BIRTLE TRANSMISSION PROJECT

Sharp-tailed Grouse Lek Monitoring 2017–2022

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ENVIRONMENTAL MONITORING PLAN

Sharp-tailed Grouse Lek Monitoring 2017–2022

Prepared for

Manitoba Hydro, Licensing & Environmental Assessment Department,

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By

Wildlife Resource Consulting Services MB Inc.

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EXECUTIVE SUMMARY

The Birtle Transmission Project (the Project) is a 230 kV AC transmission line that spans 46.2 km from the Birtle South Station, through the Spy Hill-Ellice Community Pasture, to the Saskatchewan border. Project construction began in July 2020 and was completed by March 2021.

The Spy Hill-Ellice Community Pasture, which may be subject to disturbance due Project construction and operation, provides grazing for livestock and important habitat for sharp-tailed grouse (*Tympanuchus phasianellus*), which were identified as a Species of Conservation Concern in the Birtle Transmission Project Environmental Assessment Report because they are susceptible to disturbance and predation. In spring, sharp-tailed grouse assemble at grassy areas called leks to mate. As described in the Birtle Transmission Project Environmental Monitoring Plan, the objectives of sharp-tailed grouse lek surveys were to identify the location of sharp-tailed grouse within or near the Project footprint to conduct a Before-After-Control-Impact study; to monitor perching avian predators near the transmission line and compare their abundance relative to nearby reference sites; and to determine the effectiveness of mitigation measures and, if appropriate, propose revisions to the existing plans or develop new mitigation options should unexpected impacts to sharp-tailed grouse occur as a result of construction or operation activities.

Pre-construction surveys for sharp-tailed grouse leks conducted in 2017 and 2020 were continued in 2021 and 2022, the first and second years after Project construction. In 2022, observers visited leks identified in previous survey years and travelled along roads and trails in the Spy Hill-Ellice Community Pasture, looking and listening for sharp-tailed grouse activity. When a lek was identified the number of birds attending it was counted. Females were not differentiated from males. Statistical analyses were conducted to compare the abundance of grouse at potentially affected leks within 1,000 m of the transmission line and reference leks farther away before and after Project construction.

To monitor the effectiveness of perch deterrents, surveys were conducted at four sites where they were installed on transmission towers and at two sites where they were not. At each site, two tower spans (three towers) were monitored for one hour by an observer who noted the species and behaviour of raptors (falcons, hawks, eagles) and of black-billed magpie (*Pica hudsonia*), common raven (*Corvus corax*), and American crow *(Corvus brachyrhynchos*), which are common nest predators. Each site was surveyed eight times in 2021 and in 2022. The number of perching avian predators was compared at sites with and without perch deterrents.

Operation monitoring indicated that:

- Fewer sharp-tailed grouse and sharp-tailed grouse leks were observed in the Spy Hill-Ellice Community Pasture after Project construction than before. As the number of both potentially affected and reference leks observed in the community pasture declined over the survey period and a larger decline in the number of sharp-tailed grouse was observed

at reference leks than at potentially affected leks, the change did not appear to be Project-related.

- The mean number of grouse at active leks was somewhat greater after Project construction than before at potentially affected and reference sites, likely due to the reduction in the number of leks in the Spy Hill-Ellice Community Pasture. There was no significant difference in the mean number of sharp-tailed grouse at potentially affected or reference sites before or after Project construction, suggesting that the change was not Project-related. The decline of sharp-tailed grouse leks in the study area from 2017 to 2022 was attributed to the grouse population cycle.

- Very few incidences of an avian predator perching on a transmission tower in the Spy Hill-Ellice Community Pasture were observed over a two-year survey period. No avian predators were observed perching on the perch deterrents; all were observed on other parts of the towers. The mitigation prescription for dissuading birds from perching appears to be unnecessary, particularly for raptors.

Sharp-tailed grouse lek monitoring has concluded. No unanticipated effects on sharp-tailed grouse due to Project construction or operation activites were observed and no further mitigation is recommended.

