hazing efforts began in 1990-91 to disperse swans from RRLNWR/HSP 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 trumpeters to use other more suitable winter habitats, broaden their distribution and increase population security. Feeding continued during these winters, primarily to sustain resident Centennial Valley swans which failed to disperse.

During winters 1990-91 and 1991-92, approximately 28% of the RMP was captured, marked and translocated to alternate wintering sites in Oregon, Idaho, Wyoming and Utah. Although use of new wintering areas and migration routes is beginning, record numbers of swans continue to return in autumn to the HSP/RRLNWR area. The effectiveness of efforts to disperse RMP trumpeters has been diminished by the continued availability of grain at RRLNWR.

The goal of RMP management is to restore the Rocky Mountain trumpeters as a secure and primarily migratory population, sustained by naturally occurring food sources in diverse breeding and wintering sites. Efforts will be directed at developing a broader and more secure winter distribution while maintaining numbers at least at current (1992) levels. Objectives are:

- 1) to develop a winter population of at least 2200 swans, distributed within the natural carrying capacity of the Tristate area and at least 4 additional wintering areas, without use of artificial feeding, and
- 2) to develop a dispersed breeding population of at least 355 nesting pairs, all capable of moving to suitable natural wintering habitats, while maintaining viable flocks in all currently occupied breeding areas.

Redistribution of the RMP and dispersal of swans from the HSP/RRLNWR area will be achieved by the following strategies:

1. Capture trumpeters at HSP, RRLNWR and possibly in Canada and translocation both to new wintering areas and to summer habitats that are associated with new wintering areas.
2. Haze swans from sites (HSP, RRLNWR and others if necessary) where they exceed the winter carrying capacity of aquatic vegetation.
3. Terminate artificial feeding at RRLNWR and restructure the Centennial Valley flock so that summer residents move out of the valley to suitable natural wintering sites.

As trumpeters disperse, they may increase in areas where tundra swan (C. columbianus) hunts occur. Although management strategies have been designed to minimize conflicts, regulation changes may be needed to protect a legal tundra swan hunter who unintentionally kills a trumpeter or to protect pioneering trumpeters in specific locations. Resolution of potential problems and effective implementation of these strategies requires leadership from the Pacific Flyway Council, U.S. Fish and Wildlife Service (USFWS) and Canadian Wildlife Service (CWS), and assistance from all affected states and provinces.

Monitoring in the U.S. and Canada is essential to evaluate impacts of management actions on RMP productivity, mortality and distribution, as well as trumpeter use of release sites, use of new migration routes, movements of marked swans, and changes in behavior. Research is needed to determine the factors involved in the mortality of trumpeter swans at Fish Springs NWR, Utah in 1991-92. RMP management will be highly visible at least until winter distribution problems are remedied. A well-coordinated public information effort is needed to respond to local, regional and national interest regarding RMP management.

I. INTRODUCTION

The North American Management Plan for Trumpeter Swans was completed in 1984. This revision of the section dealing with the RMP focuses on the need to increase population security by expanding winter distribution and dispersing the concentrations of trumpeter swans wintering at HSP and RRLNWR. This revision describes the actions and resources required to 1) disperse approximately 1100 swans to winter habitats outside the Tristate area; 2) prevent swans from exceeding the natural carrying capacity of winter sites; 3) terminate artificial feeding of Tristate and Canadian trumpeters at RRLNWR; and 4) restructure the Centennial Valley breeding flock so that it will migrate to suitable natural winter habitat. As trumpeter swans disperse to long-vacant habitats, conflicts with management of other waterfowl species, particularly hunting of tundra swans may arise. Management actions have been designed to restore a secure population of RMP trumpeters while minimizing conflicts with other waterfowl management objectives.

II. BACKGROUND

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. Outside of Alaska, the only surviving flocks wintered in the Tristate region of Montana, Idaho and Wyoming. 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). By 1933, this wintering remnant contained about 70 year-around residents and a similar number which migrated to Canadian nesting sites. Migrations to wintering areas outside of the Tristate area ceased as all other flocks were destroyed (Gale et al. 1987).

These trumpeters were the ancestors of today's resident Tristate and migratory Canadian flocks, which together comprise the RMP. Trumpeters that nest primarily in Alaska and winter south to Oregon comprise the Pacific Coast Population (Fig. 1). Fear of the imminent extinction of trumpeter swans led to substantial conservation efforts based upon land acquisition, artificial feeding, law enforcement, public education, and transplants.

RRLNWR was established in 1935 to protect important nesting habitat in the Centennial Valley of Montana. Since 1935, artificial feeding has enabled trumpeters to winter at RRLNWR despite the absence of natural winter habitat. By providing grain, managers minimized migration to wintering sites in eastern Idaho where mortality from illegal shooting was feared (Banko 1960). Feeding allowed the Centennial Valley flock to increase and provide over 530 swans for restoration efforts between 1938 and 1983 (Gale et al. 1987).

Attempts to disperse swans from RRLNWR and establish new breeding flocks resulted in transplants to 1) National Elk Refuge, Wyoming (1938-41), 2) Malheur NWR, Oregon (1939-61), 3) Ruby Lake NWR, Nevada (1949-58), and Turnbull NWR, Washington (1963-66). Although each of these sites eventually supported successful nesting, only the Wyoming transplants resulted in a viable free-ranging flock. Winter habitat limitations severely restricted flock size at Malheur and Ruby Lakes, and led to failure at Turnbull. Between 1953-83, trumpeters were also sent from RRLNWR to private propagators, zoos, and

restoration efforts in the mid-west (primarily at Lacreek NWR, South Dakota and Hennepin County, Minnesota) (Gale et al. 1987).

In addition to artificial feeding at RRLNWR, the establishment of a sanctuary at HSP, and creation of ice-free habitat below dams also increased the Tristate region's winter carrying capacity for swans. In response, wintering trumpeters increased from about 150-200 in the early 1930's to about 2200 by 1992. While resident Tristate trumpeters have stabilized at 500-600 (Appendix II), since winter surveys began in 1972 the Canadian flocks have continued to grow (Fig. 2) (Gale et al. 1987).

Conservation efforts have enabled the RMP to increase 10-fold and expand its Canadian breeding distribution. Despite this growth, however, RMP trumpeters have shown little inclination to disperse to winter habitats outside of the Tristate area. Increasing numbers of swans crowd into the RRLNWR feeding ponds or compete for marginal natural habitats that shrink in size during drought or frigid weather.

Since 1987, drought has reduced available winter habitat throughout the Tristate region, further increasing winter swan use of RRLNWR and HSP (Appendix I). Responding to the growing numbers of swans and potential for high winter mortality in the RRLNWR/HSP vicinity, the Pacific Flyway Council approved a Range Expansion Project in March 1988. Strategies called for evaluation of potential new winter sites, gradual introductions of small numbers of swans, testing transplant techniques and gradual expansion of efforts. Summer transfers of swans from RRLNWR to the Fort Hall Indian Reservation and Grays Lake NWR in southeastern Idaho were made in 1988, 1989, 1990 and 1991 (Appendix III).

A blizzard in February 1989 froze virtually all habitat in eastern Idaho and resulted in the deaths of about 100 trumpeters in the HSP vicinity from starvation and hypothermia. Emergency release of water from Island Park Dam thawed the Henrys Fork River at HSP and prevented the starvation of hundreds more swans which were too weak to disperse. In April 1989, the Idaho Chapter of the Wildlife Society petitioned to list the RMP as threatened due to its high vulnerability to winter mortality. The USFWS determined that listing was not warranted.

Despite heavy icing and the high emergency flows in 1988-89, surveys in October 1989 found abundant mats of aquatic plants in the Henrys Fork at HSP (Vinson 1991). Unlike the previous winter, in winter 1989-90 adequate water releases and unusually warm temperatures prevented ice formation on the Henrys Fork. Approximately 60% (1200) of the RMP wintered in the RRLNWR/HSP vicinity; a record 750 swans wintered at HSP. By early March 1990, swans, Canada geese (*Branta canadensis*) and ducks had consumed all available vegetation. About 500 swans then moved from the bare river at HSP to RRLNWR, raising the number at the feed ponds to over 800.

Since 1964, when a trumpeter died from avian cholera at the feed ponds, the potential for a disease outbreak has been recognized (Gritman and Jensen 1965). By 1990, it was increasingly apparent that RRLNWR swans could not be fed grain without attracting the growing Canadian flocks, causing swan numbers to exceed the natural carrying capacity of the RRLNWR/HSP vicinity, and further increasing disease potential among both resident and Canadian trumpeters.

By October 1990, regrowth of aquatic vegetation in the river at HSP was only about 25% of normal (Vinson 1991). Further decline appeared likely if wintering waterfowl were permitted to overgraze the remainder. The unexpected reduction in carrying capacity at HSP led to more aggressive management actions in winter 1990-91 than were anticipated in the 1988 range expansion plan. The objective of these accelerated efforts was to disperse swans from the RRLNWR/HSP vicinity in order (1) to prevent further damage to vegetation and fish habitat at HSP, (2) to minimize the vulnerability of wintering swans to catastrophic loss from either starvation or disease and (3) to translocate swans to sites which would ultimately broaden RMP winter distribution and decrease its vulnerability.

Actions to achieve these objectives were described in a Contingency Plan adopted by the Pacific Flyway Council in July 1990. Potential winter habitats were evaluated and selected based upon numerous factors including: extent of ice free area, abundance and species of aquatic vegetation, adequate security areas, lack of known disease or contaminant problems, low potential for powerline collisions, reliability of water quantity and quality, absence of conflicts with tundra swan hunting, ownership, and feasibility of winter transport and release. Priority was given to sites that could support >100 swans. During winters 1990-91 and 1991-92, 608 trumpeters were trapped and removed from RRLNWR (177) and HSP (431) (Appendix III). Swans were released at Bruneau Dunes State Park, Idaho (230), Fort Hall Indian Reservation, Idaho (176), Summer Lake, Oregon (100), Fish Springs NWR, Utah (49), Salt River, Wyoming (30), Minidoka NWR, Idaho (16), and Bear River, Idaho (7) (Drewien and Clegg 1991, 1992).

Trapping and hazing has greatly reduced swans and other wintering waterfowl at HSP compared to winter 1989-90 (Fig. 3a) and resulted in an upward trend in the abundance, species diversity and vigor of submerged aquatic vegetation. In contrast, trapping and hazing at RRLNWR, in combination with continued grain feeding, have been less successful in reducing numbers (Fig. 3b). Peak weekly counts in 1991-92 showed that swans will disperse when disturbance from trapping or hazing is adequate. When grain is provided, however, swan numbers increase and the effectiveness of dispersal efforts is diminished (Fig 4.).

Artificial feeding and protection from disturbance were effective management practices when the goals were to increase the population and supply trumpeters from RRLNWR for restoration efforts. Management priorities have changed, however, as trumpeters have increased. Additional growth of the RMP will not be a priority until distribution problems have been corrected and the security of the existing birds has been attained. RRLNWR swans are no longer essential as transplant stock for restoration efforts due to the rapid growth of the Canadian flocks. Migratory Canadian trumpeters are now available and are better suited for restoration efforts than sedentary RRLNWR swans.

Artificial feeding and protection from disturbance now attract increasing numbers of swans into inadequate habitat, subject the RMP to increasing disease risk, jeopardize the health of aquatic vegetation and fish habitat at HSP, and discourage dispersal of wintering swans. This management plan directs aggressive actions to broaden RMP distribution and correct these problems.

III. CURRENT STATUS

Terminology

In recent management reports the RMP was divided into 2 subpopulations which reflected management jurisdictions, breeding distribution and migrational tendencies. The "Tristate Subpopulation" referred to swans that breed and winter in the Tristate region of Idaho, Montana, and Wyoming and the "Interior Canada Subpopulation" referred to swans that summered in Canada and wintered almost exclusively in the Tristate area. These terms have become less useful as trumpeters disperse into summer habitat throughout Idaho, south-central Oregon, west-central Wyoming, and western Montana, and increasing numbers of Canadian-fledged trumpeters begin to summer and even nest in the Tristate area.

This plan refers to RMP trumpeters that summer in the U.S. as the "RMP/U.S. flocks". "Tristate flocks" refers specifically to swans that summer in the Tristate area, regardless of natal origin or winter movements. "RMP/Canadian flocks" refers to trumpeters that summer in Canada and winter in the U.S.

