Monitoring Sandhill Crane spring migration on the Douglas Lake Plateau in southern British Columbia

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Abstract: Sandhill Cranes (*Antigone canadensis*) stopping overnight on their spring northward migration were counted along a 32–km survey route on the Douglas Lake Plateau in south-central British Columbia. Counts were opportunistic and highly variable in 2012–2023 but done daily through the migration period in 2024 (morning and evening; 7 April through 7 May) and 2025 (mornings only; 29 March through 9 May). Large flocks (often several thousand birds) were counted using high-resolution photographs digitally stitched together into a single panorama and divided into manageable sections to count individual cranes. Morning surveys (06:00–10:00) gave higher and more reliable counts than those in the evenings (17:00–20:00). In total 10,924 cranes were counted on nine days in 2023, 11,557 cranes on 29 morning surveys in 2024 and 18,715 cranes on 42 morning surveys in 2025. The highest single day's count was 7,716 cranes on 22 April 2019. These counts confirm that about 20,000 cranes follow the B.C. Central Interior Flyway each spring. Cranes on the ground were highly concentrated, with most found on a partially-flooded grassy pasture (92% in 2024, 72% in 2025), followed by irrigated hayfields (8.0% in 2024, 28% in 2025), with few (<1%) on native bunchgrass or bare feedlots. Current practices of range management for cattle in this area are compatible with preferred habitat use by migrating cranes, but wind-farm and power-line developments on nearby hills pose a potential risk to the cranes.

Key words: Sandhill Crane, *Antigone canadensis*, migration, habitat use, Douglas Lake Plateau, southern British Columbia, range management, wind-farm risk, power-line risk

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Introduction

The Douglas Lake Plateau, near Merritt, British Columbia, is an important stop-over for Sandhill Cranes (*Antigone canadensis*) on their northward spring migration. Previous reviews (Cannings *et al.* 1987; Campbell *et al.* 1990) and work by the late Rick Howie (pers. comm.) estimated that in the 1980s and 1990s 20,000–25,000 cranes used this B.C. Central Interior Flyway, including the Douglas Lake Plateau, on their spring northward flights. Based on these estimates, and the presence of other significant avian populations, the Douglas Lake Plateau was designated as an Important Bird and Biodiversity Area (IBA) in the 1990s.

Counts of cranes using the Douglas Lake Plateau have been sporadic and the numbers visiting the area were uncertain. To provide more reliable estimates of crane usage, the Nicola Naturalist Society began systematic daily surveys over the spring migration in 2024 and 2025, covering known areas of high usage in the Douglas Lake area. I report counts of Sandhill Cranes made in spring in the southern portion of the Douglas Lake Plateau IBA from 2010 to 2025, with daily counts in 2024 and 2025, providing more complete coverage of the spring migration.

These cranes generally migrate during daylight, but might continue flying after dark if close to a preferred stop-over site (Nesbitt and Hinterminster 1984; Gerber *et al.* 2020). In our area, flocks of cranes arrived in the late afternoon until after dark, then spent the night resting, preening and feeding before resuming their northward migration around 10:00 in the morning. Fewer than a dozen cranes remain to breed in the area and most migrants remain on the ground for less than one day. Cranes were more widely dispersed and in smaller groups on their southward fall migration and were not concentrated within the same areas used in spring.

Study Area

The Douglas Lake Plateau IBA (50.277°N, 120.303°W), covering 1,552 km^2, is bordered by Kamloops in the north, Nicola Lake in the south, Highway 5A in the west and Salmon

