

Lake Winnipeg East System Improvement (LWESI)
Transmission Project

Bird Species of Conservation Concern

Construction Monitoring Report 2016



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Prepared for:

Licensing and Environmental Assessment Department

Manitoba Hydro

By

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TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	METHODS.....	3
3.0	RESULTS.....	9
4.0	DISCUSSION.....	14
5.0	LITERATURE CITED	16
	APPENDIX A	17
	APPENDIX B	20
	APPENDIX C	23
	APPENDIX D	31

LIST OF TABLES

Table 2-1:	General habitat type at 58 recording sites.....	5
Table 2-2:	Recording sites and the number of recordings at each site.....	5
Table 3-1:	Common nighthawk detections at 20 comparison sites and 20 sites on the right-of-way	9
Table 3-2:	Eastern whip-poor-will detections at 20 comparison sites and 20 sites on the right-of-way.....	9
Table 3-3:	Common nighthawk detections in four general habitat types	12
Table 3-4:	Eastern whip-poor-will detections in four general habitat types	12

LIST OF FIGURES

Figure 2-1:	Spectrogram of common nighthawk calls.....	6
Figure 2-2:	Spectrogram of eastern whip-poor-will calls	7

LIST OF MAPS

Map 2-1:	Audio recorder locations	4
Map 3-1:	Common nighthawk detections at paired sites.....	10
Map 3-2:	Eastern whip-poor-will detections at paired sites.....	11

LIST OF PHOTOS

Photo 2-1:	A programmable four-microphone audio recorder on the right-of-way	3
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1.0 INTRODUCTION

Manitoba Hydro is committed to environmental protection, which includes the development of a comprehensive Environmental Protection Program (EPP) for the Lake Winnipeg East System Improvement Transmission Project (the 'Project'). One aspect of the program is monitoring and follow-up for biophysical environmental components identified in the Lake Winnipeg East System Improvement (LWESI) Transmission Project Site Selection and Environmental Assessment (SSEA).

Manitoba Hydro collected baseline data as part of the SSEA development, and has gathered and collected additional data for avian populations as part of the Avian Biophysical Monitoring Plan. This document describes the monitoring activities that occurred for bird species of conservation concern during the construction phase of Project development.

The purpose of the Avian Biophysical Monitoring Plan is to monitor Project effects as identified in the Lake Winnipeg East System Improvement Transmission Project Environmental Act Proposal and Environmental Protection Plan (EAP/EPP), and Environment Act Licence conditions and the key activities conducted for the monitoring and follow-up component of the EPP.

Common nighthawk (*Chordeiles minor*) and eastern whip-poor-will (*Caprimulgus vociferus*, also *Antrastomus vociferous*) are listed as Threatened under the federal *Species at Risk Act* and under *The Endangered Species and Ecosystems Act* of Manitoba. They are more abundant than other bird species of conservation concern in the study area, thus can be more effectively monitored than species whose ranges overlap the study area but have not been detected within it, or that are so sparse that their presence cannot reliably be detected.

Environment Canada described the habits and habitats of common nighthawk (Environment Canada 2016) and eastern whip-poor-will (Environment Canada 2015). These species nest on the ground in a range of open habitats, including forest clearings and edges, and forage on flying insects in open areas. These members of the nightjar family blend in with their surroundings and are mainly active at dusk and dawn (common nighthawk) or at night (eastern whip-poor-will) (Environment Canada 2015,

2016), making them difficult to detect during traditional daytime surveys. As such, remote audio recorders were programmed to record over several nights, to measure common nighthawk and eastern whip-poor-will activity in the study area. Call frequency provided an indication of habitat suitability at sites on the cleared transmission line right-of-way and at similar comparison sites, for an assessment of potential Project effects on these species.

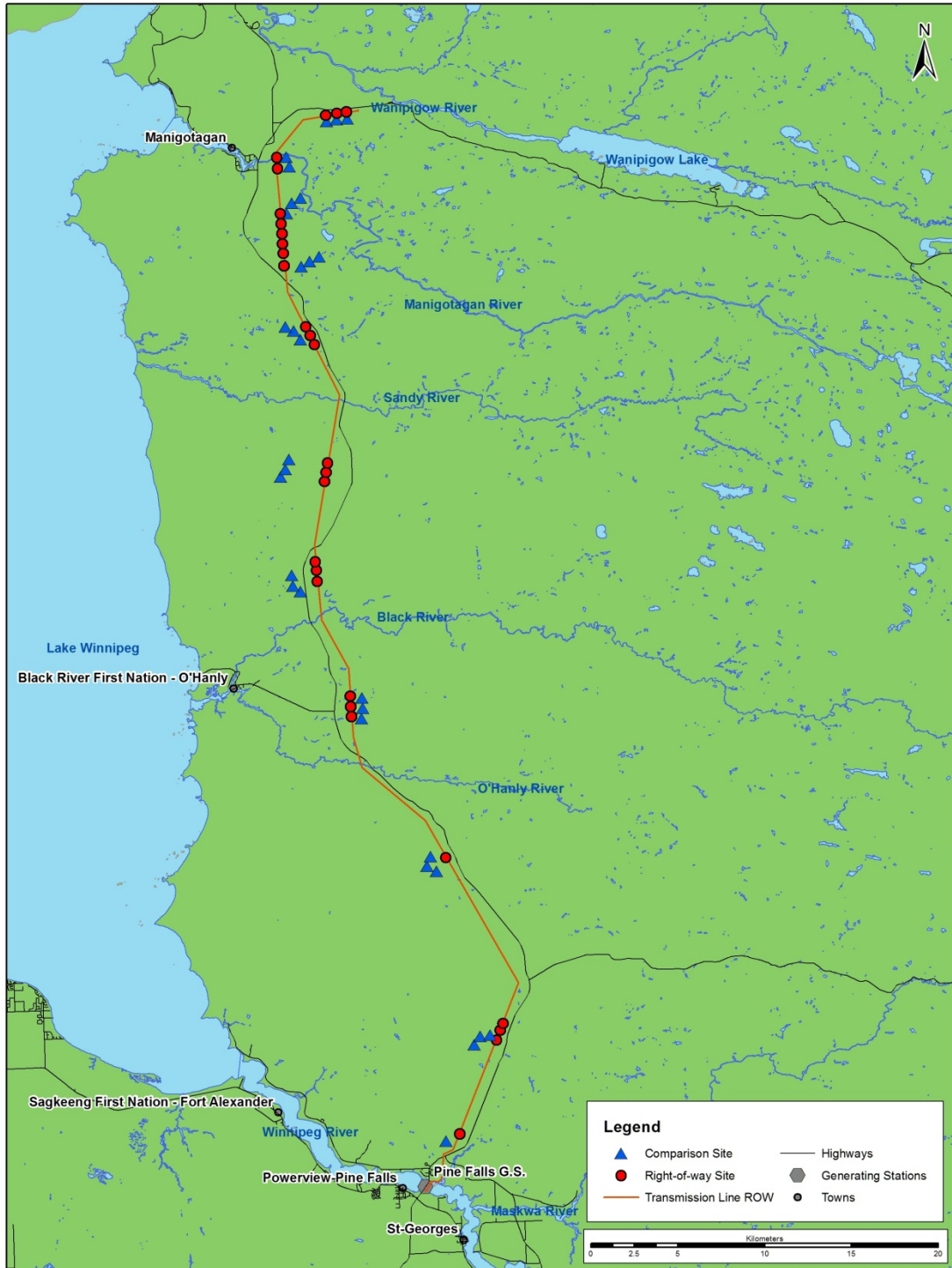
Transmission lines and linear features can affect the quality of habitat for bird species in different ways. Because common nighthawk require open areas for feeding and nesting, and similarly, eastern whip-poor-will require edge habitat to maintain their life functions, a new transmission line right-of-way could improve habitat in areas where forest cover is continuous. The additional edge formed by a transmission line right-of-way is unlikely to substantially alter common nighthawk or eastern whip-poor-will habitat in areas with natural patchy forest openings.

2.0 METHODS

Common nighthawk and eastern whip-poor-will were monitored during the construction phase to identify potential effects of the cleared right-of way on these species. Programmable four-microphone audio recorders were placed at 58 locations in the LWESI Transmission Project study area to record common nighthawk and eastern whip-poor-will calls. Recorders were placed at thirty sites June 13 and 14, 2016 and were removed June 27 and 28 (period 1). The recorders were relocated to 28 sites from June 28 to 30, and were removed July 28 and 29 (period 2). In all, 28 recorders were placed at the edge of the cleared ROW (Photo 2-1) and 30 recorders were placed at nearby comparison sites (Map 3-1) in order to compare the amount of common nighthawk and eastern whip-poor-will activity on or near the newly disturbed ROW with similar but undisturbed areas. The initial study design included 30 sites on the ROW paired with 30 forest openings in nearby undisturbed habitat (comparison sites). However, during the second period two sites on the ROW were inaccessible due to beaver flooding and no recorders were deployed.



