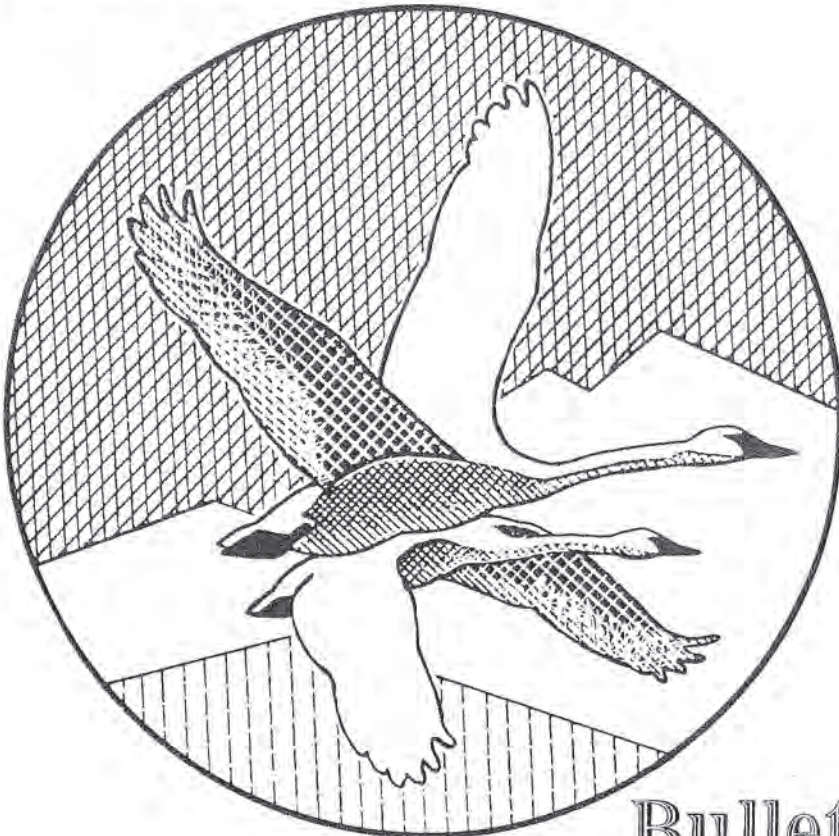
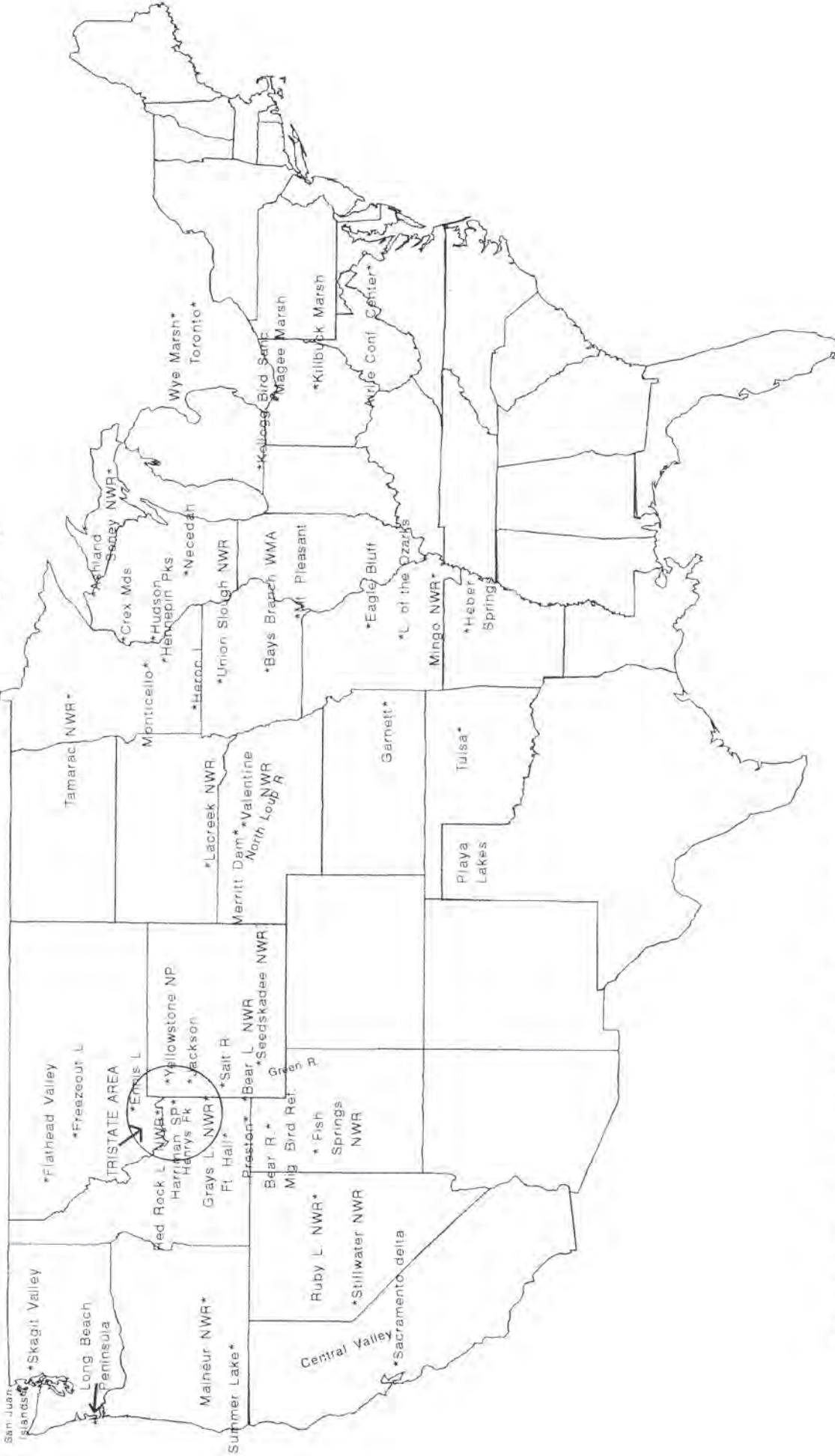


North American Swans



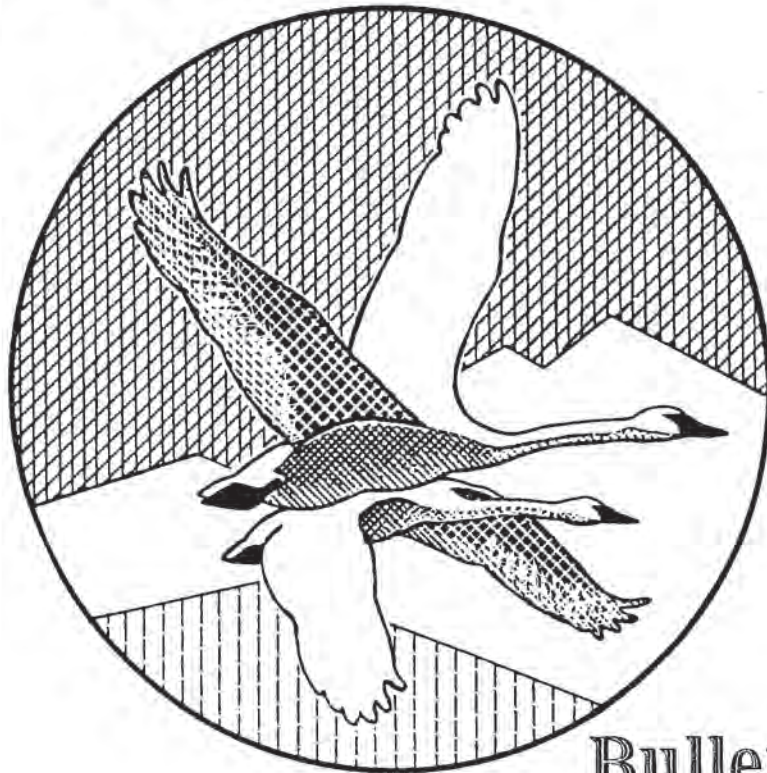
Bulletin of The
Trumpeter Swan
Society

Volume 27, No. 1 - December 1998



AREAS OF SIGNIFICANCE FOR TRUMPETER SWANS

North American Swans



Bulletin of The
Trumpeter Swan
Society

Volume 27, No. 1 - December 1998

Editors
Madeleine H. Linck
Harvey K. Nelson

Editor's Note: *North American Swans* replaces *The Trumpeter Swan Society Newsletter*. We will preserve the same system of numbering volumes and issues so that historical information available from the *Newsletters* will not be lost. Our intent is to cover topics in depth, have regional information in each edition and publish reports of research and management that would otherwise be unavailable. We will include articles and research on other species of swans as the information is pertinent to Trumpeter Swans. Publication schedule will be determined by the newly established Editorial Board.

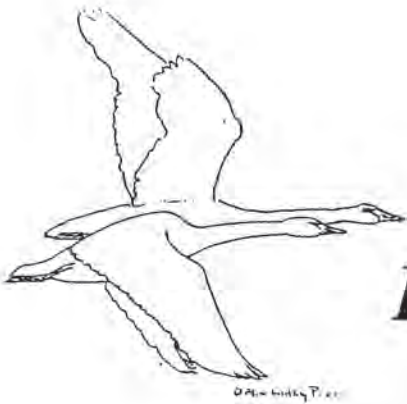
Please feel free to submit reports or articles for publication at any time. Submit articles to: The Trumpeter Swan Society, 3800 County Road 24, Maple Plain, Minnesota 55359. Diskettes can be accepted. Please format in Microsoft Word if possible. Clearly label diskette and send a hard copy as well.

Published by The Trumpeter Swan Society. For more information please contact: The Trumpeter Swan Society, 3800 County Road 24, Maple Plain, MN 55359, (612-476-4663; E-mail: ttss@hennepinparks.org).

ISSN 1094-6144

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From the President

Ruth Shea

Though we held no formal celebration, we note with pride that The Trumpeter Swan Society is 30 years old this year. Since 1968, our Society has been at the forefront of Trumpeter Swan restoration efforts and management issues across the United States and Canada. Although Trumpeters still number only a fraction of their former abundance and their distribution and migrations remain greatly diminished, much has been accomplished. You, our dedicated members, have been involved every step of the way.

In 1968, the total Pacific Coast Population was estimated to contain only about 3,400 Trumpeter Swans and less than 1,000 Trumpeters existed in Canada and the lower 48 states. Over the past 30 years, Trumpeters increased more than fourfold. Through restoration efforts, nesting flocks have reestablished a foothold in the Midwest, as well as in the province of Ontario. While much work remains, there is good reason to celebrate the progress of the past 30 years.

Trumpeters have increased substantially in Alaska, Canada and the mid-western states since 1968. It is sobering, however, to realize that the nesting population of the western states (Montana, Idaho, Wyoming, Oregon, and Washington) has declined. The western U.S. nesting population has declined from slightly over 700 Trumpeters in 1968 to only about 470 swans in 1998. Near total destruction of migrations to southerly wintering habitats has left these U.S. flocks dependent upon unsuitable northern wintering sites. Supplemental winter feeding has been terminated, but the flocks have not yet rebuilt secure migrations to alternate winter habitats. They remain highly vulnerable to winter mortality and their long-term survival is precarious.

Though unforeseen issues may arise, the most obvious challenge in the next 30 years will be to rebuild secure winter distributions for all Trumpeter Swan populations. In some cases this means reestablishing long-severed migrations. Where migration hazards are insurmountable, adequate wintering sites must be created closer to nesting areas. Where wetland quality is inadequate, we must work with the agricultural community to provide crop residues for wintering swans while minimizing

depredations. As we work to rebuild secure winter distributions, protecting the gains of the past 30 years will also be a constant challenge.

In addition to creating more secure winter distributions, protecting nesting habitat will also require increased attention. Nesting areas such as Grande Prairie, Alberta, which 20 years ago seemed to be secure, are being rapidly degraded by oil and gas drilling and other development pressures. Nesting and wintering habitats of the Pacific Coast Population face increasing degradation, even in the once-remote far north. In the Midwest, we must protect and increase the nesting effort that has been restored in recent years. To reverse the decline of the western U.S. flocks, we must prevent the loss of nesting territories and expand their nesting, as well as their winter distribution.

Success will require partnerships between TTSS and many federal, state, and provincial agencies. More than ever, success will require the increasing support and activity of informed citizens, giving voice to the Trumpeter's needs and testifying to their immeasurable value to our increasingly urban society. Our Society can not meet this need if we have to rely entirely on the efforts of an all volunteer Board. To increase the effectiveness of TTSS, the Directors voted at the November 1998 Board meeting to hire a part-time Executive Director on a trial basis in 1999. We have contemplated this step for several years and believe it is time to increase our efforts and presence. As of January 1, 1999, I will resign as President of TTSS in order to serve as acting Executive Director. Past President Larry Gillette has been appointed to serve as President, and Bruce Conant will continue as Vice President, until our next election of Directors in September 1999.

With your help and support we look forward to increasing our efforts to ensure that healthy populations of Trumpeters will thrive once again in North America and continue their return to long-vacant habitats. What better symbol of hope for conservation of rare species and priceless wetlands can we give to future generations than the successful return of these magnificent birds? Thank you all for your help and dedication in these efforts.

Board of Directors Meeting Highlights

Ruth Shea

The 13 members of the Board of Directors meet twice per year unless unusual business necessitates additional meetings. The most recent Board meeting was held on November 12, 1998, by teleconference. All Board members and Administrative Assistant Madeleine Linck were present for the 2-hour meeting.

The meeting began with a review of accomplishments in 1998 which included: publication of two issues of *North American Swans* and three issues of *Trumpetings*, reconstruction of structures to maintain water levels in wetlands on Washington's Long Beach Peninsula, completion and publication of a Flyway approved management plan for the Interior Population, substantial progress toward completion of a management plan for the Atlantic Coast Population, comments submitted on revision of Rocky Mountain Population (RMP) Management Plan, creation of TTSS Web Page, compilation of 1998 nesting data for all RMP/U.S. flocks. In addition, TTSS coordinated wintering reports of marked swans for the Interior Population, developed a volunteer observer network for RMP Trumpeters, assisted with management and development of the DeBay Swan Preserve, joined appeal of the Northern Intertie powerline project in Alaska, developed and achieved passage by the American Bird Conservancy of a resolution supporting increased funding to continue 5-year surveys of Alaskan Trumpeters, researched methods to develop migration of Ontario Trumpeters to Indiana, and participated in numerous Trumpeter Swan management meetings. Throughout the year, TTSS responded to numerous agency and public requests for information on Trumpeter Swans and their management.

The Board reviewed our current financial status and approved a 1999 budget of approximately \$45,000. We will likely end 1998 with about \$30,000 in our operating reserves. This meets our goal of having about 2/3 of the next year's budget in hand at the beginning of the year. This is necessary because our largest bill, for our administrative staff at Hennepin Parks, must be paid in January for work performed the previous year. During 1999, we will need to raise about \$45,000 to end 1999 in a similar financial position. Major anticipated expenses for 1999 include: staff salaries (\$28,000), 17th

Conference (\$5,000), publications (\$4,000), travel to Trumpeter Swan management meetings (\$2,500), and postage (\$1,800). Fundraising assistance is needed to seek grants from foundations, corporations and patrons.

Other major topics of discussion included: hiring an Executive Director, Board Officers, the need for Donna Compton to take long-term disability leave, plans for the 17th Conference, inadequacies of the management plan for the Rocky Mountain Population, status of prosecution and legal issues surrounding destruction of the water structures at our Long Beach Peninsula wetlands, and evaluation of the 5-year experimental quota on harvest of Trumpeter Swans in the Pacific Flyway.

Board Actions included: approval of the 1999 budget, hiring Ruth Shea as part-time Executive Director for 1999, accepting Ruth's resignation as President (as of January 1, 1999), appointing Larry Gillette to serve as President until the next election of officers in September 1999, and appointing an editorial board for *North American Swans*.

If you would like more information on any topic relating to the Board of Directors please contact any of the Board members or Madeleine Linck at the TTSS office.

17th TRUMPETER SWAN SOCIETY CONFERENCE FIRST CALL FOR PAPERS

The 17th TTSS Conference will be held in Idaho Falls, Idaho, September 15-18, 1999. The Conference will include sessions dealing with all Trumpeter Swan populations, their biology, management, research projects, restoration techniques and habitat issues. We also encourage presentations summarizing efforts by volunteers or private propagators, addressing artistic/cultural appreciation of Trumpeters, or sharing public educational programs and techniques. We also welcome papers that increase our understanding of the biology and management of Tundra Swans and Mute Swans in North America. If you would like to present a paper or make a presentation at the 17th Conference please contact Ruth Shea at: e-mail: ruthshea@srv.net; December - April mailing address: P.O. Box 16172, Portal, Arizona 85632. Telephone and Fax: 520-558-2506.



