

The Status and Distribution of Trumpeter Swans (*Cygnus buccinator*) in the Yukon

RICHARD W. McKELVEY¹, MALCOLM C. DENNINGTON² and DAVID MOSSOP³

ABSTRACT. The presence of a breeding population of Trumpeter Swans (*Cygnus buccinator*) in the Yukon is established from previous summer records of swans and by data from extensive aerial surveys. The population is estimated to number about 50 pairs, with at least 32 pairs found near Toobally Lakes in southeast Yukon Territory. Habitat, nesting, population, and migration data are presented for the Toobally Lakes population. The habitat is characterized by rolling hills interspersed with water bodies from 5 ha to 250 ha in area, frequently influenced by beaver. Nesting and cygnet development appeared to be later than those reported for Alaska or Alberta. Cygnet production was 19 young by August 1980 and 26 young by July 1981. Band returns indicate that part of the Yukon population winters in Montana. Recommendations for habitat protection are made.

Key words: Trumpeter Swans, *Cygnus buccinator*, Yukon, breeding, distribution, migration, habitat

RÉSUMÉ. La présence d'une population nidificatrice de cygne trompette (*Cygnus buccinator*) au Yukon est confirmée par la révision de toutes les mentions estivales de cygnes et par la présentation de résultats d'inventaires aériens intensifiés. La population de cygne est estimée à environ 50 couples, avec au moins 32 couples près des lacs Toobally. L'habitat est caractérisé par des collines parsemées de lacs de 5 ha à 250 ha, souvent modifiés par les castors. La nidification et le développement des jeunes semble être plus tard que ceux d'Alaska ou d'Alberta. Nous avons recensé 19 jeunes en août 1980 et 26 jeunes en juillet 1981. Le retour de bague indiquent qu'une partie de la population du Yukon hiverne au Montana. Des recommandations pour la protection de cette population sont présentées.

Mots clés: Cygne trompette, *Cygnus buccinator*, Yukon, nidification, distribution, migration, habitat

Traduit par J.P. Savard.

INTRODUCTION

Although the world population of Trumpeter Swans (*Cygnus buccinator*) is thought to number about 10 000 birds, (King and Conant, 1981) the numbers breeding in Canada are small. The known population consists primarily of about 40 pairs in the Grande Prairie region of Alberta and several smaller groups in British Columbia, other parts of Alberta, and Saskatchewan. In Canada the Trumpeter Swan is considered a rare breeding bird (Mackay, 1978).

Trumpeter Swans and Whistling Swans (*Cygnus columbianus*) are seen regularly in the southern Yukon during spring migration (Mossop, 1976; Canadian Wildlife Service, 1979) and in smaller concentrations during fall migration. Concentrations of mixed flocks of swans have been recorded, resting on the first available patches of open water, which are usually the ice-free outlets of the larger lakes between Kluane Lake and Frances Lake (Fig. 1). Most swans have moved on by mid-to late May, but their breeding-ground destinations have been largely speculative. Whistling Swans have been presumed to move farther north to the tundra, and it has seemed probable that Trumpeter Swans remained below the treeline, as they do in Alaska (Hanson *et al.*, 1971). Summer records of swans in the forested portion of the southern Yukon have therefore been of interest because of the probability that such sightings would be of Trumpeter Swans from an as-yet-undocumented Canadian breeding population.

No official records of swans remaining in the southern Yukon during the summer were kept prior to 1970. Since then, however, systematic efforts have been made to record swan observations in the summer, identify the species and actively search out summer residents. Extensive aerial surveys in 1978 and 1979 revealed a concentration of swans breeding near Toobally Lakes (Fig. 1); these were later confirmed to be Trumpeter Swans. In 1980 and 1981 more intensive investi-

gations were made in that area to describe the habitat, assess productivity, and band swans to determine migration routes and wintering localities. This report contains a review of all known sightings of swans during the summer in the southern Yukon and presents the results of the studies of Trumpeter Swans near Toobally Lakes.

METHODS

Records of swans migrating through and spending the summer in the Yukon have come from a number of sources. Records prior to 1977 came primarily from the Yukon Wildlife Branch, the Canadian Wildlife Service, and consultants working on the proposed Alaska Highway gas pipeline project (Foothills Pipe Lines (Yukon) Ltd., 1976).