Photo 2-1: A programmable four-microphone audio recorder on the right-of-way



Map 2-1: Audio recorder locations

Potential sites were initially identified with Forest Resource Inventory maps and 60 were selected using Google Earth and professional judgment. Suitable sites were at least 1 hectare in size, a minimum of 500 metres apart, and consisted of burns located near unburned forest edge, stands of medium-sized conifer or mixed forest next to an opening, and open areas including forestry cutovers (i.e., “an area of forest from which some or all of the timber has recently been cut) and bedrock surrounded by forest. Recorders were placed in six general habitat types, all of which were expected to be suitable for the two species (Table 2-1).

Table 2-1: General habitat type at 58 recording sites

Habitat	Number of Sites
Bog	2
Conifer dominated	6
Conifer forest	2
Cutover	6
Mixedwood forest	14
Treed rock	28

Audio recorders were programmed to record for five minutes every ten minutes from approximately 8:30 p.m. to approximately 12:30 a.m. Some recordings began at 8:20 p.m. Typically, 24 recordings were made each night. One recorder on the ROW malfunctioned and no data were collected. In all, recordings were made at 30 comparison sites and at 27 sites on the ROW (Table 2-2). Four recorders at comparison sites and three recorders on the ROW stopped recording within seven days of being deployed (Appendix A).

Table 2-2: Recording sites and the number of recordings at each site

Site Type	Deployment Period	Number of Sites	Number of Recordings
Comparison area	June 13 to 28	15	5,000
	June 28 to July 29	15	6,519
	Total	30	11,519
Right-of-way	June 13 to 28	15	4,843
	June 28 to July 29	12	5,633
	Total	27	10,476

Audio files were converted to spectrograms. These were reviewed by a single interpreter for common nighthawk calls (Figure 2-1), and then for eastern whip-poor-will calls (Figure 2-2). Where either of the two species was suspected their presence was confirmed aurally by listening to an appropriate portion of the corresponding recording. Audacity® audio software version 2.1.2 was used to confirm calls. All recordings were processed and enhanced using 30 decibel amplification (allow clipping). Other bird species data were processed using high/low pass filters at 1000 Hz (rolloff at 6 dB). If no calls were audible, no presence was recorded. All data were considered for a general indication of the distribution of common nighthawk and eastern whip-poor-will in the study area and the timing of their nightly activity, including the relationship between eastern whip-poor-will activity and moon phase.

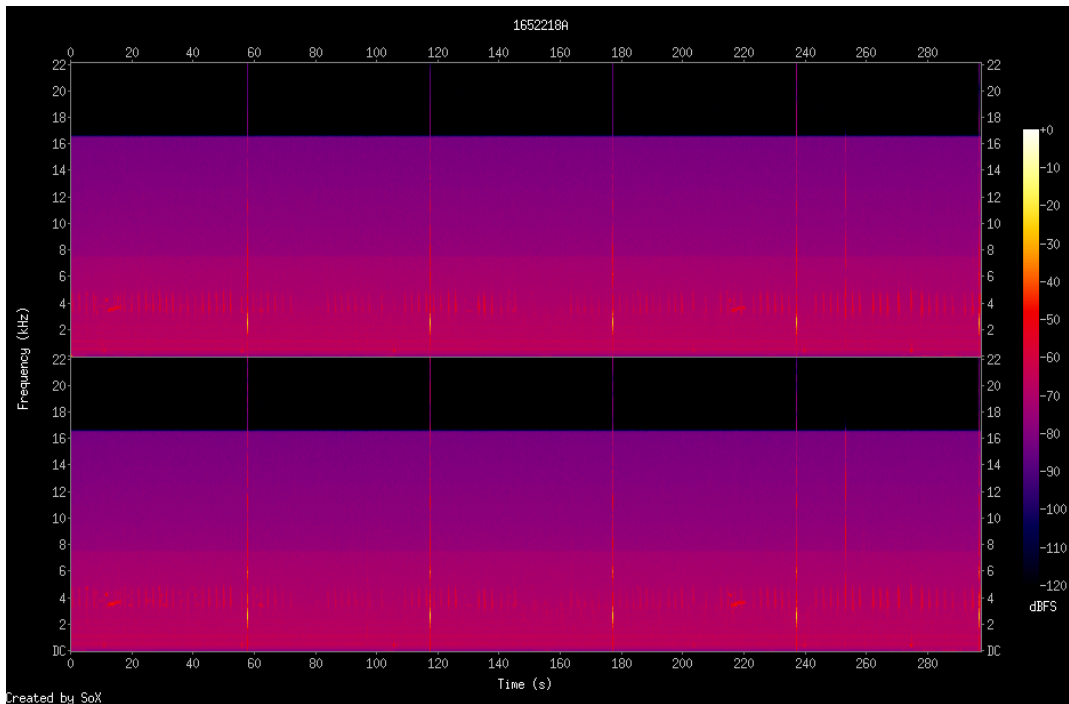


Figure 2-1: Spectrogram of common nighthawk calls

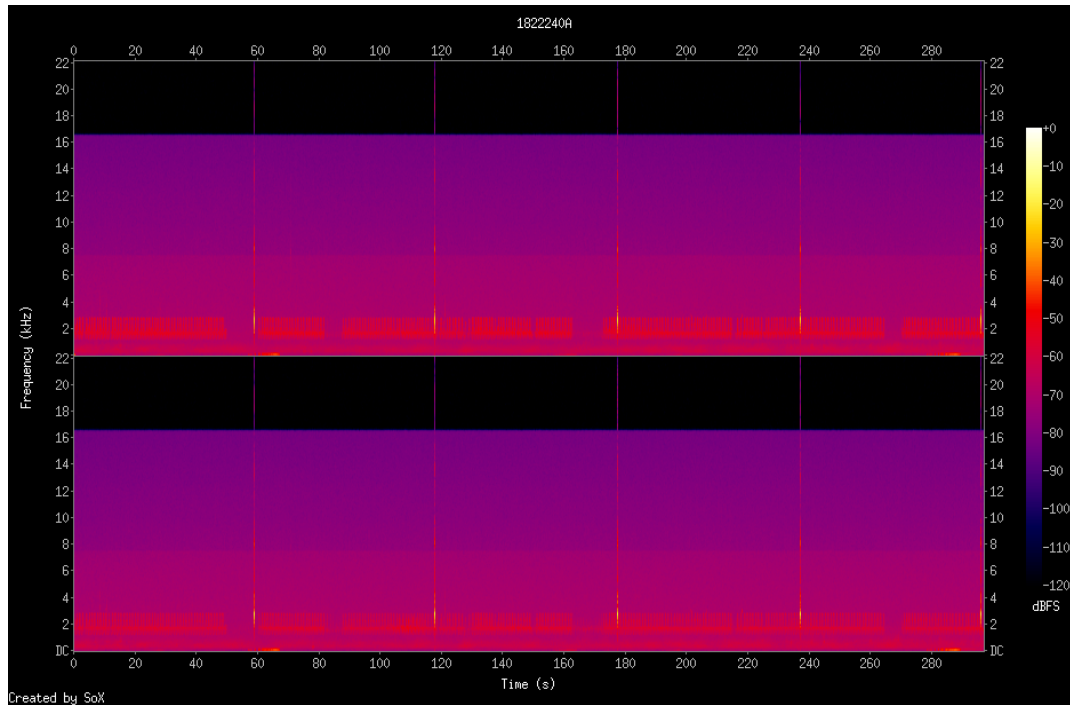


Figure 2-2: Spectrogram of eastern whip-poor-will calls

Recorders at various sites operated for different periods of time (1 to 26 nights; see Appendix A). To improve the probability of detection at each site, only recordings from the first 10 nights with favourable weather conditions were included in all statistical analyses. The night of June 19/20 during the first period and the nights of June 29/30 and July 3/4 during the second period were excluded from the analysis due to wind and rain obscuring the recordings and because of the decreased likelihood of birds calling in such weather. As a recorder at a comparison site recorded for a single rainy night, it was excluded from all analyses. The sites at which recorders functioned for fewer than 10 nights with suitable weather, their pairs, and unpaired sites (17 in total) were excluded from some statistical analyses.

Data from paired sites were used to compare the number of sites on the ROW ($n = 20$) with comparison sites ($n = 20$) at which the two species were detected (Appendix B). A two-sample t -test was used to determine if the frequency of detection of each species (the proportion of recordings on which they were detected over 10 nights) differed between the two site types. Significance was determined at the $p = 0.05$ level.