Regional Reports

Pacific Coast Population

Martha Jordan
Alaska

A report from **Rod King**, waterfowl biologist for USFWS, has summed up the fall productivity for swans in the Minto Flats area west of Fairbanks. The spring started out very dry and warm and saw the largest average clutch size (6.2) in 12 years of collections. [Eggs are collected for restoration programs.] However, the weather soon turned to the third wettest summer on record. All in all, average brood size was 3.8 compared to the 3.6 long-term average. There are 31 percent young which is only 1 percent above average, but 11 percent above 1997. Biologists recorded the highest number of broods ever observed on three of five quad maps surveyed. Considering the early hatch date and late mild fall, it looks good for cygnet survival. In general, it was a very good year for swans.

Washington State

Long Beach Peninsula Wetland Restoration

Progress continues to be made on holding accountable those individuals who committed the crime of destroying TTSS's dune dam and draining 1,000 acres of wetlands. As of December 1 the following has occurred: An individual has been charged with two misdemeanor counts and one felony for his alleged participation in the destruction of the dune. The criminal trial will be in February 1999. The individual's backhoe was confiscated by the **Washington Department of Fish and Wildlife**. Additional evidence that has been discovered implicates a third person and a charge of this individual is anticipated for some time in December.

Martha Jordan, TTSS Director
Chair, Washington State Working Group
13112 First Ave., W., Everett, WA 98208

Partnerships

TTSS is presently working in partnership with several agencies and private individuals in seeking grant money to replace the existing water control structure at the north end of Hines Marsh [TTSS once owned this property and outflow, but it is now owned by Washington State Parks.] A new redesigned water control structure is the key to insuring that water levels in the marsh can be maintained at a stable level during peak flows in the winter. Once this is in place, additional restoration work can begin to restore the open water areas that historically were attractive for wintering swans. The partners include **Washington State Parks, Pacific County, USFWS, Washington Department of Fish and Wildlife, Northern Oyster Company** and the **Weigardt Brothers**.

The **Washington State Working Group** is proud of the partnerships we have in the state. We also have a survey team in the San Juan Islands that is coordinated by **Susan Vernon** of the **San Juan Preservation Trust**. She has done an outstanding job in organizing people, collecting data and getting it to us. Last year, there were about 40 volunteers counting swans during the winter. A much appreciated thank you to Susan and to all the people who have helped in this important monitoring program.

Pacific Coast Population Priorities

The **Pacific Coast Population (PCP) Working Group** has prepared a list of suggested priorities to ensure the long-term security of the PCP of Trumpeter Swans. Comments are welcome from others concerned about this population. Preliminary ideas include the following:

1. Develop a detailed Trumpeter Swan Society management plan and timetable to complete the acquisition of property and easements to build a Northwest International Trumpeter Swan Wintering Refuge System (this can be public or private or partnerships) capable of overwintering a combined population of 50,000 PCP Trumpeter Swans primarily sustained by agricultural nutrients.

2. Develop a strategy and timetable to fund the #1 priority (both the short and long-term) outlined above with Federal, Provincial/State, local and private sources.

3. Develop partnerships/joint ventures/ management guidelines with non-government organizations which have similar objectives or appropriate properties already secured.

4. Develop viable methods of reducing impacts of late migrants or nonmigrant swans on agricultural crops.

5. Identify the carrying capacity of specific Trumpeter Swan wintering grounds already in use and areas where Trumpeters may use in the future. This needs to look at both agricultural and natural wetlands areas.

Yukon Territory

Jim Hawkings

The 1998 breeding season showed all the signs of being a good one for Trumpeters in the Yukon. We experienced an early spring, a warm summer, and a mild fall that allowed birds to linger through October. The summer was a very dry one, however, and there is some concern about the low water levels in some wetlands -- something we generally do not have to contend with this far north. Trumpeters lingering in the north in October caused some concern in the Prince George area of northern British Columbia when the gathering of swans at Fraser Lake failed to materialize on schedule. The birds did show up, but a week or two late. The annual Celebration of Swans held in the Whitehorse area in mid-April was a big success once again and attracted interest from people outside the Territory.

*Jim Hawkings, TTSS Director, Biologist
CWS, 91782 Alaska Hwy, Whitehorse,
Yukon Territory Y1A 5B7*

Alaska Birds Aerial Survey Team

Jim King

The Alaska Birds Aerial Survey Team (ABAST) consisting of U.S. Fish and Wildlife Service experts, armed with small airplanes and electronic aids, have amassed and computerized consistent records for some of our most treasured large birds, over vast areas, and in some cases for over 40 years. Oddly, developing these wonderful long-term data sets was not the result of a far sighted, cohesive plan. They emerged because outstanding biologists, facing complex management decisions, are using an alphabet stew of funding opportunities to build the baseline records they wish previous generations had been able to hand down. Sadly for future generations, current budget problems are threatening to limit the continued development of this work.

The program started in 1955 with one biologist/pilot assigned to determine whether the fall flight of game ducks from Alaska would be up or down from previous years. This was part of the continental program to manage traditional duck hunting without impairing the stock as proscribed by the 1918 Migratory Bird Treaty. Currently, ABAST has 10 biologists, two computer specialists (mapping and biometrics) and four specially modified small airplanes. Six of the biologists are qualified commercial pilots. All are expert aerial bird observers, a coordination skill that, like hitting baseballs or playing piano, improves with training and constant practice. The computer specialists have managed to insert old data into new machines making it easily retrievable as maps, tables or charts useful to developers, land managers, scientists and others with specific information requirements. The planes have high wings for maximum visibility, amphibious floats for safe overwater operation in remote locations and are modified for ease of operation by pilots who are recording bird observations while flying and navigating.

What benefits has the North American public received from supporting this survey program?

1. Four decades of Alaskan duck breeding population data is now available. Though this is an international program, the Alaska portion is unmatched for consistency and includes more species than the other eight survey areas stretching across Canada and the Great Plains.

*James G. King, TTSS Director, USFWS Retired,
1700 Branta Rd., Juneau, AK 99801*

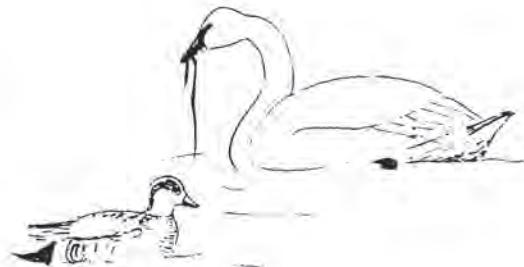
2. Trumpeter Swans were removed from consideration under the Endangered Species Act after a complete census in 1968 showed nearly 3,000 on Alaskan nesting habitat. Censuses at 5-year intervals since then document the growth and partial leveling of this species. Alaska habitat still supports 80 percent of the world's nesting Trumpeters.
3. Duck survey data from this program was used to justify establishing seven National Wildlife Refuges with more than 23 million acres of waterfowl production habitat under the Alaska National Interest Lands Claims Act of 1980.
4. The project pioneered a system of shipborne seabird transects, based on aerial methods, used in study of Alaska continental shelf waters subject to oil leases.
5. More than 40 years of consistent Lesser Sandhill Crane nesting season data shows a slight increase for this hunted species, the world's only abundant crane.
6. Some 15 years data on Alaska's four nesting species of loons provide the best view of loon distribution for any major region in the world.
7. Bald Eagle plot surveys in southeast Alaska resulted in a U.S. Forest Service program to save eagle nest trees in log sale areas, saving hundreds of nests. Location of over 1,000 Bald Eagle nests supported establishment of the Admiralty Island National Monument.
8. Twelve years of intensive survey on the Yukon Delta has documented the status of the four species of geese that are holding or recovering from serious decline in our country's greatest goose nesting area.
9. Fifteen years of consistent data on the estuarine staging habitat used by Emperor Geese in western Alaska tracks numbers of this struggling species.
10. Winter and summer surveys have been developed for water birds in southeast Alaska, a wonderland with nearly 15,000 miles of coastline including some 5,000 islands.
11. The program is beginning to unravel the distribution mysteries of North America's four

eider species, two of which are on the threatened list. This has included the first ever aerial bird surveys in Siberia by an American aircraft and crew.

Even though the personnel and equipment of ABAST are the best in the world, operating funds are insufficient to achieve the full potential. The immediate threat is possible cancellation of the 7th Alaska Trumpeter Swan census due in the year 2000, which will cost up to \$250,000. Budgeting problems could be stabilized by adding \$250,000 to the program every year ensuring the maximum productivity and long-term continuity. A workable program might include: Year 1, The Alaska Trumpeter Swan Census. Year 2, Alaska Tundra Swans, a plot survey of this hunted species that migrates to both the Pacific and Atlantic seaboard. Year 3, The Bald Eagle Plot Survey from Southeast to Western Alaska. Year 4, Alaska's summer loons, all four species, most importantly, those in the Arctic oil fields. Year 5, Alaska's nearshore waterbirds including Harlequin Ducks, sea ducks, Marbled Murrelets and a number of other species of concern that occupy oil vulnerable areas. Year 6, the Trumpeters again.

ABAST has done parts of these surveys for many years. These birds are all significant species that are jeopardized by man's activities. Wildlife managers need and use this information for important management decisions now. Continuing this work consistently through the next 50 years is essential, as human populations double again. The Aerial Survey Team continues to contribute to future generations and we should provide them the funds to do so. Who else is prepared to do it?

The following (on page 7) resolution that advocates continuation and funding of the Alaska bird surveys, including the survey of Trumpeter Swans every 5th year was presented by The Trumpeter Swan Society to the Policy Council of American Bird Conservancy at their meeting on September 1, 1998. The resolution was passed unanimously. Anyone interested in supporting this recommendation can help by contacting Bruce Babbitt, Secretary, U.S. Dept. of Interior; and Jamie R. Clark, Director, U. S. Fish and Wildlife Service, Washington, D. C. 20240.



**A RESOLUTION
POLICY COUNCIL
OF THE
AMERICAN BIRD CONSERVANCY**

WHEREAS: The Trumpeter Swan barely survived in the 19th century, has responded slowly to conservation efforts in the 20th century, remains a shadow of its 18th century numbers, but shows promise of surviving and increasing in the 21st century if we pay attention, and;

WHEREAS: The Alaska Region of the U.S. Fish and Wildlife Service has been censusing Trumpeters that summer in Alaska (80% of the world's population) for 30 years as they increased from a little less than 3,000 to over 15,000, reaching saturation in some areas, and as they shifted their winter dependence from the destroyed estuarine habitat on which they formerly depended to agricultural residue in the modified rain forest habitat of the Northwest, and;

WHEREAS: No other organization, public or private, has the skilled wildlife biologists/pilots and uniquely modified aircraft to continue this census in comparable form, and;

WHEREAS: The data are computer archived in a form easily retrieved by land managers and developers, but have never been analyzed by research scientists for geophysical and climatic correlations or population modeling, to provide information useful to those attempting to restore Trumpeters to their former range across North America; and

WHEREAS: This breadth and quality of data will have ever increasing value for each generation of management biologists in the 21st century and beyond;

NOW, THEREFORE, LET IT BE RESOLVED: That the Policy Council of the American Bird Conservancy recommend to the Secretary of the Interior that the every-fifth-year census of Trumpeter Swans summering in Alaska be continued until competent scientific review determines that the population has been restored and stabilized at a population level of optimum benefit to the people of our continent through the 21st century; and

LET IT BE FURTHER RESOLVED: That the Secretary recognize and capitalize on the unique expertise of the Alaskan wildlife biologists/pilots of the Fish and Wildlife Service and adequately fund the Waterfowl Management Division in Alaska for continued monitoring of Trumpeter Swans and other great Alaska nesting species (all put at risk by human activity) in a 5-year census/survey rotation to include:

Year 1 -- a complete Trumpeter Swan census in the year 2000;

Year 2 -- a random-plot survey of Tundra Swans including all those that winter in California and those that nest on the North Slope oil fields and winter in the mid Atlantic states;

Year 3 -- a random-plot survey of the Bald Eagles of the rain forest on the Pacific Coast where perhaps they always reached their greatest density anywhere;

Year 4 -- a special survey of all four species of Alaska nesting loons that depend in winter on degraded waters and damaged fish stocks further south; and

Year 5 -- a special survey of the nearshore species of coastal Alaska, including Harlequin and other declining sea ducks, and Marbled and Kittlitz Murrelets.

Then, this cycle to be repeated beginning with Trumpeter Swans in 2005.

Prepared and presented by
The Trumpeter Swan Society, September 1, 1998

Rocky Mountain Population

Ruth Shea

Efforts to restore nesting Trumpeter Swans in western Montana's Flathead Valley took a significant step forward on September 9, 1998, when 10 cygnets were released at **Pablo National Wildlife Refuge (NWR)** by **The Confederated Salish-Kootenai Tribes**. Working with federal, state and provincial agencies in the United States and Canada, Tribal members traveled to Grande Prairie, Alberta, where **Canadian Wildlife Service biologist Gerry Beyersbergen** led the successful capture effort. The cygnets, all weighing between 18-22 pounds, made the trip southward by truck in fine shape and were on the water in Montana the next day.

Tribal Biologist **Dale Becker** reports that all 10 remained near the release site for at least 6 weeks. Five of the cygnets, accompanied by an unmarked adult, were observed on October 30 at **Lee Metcalf NWR**, 100 miles to the south in Montana's Bitterroot Valley. The cygnets are marked with red neckbands and will be monitored to determine whether they winter in western Montana or join with migrant Tundras or Trumpeters as they pass through to more southerly sites. If these cygnets return to the Flathead Valley next summer and adapt well to the area, further releases are likely.

During surveys of 124 lakes in the Grande Prairie area prior to the capture effort, Gerry Beyersbergen found 152 adults with 124 cygnets (36 broods). Many of the cygnets appeared unusually small. However, extremely mild weather persisted through October and increased the chances that most fledged successfully. If most fledged successfully, this should be a great year for production (45% cygnets!) in the Grande Prairie region. Gerry also proudly reports that a pair of Trumpeters at **Elk Island National Park** fledged four cygnets this fall. This brood was the first to fledge from this region in over a century. Much hard work transplanting swans from Grande Prairie to Elk Island has finally started to show results - Congratulations to all who have labored in this restoration effort!

TTSS members **Marian and Robin White** traveled to Grande Prairie in early November to look for neckbands among the staging flocks. They were able to read seven neckbands among 374 Trumpeters on Valhalla, Cutbank and Saskatoon lakes. Marian and Robin report an alarming increase in development - clearcut logging, numerous oil and gas wells, and subdivision are all

*Ruth Shea, TTSS President,
3346 East 200 North, Rigby, ID 83442*

encroaching on nesting territories. They learned that the city of Grande Prairie is planning to phase out its "connection" to Trumpeters and move toward greater development of lakeside habitats. Our **Rocky Mountain Population (RMP) Working Group** will try to learn more about what is happening in Grande Prairie and what might be done to ensure the continued productivity of historic nesting lakes.

In the Tristate Region, we will miss **Dan Stevenson** who worked diligently for over 7 years to improve the status of nesting Trumpeter Swans in western Wyoming. Dan did a great job and we wish him the best as he pursues new adventures in Alaska.

Red Rock Lakes NWR Manager Danny Gomez reports that the September survey of the RMP/U.S. Flocks was completed. The U.S. flocks (Tristate, Malheur, Summer Lake, and Ruby Lakes) contained a total of 364 adults and 105 cygnets. The Tristate flocks contained only 304 adults, but production was good with 22 percent cygnets. For further details, see Selected Papers in this issue of *North American Swans*. If Tristate swans can move successfully to suitable wintering sites, this good production may help the flocks rebound from their recent declines. Idaho had its second highest production on record, with 37 cygnets fledged. It was most encouraging that 17 of these came from recently restored flocks at **Grays Lake and Bear Lake National Wildlife Refuges**.

The TTSS RMP Working Group worked with all U.S. Flock managers this fall to compile and summarize the 1998 nesting effort and productivity of the RMP/ U.S. Flocks. There were 92 active nests with 59.8 percent nest success and 1.1 cygnets fledged per active nest. The nesting effort still remains substantially below the minimum goal of 130 active nests. In the next few years, we will focus our efforts on increasing the productivity of existing nesting territories and working with private and agency landowners/managers to increase nesting in suitable habitats.