STUDY TEAM

Biologists who designed, participated in, and drafted the survey results included:

- Robert Berger – Design and reporting
- Andrea Ambrose – Analysis and reporting
- Ken DeSmet – Data collection
- Timothy Kroeker – Data collection

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1.0 INTRODUCTION

The Birtle Transmission Project (the Project) is a 230 kV AC transmission line that spans 46.2 km from the Birtle South Station, through the Spy Hill-Ellice Community Pasture, to the Saskatchewan border. Project construction began in July 2020 and was completed by March 2021. The transmission line right-of-way (ROW), described as the Project footprint, is approximately 184 hectares (ha) in area and is where most direct effects were expected to occur. There are two intact native mixed-grass prairies in the Project region, the Spy Hill-Ellice and Ellice-Archie community pastures, which encompass a combined 23,000 ha (Manitoba Hydro 2018). These flat, open pastures provide grazing for livestock and important habitat for sharp-tailed grouse (*Tympanuchus phasianellus*), which were identified as a Species of Conservation Concern in the Birtle Transmission Project Environmental Assessment Report (Manitoba Hydro 2018) because they are susceptible to disturbance and predation. In spring, sharp-tailed grouse assemble at grassy areas called leks to mate (Taylor 2003). Males dance, coo, and rattle to attract females, which begin to congregate in mid-April, and the mating season ends in June (Taylor 2003).

The Project may increase the availability of perching, nesting, or roosting sites for avian predators (eagles, hawks, and falcons) in a landscape where these habitat attributes are relatively scarce, potentially resulting in increased predation and avoidance of the transmission line by sharp-tailed grouse (Dinkins et al. 2014; Hovick et al. 2014). Sharp-tailed grouse are also vulnerable to collisions with transmission wires (Bevanger 1998; Rioux et al. 2013), which could result in increased injury or mortality. Potential Project effects on sharp-tailed grouse were predicted to be adverse, small to moderate in magnitude, local, and long-term.

Mitigation for the potential increase in avian predators and the risk of grouse-wire collisions included routing the Project through forested areas where possible and minimizing the number of tower spans crossing the Spy Hill-Ellice Community Pasture. Bird diverters, which have been proven to reduce bird-wire collisions (Morkill and Anderson 1991; Brown and Drewien 1995; Barrientos et al. 2012) were installed on the ground conductor wires to increase their visibility to birds. Alternating sequences of Swan-Flight™ Bird Diverters and Bird Flight Diverters (Photo 1) were employed. Perch deterrents were added to the upper arms of the support towers to dissuade avian predators from perching or nesting (Photo 2).

As described in the Birtle Transmission Project Environmental Monitoring Plan (Manitoba Hydro 2020), the objectives of sharp-tailed grouse lek surveys were to identify the location of sharp-tailed grouse within or near the Project footprint to conduct a Before-After-Control-Impact study; to monitor perching avian predators near the transmission line and compare their abundance relative to nearby reference sites; and to determine the effectiveness of mitigation measures and, if appropriate, propose revisions to the existing plans or develop new mitigation options should unexpected impacts to sharp-tailed grouse occur as a result of construction or operation activities.

Photo 1: **Alternating sequence of Swan-Flight™ Bird Diverters (bottom left) and Bird Flight Diveters (bottom right) on the Birtle Transmission Project (Linestar Utility Supply 2021; Preformed Line Products 2021)**