During the summers of 1978, 1979, and 1981 aerial surveys were conducted by the Canadian Wildlife Service over extensive areas of the southern Yukon, in watersheds of the Big Salmon, Little Salmon, Mugundy, upper Pelly, Ross and Liard rivers. Surveys were conducted using a float-equipped Cessna 185 flown at an altitude of approximately 300 m above the ground. Predetermined routes were flown over as many wetlands as logistics allowed, in areas where swans had been reported previously (See RESULTS AND DISCUSSION). Details of the survey routes are on file in the Vancouver and Whitehorse offices of the Canadian Wildlife Service.

Intensive investigations were conducted in an area within a radius of approximately 80 km, centered on Toobally Lakes. Four aerial surveys were conducted in 1980 and three in 1981, using various types of aircraft (Table 1). The locations of pairs, broods, nests, lone birds or birds in groups were recorded, and where possible, nest sites were visited to obtain habitat descriptions. Dates of freeze-up and ice-out at Watson Lake, the nearest recording station, were obtained from the Ministry of Transport and B.C.-Yukon Air Service in Watson Lake. In

¹Canadian Wildlife Service, Box 340, Delta, British Columbia, Canada V4K 3Y3

²Canadian Wildlife Service, 202 - 212 Range Road, Whitehorse, Yukon, Canada Y1A 3V1

³Department of Renewable Resources, Yukon Territorial Government, P.O. Box 2703, Whitehorse, Yukon, Canada Y1A 2C6

