MANITOBA-MINNESOTA TRANSMISSION PROJECT:

MAMMALS MONITORING PROGRAM TECHNICAL REPORT

CAMERA TRAP UPDATE (2022/23)

DECEMBER 12, 2023

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Manitoba Hydro

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LIST OF ACRONYMS

AC	Alternating Current
BACI	Before-After-Control-Impact
EIS	Environmental Impact Statement
FPR	Final Preferred Route
GHA	Game Hunting Area
GPS	Global Positioning Service
IR	Infrared
LAA	Local Assessment Area
MECC	Manitoba Environment and Climate Change
MMTP	Manitoba-Minnesota Transmission Project
RAA	Regional Assessment Area
RAI	Relative Abundance Index
RM	Rural Municipality
ROW	Right-of-way
SD	Secure Digital
VC	Valued Component
WMA	Wildlife Management Area

EXECUTIVE SUMMARY

This report provides the results of the final year of ungulate and predator camera trap monitoring as required for the Manitoba-Minnesota Transmission Line Project (MMTP) and associated Environmental Monitoring Plan (Manitoba Hydro 2019). This portion of analysis is for the continued camera-trap monitoring during the operational phase conducted in the winter 2020-21 season through to August of 2023. There was a total of 13 camera trap arrays deployed, including 7 cameras positioned in potentially affected areas along the FPR and 6 cameras in reference or control areas adjacent to and outside the FPR. One camera in potentially affected areas did not have usable observation data, and was excluded from further analysis (i.e., only 12 camera trap arrays were analyzed). Monitoring was active for a combined total of 11,166 camera-days between November 2020 and August 2023, observing a total of 2,491 white-tailed deer (*Odocoileus virginianus*) events (3,453 individuals), 581 black bear (*Ursus americanus*) events (784 individuals), 55 gray wolf (*Canis lupus*) events (87 individuals) and 87 coyote (*Canis latrans*) events (104 individuals). Statistical analysis of control and affected site observations revealed no significant variation between treatments for white-tailed deer and black bear; observations of gray wolf and coyote were also similar between affected and control treatments, though total observations were too low for statistical analysis.

Results continue to support the predictions as outlined in the MMTP Environmental Impact Statement (EIS) and support the null hypothesis that the operation of the transmission line does not change the distribution or mortality risk for white-tailed deer. White-tailed deer were observed at all 12 sites during summer and 8 of 12 sites in winter 2020-2023 with no significant difference between RAI means during summer with 0.23 ± 0.17 and 0.24 ± 0.17 for potentially affected and control sites, respectively. Similarly, there was no significant difference between RAI means during winter with 0.12 ± 0.06 and 0.14 ± 0.08 for potentially affected and control sites, respectively ($p = 0.54$; Figure 5b).

These findings are also consistent with those reported on for aerial surveys within the 2023 Monitoring Report (Joro 2023).

1.0 INTRODUCTION

Manitoba Hydro (MH) constructed the Manitoba-Minnesota Transmission Project (MMTP), which consists of a 500 kilovolt Alternating Current (AC) transmission line in southeastern Manitoba. Construction of the MMTP began during the summer of 2019 and was completed in June of 2020. The Project originates at the Dorsey Converter Station northwest of Winnipeg and continues south around Winnipeg, within the Existing Transmission Corridor, the Southern Loop Transmission Corridor, and the Riel-Vivian Transmission Corridor, to just east of Provincial Trunk Highway 12. The route continues southward across the rural municipalities (RM) of Springfield, Tache, Ste. Anne, La Broquerie, Stuartburn, and exits at the Canada-United States border near the community of Piney.

This report augments the results of post-construction mammal monitoring including white-tailed deer and predators from additional camera trap monitoring conducted from winter 2020-2021 to August 2023 (Map 1) to fulfill the requirements of the overall monitoring program. Camera trap surveys provide data on the distribution and abundance of ungulates (moose, elk, deer) and predators (coyote and grey wolf) to test null and alternative hypotheses on their observed impact on ungulates as outlined in the MMTP Environmental Monitoring Plan (Manitoba Hydro 2019). Existing camera traps were installed for pre-construction monitoring and carried into post-construction monitoring, with a total of 13 camera trap arrays used in the study, 7 cameras were positioned in potentially affected areas along the FPR and 6 cameras in reference or control areas. One camera in potentially affected areas did not have usable observation data during this reporting period and was excluded from further analysis (i.e., only 12 camera trap arrays were analyzed in this updated report).