Photo 2: Perch deterrents on the upper arms of support tower

2.0 METHODS

2.1 SHARP-TAILED GROUSE LEK SURVEY

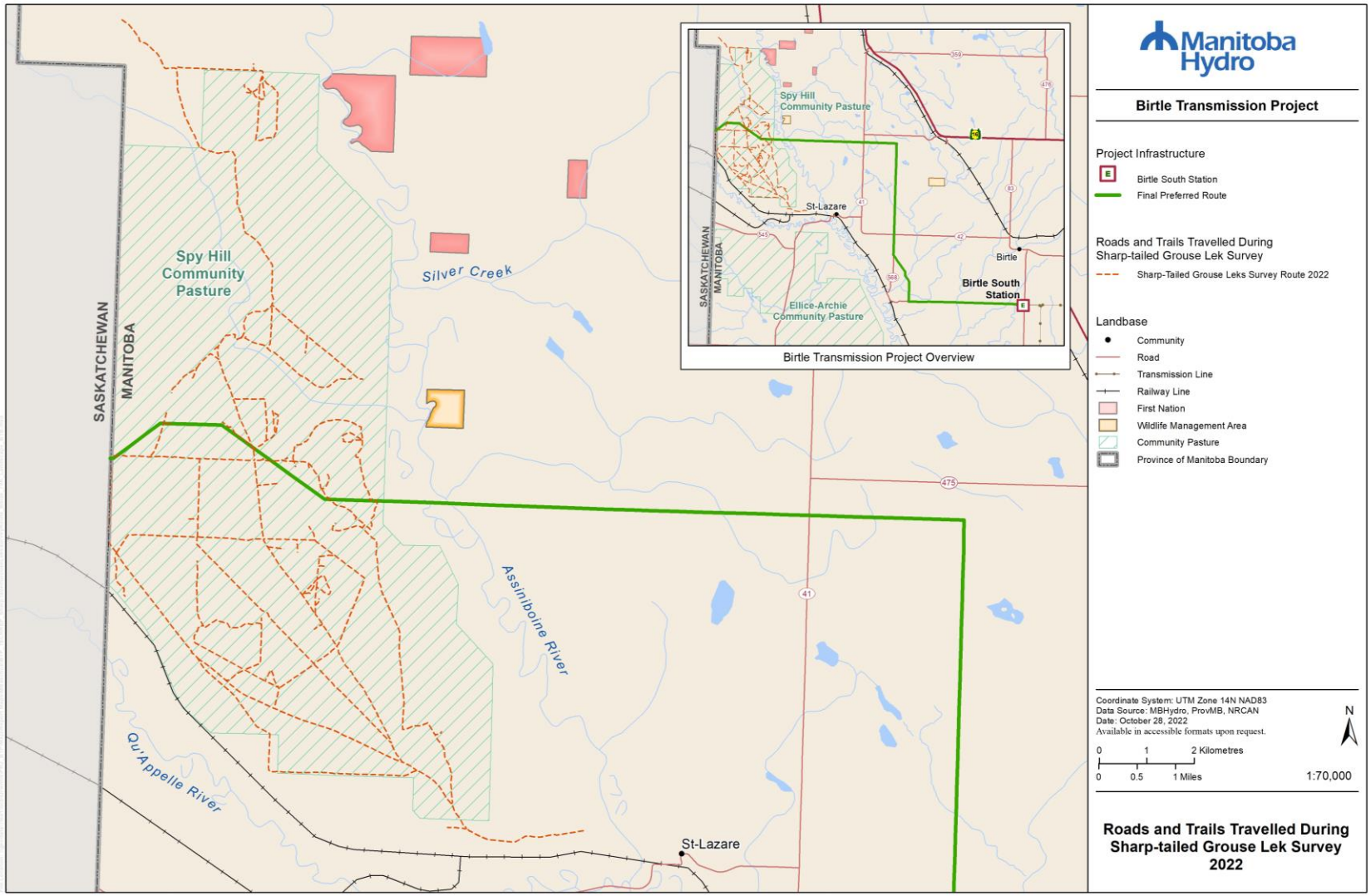
In spring 2017, a baseline sharp-tailed grouse study was conducted in the Project region, which was incorporated into the description of the existing environment. The study, which focused on sharp-tailed grouse on their leks, was repeated in spring 2020 to describe the pre-construction population; in spring 2021, the first year after project construction; and in spring 2022, the final year of monitoring as described in the Environmental Monitoring Plan.

In 2022, sharp-tailed grouse lek surveys were conducted from May 4 to 6. Two observers surveyed by vehicle and on foot from a half hour before sunrise until 8:30 a.m., when grouse were most likely to be active at leks. Observers visited leks identified in previous survey years and travelled along roads and trails in the Spy Hill-Ellice Community Pasture, looking and listening for sharp-tailed grouse activity every 500 m (Map 1). When a lek was identified, the location was georeferenced with a hand-held Global Positioning System (GPS) unit and the observer used binoculars to passively count the number of birds. Following the passive count, the observer

approached the lek and counted the birds flushed to obtain a more accurate indication of the number attending the lek (Drummer et al. 2011). Females were not differentiated from males. Lek surveys were conducted approximately two weeks later in 2022 than in previous years because deep snow impeded access to the community pasture.

A permit was obtained from the Spy Hill-Ellice Community Pasture Association before the survey and observers worked closely with the pasture manager to ensure that access to and travel in the area was approved. Biosecurity protocols were followed, including decontaminating vehicles and boots prior to and after the survey.