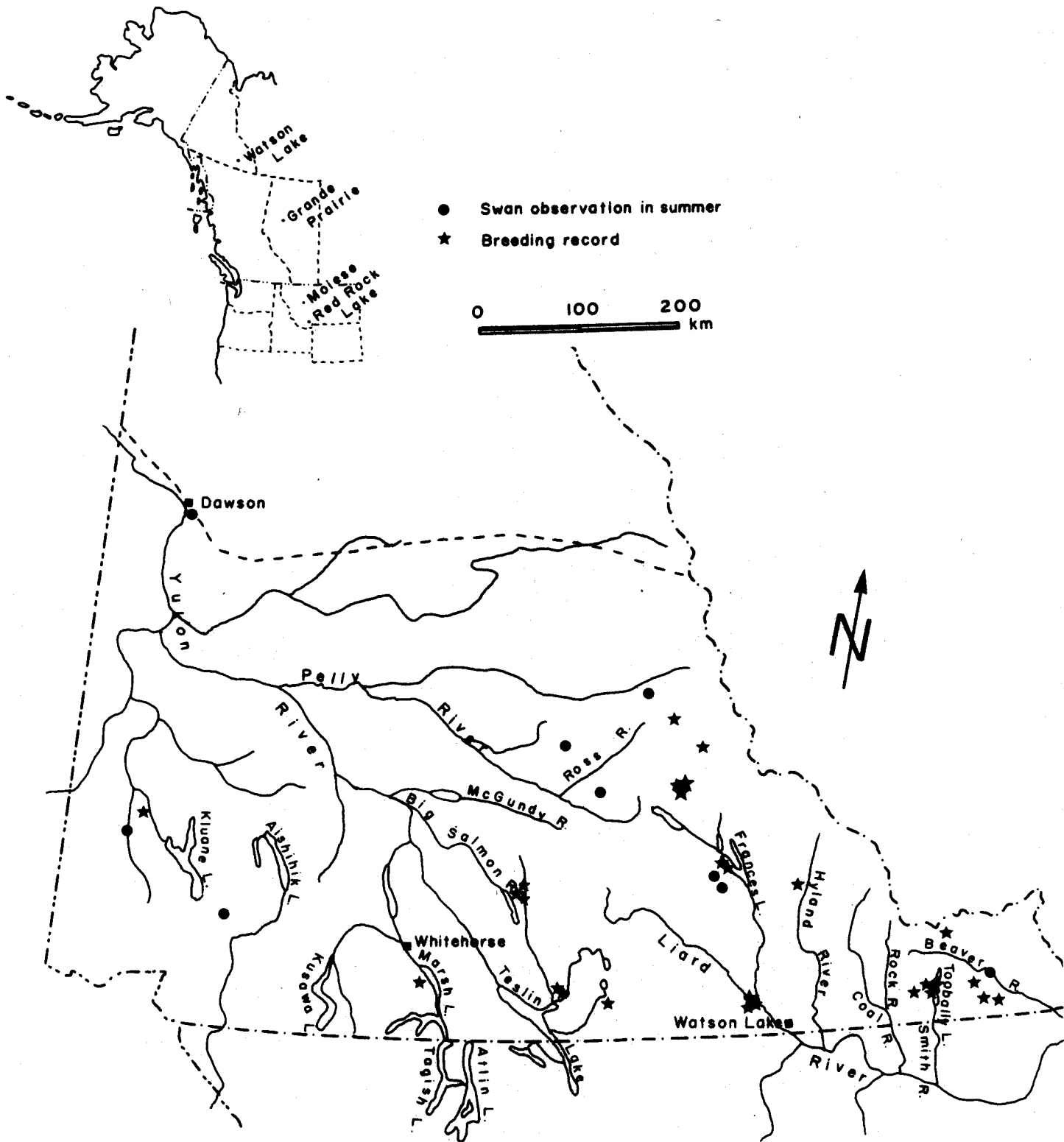


FIG.1. Distribution of swan observations in the Yukon Territory, 1970-1981, and locations of places mentioned in the text. The dotted line represents the theoretical northern limit of the Trumpeter Swans' breeding range, after Hansen *et al.* (1971).

August 1980 a brood of two cygnets and an adult female were banded with standard metal leg bands and fitted with plastic neck collars and tarsal bands. Neck collars and plastic tarsal bands were orange with matching black four-character alphanumeric codes.

TABLE 1. Details of swan surveys in the Toobally Lakes area

Date	Survey Objective	Aircraft Type
6-8 June 1980	Pair and nest counts	Fixed wing
16-18 July 1980	Brood counts, habitat data	Helicopter
16-22 August 1980	Brood counts, banding	Helicopter
8-10 October 1980	Brood survival, post-breeding aggregations	Fixed wing
8 May 1981	Liard River reconnaissance, spring staging	Fixed wing
11-12 June 1981	Pair and nest counts, habitat data	Fixed wing
14-16 July 1981	Brood counts, fall staging	Helicopter
6-7 October 1981	Brood survival, fall staging	Fixed wing

RESULTS AND DISCUSSION

Distribution

All records prior to 1978 of swans summering in the southern Yukon are shown in Table 2, and the distribution of the observations is shown in Figure 1. All the swans identified were found to be Trumpeter Swans, many with young-of-the-year. All sightings were in the Boreal forest in habitat characteristic of Trumpeter Swan habitat in Alaska (Hansen *et al.*, 1971). It seems likely that most other unidentified sightings were also of Trumpeter Swans, especially those with young birds. We are aware of only a few incidental records of Whistling Swans breeding below the tree line (W. Campbell, pers. comm. 1980), and Hansen *et al.* (1971) considered range overlaps to be the result of Trumpeter Swans infringing on Whistling Swan habitat.

Although records go back only to 1970, Trumpeter Swans were probably present in the Yukon long before that. The earliest reference to local knowledge seems to have been by Clarke (1945). He was told that swans were occasionally found on small lakes in the southwestern Yukon, and he speculated that such reports might refer to Trumpeter Swans. Soper (1954) similarly reported receiving an account of swans summering on a small lake, northeast of Kluane Lake, known locally as Swan Lake.

The records of swans seen during extensive aerial surveys in 1978, 1979 and 1981 are shown in Table 3 and their distribution in Figure 1. Identification of the swans present on those surveys was generally impossible because most lakes were too small to land on with fixed-wing aircraft. Identification criteria visible from the air, such as the nest characteristics described by Hansen *et al.* (1971), could not be used because nest site locations in this study were very different from those found in Alaska. However, based on identification of Trumpeter Swans at Toobally Lakes, the fact that all observations were within the Boreal forest, and the general absence of Whistling Swans

TABLE 2. Observations of swans in the Yukon during summer (June - August) prior to 1978

