

Disponible également en français

No. 138, August 1983

Progress Notes contain *interim* data and conclusions and are presented as a service to other wildlife biologists and agencies.

A possible migration route for Trumpeter Swans (*Cygnus buccinator*) in British Columbia
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Abstract

During the winters of 1980-81 and 1981-82, 43 Trumpeter Swans (*Cygnus buccinator*) and one Whistling Swan (*C. columbianus*) were banded and neck-collared near Powell River, BC. Those swans have been sighted since at the head of Toba Inlet, Francois Lake, and the Nautley and Middle rivers in British Columbia, and at Tagish Narrows in the Yukon. Of the 35 swans collared in 1980-81, 21 returned to Powell River in 1981-82, and several were seen on Vancouver Island at Comox. From the locations of sightings of banded birds in migration, or of banded birds wintering in the interior of British Columbia, the migration route appears to be in the interior rather than along the coast. Although climatic conditions on interior wintering areas can be harsh, those areas may be traditional staging areas and thus worthy of protection.

Introduction

A significant proportion of the world's population of Trumpeter Swans (*Cygnus buccinator*) winters in British Columbia in two distinct habitats. One is the coastal area, where they prefer the estuaries of the numerous small rivers and streams as habitat, and the other is inland water bodies that remain ice-free throughout the winter. Band returns of swans wintering in British Columbia have all been from birds breeding in Alaska. Until recently, none of the returns had indicated which migration route they took between the Alaska breeding grounds and the British Columbia wintering grounds. Because the majority of the birds wintering in British Columbia are found on the coast (McKelvey 1981), a coastal migration route seemed most likely. However, sightings of birds banded at Powell River, BC, in the winters of 1980-81 and 1981-82, and several recent sightings of birds banded in Alaska, make an interior migration route seem more probable.

This paper documents progress to date in the Powell River banding project, suggests a possible migration route for Trumpeter Swans to and from Alaska, and also suggests what the true significance of interior British Columbia wintering areas may be.

Methods**Banding location**

Swans banded in this study were captured at Cranberry Lake (49°5'N, 124°3'W) in the city of Powell River. Cranberry Lake is the site of a bird sanctuary on property owned by the National Second Century Fund and leased

to the city. In order to attract birds for educational and observational use, a caretaker (CB) feeds grain to overwintering waterfowl, including swans, which become very tolerant of the caretaker and will come ashore to feed. The ease with which Trumpeter Swans can be lured into a large bait trap, combined with amenable winter field conditions, makes Cranberry Lake a unique and ideal study area.

Banding

During the two winters of this study, 43 Trumpeter Swans and one Whistling Swan (*C. columbianus*) have been banded: 34 Trumpeter Swans and the Whistling Swan on 12 January 1981, and nine Trumpeter Swans on 28 February 1982. To do this, field staff lured the swans into large open-topped traps, whose design was changed slightly between the two years. The first trap, 16 by 20 m in area and 3.6 m high, consisted of stationary chain-link fence, the caretaker's house, trees, and portable lengths of chain-link fence positioned to prevent escape back to the lake. One bird did manage to escape from it by flying over the fence after starting its take-off from one corner. By spreading the birds out in the trap and not allowing them to bunch up, we prevented other escapes.

For the second year of the banding operation, we built an approximately circular trap, 16 m across and 3.6 m high, on a pathway leading from Cranberry Lake to a small satellite pond that the swans used regularly. We left it open at both ends until the day of banding, so that the swans could become accustomed to its presence.

