

Lesser White-Fronted Goose *Anser erythropus*: good news about the breeding population in west Chukotka, Russia

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Abstract

A total of 243 Lesser White-fronted Geese *Anser erythropus* were counted along the Rauchua River and its main tributaries, the Konevaam and Ngagleyngyvaam Rivers, in July–August 2010. Average size of flocks that included broods was 27.5 individuals (s.d. = 10.7, range = 10–40, $n = 8$). Mean brood size was 3.57 goslings (s.d. = 1.22, range = 2–6, $n = 14$). Gosling age varied from 4 to 6.5 weeks. Of the Lesser White-fronted Geese seen on the Rauchua River, 65% were young birds and 32.5% were brood-rearing (breeding) adults, whilst just 2.5% were non-breeders. We estimated that 500–600 pairs of Lesser White-fronted Geese bred in the Rauchua Basin in spring 2010, a dramatic increase from none present in 1983. This could indicate a local increase in response to human emigration from the catchment or a more general increase in the Eastern Population of the Lesser White-fronted Goose.

Key words: *Anser erythropus*, breeding, Chukotka, Lesser White-fronted Goose, Rauchua River.

Three distinct populations of the Lesser White-fronted Goose *Anser erythropus* are currently recognised on the basis of their separate breeding ranges, wintering grounds and migration routes: the Fennoscandian population, and the Western and Eastern Palearctic populations (Ruokonen *et al.* 2004). The species is thought to be declining in numbers throughout its breeding range, from Fennoscandia to easternmost Siberia

(Jones *et al.* 2008; Lorentsen *et al.* 1998), including the Eastern population which breeds in arctic Russia from east of the Taymyr Peninsula to Chukotka (Morozov & Syroechkovski 2002). Little is known about the distribution and density of Lesser White-fronted Geese breeding in Chukotka and there are no historical data relating numbers occurring in this area (Krechmar & Kondratiev 2006). The traditional breeding

range of the geese in Chukotka is considered to be the Anadyr River basin in southern Chukotka, with only observations of single broods in 1991 and 1993 reported on the Chukotka Peninsula (Krechmar & Kondratiev 2006). In the early 21st century a small number of breeding birds were recorded in the Rauchua River basin, west Chukotka (Solovieva *et al.* 2003). Although there is no evidence for a connection between Chukotka breeding grounds and wintering grounds in China it seems reasonable to attribute the Chukotka breeding geese to those using Chinese wintering sites. Numbers wintering in China have been estimated at 21,000 birds, with only a few individuals reported from other Asian countries between 2002 and 2007. The Chinese-wintering population has apparently been stable since 2002, but there were no comparable surveys before 2002, so earlier trends in numbers are unknown (Cao *et al.* 2008).

In summer 2010 we surveyed the distribution and abundance of divers (*Gavia* sp.) on the lakes of the Rauchua River catchment, making observations of other birds encountered at the time. Because of the unusual predominance of the Lesser White-fronted Goose over other geese in the area, we began to pay special attention to goose identification and to assess the abundance of the different species. No additional effort was invested in making a systematic or exhaustive survey of geese throughout the catchment, but all observations of geese were recorded during boat journeys between field camps and lake areas. These data are described here, and the results assessed to determine the potential importance of the

Rauchua River basin as a breeding area for the Lesser White-fronted Goose.

Methods

Study area

The Rauchua River is a large river in northwest Chukotka, rising in the Ilirneyskiy Mountains (67°33.27'N, 166°41.83'E; Fig. 1, Fig. 2) and draining into the East-Siberian Sea (at *c.* 69°29.94'N, 168°49.83'). It is more than 300 km long and the drainage catchment extends to 15,400 km². The upper and middle reaches of the Rauchua River pass through mountains 600–1,000 m above sea level (a.s.l.); the lower reaches are within the Chaun-Rauchua lowland region, but the study area reported here lies between *c.* 2–150 m a.s.l. In the middle reaches, the valley is deep, narrow (1–4 km wide) and has a significant slope, except at the confluence with one of its largest tributaries (the Ngagleyngyveem River) where soft sediments have been deposited. The Rauchua River is typical of the region, with numerous channels, oxbow meanders, fords and shingle spits which are exposed when water levels are low (Fig. 3). In contrast, when the river is in spate, floodwater covers most of the river valley floor. Water levels in lakes situated in the river valley are often influenced by spring flooding. Rocky cliffs are common on the banks in upper and middle reaches and the furthest downstream cliff is located 15 km from the river mouth. Further downstream, the valley of the lower section of the Rauchua River is 10 km wide, its banks are soft sediments and there are two distinct terraces above the flood-plain.