Area	Number	Date
Koidern River	2ad ¹ with young*	July 1970
Campbell Hwy.	2ad with young*	Summer 1974
McKinnon Lake	2ad with young*	Summer 1974
Rose Lake	2ad with young*	Summer 1974
Teenah Lake	2ad with young*	Summer 1974
Rose Lake	2ad 4j ⁱ **	Summer 1975
Dawson City	1ad**	Summer 1975
MacMillan River	1ad	June 1975
Campbell Hwy.	2ad with young**	July 1975
Francis River	2ad 2j	July 1975
Rose Lake	2ad 4j	August 1975
McEvoy Lake	2ad on nest	May 1976
Teenah Lake	2ad 2j**	June, August 1976
Fish Lake	2ad 2j	July 1976
Morley Lake	2ad 2j**	August 1976
Dodo Lakes	2ad**	Summer 1976
Dodo Lakes	2ad 2j**	Summer 1976
Hyland River	2ad 2j**	Summer 1976
Toobally Lakes	6ad 4j**	July 1976
Pickhandle Lakes	2ad**	Summer 1977
Alaska Hwy. at Donjek River	4ad**	Summer 1977
Pickhandle Lakes	1ad**	Summer 1977
Dodo Lakes	2ad 3j	Summer 1977
Dodo Lakes	2ad	Summer 1977
Lootz Lake	several ad	Summer 1977

¹ad = adults; j = young-of-the-year

* young birds not enumerated

**positively identified as Trumpeter Swans

from the Boreal forest, most sightings and all breeding records are believed to be of Trumpeter Swans.

Toobally Lakes Population

Habitat. The Toobally Lakes lie in the Beaver River and the Liard River Ecoregions of Oswald and Senyk (1977). The physiography of the area is characterized by rolling hills and plateaus rising from about 600 m to 1350 m above sea level. Most of the area has been glaciated on several occasions and glacial deposits such as eskers, kettles and terraces are common. The major drainages include the Coal, Rock, Smith and Beaver rivers (Fig. 1).

The climate is generally cool and wet. Precipitation varies from 400 to 500 mm, the mean annual temperature is approximately -3° C and the monthly mean temperature ranges from -23° C in January to 11° C in July (Burns, 1974). The area lies within the discontinuous permafrost subzone of Brown (1973).

The climax terrestrial vegetation on nearly all areas below the subalpine consists of white and black spruce (*Picea glauca* (Moench) Voss and *P. mariana* (Mill.) B.S.P.) with a moss or moss-shrub understory. Lodgepole pine (*Pinus contorta* Loud. var *latifolia* Engelm.) is prevalent on plateaus and hills as a result of fire, and aspen (*Populus tremuloides* Michx.) is common on south-facing slopes. Balsam poplar (*Populus balsamifera* L.) occurs along river terraces while larch (*Larix*

TABLE 3. Locations of sightings and numbers of swans observed during aerial surveys, 1978, 1979 and 1981

Area	Numbers and Comments	Dates
Dodo Lakes	1ad ¹ , 1 pair, 1 probable nest	August 1978
Lootz Lakes area*	2 lone ad, 3 pairs, 1 nest site	August 1978
Siwash Cr. area	2ad 2j ¹ , 2ad 1j, 2 pairs	August 1978
Toobally Lakes	5ad, 2 pairs	August 1978
	11 ad	Sept. 1978
Upper Crow River area of 3ad	2ad 2j, 1 pair, 2 groups	August 1978
	2ad	Sept. 1978
Upper Grayling River area	13ad	Sept. 1978
Larson Lake	1 pair	August 1978
Jackpine-Balsam lakes area	2ad 3j, 10ad, 4 pairs, 1 lone ad	August 1978
Big Salmon Lake area	1 pair	August 1978
Weasel Lake area	1ad	August 1979
McEvoy Lake area	2ad 1j	August 1979
Woodside River area	1 pair, 4ad	August 1979
Summit/Pelly River	1ad	August 1979
Teddy Lake area	1 pair	August 1979
Larsen Cr./Beaver River	1 pair	June 1981
Stonemarten Lake	1 pair	June 1981
West of Stonemarten Lake	1 pair	June 1981
McEvoy Lake area	2 pairs nesting	June 1981
Tuchita River	1 pair	June 1981
North of Simpson Lake	1 pair	June 1981

¹ad = adult; j = young-of-the-year

*area = small unnamed wetland in the vicinity of named area

laricina (DuRoi) Koch) is more common on mineral soils in lichen-forest areas near Jackpine Lake (60°14'N, 125°48'W).