Winter Status

Numbers and Distribution: The RMP can most easily be censused in mid-winter when Canadian and Tristate flocks gather in the Tristate area. Winter surveys will become increasingly difficult as trumpeters disperse to other habitats. USFWS Mid-winter Trumpeter Swan Surveys were initiated in 1972 (Appendix 1). The 1992 Mid-winter Survey found record numbers of cygnets (472), white birds (1731) and total swans (2203). When graphed with the previous September count of resident Tristate swans, the data show the stability of the Tristate flocks and the steady increase of the RMP, due to increases in Canadian flocks. Because Canadian flocks are difficult to survey on their widely dispersed breeding grounds, the difference between total swans counted in mid-winter and the previous September count of the RMP/U.S. flocks provides the best estimate of the combined size of Canadian flocks (Fig. 2).

During the 1980's, a few trumpeters, including marked RMP swans, wintered in California, Colorado, New Mexico, Nevada, Oregon and Utah. However, prior to winter 1991-92, no repeated winter use of sites outside of the Tristate area had been reported except for a few birds at Fish Springs NWR. As a result of recent management efforts in 1991-92 free-flying trumpeters returned to release sites at Bruneau Dunes, Fort Hall, Salt River and Fish Springs NWR, and at least 9 unmarked trumpeters wintered at Summer Lake. Major movement patterns of swans from the release sites show promise of creating at least 2-3 new migration routes (Fig. 5). With the exception of Fish Springs NWR, releases show signs of success in creating new wintering areas and migration routes that will divert trumpeters away from the Tristate area.

Mid-winter distribution, as determined by the USFWS Mid-winter Trumpeter Swan Survey, showed substantial change in 1991-92 compared to winter 1988-89 (Fig. 6). The greatest shifts were increases of swans at winter release sites, eastern Idaho, and RRLNWR, and a reduction of swans in HSP/Island Park. Late winter numbers were lower in 1992 at RRLNWR because unusually mild temperatures allowed northward movement of swans to thawing habitats in Montana (Fig. 3b). Numbers wintering in Wyoming remained relatively constant at about 300.

Winter Mortality from Disease: During winter 1991-92, 28 of 36 trumpeters wintering at Fish Springs NWR died. Necropsies by the National Wildlife Health Research Center, Madison, WI (NWHR) identified systemic protozoan infection by an organism similar to Histomonas sp. In February 1992, the 8 remaining trumpeters were euthanized to prevent their dispersal from Fish Springs. At least 5 of these also were infected and showed evidence that they were recovering.

Although ducks, geese, and tundra swans also wintered at Fish Springs, the protozoan killed only trumpeters. All sex and age classes succumbed, including swans that had successfully lived at Fish Springs for a year and those released in winter 1991-92. Preliminary evidence indicates that the trumpeters most likely encountered the protozoan after arriving at Fish Springs (R. Windingstad, pers. comm.).

NWHR is studying this epizootic. NWHR staff also visited Fish Springs NWR, the RRLNWR feeding ponds, and HSP to assess potential for disease problems associated both with transplanting swans and with allowing continued concentration of swans at the feeding ponds. They recommend continued dispersal of swans from RRLNWR and HSP with no further releases at Fish Springs until the situation is understood and remedied.

NWHR staff recognize that concentration of swans at the RRLNWR feeding ponds creates a high disease risk. In their opinion, this risk poses a greater threat to the well-being of the RMP than does the risk of exposure to diseases at widely dispersed sites. NWHR helped develop and review all management actions presented in this plan revision. They will continue to be actively involved in disease risk analysis at release sites and Tristate concentration areas. The NWHR has summarized results of necropsies of RMP trumpeters (Appendix IV) and recommended procedures to minimize disease risk (Appendix V).

Summer Status

Number and Distribution: RMP/U.S. flocks are monitored by a coordinated USFWS September survey (Appendix II). In addition, Malheur NWR, Ruby Lake NWR, RRLNWR, Idaho and Wyoming each conduct one or more spring surveys to document nesting effort and hatching success. RMP/Canadian flocks in Grande Prairie are annually surveyed by the Canadian Wildlife Service (CWS) and the Alberta Fish and Wildlife Department (AFWD) in June and September (Appendix VI). AFWD conducts annual fall surveys of the Edson flock, while Canadian National Parks Service has conducted nesting surveys in Nahanni National Park. All flocks are surveyed every 5 years by the USFWS/CWS Rangewide Trumpeter Swan Survey (Appendix VII).

Production: During the past 20 years cygnet production among the Tristate flocks has fluctuated, from 23 in 1980 to 175 in 1987 (Appendix II). Production is usually lower during cool wet springs or following harsh winters, and higher in warm dry springs or following mild winters. Since 1985, the Tristate flocks have fledged an average of 115 cygnets per year. Despite this productivity (21.9% cygnets), the Tristate flocks have not grown. Their lack of growth indicates either high mortality of cygnets during their first winter, high adult mortality, or emigration. Previous marking studies in Wyoming and RRLNWR suggest little emigration, adult survival of approximately 93% and high mortality of cygnets between fledging and the following June (40%)

(Lockman et al. 1987).

In contrast to the higher productivity of the Montana and Idaho flocks, productivity of the Wyoming flock was very low in both 1990 and 1991 for reasons that are not presently understood. Marked breeding pairs were present on territories but either failed to nest or suffered low nest success. Determining and remedying the causes of this declining production are a high priority in Wyoming.

Since monitoring began in the 1940's, the migratory Canadian flocks have been more productive per nest attempt than the resident Tristate flocks (Gale et al. 1987). In 1991, the Canadian flocks produced approximately 80% (375) of the 472 cygnets counted on the February 1992 midwinter survey.

Mid-winter surveys provide the best annual opportunity to assess total RMP productivity. Since 1974, the percent cygnets recorded on mid-winter surveys has averaged 18.9% and was 21.4% (472 cygnets) in February 1992. Annual cygnet recruitment in the RMP is now almost equivalent to the total size of the Tristate flocks. Continued population growth is likely unless high winter mortality should occur due to starvation or disease.

Breeding distribution: In the U.S., vacant potential breeding habitat exists in western Montana, Wyoming, western Idaho, southeastern Idaho, northern Idaho, eastern Washington, eastern Nevada, and western Montana. In 1991, the Pacific Flyway Council approved Oregon's proposal to create a breeding population of 25-50 pairs. If translocation efforts are successful, south-central Oregon has sufficient habitat quality and quantity to become an important breeding area for RMP trumpeters. Plans have also been approved to translocate trumpeters to expand both breeding and wintering distribution in the Green River drainage of Wyoming.

In Canada during the last decade, distribution has expanded in northern Alberta, northern British Columbia, southern Yukon, and southern Northwest Territories and Saskatchewan. Restoration efforts at Elk Island National Park, Alberta, have resulted in some yearlings following the tundra swan migration into the Flathead Valley of Montana. Opportunities to develop other breeding flocks that would winter outside the Tristate area exist in British Columbia, Alberta, Saskatchewan and Manitoba.

Some pioneering of vacant breeding habitat may occur as swans disperse from winter release sites. Translocation of trumpeters to summer habitats which link to wintering areas outside of the Tristate area provides an additional way to disperse RMP trumpeters. Migratory swans from the Grande Prairie flock are particularly well suited for this type of translocation.

If the RMP/Canadian flocks continue to grow, the numerical importance of the Tristate flocks to the entire population will continue to decrease. 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 the social, historical and esthetic value of breeding trumpeters in the Tristate area, particularly at RRLNWR, Yellowstone and Grand Teton National Parks, likely will equal or surpass their biological importance. Management strategies will maintain nesting trumpeters at RRLNWR and elsewhere in the Tristate area where they can exist on natural food sources.

Non-migratory breeding pairs at RRLNWR will be replaced by migratory pairs, either through natural pioneering into vacant territories or through translocations if the rate of pioneering is slower than desired.

Problems

The foremost problem facing the RMP is its restricted winter distribution and the consequences of this problem:

1. Trumpeters have exceeded the winter carrying capacity of RRLNWR and HSP.
2. Continued heavy utilization of aquatic vegetation by waterfowl at HSP will further damage both plants and fish habitat.
3. Vulnerability of the RMP to excessive winter mortality from disease at RRLNWR or starvation at HSP is high.
4. Artificial feeding at RRLNWR attracts increasing numbers of Canadian trumpeters and reduces their willingness to disperse and explore more southerly sites. Continued feeding conditions cygnets produced at RRLNWR to remain sedentary, thus perpetuating the problem of a non-migratory flock.
5. Restricted breeding distribution, particularly in the U.S., currently funnels most trumpeters back to Tristate wintering sites. Use of productive, lower elevation nesting sites, particularly in western Montana, southern Idaho, Alberta and Saskatchewan has been lost.
6. Poor nutrition on Tristate winter ranges may contribute high cygnet mortality and to depressed productivity, particularly for resident swans that remain on these sites until immediately prior to nesting (Gale et al. 1987).
7. Trumpeter swan dispersal into tundra swan hunt areas may create conflicts. Hunting regulations need to be adjusted to protect hunters who unintentionally kill a trumpeter swan while legally hunting tundra swans or to protect pioneering trumpeters in specific locations. Such an adjustment would help provide a broader base of support for trumpeter swan restoration in habitats where tundra swan hunting occurs.

IV. MANAGEMENT ACTIONS

Goal

To restore the Rocky Mountain trumpeters as a secure and primarily migratory population, sustained by naturally occurring food sources in diverse breeding and wintering sites.

Objectives

1. To develop a winter population of at least 2200 swans, distributed within the natural carrying capacity of the Tristate area and at least 4 additional wintering areas, without use of artificial feeding.
2. To develop a dispersed breeding population of at least 355 nesting

pairs, all capable of moving to suitable natural wintering habitats, while maintaining viable flocks in all currently occupied breeding areas.

Strategies and Tasks

Objective 1. Develop a winter population of at least 2200 swans, distributed within the natural carrying capacity of the Tristate area and at least 4 additional wintering areas, without use of artificial feeding.

Strategy 1. Within 5 years, establish successful use of at least 4 new wintering sites and 2 additional migration routes outside of the Tristate area (Fig. 5).

Task 1. During summer 1992 and 1993, translocate molting non-breeders and cygnets from RRLNWR to Green River, Summer Lake, and Fort Hall as detailed under Strategy 2.

Task 2. In November and December 1992, capture swans at RRLNWR and HSP using non-bait techniques and translocate birds to meet release site objectives.

A. Highest priority release sites for 1992-93 are those to which swans are least likely to disperse on their own:

- 1). Green River: 30 swans (assessment work complete, ready for first releases in 1992-93)
- 2). Summer Lake: 100 swans (previous release made in 1991-92, supplemental releases needed)
- 3). Bruneau Dunes: 30-100 swans (previous releases in 1990-91 and 1991-92, additional releases dependent upon number of free-flying swans returning in autumn 1992.
- 4). Fort Hall, Idaho (previous releases 1988-1992, closest release site to RRLNWR/HSP, use when small numbers of swans or bad weather necessitates a short haul)

Task 3. Haze at both RRLNWR and HSP as described in Strategy 2 after release site objectives have been met or trapping conditions deteriorate.

Task 4. In winter 1993-94, capture and translocate swans that fail to disperse from RRLNWR in response to hazing and drawdown of water at the feeding ponds. Capture swans at HSP if hazing is inadequate to reduce numbers to below carrying capacity or swans are needed to meet release site objectives.

Task 5. Continue translocations in future years as excess swans are available until (1) the number of swans returning to a target wintering area exceeds 50% of minimum desired numbers and the 3-year trend of returning swans is upward, (2) the desired reduction of swans in the Tristate area has occurred by dispersal to other sites of their own choosing, or (3) the percent of swans returning to a release site is <10% of minimum desired numbers for 3 years. Translocating trumpeters to summer habitats that link to target winter areas provides an additional way to disperse wintering RMP trumpeters. Migratory swans from the Grande Prairie flock are particularly well suited for this type

of translocation.

- A. Desired minimum numbers of wintering swans at release sites:
 - 200: Summer Lake, Bruneau Dunes area, Fort Hall/Minidoka NWR
 - 100: Green River
 - 75: Salt River

- B. Sites requiring further assessment for potential future releases:
 - western Montana, northern Idaho, Bighorn River, Wyoming
 - Sites in Canada as requested by CWS or respective provinces

Task 6. Monitor movements, productivity, and mortality of marked swans.

Task 7. Confer with NWHR regarding disease risk assessment. Necropsy all suitable carcasses. Handle all captured swans in ways that minimize potential for disease exposure (Appendix V)

Strategy 2. Protect habitat quality at current and potential wintering sites and maintain swans and other waterfowl within carrying capacity of aquatic vegetation.

