ALASKA
TRUMPETER SWAN STATUS REPORT
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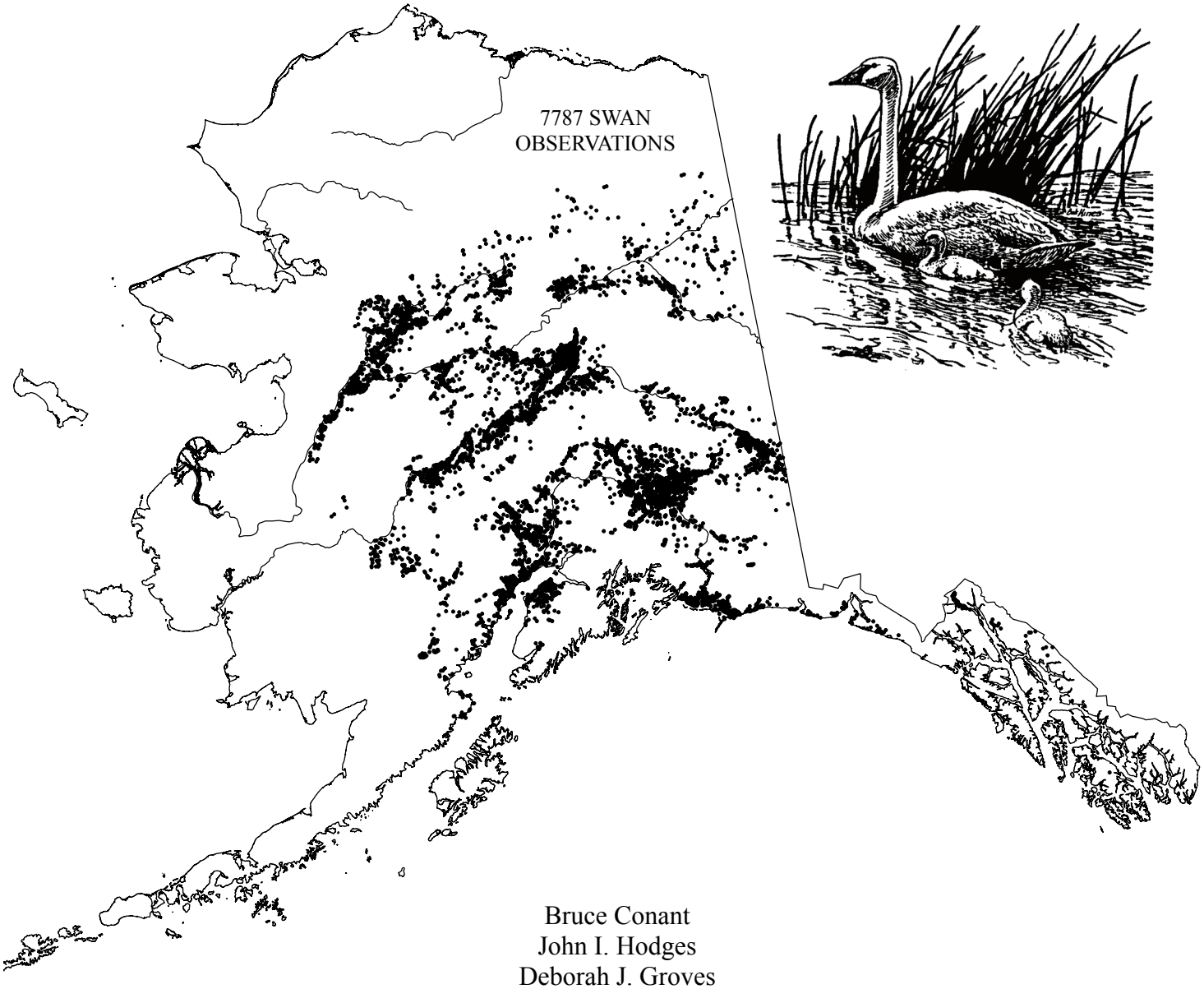