The purpose of this report is to summarize the results of additional camera trap operation phase data (2020-2023) and assess/accept null or alternate hypotheses related to Project effects. Results of findings relative to the potential effects described in the EIS and Environmental Monitoring Plan provide additional support to the conclusions found in the overall Mammals Monitoring Report which was previously submitted in January 2023 (Joro 2023).

2.0 MAMMALS OVERVIEW AND PROJECT RELATED POTENTIAL EFFECTS

As described in previous monitoring reports, the Manitoba-Minnesota Transmission project's impact on mammals has been provided to Manitoba, encompassing findings from aerial surveys and trail cameras detailed in the 2021-22 Mammals Monitoring Program Technical Report by Joro (2023). This Trail/Trap Camera update report incorporates relevant sections from that report for contextualization. The subsequent sections present background information from prior reports, leading to the analysis of camera trap data collected between November 2020 and August 2023. The overall potential effects on mammals have been previously delineated as follows:

White-tailed deer

White-tailed deer is a widespread generalist species found throughout Manitoba, and the predominate ungulate in the Project area. Within Game Hunting Area (GHA) 35, white-tailed deer are a highly valued species for hunting and outfitting use. Previous monitoring reports have provided thorough species overviews as shared below (Stantec 2018).

> *Transmission line corridors create habitat edges for white-tailed deer that provide an ecotone with high quality forage resources and accessible hiding cover in adjacent forest (Reimers et al. 2000). Disturbed vegetation is favoured by white-tailed deer because of the high diversity of plants in those areas (Stewart et al. 2011). Riparian areas, edge habitats, and linear features function as important habitats for travel and forage. Therefore, white-tailed deer are not particularly susceptible to the effects of habitat fragmentation but may be susceptible to increased mortality associated with moving through higher risk areas created by habitat loss and degradation of matrix quality (Stewart et al. 2011).*
>
> *The EIS identified a potential Project effect of increased mortality risk from hunters and predators by enhanced access to white-tailed deer habitat in eastern portions of the Project, however the effect is expected to be minimal with no measurable effect on abundance anticipated. In that portion of the Project, white-tailed deer concentrations were noted in areas near Ste. Genevieve, Richer, Sundown, Piney, and in the Watson P. Davidson and Spurwoods WMAs. The deer population in the area is considered to be stable. Habitat loss and sensory disturbance effects from ROW clearing are considered minimal and short-term, ultimately resulting in a*

positive effect of enhanced deciduous browse forage and increased edge habitat during the operation phase.

Elk

Studies regarding elk have been initiated by Manitoba Environment and Climate Change (MECC). In addition, a Memorial University Master's program is reviewing components of elk populations with the same range as studied for the right-of-way (ROW). Both initiatives may provide future data and perspectives to supplement this monitoring effort.

Previous monitoring reports have provided thorough species overviews as shared below (Stantec 2018).

As described in the EIS, the Vita elk population in Manitoba (fall/winter range) is shared with Minnesota (summer range) and is the only elk population with potential to interact with the Project. Long-term census data in Manitoba for this elk population are limited, with a stable population estimate of 100-150. Annual surveys (2004-2008) conducted in Minnesota estimated the population at 112-215 elk (MDNR 2009). The Vita elk range in Manitoba may overlap an eastern portion of the Project Regional Assessment Area (RAA; a 15 km buffer around the Project footprint) in areas near Vita and Caliento, however, EIS field studies did not detect elk occurrence within the ROW or Local Assessment Area (LAA; a 1 km buffer around the Project footprint), or RAA. The closest observations during baseline surveys were 20 km from the final preferred route. The ROW avoids the core areas known to support elk near Vita and Arbakka, with no anticipated significant adverse Project effects on the population. Since the filing of the EIS, MH has joined with the RM of Stuartburn, MECC, and the Nature Conservancy Canada to form the Vita Cross-Border Elk Monitoring Partnership. This new partnership is aimed to understand movements and home range size of elk by utilizing GPS collar technology in southeast Manitoba but is not part of this monitoring report.