Pacific Flyway Activities

In July, the **Pacific Flyway Council** approved revision of the Pacific Flyway Management Plan for RMP Trumpeter Swans. TTSS had expressed concerns that revised strategies were inadequate to reestablish migrations to more southerly wintering sites or to monitor population trend, and unilaterally altered the conditions under which we agreed not to object to the experimental harvest of Trumpeter Swans in the Pacific Flyway in 1995-99.

The plan revision calls for continued hazing of Trumpeters from eastern Idaho and speaks strongly

against supplemental feeding at Red Rock Lakes NWR or elsewhere, but also concludes that dispersal of Trumpeters into Utah and Nevada is "currently undesirable" due to possible conflicts with Tundra Swan hunts. Although over a million dollars has been spent since 1990 to disperse the RMP from the Tristate Region and rebuild southward migrations, the Plan failed to identify even one site south of Idaho where winter habitat might be managed to establish wintering Trumpeters. TTSS had urged that, at the very least, National Wildlife Refuges south of Idaho should be available to actively participate in efforts to restore migrations. The Plan, and future management options to increase and protect southward migrations, will be reviewed by TTSS in the coming months and discussed in depth at our 17th Conference in September 1999.

Idaho Department of Fish and Game has provided two temporary employees to help with hazing of swans at **Harriman State Park** and monitoring of the Tristate Region. **Doug Milek** and **Anna Noson** have been working hard to learn the area and prepare for the arrival of the Canadian migrants. The US Fish and Wildlife Service (**Southeast Idaho Refuge Complex**) also had planned to provide two employees for this winter's efforts but their hiring has been delayed. In the interim, TTSS will be helping to fill in some of the gaps in monitoring and to assist Doug and Anna when possible.

Interior Population

Trumpeter Swan Status in Ohio 1998

Dave Sherman

The **Ohio Division of Wildlife** released 13 Trumpeter Swans in the Sandusky Bay region of Lake Erie (Ottawa and Sandusky Counties) on May 1, 1998. In addition, three swans were released at **Killbuck Wildlife Management Area** (Holmes County) and two more were released at Sandusky Bay in early July to supplement existing populations. Since 1996, the Division has

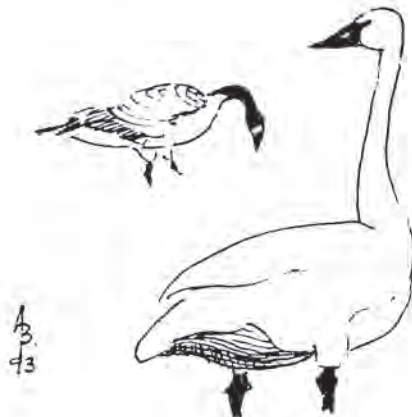
*Dave Sherman, Wildlife Biologist,
Crane Creek Wildlife Research Station
13229 W. Star Route 19, Oak Harbor, OH 43449*

released 56 Trumpeter Swans in four different areas - Magee Marsh (Ottawa County), Killbuck, Sandusky Bay, and The Wilds (Muskingum County). Thus far, 11 swans have died, the whereabouts of nine are unknown, and the remaining 36 are at the above locations.

Two pairs of Trumpeters successfully nested on Magee Marsh for the second year in a row. One pair hatched three cygnets in late June; the other pair hatched four, and lost only one cygnet even though the adult male died 2 weeks after the cygnets hatched. Unfortunately, the body of the male was too badly decomposed to determine cause of death. As of September 15th, all six of the cygnets were still alive, thus creating a total of eight Trumpeter Swan cygnets which have successfully hatched and fledged in Ohio since 1997.

Division personnel traveled to Alaska for the third and final time to collect 50 Trumpeter Swan eggs. The eggs were incubated at the **Cleveland Metropark Zoo**, and 38 cygnets successfully hatched. When the cygnets were 2 weeks old, they were transferred to **The Wilds** (a non-profit conservation center near Zanesville, Ohio) where they will be raised for 2 years and released in Year 2000.

The Division received its first nuisance Trumpeter Swan complaints in 1998. The first complaint originated from a community surrounding a private lake. An individual in the community was feeding a pair of swans which encouraged the pair to set up and defend a territory on the lake. After harassing several boaters, the swans were captured, wing-clipped and returned to Killbuck Wildlife Area. Another complaint originated from a farmer raising Mute Swans. A pair of Trumpeters had been frequenting his farm and occasionally eating the Mute Swans' feed. The landowner did not mind the visits by the Trumpeters, but he filed a complaint when the Trumpeters killed one of his Mute cygnets and injured another. The offending Trumpeters were caught, wing-clipped and returned to Killbuck Wildlife Area. We will have to wait and see whether these Trumpeters return to their old haunts after they molt and are capable of flight once again.



Ontario Trumpeter Swan Program 1998

Harry Lumsden

In 1998, the program exceeded its goal of 15 wild breeding pairs of Trumpeter Swans 1 year ahead of schedule. An estimate of 143 wild Trumpeters entered the year starting 1 September 1997. We estimate that 25 (17%) were lost up to 1 September 1998. As usual, lead poisoning claimed the highest number of those swans for which we know the cause of death. The wild production of 41 1998-hatched cygnets brings the total for 1 September 1998 to 191 Trumpeter Swans. Sixteen wild pairs nested, although three of the pairs failed to raise any cygnets. The successful pairs raised 41 cygnets which ranged from three to eight per pair. The average brood size was 2.6 cygnets on 1 September 1998. Nine pairs, all successful, nested in the Wye Marsh area. Of the seven pairs which nested near the Lake Ontario shore, two were unsuccessful in hatching any cygnets while one pair lost their cygnets soon after hatching. There are several pairs which disappeared this spring and may have nested unobserved. We shall know later this fall when they return to winter at their original release sites.

In the captive breeding part of the restoration program, cooperators and contributors cared for 23 pairs of potential breeders. Eighteen of these pairs produced 109 eggs (mean clutch size was 6.0 eggs). A total of 71 (65%) cygnets hatched and 56 (79%) survived to 1 September.

In an induced-migration experiment project, Trumpeter cygnets are being trained in Ontario this year by two teams headed by **Wayne Bezner-Kerr** and **Bill Carrick**. Swans raised under a variety of regimes will be compared in their willingness to follow an ultralight aircraft. The destination will be the Muskatatuk National Wildlife Refuge in Indiana. The flight is being planned for sometime in December.

Editor's Note: A progress report on this project and the complete Ontario Restoration report will be appear in the next issue of *North American Swans*.

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High Plains Breeding Season Report for 1998

Rolf Kraft

The late summer breeding performance aerial survey was conducted between August 30 and September 2, 1998. A total of 184 adult Trumpeter Swans was counted. There were 62 nesting pairs that produced 114 cygnets to flight in 35 broods. This compares to 171 adults including 51 nesting pairs that produced 86 cygnets (29 broods) to flight in 1997. The production survey included seven counties in western South Dakota, one county in northeast Wyoming, and six counties in the Nebraska Sandhills. Numbers of wintering swans continued to increase last winter along the Snake River upstream of Merritt Reservoir in Cherry County, Nebraska, and has resulted in more nesting in the surrounding area.

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Wisconsin Trumpeter Swans *Sumner Matteson*

Wisconsin had a total of 18 nesting pairs of Trumpeter Swans, fifteen of which were successful, during 1998. A pair with six cygnets was observed at Chippewa Lake near Clam Lake in southeastern Bayfield County. The following counties had nesting pairs: Burnett (5), Polk (4), Wood (3), Ashland (1), Bayfield (1), Douglas (1), Iron (1), Jackson (1), and Juneau (1). 66-68 cygnets hatched (36 of these young were collared/banded). Fifty-one were still alive as of 22 September 1998. It is estimated that approximately 285 free-flying Trumpeters are in the state.

A satellite/radio telemetry study is planned for 1999 to identify stop-over and wintering sites of Wisconsin-banded Trumpeter Swans. It is hoped that this project will equip wildlife managers with more specific information to manage these sites in an appropriate manner. The project will have a web site and will provide an important communication and education tool.

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News from Iowa and Minnesota

Madeleine Linck

Iowa

Ron Andrews, Coordinator of Iowa's Trumpeter Swan restoration program, reports that the three cygnets of the first wild brood to hatch in Iowa since 1883 all fledged successfully. The cygnets were born on a farm pond in Dubuque (Dubuque County) and were alive as of 1 December. The public's support of and interest in the restoration program has continued at a phenomenal level. Due perhaps to this fall's mild weather conditions, there generally has been little movement of Trumpeters around the state. Five swans, however, were shot in two separate incidents, one of which was clearly a case of vandalism. Investigations are currently underway. Iowa's Trumpeters are marked with green collars with the alpha "F" and two numerals. Observers are encouraged to report swan sightings by calling the Iowa Department of Natural Resources (DNR) at 515/357-3517 or by e-mailing the DNR at iadnrcl@netins.net

The Iowa restoration program received two female adult Trumpeters from Minnesota this fall. Both of these swans were reported by local residents as injured and were captured on the Mississippi River in Anoka County, Minnesota. The birds were examined at the **University of Minnesota Raptor Center** and, because of serious wing injuries, will be permanently flightless. Iowa is placing both birds in captive breeding settings.

Minnesota

The **Minnesota DNR Nongame Program** and **Hennepin Parks** have tallied the number of confirmed successful nesting pairs of Trumpeters within Minnesota. Trumpeters with broods were observed in 20 counties: Becker, Beltrami, Cass, Clearwater, Hubbard, Itasca, Mahnomon, Norman, St. Louis, Otter Tail, Polk, Wadena in the north and northcentral part of the state; Carver, Chisago, Hennepin, Ramsey, Washington, and Wright counties within the Minneapolis/St. Paul metro area; Le Sueur and Rice counties in southern Minnesota. **Steve Kittelson** noted there were 15 other sites where incubating Trumpeters were observed on a May 21st aerial survey, but were not seen on a later date. The combined Hennepin Parks and Minnesota DNR flock has 54 known broods with an estimated total of 193 cygnets.

Given such a large area to cover with many wetlands and so many unmarked swans, there are no doubt a number of broods missed. These birds will hopefully turn

up to be counted later on traditional wintering sites such as the Otter Tail and Mississippi Rivers.

One pair on a private marsh in Buffalo (Wright County) has a brood of eight cygnets. This family traditionally migrates to a cattle ranch in Oklahoma to spend the winter. But, due to a very mild late fall, many wetlands have stayed open throughout November with many of the birds not yet showing up at wintering sites.

The **Minnesota DNR** presented awards at a September 9, 1998, ceremony to the following TTSS members for "excellent efforts in restoring Trumpeter Swans in Minnesota": **Donna Compton, Katie Haws, Steve Kittelson, Carrol Henderson, Larry Gillette, Madeleine Linck, James Pichner and Ray Whitney Family**. Efforts went back to 1969 when Hennepin Parks initiated a local captive breeding program for Trumpeter Swans and then, in 1982, the DNR initiated releases of Trumpeters in northwestern Minnesota.

In compiling the number of 1998 known mortalities of Trumpeters in Minnesota, Steve Kittelson reports that six of the cases were determined to be shootings. While this number is higher than the average of the past few years, it may reflect the increase in the free-flying population. An incident in Otter Tail County resulted in the death of two adults and one cygnet from the same family group. The individual charged in this case was sentenced by the court to 30 days and \$500 stayed on the condition that he pay \$4,500 in restitution. A veterinary bill of \$760 will be paid out of the \$4,500 for treatment of the cygnet before it died. A number of conservation officers participated in the investigation of this case. Their participation and excellent work is very much appreciated. Other cases have ongoing investigations with rewards being offered for information.

Trumpeter Swans and the Minnesota Zoo

Jimmy Pichner, avian zoologist, reports that 12 captive Trumpeter Swans were provided for the Minnesota DNR restoration program by the **Minnesota Zoo** in 1998. The Zoo has provided over 110 swans for release from the captive breeding pairs maintained by the Zoo. The Zoo has also hatched and reared cygnets for the Iowa and Wisconsin restoration programs. One of the breeding pairs is housed at the **Bramble Park Zoo** in South Dakota and has provided over 20 cygnets to the program. This is especially noteworthy since each of the breeding pair is missing a wing. The pair was originally released, but had to be returned to captivity after being shot. At present, the Minnesota Zoo is holding 20 birds for release in 1999 and 2000. These birds were hatched at the **Minnesota Zoo, Topeka Zoo, Bramble Park Zoo and Sedgwick County Zoo**.

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Atlantic Flyway

Attendance at Summer Meeting of the Atlantic Flyway Technical Section

Harvey K. Nelson

I represented The Trumpeter Swan Society (TTSS) at the Atlantic Flyway Technical Section (AFTS) meeting at Simsbury, Connecticut, July 28 – 29, 1998, to discuss the current draft of the Atlantic Flyway Management Plan for the Atlantic Coast Population of Trumpeter Swans (ACPMP). I made several suggestions concerning format and content, based on our recent experience with the Interior Population Management Plan. I will work with Dennis Luszcz, North Carolina (Chair: Snow Goose, Brant, Swan Committee), on further revision of the June 1998 draft (#6) of the ACPMP. We will take another look at the format and strengthen the sections on management strategies and recommendations. Dennis will review and incorporate comments received on the latest draft and begin preparation of the next draft during November – December. The intent is to have a near final draft by late January 1999, so that they can circulate to AFTS members for review prior to their February 1999 meeting. The final plan will be presented to the Atlantic Flyway Council for approval at their March 1999 meeting.

The initial effort was led by the Migratory Bird Project Group (Dr. William J. L. Sladen, Environmental Studies Group, Airlie Center, Warrenton, Virginia, and the Defenders of Wildlife) in cooperation with the AFTS. That partnership was dissolved following completion of the June draft of the ACPMP. The AFTS has accepted responsibility for completing the plan, with continued input from all previous participants. They welcome the assistance of TTSS in guiding this task through to completion.

We should circulate the January 1999 draft ACPMP to TTSS Board members for review and comment prior to the February meeting of the AFTS. I will plan to attend that meeting if necessary, and will attend the March 1999 meeting of the Atlantic Flyway Council in conjunction with other business at the North American Wildlife and Natural Resources Conference in San Francisco, California.

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Ultralight Aircraft and Trumpeter Swans Continue to Make Progress...

[The following excerpt is from a November 12, 1998, press release from Environmental Studies at Airlie, Virginia. For updates, the project now has a web site at <http://www.iapm.org>]

The Trumpeter Swan Restoration Project (TSRP) is in its second year of a 3-year experiment to show Trumpeter Swans predetermined migration routes by leading them behind an ultralight aircraft in hopes of reestablishing an East Coast migratory flock.

Environmental Studies (ES) at Airlie, Virginia, reported that the young Trumpeter Swans have been at their New York flight-training facility for nearly 2 months. Due to moderate winds and even a few flurries, the team has had fewer opportunities to exercise the birds and reinforce their training compared to last year's [see *North American Swans* Vol. 26, No. 2 for report on the earlier flight to Chesapeake Bay, Maryland] experiment. Despite the poor weather, the birds continue to make great progress.

"Last year we were lucky to have three or four flying days each week, this year we're lucky to get one or two, but the birds are much further along than last year's birds were at this point," observes Gavin Shire, Lead Biologist/Pilot for Environmental Studies at Airlie.

Fourteen birds, which are following well behind the plane, have been deemed candidates for the migration. The team in New York, which includes our dedicated volunteer pilot Brooke Pennypacker, will now concentrate on getting the bond between birds and plane more firmly in place and begin taking out-trips or day-flights to nearby locations to build the birds' strength in preparation for the migration. We will truck the remaining birds along the route, joining the others each night, until they reach their wintering destination - The Wildfowl Trust of North America near Grasonville, Maryland. We are now finalizing the migration route and the team hopes to begin migration by the end of November. Departure, and also daily progress, is highly weather dependent.

TSRP is a research experiment orchestrated by ES with cooperation from the New York Department of Environmental Conservation, The Wildfowl Trust of North America, Operation Migration and with the kind assistance from the Council of Chiefs for the Tonawanda Band of Senecas.

Selected Papers

Ancestral Breeding and Wintering Ranges of the Trumpeter Swan (*Cygnus buccinator*) in the Eastern United States

Philip M. Rogers and Donald A. Hammer

[This paper was originally prepared in 1978. Phil Rogers died in 1981. Don Hammer's current address is P. O. Box 65, 127 Orchard Rd., Norris, TN 37828.]

Abstract

Synthesis of paleontological, archaeological, historical and ecological evidence provides the basis for postulation of ancestral breeding populations of the trumpeter swan (*Cygnus buccinator*) in the Eastern United States. Breeding populations are suggested for northern Florida, North and South Carolina, the Lower Mississippi Valley, and northwestern Ohio, and are considered in other areas of suitable habitat outside the accepted ancestral breeding range.