Task 1. Continue monitoring of habitat trends and carrying capacity at key wintering sites. Reduce swans wintering within the Tristate area to approximately 1100, including virtually none at RRLNWR, 300 in HSP/Island Park, 250 in Jackson Hole/Salt River, 120 in YNP, 300 on Lower Henrys Fork/ Teton River/So. Fork, and 130 at other sites. (This is the approximate distribution of swans that survived in areas other than RRLNWR/HSP during the harsh winter of 1988-89).

Task 2. Terminate artificial feeding at RRLNWR and disperse swans to suitable wintering sites.

- A. Mark all RRLNWR breeding pairs during summer 1992.

B. During July 1992, remove 66% of molting Centennial Valley non-breeders that currently depend upon artificial feeding and translocate to Summer Lake and Green River. Do not remove any marked birds that are known to winter away from the feeding ponds. Mark as many as possible of the remaining non-breeders to evaluate the effectiveness of winter trapping/hazing activities to disperse these birds from the Centennial Valley.

C. During September 1992, remove 66% of Centennial Valley cygnets to avoid exposing them to artificial feeding and release them at Green River, Summer Lake and possibly Fort Hall if excess are available. (Cygnets released at Fort Hall could add to swans with knowledge of Fort Hall which would be available to restock RRLNWR after non-migratory swans are removed.) Mark as many as possible of the remaining cygnets to evaluate the effectiveness of winter hazing/trapping activities to disperse birds out of the Centennial Valley. Do not translocate cygnets of breeding pairs that leave the Centennial Valley during winter.

- D. During November and December 1992, use non-bait methods to

capture swans that congregate at the feed ponds. Release on-site any marked Centennial Valley swans to allow them the opportunity to learn to disperse from the valley. Manipulate water levels at the feed ponds to increase efficiency of trapping and hazing. Transplant captured birds to Green River, Summer Lake, Bruneau Dunes, Fort Hall (order of priority for releases). After release site objectives are met or trapping conditions deteriorate, haze swans that remain at the feed ponds. Initiate feeding if needed to insure survival of resident swans that cannot be captured or dispersed. Drawdown waterlevels and withhold feed if all swans have departed and are adequately dispersed to suitable wintering sites.

E. During July 1993, capture and transplant 66% of molting non-breeders. Do not remove any non-breeders known to winter away from the feeding ponds. [The 66% level may be adjusted based upon the observed dispersal rates of marked non-breeders during the 1992-93 winter.]

F. During September 1993, remove cygnets and transplant to Green River, Summer Lake and Fort Hall. Do not translocate cygnets of breeding pairs that are known to leave the Centennial Valley during the winter. [The number of cygnets translocated will be based upon dispersal rates of marked cygnets during winter 1992-93.]

G. During winter 1993-94, manipulate water levels to eliminate fall habitat at the feeding ponds and haze swans out of the valley. Trap and transplant all swans that fail to disperse. Provide no artificial food.

H. For several winters after feeding has been discontinued, hazing and draw down of the feeding ponds may be necessary to reinforce migration from RRLNWR.

I. Monitor movements and mortality of marked swans and productivity of breeding pairs.

Task 3. Reduce winter waterfowl use of HSP and maintain winter swan numbers at approximately 200 from Box Canyon to Pinehaven until aquatic vegetation recovery shows that more swans can be sustained without damage to vegetation and fish habitat. (Intent is to not exceed 10% of the RMP at any one wintering site.)

A. Monitor waterfowl use and trend of aquatic vegetation.

B. In 1992, disperse wintering swans and meet release site objectives by trapping. When release site objectives are met or trapping conditions deteriorate, haze to maintain numbers at or below 200.

C. Manipulate water flows to minimize attractiveness to waterfowl while avoiding adverse impacts to fisheries or aquatic vegetation.

D. After 1992, integrate waterfowl hazing into routine winter Park management activities to maintain use within carrying capacity. Trap only when swans are needed to meet specific release site objectives.

Task 4. Monitor swan and other waterfowl use at key wintering sites in the Tristate area.

Task 5. Continue to refine techniques for monitoring trend of aquatic vegetation, overall habitat quality, and winter carrying capacity.

Task 6. Confer with the NWHR regarding disease risk assessment. Necropsy all suitable carcasses. Handle all captured swans in ways that minimize potential for disease exposure (Appendix V).

Task 7. Monitor swan numbers at Ennis Lake, Montana, where over 33% of the RMP congregated in March 1992. Document use as a spring staging area and assess any potential habitat or disease problems.

Task 8. Coordinate all activities with responsible resource management agencies. Coordinate monitoring at Ennis Lake and Fort Hall Indian Reservation with Montana Power Company and the Shoshone-Bannock Indian Tribes, respectively.

Objective 2. To develop a dispersed breeding population of at least 355 nesting pairs, all capable of moving to suitable natural wintering habitats, while maintaining viable flocks in all currently occupied breeding areas.

Strategy 1. Protect current and potential nesting habitat, and achieve a minimum breeding pair distribution of:

<u>U.S. Flocks -- Total</u>	<u>145</u>
Montana/Centennial Valley	38
Montana/Other	5
Wyoming/Yellowstone NP	15
Wyoming/outside Yellowstone	30
Idaho/Targhee NF	10
Idaho/Other sites	15
Oregon	25
Nevada	7
<u>Canadian Flocks -- Total</u>	<u>210</u>
Alberta	80
British Columbia	60
Yukon	35
Northwest Territories	30
Saskatchewan	5

Task 1. Work with the Intermountain Joint Venture to identify and properly manage potential nesting habitat.

Task 2. Work with appropriate land management agencies and private citizens.

Strategy 2. Restructure the Centennial Valley breeding flock as migrants to natural winter habitat including Fort Hall Indian Reservation, Madison River drainage, eastern Idaho, and Bruneau Dunes area.

Task 1. Remove non-migratory individuals from RRLNWR by trapping, hazing, and terminating artificial feeding as described under Objective 1. Do not capture marked swans that are known to leave the valley in winter.

Task 2. After feeding has been terminated at RRLNWR, allow vacant territories to be reoccupied by migrant trumpeters and encourage their increase by minimizing further removals until breeding goals are achieved.

Task 3. If rate of reoccupancy of vacant territories is slower than desired, devise strategies to release migratory Canadian swans, or swans from Fort Hall or Bruneau Dunes into the Centennial Valley to supplement restoration of a migratory breeding flock.

Task 4. Monitor numbers, nesting effort, and winter destinations of swans that summer in the Centennial Valley.

Strategy 3. Encourage expansion of breeding range to sites that will cause RMP trumpeters to winter in areas other than the Tristate area.

Task 1. Release cygnets and non-breeders from the Centennial Valley into the Green River drainage of Wyoming and at Summer Lake, Oregon in 1992-93 and 1993-94.

Task 2. Assess habitat potential and develop strategies to create migratory breeding flocks where appropriate habitat exists in western Montana, northern Idaho, eastern Idaho (Bear Lake NWR), eastern Washington (Turnbull NWR) and eastern Nevada (Ruby Lakes NWR), Alberta and Saskatchewan.

Task 3. Continue efforts to restore breeding in the vicinity of Elk Island NP Alberta by swans that winter outside the Tristate area.

Task 4. Develop strategies that favor establishment of Canadian breeding sites that will cause swans to migrate to sites other than the Tristate area. Provide Canadian trumpeters for use in restoration programs in other flyways if requests are compatible with RMP objectives.

Task 5. Search for neck-banded swans at spring/fall staging areas and among summer flocks in Canada and the U.S. to assess relationships between new wintering sites, migration routes, summer habitats and impacts on nest distribution and success.

Strategy 4. Promote growth of the Malheur NWR breeding flock and its migration to the Summer Lake area.

V. PUBLIC EDUCATION

Public interest in trumpeter swans and their management has traditionally been high, locally, regionally and nationally. RMP management will likely continue to be a high profile effort, with occasional controversy and a high need to convey accurate, rather detailed information as clearly as possible.

Strategy 1. Develop an effective public information program. Coordinate press releases, generate interpretive materials and distribute throughout RMP range.

Task 1. Develop and distribute interpretive materials including a video and/or slide show on restoration efforts, posters regarding sightings of marked swans, public service announcements regarding "Don't shoot Trumpeters", and a pamphlet providing a synopsis of the RMP management program.

Task 2. Develop an effective network to disseminate accurate information to the information and education branches of the involved agencies.

VI. MONITORING

The effort to redistribute the RMP requires monitoring and evaluation of both the results of translocations and the impacts of these actions on RMP distribution, productivity, mortality, and population growth.

Strategy 1. Monitor the productivity of breeding flocks in the U.S. and Canada, mid-winter numbers, and distribution.

Task 1. Continue the USFWS September production and mid-winter surveys. States and Refuges should monitor nest attempts and hatching success. CWS and provinces should monitor nest attempts and production for the entire Grande Prairie flock in Alberta and British Columbia. This database was started in 1959 and should be maintained as an indicator of the health and productivity of the Canadian flocks as translocations and hazing proceed.

Strategy 2. Continue to mark transplanted swans and monitor movements, mortality, and productivity. Assess use of release sites, changes in behavior or habitat use, and evaluate progress toward plan objectives.

Task 1. Maintain a coordinated monitoring network in U.S. and Canada for sightings of marked trumpeters and a single database for sightings. Conduct intensive monitoring of marked swans at key wintering sites.

Task 2. Monitor habitat use and identify marked trumpeters at key migration and staging areas in Canada. Canadian observations are essential for resighting marked swans that have begun using unidentified wintering sites.

Strategy 3. Develop adequate methods and monitor trend of submerged aquatic vegetation at HSP.

Task 3. Annually provide a preliminary report on management activities and monitoring results to the RMP Study Committee at the March Flyway meeting and a final written report by June 20.

VII. RESEARCH NEEDS

1. Ascertain epizootiology of the protozoan responsible for 1991-92 trumpeter swan mortality at Fish Springs NWR. Identify factors contributing to the outbreak and means of prevention or reducing risk.
2. Determine causes of low productivity of Wyoming trumpeters.
3. Continue evaluation of potential habitat on the Bighorn River WY, northern Idaho, western Montana, southern Nevada, eastern Washington. Coordinate habitat evaluation with appropriate states and National Wildlife Refuges.
4. Develop methods to routinely monitor vegetative trends at key wintering sites.
5. Clarify genetic relationships between various populations and flocks.
6. Assess competition/interaction between trumpeters and other waterfowl.
7. Investigate use of morphological measurements to differentiate between trumpeter and tundra swans.
8. If university interest exist, obtain graduate student help to investigate movements, habitat use, behavior and factors affecting success of translocations at Summer Lake, Oregon and the Green River drainage of Wyoming.

VIII. AGENCY RESPONSIBILITIES AND FUNDING

The bulk of the funding for RMP range expansion has been provided by the USFWS. The Pacific Flyway Council strongly recommends that all agencies concerned with the RMP 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 marked swans.

The chairman of the RMP Study Committee will annually draft a letter to all involved agencies outlining needs for the upcoming year and requesting personnel and equipment. Any financial assessments would be made after specific approval by the Pacific Flyway Council.

The following are the major on-going tasks and recommended agency involvement:

- 1) Translocations - Currently this involves trapping and transporting swans from HSP and RRLNWR to various release sites. The USFWS has the lead role. Recipient states and agencies, as well as the state of origin, are asked to provide two individuals for approximately 7-10 days, vehicles and other associated equipment to assist with the operation. Support from the various

agencies would greatly enhance the implementation of this labor intensive project.

2) Monitoring - Monitoring of marked swans is a high priority aspect of current management efforts. Data provide the basis for evaluation of the success of translocations and their impacts on the population. Observations from recipient states and at nesting and staging areas in Canada are essential to supplement monitoring by the USFWS. The USFWS will coordinate this effort with assistance requested from the CWS and all states, particularly those with release sites.

3) Surveys - Several surveys have evolved for monitoring population trends and distribution of RMP trumpeter swans. The USFWS has assumed the responsibility of coordinating efforts and reporting survey data. The following are on-going surveys and participants.

a. Breeding flock surveys - USFWS coordinates nesting data gathered by states, federal refuges, CWS and Canadian provinces.

b. September Tristate (production) Survey - conducted by the USFWS with assistance from states with breeding flocks

c. Mid-winter Survey - conducted by the USFWS with assistance from states

d. 5 year range-wide survey - coordinated by the USFWS in 1995 with assistance from the states, CWS, provinces, and The Trumpeter Swan Society.