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THE 2005 CENSUS OF TRUMPETER SWANS ON ALASKAN NESTING HABITATS

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ABSTRACT

The eighth complete census of Trumpeter Swans (Cygnus buccinator) on their Alaska summering grounds was completed in late summer 2005. This year 1040 hours of flight time was expended by many survey crews to fly about 124,000 km of survey tracks (84,829 km in 2000) over all the potential Trumpeter swan habitat 128,332 km^2 in 2005 (123,864 km^2 in 2000) depicted on 780 (733 in 2000) USGS, 1:63,360 scale maps. Compared to 2000 the population was comprised of: paired birds 11940 (+20%); singles 1157 (+29%); flocked birds 4148(+36%); total white swans 17245 (+24%); cygnets 6447 (+100%); and total swans 23692 (+38%). Cygnets accounted for 27% of the population (19% in 2000) and 2084 broods (+81% from 1149 in 2000) were found with an average brood size of 3.1 (2.8 in 2000). Although the population of white phase Trumpeters summering in Alaska continues to follow a logistic growth curve, a comprehensive Alaska Trumpeter Swan Management Plan is still needed to ensure that they remain an integral part of each geographical unit of their present distribution. The continual loss of Pacific coast wintering habitat and the recent large losses of Pacific coast wintering swans to lead poisoning are of special concern. In Alaska a complete census every five years is recommended until the Alaska summering population stabilizes to provide the high quality data needed for the best management of this magnificent international resource.

INTRODUCTION

The U. S. Fish and Wildlife Service (USFWS) conducted complete censuses of Trumpeter Swan (Cygnus buccinator) summer populations in Alaska in 1968, 1975, 1980, 1985, 1990, 1995, 2000 and 2005 (Hansen et al. 1971, King 1976, King and Conant 1981, Conant et al. 1986, Conant et al. 1991, Conant et al. 1997, Conant et al. 2002). Because of the projected increase in the summer population, many survey crews and aircraft were needed at the outset to ensure completion of the 2005 census. A total of 1140 hours of flight time was expended to fly about 124,000 km of survey tracks over all the potential Trumpeter Swan summer habitat in Alaska (128,325 km^2).

SURVEY AREAS

A total of 780 U. S. Geological Survey (USGS) 1:63,360 scale quadrangle maps were censussed in 11 delineated Trumpeter Swan nesting areas in Alaska (Figure 1). Most of these 11 units were separated on the basis of significant geographical features such as large drainages and mountain ranges.

METHODS

The survey was initiated on 20 July and terminated on 8 September. The primary survey aircraft used were a specially-modified, turbine-powered de Havilland Beaver, Cessna 206's and 185's, Found Bushhawks and Piper Supercubs. The aerial survey technique used small aircraft to put observers over all known or suspected Trumpeter Swan summer habitat (King 1973). Generally, a system of parallel tracks was flown within each USGS 1:63,360 scale quadrangle at an altitude of 150-180 m above ground. Each survey crew consisted of a pilot-biologist and one primary observer. The pilot-biologist was responsible for navigation, searching for swans, and ensuring that all swan habitat was adequately surveyed, considering factors such as sun glare and observer experience. The primary observer recorded the flight path (when paper maps were used), searched for swans, and recorded the observations by type, number, and precise location. In a few cases where non-biologist pilots did the flying, all of these duties were performed by the primary observer. Most crews used a combination of an onboard computer, software, and a global positioning system (GPS) to record the swan data and the flight path. Several crews used a custom computer program, developed by John Hodges, that allowed the observer to record the location and attributes of each observation onto a moving digital 1:63,360 scale USGS topographic map, which was continuously displayed on the computer screen. The program also recorded the survey flight track automatically via a connection to the aircraft's GPS unit and displayed this on the screen as well. A few crews used their own combinations of hardware and software to record the data and flight track digitally, while the remaining crews recorded the data and track by hand onto USGS 1:63,360 paper maps.

After the survey, all digitally-recorded data were converted to a standard comma-delimited ASCII format, and location coordinates were projected to one common coordinate system (geographic coordinates, North American 1927 datum). Data and flight tracks that were recorded on paper maps were transcribed and digitized into digital format and combined with the remaining data set. The final data set was archived in the Alaska Swan Data Base in Juneau, from which summary tables, charts, graphs, and distribution maps of any scale can be easily produced.

RESULTS

The eight complete, state-wide Trumpeter censuses show how the population of white swans (birds more than one year old) has increased in size (Table 1, Figures 2 and 3). Singles plus paired birds and the subtotal for all white swans best show this sustained population growth (Figure 4).

Continued expansion of Trumpeters into the peripheral habitat (Units 5 and 7 through 11) is shown in Table 1 and Figures 3 and 5.

Trumpeter Swan production as measured in late summer is summarized in Table 2 for the eight census years. Above average production in 2005 is indicated by the values for the total number of cygnets and the total number of broods which both increased from 2000.

The trend in numbers of white swans recorded for the eight statewide counts varies by unit (Figure 5). Generally, the expansion of swans into peripheral habitat is best shown by the increase in the

amount of habitat surveyed for units 6-11. Increases in the density of swan numbers since 1975 is demonstrated by the increase in the numbers of white swans recorded in units 1, 3, and 4-11.