An analysis of variance (ANOVA) was performed to determine if habitat influenced the frequency of detection of common nighthawk or eastern whip-poor-will at the recording

sites. Tukey's test was performed post hoc where ANOVA results were significant, to identify habitat types whose means were significantly different from each other. Significance was determined at the $p = 0.05$ level for both tests. The number of sites surveyed in the six habitat types ranged from two to 28 (see Table 2-1). Bog and conifer forest were removed from the analysis due to low sample size ($n = 2$). In order to equalize the number of sites in the remaining four habitat types, six sites in each of mixedwood forest and treed rock were selected at random to include in the analysis. All sites for which there were ten nights of recordings were included for selection (both paired sites and the unpaired sites excluded from the comparison of site types). All six sites in conifer dominated and cutover habitat were included (Appendix B).

A sample of 112 recordings was reviewed aurally to identify other bird species at 56 sites. One recorder malfunctioned after recording for one rainy night and was not included. Recordings from the nights of June 20 (period 1) and June 30 (period 2), during the primary breeding bird season and peak dates for common nighthawk and eastern whip-poor-will calling, were selected. Two five-minute recordings were reviewed for each of the two nights, at 9:30 p.m. and 10:30 p.m. If there was a recorder malfunction, recordings from the next appropriate day and similar time were reviewed. The presence of bird species was recorded but individuals were not counted. The presence of common nighthawk and eastern whip-poor-will was also noted, to compare with visual detections from spectrograms.

3.0 RESULTS

The distribution and activity of common nighthawk and eastern whip-poor-will from June 13 to July 29 are presented in Appendix C. Recordings from all 57 sites were considered in the initial analyses. Each species was detected at more than half of comparison area and ROW sites. The following results are limited to sites at which there were 10 or more nights of recording data (Appendix D Table D–1 and Table D–2).

Of the 40 paired sites examined, common nighthawk (Table 3-1) and eastern whip-poor-will (Table 3-2) were each detected with marginally greater frequency on the ROW than at comparison sites.

Common nighthawk were recorded at most sites in the northern and southern portions of the study area, but were detected at few sites between the O'Hanly and Sandy rivers in the central portion of the study area (Map 3-1).

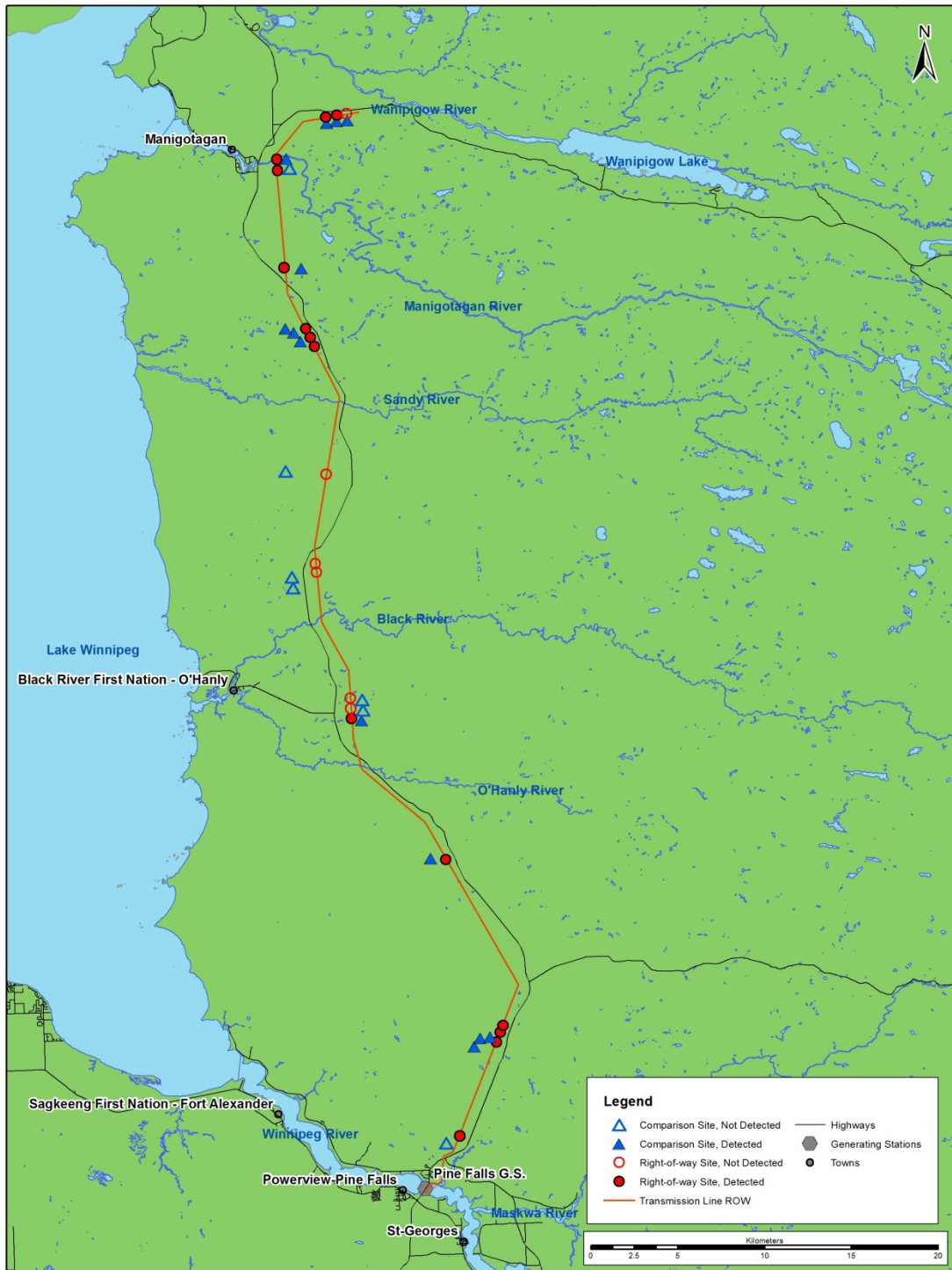
Eastern whip-poor-will were recorded at few sites in the southern portion of the study area; most were detected north of the O'Hanly River (Map 3-2). There was no statistical difference in the frequency of calls at sites on the ROW and at comparison sites for common nighthawk ($p = 0.805$) or eastern whip-poor-will ($p = 0.465$).

Table 3-1: Common nighthawk detections at 20 comparison sites and 20 sites on the right-of-way

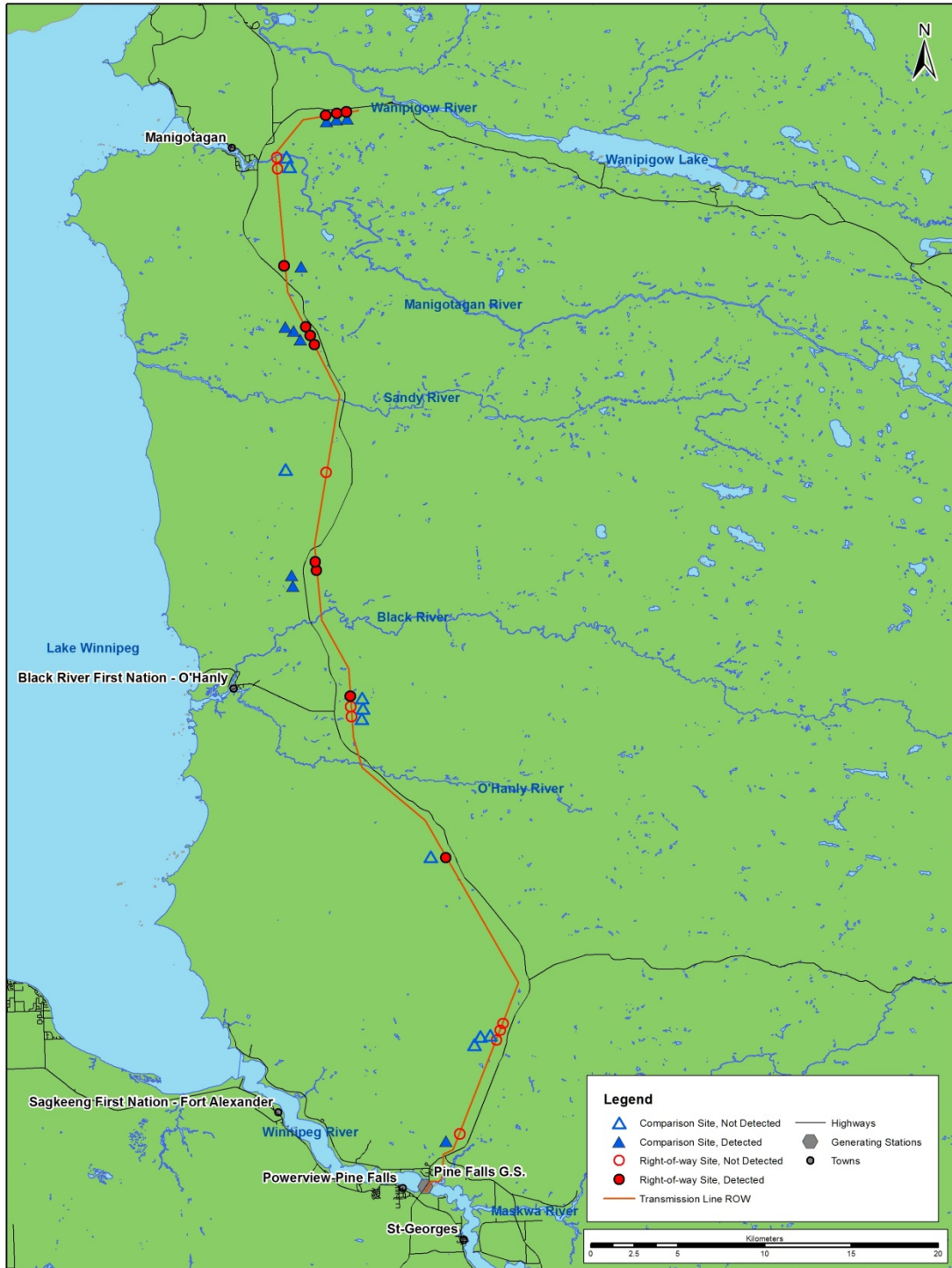
Site Type	Number of Sites at Which Detected	Mean Frequency of Detection	Standard Deviation
Comparison area	13	0.059	0.139
Right-of-way	14	0.069	0.109