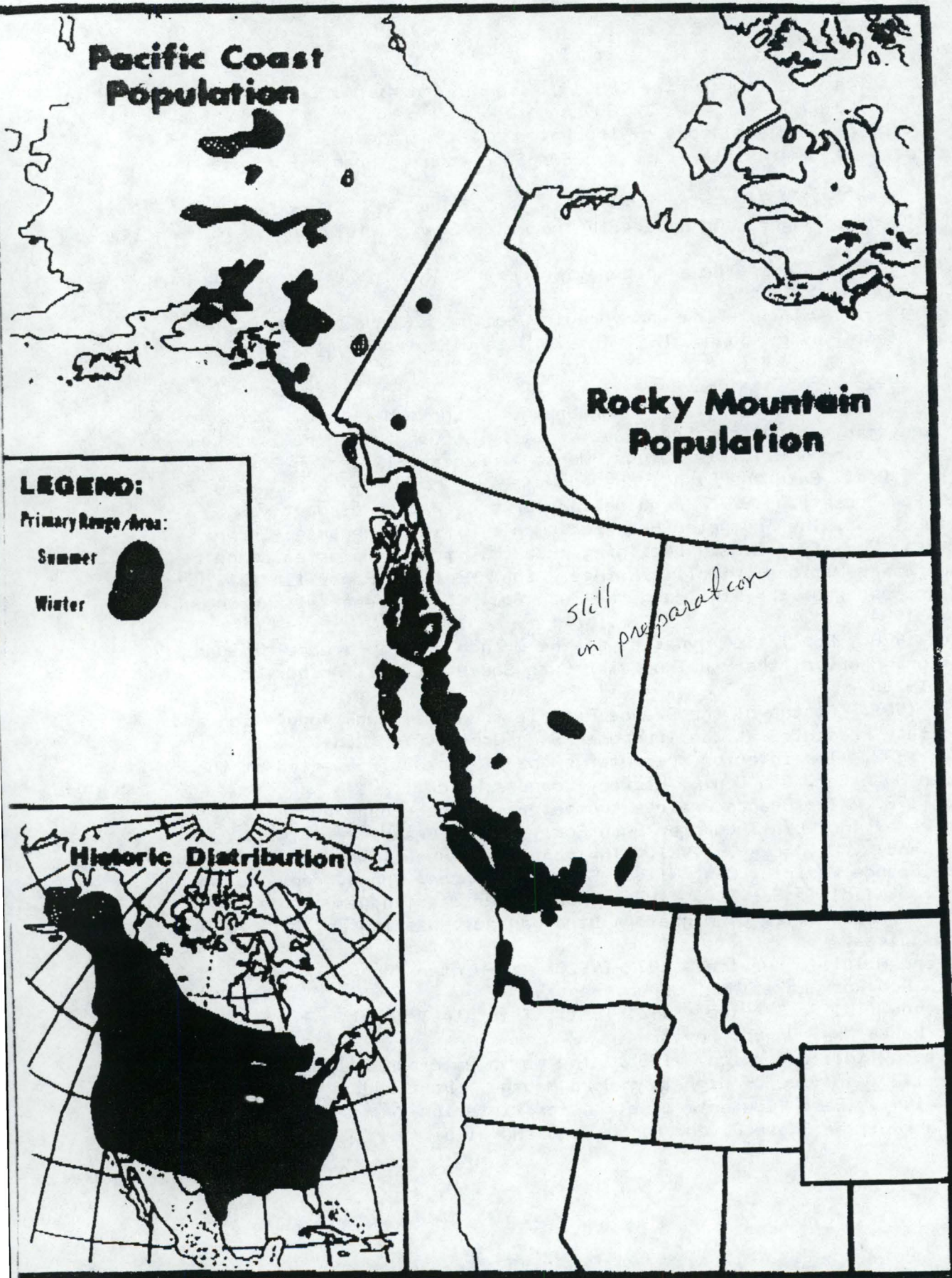
References

- Anderson, D. R., R. C. Herron, and B. Reiswig. 1986. Estimates of annual survival rates of trumpeter swans banded 1949-82 near Red Rock Lakes National Wildlife Refuge, Montana. *J. Wildl. Manage.* 50(2):218-221.
- Annear, J. T. 1969. Historical notes on the transfers of trumpeter swans. U.S. Fish Wildl. Serv., Red Rock Lakes Nat. Wildl. Ref. Unpub. rept. 86 pp.
- Banko, W. E. 1960. The trumpeter swan. *N. Am. Fauna* 63, U.S. Fish Wildl. Serv., Washington, D.C. 214 pp.
- Barrett, V. A. 1980. Genetic comparison of trumpeter swan (*Olor buccinator*) populations. M.S. Thesis. Montana State Univ., Bozeman. 101 pp.
- Barrett, V. A., and E. R. Vyse. 1982. Comparative genetics of three trumpeter swan populations. *Auk* 99:103-108.
- Brechtel, S. H. 1982. A management plan for trumpeter swans in Alberta-1982. Alberta Dept. Energy and Nat. Res., Fish and Wildl. Div., Edmonton. 135 pp.
- Burgess, T. E. 1972. Investigations into the breeding ecology of the Grande Prairie trumpeter swan population. Pages 16-18 in *Proc. and Papers of the Second Trumpeter Swan Soc. Conf.*, Grande Prairie, 1972.
- Churchill, B. P. 1987. Potential trumpeter swan nesting habitat in northeastern British Columbia. *Proc. and Papers Tenth Trumpeter Swan Soc. Conf. Grande Prairie.*
- Coale, H. K. 1915. The present status of the trumpeter swan (*Olor buccinator*). *Auk* 32:82-90.
- Condon, D. D. 1941. Preliminary report on the trumpeter swans of Yellowstone National Park. U.S. Natl. Pk. Serv. 27 pp.
- Cornely, J. E., S. P. Thompson, E. L. McLaury, and L. D. Napier. 1985. A summary of trumpeter swan production at Malheur National Wildlife Refuge, Oregon. *Murrelet* 66:50-55.
- Dennington, M. 1987. Trumpeter swan habitat in southern Yukon. *Proc. and Papers of the 10th Trumpeter Swan Soc. Conf. Grande Prairie, 1986.*
- Drewien, R. C. and K. R. Clegg. 1991. Winter trapping of trumpeter swans at Harriman State Park, Idaho and Red Rock Lakes National Wildlife Refuge, Montana. *Proc. and Papers of the 13th Trumpeter Swan Soc. Conf. Salt Lake City.* In press.
- Drewien, R. C. and K. R. Clegg. 1992. Capturing trumpeter swans at Harriman State Park, Idaho, winter 1991-92. *Wildl. Res. Inst. U. of Idaho.* Moscow. Unpub. rept. 15pp.
- Gritman, R. B., and W. I. Jensen. 1965. Avian cholera in a trumpeter swan. *Bull. Wildl. Dis. Assoc.* 1(4):54-55.
- Hampton, P. D. 1981. The wintering and nesting behavior of the trumpeter swan. M.S. Thesis. University of Montana, Missoula. 185 pp.
- Hansen, C. G. 1959. Report on the aquatic plants found in the Island Park area of Idaho during the fall and winter of 1958. U.S. Fish Wildl. Serv., Red Rock Lakes Nat. Wildl. Ref. Unpub. rept. 3 pp.
- Hansen, H. A., P. E. K. Shepherd, J. G. King, and W. A. Troyer. 1971. The trumpeter swan in Alaska. *Wildl. Mono.* 26. 83 pp.
- Holton, G. R. 1982. Habitat use by trumpeter swans in the Grande Prairie region of Alberta. M.S. Thesis. University of Calgary, Alberta. 164 pp.
- Holton, G. R. 1983-85. Trumpeter swans in the Peace River Region. Alberta Energy and Natural Resources. Unpub. annual survey repts.
- Holton, G. R. and L. J. Shandruk. 1987. Trumpeter swans in the Peace River Region, 1986. Alberta Energy and Natural Resources and the Canadian Wildl. Serv. Unpub. rept. 8pp.

- Hull, A. V. 1939. Trumpeter swans, their management and preservation. Pages 378-382 in Trans. 4th N. Am. Wildl. Conf., Am. Wildl. Inst.
- Johnsgard, P. A. 1978. The triumphant trumpeter. Nat. Hist. 77(9):72-77.
- Killaby, M. 1987. Trumpeter swan habitation and proposed management in Saskatchewan. Proc. and Papers 10th Trumpeter Swan Soc. Conf., Grande Prairie.
- Lockman, D. C. 1983. Rocky Mountain Trumpeter Swan Population - Wyoming flock. Progress report September 16, 1982 - September 15, 1983. Wyo. Game and Fish Department, Cheyenne. 9 pp.
- Lockman, D. C. and M. Brandt. 1987. An evaluation of trumpeter swan winter habitat in the Snake River drainage, Wyoming. Draft manuscript. Wyoming Game and Fish Dept. Cheyenne.
- Lockman, D. C., R. Wood, B. Smith, B. Raynes. 1985. Progress report on the Rocky Mountain Trumpeter Swan Population, Wyoming flock. Wyo. Game and Fish. Dept. Unpub. rept. 16 pp.
- Lockman, D. C., R. Wood, H. Smith, B. Smith, and H. Burgess. 1987. Rocky Mountain Trumpeter Swan Population - Wyoming flock, 1982-86. Progress report. Wyo. Game and Fish Dept., Cheyenne. 74 pp.
- Lumsden, H. G. 1984. The pre-settlement breeding distribution of trumpeter, (Cygnus buccinator) and tundra swans (C. columbianus) in eastern Canada. Can. Field-Nat. 98(4):415-424.
- Lumsden, H. G. 1987. Productivity of trumpeter swans in relation to condition. Proc. and Papers 11th Trumpeter Swan Soc. Conf., Grande Prairie.
- Mackay, R. H. 1957. Movements of trumpeter swans shown by band returns and observations. Condor 59(5):339.
- Mackay, R. H. 1978. Status report on trumpeter swan (Olor buccinator) in Canada, 1978. Status reports on endangered wildlife in Canada. Vol. 1. Committee on the Status of Endangered Wildlife in Canada. Can. Wildl. Serv., Ottawa. Unpub. 27 pp.
- Mackay, R. H. 1987. Trumpeter swan investigations, Grande Prairie area, Alberta, 1953-1975. Proc. and Papers 10th Trumpeter Swan Society Conf., Grande Prairie, 1986.
- Maj, M. E. 1983. Analysis of trumpeter swan habitat on the Targhee National Forest of Idaho and Wyoming. M.S. Thesis. Montana State University, Bozeman. 102 pp.
- McCormick, K. J. 1985. A survey of trumpeter swans and their habitat in Nahanni National Park Reserve and vicinity. Tech. Rept. No. 84-12. Can. Wildl. Serv., Yellowknife. 35 pp.
- McCormick, K. J., and L. J. Shandruk. 1986. A survey of trumpeter swans and their habitat in southern Mackenzie District, Northwest Territories. Tech. Rept. No. 86-5. Can. Wildl. Serv., Yellowknife, Northwest Terr. 34 pp.
- McEneaney, T. 1986a. Movements and habitat use patterns of the Centennial Valley trumpeter swan population (Montana) as determined by radio telemetry data. U.S. Fish Wildl. Serv., Red Rock Lakes NWR. Unpub. rept. 31 pp.
- McEneaney, T. 1986b. An analysis of the Red Rock Lakes National Wildlife Refuge trumpeter swan winter feeding program. U.S. Fish Wildl. Serv. Unpub. rept. 42 pp.
- McEneaney, T., and R. Sjostrom. 1983. Migration and movement of the Tristate Trumpeter Swan Population, an analysis of neck-banding data. U.S. Fish Wildl. Serv., Red Rock Lakes NWR. Unpub. rept. 12 pp.
- McEneaney, T., and R. Sjostrom. 1986. Trumpeter swan movements and seasonal use, Centennial Valley (Montana). U. S. Fish Wildl. Serv., Red Rock Lakes NWR. Unpub. rept. 20 pp.