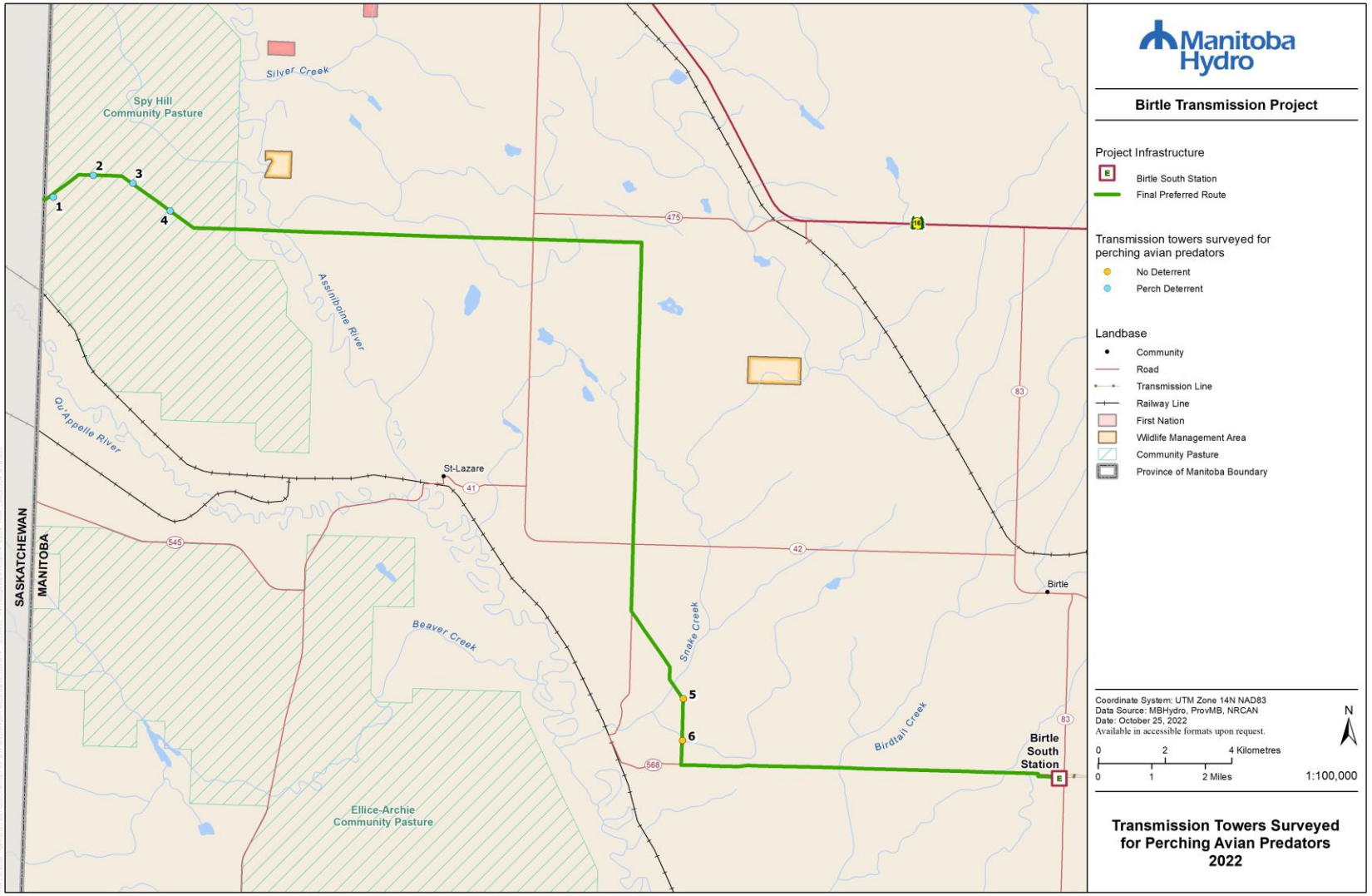
Sharp-tailed grouse leks within 1,000 m of the ROW centreline were considered potentially affected by the Project and leks more than 1,000 m from the ROW centerline were considered reference sites. Because leks were surveyed each year after they were initially observed, observers recorded each lek that was not in its original position as new. However, active sharp-tailed grouse leks are typically spaced 1 to 2 km apart (Gratson 1983; Baydack 1986; Niemuth and Boyce 2004; Vodehnal et al. 2020) and can range from approximately 100 to 1,200 m² in area (Baydack 1986). For the final analysis, leks spaced less than 150 m apart and where grouse were never observed during the same year, or leks that were identified as possible satellites (nearby and used by fewer males) of another lek during a survey were considered a single lek. Areas where grouse were observed but no mating activity was confirmed during any of the survey years were removed from the analysis. The mean number of sharp-tailed grouse at the remaining active potentially affected and reference leks was compared with statistical *t*-tests (McDonald 2014). Results were also compared before (2017 and 2020) and after (2021 and 2022) Project construction. Significance was determined at the $\alpha = 0.05$ level.