Introduction

The ancestral breeding and wintering ranges for the trumpeter swan (*Cygnus buccinator*) summarized most recently by Bellrose (1976) and Palmer (1976) are based primarily on reports in ornithological journals. These journals (*Auk*, *Condor*, *Wilson Bulletin*, etc.) were

established in the 1880's as a response to the popularization of ornithology by the publications of Wilson (1808), Bonaparte (1825-33), Audubon (1834-38, 1840-44), and Brevier (1840). Prior to 1880, several factors affected the geographic distribution of *C. buccinator* and, consequently, of reports published and summarized later.

The most significant factor was the growth of the European colonial population from 1600 to 1840 (Figure 1). Settlement of the east coast between 1607 (Jamestown, Virginia Colony) and 1763 (French cession of all lands east of the Mississippi to England) was a process of continuous expansion that resulted in the extermination or, severe depletion of, *C. buccinator* and other wildlife east of the Appalachians. Removal of the Appalachian geopolitical barrier between 1763 and 1776 permitted explosive population growth between the mountains and the Mississippi River (e.g., Tennessee, first settled in 1769, had a population of 261,727 by 1810).

The pioneer settlers were intimately concerned with personal survival. The biota of the area were regarded as a resource to be utilized and any information about an animal's behavior was simply a means to more efficient use. These pioneer settlers, while frequently literate, had neither reason nor desire to keep superfluous records of an apparently inexhaustible resource. The study of natural history was limited to the wealthy, or to those like

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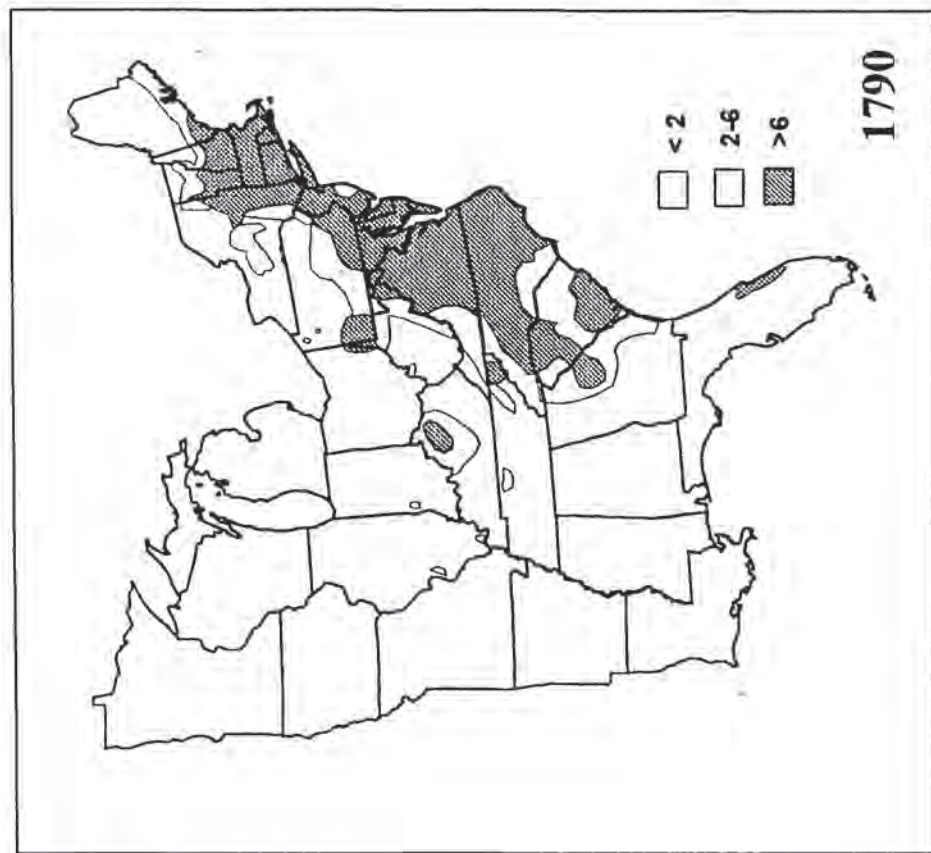
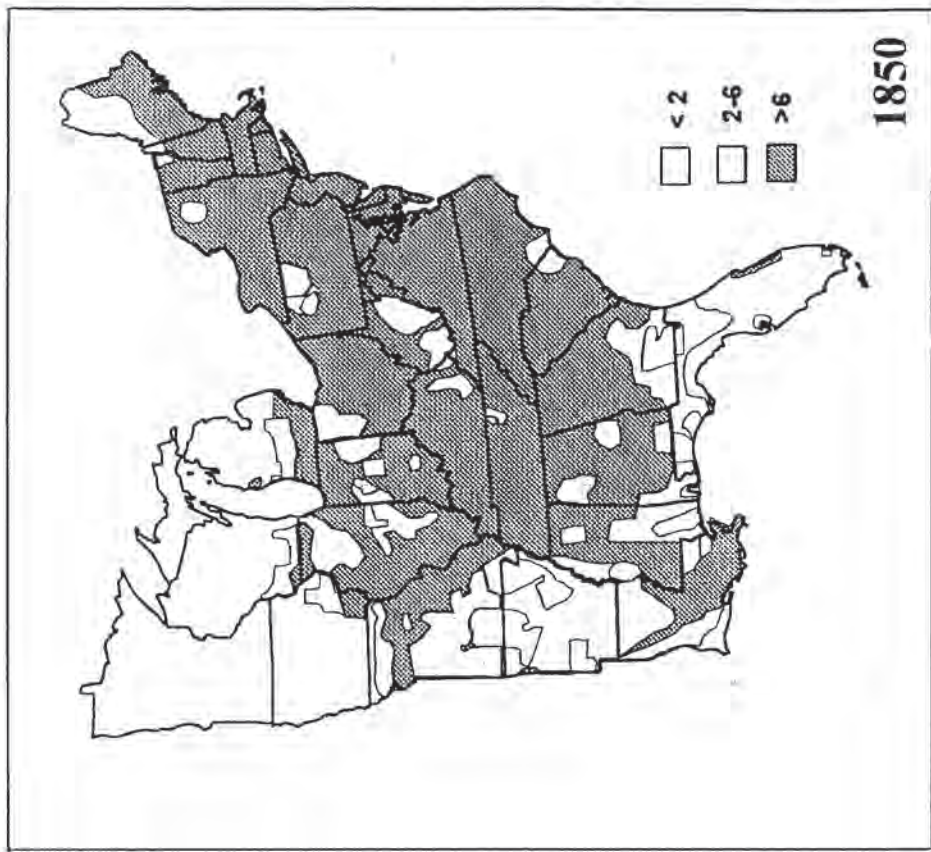


Figure 1. Human population density per square mile in the eastern United States, 1790 and 1850 (Bidwell and Falconer 1925).

Bartram (van Doren 1928) who were supported by the wealthy. The rapid growth of the colonial population also led to commercial market hunting to provide table meat for the expanding city populations. Market hunters operated without restrictions, and anything that could be sold in the city meat market was killed in the greatest possible numbers, salted, packed, and shipped. For example, Audubon (Corning 1929) noted cardinals and robins for sale in the New Orleans market in 1820. Market hunting remained an important source of table meat until expansion of the railroads brought western beef to market in the mid-1800's.

The introduction of firearms as a trade item permitted employment of Indians as commercial market hunters while colonial populations were small (duPratz 1774), and the peltry trade altered the focus of the aboriginal hunter from subsistence to commerce. The peltry trade, including swan skins, was a primary focus of the Indian economy from the introduction of firearms until the nineteenth century. Audubon (1840-44) recorded the taking of more than 50 *C. buccinator* for skins by a band of Shawnee in northwestern Kentucky about 1810. Commercial hunting pressure on *C. buccinator* resulting from the trade in swan skins was documented by the Hudson's Bay Company from sometime prior to 1772, until after 1900 (Banko 1960). Company records show the sale of some 108,000 swan skins between 1823 and 1877 (Banko and Mackay 1964) of which only 17,761 (about 16 percent) were sold between 1853 and 1877 (Banko 1960). This trade is often cited as the principal cause of the near-extinction of *C. buccinator* and the low figures for 1853-77 reflect the decline of the species.

As the colonial populations grew and the Indian populations were decimated or removed, the land was modified to suit the European concept of civilization which entailed drainage of wetlands and clearing of forests. Putting all available land to agricultural use was necessary to the colonist's welfare in order to produce not only sufficient food for consumption, but an excess for export. The resultant destruction of wildlife breeding habitat is the second most frequently cited cause of the decline of *C. buccinator*.

A less obvious influence on the geographic distribution of nesting swans (and records made after 1880) was the American Civil War. The extent to which this upheaval contributed to the extermination of *C. buccinator* populations east of the Mississippi is unknown. However, Berglund et al. (1963) noted the near-extinction of the mute swan (*Cygnus olor*) in Europe during World War I and, again, during World War II. The disruption of food production and distribution caused by war led to increased hunting pressure on all wildlife, including those species normally protected by law. All of the influences discussed can be found in the area east of the

Mississippi prior to 1880. Any one or combination of them, could have been responsible for the extermination of local breeding or wintering populations of *C. buccinator*. We suggest that the currently accepted ancestral ranges for *C. buccinator*, based principally on reports published after 1880, summarized by Bellrose (1976) and Palmer (1976), are unrealistically conservative. We present evidence to support the hypothesis of a broader ancestral distribution for *C. buccinator*.

This evidence is presented in four chronological parts reflecting three transitions in the lines of evidence:

- (1) the arrival of primitive humans east of the Mississippi (c. 10,000 B.C.);
- (2) the arrival of European culture and firearms (c. 1600-1700 A.D.); and,
- (3) the recognition of *C. buccinator* as a species and its distinction from the whistling swan, *C. columbianus*, in the records (1832).

The first line of evidence presented is the fossil record of the late Pleistocene: prior to the arrival of primitive humans.

Prehistoric Period: Pleistocene (before 10,000 B.C.)

The fossil record is sparse with respect to *C. buccinator*. However, fossil remains of *C. buccinator* have been reported from late Pleistocene deposits at Fossil Lake, Oregon (Schufeldt 1913), and Aurora, Illinois (Wetmore 1935), both of which are incorporated in the ancestral range depictions of Bellrose (1976) and Palmer (1976) and from the Itchtucknee River, in Florida (Wetmore 1931, McCoy 1963). The latter area is not only far outside the accepted ancestral breeding range, it is outside the accepted ancestral wintering range as well. Yet Brodkorb has stated (pers. comm.) that sufficient remains have been found in the Itchtucknee River to confirm the presence of a population of *C. buccinator*, in that area during the late Pleistocene, and since little change has occurred in the habitat, there is no reason to postulate the extinction of this population prior to the arrival of the Spaniards about 1500 A.D. Brodkorb is unwilling to speculate on the breeding or wintering nature of this population on the basis of the current evidence.

However, indirect evidence appears to warrant some speculation. Late Pleistocene glaciation, which extended south nearly to the present course of the Ohio River, probably resulted in a severe reduction of suitable breeding habitat for *C. buccinator*. The nesting requirement for 142 frost-free days (Johnsgard 1978) is significantly greater than the 120 day period suggested by Watts (1970) for northern Georgia, during the late

Pleistocene.

Additional indirect evidence is the migratory behavior of the Canada goose (*Branta canadensis*) and the sandhill crane (*Grus canadensis*). While most races of *B. canadensis* are characteristically strong migrators, one race (*B. c. maxima*) is typically limited in its migrations or actually sedentary (Hanson 1965). Two subspecies of the sandhill crane are also essentially nonmigratory: *G. c. pratensis* is restricted to Florida and *G. c. pulla* to southern Mississippi and Alabama (Lewis 1977). While both subspecies are year-round residents of their areas, the majority of sandhill cranes subspecies display strong migratory behavior. The eastern population of greater sandhill cranes (*G. c. tabida*), for example, annually migrates between Wisconsin and Florida. Extant populations of *C. buccinator* also exhibit limited migratory behavior (Delacour 1944, Banko 1960, Hansen et al. 1971).

The variability of "characteristic" behavior, in migratory birds and the limited migratory behavior of existing populations of *C. buccinator* permit postulation of a resident breeding population of *C. buccinator* in northern Florida, originating during the Pleistocene glaciation and remaining until exterminated sometime after 1500 A.D.

Alternatively, the Florida population of *C. buccinator* may have wintered in this area, migrating north to breed. A larger breeding range could have promoted development of a migratory population of *C. buccinator* wintering in Florida and breeding somewhere to the north, possibly east of the Appalachian Mountains. The migratory behavior, of *C. columbianus*, the "typical" behavior of *B. canadensis* and *G. canadensis* and the accepted ancestral wintering range of *C. buccinator* (Gulf and East coasts) tend to support this alternative hypothesis.

Whichever hypothesis is eventually accepted, the currently accepted ancestral ranges do not include this population of *C. buccinator*. Minimally, the ancestral wintering range boundary should be extended (Figure 4) and probably the breeding range boundary as well.

Prehistoric Period: Paleolithic (10,000 B.C. to 1600 A.D.)

The archaeological faunal record is also sparse with respect to *C. buccinator*. The number of swan bones recovered from a particular archaeological site is a function of several factors. Obviously, the general state of preservation of the site is a major influence since light, hollow bird bones are generally quite susceptible to the loss of integrity on which identification depends. Another factor is the use made of the bones. Food use of the bird resulted in bones being discarded in the midden material which was seldom examined by archaeologists

prior to 1950. Working bones into tools, handles, beads, flutes, etc., tends to destroy some portions of the bones (Parmalee 1958). Ceremonial use as fans or ornaments (Perino 1967) and as treaty symbols (Adair 1775) results in the separation of the wing bones from the rest of the skeleton and further confuses the picture with respect to total number of birds taken. These ceremonial uses appear to account for wing bones found in aboriginal burials.

Several other factors may influence the number of swan bones recovered from a given site. The first is the ease with which the bird can be taken. Both swans are wary (Taverner 1947; Banko 1960) and prefer areas difficult for humans to traverse. The caloric gain per unit of hunting effort would thus be lower for swans than for comparable upland game (e.g., wild turkey), making swans less desirable as a food source. The numbers of hunters based at a particular site governs the number of hunting effort units available and the efficiency of the hunters governs the use to which their effort is put. Any excess hunting effort units might be devoted to the more difficult game species, such as swans. Last, the spoilage of swan meat after the bird was skinned was considered very rapid (Hearne 1795), encouraging immediate consumption in the hunting camp with local disposal of the remains.

The above considerations make the report of the Cahokia Site, Illinois (Parmalee 1958) the more striking. Cahokia is the largest such site in North America (Fowler 1969) encompassing over 3,700 acres with an estimated peak population of 10,000 people. More than 152,000 bone pieces have been recovered from this site of which 44,298 (29 percent) have been identified to family, genus, or species (Parmalee 1976). Of the 9,053 identified bird bones, "Approximately 375 bones of the Trumpeter Swan were identified from the sample of midden material excavated.... by Mr. Perino during the latter part of 1956" (Parmalee 1958).

While Parmalee is of the opinion (pers. comm.) that this concentration of *C. buccinator* bones represents a migrating population, there is an alternative explanation. Molting waterfowl are flightless for a period of several weeks during which they are captured with relative ease (a fact still used by native cultures of the Arctic and waterfowl managers everywhere). Hence, the concentration of remains at Cahokia may represent a breeding, molting population rather than a migrating population. Cahokia is within the accepted ancestral breeding range for *C. buccinator* and well outside the breeding range for *C. columbianus* of which far fewer bones were recovered in the sample site. Behavioral differences (Delacour 1944, Taverner 1947) between the two species might be cited as the reason for the difference in number taken during migration, but it is

more readily accounted for by the taking of local, flightless birds. This hypothesis is partially supported by the statement of Marquette (1673) from the confluence of the Wisconsin and the Mississippi: "... we see nothing but deer and moose, bustards and wingless swans, for they shed their plumes in this country."

Smaller Illinois cities within the accepted ancestral breeding range are the Fisher Site (Will County) and the Synders Site (Calhoun County) from which small numbers of *C. buccinator* bones have been recovered, and the Crawford Farm Site which will be discussed later (Parmalee 1958, 1964). Three small Illinois sites on the Wabash River, just outside the accepted ancestral breeding range, were reported by Winters (1969) to contain four confirmed *C. buccinator* bones and a single, worked swan bone (possibly also *C. buccinator*). Also just outside the accepted ancestral breeding range are the Tick Creek Cave Site (Parmalee 1965) and the Rodgers Shelter Site (Parmalee et al. 1976), both in Missouri. The former site has yielded 24 bones of *C. buccinator* and five unidentified swan bones, and the latter site has yielded nine *C. buccinator* bones.