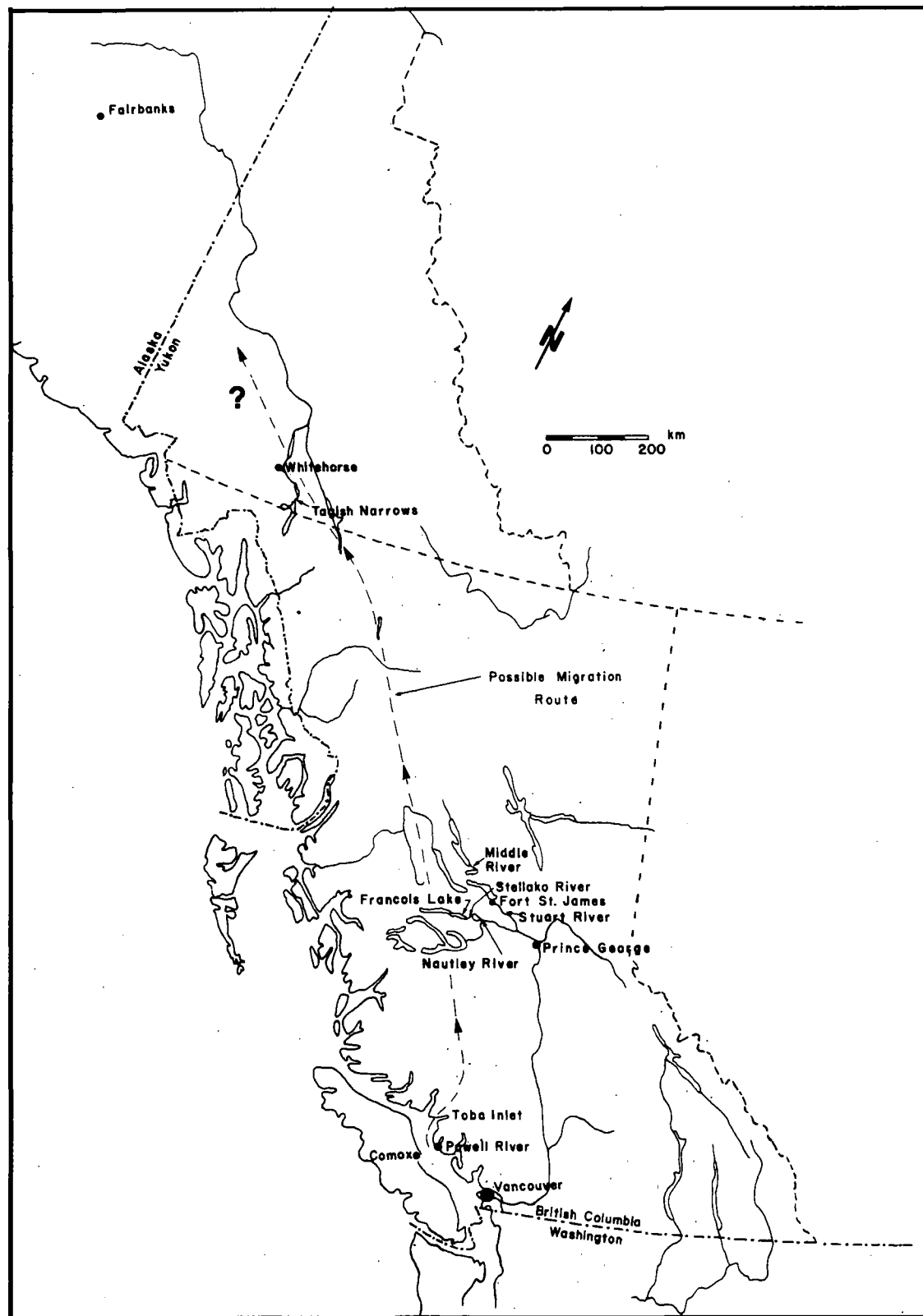
Once the swans were in the traps, the banders separated and restrained, weighed and banded them. We followed the regional colour-marking code agreed between the International Waterfowl Research Bureau, the US Fish and Wildlife Service, and CWS, fitting onto each bird a green plastic neck-collar with a white numeric-alpha code, an identically coded plastic tarsal band, and a standard metal leg band. W. Sladen supplied the collars, which bore the codes O1EE to 44EE.

Results and discussion**Sightings of banded swans**

Band sightings of swans captured at Powell River occurred during spring migrations in 1981 and 1982, and in the winter period of 1981-82. In the spring of 1981, all swans, banded and unbanded, had left Cranberry Lake by 1 March. On 9 March, L. Ender, a conservation officer with the British Columbia Ministry of Environment, saw five green-collared swans on the Toba River estuary at the head of Toba Inlet (Fig. 1). Since he observed them from the air, he could not record their band numbers. We presume that they were from the group banded at Powell River because Toba Inlet is only 80 km away, the timing

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Figure 1
The distribution of swan-band sightings in British Columbia and the Yukon, and the locations of places mentioned in the text.



of the sighting tallied with the departure of swans from Cranberry Lake, and no other green-collared swans have ever been reported on the British Columbia coast.

On 23 March 1981, four green-collared swans were reported in a flock of swans at Tagish Narrows, Yukon (Fig. 1) by Mrs. G. McLeod, a local resident, who did not record their numbers. On 5 April 1981, five green-collared swans were again sighted at Tagish Narrows by K. Asquith and M. Dennington of CWS, Whitehorse. Four of them were in a group of five, presumed to be a family, but were too distant to allow the collars to be read. The other collared swan, an apparently unattached bird in a group of 15 swans, bore the collar 01EE from the series used at Cranberry Lake.