Map 1: Roads and trails travelled during sharp-tailed grouse lek survey, 2022

2.2 PERCH DETERRENT EFFECTIVENESS SURVEY

Perch deterrent effectiveness surveys that began in spring 2021 were repeated from May 2 to 5 and June 20 to 23, 2022. Six sites were surveyed, four at transmission towers where perch deterrents were installed (see Photo 2) and two at transmission towers with no deterrents (Map 2). At each site, two tower spans (three towers) were monitored for one hour by an observer who noted the species and behaviour of raptors (falcons, hawks, eagles) and of common raven (*Corvus corax*), American crow *(Corvus brachyrhynchos*), and black-billed magpie (*Pica hudsonia*), which are common nest predators. The total number of observations of each species perching was recorded each day, as it was not possible to determine whether an individual was returning to the location or if more than one was observed. Each site was surveyed daily over the four-day period in May. In June, sites with perch deterrents were surveyed daily over the four-day period and sites without deterrents were surveyed four times over three days, with morning and afternoon surveys on June 21. A total of 16 man-hours were surveyed in May and June. The number of perching avian predators was compared at sites with and without perch deterrents.



Map 2: Transmission towers surveyed for perching avian predators, 2022

3.0 RESULTS

3.1 SHARP-TAILED GROUSE LEK SURVEY

Six sharp-tailed grouse leks were found in the Spy Hill-Ellice Community Pasture during lek surveys in May 2022 and an additional one (site 029) was found during grassland habitat bird species of conservation concern monitoring surveys in June 2022 (Map 3), all of which had been used by sharp-tailed grouse during at least one previous survey year (Table 1). No new leks were found in 2022. Fewer leks were observed in 2022 (n = 7), the second year after Project construction, than in 2017 (n = 25) and 2020 (n = 14), before Project construction. Fewer leks were also observed in 2022 than in 2021 (n = 9), the first year after construction. There was a 44% decrease in the number of leks observed from 2017 to 2020, a 36% decrease from 2020 to 2021, and a 22% decrease from 2021 to 2022. In all, 35 leks were identified in the community pasture over the four-year survey period, one of which was not re-visited in 2022 (Appendix A, Table A-1). The number of sharp-tailed grouse observed on leks in the community pasture also declined over the survey period, from 182 in 2017 to 115 in 2022 (Figure 1). The largest decline (30%) was from 2017 to 2020, during the pre-construction period. Twenty-one sharp-tailed grouse were incidentally observed perching, foraging, or flying in the community pasture in 2022.

Table 1: Number of sharp-tailed grouse observed at seven leks in the Spy Hill-Ellice Community Pasture, 2022

Site	UTM Location	Distance from ROW (m)	Number of Grouse	Previous Years Used
001	Redacted	606	36	2017, 2020, 2021
002		1,327	7	2017, 2020, 2021
005		4,837	15	2017, 2021
008		3,734	10	2021
010		5,808	10	2021
014		1,361	20	2020
029[1]		495	17	2017

1. Observed during grassland habitat bird species of conservation concern monitoring 2022.

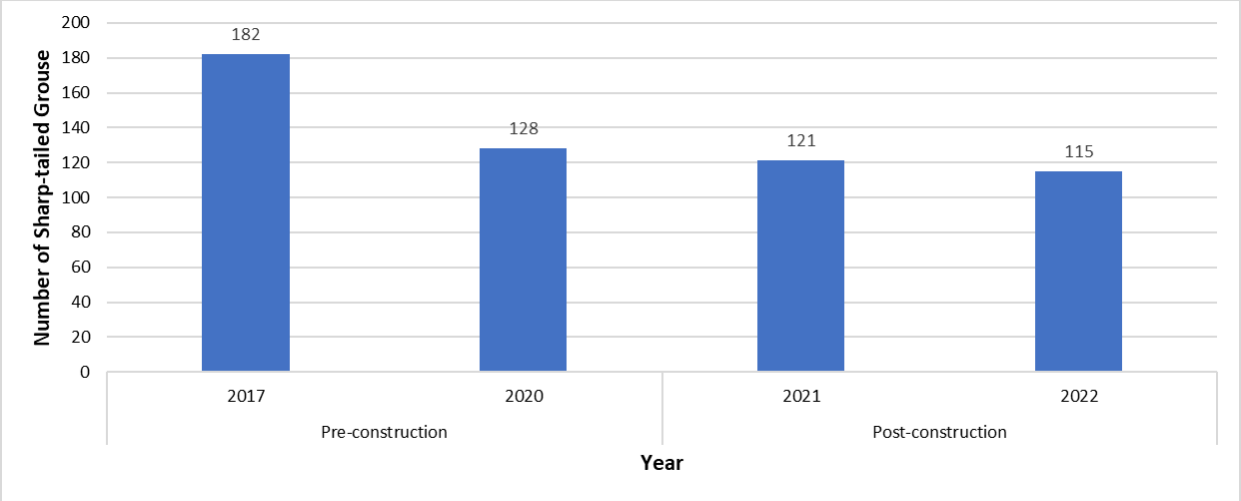


Figure 1: Number of sharp-tailed grouse observed on leks in the Spy Hill-Ellice Community Pasture before and after Project construction