Further south is the Lilbourn Site, about two miles west of New Madrid, Missouri. Two identified *C. buccinator* bones (Smith 1975) and a clavicle of an unusually large, as yet unidentified, swan (Gilbert, pers. comm.) have been recovered from the midden material in this site. Lower on the Mississippi are the Armorer Site and the Banks Site, both in northeastern Arkansas. Bogan (1974) has identified bones from the Armorer site as *C. buccinator*. Parmalee (1959) reported the Banks Site as having yielded three *C. buccinator* and four *C. columbianus* bones, and Perino (1966) updated the totals to seven *C. buccinator* and six *C. columbianus*. The presence of bones of both species is suggestive of migratory flocks, and both species are thought to have migrated along the Mississippi River.

A few miles downriver from the Banks Site, the Chucalissa Site, in extreme southwestern Tennessee, was reported (Parmalee 1960) to contain three bones of *C. buccinator* among the relatively small percentage of waterfowl remains found at this site (Smith 1975). A single wing bone of *C. buccinator* has been recovered from a stone box grave in Davidson County, Tennessee (Parmalee, pers. comm.). This specimen may have been of local origin (Donelson 1780) or a trade item. Further reports from this area will be discussed in the Early and Late Historical Sections.

Mayfield (1972) described four sites within 10 miles of Toledo, Ohio, on the western end of Lake Erie. Only the principal site, Indian Hills, produced significant numbers of bird bones. This site, however, yielded a total of 225 identified bird bones, 15 of which were *C. buccinator*. *C. columbianus* was not reported from these

sites. Northwestern Ohio is only marginally outside the accepted ancestral breeding range of *C. buccinator* and was ideal waterfowl habitat (Trautman 1957) prior to extensive drainage projects (Shaw and Fredine 1956).

Further evidence of the presence of *C. buccinator* in Ohio is found in the report of Mills (1904) noting "small numbers" of *C. buccinator* bones in the midden pits of the Gartner Village Site; and the large numbers in the Ohio State Museum collection (Coale 1915). Goslin (1955) noted a single *C. buccinator* bone in material collected from the Kettle Hill Cave Site. Both sites are located in south-central Ohio not far from Chillicothe. The origin of the *C. buccinator* bone is unknown, but it is likely that these bones represent birds taken on the Ohio River.

Across the river in West Virginia, the Buffalo Site in Putnam County (Guilday 1971) and the Lee Farm Site in Mason County (Guilday, pers. comm.) have both yielded remains of *C. buccinator*. Also near the Ohio River and its tributaries in western Pennsylvania are the McKees Rocks Village Site in Allegheny County (Lang 1968), Murphy's Old House Site in Armstrong County, and Meadowcroft Rock Shelter in Washington County (Guilday, pers. comm.). These latter three sites have yielded small or unspecified numbers of *C. buccinator* bones. It should be noted that *C. columbianus* was also reported from the McKees Rocks Village Site (Lang 1968) and from the Mt. Carbon Site in Fayette County, West Virginia (Guilday and Tanner 1965). Guilday (pers. comm.) has commented that *C. buccinator* "remains are not all that rare from the upper Ohio [River] area . . . Trade may be a possibility, but I don't think much of one. I would opt for a definite prehistoric population in the area." It is not possible, however, to determine the season of the year or the reason for the presence of the birds (breeding vs. wintering) on the basis of archaeological data. The authors have not pursued the historical literature of this region.

Five sites noted in Figure 2 remain to be mentioned. The Eschelman Site in Lancaster County, Pennsylvania (Guilday et al. 1962), has yielded remains of *C. buccinator* and *C. columbianus* in small numbers. The Sheep Rock Site in Huntingdon County, Pennsylvania, has yielded two wing bones of *C. buccinator*, apparently worked as handles (Parmalee 1961). Parmalee suggested that these bones originated with a stray or migratory individual, but the comments of Perino (1966) and Adair (1775) suggest the possibility of trade. A single wing bone has been recovered from the Toqua Site in Monroe County, Tennessee (Parmalee, pers. comm.). This bone, found in association with a burial in a site yielding very few waterfowl remains, probably originated as a trade item though the reports of Timberlake (1765) and Ker (1816) suggest the possibility of local, winter origin.

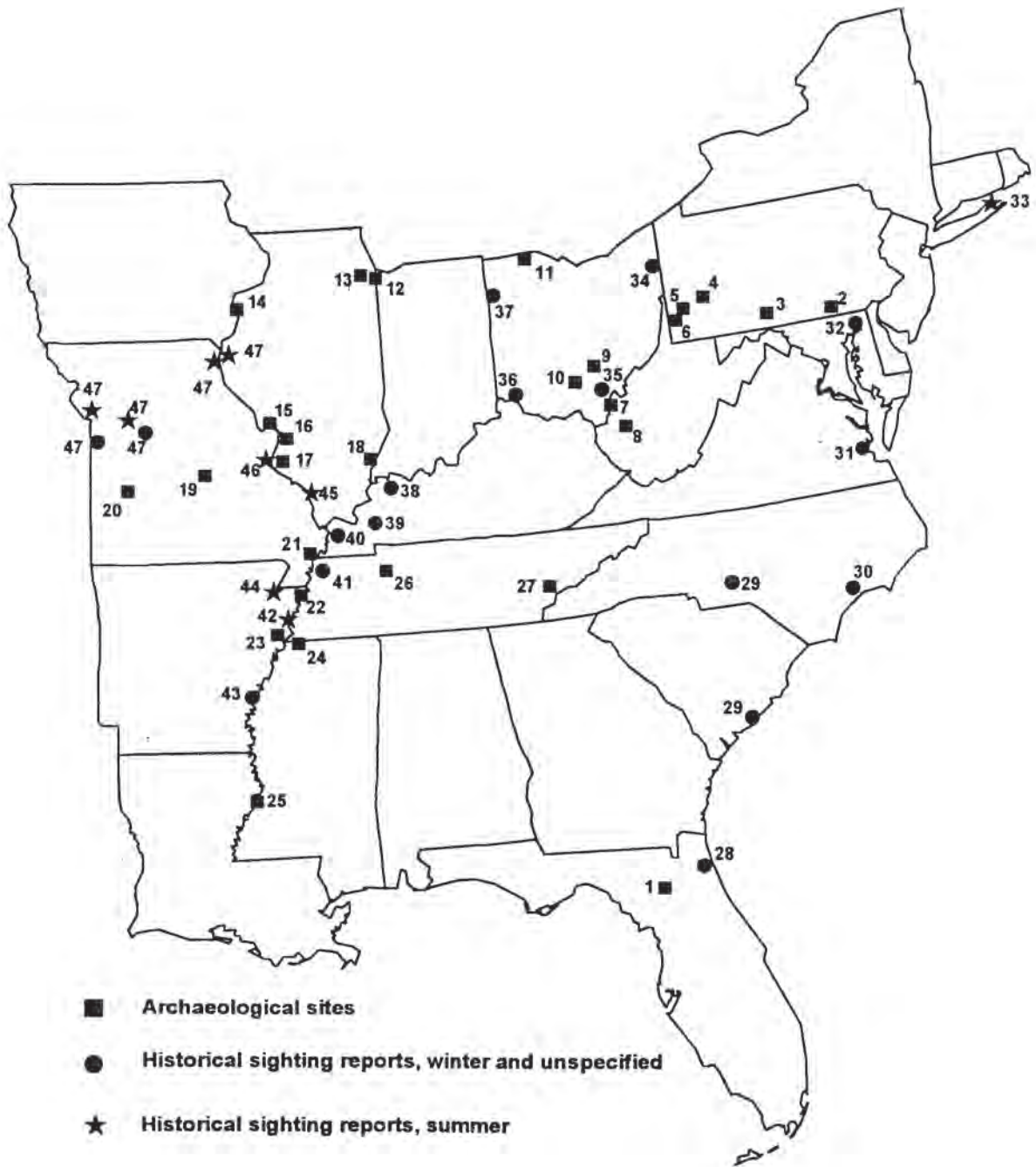


Figure 2. Archaeological sites and historical sighting reports of Trumpeter Swans with citations.

Figure 2a. Archaeological sites () and historical sighting reports (winter and unspecified, summer) with citations.

1. Itchtucknee River (Brodkorb 1964).
2. Eschelman (Guilday, et al, 1962)
3. Sheep Rock (Parmalee 1961)
4. Murphy's Old House (Guilday, pers. comm.)
5. McKees Rock Village (Lang 1968)
6. Madowcroft Rock Shelter (Guilday, pers. comm.)
7. Lee Farm (Guilday, pers. comm.)
8. Buffalo (Guilday, 1971)
9. Kettle Hill Cave (Goslin 1955)
10. Gartner Village (Mills 1904)
11. Indian Hills (Mayfield 1972)
12. Fisher (Parmalee 1958)
13. Aurora (Brodkorb 1964)
14. Crawford Farm (Parmalee 1964)
15. Snyders (Parmalee 1958)
16. Cahokia (Parmalee 1958, 1976)
17. Modoc Rock Shelter (Parmalee 1958)
18. Wabash R. Sites (Winters 1969)
19. Tick Creek Cave (Parmalee 1965)
20. Rodgers Shelter (Parmalee, et al. 1976)
21. Lilbourn (Smith 1975, Gilbert, pers. comm.)
22. Armored (Bogan 1974)
23. Banks (Perino 1966)
24. Chucalissa (Parmalee 1960, Smith 1975)
25. Fatherland (Neitzel 1965)
26. Davidson Co. stone box grave (Parmalee, pers. comm.)
27. Toqua (Parmalee, pers. comm.)
28. Audubon 1832 (1930)
29. Lawson 1701 (1709)
30. Lawson (1709)
31. Gates (Barrett 1610), Hilton (1664)
32. Evelin (1648)
33. Rosier (1605)
34. Catlin 1880's (Coale 1915)
35. Davie 1900 (Henniger 1919)
36. Dury 1876 (Coale 1915)
37. Dury 1870's/1880's (Coale 1915)
38. Ashe 1806 (1809)
39. Donelson 1780 (unpublished)
40. Audubon 1810 (1869)
41. Rhoads (1895), Ganier (1929)
42. Cuming 1808 (1810)
43. Audubon 1820 (1929)
44. Hildreth 1805 (1842)
45. Peale 1819 (1947), James 1819 (Thwaites 1906)
46. Musick 1885 (Cooke 1887)
47. McKinley (1962)

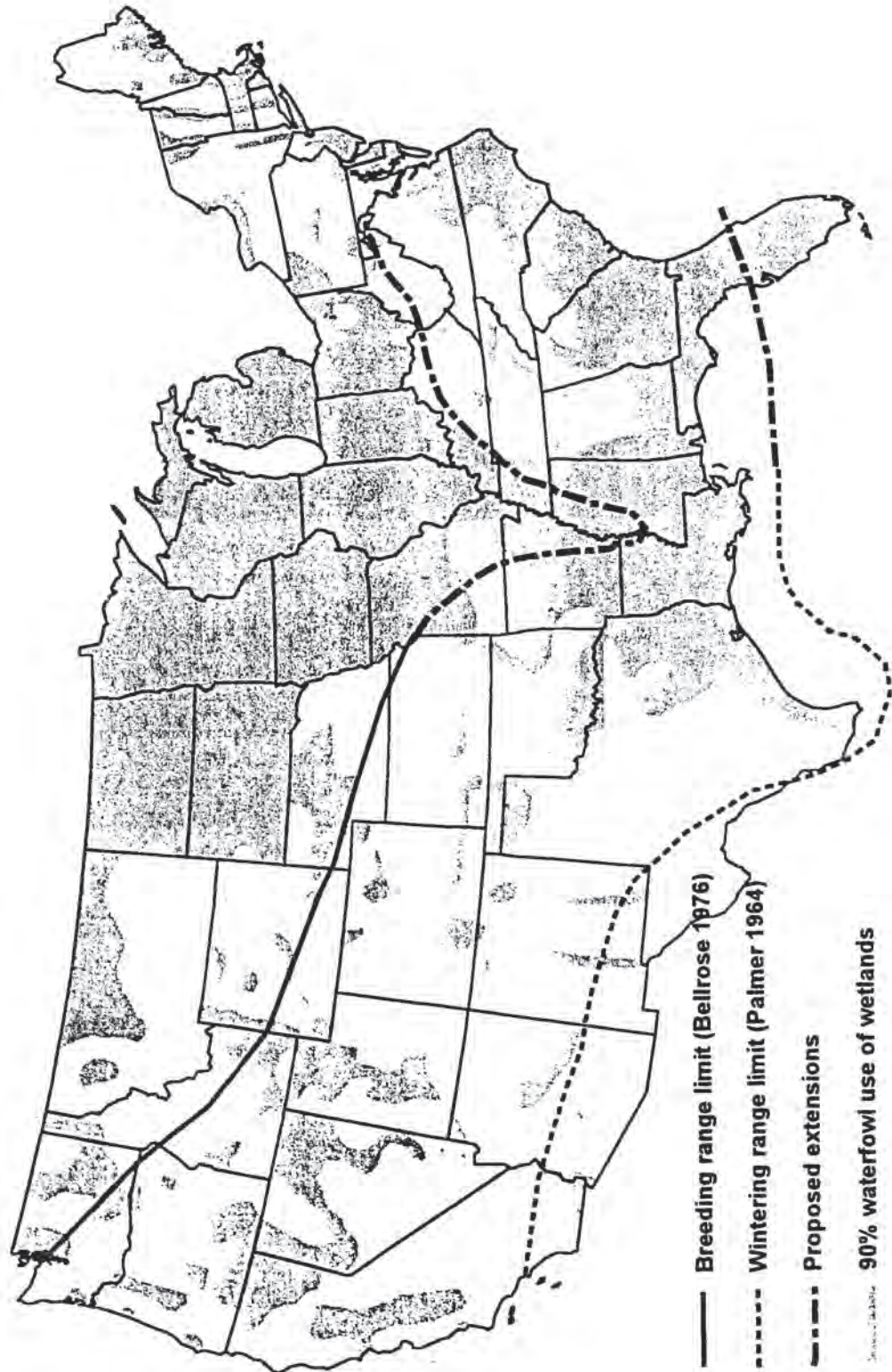


Figure 4. Proposed modifications of the ancestral Trumpeter Swan breeding range presentation of Bellrose (1976) and the ancestral wintering range presentation of Palmer (1976) based upon the evidence presented.

From the Lower Mississippi Valley the reports of Rhoads (1895) and Ganier (1929) place swans at Reelfoot Lake in northwestern Tennessee as late as 1926. Rhoads indicated *C. buccinator* as considerably more common than *C. columbianus* while Ganier reported carload lots of *C. columbianus* killed and shipped from Reelfoot Lake until settlement of their breeding grounds. It is apparent that Ganier confused the two species in his report though it is not obvious whether the swans killed in carload lots were *C. columbianus* or *C. buccinator*. Cooke (1887) reported migratory populations of *C. buccinator* from the Gulf Coast to Minnesota and noted a small flock at Mt. Carmel, Missouri, in early June of 1885. Other reports, discussed by McKinley (1962), from Missouri and Illinois are included in Figure 2 for reference. These reports place migratory populations of *C. buccinator* in the Lower Mississippi Valley and potentially breeding populations at Reelfoot Lake as late as 1895.

Summary

Evidence has been presented (summarized in Figure 2) to support postulation of breeding populations of *C. buccinator* in Florida, the Carolinas, Ohio, and the Lower Mississippi Valley. None of these areas is within the currently accepted ancestral breeding range by Bellrose or Palmer and all are partly or wholly outside the accepted wintering ranges (Figure 3). It is the intent of this paper to suggest expansion of the previously accepted ranges to include those areas of the eastern United States where *C. buccinator* bred and wintered prior to 1880. The evidence currently available is limited by a variety of factors, but we anticipate that additional evidence will become available with continued archaeological and paleontological field efforts and further publication and republication of manuscripts and volumes of historical significance.

Despite its limitations, the evidence presented is deemed sufficient to suggest that *C. buccinator* probably bred wherever suitable habitat could be found in North America. This suggestion is based on the similarity of the discussed breeding habitats to each other and to the habitats currently supporting breeding populations of *C. buccinator*. The shallow, productive ponds, lakes, and sloughs favored by *C. buccinator* for nesting (Banko 1960; Hansen *et al.* 1971) can be found throughout North America though they are more common in the upper midwest and the southeast (Shaw and Fredine 1956). The present resident populations of mute swans (*C. olor*) with essentially similar habitat requirements (Dement'ev *et al.* 1967; Scott and the Wildfowl Trust 1972; Bellrose 1976; Palmer 1976) in Massachusetts, Michigan, and the Chesapeake Bay argue for the probability of breeding *C. buccinator* in these areas. The reports of Rosier (1605) and Morton (1632) are certainly suggestive, and when

coupled to the reports of Hearne (1795) and Lawson (1709) indicate a need for further investigation.

