

The 1980 census of Trumpeter Swans on Alaskan nesting habitats

*Report on a project to establish
a complete population data base
in this productive and sensitive area*

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NESTING TRUMPETER SWANS (*Olor buccinator*) in Alaska are distributed along the north Pacific coastal plain from Yakutat to Cook Islet and through the forested valleys of the Copper, Susitna and Yukon Rivers to near the Arctic Circle at elevations below 900 m. In large portions of this region there are high mountains and ice fields. Banko (1960), Hansen *et al.* (1971) and King (1980) have described this habitat.

Old records of Trumpeter Swans in Alaska go back to 1878 (Banko 1960). Attempts to evaluate the status of Alaskan Trumpeter Swans began after the investigation of a nesting population

in the Bremner and Tasnuna valleys in the Copper River Canyon in 1954 (Monson 1956). By 1959 the principal nesting areas were identified and an autumn aerial survey tallied 1124 birds. In 1968 an improved census method was designed that recorded the location of every swan sighted and the track of the aircraft. The 1968 census, although still incomplete, disclosed 2847 birds (Hansen *et al.*, 1971). The Trumpeter Swan was removed from the endangered species list as a result of this count.

Censuses in 1975 and 1980 were more complete and were directly comparable to the 1968 record, as the location of every previous sighting could be

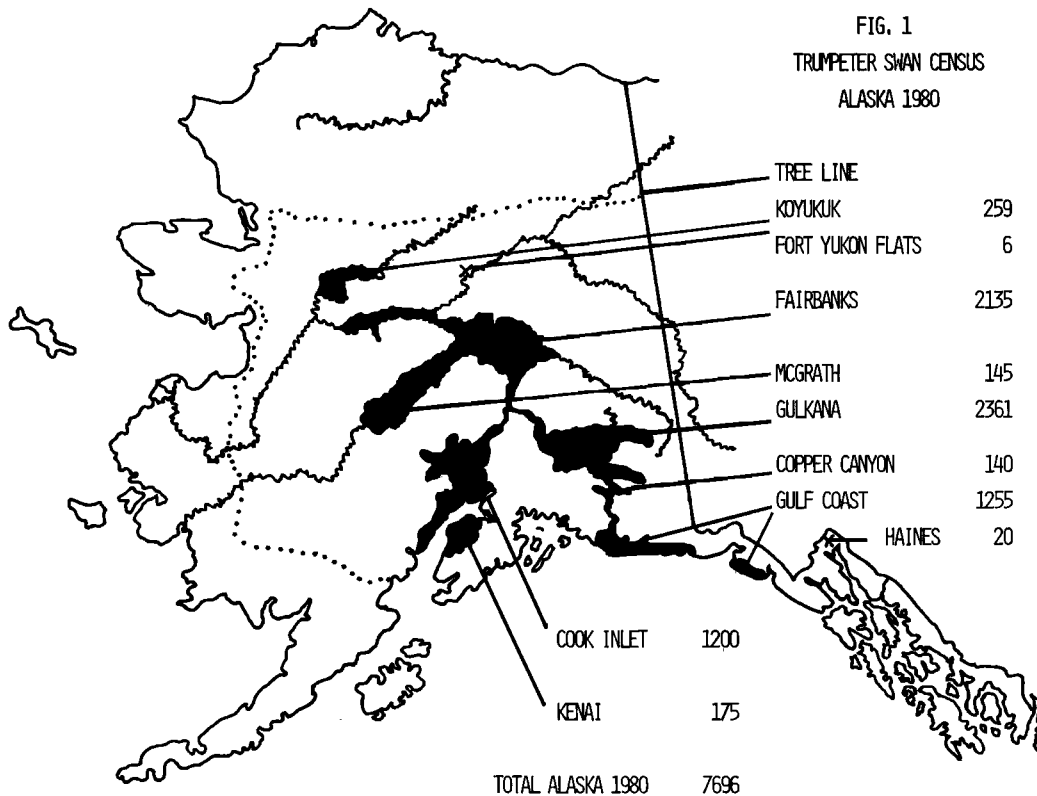
rechecked. The 1980 census disclosed 7696 Trumpeters on the breeding grounds in Alaska. In Canada and states other than Alaska surveys in summer 1980 recorded 1032 birds including populations reestablished at four national wildlife refuges (Weaver 1981). This indicated a world population of at least 8728 Trumpeter Swans of which 88% were found in Alaska. Observers suggested that less than 10% of the total swans were unseen in these counts.