Appendix I contains statewide maps showing the increase, distribution and patterns of all swan observation points for all eight census years for easy comparison.

Appendix II gives a comparison of the distribution patterns by unit of all swan observation points for 2000 and 2005.

Appendix III gives examples of mapping products that are available from the Alaska Swan Data Base.

Appendix IV is a copy of the survey protocol.

Appendix V lists all participants of the 2005 Alaska Trumpeter Swan Census.

DISCUSSION

The summering population of Trumpeter Swans continues to increase in Alaska. This continued growth is best reflected by the increase in white swans recorded since 1968 (Figures 2-5). In the last census in 2000 we thought we were starting to see a leveling off of the white swan component. Thus we were surprised to see a large proportional increase in the numbers of white swans recorded in 2005. The large number of broods seen with an average rate of production added a record number of cygnets to the total population.

Obviously, the population increase can not be sustained indefinitely, but it is still not apparent when the total summering population in Alaska will stabilize or perhaps reverse. We thought that the habitat was saturated with swans in the Gulf Coast (unit 1), Kenai (unit 4) and Cook Inlet (unit 5) areas in 2000. Thus we were surprised by the increases noted in those units. For other areas various rates of increase have occurred (Figure 3). There appears to be a large (approximately 23,000 km^2) amount of summer habitat available on the Yukon Flats (unit 9) which is just starting to become occupied (numbers of white swans here nearly doubled again from 2000). The density of swan use in some of the apparent best habitat is still increasing (Kuskokwim-unit 7, Koyukuk-unit 8, southeast mainland-unit 10 and the upper Tanana-unit 11). Peripheral habitat is still being pioneered noticeably in the Lower Tanana (unit 6), Kuskokwim (unit 7), Koyukuk (unit 8), and Upper Tanana (unit 11) areas.

The scientific evidence that global warming is occurring (and particularly in Alaska) is increasing. More summering habitat yet may become available and the population increase may be sustained for some unknown period of time. Past or future limiting factors are not readily apparent although there is continual loss of wintering habitat. Of note is this measured increase in spite of large losses to lead poisoning on the wintering grounds of southwestern British Columbia and northwestern Washington. Additional analyses of these data currently underway and population modeling for survival rates may increase our understanding.

A factor which may be slowing and could ultimately reverse the present trend is the exclusion of swans from good habitat by human appropriation and disturbance, especially on the rapidly urbanizing wintering grounds in the Pacific Northwest. This obviously has happened to some of the swan habitat on the breeding grounds in the Cook Inlet (unit 5) area. There, swans are being displaced from good lake and pond habitat because of recreational use (Timm and Wojeck 1978). Despite this displacement, prior to 1985 (and perhaps in 2005) the population increased due to the ability of Trumpeters to utilize beaver ponds and marshy areas not yet selected by people. Since 1985, the population failed to follow the population growth curve evident in most other similar units until 2005. Perhaps we are seeing evidence of Trumpeters to better accommodate human disturbance. As the human population in Alaska also increases and becomes more mobile, the loss of swan habitat will accelerate. A rapidly expanding tourist industry presents an additional challenge for effective swan conservation in Alaska. A comprehensive Trumpeter Swan management plan is still needed for Alaska summering habitat as well as for the Pacific wintering grounds. Trumpeters should be allowed to flourish and remain an integral part of the avifauna of each geographical unit of their present distribution throughout their range for their intrinsic value and the benefit of people.

Although the amount of area censussed within the Trumpeter summer range in Alaska continues to increase (number of maps surveyed: 1968 - 177; 1975 - 278; 1980 - 306; 1985 - 425; 1990 - 625; 1995 - 674; 2000 – 733, 2005 - 780), that factor is not the primary reason for the increase in the numbers of swans recorded. Personnel conducting state-wide swan surveys have over the years been involved with other detailed waterfowl surveys and hence knew where any significant expansion of the summer swan population was occurring. The main factors responsible for the population increases were the increase in density on the previously censussed high quality habitat (Gulkana and Lower Tanana units) as well as the expansion of swan range into peripheral habitat (Upper Tanana, Kuskokwim and Yukon Flats units). Although the rate of increase was surprising, the pattern of expansion of habitat use was expected. It resulted from a rapidly increasing population (Figures 2, 3 and 4), the consequence of a number of recent years of good production.