Acknowledgments

The authors are indebted to Mr. Earl Olson for his help in locating the Devil's Elbow, and Paul Parmalee, John Guilday, and B. Miles Gilbert for permission to discuss unpublished material.

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Editor's Note: For additional reading, the reader is referred to Harry Lumsden's paper History of Trumpeter Swans in Ontario. 1997. Pages 11-17 in W. A. Rapley, E. Christens and T. P. Birt, eds. Proceedings of the Trumpeter Swan Symposium Metro Toronto Zoo. Metro Toronto Zoo, Scarborough, Ontario. Copies are available at TTSS office.

The Nebraska Trumpeter Swans

Harold and Ruth Burgess

The beautiful Nebraska Sandhills in northwestern Nebraska and southwest South Dakota seem to be a perfect range for the magnificent Trumpeter Swan. Trumpeters historically nested in the Sandhills and may never have been extirpated from the northeastern corner of Sheridan County. Manager Ivan Moss of Brush Creek Ranch in Gordon, Nebraska, said that Trumpeters were nesting in the Hoover-Frye Lake area when he moved to their ranch house in 1960. Hoover Lake is in a very isolated range near the corners of Cherry County in Nebraska and Shannon and Bennett Counties in South Dakota, and is seven miles from the nearest ranch house.

The source of the most recent Trumpeter Swan pioneering into the Sandhills was, however, the restored flock at Lacreek National Wildlife Refuge (NWR) in nearby Bennett County, South Dakota. That flock was started with cygnets translocated from Red Rock Lakes NWR during the fall of 1960, but none nested until 1963.

Trumpeters reappeared on North Marsh Lake in Valentine National Wildlife Refuge during 1966. This lake is 25 miles south of the city of Valentine, Nebraska, and 80 miles southeast of Lacreek NWR. Three pairs were nesting in that area within 10 years.

Whether the Hoover Lake Trumpeters were remnants of an earlier population or not, they were part of the Lacreek wintering flock during the 1970's that spread south to the Rush and Spring Lake areas in Sheridan County, Nebraska, and east to Alkali and Twin Lakes area in northeast Cherry County, Nebraska. Trumpeters nesting in southeast Bennett County, South Dakota, simultaneously pioneered into the Cody Lakes and south into Cherry County. Efficient law enforcement and education by Conservation Officer Elvin Zimmerman and cooperating landowners secured that area for Trumpeters after several birds were shot.

The Trumpeters spread so quickly over such a large range that the flock managers could not keep track of them. Stamped, self-addressed postcards for reporting swans were given to ranchers, natural resources personnel and other potential cooperators. Ranchers not only reported their observations but took a proprietary interest in the beautiful swans - protecting them from disturbances and poaching. At one time over 100 cooperators were involved.

Trumpeters expanded through western Nebraska and western South Dakota, north into Saskatchewan, and west into Wyoming. Longtime flock manager, Rolf Kraft, coined the term "High Plains Trumpeter Swan Flock" to better describe this subpopulation.

The High Plains Trumpeter Swans have recovered well, but nowhere have they done so well as in the Nebraska Sandhills. Late 1997 summer aerial surveys of Nebraska found 133 Trumpeters including 39 cygnets in Cherry County alone (Rolf Kraft, pers. comm.). The undulating dry sandhills and wet valleys are spaced about right for the extensive breeding territories desired by Trumpeters. The many rich stable lakes, ponds, marshes and ever-flowing streams filled with sago pondweed, arrowleaf, and other aquatic foods in the valleys are protected from cold north winds and are separated out of sight and sound from other waters and Trumpeter nesting pairs. The 140 frost-free days common in the Sandhills are ideal for Trumpeters that require 100 days between the first egg laid and the cygnets' first flight. Few ponds in the Sandhills freeze before the cygnets are flying.

More importantly, the High Plains Trumpeters have resumed wintering on Nebraskan spring-fed open streams. A few Trumpeters have wintered at the Cody Lakes' and Merritt Dam's inlets and outlets since 1974. But on 24 January 1998, Rolf Kraft found 258 Trumpeters wintering in Nebraska compared to 57 wintering in the Lacreek NWR area. He found 16 Trumpeters at Cody Lakes, 130 on the Snake River above Merritt Dam and 45 on the Upper North Loup - all in Cherry County, Nebraska; 28 on two lakes in Whitman in Grant County, Nebraska, 32 on Blue Creek in Garden County, Nebraska, and seven on the North Platte River in Keith County, Nebraska.

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The number of swans on Blue Creek had increased to 45 for Nebraska's Midwinter Waterfowl Survey, and Jim Ducey, TTSS member from Lincoln, Nebraska, saw at least 58 Trumpeters on Mud Lake in southern Cherry County during the 6 March 1998 blizzard. No swans were forced to return to the Lacreek NWR feeders for food during or after that early March storm.

The greatest contribution to Trumpeter Swan restoration may have been the Nebraskan support. The Nebraska Game and Parks Commission has maintained a

low profile in its efforts, but has given Trumpeter Swan restoration its full support. The Commission's conservation officers, wildlife managers and biologists taught the public the value of Trumpeter Swans for improving the quality of life (particularly in the lonely Sandhills) while controlling disturbances to Trumpeters. The cooperation of hundreds of residents went well beyond good stewardship of their lands, and was a primary factor in the success of Trumpeter Swan restoration.



Trumpeter Swan Survey of the Rocky Mountain Population/U.S. Flocks, Fall 1997

Daniel Gomez

[A copy of the full report is available from Red Rock Lakes NWR Refuge, Monida Star Rt., Box 15, Lima, MT 59739.]

We conducted the 1998 Fall Trumpeter Survey during the week of 20 September 1998. Weather was good throughout the flight, except for 25 September, when a storm required the shortening of the Centennial Valley portion. As a result, we could not loiter to find cygnets in the emergent vegetation and I missed some cygnets that I had seen during an August flight. I flew only the Centennial Valley portion again on 7 October, and counted only cygnets, as the flighted adults had likely moved around. I found missing cygnets and noted them in the remarks as 7 October 1998.

Results

This fall's survey found 469 Trumpeter Swans, an increase from last year's 433 Trumpeters (Table 1). "White birds" refers to adults or subadults, as distinguished from the readily identifiable gray cygnets. "White birds" and "adults" are used interchangeably. More cygnets fledged this year than last (69 cygnets in 1997 compared to 105 in 1998). In addition, 10 cygnets from Grand Prairie, Alberta, were released in September in the Flathead Valley of northwestern Montana. The state by state results of the Fall Survey are listed in Table 2 and attached figures.

I asked cooperators for bullet statements which may give the reader a closer feel for the situation in various localities.

- Ten cygnets were brought into Montana from Canada. Jeff Herbert spoke to Dale Becker of the Confederated Salish and Kootenai Tribes, who said the cygnets were trapped in the Grande Prairie region of Alberta in cooperation with the province and the Canadian Wildlife Service, on 9 September 1998. The cygnets were transported by vehicle to the Flathead Valley and released onto sub-impoundments

on Pablo Reservoir. They remained together through 14 October without any losses. On 16 October, an aerial survey located four cygnets (J. Herbert, pers. comm.). Five of the remaining cygnets were observed at Lee Metcalf NWR, MT, accompanied by an unmarked adult Trumpeter and apparently heading south (R. Shea, pers. comm.).

- Cygnet production and survival was better than recent years throughout the U.S. Flocks area. Red Rock Lakes experienced really good cygnet production early on. However, a late June freezing spell with high winds and hail may have caused the loss of several cygnets not seen again on a later flight.

- Two wetlands on private lands in the Centennial Valley produced broods of six cygnets each. All the cygnets survived into the fall.

- Widgeon Pond, within Red Rock Lakes, lost an adult nesting swan after three cygnets hatched. For reasons unknown, the remaining adult moved the brood onto nearby Elk Lake in the Beaverhead National Forest. The capture and banding of the cygnets on Elk Lake, coupled with recreational motorboat disturbance, may have then caused the brood to move onto Hidden Lake, a deep lake to the north. To get to Hidden Lake, the brood walked over 1½ miles and climbed at least 100 feet through sagebrush slopes to cross a ridge. The brood lost one cygnet on the way, and survived into the fall with one adult and two cygnets. We are now considering banding some cygnets as second year birds to lessen the potential disturbance to higher risk broods.

- Tucks Slough, a 9-year old Ducks Unlimited wetland project on the east end of Red Rock Lakes, supported its first swan nest this year which hatched three cygnets. The cygnets were lost to unknown causes.

- Thanks to volunteer Hope Woodward, the Red Rock

*Daniel Gomez, Refuge Manager, Red Rock Lakes NWR,
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Lakes Refuge homepage will soon be launched. It contains basic Trumpeter Swan information. Eventually, we may be able to incorporate general survey results. Our homepage includes a link to The Trumpeter Swan Society homepage. Once launched, our homepage will be found via the Fish and Wildlife Service website at <http://www.fws.gov>. This will be a good site to visit, especially for anyone doing school presentations. Our volunteers may spend time at Seedskaadee NWR tracking Trumpeters on the Green River.

Discussion

The increase this year is due more to high cygnet production than adult (white bird) numbers. The high cygnet production of 1994 led to an increase in adults in 1995 indicating some cygnet to subadult survival. However, since 1995, white birds have fluctuated and not increased as one would expect with recruitment. Apparent adult mortality appears to at least equal or exceed productivity. A hypothesis proposed by Ruth Shea is that there is little evidence from neckband reports that U.S. flock adults are successfully dispersing to summer habitats outside of the survey area. Therefore, dispersal

from the Tristate area may not account for less adults here. This may point to a continued need to establish secure alternate wintering sites for Trumpeters that are forced out of the Tristate area. However, what the data indicate, and what factors account for the trends, needs to be analyzed and discussed further.

Observers and Compilation

In the core Tristate and adjacent areas, D. Gomez and pilot B. Twist (Western Montana Aviation – Cessna 206) flew the southwest Montana portion. Other Montana observations were provided by J. Herbert and T. McEneaney. M. Fisher, S. Bouffard and B. Twist flew Island Park and eastern Idaho, and south to Bear Lake Refuge. D. Gomez, T. McEneaney, J. Warren (Red Rock Lakes technician), and B. Twist flew the Yellowstone portion. D. Stevenson and pilot G. Lust (Mountain Air Research) flew the Wyoming portion.

In the restoration areas, J. Mackay surveyed Ruby Lake NWR in Nevada, M. St. Louis surveyed Summer Lake WMA, Oregon, and vicinity, and G. Ivey provided numbers for Malhuer Refuge. R. Shea provided some consultation and helped to analyze trends. Red Rock Lakes employees or volunteer J. Vann, J. Warren, T. Reed, R. Gomez, and C. Boes helped verify, compile and distribute this report.

Table 1. Yearly Trends since 1990.

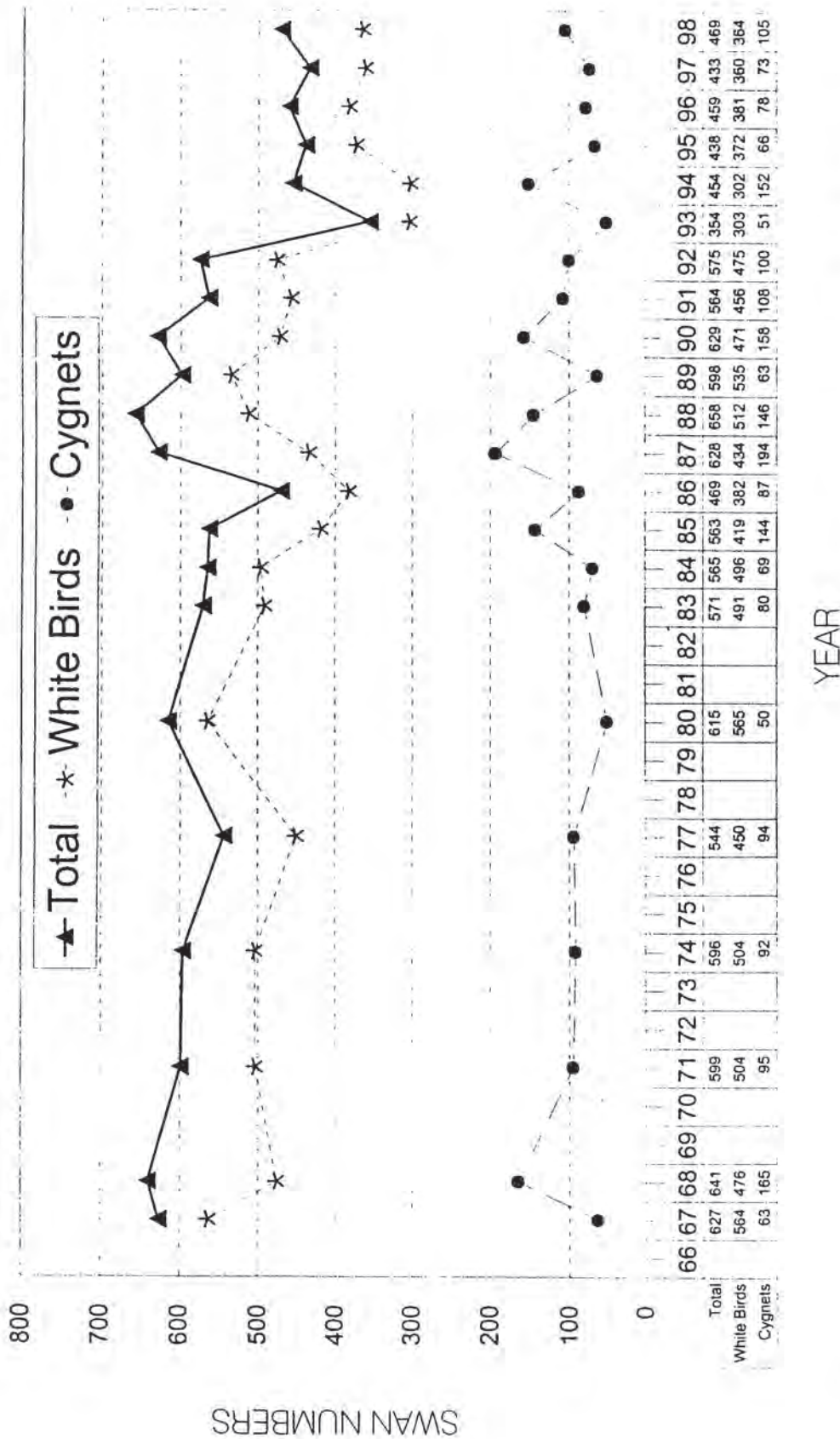
Year (Sept.)	White birds	Cygnets	Total swans
1990	432 (75%)	147 (25%)	579 (100%)
1991	463 (81%)	108 (19%)	571 (100%)
1992	473 (83%)	97 (17%)	570 (100%)
1993	303 (86%)	51 (14%)	354 (100%)
1994	302 (67%)	152 (33%)	454 (100%)
1995	372 (85%)	66 (15%)	438 (100%)
1996	381 (83%)	78 (17%)	459 (100%)
1997	360 (83%)	73 (17%)	433 (100%)
1998	364 (78%)	105 (22%)	469 (100%)

Table 2. State by State Summary

State	White birds	Cygnets	Total Swans
Montana	105	35	133
Idaho	110	37	147
Wyoming	89	18	107
Nevada	21	7	28
Oregon	39	8	47
U. S. RMP Total	364	105	469

U.S. FLOCKS

Rocky Mountain Population



1998 Trumpeter Swan Fall Survey

Fig. 1

1998 Nesting Effort and Productivity of the RMP/U.S. Flocks of Trumpeter Swans.
Compiled by The Trumpeter Swan Society

	Occupied Sites (a)	Active Nests (b)	Successful Nests (c)	Cygnets Hatched (d)	Broods Fledged (e)	Cygnets Fledged (e)	Total Adults (September) (e)
MONTANA TOTAL (f)	41	26	17	57	15	35	105
*RRLNWR	28	16	10	30	3	8	31
*Other Cent. V.	8	5	5	21	6	21 ^(g)	56
*Madison River drainage	0	0	0	0	0	0	0
*East Front	1	1	1	2	1	2	2
*Yellowstone R./ Paradise Valley	4	4	1	4	1	4	16
WYOMING TOTAL	34	27	13	32	9	18	89
*Outside YNP	25	18	10	26	7	15	69
*YNP	9	9	3	6	2	3	20
IDAHO TOTAL	41	27	16	47	14	37	110
*Island Park	16	10	5	13	5	12	46
*Ashton-Id. Falls	8	5	2	6	1	3	27
*Grays L. NWR area	15	10	7	22	6	16	33
*So. central ID	0	0	0	0	0	0	no count ^(h)
*Ft. Hall	1	1	1	5	1	5	2
*Bear Lake NWR area	1	1	1	1	1	1	2
OREGON TOTAL	10	7	4	11	4	8	39
Malheur NWR	4	3	3	8	3	5	22
Summer L. area	6	4	1	3	1	3	17
NEVADA TOTAL	8	5	5	8	4	7	21
Ruby Lake NWR	7	4	4	7	3	6	10
Franklin Lake MA	1	1	1	1	1	1	11
WASHINGTON TOTAL	0	0	0	0	0	0	0
U.S. FLOCKS TOTAL	134	92	55	155	46	105	364
*TRI-STATE FLOCKS TOTAL	116	80	46	136	38	90	304

(a) pair present on site with known or suspected suitability for nesting (does not include sites with 1 territorial bird); (b) incubation or clutch observed; (c) nest hatched at least 1 egg; (d) minimum estimate of cygnets hatched based upon early observation of broods; (e) cygnets, broods and adults counted on USFWS September survey; (f) Montana total does not include 10 cygnets released at Pablo NWR in September; (g) includes 2 cygnets that probably hatched on RRL and moved off refuge by September; (h) 2 adults seen on Big Wood River south of Hailey on 8 Sept.