The objective of our survey was to monitor the status of the Alaska Trumpeters. Although increasing in recent years the Trumpeter Swan is still the rarest swan and among the rarest of



Trumpeter Swans, adults and cygnets on nest. Photo/Harry Engels from Photo Researchers.

FIG. 1
TRUMPETER SWAN CENSUS
ALASKA 1980



large wildlife species in North America. Future censuses are planned at 5-year intervals. As large projects proliferate in Alaska perhaps regular monitoring and timely conservation measures can prevent the return of the Trumpeter Swan to the endangered species list.

METHODS

FOR CENSUS PURPOSES the Trumpeter nesting range was divided into ten units (Fig. 1), two of which had tiny populations with a possible potential for expansion, three of which were perhaps occupied to their full potential and five of which showed rapidly expanding populations (Table 1). For convenience a brief description of each area is included in the section on results.

The 1980 census was conducted August 2-September 14 and was completed (we believe) before any young had fledged. A turbine Beaver aircraft was used for the bulk of the survey but a Cessna 185 was needed for two weeks in early September to complete the count, which had been slowed somewhat by poor weather. The Beaver flew 212 hours and the Cessna 46 hours for a total of 258 flying hours.

Data had been recorded on U.S. Geological Survey maps. In 1980, 28 maps were added, mostly in the Fair-

banks unit, where some expansion of the swan range in the upper Tanana Valley had occurred. A total of 7,628,458 hectares (29,453 square miles) of swan habitat was delineated on 306 of these maps. The track of the airplane was marked on each map and later measured. A distance of 38,452 km was actually flown over the habitat. The exact location of each single swan, pair, brood or flock of three or more birds was marked on the maps resulting in swan observations at 2039 locations. All swans sighted in 1968 and 1975 were marked on maps prior to the survey and these sites were rechecked in 1980.

No comparable data were available to determine what per cent of swans was missed in this type of aerial count. Our goal was to find all swans. Places in which swans could have been concealed were circled in planes, until the observers were confident that any present had been detected. Whole families of swans were occasionally observed disappearing into heavy lakeside vegetation; one must conclude that some birds were missed.

RESULTS

WEATHER AND OTHER factors, vary from year to year affecting the number of young and flocked birds in the population. We believe that the best

indicator of population trends was the number of birds seen as adult pairs secluded on what appeared to be nesting territories.

A comparison of pairs within the portions of the 1968 and 1975 counts done both years indicated an annual increase of 3.1 per cent. We therefore expected a population count of slightly under 5000 in 1980 (King 1980). Our 1980 total of 7969 swans suggests, when adjusted for comparability, that the paired bird increase during the 5-year period was closer to 9.6 per cent. The danger inherent in speculation based on limited data is well illustrated.

Table 1 shows a comparison of swan observations from the 1968, 1975 and 1980 censuses. The total and per cent composition are given for observations of 14,713 swans. These figures erroneously indicate a long-term 31% of the fall population as young of the year. Production seems to have been good in 1968 and 1980 and only slightly lower in 1975. In essence we are showing the population structure displayed by 3 samples in 3 very favorable years. We know that in years with a very late spring, broods are scarce and hard to find. Any realistic prediction of the long-term trend is therefore impossible with data from only 3 favorable years. Examination of the data area by area does allow us to draw some conclusions.

Gulf Coast—1255 swans

There are 502,987 hectares of habitat in this unit. Surveys were virtually identical in all 3 years. No obvious man-caused developments or changes have occurred in the habitat. The land was uplifted in a 1964 earthquake and some erosion and wetland drainage is occurring as streams seek new levels. Willows (*Salix* spp.) and alders (*Alnus* spp.) are pioneering into these recently drained areas and beaver (*Castor canadensis*) are following, creating new ponds. There is no indication of a major loss or gain of habitat but only some adjustment.