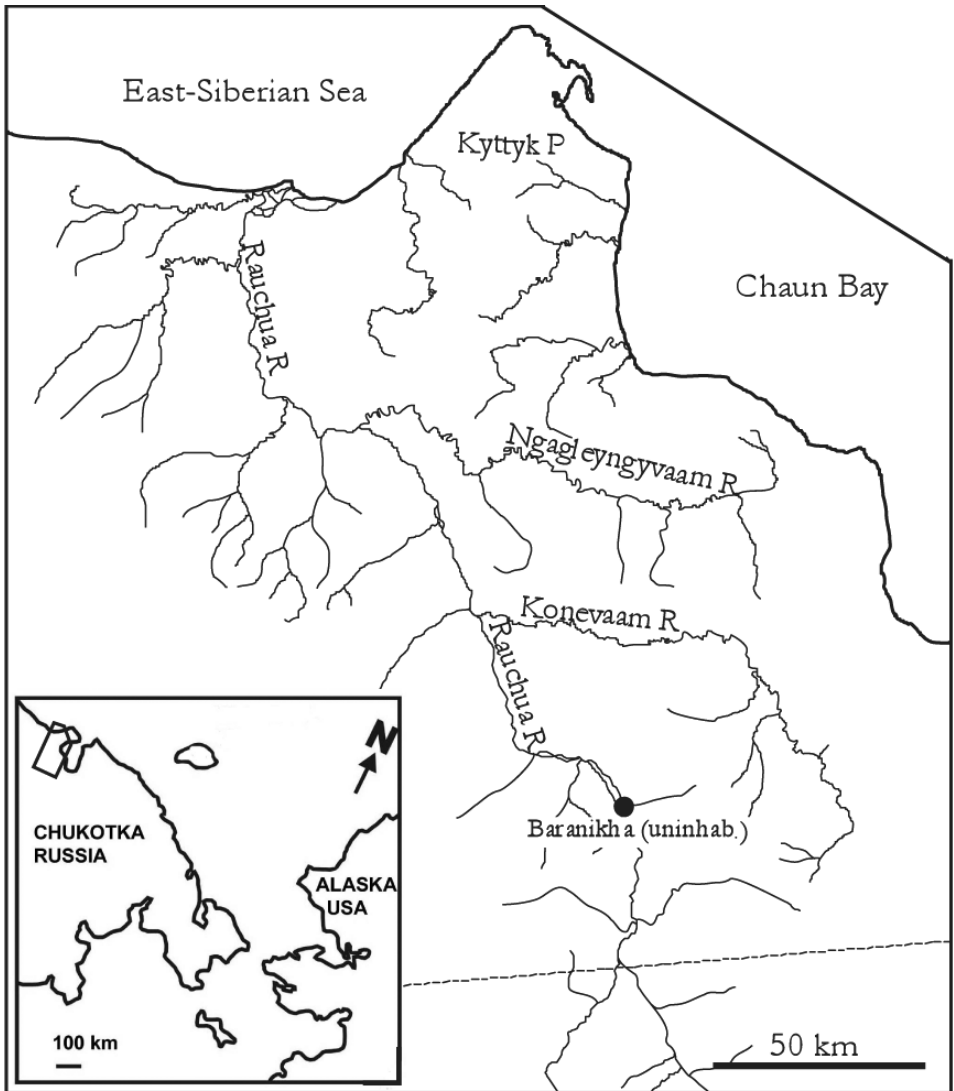


Figure 1. Map of the study area in west Chukotka. The deserted Baranikha settlement is marked and the Pevk to Bilibino public road is shown by the dotted line.

The climate in the study area is continental arctic, with a long and cold winter. Average temperature is -35°C in January, 10°C in July, and average precipitation is 200 mm a year with rainfall occurring mainly in autumn.

Vegetation in the flood-plain and on the slopes dries out by the end of summer (Galanin 2005). Snow lasts from October to early June but the snow cover is not deep and melts quickly in the spring sunshine.