*September Surveys prior to 1992 included only the Tri-state Flocks; subsequent survey have included all the RMP/U.S. Flocks. Data were gathered by US Fish and Wildlife Service, US National Park Service, US Forest Service, Idaho Dept. of Fish and Game, Wyoming Game and Fish Dept., Oregon Dept. of Fish and Wildlife and The Trumpeter Swan Society.

Trumpeter Swan surveys on the Chugach National Forest 1997

Deborah J. Groves, Bruce Conant, Rodney J. King, and Daniel Logan

Abstract

Trumpeter Swan (*Cygnus buccinator*) aerial surveys were conducted during May and August 1997 on the Copper River Delta and surrounding areas of the Chugach National Forest in southcentral Alaska. The surveys were accomplished through cooperation between the U.S. Fish and Wildlife Service and the U.S. Forest Service. In May, 517 white (adult and subadult) swans and 117 nests were counted. In August, 598 white swans and 54 broods were counted. Production was average. Nest success was 0.46, average brood size was 3.2, and young made up 23% of the early fall population. The fall white swan population was down 5% from 1996 and was 7% below the 22-year average. There are now 41 comparable swan surveys in 22 different years for this area. A continued standardized Trumpeter Swan survey program is recommended.

Introduction

The Copper River Delta and surrounding coastal wetlands in the Chugach National Forest support a large and dense nesting and summering population of Trumpeter Swans. Aerial surveys were conducted in this area as part of U.S. Fish and Wildlife Service (USFWS) statewide Trumpeter censuses in 1968, 1975, 1980, 1985, 1990, and 1995 (Hansen *et al.* 1971, King 1976, King and Conant 1981, Conant *et al.* 1985, Conant *et al.* 1991, Conant *et al.* 1996). The U.S. Forest Service (USFS) initiated aerial surveys in 1978, and annual swan surveys have been jointly accomplished under a formal agreement between the USFWS and USFS since 1981.

Study Area

The study area was comprised of portions of the Copper River Delta and Controller Bay drainages within 11 U.S. Geological Survey 1:63,360 scale topographic

maps (Figure 1). The area actually surveyed consisted of 1787 km² (690 mi²) of potential swan nesting and summering habitat delineated on these maps. In general, potential swan habitat included most lakes, rivers, streams and all wetland areas under 760 m (2500 ft.) elevation.

Methods

Aerial surveys were conducted 26-27 May 1997 with a Cessna 185 (N1055F) and on 14-17 August 1997 with the USFWS Turbo-Beaver (N754). The aerial survey method used for both surveys was described by King (1973). Generally, a system of parallel tracks was flown over all known and suspected habitat within each quadrangle map at an altitude of 150-180 m (500-600 ft.) above ground. The pilot was responsible for navigation, making swan observations, and ensuring that all swan habitat was adequately surveyed, considering factors such as visibility and the observer's level of training. The front seat observer was responsible for recording the flight path, making swan observations, and recording the type and exact location of each observation on 1:63,360 scale maps. During five previous USFS surveys in which chartered aircraft were used, all of these duties were assumed by the observers. Back seat observers were used, when available, to increase the eye power from the aircraft.

Swan observations were entered directly from field maps into a portable Compaq LTE/286 computer. These data were then merged with exact latitude and longitude coordinates for each observation from field maps via an Altek digitizing system. The final data files formed the framework from which statistical summaries were produced.

Results

Population Trend

In May 1997, 517 white swans (adults and subadults) were counted, down 13% from spring 1996 and 16% below the 19-year average (Table 1). The number of single and paired birds in spring decreased 8% from last year and was similar (-2%) to the average (Table 1). The number of flocked birds decreased 33% from 1996 and was 51% below the average (Table 1).

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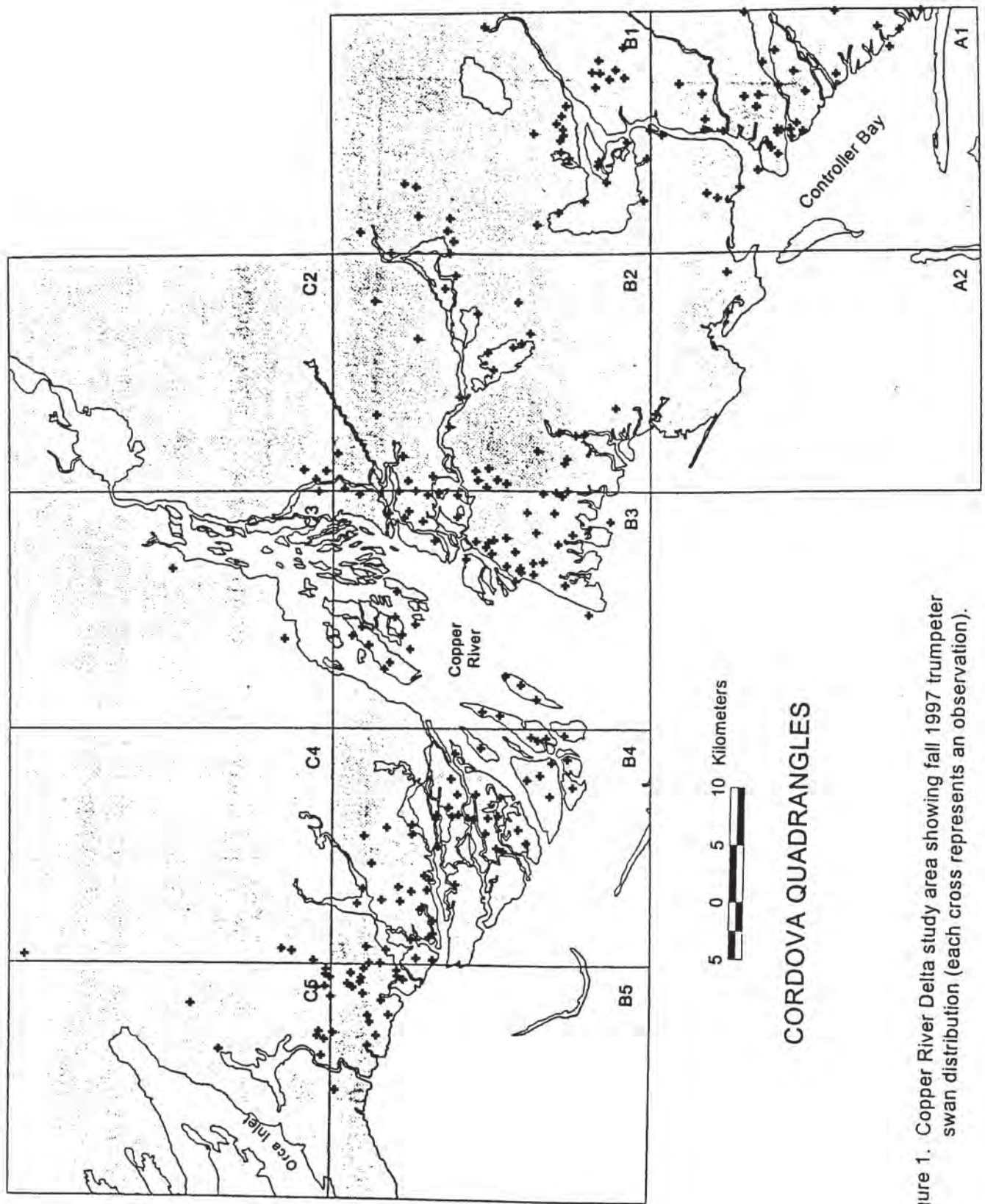


Figure 1. Copper River Delta study area showing fall 1997 trumpeter swan distribution (each cross represents an observation).

Table 1. Spring survey swan observations - Chugach National Forest (1978-1997).

Year	Miles Flown	White Swans						Total Swans
		Observations	Paired	Single	Flocked	Subtotal	Cygnets	
5/78	967	192	278	20	362	660	--	660
5/80	783	222	320	45	169	534	--	534
5/81	924	244	350	37	235	622	--	622
6/82	852	247	356	44	200	600	--	600
6/83	--	297	448	47	144	639	23	662
6/84	1074	324	502	43	190	735	--	735
6/85	986	309	452	50	235	737	--	737
5/86	935	304	508	35	123	666	--	666
5/87	--	291	462	39	101	602	--	602
5/88	--	263	418	42	116	576	5	581
5/89	--	241	400	28	174	602	--	602
5/90	989	226	374	25	121	520	--	520
5/91	966	250	394	34	152	580	--	580
5/92	905	249	412	25	195	632	--	632
5/93	985	248	394	25	159	578	--	578
5/94	912	278	436	31	204	671	--	671
5/95	921	246	402	24	157	583	--	583
5/96	915	267	442	27	125	594	--	594
5/97	934	246	406	27	84	517	--	517
19 Yr. Avg.	937 ^a	260	408	34	171	613	--	615

^a Fifteen year average.

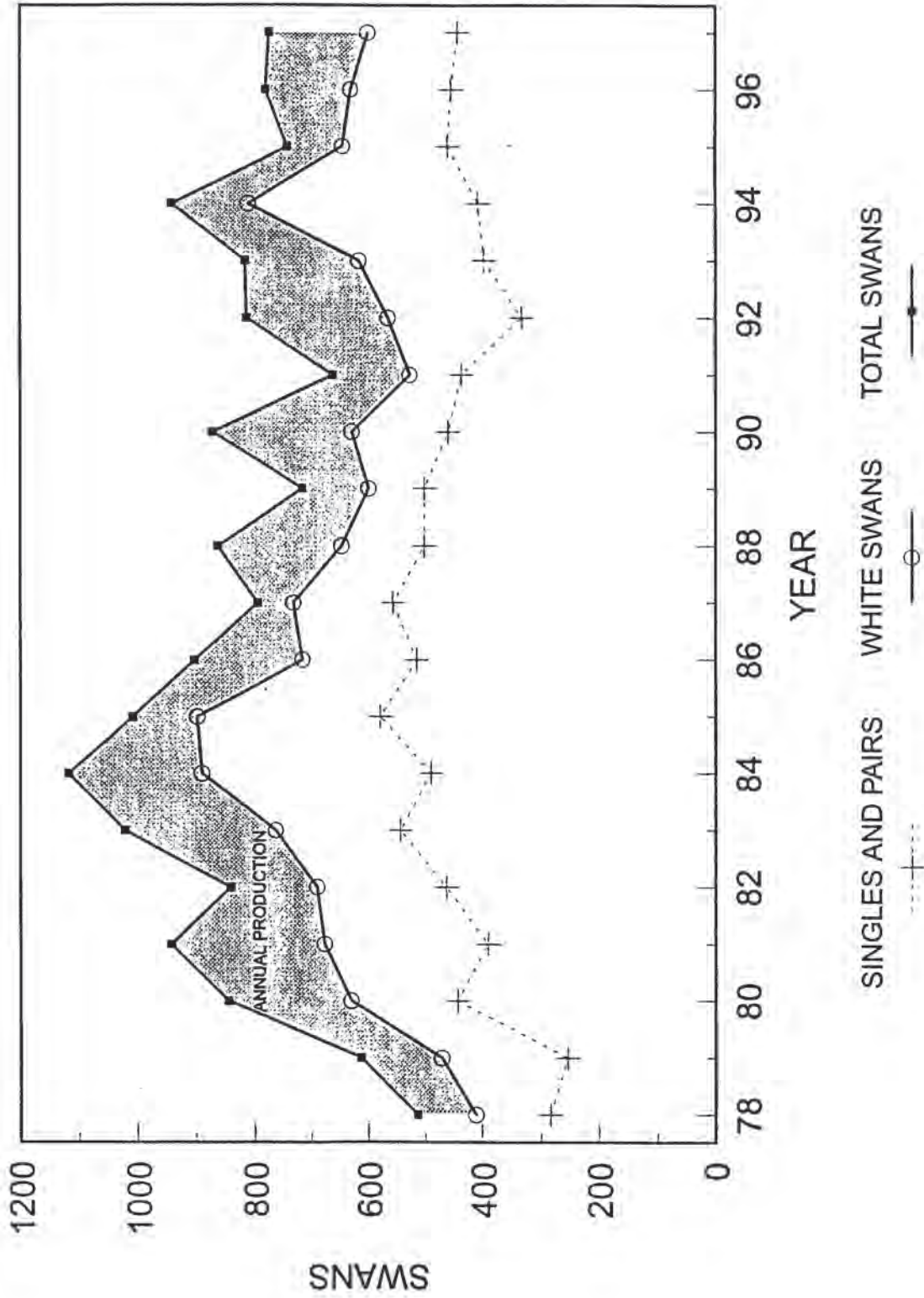


Figure 2. Population trend of trumpeter swans on the Copper River Delta study area, 1978-1997.

In August 1997, 598 white swans were counted, down 5% from August 1996 and 7% below the 22-year average (Table 2, Figure 2). The number of single and paired birds decreased 3% from last year and was nearly identical (+1%) to the average (Table 2). The number of flocked birds decreased 11% from 1996 and was 24% below the average (Table 2).

Productivity

The proportion of pairs with nests in late May was 0.55, up 15% from 1996 and similar (+2%) to the 19-year average. One hundred seventeen nests observed in May produced 54 broods still present in August, resulting in a nest success of 0.46 (Table 3, Figure 3). Nest success increased 21% from 1996 and was similar (-2%) to the 19-year average (Table 3). Pairs nesting on the western portion of the Copper River Delta experienced much greater nest success than those nesting on the east Delta and in the Controller Bay drainage (Figure 3). Nest success was 0.64, 0.24, and 0.34 on the west delta, east delta, and Controller Bay drainage, respectively. The number of young per occupied nest, a productivity statistic based on the number of known territorial pairs (as evidenced by the presence of a nest), was 1.5 (average = 1.6) for the entire study area, and average brood size was 3.8 (average = 3.3) (Table 3). The proportion of young in the early fall population was 0.23, up 21% from 1996 and 10% above the 22-year average (Table 2).

Discussion

The population of white swans on the study area increased steadily between 1978 and 1985, in response to several years of good to excellent reproductive success during the early 1980's (Table 3). The population leveled off in fall 1985 at 898 white swans and began a

reverse trend, declining to a low of 526 white swans in fall 1991. Since then, the number of white swans has increased slightly and seems to have stabilized (Figure 2). Reproductive success has fluctuated over the years, likely due in large part to weather conditions during the breeding season. Production in 1997 was average, an improvement over the below-average production that occurred in recent years.

Bias

Possible sources of bias in these data come from using different pilots and observers with variable levels of experience and training, using more than one type of aircraft, and surveying in variable weather conditions. However, by using a standardized system, comparable sets of data were collected as evidenced by comparable recorded flight paths and mileages flown.

Recommendations

We now have 41 comparable Trumpeter Swan surveys (19 spring and 22 fall) on the Copper River Delta, one of the most complete records for any swan population in Alaska. We recommend continuing a cooperative program of two surveys per year. Information acquired from both the early and late phases of the breeding season has greatly enhanced our ability to understand the factors influencing the population's reproductive success. Long-term, standardized data sets such as these are an invaluable tool for evaluating population dynamics and properly managing Trumpeter Swan breeding populations.