There has been some increase in adult birds since 1975 but production was essentially the same in 1980 as it was in 1968. The breeding territories may be saturated here, with surplus birds moving elsewhere as they reach breeding age.

Copper Canyon—140 swans

This is a small area of 12,691 hectares that appears to have been saturated since at least 1959 when 147 birds were tallied (Hansen *et al.*).

Gulkana Basin—2361 swans

The 1980 survey on this 1,320,146-hectare area was nearly identical with the two earlier ones. Habitat changes include a moderate increase in recreational cabins in the Lake Louise area, a trend that has so far had only a minor effect on the swans. The installation and use of the trans-Alaska oil pipeline does not appear to have had an adverse effect on swan habitat. The attraction of more people and airplanes to the area may be the most significant pipeline impact. The swans increased 127 per cent from 5 years ago. Pairs increased 84 per cent and young 132 per cent. Flocked birds increased 307 per cent lending some credibility to our theory that there may be migration of non-breeders from the Gulf Coast. Broods were found at slightly higher elevations at the periphery of the area. In past surveys no lake in the Gulkana Basin, had more than one brood, but in 1980, 11 large lakes each had two broods. Beaver ponds are not common in this area and had insignificant value for swans. It seems doubtful that the increase of swans can continue long at the present rate. The Gulkana unit is the highest block of habitat in Alaska, ranging from 480 to 860 m above sea-level. A series of colder seasons could be more devastating to nesting swans here than at lower elevations. The double occupancy of some lakes by successful swan families and the high number of flocked birds here may indicate that new pairs are beginning to have some difficulty finding suitable unoccupied nesting territories.

Kenai—175 swans

The population on this 404,047-hectare block of habitat seemed to remain static in spite of annual production comparable to areas where swans were rapidly increasing. The presence of an oil field, refineries and major residential development on the lakes north of Kenai village seems to have removed substantial habitat from consideration by swans seeking nesting sites. Extensive recreational activity by canoeists and others has driven swans from additional nesting habitat.

Cook Inlet Basin—1200 swans

There are 1,386,192 hectares of swan habitat in this region. More than half the people of Alaska live in the lowlands of the Cook Inlet—Kenai region. Petroleum, agriculture, residential and recreational activities continue to expand in what is one of America's loveliest intermountain coastal basins. In spite of these activities Trumpeters increased 94 per cent in 5 years and young increased 104 per cent. Flocked birds again showed the greatest increase, 210 per cent, possibly indicating immigration or difficulty in finding suitable nesting territories. As the large lakes, many of them formerly occupied by swan families, become ringed with recreational cabins, swan use of them decreases. There is a noticeable shift of swans' nests to beaver dams and boggy lowland flowages that are largely inaccessible to people.

Fairbanks—2135 swans

The largest block of Trumpeter habitat, some 2,101,303 hectares, occurs in the lowlands of the Yukon and Tanana rivers near Fairbanks. Extensive use of airboats in marshland southwest of Fairbanks was the only new activity that seems to have affected swan productivity. Six-to-ten potential nesting territories may have been affected.

The population in this area increased 92 per cent. The greatest density of swans was the long-occupied Minto Lakes area. Swans seemed to be spreading east into the upper Tanana valley and west toward McGrath. Continued expansion of the population seems possible.

McGrath—145 swans

The 741,530 hectares of habitat in this unit had only 37 swans in 1975. The increase is largely in the eastern portion near the low divide separating the Tanana and Kuskokwim drainages. Emigration of birds from the more densely populated Fairbanks unit may have caused this increase. Expansion of the population in the extensive habitat of this area seems possible. Human activity remains minimal within the entire unit.

Haines—20 swans

There are only 11,914 hectares of habitat in the Chilkat valley in this unit. One pair of swans has reared young here successfully for more than a decade. It was not until 1979 that a second pair reared a brood. Three pairs were present in 1980, one with five and one with six young. A flock of three other adults remained nearby most of the summer. It is not clear why no rapid increase occurs in this area in spite of good production.