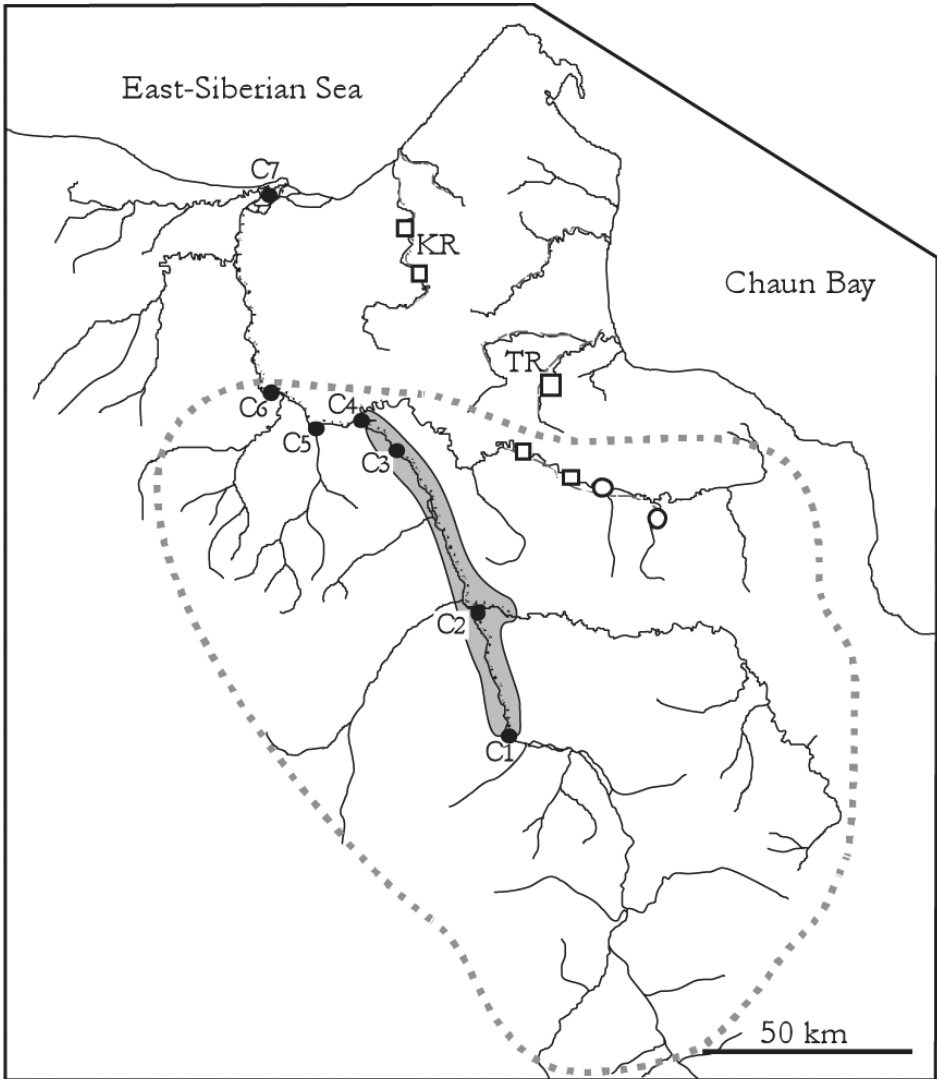


Figure 2. Distribution of Lesser White-fronted Geese found in the Rauchua River basin and the Kyttyk Peninsula. Boat and foot survey routes followed in July–August 2010 are shown by bold dotted lines. Field camps along this route are marked as C1, C2, etc. Grey shading illustrates the part of the Rauchua River basin where only Lesser White-fronted Geese were found during the 2010 survey. White squares on the other rivers show sites where moulting adult Lesser White-fronted Geese were recorded during 2002–2009; white circles are where Lesser White-fronted Goose broods were recorded from 2002–2009. Routes followed during the river surveys made in 2002–2009 are shown by grey dashed lines. KR = Koz'mina River, TR = Teukulkay River. The grey dotted line represents the estimated extent of the Lesser White-fronted Goose breeding range in the Rauchua River basin.



Figure 3. View of the Rauchua River valley near the mouth of the Konevaam River. A number of side channels and oxbow meanders and lakes fill the valley from bank to bank.

