

MANITOBA–MINNESOTA TRANSMISSION PROJECT

ENVIRONMENTAL MONITORING PLAN

GOLDEN-WINGED WARBLER MONITORING REPORT 2017–2021



Prepared for

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Manitoba Hydro

By

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SENSITIVE DATA REDACTED

EXECUTIVE SUMMARY

The golden-winged warbler (*Vermivora chrysoptera*) is listed as Threatened under the federal *Species at Risk Act* and under *The Endangered Species and Ecosystems Act* of Manitoba. It inhabits shrubby or early successional habitats near forest edges. As described in the Manitoba–Minnesota Transmission Project Environmental Monitoring Plan, the objectives of golden-winged warbler monitoring were to evaluate the effects of the Manitoba–Minnesota Transmission Project (the Project) on the species' habitat quality and density, including hypothesis testing while controlling for proximity to the Project.

Pre-construction surveys for golden-winged warbler conducted in 2017 and 2019 were continued in 2020 and 2021, the first and second years after Project construction. With permission from landowners, point counts with and without playback recordings were conducted at 55 sites on the transmission line right-of-way and at 16 nearby reference sites in June 2021. In all, 60 right-of-way sites and 24 reference sites were surveyed at least once over the four-year monitoring period. The occupancy rate (percentage of sites at which golden-winged warblers were observed) was used to evaluate Project effects on golden-winged warbler density. Post-construction monitoring surveys were conducted to identify changes to golden-winged warbler habitat on the right-of-way.

Twenty-one golden-winged warblers were observed at 20 sites in 2021, 14 were observed at 13 sites in 2020, 27 were observed at 20 sites in 2019, and 16 were observed at 13 sites in 2017. Incidental observations were made each year, ranging from two in 2020 to 28 in 2019. Over the four-year survey period, golden-winged warbler occupancy rate was greatest at both right-of-way and reference sites in 2019, the second year of pre-construction monitoring. A significant difference in occupancy rates was observed between ROW and reference sites among the four survey years. The occupancy rates in 2017 and 2019 were not significantly different from those in 2020 but did differ from those in 2021, likely due to the low occupancy rate at reference sites during the second year of operation monitoring. While occupancy rates were lower at reference sites during operation than before construction, occupancy rates were similar at ROW sites over the same period.

Although post-construction monitoring of golden-winged warbler habitat indicated that habitat mitigation did not appear to meet all objectives of immediately enhancing or maintaining golden-winged warbler habitat throughout the ROW, it did not appear to affect population abundance. Golden-winged warbler habitat monitoring will continue in 2022, the final year of operation monitoring. Operation monitoring for golden-winged warblers has concluded; no effect of construction and installation of the transmission line on golden-winged warbler density was detected and no unanticipated local population effects were observed. Due to the variation in occupancy rates, continued monitoring should be considered, particularly as habitat quality improves on the ROW with the expected regeneration of shrubs.

STUDY TEAM

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INTRODUCTION

The golden-winged warbler (*Vermivora chrysoptera*) is listed as Threatened under the federal *Species at Risk Act* and under *The Endangered Species and Ecosystems Act* of Manitoba. Hybridization and competition with the blue-winged warbler (*Vermivora cyanoptera*) is a primary threat to golden-winged warbler populations (Edie et al. 2003; Environment and Climate Change Canada 2016). Other important threats include habitat loss, nest parasitism by the brown-headed cowbird (*Molothrus ater*), and mortality due to collisions with human-made structures (Environment and Climate Change Canada 2016).

The golden-winged warbler is an inhabitant of shrubby or early successional habitats near forest edges (Environment and Climate Change Canada 2016). It can be found in the Manitoba–Minnesota Transmission Project (the Project) regional assessment area (RAA), as indicated in the Manitoba–Minnesota Transmission Project Environmental Impact Statement (Manitoba Hydro 2015). The Project right-of-way (ROW) crosses through five grid squares of critical golden-winged warbler habitat identified by Environment and Climate Change Canada (2016). Right-of-way clearing, which occurred during the winter of 2019/2020, was estimated to have affected 475 hectares (ha) of critical golden-winged warbler habitat. Of this, 473 ha were expected to regenerate into shrubby habitat suitable for golden-winged warbler. Additionally, vegetation management prescriptions were developed prior to ROW clearing as part of the mitigation strategy, to maintain or enhance golden-winged warbler habitat on the ROW (Manitoba Hydro 2019a). As described in the Environmental Monitoring Plan (Manitoba Hydro 2019b), pre-construction, construction, and operation monitoring will identify changes in golden-winged warbler habitat and potential effects on the local golden-winged warbler population.