Koyukuk—259 swans

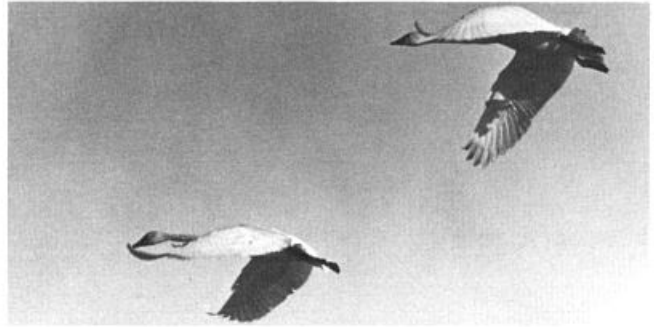
This unit with 1,050,522 hectares, like the McGrath unit, appeared to be underpopulated by swans and unaffected by man. The population was focused in the great marshes around Boat Lake. Our census was flown here on September 10-14 and we felt unproductive pairs may have been leaving their territories by this time. There was a flock of 396 adults and 51 young

swans on Boat Lake which we believed to be mostly Whistling Swans (*Olor columbianus*) from the Selawik country to the northwest. Some Trumpeters may have been mixed with them. None of the Boat Lake birds were included in our totals. The 259 Trumpeter Swans counted were distributed on what appeared to be territories and none of the 36 broods seemed capable of flying. Our figures may be below the true population for the Koyukuk.

Fort Yukon—6 swans

The 2.6 million hectares of Yukon Flats waterfowl habitat continues to harbor just one Trumpeter Swan family that has been seen repeatedly since 1969. It was on the southwest corner of the Flats near a warm spring that provides open water year 'round. We calculated eligible habitat here as 97,127 hectares. This is an arbitrary figure for an area we check regularly so that any increase in swans will be detected. In the past, a few other swans have been sighted here and we observed a brood

on one other lake in the early 1960s. Whether a larger swan population could develop here or if the area is too far north for rearing a family without the aid of the warm spring, remains to be seen. Dall and Bannister (1869) reported Trumpeter Swan eggs in possession of a man in Fort Yukon, 190 km east of our observations.



Photo/Joe Van Wormer, from Photo Researchers.

Table 1. Total swans 1968, 1975, 1980 and per cent composition.

Region	Year	Single Adults		Paired Birds		Flocked Adults		Young in Broods		Total Birds		% Change
		No.	%	No.	%	No.	%	No.	%	No.	%	
Gulf Coast	1968	29	3	442	43	191	19	363	35	1025	100	
	1975	32	4	442	52	190	22	193	23	857	101	-16
	1980	52	4	586	47	266	21	351	28	1255	100	+46
Copper Canyon	68	5	3	56	35	53	34	44	28	158	100	
	75	2	1	56	31	72	40	49	27	179	99	+13
	80	4	3	70	50	33	24	33	24	140	101	-22
Gulkana	68	31	5	288	49	81	14	190	32	590	100	
	75	43	4	556	54	155	15	284	27	1038	100	+76
	80	43	2	1026	43	632	27	660	28	2361	100	+127
Kenai	68	3	2	86	48	27	15	65	36	181	101	
	75	5	3	72	50	29	20	39	27	145	100	-20
	80	12	7	90	51	8	6	65	37	175	101	+21
Cook Inlet	68	19	5	224	54	50	12	124	30	417	101	
	75	36	6	340	55	60	10	181	29	617	100	+48
	80	37	3	608	51	186	15	369	31	1200	100	+94
Fairbanks	68	21	4	224	47	94	20	137	29	476	100	
	75	21	2	518	47	185	17	388	35	1112	101	+134
	80	17	1	752	35	589	28	777	36	2135	100	+92
McGrath	68	---	---	---	---	---	---	---	---	---	---	
	75	6	16	20	54	4	11	7	19	37	100	
	80	0		60	41	22	15	63	43	145	99	+292
Koyukuk	68	---	---	---	---	---	---	---	---	---	---	
	75	6	3	94	52	45	25	35	19	180	99	
	80	4	2	124	48	27	10	104	40	259	100	+44
Fort Yukon	68	---	---	---	---	---	---	---	---	---	---	
	75	0		2	67	0		1	33	3	100	
	80	0		2	33	0		4	67	6	100	+100
Haines	68	---	---	---	---	---	---	---	---	---	---	
	75	0		2	100	0		0		2	100	
	80	0		6	30	3	15	11	55	20	100	+1000
Totals	1968	108	4	1320	46	496	17	923	32	2847	99	
	1975	151	4	2102	50	740	18	1177	28	4170	100	+46
	1980	169	2	3324	43	1766	23	2437	32	7696	100	+85
Total all years		428	3	6746	46	3002	20	4537	31	14713	100	