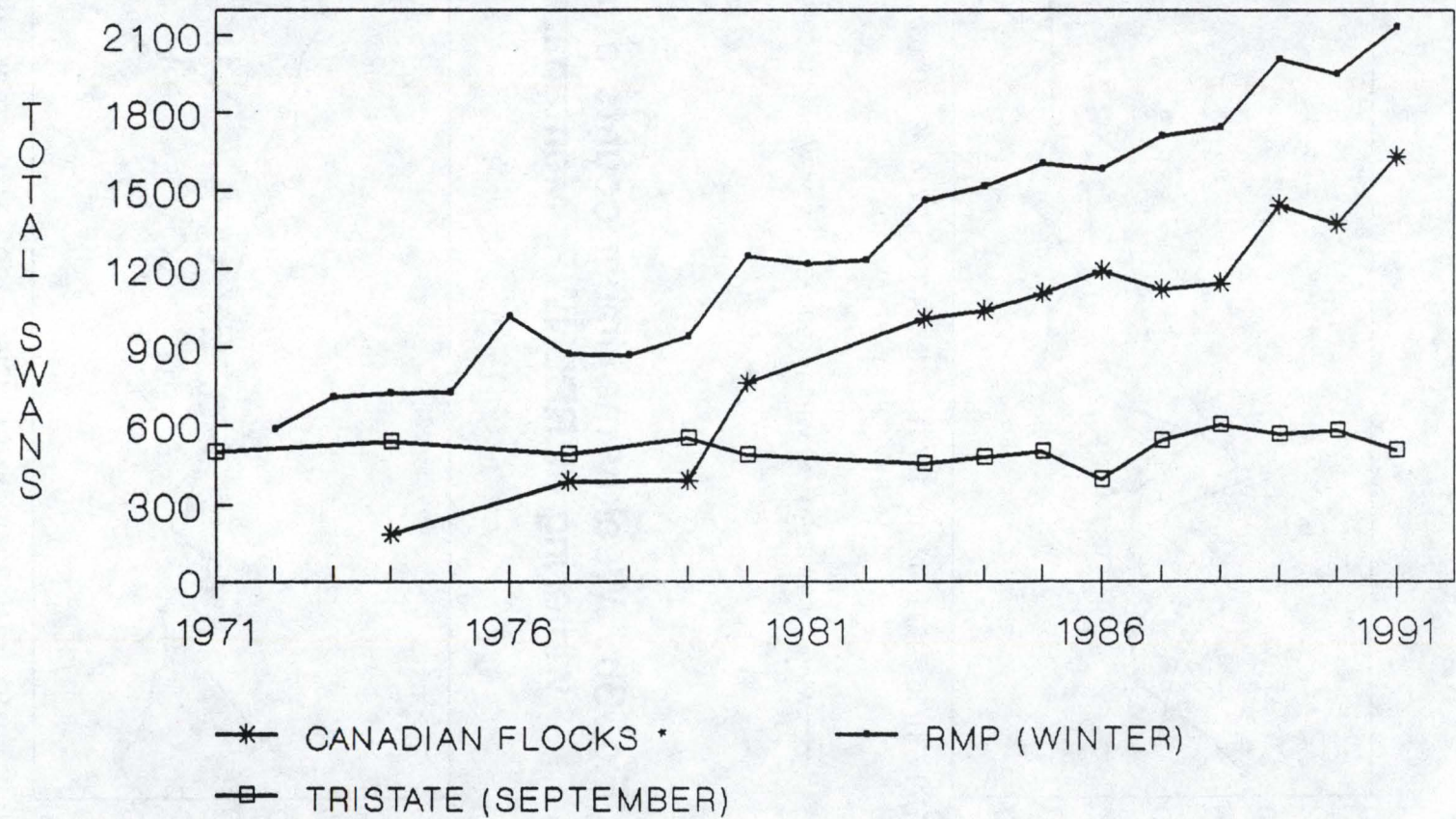
- McKelvey, R. W. 1986. The status of trumpeter swans in British Columbia and Yukon, summer, 1985. Tech. Rept. Series No. 8. Can. Wildl. Serv., Pacific and Yukon Region, B.C. 12 pp.
- McKelvey, R. W., M. C. Dennington, and D. Mossop. 1983. The status and distribution of trumpeter swans (Cygnus buccinator) in the Yukon. Arctic 36(1):76-81.
- McKelvey, R. W., K. McCormick, and L. Shandruk. 1986. The status of trumpeter swans, Cygnus buccinator, breeding in western Canada, 1985. Unpub. manuscript
- Monnie, J. B. 1966. Reintroduction of the trumpeter swan to its former prairie breeding range. J. Wildl. Manage. 30(4):691-696.
- Nieman, D. 1976. Population status and management of trumpeter swans in Saskatchewan. Trumpeter Swan Soc. Newsletter No.9.
- Nieman, D. 1979. Population and productivity data for Saskatchewan trumpeter swans. The Trumpeter Swan Soc. Newsletter No. 17:12.
- Nieman, D. J. and R. J. Isbister. 1974. Population status and management of trumpeter swans in Saskatchewan. Blue Jay 32(2):97-101.
- Niethammer, K. 1992. Feeding, hazing, and trapping trumpeter swans at Red Rock Lakes NWR, winter 1991-92. U. S. Fish Wildl. Serv. Red Rock Lakes NWR. Unpub. rept. 2 pp.
- Page, R. 1976. The ecology of the trumpeter swans on Red Rock Lakes National Wildlife Refuge, Montana. Ph.D. Thesis, University of Montana, Missoula. 165 pp.
- Papike, R. 1971. Investigations of nonbreeding trumpeter swan range, movements, migration, and nesting territories. Wildlife Management Study RRL-1. U. S. Fish Wildl. Serv. Red Rock Lakes Nat. Wildl. Ref. Unpub. rept. 10 pp.
- Paullin, D.G. 1973. The ecology of submerged aquatic macrophytes of Red Rock Lakes National Wildlife Refuge, Montana. M.S. Thesis, University of Montana, Missoula. 171 pp.
- Randall, L. C. and L. C. Peterson. 1978. Red Rock Lakes National Wildlife Refuge: An aquatic history 1899-1977. Dept. of Interior, Fish and Wildl. Serv. Kalispell.
- Rogers, P. M. and D. A. Hammer. 1978. Ancestral breeding and wintering ranges of the trumpeter swan (Cygnus buccinator) in the eastern United States. Tennessee Valley Auth. Unpub. 45 pp.
- Roscoe, J. W. 1976. Aquatic vegetation report, Red Rock Lakes National Wildlife Refuge. U.S. Fish Wildl. Serv. Red Rock Lakes NWR. Unpub. rept. 18 pp.
- Salter, R. J. 1954. The trumpeter swan in Idaho. Pages 254-257 in Proc. 34th Conf. Western Assoc. Fish and Game Comm.
- Shandruk, L. J. 1986. A survey of trumpeter swan breeding habitats in Alberta, Saskatchewan, and northeastern British Columbia. Tech. Rept. No. 86-6. Can. Wildl. Serv., Edmonton. 22 pp.
- Shea, R. E. 1979. The ecology of trumpeter swans in Yellowstone National Park and vicinity. M.S. Thesis, University of Montana, Missoula. 132 pp.
- Shea, R. E. 1980. Causes of pre-fledging mortality of trumpeter swans. U.S. Fish Wildl. Serv., Madison Wildl. Health Lab. Unpub. rept. 32 pp.
- Shea, R. E. 1991a. Response of trumpeter swans to trapping at Red Rock Lakes National Wildlife Refuge, Montana, and Harriman State Park, Idaho, winter 1990-91. Proc. and Papers 13th Trumpeter Swan Soc. Conf. Salt Lake City. In press.
- Shea, R. E. 1991b. Monitoring of trumpeter swans in conjunction with trapping efforts at Red Rock Lakes National Wildlife Refuge, Montana, and Harriman

- State Park, Idaho, during winter 1990-91. U. S. Fish Wildl. Serv. Pocatello. Unpub. rept. 40 pp.
- Sheehan, B. 1987. Early history of trumpeter swans in the Grande Prairie area. Proc. and Papers 10th Trumpeter Swan Soc. Conf., Grande Prairie, 1986. In press.
- Sjostrom, R. R. 1982. Trumpeter swan collaring at Red Rock Lakes National Wildlife Refuge. Papers and Proc. 8th Trumpeter Swan Society Conf., Hickory Corners, Mich., 1982.
- Smith, J. H. 1985. Trumpeter swan behavior report. Wyoming Dept. of Game and Fish. Unpub. rept. 12 pp.
- Snyder, J. 1991. The wintering and foraging ecology of the trumpeter swan, Harriman State Park of Idaho. M.S. Thesis. Idaho State U. Pocatello. 145 pp.
- Squire, J. 1992. Get citation.
- Thorne, T. T., E. S. Williams, S. L. Anderson, D. Lockman. 1985. Trumpeter swan disease investigations, northwest Wyoming, southeast Idaho, and Red Rock Lakes National Wildlife Refuge, Montana. Pages 9-14 in Job Performance Rept. Wyo. Dept. Game and Fish., Cheyenne.
- Trumpeter Swan Society. 1977. A guideline for propagation of captive trumpeter swans. The Trumpeter Swan Soc. Maple Plain, Minnesota. 24 pp.
- Trumpeter Swan Society. 1986. Declining productivity of trumpeter swans at Red Rock Lakes National Wildlife Refuge, Lima, Montana. Pages 124-131 in Proc. and Papers of the 9th Trumpeter Swan Soc. Conf., West Yellowstone, Montana, 1984.
- Turner, B. 1978. Population dynamics of the Grande Prairie trumpeter swan population. Proc. of the 9th Trumpeter Swan Society Conf., Anchorage, Alaska, 1978.
- Turner, B. 1981. Status of the Grande Prairie trumpeter swan population and its habitat. Presented at the Trumpeter Swan Society 7th Conf.
- Turner, B. 1982. The interior trumpeter swans of Canada. Presented at the Trumpeter Swan Soc. 8th Conf., Hickory Corners, Mich.
- Turner, B. 1987. The Grande Prairie trumpeter swan neck-band program. Proc. and Papers of the 10th Trumpeter Swan Soc., Conf., Grande Prairie, 1986.
- Turner, B., and R. H. Mackay. 1981. The population dynamics of the trumpeter swans of Grande Prairie. Can. Wildl. Serv., Edmonton. Unpub. rept. 17 pp.
- U. S. Fish and Wildlife Service. 1984. North American management plan for trumpeter swans. Office of Migratory Bird Manage., Washington, D.C. 62 pp. plus appendices.
- U. S. Fish and Wildlife Service. 1972-1992. Mid-winter Trumpeter Swan Surveys. Red Rock Lakes NWR. Unpub. repts.
- U. S. Fish and Wildlife Service. 1931-1991. Tristate Trumpeter Swan Surveys. Red Rock Lakes NWR. Unpub. repts.
- U. S. Fish and Wildlife Service. 1985. The North American Trumpeter Swan Survey - 1985. Office of Migratory Bird Manage., Portland.
- Vinson, D. 1991. Base flow determination for wintering trumpeter swans on the Henrys Fork of the Snake River. U. S. Fish and Wildl. Serv. Boise. 310 pp.



Len - Sketch on Canadian summer dist & send back to me.

Fig. 2. Trends of RMP, Canadian Flocks and Tristate Flocks, 1971-91.



*Canadian Flocks = RMP - Tristate

Fig. 3a. Weekly maximum counts of swans wintering at Harriman SP, Idaho.

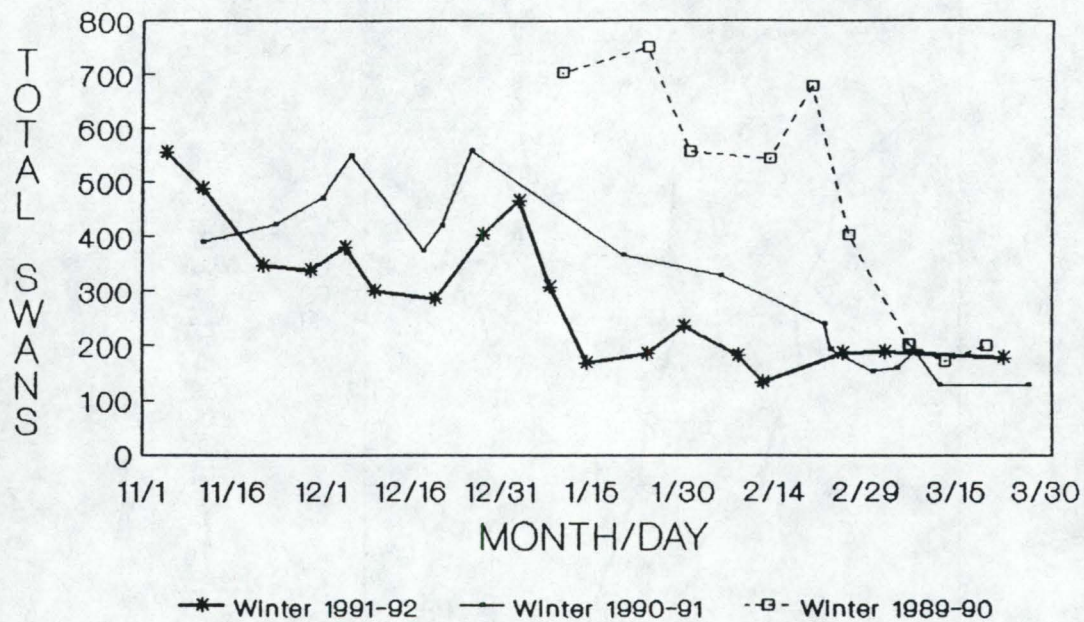


Fig. 3b. Weekly maximum counts of swans wintering at RRLNWR, Montana.