Moose

As described in the MMTP EIS, moose populations in southern Manitoba have experienced significant declines over the years. Previous monitoring reports have provided thorough species overviews as shared below (Stantec 2018).

Moose were a common ungulate species in southeastern Manitoba prior to the 1990s but populations in the region have since collapsed (Leavesley 2015, pers. comm., Rebizant 2015, pers. comm.). Despite the presence of suitable moose habitat (e.g., shrubby wetlands, alder swamps, sub-climax deciduous forest; Banfield 1974), moose are rare in southeastern Manitoba due to a combination of factors such as habitat fragmentation, predation by wolves, parasites, fire

suppression, and unregulated harvest (Leavesley 2015, pers. comm., Rebizant 2015, pers. comm). The areas south of the Watson P. Davidson Wildlife Management Area heading southeast to the Spur Woods WMA and south of Piney, in the RAA was identified as containing moose habitat, especially near Piney (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015).

Black Bear

Previous monitoring reports have provided thorough species overviews as shared below (Stantec 2018).

Black bears favor high landscape connectivity and are sensitive to significant habitat changes and disturbances that affect access to, and availability of, food resources (Rogers and Allen 1987, Gunson 1993, Kindell and Van Manen 2007). They are widely distributed as a consequence of food resource availability both spatially and seasonally (Gunson 1993, Costello and Sage 1994, Pelton et al. 1999, Pelton 2000), but local abundance may be variable depending on annual severity of weather and food availability. Bears may avoid linear development with active human activity, particularly during denning (Forman et al. 1997, Linnell et al. 2000).

The EIS indicates the black bear population within the RAA is stable (possibly increasing), with common occurrence and widespread distribution throughout areas supporting forest habitat; particularly at the forest-agricultural habitat interface, primarily east and south of the Watson P. Davidson WMA. Field studies identified bear activity within the vicinity of the proposed D604I ROW, along existing transmission line M602F, and other forested parts of the RAA, occupying forested areas near the communities of Richer, Marchand, Sundown, and Piney.

Black bears are an important species to subsistence users (First Nations and Metis) and to the livelihood of local commercial outfitters. The Project footprint will contribute to habitat fragmentation of natural habitat patches that may affect bear habitat availability, occurrence, and distribution. Measurable changes in abundance are not anticipated because of Project activities or disturbance because of routing and scheduling of construction activities.

Predators

The ROW and Project access development may enhance predator mobility into areas that were previously secure habitat for prey species, decrease predator search times for prey, and/or make prey escape more difficult. Predators such as wolves and coyotes may benefit from enhanced access, leading to increased predation of ungulates.

3.0 MAMMALS MONITORING PLAN OVERVIEW

As described in previous monitoring reports, the MMTP Environmental Monitoring Plan (Manitoba Hydro 2019) identified specific monitoring activities to evaluate several null and alternate hypotheses related to Project effects. To test these hypotheses, a Before-After-Control-Impact (BACI) was implemented using data gathered during the mammal baseline (pre-construction), during construction and operation monitoring surveys described in this report and the Environmental Monitoring Plan (Manitoba Hydro 2019). Distribution of white-tailed deer, elk, wolves and coyotes through aerial surveys and camera trap studies were conducted relative to the Project ROW to assess distribution and population trends as a factor of density in Project effected and control blocks to assess any potential of increased mortality. The monitoring program has been designed to test these hypotheses and are summarized as follows (MMTP Environmental Monitoring Plan; Manitoba Hydro 2019).