Acknowledgments

The following people and agencies are gratefully acknowledged for their participation in the swan surveys:

Year	Spring Survey Personnel	Fall Survey Personnel
1968		J. King, J. Bartonek - USFWS
1975		J. King, T. Schoenfelder - USFWS
1978	G. Bucaria, S. Watson - USFS	G. Bucaria, S. Watson - USFS
1979		C. Moitoret - USFS
1980	G. Bucaria, D. Logan - USFS	J. King, B. Conant - USFWS
1981	G. Bucaria - USFS	J. King, B. Conant - USFWS
1982	R. King, G. Bucaria - USFWS, USFS	J. King, B. Conant - USFWS
1983	R. King, Zimmerman - USFWS	B. Conant, D. Derksen, J. Baker, M. Jacobson - USFWS; G. Covel, Broekema - USFS
1984	R. King, R. Leedy - USFWS	B. Conant, J. Hodges - USFWS
1985	R. King, T. Simon-Jackson - USFWS	B. Conant, S. Cain - USFWS
1986	R. King, K. Bollinger - USFWS	B. Conant, J. Hodges - USFWS
1987	R. King, M. North - USFWS	B. Conant, J. Hodges - USFWS
1988	R. King, R. Pospahala - USFWS	B. Conant, J. Hodges, M. Jacobson - USFWS
1989	R. King, F. Gerhardt - USFWS	B. Conant, R. Oates, M. Jacobson - USFWS
1990	R. King, A. Brackney - USFWS	B. Conant, D. Groves, J. King - USFWS
1991	R. King, A. Brackney - USFWS	B. Conant, D. Groves - USFWS
1992	R. King, D. Youkey - USFWS, USFS	J. Hodges, J. King - USFWS
1993	R. King, D. Youkey - USFWS, USFS	J. Hodges, D. Groves - USFWS, D. Youkey - USFS
1994	R. King, P. Greene - USFWS, USFS	B. Conant, D. Groves - USFWS
1995	R. King, B. Leedy - USFWS	B. Conant, E. Lucas - USFWS
1996	R. King, S. Hill - USFWS	J. Hodges, D. Groves - USFWS
1997	R. King, T. Tiplady - USFWS	B. Conant, G. Fowler - USFWS, Ducks Unlimited Canada

Table 2. Fall survey swan observations - Chugach National Forest (1968-1997).

Year	Miles Flown	White Swans					Young in Pop. (%)	Total Swans	
		Observations	Paired	Single	Flocked	Subtotal			
8/68	851	199	326	24	181	531	267	33	798
8/75	1125	196	312	24	142	478	131	22	609
8/78	1088	186	248	36	127	411	103	20	514
8/79	887	160	234	20	217	471	143	23	614
8/80	1961	262	410	33	187	630	216	26	846
8/81	1541	234	374	16	287	677	266	28	943
8/82	1644	271	436	27	227	690	152	18	842
8/83	1948	314	512	32	219	763	259	25	1022
8/84	1731	303	448	42	400	890	228	20	1118
8/85	1952	348	534	45	319	898	111	11	1009
8/86	1611	298	490	25	200	715	188	22	903
8/87	1648	318	510	46	175	731	64	8	795
8/88	1600	281	472	29	145	646	217	25	863
8/89	1578	278	460	41	98	599	117	16	716
8/90	1710	267	424	35	169	628	245	28	873
8/91	1247	253	400	36	90	526	136	21	662
8/92	1025	197	314	19	231	564	250	31	814
8/93	1158	237	368	29	218	615	201	25	816
8/94	1486	260	382	24	404	810	131	14	941
8/95	1659	280	408	51	185	644	97	13	741
8/96	1231	259	430	23	176	629	151	19	780
8/97	1533	259	416	25	157	598	175	23	773
22 Yr. Avg.	1464	257	405	31	207	643	175	21	818

Table 3. Swan productivity : Chugach National Forest (1968-1997).

Year-Survey	Pairs w/ Nest or Brood (†)	Nests or Broods	Average Brood Size	a Nest Success	Young Per Occupied Nest ^b
68 - Spring Fall	-- 40	-- 67	4.0	--	--
75 - Spring Fall	-- 24	-- 39	3.4	--	--
78 - Spring Fall	51 26	78 32	3.2	0.41	1.3
79 - Spring Fall	-- 34	-- 41	3.5	--	--
80 - Spring Fall	59 30	94 62	3.5	0.66	2.3
81 - Spring Fall	58 34	120 67	4.0	0.56	2.2
82 - Spring Fall	40 23	83 51	3.0	0.61	1.8
83 - Spring Fall	27 27	68 71	3.6	1.04	3.8
84 - Spring Fall	53 27	141 61	3.7	0.43	1.6
85 - Spring Fall	42 13	103 37	3.0	0.36	1.1
86 - Spring Fall	52 24	140 60	3.1	0.43	1.3
87 - Spring Fall	43 10	115 25	2.6	0.22	0.6
88 - Spring Fall	59 29	133 68	3.2	0.51	1.6
89 - Spring Fall	63 17	130 38	3.1	0.29	0.9
90 - Spring Fall	67 33	130 70	3.5	0.54	1.9
91 - Spring Fall	64 25	129 49	2.8	0.38	1.1
92 - Spring Fall	65 46	134 73	3.4	0.54	1.9
93 - Spring Fall	59 32	118 61	3.3	0.52	1.7
94 - Spring Fall	57 23	130 44	3.0	0.34	1.0
95 - Spring Fall	56 17	115 35	2.8	0.30	0.8
96 - Spring Fall	48 19	106 40	3.8	0.38	1.4
97 - Spring Fall	55 25	117 54	3.2	0.46	1.5
19 Yr. Avg.-Spring	54	115	--	0.47	1.6
22 Yr. Avg.-Fall	26	52	3.3	--	--

a Proportion of total nests that produced 1 or more young to near fledging age.

b Total number of young divided by total number of nests (territorial pairs).

c No survey was performed.

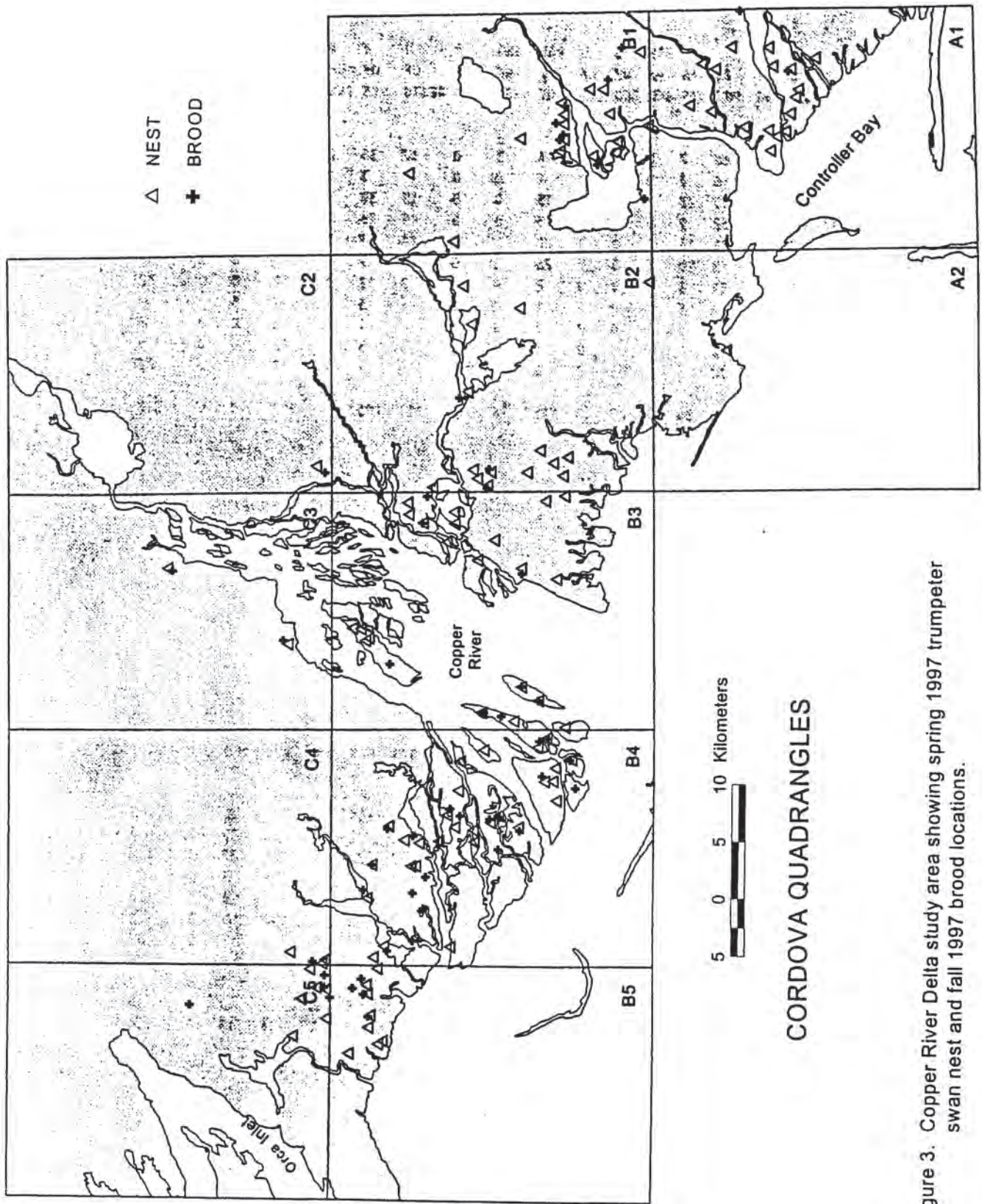


Figure 3. Copper River Delta study area showing spring 1997 trumpeter swan nest and fall 1997 brood locations.

TRUMPETER SWAN SURVEY
COPPER RIVER DELTA
SPRING 1997

Q																				
U																				
A	1/4	#		PRS SNG		0	PRS SNG		#	#	#	#	TOT	TOT	TOT	TOT				
MAP	D	QD	DATE	OF	AS	IN	IN	W/	W/	W/	W/	W/	OF	OF	OF	OF	ADU	YNG	EGG	SWANS
96	A1	0	52697	40	5	66	7	0	0	0	14	3	0	17	33	2	78	0	0	78
96	A2	0	52697	4	1	6	0	0	0	0	1	0	0	1	3	0	7	0	0	7
96	B1	0	52697	38	5	60	27	0	0	0	15	0	0	15	30	3	92	0	0	92
96	B2	0	52697	29	1	52	9	0	0	0	15	0	0	15	26	2	62	0	0	62
96	B3	0	52697	43	3	74	13	0	0	0	20	1	0	21	37	3	90	0	0	90
96	B4	0	52697	50	9	78	10	0	0	0	26	2	0	28	39	2	97	0	0	97
96	B5	0	52697	15	2	24	6	0	0	0	8	0	0	8	12	1	32	0	0	32
96	C2	0	52697	4	0	6	3	0	0	0	1	0	0	1	3	1	9	0	0	9
96	C3	0	52697	4	0	8	0	0	0	0	2	0	0	2	4	0	8	0	0	8
96	C4	0	52797	6	0	10	5	0	0	0	3	0	0	3	5	1	15	0	0	15
96	C5	0	52797	13	1	22	4	0	0	0	6	0	0	6	11	1	27	0	0	27
*** Total ***				246	27	406	84	0	0	0	111	6	0	117	203	16	517	0	0	517

FALL 1997

Q																				
U																				
A	1/4	#		PRS SNG		0	PRS SNG		#	#	#	#	TOT	TOT	TOT	TOT				
MAP	D	QD	DATE	OF	AS	IN	IN	W/	W/	W/	W/	W/	OF	OF	OF	OF	ADU	YNG	EGG	SWANS
96	A1	0	81597	35	1	62	18	2	0	0	0	0	2	0	31	3	81	12	0	93
96	A2	0	81497	3	0	4	4	0	0	0	0	0	0	0	2	1	8	0	0	8
96	B1	0	81597	37	2	56	73	8	0	1	0	0	9	0	28	6	131	27	0	158
96	B2	0	81597	35	4	54	15	3	0	0	0	0	3	0	27	4	73	3	0	76
96	B3	0	81697	52	6	88	11	7	1	0	0	0	8	0	44	2	105	25	0	130
96	B4	0	81797	57	8	96	3	20	0	0	0	0	20	0	48	1	107	65	0	172
96	B5	0	81797	18	2	24	16	4	0	0	0	0	4	0	12	4	42	17	0	59
96	C2	0	81697	4	0	6	4	1	0	0	0	0	1	0	3	1	10	4	0	14
96	C3	0	81697	2	0	4	0	2	0	0	0	0	2	0	2	0	4	7	0	11
96	C4	0	81697	4	0	4	10	1	0	0	0	0	1	0	2	2	14	2	0	16
96	C5	0	81797	12	2	18	3	4	0	0	0	0	4	0	9	1	23	13	0	36
*** Total ***				259	25	416	157	52	1	1	0	0	54	0	208	25	598	175	0	773

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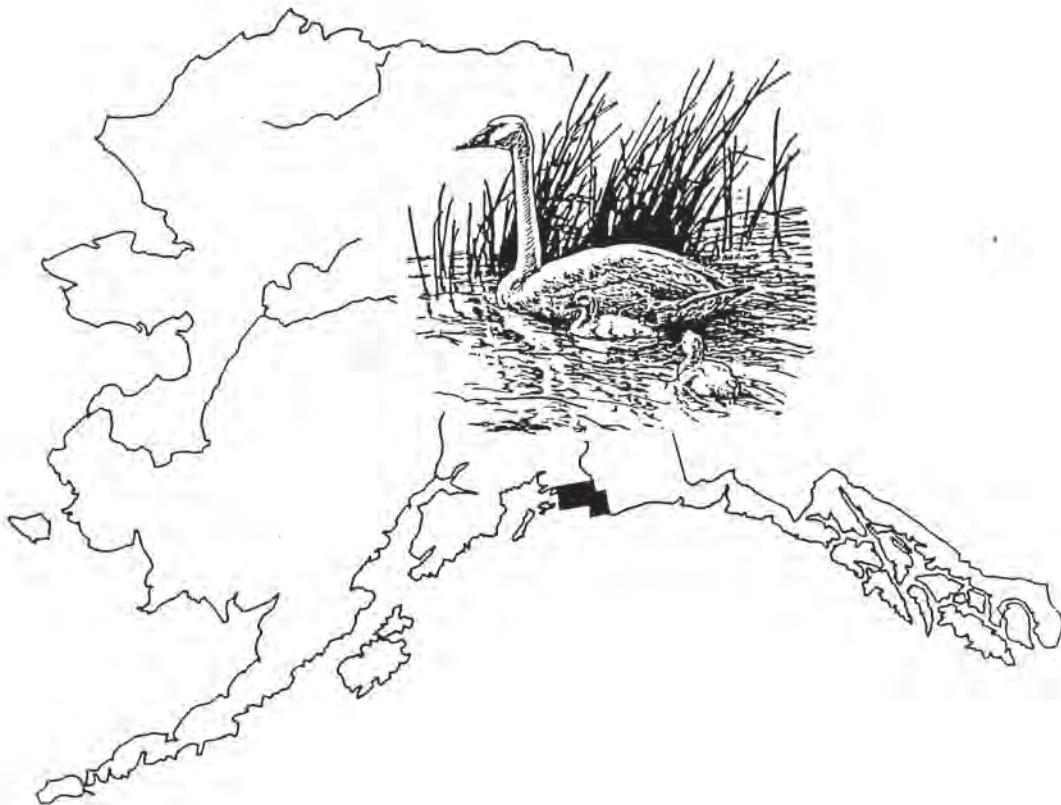
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THE TRUMPETER SWAN SOCIETY

The Trumpeter Swan Society (TTSS) is a private, non-profit organization dedicated to assuring the vitality and welfare of wild Trumpeter Swan populations, and to restoring the species to as much of its former range as possible.

Since its founding in 1968, TTSS has provided the vision, knowledge and advocacy to move restoration efforts forward and improve management of Trumpeter Swans across North America. Our 480 members in the U. S. and Canada include interested private citizens and waterfowl propagators, plus most of the professional waterfowl biologists and managers who have guided Trumpeter restoration and management in recent decades. Most of our accomplishments result from the work of our members and Board of Directors in their professional roles and through their countless hours of volunteer effort.

The Society is run by a President, Vice President, Board of Directors and two part-time staff members who work at our headquarters located at Hennepin Parks, Maple Plain, Minnesota. We publish *Trumpetings* four times per year and *North American Swans*, schedule determined by the Editorial Board. We are a nonprofit, tax exempt corporation under Section 501(c)(3) of the Internal Revenue Code. Contributions are tax deductible. TTSS's Web Page may be located at www.taiga.net/swans/index.html



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