Table 3-2: Eastern whip-poor-will detections at 20 comparison sites and 20 sites on the right-of-way

Site Type	Number of Sites at Which Detected	Mean Frequency of Detection	Standard Deviation
Comparison area	10	0.105	0.137
Right-of-way	11	0.077	0.101



Map 3-1: Common nighthawk detections at paired sites



Map 3-2: Eastern whip-poor-will detections at paired sites

Mean frequency of common nighthawk detections was greatest in conifer dominated and treed rock habitat (Table 3-3). There were few detections in mixedwood forest and none in cutovers. The difference in the frequency of common nighthawk detections among the four habitat types was not significant ($p = 0.094$).

Table 3-3: Common nighthawk detections in four general habitat types

Habitat Type	Number of Sites at Which Detected	Mean Frequency of Detection	Standard Deviation
Conifer dominated	5	0.16	0.24
Cutover	0	0	0
Mixedwood forest	2	<0.01	0.01
Treed rock	6	0.15	0.21

Mean frequency of eastern whip-poor-will detections was also greatest in conifer dominated and treed rock habitat types (Table 3-4). There were few detections in mixedwood forest and no detections in cutovers. The difference in the frequency of eastern whip-poor-will detections among habitat types was significant ($p < 0.001$). Mean frequency of detection was significantly different between conifer dominated and cutover ($p = 0.002$), conifer dominated and mixedwood forest ($p = 0.002$), cutover and treed rock ($p = 0.005$), and mixedwood forest and treed rock ($p = 0.005$) habitat types. That is, there was a difference between the means of the habitat types with few detections and those with more detections, but no difference between the means of habitat types with few detections or between those with more detections.

Table 3-4: Eastern whip-poor-will detections in four general habitat types

Habitat Type	Number of Sites at Which Detected	Mean Frequency of Detection	Standard Deviation
Conifer dominated	6	0.23	0.05
Cutover	0	0	0
Mixedwood forest	1	<0.01	<0.01
Treed rock	5	0.21	0.18

Sixty-three other bird species were identified in the study area (Table D-3). Of these, most ($n = 45$) were recorded at fewer than 10 sites. White-throated sparrow (*Zonotrichia albicollis*) was identified at 55 of 56 sites, the most of any species. Olive-sided flycatcher (*Contopus cooperii*), a species of conservation concern, was recorded at

one site on the ROW. Other species of conservation concern or rare bird species were not detected.

Of the 112 recordings reviewed aurally to identify other bird species in the study area, common nighthawk were detected on 14 (13%) but were not identified on the corresponding spectrogram. Common nighthawk calls were not visible on 13 spectrograms, either because there was no call, only "booming" sounds created by courtship dives that are difficult to detect visually; the calls were too faint to see on the spectrogram; or calls were of short duration and obscured by other sounds at the same frequency, mainly other birds calling. The remaining aural detection was faint but visible on the spectrogram, was likely missed by the reviewer, and represented less than 1% of the recordings reviewed both aurally and visually. A single "boom" was heard at a comparison area site where no common nighthawk were otherwise detected for the entire study period. There were no instances of common nighthawk mistakenly identified from spectrograms.

Eastern whip-poor-will were detected on seven (6%) of the recordings reviewed aurally but not identified on the corresponding spectrogram. All eastern whip-poor-will calls not detected visually were faint and obscured by activity at the same frequency, mainly vehicles passing through the study area. One call that was faint but visible on the spectrogram was likely missed by the reviewer, which represented less than 1% of the recordings reviewed both aurally and visually. There were no instances of eastern whip-poor-will mistakenly identified from spectrograms.

4.0 DISCUSSION

Common nighthawk and eastern whip-poor-will appeared common in the study area, as indicated by their presence at more than half of the sites surveyed and by the frequency of their calls. There was no statistically significant difference between common nighthawk and eastern whip-poor-will activity at sites on the ROW and at comparison sites in similar habitat. The similarities in detection rate between ROW and comparison sites suggest that there were no measurable adverse effects of the cleared transmission line ROW on either species to date. As outlined in the LWESI Biophysical Monitoring Plan, it is well understood that both species forage and nest in forest clearings and edges (Environment Canada 2015, 2016), so no detectable effect was hypothesized. Portions of the cleared transmission line appeared to provide suitable habitat for common nighthawk and eastern whip-poor-will. However, other factors affecting these populations in the study area, such as insect populations, predation rates and reproductive success, are unknown.

Both species appeared to avoid maturing forestry cutover habitat, as there were no detections of either at the six sites in this habitat type during the 10 recording nights. As all habitats were expected to be suitable for these species, no difference in the frequency of detection was anticipated. Cutovers identified as forest openings or edges with Forest Resource Inventory data and with Google Earth were likely maturing, making them less suitable for common nighthawk and eastern whip-poor-will.

Both species were detected throughout the study area ranging from Pine Falls to Manigotagan Station, but common nighthawk were mostly absent from sites between the O'Hanly and Sandy rivers. All of the sites were in cutover and mixedwood forest, which common nighthawk appeared to avoid throughout the study area. Eastern whip-poor-will were relatively sparse in all habitats south of the Black River, including those that appeared to be favoured in other portions of the study area. As such, the apparent avoidance of the southern portion of the study area may be attributable to other factors, such as proximity to the town of Powerview-Pine Falls. Common nighthawk, which commonly nests on human structures and in areas inhabited by people (COSEWIC 2016), showed no such avoidance.

The only other bird species at risk detected incidentally using audio recorders along or near the transmission line ROW was the olive-sided flycatcher. No other species of

conservation concern, such as golden-winged warbler (*Vermivora chrysoptera*), were detected.

The visual detection method used to generate presence or absence occurrence data for common nighthawk and eastern whip-poor-will appeared to be satisfactory. A sample of 112 recordings was reviewed aurally, on a small percentage (<15%) of which common nighthawk or eastern whip-poor-will were identified when not detected visually on the corresponding spectrograms. In these cases the calls were faint on the recordings and were inconspicuous on the spectrograms, suggesting that the birds were some distance from the recorder and likely beyond the area intended to be surveyed at each site.

A single boom call was the only indication of common nighthawk at a comparison area site over the entire recording period, where the species was considered "not detected" for data analyses. The lack of any other sign of common nighthawk presence at this site suggests that it is not an important part of an individual's territory. The habitat type at the site, mixedwood forest, appeared to be avoided by common nighthawk throughout the study area.

5.0 LITERATURE CITED

Environment Canada. 2015. Recovery strategy for the eastern whip-poor-will (*Antrastomus vociferous*) in Canada [proposed]. *Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa, ON. 59 pp.

Environment Canada. 2016. Recovery strategy for the common nighthawk (*Chordeiles minor*) in Canada. *Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa, ON. 49 pp.