Survey routes and methods

The middle and lower reaches of Rauchua River (start point at 68°34.719'N, 168°0.857'E) were surveyed by boat from the former settlement at Baranikha to the mouth of the river (Fig. 1). The 152 km journey downstream took 14 days from 26 July to 11 August 2010. Two major tributaries, the Konevaam (7 km) and Ngagleynygyvaam Rivers (10 km) were surveyed on foot. A helicopter was used to reach the start point and an inflatable boat with a 30 horse-power outboard motor for travelling along the river. We always

followed the main stream of the Rauchua River when travelling, because of its higher water levels, so were unable to include any birds in side channels and oxbow lakes during the survey.

Two observers scanned ahead of the moving boat using 8× binoculars, searching open water and shorelines for waterfowl. When geese flocks were reported we: (1) counted individuals; (2) determined the age of the birds (*i.e.* whether they were adult or juvenile) from their size and plumage and (3) estimated the percentage of adults in a flock either by direct counts (in small flocks) or by making a rough estimate of the proportion

of adults to young. Flocks were followed for 0.3–2 km until they escaped alongside channels or otherwise were lost from sight. Groups of juveniles associating with two adult birds were considered single broods. Brood size was averaged from observations of single broods; brood flocks invariably broke up as they dispersed from the approaching boat and separated into discrete broods. Where brood size could not be determined accurately, these were omitted from brood size calculations. Although it is not certain that all adults in flocks with young were parents (the proportion of non-breeders in these flocks is unclear) they were treated as brood-rearing birds because non-breeding geese generally stay in flocks separate from those with young. Age of flying offspring was considered to be 6.5 weeks (Owen 1980); age of younger goslings was estimated from their size and plumage, based on descriptions and photographs of gosling development reported for Greater White-fronted Geese *A. albifrons* (Krechmar & Kondratiev 2006).

Results

A total of 243 Lesser White-fronted Geese were counted along the Rauchua River, the Konevaam River and the Ngagleyngyveem River (Table 1). A further twenty-eight geese were not identified to species, but were almost certainly also Lesser White-fronted Geese. Bean Geese *Anser fabalis* were also present, but no Greater White-fronted Geese were observed during our 2010 survey. The Lesser White-fronted Goose was the main goose species found along the middle reaches of the river (from C1 to C5,

Figure 2) and on its tributary, the Konevaam River (Table 1). This area could be considered as being only occupied by Lesser White-fronted Geese, although a single flock of Bean Geese was sighted on the water on 1 August (Table 1). The lowest point on the river where Lesser White-fronted Geese were seen was at camp 6 (C6); only Bean Geese were observed downstream of C6. The lower reaches of the Ngagleyngyvaam River were occupied exclusively by Bean Geese. In general, stony fast-flowing river habitats in the area were occupied by Lesser White-fronted Geese, whereas sandy slow-flowing river habitats were used mainly by Bean Geese.

Only one flock of five non-breeding adult Lesser White-fronted Geese was recorded, on 6 August, all in flight. All other birds of this species were breeding adults with their young. Breeding geese were observed as single families (18 birds; 7.6% of all birds counted) and in brood-rearing flocks (220 birds; 92.4%). The mean size of brood-rearing flocks was 27.5 individuals (s.d. = 10.7, range 10–40, $n = 8$ flocks), mean brood size was 3.6 goslings (s.d. = 1.2, range = 2–6, $n = 14$ broods) and gosling age varied between 4 weeks (when goslings were 75% of adult size) and 6.5 weeks (fledging age). Two broods were flying (on 2 and 6 August), but remained with the brood-rearing flocks. The parents of both flying broods were flying and seven other brood-rearing adults were flying during 31 July – 6 August 2010; all other adult geese were moulting and flightless. Young birds made up 65% of the Lesser White-fronted Geese on the Rauchua River in 2010; brood-rearing (breeding) adults comprised 32.5% and just

Table 1. Numbers of Lesser White-fronted Geese (LWFG) and Bean Geese (BG) counted in the Rauchua River basin in July–August 2010. Boat survey routes were from one field camp to another; camp numbers are illustrated in Figure 2. Surveys of tributaries were made on foot.

Date	Survey route	No. of LWFG	No. of BG	No. of unidentified geese
29 July	C1–C2	48	0	28
31 July	Konevaam River	4	0	51
1 August	C2–C3	0	20	0
2 August	C3–C4	95	0	0
4 August	C4–C5	35	0	0
5 August	Ngagleyngyvaam River	0	144	0
6 August	C5–C6	61	71	0
11 August	C6–C7	0	161	0
Total		243	396	79

2.5% were non-breeders (Table 2). Bean Geese comprised 59.4% young, 32.4% breeding adults and 8.2% non-breeders (Table 2). Including the flock of 28 unidentified geese, a total of 271 Lesser White-fronted Geese were observed in 2010, of which 32.5% were breeding adults, suggesting a total of 44 pairs.