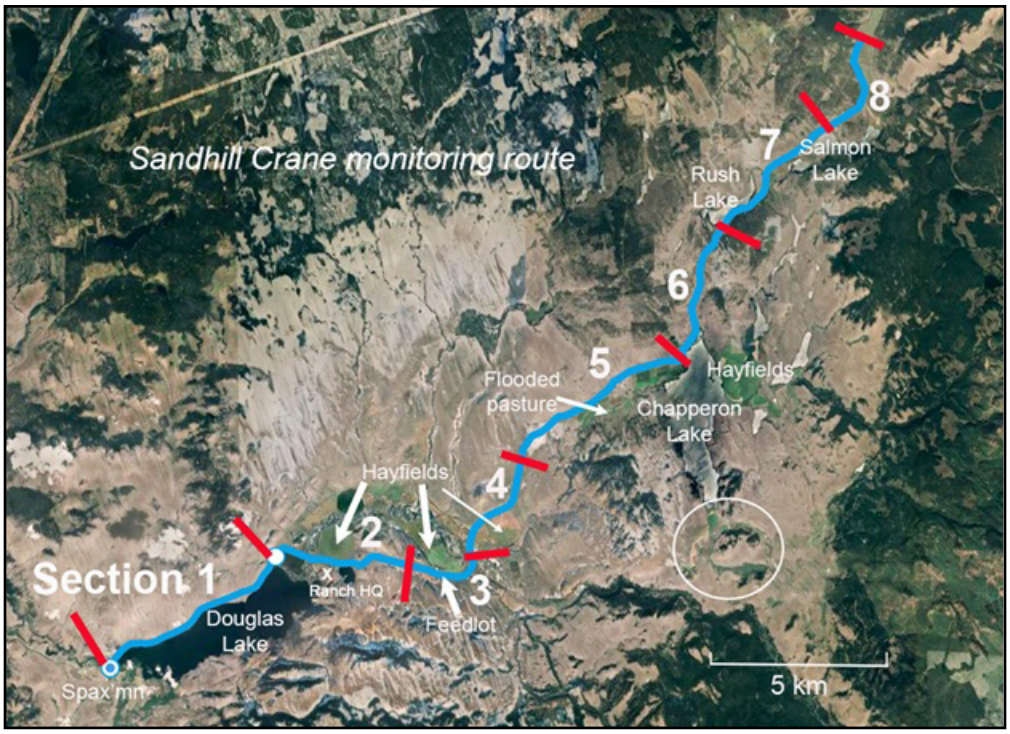

Figure 1. Layout of the 32–km survey route for Sandhill Cranes, beginning at the Spax'mn village and ending northeast of Salmon Lake. The numbers show the eight survey sectors and arrows indicate locations where cranes were often found. The circle outlines a site where some cranes rested overnight outside our survey area but were counted as they flew past Chapperon Lake on our survey route.

Lake in the east (details at: https://www.ibacanada.ca/site.jsp?siteID=BC172). The habitat includes extensive grasslands, dominated by native bluebunch wheatgrass (*Agropyron spicatum*), with mixed coniferous–aspen forests, a few large lakes, cultivated hayfields and numerous small ponds and shallow wetlands. The area surveyed for cranes is in the southern portion of the IBA, and extends from Spax'mn village on the Upper Nicola Band Reserve, at the southwest end of Douglas Lake, to the hayfields 8 km northeast of Salmon Lake (Figure 1). The land bordering the route is primarily ranchland owned by the Douglas Lake Cattle Company and the Upper Nicola Band. Based on preliminary surveys, this encompasses most of the known resting sites used by cranes on the Douglas Lake Plateau, except for a few areas to the south of Chapperon Lake (see Figure 1). Cranes gaining altitude as they flew northward evidently originated from these areas and were tallied among the flying cranes in our surveys.

Methods

Counts were made by volunteers in the Nicola Naturalist Society and in 2024 and 2025 by a trained contractor, Opal Charters, who lives in the Spax'mn village within the survey area. The contractor did week-day surveys and Nicola Naturalist Society volunteers covered weekends. All surveys were made from the public Douglas Lake Road. The 32–km survey route was divided into eight unequal sections, using obvious landmarks as sector boundaries (Figure 1). Counts made in years prior to 2024 were opportunistic and made no attempt to cover the entire migration period. In 2024 daily counts were made between 7 April and 7 May in both morning (06:00–10:00) and evening (17:00–20:00) surveys. Based on the 2024 results, the 2025 surveys covered only mornings, from 29 March to 9 May.

Surveyors were provided with a survey protocol, route map, data sheet and tips on taking photos of crane flocks. The protocol involved making a traverse of the route, counting on the outbound trip and adding any birds missed on the return trip. Surveyors (1 to 3 people on any survey) drove slowly along the route, stopping to scan with binoculars at likely habitats and watching for flocks passing overhead. Cranes on the ground or flying were generally obvious and easily identified; observer bias was therefore considered negligible. Cranes on the ground or taking off were tallied separately from those in flight passing overhead. Smaller flocks (generally <50 birds) were counted on site. For large flocks a sequence of overlapping high-resolution photos covering the flock was taken and later stitched together in Photoshop. Cranes were then counted within manageable sections on the panorama photo (*e.g.,* Figure 2). Some cranes on the ground were hidden by vegetation and our tallies are

Figure 2. An example of multiple photos stitched together to count a large flock of Sandhill Cranes. The upper panorama shows a section of a flock that contained 1,014 cranes; the lower image is an enlarged portion of the same photo showing the divisions used to count cranes. Photos taken 15 April 2024 by Opal Charters.

therefore minimum estimates of the actual numbers using the area. The road used for surveys was never close enough to the cranes on the ground to disturb them.