APPENDIX A

AUDIO RECORDER LOCATIONS AND RECORDINGS

Deployment Period	Site Type	Site	Location	Number of Nights Recorded	Number of Recordings
June 13 to 28	Comparison area	01EE	14 U 701018 5608175	13	306
		02EE	14 U 702635 5613729	15	360
		03EE	14 U 702992 5614222	15	360
		04EE	14 U 703559 5614295	15	360
		11EE	14 U 696141 5632535	15	360
		12EE	14 U 696232 5633123	13	304
		13EE	14 U 696173 5633717	15	360
		17EE	14 U 692624 5639852	13	312
		18EE	14 U 692203 5640168	13	312
		19EE	14 U 692133 5640771	13	310
		26EE	14 U 691806 5664874	15	360
		27EE	14 U 691989 5664316	15	360
		28EE	14 U 694137 5666922	13	312
		29EE	14 U 694722 5667037	13	312
		30EE	14 U 695319 5667098	13	312
	Right-of-way	01TL	14 U 701799 5608593	15	360
		02TL	14 U 703923 5613997	14	308
		03TL	14 U 704141 5614559	14	336
		04TL	14 U 704298 5614953	14	336
		11TL	14 U 695561 5632641	15	360
		12TL	14 U 695520 5633215	15	360
		13TL	14 U 695482 5633815	15	360
		17TL	14 U 693602 5640425	5	96
		18TL	14 U 693547 5641049	14	336
		19TL	14 U 693488 5641566	14	336
		26TL	14 U 691267 5664846	15	359
		27TL	14 U 691307 5664222	15	360
		28TL	14 U 694062 5667278	13	312
		29TL	14 U 694714 5667383	13	312
		30TL	14 U 695262 5667474	13	312

Deployment Period	Site Type	Site	Location	Number of Nights Recorded	Number of Recordings
June 28 to July 29	Comparison area	05EE	14 U 691830 5661622	2	44
		06EE	14 U 692127 5662220	25	592
		07EE	14 U 692632 5662525	25	587
		08EE	14 U 700478 5623731	24	569
		09EE	14 U 699933 5624027	24	558
		10EE	14 U 700122 5624566	21	495
		14EE	14 U 692627 5654360	26	616
		15EE	14 U 692253 5654855	26	620
		16EE	14 U 691757 5655095	26	609
		20EE	14 U 691492 5646445	24	565
		21EE	14 U 691762 5646881	25	579
		22EE	14 U 691960 5647465	2	43
		23EE	14 U 692682 5658572	25	595
		24EE	14 U 693159 5658858	1	2
	25EE	14 U 693703 5659136	2	45	
	Right-of-way	05TL	14 U 691550 5660470	25	593
		06TL	14 U 691513 5661041	0	0
		07TL	14 U 691477 5661598	7	146
		10TL	14 U 701003 5624504	24	567
		14TL	14 U 693438 5654060	24	568
		15TL	14 U 693173 5654592	22	520
		16TL	14 U 692918 5655093	24	572
		20TL	14 U 694005 5646173	11	256
		21TL	14 U 694093 5646698	25	582
		22TL	14 U 694184 5647260	2	43
23TL		14 U 691667 5658611	25	592	
24TL	14 U 691622 5659309	25	596		
25TL	14 U 691584 5659866	25	598		

APPENDIX B

RECORDING SITES INCLUDED IN STATISTICAL ANALYSES

Site Type	Site	Habitat Type	Included in Paired Analysis	Included in Habitat Analysis
Comparison Area	01EE	Conifer forest	✓	
	02EE	Treed rock	✓	✓
	03EE	Treed rock	✓	
	04EE	Treed rock	✓	
	05EE	Treed rock		
	06EE	Treed rock		✓
	07EE	Treed rock		
	08EE	Treed rock		
	09EE	Treed rock		✓
	10EE	Treed rock	✓	
	11EE	Bog	✓	
	12EE	Mixedwood forest	✓	✓
	13EE	Mixedwood forest	✓	✓
	14EE	Treed rock	✓	
	15EE	Treed rock	✓	✓
	16EE	Treed rock	✓	
	17EE	Mixedwood forest		
	18EE	Mixedwood forest	✓	
	19EE	Mixedwood forest	✓	
	20EE	Cutover		✓
	21EE	Cutover	✓	✓
	22EE	Cutover		✓
	23EE	Treed rock	✓	
	24EE	Unknown		
	25EE	Treed rock		
	26EE	Mixedwood forest	✓	
	27EE	Mixedwood forest	✓	
	28EE	Conifer dominated	✓	✓
	29EE	Conifer dominated	✓	✓
	30EE	Conifer dominated	✓	✓

Site Type	Site	Habitat Type	Included in Paired Analysis	Included in Habitat Analysis
Right-of-way	01TL	Conifer forest	✓	
	02TL	Treed rock	✓	
	03TL	Treed rock	✓	
	04TL	Treed rock	✓	
	05TL	Treed rock		
	07TL	Treed rock		
	10TL	Treed rock	✓	
	11TL	Bog	✓	
	12TL	Mixedwood forest	✓	✓
	13TL	Mixedwood forest	✓	
	14TL	Treed rock	✓	✓
	15TL	Treed rock	✓	
	16TL	Treed rock	✓	✓
	17TL	Mixedwood forest		
	18TL	Mixedwood forest	✓	
	19TL	Mixedwood forest	✓	✓
	20TL	Cutover		✓
	21TL	Cutover	✓	✓
	22TL	Cutover		✓
	23TL	Treed rock	✓	
	24TL	Treed rock		
	25TL	Treed rock		
	26TL	Mixedwood forest	✓	
	27TL	Mixedwood forest	✓	✓
	28TL	Conifer dominated	✓	✓
	29TL	Conifer dominated	✓	✓
	30TL	Conifer dominated	✓	✓

APPENDIX C

DISTRIBUTION AND ACTIVITY OF
COMMON NIGHTHAWK AND EASTERN WHIP-POOR-WILL,
JUNE 13 TO JULY 29

When all recordings at all 57 sites were considered, common nighthawk were recorded in the northern and southern portions of the study area, but were detected at few sites between the O'Hanly and Sandy rivers (Map C–1). Eastern-whip-poor-will detections were more evenly distributed in the study area, but appeared to be more common in the northernmost portion than in the southern portion (Map C–2). Each species was detected at a similar proportion of comparison and ROW sites (Table C–1). Each species was detected most nights throughout the survey period. Common nighthawk were detected on the greatest proportion of recordings in early July (Figure C–1) and eastern whip-poor-will were detected on the greatest proportion of recordings on the last day of June and early July (Figure C–2). Eastern whip-poor-will typically call most frequently when the moon is at least half full (*e.g.*, Wilson and Watts 2006¹). The full moon was June 20, a rainy night, and July 19. While eastern whip-poor-will in the study area were active from June 13 to 27 and July 11 to 26, when the moon was brightest, they appeared to be most vocal at the end of June and in early July.

Table C–1: Proportion of sites at which and nights on which common nighthawk and eastern whip-poor-will calls were recorded, June 13 to July 23

Site Type	<u>Common Nighthawk</u>		<u>Eastern Whip-poor-will</u>	
	Proportion of Sites	Proportion of Nights	Proportion of Sites	Proportion of Nights
Comparison area	0.63	0.98	0.60	0.90
Right-of-way	0.70	0.98	0.63	0.90

¹ Wilson, M.D. and B.D. Watts. 2006. The effect of moonlight on detection of whip-poor-wills: implications for long-term monitoring strategies. *Journal of Field Ornithology* 77(2): 207–211.