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Map 3: Sharp-tailed grouse lek locations in the Spy Hill-Ellice Community Pasture, 2022

The number of potentially affected sharp-tailed grouse leks observed in the Spy Hill-Ellice Community Pasture declined from 2017 to 2020, before Project construction, declined from 2020 to the first year after construction in 2021, and remained the same from 2021 to 2022 (Table 2). The number of reference leks declined each survey year.

Table 2: Number of potentially affected and reference sharp-tailed grouse leks in the Spy Hill-Ellice Community Pasture before and after Project construction

Site Type	Pre-construction		Post-construction	
	2017	2020	2021	2022
Potentially affected	11	5	2	2
Reference	14	9	7	5

The number of sharp-tailed grouse observed on potentially affected leks in the Spy Hill-Ellice Community Pasture declined from 2017 to 2020, before Project construction, remained the same in 2021, and increased in 2022 (Figure 2). There was a 50% difference in the greatest (70 in 2017) and lowest (42 in 2020 and 2021) number of grouse observed on potentially affected leks in the community pasture. The number of sharp-tailed grouse observed on reference leks declined from 2017 to 2022. There was a 57% difference in the greatest (112 in 2017) and smallest (62 in 2022) number of grouse observed on reference leks in the community pasture. The decline in the number of sharp-tailed grouse appeared to be greater on reference than potentially affected leks over the survey period (Figure 2).

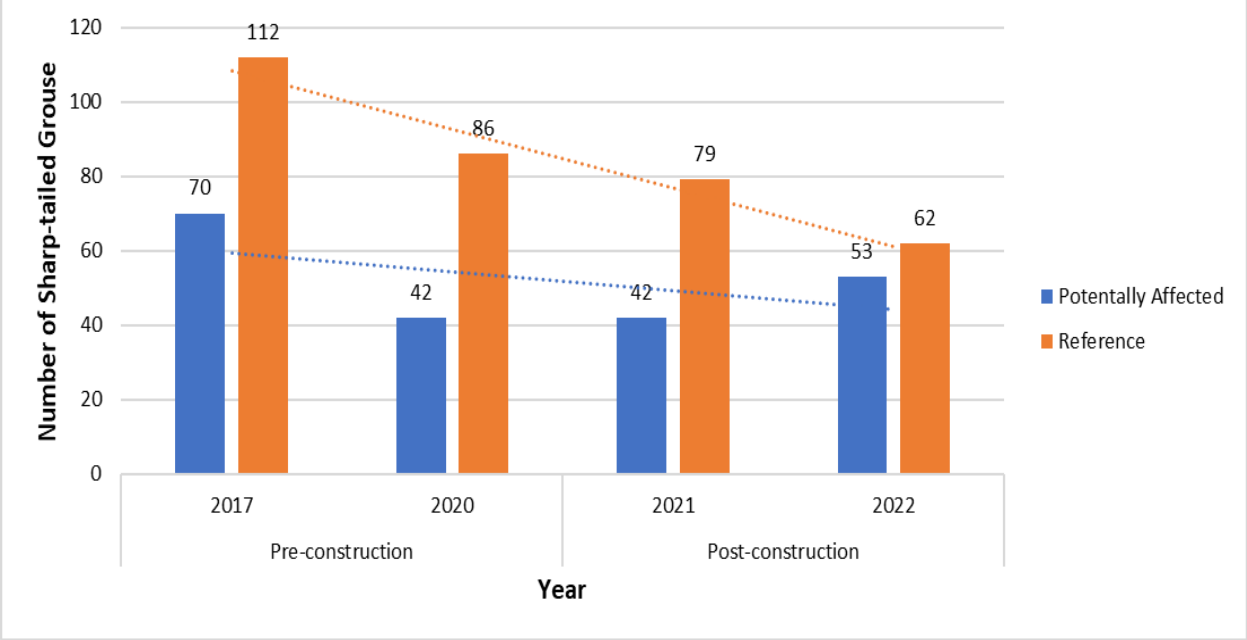

Figure 2: Number of sharp-tailed grouse observed at potentially affected and reference leks in the Spy Hill-Ellice Community Pasture before and after Project construction