- *Hypothesis 1:*
- H_0 (null): The construction of the transmission line does not affect the distribution of white-tailed deer.
- H_1 (alternate): The construction of the transmission line does affect the distribution of white-tailed deer.
- *Hypothesis 2:*
- H_0 (null): The operation of the transmission line does not affect the distribution of white-tailed deer.
- H_1 (alternate): The operation of the transmission line does affect the distribution of white-tailed deer.
- *Hypothesis 3:*
- H_0 (null): The operation of the transmission line does not change the mortality risk for white-tailed deer.
- H_1 (alternate): The operation of the transmission line does affect the mortality risk for white-tailed deer.

The initial monitoring strategy primarily concentrated on two key aspects:

1. **Pre-construction Baseline Data Collection:**
    - Purpose: Facilitating the validation of Environmental Impact Statement (EIS) predictions.

- Objective: Verifying the effectiveness of mitigation measures and assessing alterations in the distribution and occurrence of ungulates and predators due to the Project.
- Focus Species: White-tailed deer (as the dominant ungulate), wolves, coyotes, and black bears.
- Methodology: Collection of baseline data to establish a reference point for comparison during and after construction.

2. **Monitoring During Construction and Operation:**
    - Purpose: Assessing changes in distribution and occurrence relative to baseline conditions.
    - Focus Species: White-tailed deer (dominant ungulate), wolves, coyotes, and black bears.
    - Exclusion of Moose: Due to known low densities, specific monitoring of moose populations was omitted.
    - Methodology: Ongoing monitoring during both the construction and operational phases to track any shifts in ungulate and predator populations.

The gathered data served multiple purposes:

- **Determination of Changes:** Identifying alterations in wildlife distribution and occurrence resulting from the development.
- **Validation of EIS Hypotheses and Predictions:** Assessing whether the actual outcomes align with the expectations outlined in the Environmental Impact Statement.
- **Adaptive Management:** Applying adaptive management strategies during the operational phase based on the monitored data if necessary.

This approach was intended to inform decision making and to document if the predicted effects and hypotheses assumed align with the EIS while facilitating adaptive adjustments if needed.