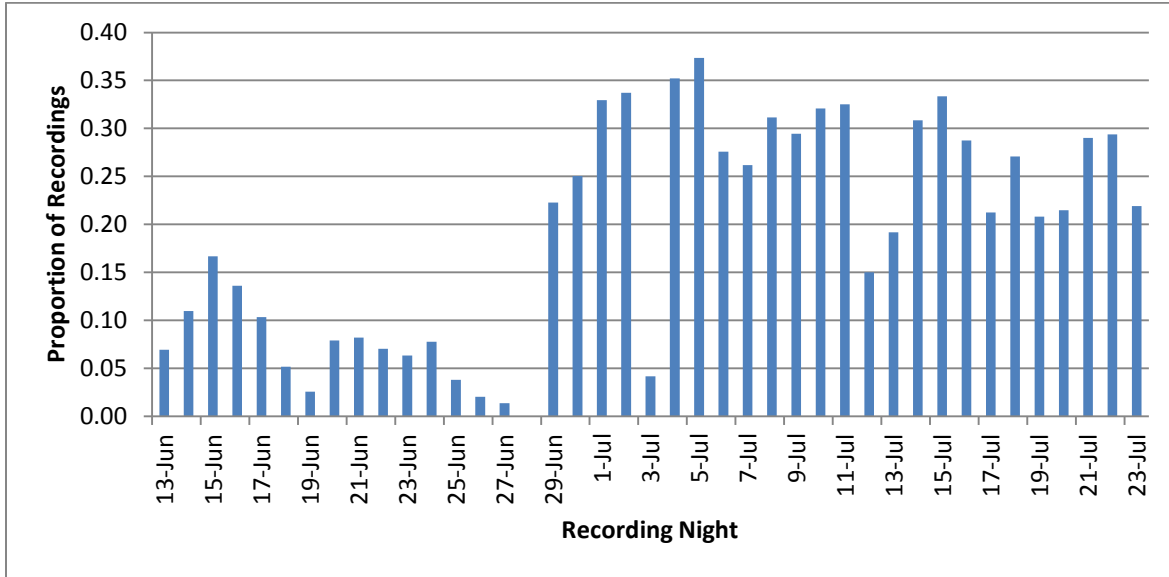
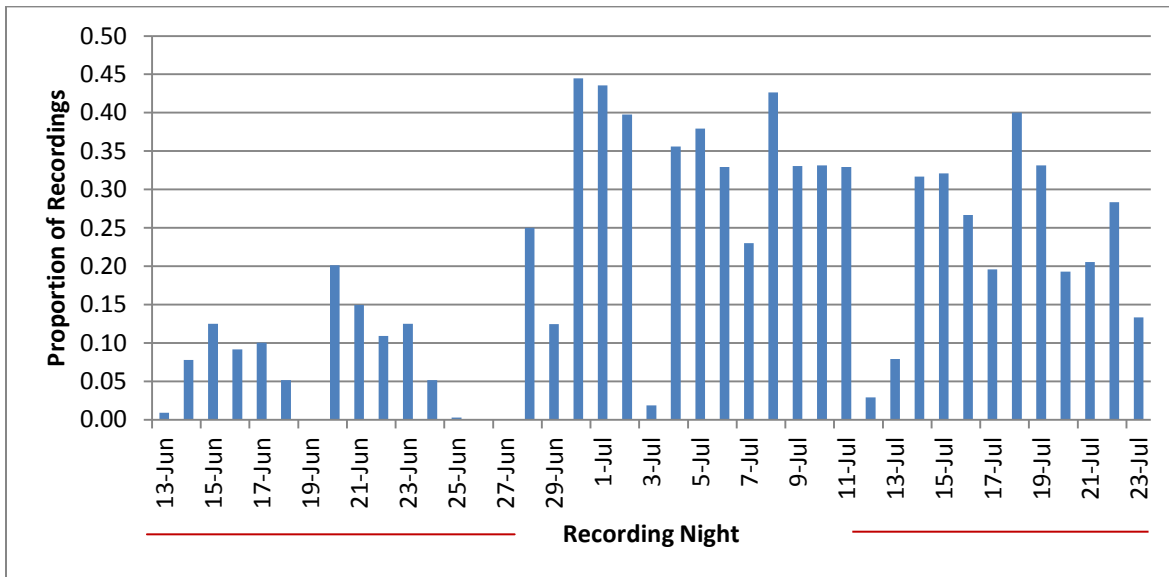
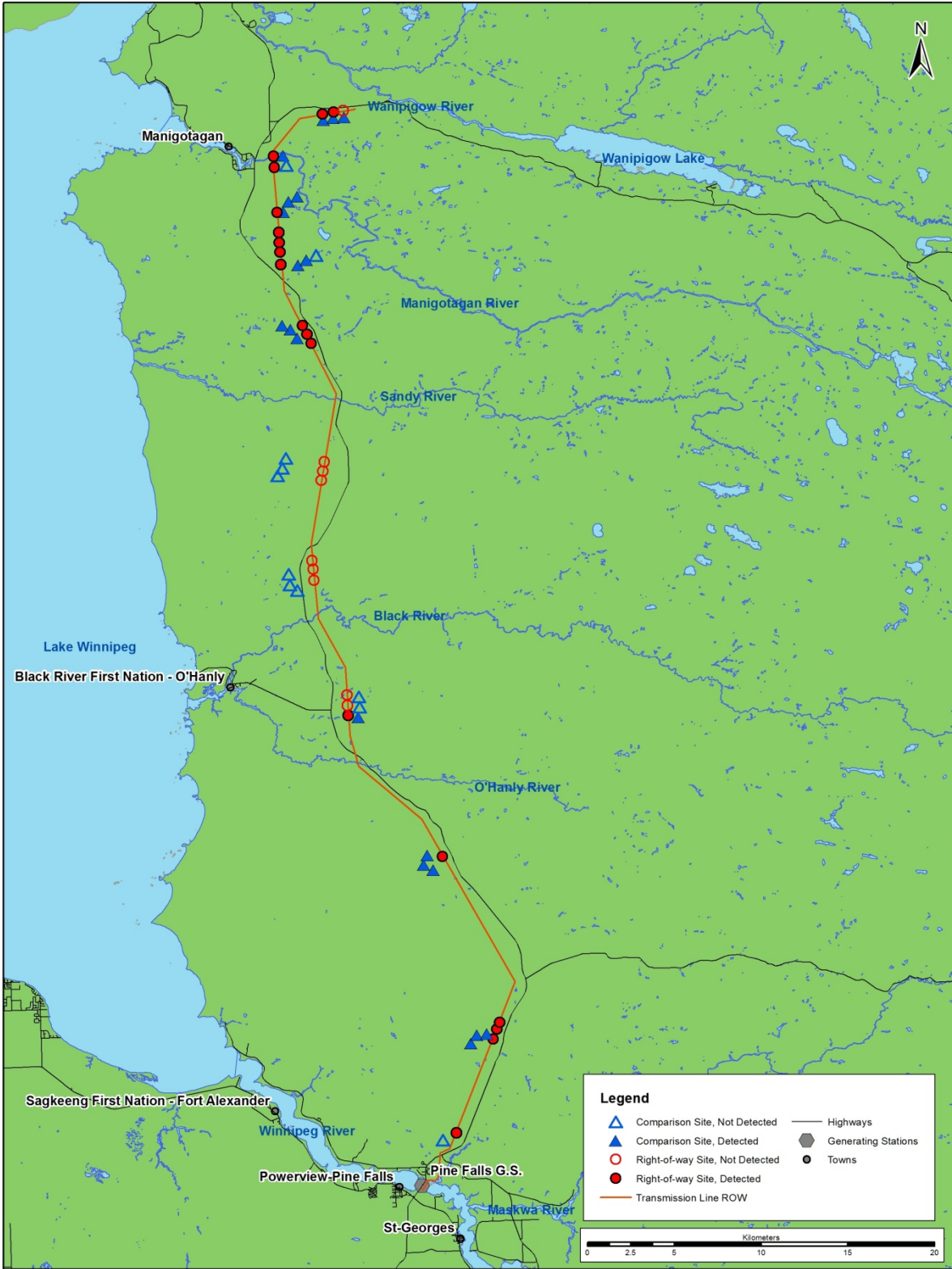


Figure C–1: Proportion of recordings on which common nighthawk were detected nightly from June 13 to July 23