At active leks, the mean number of sharp-tailed grouse observed was greater after Project construction (2021 and 2022) than before (2017 and 2020) at potentially affected sites, but the difference was not significant (Table 3). The mean number of grouse was also greater after construction than before at reference leks, with no significant difference. Before Project construction, the mean number of sharp-tailed grouse was lower at potentially affected leks than reference leks, but the difference was not significant (t = 2.03, p = 0.45). After Project construction, the mean number of grouse was greater at potentially affected than reference leks, with no significant difference (t = 3.18, p = 0.14).

Table 3: Mean number of sharp-tailed grouse observed at potentially affected and reference leks in the Spy Hill-Ellice Community Pasture before (2017 and 2020) and after (2021 and 2022) Project construction

	Pre-construction			Post-construction				
Site Type	**Range**	**Mean**	**SD**	**Range**	**Mean**	**SD**	***t***	***p***
Potentially affected	2–19	7.0	5.1	11–36	23.8	11.7	3.18	0.07
Reference	2–30	8.6	7.3	6–20	11.8	4.6	2.03	0.19

3.2 PERCH DETERRENT EFFECTIVENESS SURVEY

A total of 17 observations of avian predators perched on transmission towers were made in 2021 and 13 in 2022 (Appendix A, Table A-2). Only five instances of raptors perched on transmission towers were recorded over the two-year survey period (Table 4). A pair of red-tailed hawks (*Buteo jamaicensis*) were observed perched at a nest below the deterrents on a tower at site 3 in May 2022. The other three observations were of a rough-legged hawk (*Buteo lagopus*), an American kestrel (*Falco sparverius*), and a red-tailed hawk perched on a tower with no deterrents at site 5. All were observed on different days in 2021. More nest predators were observered on transmission towers with perch deterrents than without in 2021 and 2022. The mean number of nest predators was also greater on towers with perch deterrents both years. Common ravens accounted for 88% (n = 23) of the 26 total observations of perched nest predators over the two-year survey period. American crow (n = 2) and black-billed magpie (n = 1) were also observed. No avian predators were observed perching on the perch deterrents.

Table 4: Raptors and nest predators perched at sites with and without perch deterrents, 2021 and 2022

Perch Deterrents	Site	Number of Raptors		Number of Nest Predators	
		2021	2022	2021	2022
Yes	1	0	0	0	2
	2	0	0	0	2
	3	0	2	11	5
	4	0	0	1	3
	Total	0	2	12	12
	Mean	0	0.5	3.0	3.0
	SD	–	0.8	5.4	1.4
No	5	3	0	2	0
	6	0	0	0	0
	Total	3	0	2	0
	Mean	1.5	0	1.0	0
	SD	2.1	–	1.4	–

4.0 DISCUSSION

Fewer sharp-tailed grouse and sharp-tailed grouse leks were observed in the Spy Hill-Ellice Community Pasture in 2022 than in 2017, 2020, and 2021. In 2022, there was no activity at 27 sites where lekking was observed during at least one of the previous years. Lekking was observed at 21 of these sites for a single year only, 15 in 2017, five in 2020, and one in 2021. Some were temporary satellite leks. A total of 14 leks were observed during two or more survey years. Of these, seven were not observed in 2022 including four (two potentially affected sites and two reference sites) that were not observed after Project construction. The apparent decline in the number of grouse in the community pasture may be due in part to variability in their observability, as suggested in 2022 by the mating activity at site 029 detected only during a later survey. Sharp-tailed grouse populations may fluctuate naturally in about 10-year cycles (Keith 1963) and also from year to year due to habitat availability, food abundance, grazing practices, predator abundance, and weather (Goddard and Dawson 2009; Geaumont and Graham 2020). As the number of both potentially affected and reference leks observed in the community pasture declined over the four-year survey period and a larger decline in the number of sharp-tailed grouse was observed at reference leks than at potentially affected leks, the change did not appear to be Project-related.