We received no reports of collars after 5 April, from any location, until the winter of 1981-82, when 21 collared swans returned to winter at Powell River, and at least one wintered in west-central British Columbia. Conservation Officer D. Parker reported that on 4 January 1982 the one Whistling Swan banded in 1981, 06EE, was wintering with a flock of swans on Francois Lake (Fig. 1). That swan was not reported at Powell River in the winter of 1981-82, and we presume that it remained in the vicinity of Francois Lake throughout the winter. The relationships of collared swans in 1980-81 to those that returned in 1981-82 are shown in Table 1. The dates of arrival at Powell River varied from 4 November, which is approximately the expected date of first arrival (C. Burton,

unpubl. data), to 6 January, which is near the time of peak swan numbers on the coast (McKelvey 1981).

Swans collared in 1980-81 were again seen in spring migration in 1982, along with some of the swans banded in 1981-82. On 5 March 1982, three collared swans were reported on the Stuart River at Fort St. James (Fig. 1). One of the collars could not be read; the other two were reported as 07EE and 33EE, both of which had been seen previously at Powell River that winter (Table 1).

Swans were again reported from Tagish Narrows, Yukon, in 1982 (G. Johnston, pers. commun.). On 1 May, six collared Trumpeter Swans were observed in a mixed flock resting and feeding at the narrows. Four had been banded on 28 February at Cranberry Lake; they bore the collars 37EE, 41EE, 43EE, and 44EE, and were seen as a group. The other two collared birds were exhibiting courting behaviour and were presumed to be paired. One, collared 32EE, was banded at Powell River on 12 January 1981; the other, 29UJ, was banded in the Fairbanks, Alaska, area in the summer of 1981 by W. Gossweiler of the US Army.

Several other sightings in British Columbia of swans banded near Fairbanks are of interest. One swan, banded in the summer of 1980 (16UJ) and seen at Comox in both winters since then, was also seen during spring migration on 19 March 1982 on the Middle River (Fig. 1) by A. Grainger, a local outfitter. One other swan from Fair-

Table 1
Relationships of swans banded at Powell River in 1980-81 and their known fates in the winter of 1981-82

| Banded 1980-81 | | Fate 1981-82 | |
|----------------------------|-------------------|---|---|
| Adults | Young | Adults | Young |
| Families | | | |
| 02,03 | 04,09,12,19,22 | 02,03, and 4 young returned* | 04 returned alone, 12, 19, 22 returned together |
| Unbanded | 14,24,25,26 | — | 26 returned alone |
| 32,33 | 05,15,17 | 32,33 and 2 young returned | 05,17 returned separately |
| 31,35 | 11,13,18,23,27,28 | 31,35, and 7 young returned | 11,27 returned together |
| Unassociated | | | |
| 01,06,07,08,10,16,20,30,34 | 21,29 | 01,10†,16,20 returned separately, 07,08 returned same day, 06 wintered at Francois Lake | — |

* Returned to Powell River unless stated otherwise.

† Found dead at Powell River, 13 January 1982.

banks (05UJ) apparently wintered in 1981-82 on the Stellacko River, but it did not survive, being found with several other winter-killed swans on the Nautley River as reported by Sgt. W. Mohn, RCMP, Fraser Lake.

Probable migration route

All of these observations allow some speculation about the nesting ground destinations and migration routes of some Trumpeter Swans wintering on south coastal British Columbia. If they stay faithful to both breeding and wintering areas, at least some of the Powell River birds probably breed in the Fairbanks area. Although none of the Fairbanks birds (UJ series) have been seen at Powell River, some of the Powell River birds (EE series) were seen at Comox in the 1981-82 winter. The close proximity of the wintering areas of Comox and Powell River (Fig. 1) might indicate a common breeding area for that group of swans.

The migration route to the breeding grounds, wherever they may be, appears to be an interior overland route rather than a strictly coastal one. Although most swans wintering in British Columbia do so on coastal habitats, particularly estuaries (McKelvey 1981), an interior migration route is perhaps more logical. Much of the estuarine habitat, at least on the mainland, lies at the heads of the inlets and fjords, and is geographically closer to the interior of British Columbia than to the ocean. Therefore, if migration were to occur along the coast, the swans would have to fly up the inlets to reach the estuaries. However, if they followed an interior route, they would reach the estuarine habitat en route to the coast.

Significance of interior wintering areas

Another argument for an interior migration route also explains why some swans (at least 500) choose to winter in the relatively inhospitable central interior of British Columbia. They appear to use those areas for staging in the spring and fall migration, perhaps as part of their traditional route. Therefore, we may now see the need to protect those areas in a different light. Their use in migration may also explain why periodic winter kills of swans in the interior seem to have little or no effect on the local wintering population in the following year, because those lost in the previous year may be replaced by migrants.

Acknowledgements

We thank all those who took the time to look for neck-collared swans and to report those sightings to us, and hope to hear from them again. Special thanks go to Fred Moss and his crew from the Powell River Parks Department for their assistance with the banding, and to G. Kaiser and A. Martell for reviewing the manuscript.

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