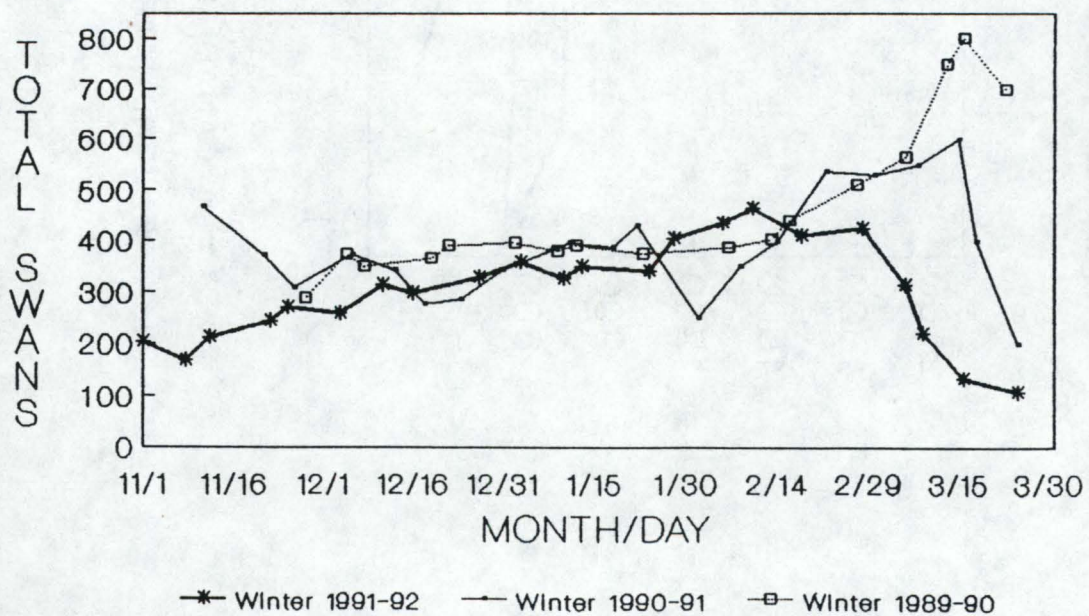
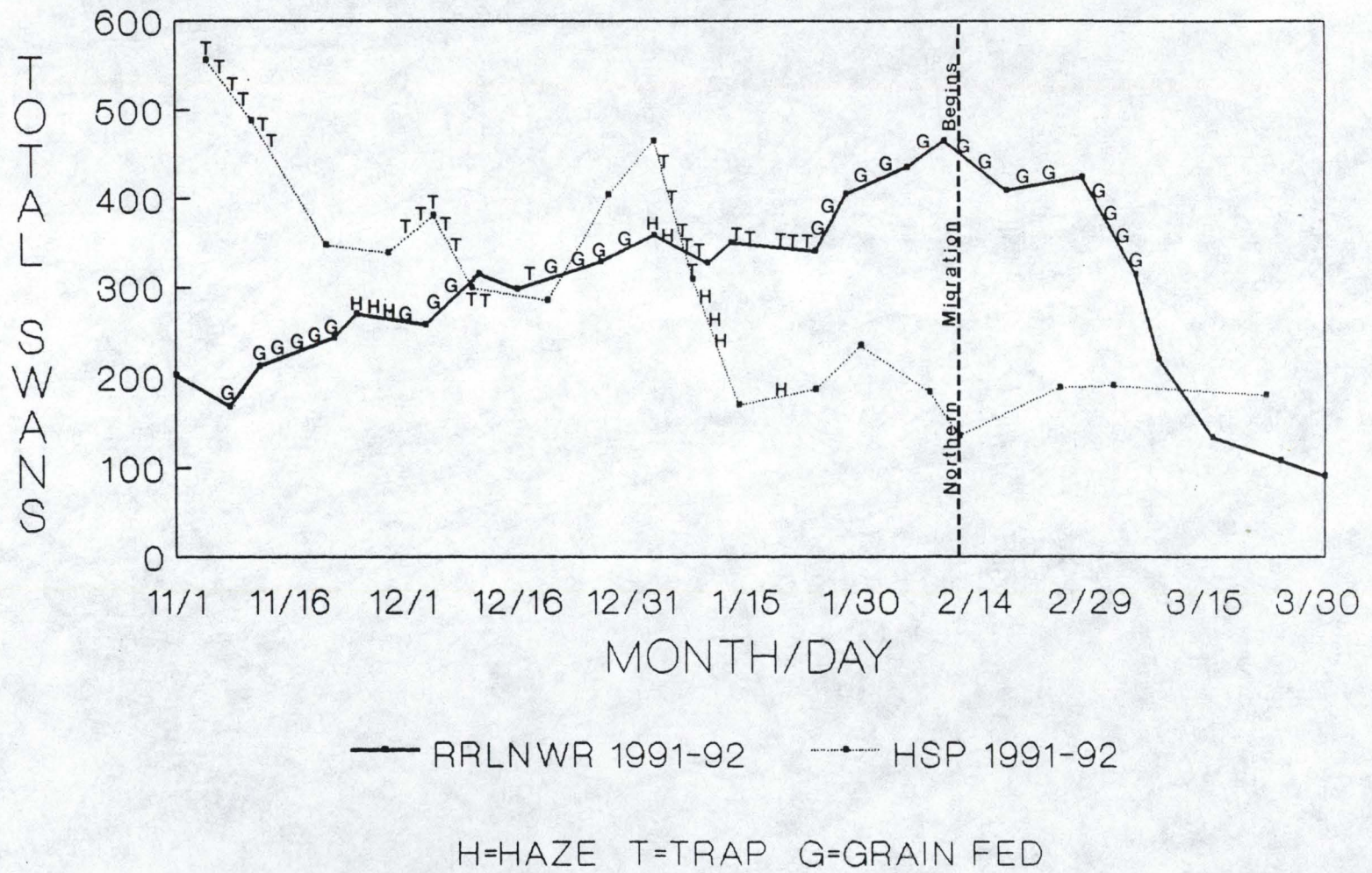
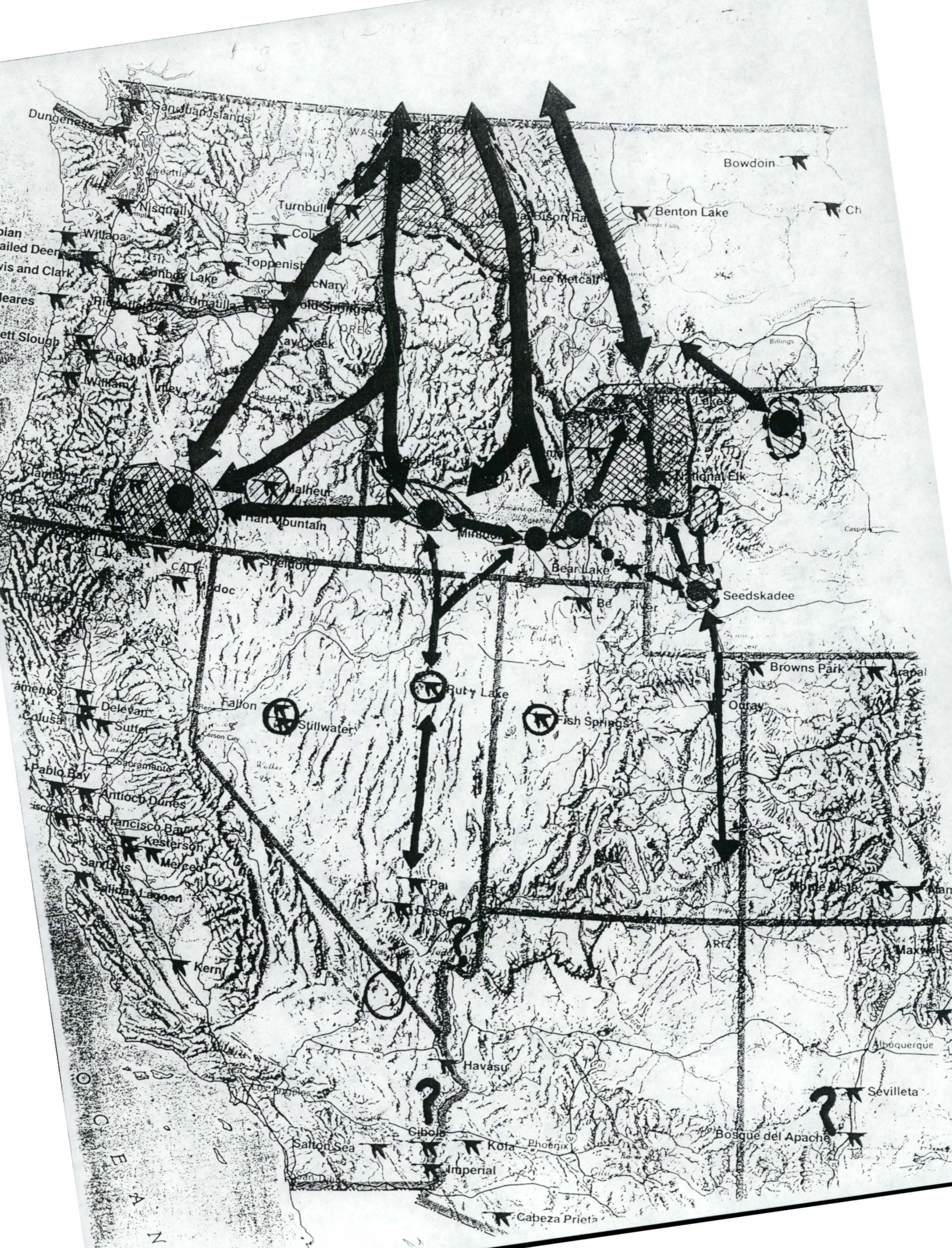
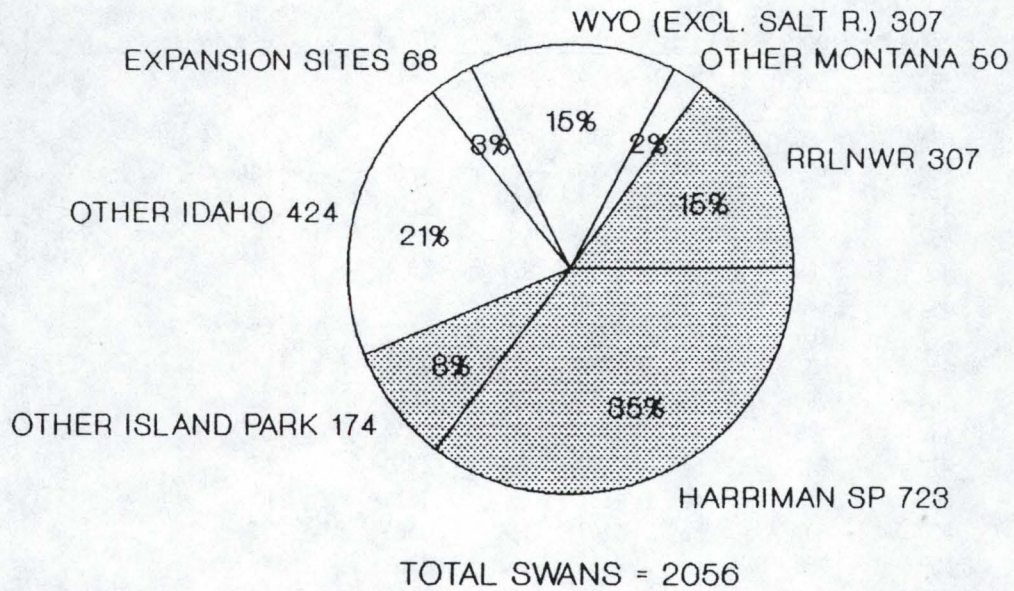


Fig. 4. Response of swans to trapping, hazing, and grain in winter 1991-92.