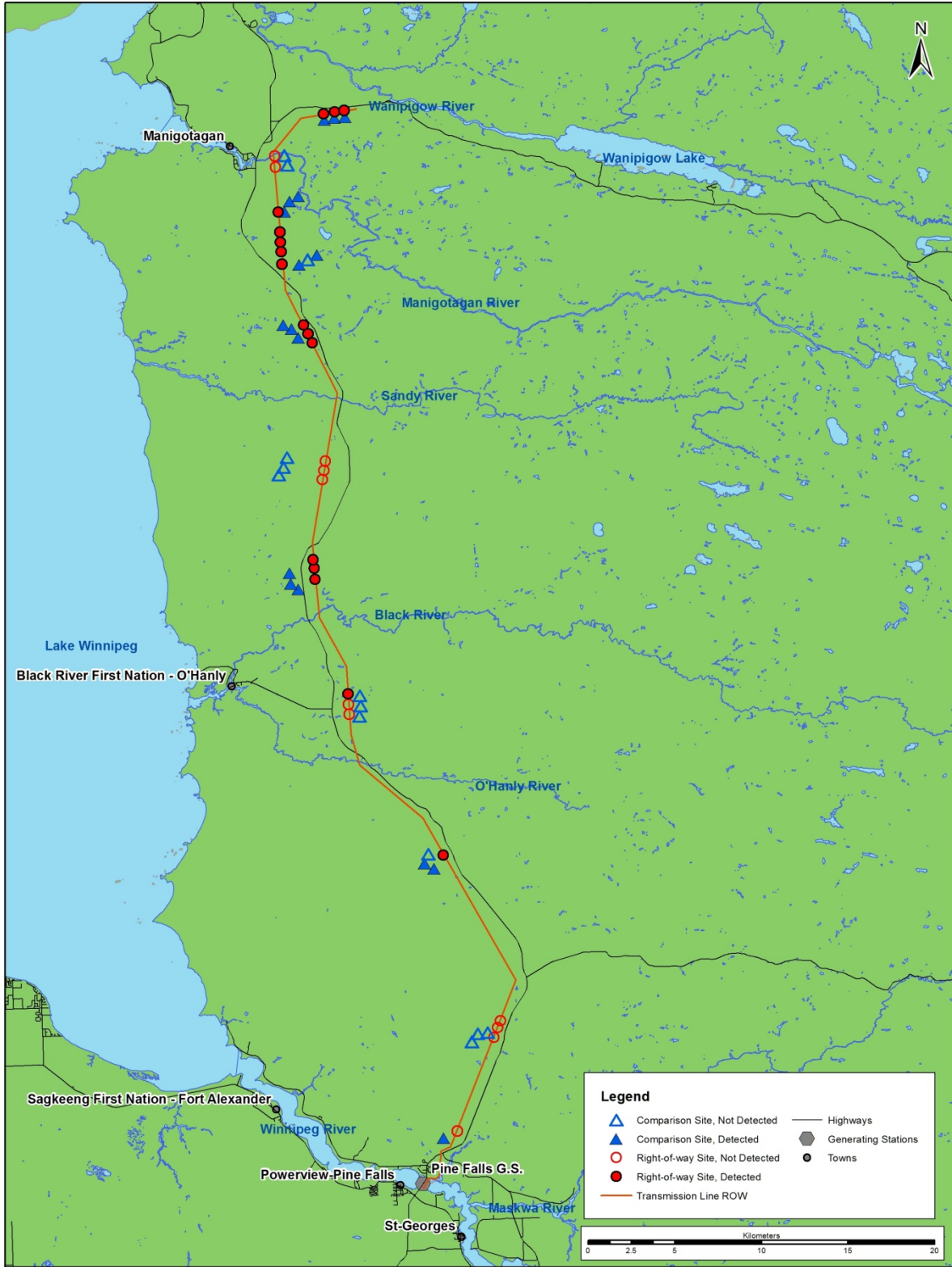


NOTE: Horizontal red lines indicate periods when the moon was at least half full. Full moon occurred on June 20 and July 19.

Figure C–2: Proportion of recordings on which eastern whip-poor-will were detected nightly from June 13 to July 23



Map C-1: Common nighthawk detections at all sites



Map C-2: Eastern whip-poor-will detections at all sites

Common nighthawk calls were most frequently recorded at dusk (Figure C–3) and eastern whip-poor-will calls were most frequently recorded at night (Figure C–4).

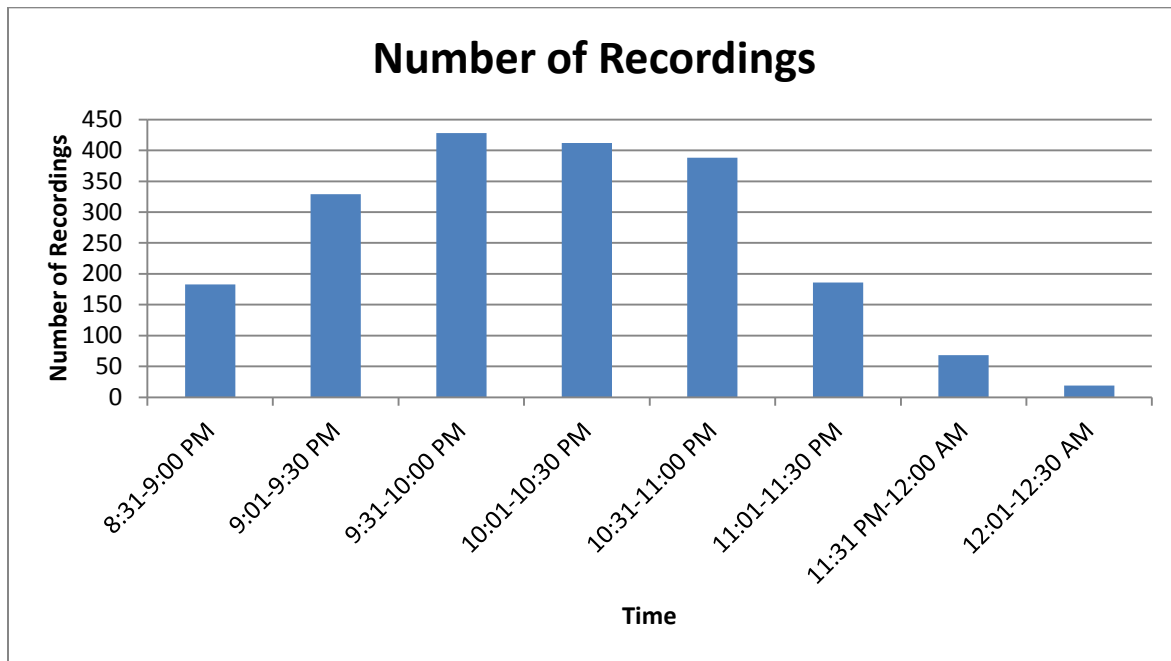


Figure C–3: Number of recordings with common nighthawk calls at half-hour intervals, June 13 to July 23

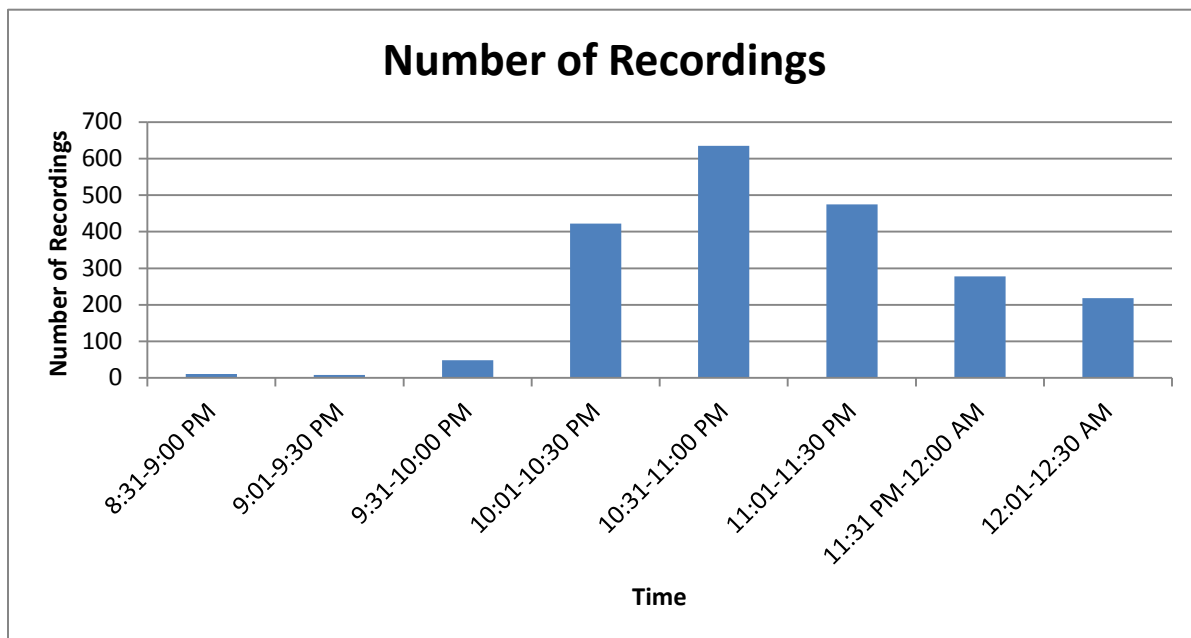


Figure C–4: Number of recordings with eastern whip-poor-will calls at half-hour intervals, June 13 to July 23

Common nighthawk activity was greatest in treed rock and conifer dominant habitat types (Table C–2). The species was detected at most sites and on the greatest proportion of recordings in these habitat types. While common nighthawk were detected at both sites in bog habitat and at one of two sites in conifer forest, they were found on only 1% of recordings. They were detected at relatively few sites and on a small proportion of recordings in cutover and mixedwood forest habitat. Common nighthawk appeared to select treed rock and conifer dominated habitat types.

Eastern whip-poor-will activity was greatest in conifer dominated and treed rock habitat types (Table C–2). No activity was detected in bog or cutover habitat. While eastern whip-poor-will were present on at least half of sites in conifer forest and mixedwood forest, they were detected on a very small proportion of recordings, suggesting that they spent relatively little time in these habitats.