Water bodies in the study area appeared to be of three main types: deep, elongated lakes resulting from glacial scouring (Toobally Lakes); perch basins associated with moraines and terraces; and meandering outflow streams in valley bottoms with connections to adjacent impoundments or to perch basins on moraines. Beaver activity has been an important influence in the development of ponds associated with the latter. Swans were seen in flocks on the large lakes, such as Toobally Lakes, but did not nest on those lakes; nesting occurred both in perch basins and in beaver-affected outflow streams.

Morphology and aquatic vegetation varied among the ponds used for nesting. They ranged in area from 5 ha to >250 ha; larger bodies of water were usually forested to their edges but also had some degree of marsh development at one end. Some of the smaller ponds were forested to their edges while some were surrounded by shrubby vegetation, but in all cases they supported some emergent vegetation, either close to shore or towards their centres.

The dominant emergent plants in lakes with swan nests were sedges (*Carex rostrata* Stokes and *C. aquatilis* Wahlenb.). Submerged aquatics seen most often included muskgrass (*Chara* sp.), mare's tail (*Hippuris vulgaris* L.), pond lily (*Nuphar* sp.), burreed (*Sparganium* sp.), and various pond weeds, most commonly Richardson's pond weed (*Potamogeton richardsonii* (Benn.) Rybd.).

Nest Locations. The preferred location for swan nests appeared to be small islands, although a variety of structures were used, and some islands may have resulted from nest construction over the years. In the two years of the study at Toobally Lakes 16 different nests were located, 11 on islands, four on beaver lodges or dams, and one on the shore. Only one was of the "moat" type described by Hansen *et al.* (1971).

Spring breakup at Watson Lake occurs about 4 May (± 10 days, $n=23$ yr) and probably occurs at approximately the same time at Toobally Lakes. Nesting presumably begins about that time. Swans were seen in pairs on open water on south Toobally Lake 8 May 1981, and were reported on the Liard River and Crooked Lake (56°N, 126°20'W) at about the same time (M. Wyborn and R. Puttonen, pers. comm. 1981). On 19 May 1982, while near the Toobally Lakes study area, RWM observed a swan on a nest in the Egnell Lakes area (59°53'N, 127°43'W); the marsh used for nesting was ice-free but ice still remained on the lake. Based on an aerial assessment of cygnet feather development, and size descriptions in Hansen *et al.* (1971), we estimate that the hatching date of most broods in this study was approximately the first week of July. This date is somewhat later than those reported from Alaska (Hansen *et al.*, 1971) and is two to four weeks later than hatching dates observed in Grande Prairie (G. Holten, pers. comm. 1980).

Freeze-up occurs on average at Watson Lake on about 12 November (± 6 days, $n=27$ yr). Freeze-up may occur in mid- to late October on the smaller lakes used for nesting but probably does not take place until mid-November on Toobally Lakes. The time period needed after hatching for cygnets to reach fledging size has been estimated by Hansen *et al.* (1971) to be 14 wk, and by Banko (1960) to be 100-120 days. Though the average freeze-up dates in the study area should provide time enough for fledging to occur, for some broods studied in 1980 it appeared to be barely enough. Thus in some years fledgling production may be lowered if there is an early fall. Young birds just able to fly but not yet strong enough to migrate might be able to finish developing on Toobally Lakes, after the smaller breeding lakes have frozen.