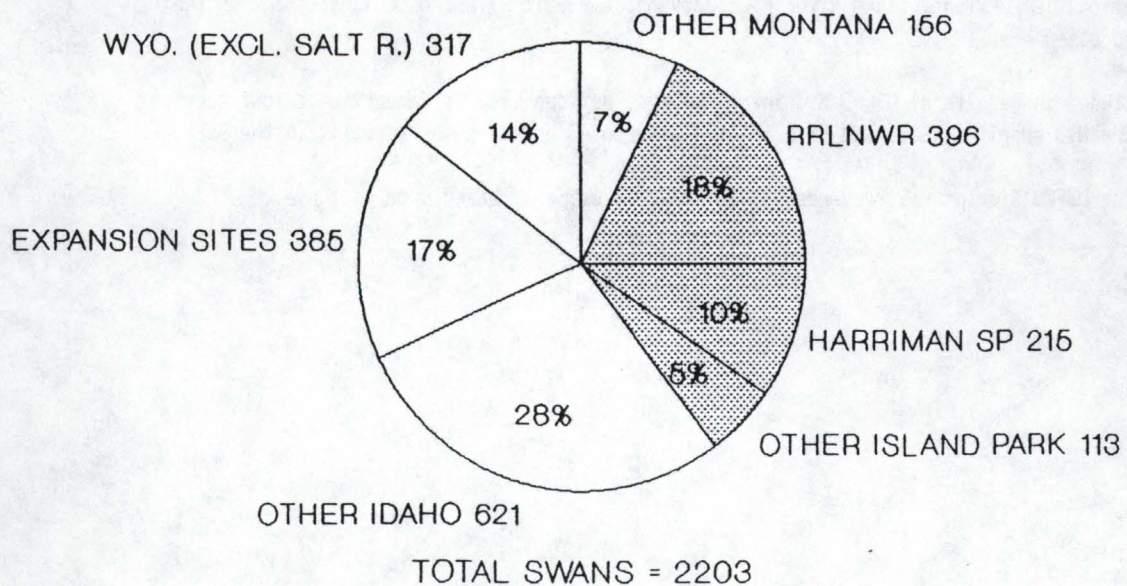




**Fig. 6. RMP winter distribution
1989-90**



1991-92



Appendix I. USFWS Midwinter Trumpeter Swan Surveys, 1972-92, including Oregon, Nevada and Utah.

	Montana			Idaho			Wyoming		Tristate	Oregon	Nevada	Utah
	RRLNWR	Hebgen Lake	Other ^a	Henry's Fk. above Pinehaven ^b	Pinehaven Dam ^c	South of Idaho Falls ^d	YNP	Other ^e	Total	Malheur Summer L. area	Ruby L. NWR area	Fish Sps. area
1972	223	ns ^f	ns	167	1	ns	56	ns	447			
1973	240	ns	ns	240	40	ns	61	ns	585			0
1974	266	ns	7	326	65	ns	38	7 ^h	709			
1975	179	27	18	398	29	ns	30	42	723	15		0
1976	221	62	4	337	38	ns	32	63	725	30		0
1977	324	20	14	452	69	ns	52	86	1017	17		0
1978	189	65	8	400	88	ns	57	47 ^a	874	7		8
1979	273	38	19	342	92	ns	84	18	867	41		25
1980	357	85	12	211	109	ns	96	69	939	65		9
1981	301	55	32	447	33	ns	332	47	1247	77		8
1982	274	145	61	366	200	ns	77	95	1218	65		8
1983	178	196	48	436	178	ns	102	93	1232	52		0
1984	197	229	72	423	242	ns	199	98	1460	63		1
1985	229	177	18	489	356	ns	161	86	1516	85		3
1986	260	184	9	420	507	6	107	116	1603	33		1
1987	275	94	14	659	286	ns	157	103	1582	49		2
1988	370	173	48	439	460	4	85	131	1710	24		4
1989	301	87	44	632	318	8	117	236	1743	33		3
1990	307	20	30	895	423	7	110	325	2007	20		7
1991	322	91	42	464	451	214	75	272	1931	26		20
1992	396	83	73	308	641	192	112	234	2039	123		9

^a Madison River drainage including Ennis Lake area.

^b Henry's Fork drainage above Pinehaven, including Buffalo River and Sheridan Reservoir.

^c Henry's Fork drainage below Pinehaven, Teton River and South Fork of the Snake River.

^d Lower Snake River from Idaho Falls to Bruneau Dunes State Park area.

^e Primarily the National Elk Refuge, Snake River near Jackson, and Salt River; occasional swans on the Green River and elsewhere.

^f Area not surveyed.

^g Although not included in results of USFWS Midwinter surveys, between 1969-74 January waterfowl surveys conducted by the Wyo. Dept. of Game and Fish located between 43 and 47 swans annually in the Snake River drainage.

^h Not surveyed. The USFWS Midwinter Survey results included an estimate based upon past use.

Appendix II. USFWS Tristate Trumpeter Swan Surveys (adults - cygnets)*.

Date	Montana			Wyoming			Idaho		Tristate
	RRLNWR	Other CV ^b	State Total	YNP	GTNP	State Total	HSP	State Total	Total
1931	ns ^c	ns	ns	14-12	6-3	20-15	ns	ns	20- 15 (35)
1932	19- 7	1- 2	20- 9	29- 2	2-1	31- 3	ns	7- 0	58- 12 (70)
1933	15- 9	2- 0	17- 9	27- 8	1-0	28- 8	ns	4- 0	49- 17 (66)
1934	16-26	ns	16-26	16-17	1-0	19-18	ns	13- 5	48- 49 (97)
1935	30-16	ns	30-16	16-11	ns	16-11	ns	ns	46- 27 (73)
7/13/36	29-26	2- 0	31-26	38-13	ns	43-15	ns	ns	74- 41 (115)
8/5/37	34-51	ns	36-51	38-26	ns	42-26	ns	3-0	81- 77 (158)
8/38	28-42	18- 9	46-51	40- 4	ns	47- 4	ns	ns	93- 55 (148)
8/15/39	50-59	8- 0	58-59	47-17	ns	56-17	ns	12- 0	126- 76 (202)
8/15/40	58-48	5- 0	67-49	39-14	ns	46-14	ns	7- 5	120- 68 (188)
8/15/41	52-44	14- 4	74-54	44-15	ns	47-15	ns	19- 0	140- 69 (209)
8/20/42	45-43	20- 3	71-53	ns	ns	7- 5	ns	24- 0	102- 58 (160)
8/26/43	88-25	24- 1	126-34	ns	ns	3- 0	ns	8- 0	137- 34 (171)
8/12/44	106-58	21- 3	137-61	35- 8	ns	48-11	ns	22- 0	207- 72 (279)
8/31/45	113-50	25- 0	146-52	ns	ns	4- 3	ns	8- 0	158- 55 (213)
8/11/46	124-46	43- 1	181-62	43- 8	ns	51-10	ns	23- 0	255- 72 (327)
8/12/47	131-49	38- 3	179-52	45- 8	ns	60- 8	ns	24- 0	263- 60 (323)
8/16/48	121-73	67- 5	199-85	49-13	ns	63-21	ns	26- 0	288-106 (394)
8/3/49	132-61	87- 7	233-75	54-21	ns	72-23	5- 5	16- 5	321-103 (424)
7/31/50	106-40	73- 0	187-47	57-16	ns	68-21	4- 3	24- 5	279- 73 (352)
7/31/51	170-76	104- 5	285-89	63-11	ns	76-14	6-11	39-15	400-118 (518)
7/16/52	184-55	142- 1	340-67	58-10	ns	74-17	6- 5	54- 9	468- 93 (561)
8/3/53	211-38	132- 9	355-57	51-10	4-1	87-22	6-12	28-20	470- 99 (569)
8/31/54	352-28	49- 8	412-40	64-23	8-4	98-32	21- 5	38- 7	548- 79 (627)
8/29/55	242-41	109- 4	366-48	58-10	10-5	99-31	10-11	26-16	491- 95 (587)
8/27/56	293-39	68- 9	374-48	48- 9	10-6	81-19	6- 4	26-14	481- 81 (562)
8/20/57	159-45	78-10	247-57	44-16	13-6	85-28	5- 1	27- 4	359- 89 (448)
9/9/58	270-40	76-21	358-62	64-18	17-9	105-45	8- 0	48-23	511-130 (641)
9/8/59	271-40	92-12	379-59	62- 8	26-8	109-30	12- 0	44-10	532- 99 (631)
9/6/60	163-33	116-14	296-49	56- 7	36-6	125-25	20- 0	66-14	487- 88 (575)
9/26/61	155-14	91-10	257-29	69- 3	19-6	130-12	20- 5	43-18	430- 59 (489)
9/10/62	179-50	39-18	225-76	44- 7	13-0	96- 9	13- 5	45-18	366-103 (469)

* These data were assembled primarily from the original USFWS Tristate Survey flight maps and data sheets which are on file at RRLNWR. Supplemental data from ground counts of areas not aerially surveyed were also included. In many instances these data differ from previously published data, primarily due to addition and transcription errors.

^b Other CV includes the Centennial Valley downstream from RRLNWR. Elk, Conklin, Cliff, or Wade lakes are included in the category State Total for Montana.

^c Not surveyed.

Appendix II, cont.

Date	Montana		Wyoming			Idaho		Tristate	
	RRLNWR	Other CV	State Total	YNP	GTNP	State Total	HSP Total	Total	
9/3/63	145-122	78-12	229-138	49- 7	23- 4	111-16	4- 5	41-28	381-182 (563)
9/14/64	180- 22	217- 4	402- 31	61- 8	26- 1	106-10	9- 4	46- 7	554- 48 (602)
9/14/65	190- 16	157-20	354- 36	62- 5	24- 0	123-13	10- 4	62-12	539- 61 (600)
9/12/66	240- 54	104-11	351- 66	57-12	26- 4	101-28	18- 7	62-21	514-115 (629)
8/28/67	184- 20	143- 5	334- 25	55- 2	21- 5	100-18	8- 3	85- 8	519- 51 (570)
8/26/68	155- 90	79-24	242-123	57- 4	29-14	101-25	10- 3	88- 6	431-154 (585)
1969	ns- 7	ns-11	ns- 20	ns	14- 8	ns	ns	ns	ns
1970	ns- 50	ns	ns	ns	8- 6	ns	ns	ns	ns
8/23/71	146- 12	142-26	297- 49	30- 3	27-10	74-13	6- 1	60- 6	431- 68 (499)
8/20/72	ns- 20	ns	ns	ns- 3	19- 4	ns	ns	ns	ns
9/19/73	ns- 39	ns-26	ns- 65	ns	18- 6	ns	ns	ns	ns
8/26/74	139- 33	151-11	296- 49	50- 4	30-10	90-14	25- 8	71-17	457- 80 (537)
9/4/75	120- 22	ns-14	ns- 36	ns	ns	ns	ns	ns	ns
1976	ns- 23	ns-22	ns	52- 1	20- 0	ns	ns	ns	ns
8/29/77	137- 39	122-13	267- 64	51- 7	14- 6	76-15	25- 2	60- 7	403- 86 (489)
9/14/78	ns- 38	ns- 9	ns- 50	45- 2	ns	ns	ns	ns	ns
9/25/79	297- 52	18- 4	324- 63	38- 3	32- 4	80-15	34- 0	58- 9	462- 87 (549)
9/2/80	175- 5	128- 0	315- 6	39- 1	29- 1	74- 6	10- 1	73-11	462- 23 (485)
10/1/81	247- 37	40-13	ns	ns	ns	ns	ns	ns	ns
1982	ns- 4	ns-14	ns- 21	ns	ns	ns	ns	ns	ns
9/12/83	106- 19	112-12	228- 32	29- 6	23- 3	78-16	8- 0	92- 6	398- 54 (452)
9/11/84 ^d	115- 4	131-13	259- 17	37- 4	20- 1	93-15	26- 7	72-21	424- 53 (477)
8/25/85 ^d	108- 42	96-34	208- 83	27- 5	21- 5	73-25	20- 6	83-27	364-135 (499)
9/7/86 ^d	87- 15	80-13	174- 28	24-12	26- 0	74-19	22- 0	83-14	331- 61 (392)
9/14/87 ^d	113- 96	91-35	210-133	49- 6	18- 6	92-27	15- 0	63-15	365-175 (540)
9/19/88 ^d	219- 54	38-17	268-77	36- 7	27- 5	109-32	24- 6	87-28	464-137 (601)
9/11/89 ^d	210- 15	75- 8	294- 23	25- 5	21- 5	110-21	16- 1	101-16	505- 60 (565)
9/10/90 ^d	178- 80	61-26	245-108	25- 3	30- 4	95-11	10-10	92-28	432-147 (579)
9/17/91 ^d	121- 36	49-24	176- 60	30- 3	30- 0	100- 5	12-13	138-26	414- 91 (505)

^d For comparability with survey results of previous years, East Front Montana data have not been included. Since 1984 East Front data are: 1984 7-5; 1985 4-4; 1986 2-2; 1987 5-3.