Table C–2: Common nighthawk and eastern whip-poor-will activity in six habitat types, June 13 to July 23

Habitat Type	Number of Sites	Number of Recordings	<u>Common Nighthawk</u>		<u>Eastern Whip-poor-will</u>	
			Proportion of Sites	Proportion of Recordings	Proportion of Sites	Proportion of Recordings
Bog	2	720	1.00	0.01	0	0
Conifer dominated	6	1,872	0.83	0.13	1.00	0.18
Conifer forest	2	666	0.50	0.01	0.50	<0.01
Cutover	6	2,068	0.17	<0.01	0	0
Mixedwood forest	14	4,525	0.21	<0.01	0.57	0.01
Treed rock	27	12,144	0.96	0.14	0.74	0.14

Of the seven sites where recorders functioned for seven nights or fewer, common nighthawk were recorded at three, and eastern whip-poor-will were recorded at four (Table C–3). Neither species was recorded at sites 22EE and 22TL, where recorders functioned for two nights only.

Table C–3: Presence of common nighthawk and eastern whip-poor-will at sites where recorders functioned for seven or fewer nights

Site Type	Site	Recording Night	Date	Common Nighthawk Presence	Eastern Whip-poor-will Presence
Comparison area	05EE	1	June 29/30	✓	✓
		2	June 30/July 1	✓	✓
	22EE	1	June 29/30		
		2	June 30/July 1		
	24EE	1	June 29/30	✓	
	25EE	1	June 29/30		✓
		2	June 30/July 1		✓
	Right-of-way	07TL	1	June 29/30	✓
2			June 30/July 1	✓	✓
3			July 1/2	✓	✓
4			July 2/3	✓	✓
5			July 3/4		✓
6			July 4/5	✓	✓
7			July 5/6		
17TL		1	June 13/14		✓
		2	June 14/15		✓
		3	June 15/16		
		4	June 16/17		✓
		5	June 17/18		
22TL		1	June 29/30		
		2	June 30/31		

APPENDIX D

RESULTS

Table D–1: Frequency of common nighthawk detection at paired sites in comparison areas and on the transmission line right-of-way

Site Type	Site	Number of Recordings on Which Detected	Frequency of Detection (proportion of recordings on which detected)
Comparison area	01EE	0	0
	02EE	32	0.13
	03EE	55	0.23
	04EE	27	0.11
	10EE	46	0.19
	11EE	1	<0.01
	12EE	0	0
	13EE	0	0
	14EE	1	<0.01
	15EE	31	0.13
	16EE	11	0.05
	18EE	0	0
	19EE	0	0
	21EE	0	0
	23EE	19	0.08
	26EE	3	0.01
	27EE	0	0
	28EE	100	0.42
	29EE	1	<0.01
	30EE	2	0.01
Right-of-way	01TL	8	0.03
	02TL	2	0.01
	03TL	4	0.02
	04TL	2	0.01
	10TL	37	0.15
	11TL	2	0.01
	12TL	0	0
	13TL	0	0
	14TL	2	0.01
	15TL	1	<0.01
	16TL	2	0.01
18TL	0	0	
19TL	0	0	

Table D–1: Frequency of common nighthawk detection at paired sites in comparison areas and on the transmission line right-of-way

Site Type	Site	Number of Recordings on Which Detected	Frequency of Detection (proportion of recordings on which detected)
Right-of-way	21TL	0	0
	23TL	96	0.40
	26TL	3	0.01
	27TL	1	<0.01
	28TL	120	0.50
	29TL	2	0.01
	30TL	0	0

Table D–2: Frequency of eastern whip-poor-will detection at paired sites in comparison areas and on the transmission line right-of-way

Site Type	Site	Number of Recordings on Which Detected	Frequency of Detection (proportion of recordings on which detected)
Comparison area	01EE	1	<0.01
	02EE	0	0
	03EE	0	0
	04EE	0	0
	10EE	0	0
	11EE	0	0
	12EE	0	0
	13EE	0	0
	14EE	50	0.21
	15EE	46	0.19
	16EE	47	0.20
	18EE	10	0.04
	19EE	6	0.03
	21EE	0	0
	23EE	52	0.22
	26EE	0	0
	27EE	0	0
	28EE	45	0.19
	29EE	53	0.22
	30EE	60	0.25
Right-of-way	01TL	0	0
	02TL	0	0
	03TL	0	0
	04TL	0	0
	10TL	23	0.10
	11TL	0	0
	12TL	0	0
	13TL	2	0.01
	14TL	63	0.26
	15TL	78	0.33
	16TL	77	0.32
	18TL	11	0.05
	19TL	1	<0.01

Table D–2: Frequency of eastern whip-poor-will detection at paired sites in comparison areas and on the transmission line right-of-way

Site Type	Site	Number of Recordings on Which Detected	Frequency of Detection (proportion of recordings on which detected)
Right-of-way	21TL	0	0
	23TL	78	0.33
	26TL	0	0
	27TL	0	0
	28TL	78	0.33
	29TL	51	0.21
	30TL	43	0.18

Table D–3: Number of sites at which other bird species were detected at dusk and at night in the study area

Species	Scientific Name	Number of Sites
White-throated sparrow	<i>Zonotrichia albicollis</i>	55
Veery	<i>Catharus fuscescens</i>	44
Wilson's snipe	<i>Gallinago delicata</i>	44
Hermit thrush	<i>Catharus guttatus</i>	41
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	31
Nashville warbler	<i>Oreothlypis ruficapilla</i>	27
Ovenbird	<i>Seiurus aurocapilla</i>	26
Common yellowthroat	<i>Geothlypis trichas</i>	25
Swainson's thrush	<i>Catharus ustulatus</i>	17
American robin	<i>Turdus migratorius</i>	13
Black-and-white warbler	<i>Mniotilta varia</i>	13
Swamp sparrow	<i>Melospiza georgiana</i>	13
Cedar waxwing	<i>Bombycilla cedrorum</i>	11
Northern waterthrush	<i>Parkesia noveboracensis</i>	11
Yellow-rumped warbler	<i>Setophaga coronata</i>	11
Chipping sparrow	<i>Spizella passerina</i>	10
Magnolia warbler	<i>Setophaga magnolia</i>	10
Tennessee warbler	<i>Oreothlypis peregrina</i>	10
American redstart	<i>Setophaga ruticilla</i>	8
Ruffed grouse	<i>Bonasa umbellus</i>	8
Red-winged blackbird	<i>Agelaius phoeniceus</i>	8
American woodcock	<i>Scolopax minor</i>	7
Eastern wood-pewee	<i>Contopus virens</i>	6
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	6
Winter wren	<i>Troglodytes hiemalis</i>	6
Chestnut-sided warbler	<i>Setophaga pensylvanica</i>	5
Alder flycatcher	<i>Empidonax alnorum</i>	4
American goldfinch	<i>Spinus tristis</i>	4
Killdeer	<i>Charadrius vociferus</i>	4
Mallard	<i>Anas platyrhynchos</i>	4
Pied-billed grebe	<i>Podilymbus podiceps</i>	4
Sedge wren	<i>Cistothorus platensis</i>	4
Yellow warbler	<i>Setophaga petechia</i>	4
Common raven	<i>Corvus corax</i>	3

Table D–3: Number of sites at which other bird species were detected at dusk and at night in the study area

Species	Scientific Name	Number of Sites
Dark-eyed junco	<i>Junco hyemalis</i>	3
Least flycatcher	<i>Empidonax minimus</i>	3
Mourning warbler	<i>Geothlypis philadelphia</i>	3
Northern flicker	<i>Colaptes auratus</i>	3
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	3
Bay-breasted warbler	<i>Setophaga castanea</i>	2
Blue-headed vireo	<i>Vireo solitarius</i>	2
Blackburnian warbler	<i>Setophaga fusca</i>	2
Blue jay	<i>Cyanocitta cristata</i>	2
Great crested flycatcher	<i>Myiarchus crinitus</i>	2
Gray jay	<i>Perisoreus canadensis</i>	2
Mourning dove	<i>Zenaida macroura</i>	2
Red-breasted nuthatch	<i>Sitta canadensis</i>	2
Ruby-crowned kinglet	<i>Regulus calendula</i>	2
American crow	<i>Corvus brachyrhynchos</i>	1
Brown creeper	<i>Certhia americana</i>	1
Clay-colored sparrow	<i>Spizella pallida</i>	1
Common loon	<i>Gavia immer</i>	1
Connecticut warbler	<i>Oporornis agilis</i>	1
Gray catbird	<i>Dumetella carolinensis</i>	1
Lincoln's sparrow	<i>Melospiza lincolnii</i>	1
Northern parula	<i>Setophaga americana</i>	1
Olive-sided flycatcher	<i>Contopus cooperi</i>	1
Palm warbler	<i>Setophaga palmarum</i>	1
Red-eyed vireo	<i>Vireo olivaceus</i>	1
Sora	<i>Porzana carolina</i>	1
Spotted sandpiper	<i>Actitis macularius</i>	1
Tree swallow	<i>Tachycineta bicolor</i>	1
Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	1