DISCUSSION

THE MAGNITUDE OF the increase in Trumpeter Swans occupying the Alaskan breeding habitat was a surprise even to those of us who regularly frequent the region. The density of successful families had increased beyond what we formerly thought was possible and habitats we thought unusable are producing swans. The birds were adjusting somewhat to encroachments and disturbance by man by moving to smaller water bodies. We no longer feel as confident about predicting the future of these great birds as we once did. Even so, some patterns are beginning to appear and some conclusions are possible.

Weather has been favorable for swan production since 1968 and particularly since 1975. Trumpeters start laying eggs early in May before snow and ice are gone from most of their nesting habitat. Some years snow and ice persists into late May and swans, unable to build nests, resorb their unruptured follicles, resulting in reduced clutches or no eggs. Late seasons sometimes occur in series, as was the case in the early 1960s, resulting in an extended period of low waterfowl production. Late seasons would be particularly devastating to birds pioneering higher elevations where air temperatures are lower. Rapid expansion has occurred near what appears to be a northern limit of Trumpeter distribution. A period of late springs could slow or reverse the present population trend.

We do not know why Trumpeters are pioneering sparsely occupied territory, especially west of Fairbanks in the Koyukuk and McGrath areas. Did some catastrophe remove them from these areas? Did some genetic change occur in a much reduced population elsewhere that is enabling them now to expand into areas and habitats where formerly they could not succeed? Has some subtle climatic change occurred that favors Trumpeter production? Garfinkel and Brubaker (1980) report that summer temperatures in Interior Alaska have been about 2.1°C. warmer in the 20th

century than in the 19th, as indicated by tree ring analysis.

In the Cook Inlet area particularly, we are seeing swans rapidly excluded by recreational developments from large lakes they formerly used for nesting (Timm and Wojciet 1978). Here they are making extensive use of beaver ponds. Beavers were thought to be nearly extinct in Alaska in the early decades of this century (Brooks 1953) but have made a very strong comeback since World War II. Could swan success be closely linked with beaver abundance in some areas? Could a decline in beavers result in a subsequent decline in swans?

Perhaps the limiting factor for Alaskan swans occurs on the wintering grounds in Canada and Washington. Alaskan wintering habitat is limited to a few areas from Cook Inlet southeast along the coast and shows no indication of accommodating any major increase in spite of increases in the nesting population.

Public interest in Trumpeters is increasing. Illegal swan killing seems to be decreasing in the Trumpeter areas even by subsistence hunters, who may have affected their numbers in the past. Perhaps the most valuable result of this interest is the State of Alaska's program to protect some swan habitat on state lands in the Cook Inlet area. Possibly an effort now to protect some of the known nesting sites in each of the broad habitat units would ensure perpetuation of some swans in each unit of their Alaskan nesting range.

Basic research is needed to determine why Trumpeter Swans are currently doing well in Alaska in spite of increasing human activity. Continued monitoring of the population will be necessary.

Land ownership patterns for Alaska are still developing, as a result of state and native selections from the public domain. Although some Trumpeter habitat is in the national refuge, park, and forest systems, two-thirds or more of it will not be so protected. No single agency will have control of the Trumpeters' destiny. A continuing cooperative conservation effort by federal, state and private land managers will be required to ensure

that Trumpeters are never returned to the Endangered Species list because of habitat destruction or excessive disturbance in Alaska.

ACKNOWLEDGEMENTS

WE ARE INDEBTED to Rodney King and Scott Schliebe who were called in with an extra airplane to help complete the survey. Jerry Lawhorn and his aircraft maintenance crew at the Interior Department Aircraft Service hanger worked wonders in keeping the airplanes going for a long mission. Jan Riffe and Wilbur Ladd expedited support from the Alaska Area Office of the U.S. Fish and Wildlife Service. Dirk Derksen was helpful with manuscript review.

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