Appendix III. Summary of releases of trumpeter swans translocated from Harriman State Park, Idaho and Red Rock lakes NWR, Montana, July 1988 - January 1992.

Release Site	Capture Site								
	Harriman SP			RRLNWR			Combined		
	Ads.	Cygs.	Total	Ads.	Cygs.	Total	Ads.	Cygs.	Total
<u>Summer L., OR</u>	52	48	100	--	--	--	52	48	100
winter 1991-92									
<u>Fish Sps. NWR, UT</u>									
winter 1990-91	6	3	9	7	9	16	13	12	25
winter 1991-92	<u>8</u>	<u>16</u>	<u>24</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>8</u>	<u>16</u>	<u>24</u>
Total	14	19	33	7	9	16	21	28	49
<u>Bruneau Dunes, ID</u>									
winter 1990-91	41	33	74	49	40	89	90	73	163
winter 1991-92	<u>28</u>	<u>39</u>	<u>67</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>28</u>	<u>39</u>	<u>67</u>
Total	69	72	141	49	40	89	118	112	230
<u>Bear R., ID</u>									
winter 1990-91	4	3	7	0	0	0	4	3	7
<u>Minidoka NWR, ID</u>									
winter 1990-91	10	6	16	0	0	0	10	6	16
<u>Salt R., WY</u>									
winter 1990-91	8	12	20	3	7	10	11	19	30
<u>Fort Hall, ID</u>									
winter 1990-91	83	28	111	1	0	1	84	28	112
winter 1991-92	<u>0</u>	<u>3</u>	<u>3</u>	<u>42</u>	<u>19</u>	<u>61</u>	<u>42</u>	<u>22</u>	<u>64</u>
Total	83	31	114	43	19	62	126	50	176
<u>Fort Hall, ID</u>									
summer 1988	--	--	---	15	0	15	15	0	15
summer 1990	--	--	---	10	0	10	10	0	10
summer 1991	--	--	---	<u>1(1)a</u>	<u>13</u>	<u>14</u>	<u>2</u>	<u>13</u>	<u>15</u>
Total	0	0	0	26(1)a	13	39	27	13	40
<u>Grays L. NWR, ID</u>									
summer 1988	--	--	---	13	0	13	13	0	13
summer 1989	--	--	---	15	0	15	15	0	15
summer 1990	--	--	---	10	0	10	10	0	10
summer 1991	--	--	---	<u>29</u>	<u>0</u>	<u>29</u>	<u>29</u>	<u>0</u>	<u>29</u>
Total	0	0	0	67	0	67	67	0	67
<u>Malheur NWR, OR</u>									
summer 1991-92	--	--	---	4	0	4	4	0	4

a. 1 rehabilitated adult was released with the RRLNWR birds.

Appendix IV. Trumpeter swan mortality diagnosed at NWR from Colorado, Idaho, Montana, Utah, and Wyoming, 1980-91.

<u>Location</u>	<u>Date</u>	<u>Diagnosis</u>	<u>Comments</u>
<u>Colorado</u>			
Eades	03/23/91	Avian cholera	Only bird found
<u>Idaho</u>			
Ashton	05/05/84	Trauma	Gunshot
Harriman State Park	03/10/85	Emaciation	Caused by parasitism and copper toxicity
Henry's Fork River (Island Park)	03/15/85- 04/15/85	Lead poisoning N=5 Emaciation N=10 Coccidiosis N=3	*See note at end of table
Harriman State Park	12/85	Emaciation	
Harriman State Park	02/15/86	Emaciation	Incidental parasites-nasal leeches
Buffalo River	03/06/86	Emaciation	Incidental parasites-tapeworms
Harriman State Park	02/13/87	Lead poisoning	No shot in gizzard; Liver Pb: 29 ppm (wet)
Salem	03/17/87	Lead poisoning	4 lead, 3 steel shot in gizzard; Liver Pb value: 17 ppm (wet)
Swan Lake	09/04/87	Emaciation	Probable enteritis
Swan Lake	06/87	Lead poisoning	2 lead shot in gizzard; Liver Pb 12 ppm (wet)
Swan Lake	06/27/87	Emaciation	
Pinehaven	12/31/87	Emaciation	
Sand Creek Pond	10/03/88	Aspergillosis	
Fort Hall	11/89	Ulcerative proventriculitis	Held in captivity for approx. 9 months
Fort Hall	11/89	Ulcerative proventriculitis	Held in captivity for approx. 9 months
Soda Springs	12/03/89	Trauma	Metal fragments (not Pb) found in gizzard
Harriman State Park	12/20/90	Nasal leech infestation	
Harriman State Park	12/27/90	Nasal leech infestation	
Harriman State Park	12/28/90	Nasal leech infestation	
Harriman State Park	01/29/91	Trauma	Powerline
Harriman State Park	01/91	Trauma	
Harriman State Park	12/12/90	Undetermined	Translocated to Fish Springs NWR, UT; on refuge for 1 day prior to death
<u>Montana</u>			
Red Rock Lakes NWR	01/24/84	Lead poisoning	5 shot in gizzard; Liver Pb: 14 ppm (wet)
Red Rock Lakes NWR	09/12/83	Trauma	Broken neck
Red Rock Lakes NWR	08/16/83	Impaction with necrotizing colitis	
Red Rock Lakes NWR	05/21/84	Peritonitis/pericarditis	
Red Rock Lakes NWR	05/21/84	Undetermined	
Red Rock Lakes NWR	02/28/85	Impaction	Part of Lead Poisoning Monitoring Program
Red Rock Lakes NWR	02/28/85	Avian tuberculosis/ Aspergillosis	Part of LPMP
Red Rock Lakes NWR	08/01/85	Emaciation	
Red Rock Lakes NWR	11/19/86	Trauma	
Red Rock Lakes NWR	06/11/86	Unsuitable for exam	
Red Rock Lakes NWR	10/19/86	Trauma	Gunshot
Red Rock Lakes NWR	12/05/86	Lead poisoning	59 Pb shot in gizzard; Liver Pb 11 ppm wet
Red Rock Lakes NWR	12/01/86	Renal coccidiosis	1 lead shot found in gizzard
Red Rock Lakes NWR	06/25/87	Emaciation	Liver Pb value slightly high: 3.5 ppm (wet); No shot found; impacted

Appendix IV cont.

<u>Location</u>	<u>Date</u>	<u>Diagnosis</u>	<u>Comments</u>
Red Rock Lakes NWR	11/25/87	Unsuitable for examination	Severely scavenged
Red Rock Lakes NWR	11/25/87	Predation	Eagle seen flying from the swan and injured swan was euthanized
Red Rock Lakes NWR	11/25/87	Unsuitable for examination	Severely scavenged
Red Rock Lakes NWR	11/25/87	Lead poisoning	Partially scavenged; Liver Pb: 6 ppm (wet)
Red Rock Lakes NWR	08/30/88	Emaciation	Partially scavenged
Red Rock Lakes NWR	08/23/88	Unsuitable for examination	Too decomposed for evaluation
Red Rock Lakes NWR	08/23/88	Unsuitable for examination	Scavenged
Red Rock Lakes NWR	08/30/88	Emaciation	
Red Rock Lakes NWR	08/30/88	Emaciation	
Red Rock Lakes NWR	04/28/88	Undetermined	
Red Rock Lakes NWR	06/28/89	Avian tuberculosis	
Red Rock Lakes NWR	11/10/89	Trauma	Suspect powerline strike
Red Rock Lakes NWR	12/05/89	Undetermined	
Red Rock Lakes NWR	Unknown	Amputation	No history with bird
Red Rock Lakes NWR	09/11/90	Lead poisoning	14 Pb shot in gizzard; Liver Pb: 6 ppm (wet)
Red Rock Lakes NWR	12/11/90	Undetermined	Suspect suffocation; head was placed under wing during handling
<u>Nevada</u>			
Ruby Lake NWR	12/18/82	Undetermined	Part of LPMP
Ruby Lake NWR	01/11/84	Emaciation	Part of LPMP
Ruby Lake NWR	01/23/85	Ulcerative proventriculitis	Part of LPMP; no parasite identified
Ruby Lake NWR	01/27/85	Emaciation	Part of LPMP
Ruby Lake NWR	02/01/85	Emaciation	Part of LPMP
Ruby Lake NWR	02/10/85	Emaciation	Part of LPMP
Ruby Lake NWR	03/25/85	Emaciation	Brass weight in gizzard; part of LPMP
Ruby Lake NWR	05/01/85	Undetermined	
Ruby Lake NWR	07/17/87	Undetermined	
<u>Utah</u>			
Fish Springs NWR	04/11/91	Protozoan infection	Translocated from Red Rock Lakes NWR in Dec of '90
Fish Springs NWR	12/26/91- 02/14/92	Protozoan Infection	22 Trumpeter Swans died or were euthanized in this epizootic
<u>Wyoming</u>			
Jackson	02/06/85	Trauma/injury	Scavenged
Livingston	12/11/90	Aspergillosis	Aspergillosis fumigatus

*Die-off involving 22 trumpeter and 4 tundra swans; Pb fragments were found in 3 of the trumpeters; Liver Pb values ranged from 7-21 ppm (wet)

Appendix V. Handling of trumpeter swans captured for translocation and/or health monitoring.

Crates and sacks used in the translocation effort or for holding swans should only be used for swans. Crates and sacks used at one capture location should not be used at another capture location unless they are disinfected between sites. Crates and sacks should be disinfected between translocation years. A good disinfectant is commercially available household chlorine bleach. This bleach can be diluted 1:10 with water and used to disinfect materials which contact the birds.

Veterinarians involved with the trumpeter swans should be requested to practice good biosecurity measures. They should make the trumpeters the first stop of the day, wear fresh clothing (labcoats, etc), and be cognizant of the possibility of the transfer of infectious agents from other cases (i.e. sick pet birds or poultry). Since it is difficult to control exposure within a veterinary clinic, it is preferable to have the birds examined outside, i.e. on the tailgate in the parking lot.

Until more is known about the Fish Springs NWR mortality, avoid exposure of trumpeter swans to other bird species (particularly gallinaceous birds). Handlers should not have any immediate association with gallinaceous birds prior to handling swans. This includes backyard chickens and captive-raised quail, pheasants etc.

Swans observed sick/moribund or injured during capture and handling should not be transported to a release site. Whether to transport birds for treatment and rehabilitation, release them at the capture site and attempt to monitor them or euthanize them will have to be decided on an individual case basis. The paramount consideration is to avoid spreading disease to any release site.

Swans that have been held at a rehabilitation facility or veterinary clinic for treatment and then released in the wild could carry disease. To minimize this risk, the operators of such facilities should be queried as to possible exposure to disease. If possible, cloacal swabs should be taken to check for salmonella and coccidiosis and release of the birds delayed pending the results.

Proficiency at blood and other sample collection should be achieved so that birds are handled minimally and the translocation effort is efficient and quick.

Any swans that die during capture, handling, or the post release period should be sent to an appropriate laboratory for necropsy.

Appendix VI. Canadian Wildlife Service late summer surveys of the Grande Prairie flock, 1959-1992^a.

	Total No. Lakes Surveyed	Pairs With Cygnets	Total Pairs	Single & Flocked Adults	Total Adults	Total Cygnets	Total Flock
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 ^b	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							
1988							
1989							
1990							
1991							
1992							

obtain CWS data

^a These data were assembled by 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).

^b Incomplete survey.

Appendix VII. Status of RMP flocks as determined by summer rangewide surveys in 1985 and 1990.

Location	1985		1990	
	Adults	Cygnets	Adults	Cygnets
Montana	212	87	245	108
Idaho	83	27	92	28
Wyoming	73	25	95	11
Oregon (Malheur NWR)	36	2	?	?
Nevada (Ruby Lakes NWR)	23	3	?	?
Washington (Turnbull NWR)	9	1	?	?
U.S. FLOCKS SUBTOTAL	436	145	?	?
Alberta	228	112	317	160
British Columbia	59	27	191	104
Yukon	87	20	164	51
Northwest Territories	51	24	117	65
Saskatchewan	4	2	2	1
CANADIAN FLOCKS SUBTOTAL	429	185	791	381
RMP SUMMER TOTAL	865	330	?	?

Obtain 1990 data