Productivity. Aspects of the swan population structure observed in the Toobally Lakes study area are shown in Table

TABLE 4. Structure of the swan population in the Toobally Lakes study area in 1980 and 1981

	Date	
	1980	1981
Pairs	25	32
Nests located	14	12
Broods raised	6	10
Mean brood size (range)	3.2(2-5)	2.6(2-4)
Productivity (cyg/adult paired in June) ¹	0.38	0.41
Single swans	1	1
Swans in flocks	15	3
Total (ad/cyg) ²	66/19	68/26

¹cyg = young-of-the-year; adult paired in June = birds seen in pairs; may include paired subadults

²ad = adults + subadults

4. Productivity here is defined as the ratio of cygnets to paired adults, where adults include potentially non-breeding, but paired, subadults. The swans produced 0.38 cygnets per paired adult in 1980, based on surveys in August, and 0.41 cygnets per paired adult in 1981, based on surveys in July. The Alaska population had a productivity of 0.69 in 1968 (based on data in Hansen *et al.*, 1971:67), 0.55 in 1975 and 0.73 in 1980 (based on data from J. King, pers. comm. 1981). Similar calculations for the Grande Prairie Trumpeter Swans (B. Turner, pers. comm. 1981) revealed an average productivity of 0.88 over the period 1978-1980. The only population having a productivity similar to the Toobally Lakes swans was that of the Red Rock Lakes National Wildlife Refuge in Montana (E. Stroops, pers. comm. 1981). Productivity there averaged 0.39 in 1978 and 1979.

The productivity of the Toobally Lakes population may actually be depressed, owing to climate or predation; or the apparent low productivity may be the result of a young population age structure. Climatic conditions may be too severe to allow the nesting ponds to open early enough for high productivity. Late springs may cause later nesting, as we have seen, or a reduction of clutch size through the resorption of some eggs (Hansen *et al.*, 1971). However, the ice-free period at Watson Lake appears to provide enough time for cygnets to reach fledging size even with late nesting. The only predator found in the Toobally Lakes area was the bald eagle (*Haliaeetus leucocephalus*). We saw bald eagles attempt attacks on young swans on two occasions, after our presence disrupted the family bond resulting in separation of the young from the adults. Part of the remains of a cygnet (sternum and grey down) were found in 1981 below a bald eagle nest on a lake known to have had broods that disappeared in both 1980 and 1981. Bald eagles were known to nest successfully on at least three other lakes in the Toobally Lakes area that also supported nesting Trumpeter Swans in 1980 and 1981.

Migration. Circumstantial evidence had led to the hypothesis that the Toobally Lakes Trumpeter Swans migrated down the east side of the Rocky Mountains and wintered in eastern Montana with the rest of the Mid-Continental population (McKelvey and Stroops, 1978 ms). More Trumpeter Swans were known to winter in eastern Montana than could be accounted for by local populations and the Grande Prairie flock combined. The small banding program of this study supports the view that some of those "extra" swans were coming from the Yukon breeding area. Of the three birds banded in 1980, the two cygnets were sighted near Moiese, Montana, on 19 December 1980 (H. Null, pers. comm. 1981). In July 1981 the banded adult female, together with two other apparently unbanded swans, was resighted in the Toobally Lakes area, on a small lake approximately 9 km southeast of where she had been banded.

Two other sightings of marked swans have been made near Toobally Lakes. Unfortunately on both occasions only the green colour of the neck collars was discernible, not the numbers, so that the exact origin of the banded swans remains unknown. One bird was sighted on Crooked Lake on 25 April

1980 (R. Puttonen, pers. comm. 1980), and the other was seen during an aerial survey on the Smith River between the north and south Toobally Lakes on 20 August 1980. There were two possible origins of green-collared Trumpeter Swans at that time: (1) Turnbull National Wildlife Refuge, Cheney, WA; and (2) Red Rock Lakes National Wildlife Refuge, Lima, MN. One obvious disadvantage of alpha-numerically coded collars is that a sighting in conditions that prohibit reading the collar code provides little information, particularly when several banders have been assigned the same colour.

CONCLUSIONS

Based on a review of sight records, extensive aerial surveys and intensive investigations we estimate that there are at least 50 pairs of Trumpeter Swans within surveyed areas of the southern Yukon. Although this number may not effectively change the status of the Trumpeter Swan in Canada, it approximately doubles the known population. The population is distributed in the Boreal forest from the southeast corner of the Yukon to the Alaska border near Dawson City. The largest concentration (approximately 32 pairs) is centered in the southeast near Toobally Lakes.