The objectives of golden-winged warbler monitoring were to:

- Monitor the response of the local golden-winged warbler population along the ROW;
- Assess the effectiveness of mitigation measures implemented;
- Identify unexpected environmental effects of the Project if they occur; and
- Identify additional mitigation measures to address unanticipated environmental effects, if required.

This report outlines the findings of two pre-construction monitoring surveys conducted in 2017 and 2019, and two operation monitoring surveys conducted in 2020 and 2021.

METHODS

Golden-winged warbler surveys were conducted twice prior to Project construction (pre-construction surveys) and twice during operation. Pre-construction surveys for golden-winged warbler were conducted from June 8 to 12, 2017 and from June 17 to 19, 2019. Operation surveys were conducted from June 16 to 19, 2020 and from June 14 to 16, 2021. Survey sites were initially identified using a desktop analysis of available remotely-sensed data. Suitable golden-winged warbler habitat on and near the ROW was identified using a habitat model (Stantec 2015; Wildlife Resource Consulting Services MB Inc. [WRCS] 2017) and verified with high-resolution imagery. Potential high-quality habitat areas consisting of a mixture of shrubs and grassland near forest edge (Photo 1), spaced at least 400 m apart, were selected in the area that overlaps five golden-winged warbler critical habitat grids identified by Environment and Climate Change Canada (2016). Survey sites were selected on the ROW (ROW sites) and nearby (reference sites; Map 1), most of which were surveyed consistently over the four-year monitoring period (Appendix A). However, the number of survey sites varied somewhat among years due to permission to access private land and because sites were added during the post-construction period (Table 1). Landowners off the ROW were contacted and permission to access their property was obtained prior to the surveys. In 2021, the final year of operation monitoring as per the Environmental Monitoring Plan (Manitoba Hydro 2019b), 55 ROW and 16 reference sites were surveyed. In all, 60 ROW sites and 24 reference sites were surveyed at least once over the four-year monitoring period.

Table 1: Number of sites surveyed before construction and during operation

Period	Year	Site Type	Number of Sites Surveyed
Pre-construction	2017	ROW	43
		Reference	19
		Total	62
	2019	ROW	44
		Reference	14
		Total	58
Operation	2020	ROW	53
		Reference	15
		Total	68
	2021	ROW	55
		Reference	16
		Total	71

Point counts with and without playback recordings (Kubel and Yahner 2007) were conducted between 5:00 a.m. and 9:30 a.m. to detect golden-winged warblers. At each site surveyors listened for three minutes, played a recording of golden-winged warbler song for five minutes, and then listened for another two minutes. Recordings were played at 100 decibels with an MP3 player and speaker (Artuso 2009; Photo 2). Golden-winged warbler song broadcasting was conducted

under Species at Risk Permit conditions issued by Manitoba Agriculture and Resource Development. All visual and aural detections of golden-winged warbler were noted over the 10-minute period. Incidental observations of other rare bird species, if any, were also noted during surveys.

As described in Section 7.3.2.3 of the Environmental Monitoring Plan (Manitoba Hydro 2019b), the purpose of golden-winged warbler monitoring was to test the hypothesis that:

- H_0 (null): The construction and installation of the transmission line does not affect the habitat quality or density of golden-winged warbler.
- H_1 (alternate): The construction and installation of the transmission line does affect the habitat quality or density of golden-winged warbler.

To test the hypothesis, a Fisher's exact test (McDonald 2014) was used to compare the occupancy rates (percentage of sites where golden-winged warbler was detected) of ROW sites and reference sites during the surveys in 2017, 2019, 2020, and 2021. Significance was determined set at the $\alpha = 0.05$ level. If a significant difference was observed, pre-construction surveys in each of 2017 and 2019 were compared post hoc with post-construction surveys in each of 2020 and 2021. Because multiple comparisons were made, a Bonferroni correction of $0.05/4 = 0.0125$ was applied to determine statistical significance when individual years were compared (McDonald 2014). A two-proportion z test (Glen 2021; Statology 2019) was used to test the difference between occupancy rates at ROW vs. reference sites each year, with significance determined at the $\alpha = 0.05$ level.



Photo 1: Golden-winged warbler habitat at a right-of-way site June 15, 2021



Photo 2: MP3 player (right) and speaker (left)

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Map 1: Golden-winged warbler survey sites during the pre-construction (2017, 2019) and operation (2020, 2021) periods

RESULTS AND DISCUSSION

Sixteen golden-winged warblers were observed at 13 sites in 2017, 27 were observed at 20 sites in 2019, 14 were observed at 13 sites in 2020, and 21 were observed at 20 sites in 2021 (Table 2). Incidental observations included nine golden-winged warblers in 2017, 28 in 2019, two in 2020, and five in 2021.