Surveyors were asked to report sightings of potential predators (as listed by Gerber *et al.* 2020), including coyotes (*Canis latrans*), grey wolves (*C. lupus*), black bears (*Ursus americanus*) and eagles (Bald Eagle *Haliaeetus leucocephalus* and Golden Eagle *Aquila chrysaetos*). Cougars (*Puma concolor*), American lynx (*Lynx canadensis*), bobcats (*L. rufus*) and American badgers (*Taxidea taxus*) are present in this area, but were not seen on our surveys.

Three subspecies of Sandhill Cranes have been reported within British Columbia (Campbell *et al.* 1990). We did not differentiate subspecies in our surveys but both Greater (*A. c. tabida*) and Lesser (*A. c. canadensis*) were photographed in these flocks and both types are known to use this migration route (Campbell *et al.* 1990; Petrula and Rothe 2005). We follow the flyway terminology (*i.e.,* B.C. Central Interior Flyway) proposed by Campbell *et al.* (1990); this is a subset of the more general Interior Pacific Flyway described by Gerber *et al.* (2020).

Results

Counts prior to 2024

Between 2012 and 2023 opportunistic counts of cranes made at the expected migration time showed large variations in numbers (Table 1). The highest single day's count was 7,716 cranes on 22 April 2019, counted from high-resolution panorama photos. There were likely over 8,000 cranes present on that day. In 2023 10,195 cranes were counted on

Table 1. Pre-2024 counts of Sandhill Cranes on the Douglas Lake Plateau made by the Nicola Naturalist Society and its collaborators.

Year	Date	No. of cranes
2012	17 April	95
2013	18 April	296
2013	21 April	2300
2013	22 April	114
2013	28 April	3
2014	21 April	3
2015	19 April	1
2017	22 April	599
2018	18 April	76
2019	22 April	7716**
2020	5 May	2
2021	8 April	36
2021	11 April	296
2021	16 April	1000
2021	17 April	2123
2022	17 April	1200
2023	14 April*	3000
2023	15 April	300
2023	16 April	700
2023	19 April	300
2023	19 April*	2000
2023	21 April	2228
2023	22 April	1245
2023	25 April	247
2023	27 April*	175

*Evening counts (all others are morning counts)
**Counted in a panorama photo, likely >8,000 cranes