What will happen to this population in the future is unclear. Though reasons for the apparently low productivity are obscure, if they are climate-related, production might be expected to fluctuate as the climate fluctuates (G. Shaeffer, pers. comm. 1981). Production surveys should be made periodically, as they are in Alaska (King, 1980), to monitor the dynamics of the Yukon population in relation to climate and to any forms of disturbance such as land use. The Canadian Wildlife Service recommends that the Toobally Lakes area be given special protection as a National Wildlife Area because of its importance to Trumpeter Swans breeding in Canada. Because the area is becoming increasingly attractive to sport fishermen and to mineral and hydrocarbon exploration interests, immediate action is required to protect the swan population from direct habitat loss and from disturbance. The Toobally Lakes area, while significant to Trumpeter Swans, has great potential as a recreation area.

There are many still-unsurveyed areas in the Yukon where swans may breed. A sight-record card system is maintained by the Canadian Wildlife Service in Vancouver for the collection of incidental swan observations by any travellers in those unsurveyed areas. Efforts should be made in the near future to systematically survey those areas and more accurately document the distribution of the Trumpeter Swan in the Yukon.

ACKNOWLEDGEMENTS

The assistance of V. Bartonec, Inland Waters Directorate, and G. Shaeffer, Atmospheric Environment Service, is appreciated. D. Flook, Canadian Wildlife Service, assisted with editing of the manuscript. Thanks also to the reviewers, to N. Rowe, and the many people cited for personal communication throughout the manuscript.

REFERENCES

- BANKO, W.E. 1960. The Trumpeter Swan: its history, habits and population in the United States. Washington, D.C.: U.S. Fish and Wildlife Service. North American Fauna No. 63. 214 p.

- BROWN, R.J.E. 1973. Permafrost in Canada. Toronto: University of Toronto Press. 234 p.
- BURNS, B.M. 1974. The climate of the Mackenzie Valley-Beaufort Sea. Vol. 2. Atmospheric Environment Service, Environment Canada. Climatological Studies No. 24. 239 p.
- CANADIAN WILDLIFE SERVICE. 1979. 1978 spring waterfowl survey in the southern Yukon. Unpublished ms. Canadian Wildlife Service, Vancouver, B.C. 68 p.
- CLARKE, C.H.D. 1945. Biological reconnaissance of lands adjacent to the Alaska Highway in northern British Columbia and the Yukon Territory. Ottawa: Department of Mines and Resources; Lands, Parks and Forests Branch. Available as Canadian Wildlife Service Report CWS 240. 42 p.
- FOOTHILLS PIPE LINES (YUKON) LTD. 1976. Application of Foothills Pipe Lines (Yukon) Ltd. for a certificate of public conveyance and necessity. Calgary, Alberta: Foothills Pipe Lines (Yukon) Ltd. 20 p. + 3 maps.
- HANSEN, H.A., SHEPERD, P.E.K., KING, J.G. and TROYER, W.A. 1971. The Trumpeter Swan in Alaska. The Wildlife Society. Wildlife Monograph No. 26. 83 p.
- KING, J.G. 1980. The status and future of the Alaska Trumpeter Swan population. In: Proceedings, Second International Swan Symposium, Sapporo, Japan. Gloucester, England: International Waterfowl Research Bureau, Slimbridge. 33-39.
- _____ and CONANT, B. 1981. The 1980 census of the Trumpeter Swan on Alaskan nesting habitats. American Birds 35:783-789.
- MACKAY, R.H. 1978. Status of endangered species in Canada. Trumpeter Swan. Canadian Wildlife Service contract report. 38 p.
- McKELVEY, R.W. and STROOPS, E. 1978. The Pacific Flyway Trumpeter Swan Management Plan. Unpublished MS. U.S. Fish and Wildlife Service, Lloyd 500 Building, Suite 1692, 500 N.E. Multnomah Street, Portland, OR 97232, U.S.A. 10 p.
- MOSSOP, D. 1976. Studies of waterfowl staging areas. Interim report. Unpublished ms. Yukon Game Branch, Whitehorse, Yukon. 34 p.
- OSWALD, E.J. and SENYK, J.P. 1977. Ecoregions of Yukon Territory. Victoria, B.C.: Canadian Forest Service, Pacific Forest Research Centre. 115 p.
- SOPER, J.D. 1954. Waterfowl and other ornithological investigations in the Yukon Territory, Canada, 1950. Ottawa: Canadian Wildlife Service. Wildlife Management Bulletin No. 2. 40 p.