Table 2: Golden-winged warbler observations before construction and during operation

Period	Year	Site Type	Number of Sites Surveyed	Number of Birds	Number of Sites with Birds
Pre-construction	2017	ROW	43	11	8
		Reference	19	5	5
	2019	ROW	44	19	15
		Reference	14	8	5
Operation	2020	ROW	53	11	10
		Reference	15	3	3
	2021	ROW	55	19	18
		Reference	16	2	2

During all survey years most golden-winged warbler detections occurred in the northern portion of the study area and relatively few were detected south of Highway 1 (Map 2; WRCS 2017; WRCS 2019; WRCS 2020), indicating a potentially high abundance of golden-winged warblers and the presence of good-quality habitat in this area.

Fifty-seven ROW sites and 18 reference sites were surveyed twice or more over the four-year survey period. Many of the sites where golden-winged warblers were observed more than once were in the northern portion of the study area. Golden-winged warblers occupied six sites for three years and 14 sites for two years (Map 2). Golden-winged warblers occupied 30% ($n = 17$) of ROW sites and 17% ($n = 3$) of reference sites for two or more survey years. No golden-winged warblers were detected at 31 ROW sites and 13 reference sites over the survey period. Of these, three and four sites, respectively, were only surveyed one year.

Over the four-year survey period, golden-winged warbler occupancy rates were greatest at both ROW and reference sites in 2019, the second year of pre-construction monitoring (Table 3). At ROW sites, the occupancy rate in 2021, the second year of operation monitoring, was greater than or similar to the occupancy rates in 2017 and 2019, before construction. At reference sites, occupancy rates were greater before construction than during operation. A significant difference in occupancy rates was observed between ROW and reference sites among the four survey years ($p = 0.02$). Post-hoc tests indicated that the occupancy rates in 2020, the first year of operation monitoring, were not significantly different from those in 2017 ($p = 0.6640$) or 2019 ($p = 1.0000$). The occupancy rates in 2021 differed significantly from those in 2017 ($p = 0.0026$) and 2019 ($p = 0.0120$). There was no significant difference in occupancy rates at ROW vs. reference sites in 2017 ($z = 0.69$, $p = 0.49$), 2019 ($z = 0.11$, $p = 0.91$), 2020 ($z = 0.10$, $p = 0.92$), or 2021 ($z = -1.58$, $p = 0.11$).

The difference in occupancy rates between 2021 and the pre-construction years was likely due to the particularly low occupancy rate at reference sites in 2021. This low occupancy rate may have been due to differences in habitat at, and variation in, reference sites surveyed (Appendix B). In 2021, no golden-winged warblers were detected at reference sites south of Highway 1, where farmland is common but there is relatively little shrubby habitat. Golden-winged warblers were observed at a minimum of one site south of the highway in previous survey years. While occupancy rates were lower at reference sites during operation than before construction, occupancy rates were similar at ROW sites over the same period. The alternative hypothesis was not supported as no effect of construction and installation of the transmission line on golden-winged warbler density was detected. The null hypothesis was not rejected.

Table 3: Percentage of sites occupied by golden-winged warbler before construction and during operation

Period	Year	ROW	Reference
Pre-construction	2017	19	26
	2019	34	36
Operation	2020	19	20
	2021	33	13

As prescribed in the golden-winged warbler habitat management plan, a feathered edge with a mixture of shrubs and perch trees was to remain to the extent possible on the ROW, to mitigate potential changes in habitat availability (Manitoba Hydro 2019a). Although perch trees occasionally remained along the edge of the ROW, few were retained on it and there was generally no tree canopy cover at golden-winged warbler habitat sites (Szwaluk Environmental Consulting Ltd. and Newman 2021). Previous post-construction surveys indicated that shrub growth did not appear to be retained as expected and typically remained only around small wetlands (Szwaluk 2020). During the second year of post-construction habitat monitoring, species cover, richness, and diversity measures in the mid-canopy layer were considerably lower than before construction (Szwaluk Environmental Consulting Ltd. and Newman 2021). However, low shrubs became part of the tall shrub stratum, the cover and richness in the lower canopy increased, and higher-quality golden-winged warbler habitat was identified at one site (Szwaluk Environmental Consulting Ltd. and Newman 2021). Although habitat mitigation did not appear to meet all objectives of immediately enhancing or maintaining golden-winged warbler habitat throughout the ROW, it did not appear to affect population abundance. While the tree canopy will be prevented from completely regenerating on the ROW (Szwaluk Environmental Consulting Ltd. and Newman 2021), it is expected that the amount of tall shrub cover (<4 m) will continue to increase in numerous areas along the ROW, increasing habitat suitability for breeding golden-winged warblers. Because no change in golden-winged occupancy rates was detected on the ROW after construction, no effect of construction and installation of the transmission line on golden-winged warbler habitat quality was identified and the null hypothesis was not rejected.