Discussion

Rauchua River basin as a Lesser White-fronted Goose breeding site

Lesser White-fronted Geese were first found breeding in the Rauchua River basin in 2003 (Solovieva *et al.* 2003), when only a small part of the basin was visited. A boat

survey of the Rauchua and Konevaam Rivers made by Alexander Ya. Kondratiev and Gennady I. Atrashkevich in late July 1983, which covered the same sections of the river, found no Lesser White-fronted Geese at all in the area (Krechmar *et al.* 1991; A.Ya. Kondratiev, pers. comm.). The absence of Lesser White-fronted Geese on the Rauchua and Konevaam Rivers in 1983 corresponds with the general decline of the species reported in Chukotka in 1980–82, based on the relative abundance of Lesser White-fronted Geese compared with the Greater White-fronted Goose during the 1970s and 1980s (calculated from observations of migrating birds, information from hunters and goose

Table 2. Population structure for Lesser White-fronted Geese (LWFG) and Bean Geese (BG) seen in the Rauchua River basin, July–August 2010. Birds of unknown age were excluded from the table.

Species	Percent of breeding adults	Percent of non-breeding adults	Percent of young	No. of birds
LWFG	32.5	2.5	65.0	243
BG	32.4	8.2	59.4	355

sightings made at the Chaun Biological Station, Chaun Delta, West Chukotka in 1975–77 and 1980–84; Krechmar *et al.* 1991). The Lesser White-fronted Goose was commonly encountered near the Chaun Biological Station before 1980, although it was never reported as breeding in the area. From 1980 onwards, it became much rarer and shooting of this bird became a very unusual event (Krechmar *et al.* 1991). Whilst working at the Chaun Biological Station during 2002–2010, observations of Lesser White-fronted Geese remained very scarce, and only once was there a report of a pair shot in spring 2010. It therefore seems likely that the establishment or re-establishment of breeding by Lesser White-fronted Geese in the Rauchua River basin is not reflected in other parts of species' range in Chukotka. We suspect that Lesser White-fronted Geese breeding in the Rauchua River basin use the Kolyma River (west of the Rauchua) as a main flyway corridor to and from the breeding grounds, and thus still rarely occur east of the Rauchua River. Further studies are needed to understand the migration routes, and links between the breeding and

winter sites, for the Chukotkian Lesser White-fronted Geese.

Based on our findings of Lesser White-fronted Goose broods in the upper Ngagleyngyveem River and its small tributary the Lishaynikoviy Creek in 2003 (Solovieva *et al.* 2003), together with the results of the 2010 survey presented here, we consider the breeding distribution of the species in the Rauchua basin to be as shown in Figure 2. This includes the main Rauchua River and all its small tributaries, but excludes the lowest 60 km of the river. About 44 pairs (88 individuals) were recorded as breeding birds during our surveys, plus 5 five individuals as non-breeders (potentially two failed pairs). Birds were counted only on the main river channel (side channels and oxbow lakes were not visited) and most of the flocks tended to escape from the boat by hiding alongside channels or in bushes on rocky cliffs. The noise of engine alerted geese, and they often hid before we can observe them. Some flocks therefore were probably missed even in the river channel surveyed. Given that the main river consists of an average of four

channels, we estimate that there were at least $46 \times 4 = 184$ pairs on the 92 km of the Rauchua River from our start point to the lowest point where Lesser White-fronted Geese were observed. The upper 215 km of the main stream and two major tributaries have similar habitats to those of the surveyed area so, assuming similar pair densities, these could support another 220 pairs. Small tributaries with stony habitats, similar to the Lishaynikovyi Creek where we found a Lesser White-fronted Goose brood in late July 2003, extend to a further 200–300 km and could potentially contribute another 50–75 pairs. Several dozen pairs (up to 20 at one moulting site on the Kyttyk Peninsula in 2004; Fig. 2) could be considered as moulting non-breeders; we believe they belonged to the Rauchua River population, although this might not be the case. On this basis, we consider that the total numbers of Lesser White-fronted Geese breeding in the Rauchua River basin in spring could be of the order of 500–600 pairs, including those birds which arrive to breed in spring but subsequently leave to moult elsewhere, either as non-breeders or failed breeders.