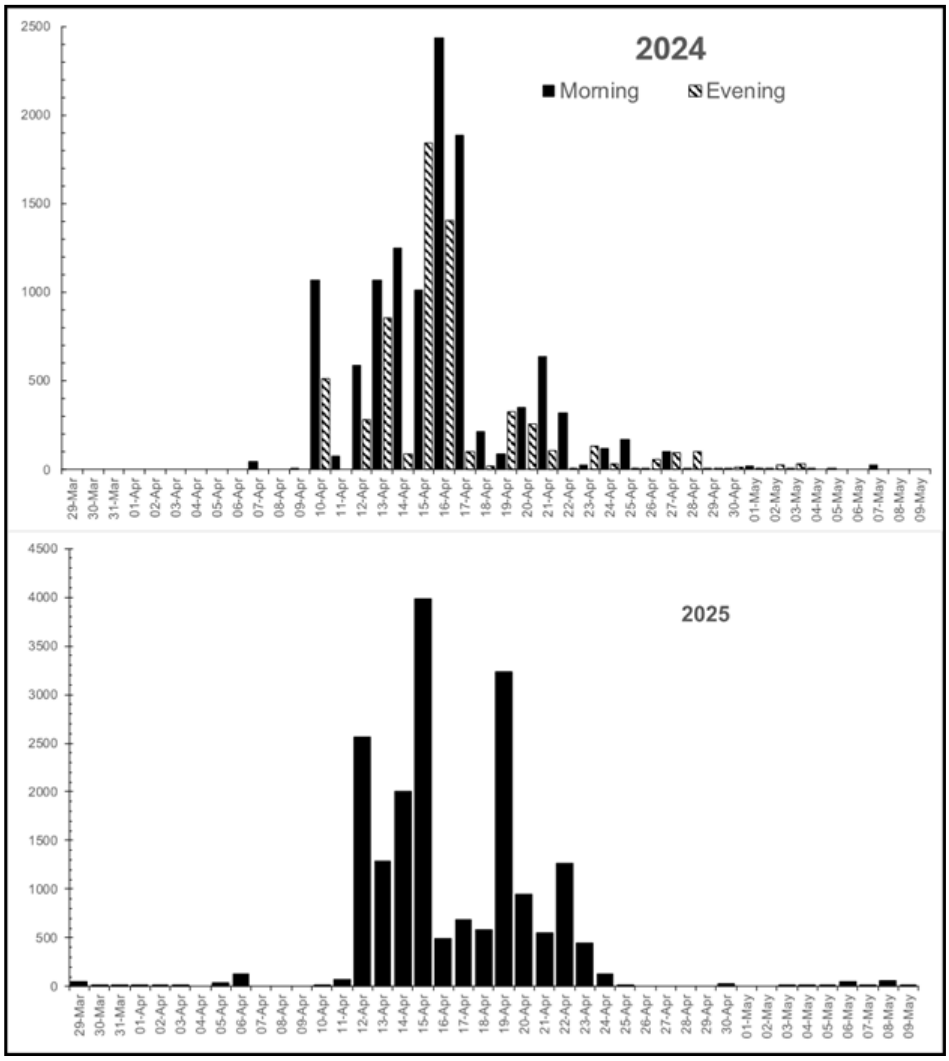

Figure 3. Daily counts of Sandhill Cranes on the Douglas Plateau survey route in 2024 and 2025. The 2024 surveys covered morning and evenings between 7 April and 7 May (no surveys on 8 and 9 April and 6 May). The 2025 surveys covered mornings only between 29 March and 9 May (no surveys on 1 and 2 May).

nine visits—the highest annual count at that time (Table 1). The high variation in these opportunistic counts prompted more systematic surveys, beginning in 2024.

Systematic surveys in 2024 and 2025

In 2024 we completed 29 morning and 23 evening surveys within the period 7 April to 7 May. The bulk of the cranes were encountered between 10 and 22 April (Figure 3). In total we counted 11,557 cranes on morning surveys and 6,342 on evening surveys. On the morning surveys 10,924 cranes (94.5%) were on the ground and 633 (5.5%) were passing by overhead. In 2025 we did 42 morning surveys between 29 March and 9 May with most cranes reported between 12 and 23 April, inclusive (Figure 3). In total we counted 18,715 cranes in 2025, with 18,252 (97.5%) on the ground and 463 (2.5%) passing overhead.

Distribution and habitat use

Cranes counted on the ground showed marked habitat preferences for overnight visits (Table 2), although precise habitat locations were not always possible with large spread-out flocks. Most cranes (92% in 2024, 72% in 2025) were on partly flooded pasture in Section 5, the area that the Douglas Lake Ranch management refers to as the "Big Meadow." This is deliberately flooded each spring, to promote growth of grass for cattle grazing through the summer and the cranes were mostly seen in grassy pasture along the edges of the flooded fields (*e.g.,* Figure 2). Cultivated hayfields, irrigated with overhead sprinkler systems, were the next most-used habitats (8.0% in 2024, 28% in 2024), primarily in Sections 3 and 4. Relatively few cranes (<1%) were reported on the drier native bunchgrass habitat. A few cranes (23 on one survey in 2024 and 7 and 108 on two sur-

Table 2. Distribution and habitat use by Sandhill Cranes in 2024 and 2025, using counts of cranes on the ground. Survey sectors are shown in Figure 1.

Survey sector	2024 (%)	2025 (%)	Primary habitat used
1	0.00	0.00	Grasslands
2	0.02	6.97	Hayfields
3	4.89	9.34	Hayfields; feedlot
4	3.11	11.65	Hayfields
5	91.94	71.90	Partly flooded pasture; hayfields
6	0.00	0.09	Grasslands
7	0.00	0.01	Grasslands
8	0.04	0.04	Pasture; hayfields
No. of cranes	10,924	18,252	

veys in 2025) were found within the fenced cattle feedlots devoid of vegetation, where they mingled with the cattle.

Presence of potential predators and human disturbance

In 2024, coyotes were reported on five surveys (9.6% of surveys; 4 evening and 1 morning survey), black bears on four surveys (7.7%; 2 morning, 2 evening surveys), and grey wolves on 1 survey (1.9%; four wolves together). Most observers did not regularly report eagles, but when experienced birders did the surveys, Bald Eagles were seen on all 11 surveys with an average of 5.6 eagles per survey (range 2–10), and a lone Golden Eagle was reported on one survey.