Alaska hosts nesting populations of both Trumpeter and Tundra Swans (Cygnus columbianus) during the summer. The Trumpeter Swan census in Alaska is geographically based on general habitat type. All swans sighted during the census are plotted. Species are not differentiated from the air. In Alaska Trumpeters mostly summer in the south coastal and interior boreal forest and taiga habitat while Tundra Swans summer mainly on the western and northern coastal tundra. There is some overlap of these habitats and the range of both species. There are an unknown but probably small number of Trumpeters outside the Trumpeter census area and some Tundra Swans within it. Populations of both Trumpeter and Tundra Swans are growing and the amount of overlap is probably increasing. This census probably does not miss many Trumpeters but does include some Tundra Swans. Limited observations from the ground and helicopters have suggested that only the Koyukuk (unit 8) contains substantial numbers of Tundra Swans during the survey periods. More ground and/or helicopter studies are needed to determine the percent of Tundra Swans included and Trumpeters omitted in this and other units.

The census is an exhaustive attempt to find and plot on maps all swans present, but an unknown proportion was missed. Although swans are easily seen from the air, poor light, pilot and observer fatigue, poor weather conditions, dense vegetative cover, and other factors can cause swans to be

missed. The increased use of onboard computers increased the amount of time observers were able to look for swans and reduced survey fatigue. It is believed that the proportion missed is less than 10 percent of the total present. Repetitive air surveys, perhaps using a helicopter and/or ground study, could help evaluate the number of swans missed on a single fixed-wing air survey. An indication of potential under counting was obtained this year with the accidental double survey of one 1:63,360 scale map. Two surveys of this map occurred within one day of each other. One survey crew found 95 white and 30 cygnets while the other crew tallied 130 white and 42 cygnets. It is unknown, however, whether the difference was due to visibility bias or to movement of birds into or out of the area.

The custom computer program developed by John Hodges allowed more survey crews to enter observations directly into onboard computers. Simultaneously an accompanying global positioning system of navigation automatically recorded the aircraft flight track. These crews accomplished more than half of the flying in this year's census. It increased the efficiency, accuracy and ease of gathering vast amounts of geographically based swan observations.

Aircraft type and survey timing can affect the results of aerial surveys for swans (Spindler et al. 2000). They found that some detection rates varied with aircraft type and that during month long surveys swans exhibit increased flocking behavior. More studies are needed in other areas to better evaluate the complete census results. All eight censuses to date have been conducted in a similar sequence from year to year. Many different aircraft were used in the first attempt in 1968 and in the last four in 1990, 1995, 2000 and 2005. However, it is our belief that the population growth rate is not due to improved equipment or coverage.

Despite these concerns, it is practical to monitor Trumpeter Swan populations in Alaska with this census method. All swan data collected using the survey protocol is easily archived in the Alaska Swan Data Base and is directly comparable to data from previous surveys. The completeness of the georeferenced census data allows us to produce accurate swan distribution maps for any area within the Trumpeter's Alaska summer range. This has proven invaluable to wildlife managers and land-use planners evaluating potential impacts of human development and disturbance on waterfowl habitat in a large portion of Alaska.

We hope those wishing to continue or start collecting standardized Trumpeter population data will contribute to the digital storage system. A detailed data-collecting protocol has been developed (Appendix IV) and is also available upon request. A continued complete census every five years is recommended, at least until the Alaska summering population stabilizes, in order to maintain the continuity of this impressive data set for the better management of this magnificent international resource.

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(NWR) division of the USFWS and the U. S. National Park Service (USNPS). A private air charter service was utilized in one area where there were lower densities of swan numbers. Dedicated pilots and observers in the following organizations made completion of this census possible. These include: USFWS - WM/Anchorage, WM/Fairbanks, WM/Juneau, Koyukuk NWR, Kanuti NWR, Tetlin NWR, Yukon Flats NWR, Arctic NWR, MBMO/Mare Island, CA, MBMO/Laurel, MD, USNPS, U. S. Forest Service (USFS) Yakutat Ranger Districts. Logistic support was provided by the Koyukuk NWR of the USFWS, Gulkana Management Office of Bureau of Land Management (BLM) and USFS - Cordova Ranger District. Funding support was provided by Denali National Park and the Anchorage Field office of the BLM. Bruce Conant, Deborah Groves and Ed Mallek organized and coordinated the census. Deborah Groves served as a primary observer on one survey crew and post-processed all of the survey data. John I. Hodges developed the original transcribing and digitizing programs for paper map data as well as the new moving map/data entry program used in the aircraft. This census would not have been possible without the enthusiastic support of these individuals in the Alaska Regional Office of the USFWS: Rowan Gould-Regional Director, Doug Alcorn-Assistant Regional Director/Migratory Birds and State Programs, Russ Oates-Chief/WM, Robert Leedy-Chief Migratory Bird Management/Migratory Bird Coordinator and Todd Logan-Regional Chief National Wildlife Refuge System.

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