The increase in the number of breeding birds in the Rauchua River basin, from zero to several hundred breeding pairs between 1983 and 2010, could indicate a general increase in the region and potentially in the entire Eastern population of the Lesser White-fronted Goose. An aggregation of Lesser White-fronted Geese was recently located in the Kanchalan River basin, where these geese have not been found in previous surveys, although breeding wasn't confirmed (Heinicke *et al.* 2009). Population

trends for the species based on counts on their wintering grounds in China are limited, due to the lack of good historical counts to underpin population size estimates, put at 25,000–100,000 birds in the early 1990s (Perennou *et al.* 1994). A total of 21,000 birds was counted in China in 2002–05, but it is not possible to determine whether this represents an increase or a decrease in numbers over earlier times (Cao *et al.* 2008). One potential reason for the specific increase in Lesser White-fronted Geese in the Rauchua River basin could be the abandonment of the only human settlement in the area at Baranikha. The Baranikha gold mining village was closed in 1995 and no people have lived in or exploited the Rauchua River valley since then. A public road crosses the river in its upper reaches, and an old road to Baranikha is still possible to use (Fig. 1). However, fewer and fewer people penetrate into the basin from year to year, due to the road falling into disrepair and the continuous emigration of people from west Chukotka, with a resulting decline in hunting and disturbance of the geese.

Habitat use and separation of breeding and moulting areas

Moulting sites seem to be permanent for Lesser White-fronted Geese in Chukotka; one known moulting site of non-breeding birds was visited in July 2002, 2003 and 2004 and the 30–40 birds present were consistently within the same 100 m stretch of the Teukulkay River (Fig. 2; Solovieva *et al.* 2003, D. Solovieva, unpubl. data). In our survey of Koz'mina River (location in Fig. 2) several groups of moulting non-breeding

Lesser White-fronted Geese occurred in Bean Goose moulting flocks. The majority of Lesser White-fronted Geese on the Rauchua River were breeding adults and their young. It is possible that non-breeding birds and failed breeders move to the north of the breeding range to moult in typical tundra environment (Fig. 2). Brood-rearing habitats were the stony upper reaches of Rauchua River, while moulting habitats were slow-flowing tundra rivers and possibly lakes on the tundra. The change in goose fauna along the transition from upper to lower reaches of large tundra rivers has also been noted by Alexander Andreev for the Kon'kovaya River, which is similar in size to the Rauchua River and situated to the west of the Kolyma River (A. Andreev pers. comm.). The upper reaches of the Kon'kovaya River were occupied by Lesser White-fronted Geese, the middle reaches by Bean Geese, and the lower reaches by Greater White-fronted Geese. A similar distribution of geese was observed on the Rauchua River, except that the Greater White-fronted Goose was not present.

Reproductive success

The summer of 2010 was seemingly a good breeding year for goose populations in west Chukotka. The proportion of young Bean Geese in flocks seen on the Rauchua River (59.4%) was the highest reported in west Chukotka during the years 2002–2010 (Solovyova 2007; D. Solovieva, unpubl. data). We have no data on Lesser White-fronted Goose reproductive success and proportion of young for other years. However, the combination of the Bean Goose productivity data and the high

percentage of Lesser White-fronted Goose goslings recorded during the survey (65%) suggest that 2010 was a very successful breeding year for both species. Our general observations indicated that Lesser White-fronted Goose nesting distribution may be linked to the presence of Peregrine Falcon *Falco peregrinus* nests on cliffs in the catchment. A similar association has been described for Red-breasted Geese *Branta ruficollis* which are thought to gain protection by nesting close to raptors (Kostin & Mooij 1995; Quinn *et al.* 2003). Although this association needs to be investigated more rigorously for the Lesser White-fronted Goose, it may provide another reason for recent changes in the abundance of this species in the Rauchua River catchment.

Acknowledgements

We are most grateful to our field assistants Gleb Danilov and Mikhail Ettuvgi for their work during the survey of the Rauchua River catchment. The helicopter flight to the remote study area was kindly provided by Chukotka Mining and Geological Company (Kupol) of Kinross Gold Corporation; we express our great thanks to Rob and Olga Smith, and to Alexandr Kazantsev from Kinross Gold. We also wish to thank two anonymous referees for their helpful comments on an earlier draft of the text.

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