In 2025, coyotes were reported on five morning surveys (11.9%) with two and three coyotes on two surveys. On 1 April a coyote was seen stalking a group of seven cranes but failed to attack. The cranes responded by vocalizing, spreading their wings and leaping up and down, but not retreating. The coyote ran off when a vehicle passed nearby. Bald Eagles were reported on all eight surveys done by experienced birders, with an average of 4.4 eagles per survey (range 1–9 eagles). A Golden Eagle was reliably reported on one survey. On 16 April six Bald Eagles, feeding at the carcass of a calf, were photographed within 150 m of scattered cranes which showed no signs of alarm.

Cattle were often among the cranes at the Big Meadow and on hayfields with no evidence of avoidance. On one occasion two cowboys on horseback moved among the cattle and cranes at the Big Meadow, and the cranes walked away but did not take flight. Cranes were not seen on hayfields where people were busy adjusting irrigation sprinklers.

Discussion

Sandhill Cranes reported on the Douglas Lake Plateau were following the B.C. Central Interior Flyway across British Columbia (Cannings *et al.* 1987; Campbell *et al.* 1990; Petrula and Rothe 2005; Fink *et al.* 2024). These cranes enter British Columbia at the south Okanagan, traverse the Thompson–Nicola and the Chilcotin plateaus and most continue into the Yukon and Alaska. Based on incomplete surveys Campbell *et al.* (1990) estimated that 22,000–25,000 cranes use this flyway in spring. Our surveys provide the most reliable counts of these birds. Given that some birds using this flyway were not seen on our surveys, there are likely around 20,000 cranes passing through in spring in the 2020s. This information is important for supporting the continued status of the Douglas Lake Plateau IBA and provides support for its inclusion as a Key Biodiversity Area (KBA). In addition, our data provide essential baselines for tracking future population trends—these trends are currently not well documented for the inland Pacific flyways (Petrula and Rothe 2005; Gerber *et al.* 2020).

The importance of the Douglas Lake Plateau as a migratory resting site has not been fully recognized in reviews of crane migration and concentrations within British Columbia (Cannings *et al.* 1987; Campbell *et al.* 1990; Gebauer 2004; Gerber *et al.* 2020). Data in eBird (Fink *et al.* 2024) indicate that during their northward migration these cranes are widely dispersed in interior Oregon and Washington and reach a more restricted pinch-point in northern Washington/southern British Columbia, *i.e.,* the Okanagan Valley. The Douglas Lake area therefore provides a key overnight stop-over site in this important flyway.

In 2024 and 2025 the bulk of the cranes passed through the Douglas Lake Plateau between the 10th and 24th of April. Cannings *et al.* (1987) show a similar trend for cranes moving through the Okanagan Valley on the same flyway. The exact timing of their passage is, however, variable, as shown by the high variation in our pre-2024 counts and the day-to-day variation in numbers in 2024 and 2025. Daily surveys each morning across the period sampled in 2025 are therefore recommended for future monitoring. Just missing a single day with favourable conditions for migration flights could lead to underestimates of the true numbers.

Sandhill Cranes show high fidelity to migratory stop-over sites that provide predictable foraging and resting habitat and continued availability of suitable foraging and resting sites is essential for maintaining migratory populations (Gerber *et al.* 2020). The flooded pastures and irrigated hayfields on the Douglas Lake Plateau provide such predictable habitat, and current ranching practices are evidently compatible with maintaining suitable habitat for cranes. In particular, the flooded pasture at the Big Meadow provides ideal stop-over habitat, with over 7,000 cranes using the area on some days.

Future enlargement of existing wind turbine farms and development of new wind farms with their associated power-lines on and near the Douglas Lake Plateau, such as the K2 Project on Pennask Mountain (Innergex 2024), pose potential threats to the crane migrants passing along the B.C. Central Interior Flyway. Sandhill Cranes and other crane species are susceptible to collisions with power lines and by avoiding wind farms can have their migratory routes displaced (Navarette and Griffis-Kyle 2016; Dwyer *et al.* 2019; Gerber *et al.* 2020; Pearse *et al.* 2021). Careful consideration of crane migratory routes and overnight resting sites is therefore essential in planning the locations, size and mitigation of new wind farms in this area. Collisions by cranes with power lines can be greatly reduced with appropriate mitigation (Dwyer *et al.* 2019).

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