No incidental observations of other rare bird species (e.g., least bittern, short-eared owl) occurred during the surveys in 2017, 2019, 2020, or 2021. No unanticipated local golden-winged warbler population effects were observed and no additional mitigation measures are required. Other important threats such as mortality due to collisions with human-made structures (Environment and Climate Change Canada 2016) were not detected in 2020 or 2021 on the ROW (WRCS 2021). Golden-winged warbler habitat monitoring will continue in 2022, the final year of operation monitoring. Operation monitoring for golden-winged warbler has concluded, but due to the variation in occupancy rates continued monitoring should be considered, particularly as habitat quality improves on the ROW with the expected regeneration of shrubs.

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Map 2: Number of years golden-winged warbler were detected at each site during the pre-construction (2017, 2019) and operation (2020, 2021) periods

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APPENDIX A

Sites surveyed for golden-winged warbler before construction (2017, 2019) and during operation (2020, 2021)

Site Type	Site	Location	2017	2019	2020	2021
ROW	1	REDACTED	✓	✓	✓	✓
	2		✓	✓	✓	✓
	3		✓	✓	✓	✓
	4		✓	✓	✓	✓
	5		✓	✓	✓	✓
	6		✓	✓	✓	✓
	7		✓	✓	✓	✓
	8		✓	✓	✓	✓
	9		✓	✓	✓	✓
	10		✓	✓		✓
	11		✓	✓	✓	✓
	12		✓	✓	✓	✓
	13		✓	✓	✓	✓
	14		✓	✓	✓	✓
	16		✓	✓	✓	✓
	17			✓	✓	✓
	18		✓	✓	✓	✓
	19		✓	✓	✓	✓
	20		✓	✓	✓	✓
	21		✓	✓	✓	✓
	22		✓	✓	✓	✓
	23		✓	✓	✓	✓
	24			✓	✓	✓
	25		✓	✓	✓	✓
	26		✓	✓	✓	✓
	27		✓	✓	✓	✓
	28		✓	✓	✓	✓
	29		✓	✓	✓	✓
	30		✓	✓	✓	✓
	31		✓	✓	✓	✓
	32		✓			✓
	33		✓			✓
	34		✓	✓		
	35		✓			
	36		✓	✓	✓	
	37		✓	✓	✓	✓

Site Type	Site	Location	2017	2019	2020	2021
ROW	38		✓	✓	✓	✓
	39		✓	✓	✓	✓
	42		✓			
	43		✓			
	44		✓	✓	✓	✓
	45			✓	✓	✓
	46			✓	✓	✓
	47			✓	✓	✓
	48			✓	✓	✓
	49				✓	✓
	50				✓	✓
	51				✓	✓
	52				✓	✓
	53				✓	✓
	54				✓	✓
	55				✓	✓
	56				✓	✓
	57				✓	✓
	58				✓	✓
	59				✓	✓
	901		✓	✓	✓	✓
	902		✓	✓	✓	✓
	903		✓	✓	✓	✓
	904		✓	✓	✓	✓
Reference	501		✓	✓	✓	✓
	502		✓			
	503		✓			
	504		✓			
	505		✓			
	506		✓	✓	✓	
	507		✓	✓		✓
	508		✓			✓
	509		✓			✓
	510		✓	✓	✓	
	512		✓	✓	✓	✓
	513		✓	✓	✓	✓
	514		✓	✓	✓	✓
	515		✓			
	516		✓		✓	✓
	517		✓			
	518		✓		✓	✓
	519		✓	✓	✓	✓

Site Type	Site	Location	2017	2019	2020	2021
Reference	520		✓	✓	✓	✓
	521			✓	✓	✓
	522			✓	✓	✓
	523			✓	✓	✓
	524			✓	✓	✓
	525			✓	✓	✓

APPENDIX B



Photo B-1: Habitat at reference site 518, 2017



Photo B-2: Habitat at reference site 501, 2019



Photo B-3: Habitat at reference site 512, 2021



Photo B-4: Habitat at reference site 519, 2021