Fewer leks were observed in the Spy Hill-Ellice Community Pasture after Project construction than before; however, the mean number of grouse at active leks was somewhat greater after Project construction at potentially affected and reference sites. While a reduction in the number of smaller leks results in an overall decline when compared year to year, average lek size tends to increase or remain the same (Roy 2019). However, the loss of small leks, their amalgamation with others, and inconsistent lek attendance by grouse can indicate a declining population (Lumsden 1965, Cannon and Knopf 1981, and Wells 1985 in Baydack 1986; Roy and Coy 2021),

particularly when fewer birds are counted (Roy 2021). There was no significant difference in the mean number of sharp-tailed grouse at potentially affected or reference sites before or after Project construction, suggesting that the change was not Project-related. No unanticipated effects on sharp-tailed grouse due to Project construction or operation activites were observed and no further mitigation is recommended.

Very few incidences of an avian predator perching on a transmission tower in the Spy Hill-Ellice Community Pasture were observed over a two-year survey period. No avian predators were observed perching on the perch deterrents; all were observed on other parts of the towers. Based on spring surveys, the mitigation prescription for dissuading birds from perching appears to be unnecessary in the community pasture given the rarity of attempted landings on towers, particularly for raptors. No further mitigation is recommended.

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APPENDIX A
Tables

Table A-1; Number of sharp-tailed grouse observed at leks in the Spy Hill-Ellice Community Pasture before and after Project construction

Site	UTM Location	Pre-construction		Post-construction		Distance from ROW (m)
		2017	2020	2021	2022	
001	REDACTED	15	19	31	36	606
002		30	12	19	7	1,327
003		9	18	10	0	6,699
004		0	12	11	0	617
005		24	0	8	15	4,837
006		4	16	0	0	5,411
007		0	0	9	0	2,245
008		0	0	11	10	3,734
010		0	0	16	10	5,808
012		0	4	0	0	666
013		0	3	0	0	714
014		0	9	0	20	1,361
017		0	7	0	0	1,939
019		0	11	0	0	6,214
020		0	6	0	0	7,312
022		11	0	0	0	13
023		10	0	0	–	22
025		4	0	0	0	148
026		3	0	0	0	340
027		3	0	0	0	481
028		2	4	0	0	483
029		6	0	0	17	495
030		8	0	0	0	567
031		2	0	0	0	753
032		6	0	0	0	858
033		8	5	0	0	1,264
034		3	0	0	0	1,380
036		2	0	0	0	1,629
037		10	2	0	0	1,760
039		5	0	0	0	3,616
040		2	0	6	0	3,731
041		6	0	0	0	4,483
042		3	0	0	0	5,286
043		4	0	0	0	5,602
044		2	0	0	0	6,371

Table A-2: Raptors and nest predators observed perched on transmission towers during perching avian predator surveys, 2021 and 2022

Year	Perch Deterrents	Site	Centre Tower Location	Date	Type	Common Name	Scientific Name	Number Perched
2021	Yes	1	14 U 324678 5599456	–	–	–	–	0
		2	14 U 325878 5600107	–	–	–	–	0
		3	14 U 327076 5599870	20-Apr	Nest predator	Common raven	*Corvus corax*	1
				21-Apr	Nest predator	Common raven	*Corvus corax*	3
				22-Apr	Nest predator	Common raven	*Corvus corax*	4
				23-Apr	Nest predator	Common raven	*Corvus corax*	3
		4	14 U 328190 5599037	22-Apr	Nest predator	Common raven	*Corvus corax*	1
	No	5	14 U 343606 5584402	21-Apr	Nest predator	Common raven	*Corvus corax*	1
				22-Apr	Raptor	Rough-legged hawk	*Buteo lagopus*	1
				20-Jun	Raptor	Red-tailed hawk	*Buteo jamaicensis*	1
				23-Jun	Nest predator	Black-billed magpie	*Pica hudsonia*	1
				24-Jun	Raptor	American kestrel	*Falco sparverius*	1
		6	14 U 343581 5583145	–	–	–	–	0
2022	Yes	1	14 U 324678 5599456	3-May	Nest predator	Common raven	*Corvus corax*	2
		2	14 U 325878 5600107	20-Jun	Nest predator	American crow	*Corvus brachyrhynchos*	2
		3	14 U 327076 5599870	2-May	Nest predator	Common raven	*Corvus corax*	1
				4-May	Nest predator	Common raven	*Corvus corax*	1
				5-May	Raptor	Red-tailed hawk	*Buteo jamaicensis*	1
				5-May	Nest predator	Common raven	*Corvus corax*	3
		4	14 U 328190 5599037	4-May	Nest predator	Common raven	*Corvus corax*	3
	No	5	14 U 343606 5584402	–	–	–	–	0
		6	14 U 343581 5583145	–	–	–	–	0

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