4.0 METHODS

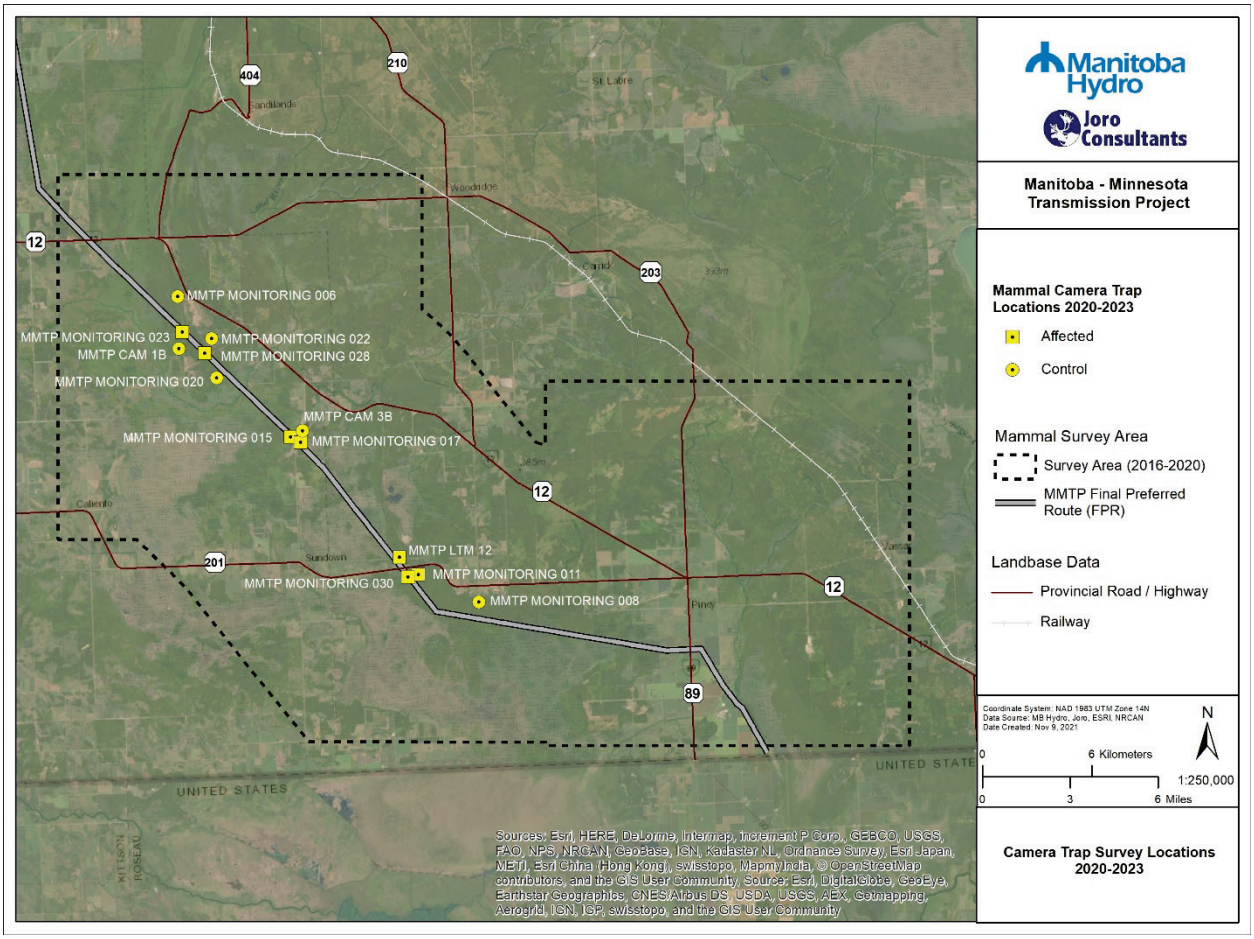
4.1 Camera Trap Survey

Methods of trail camera deployment and analysis have remained consistent through all phases of the project. Camera traps focus on large mammals, particularly white-tailed deer, and predators such as black bear, wolf, and coyotes. Moose are rare in this region and elk are known to have fidelity to areas away from the MMTP ROW. In this study, infrared (IR) camera trap arrays are used to monitor mammal activity along the FPR (i.e., potentially affected sites) and adjacent control areas (>500 m from the FPR).

Survey efforts focused on large, contiguous patches of intact forested habitats between Provincial Highway 12 and the Canada-U.S. border that are most likely to be affected by habitat fragmentation. The LAA in this extent includes softwood forest (36% total area), hardwood forest (18%), and mixed wood forest (4%). Site selection aimed to sample each forested habitat equally in both potentially affected sites and control sites; however, the lack of mixedwood forest within the LAA limited its inclusion. Existing camera traps installed for pre-construction monitoring were carried into post-construction monitoring, with a total of 13 camera trap arrays used in the study; 7 cameras were positioned in potentially affected areas along the FPR and 6 cameras in reference or control areas (Map 1).

Camera traps were deployed/reset in late 2020 or early 2021 with the final data retrieval occurring in either November 2022 or August 2023. For post-construction monitoring assessment in this report, all camera data collected between winter 2020-2021 and August 2023 were analyzed and reported on, divided into winter (November – April) and summer (May – October.).

IR cameras were attached to trees at approximately 1 m from ground level and all vegetation that might falsely trigger or obscure the camera view was removed within at least 5 m, where possible. Reconyx™ cameras were used in continuous photo capture mode (i.e., a 2-photo burst with no time delay) and using compact flash type I/II or SD (Secure Digital) memory cards.



Map 1 - Locations of 2020-2023 mammal camera trap locations (affected and control)

4.1.1 Analytical Methods

Results of camera trap surveys were provided by MH, generated following established photo analysis. All photographs were classified using MH's Camera Trap Data Classification Guide (Manitoba Hydro 2014) to identify the number, age, sex, and species involved in each camera event. A camera event is any number of individuals of a particular species captured on camera within a one-hour period. An annual relative abundance index (RAI; number of photo events / camera-days) is calculated for key species (i.e., white-tailed deer, black bear, gray wolf, and coyote), year, and season (summer [May-October] and winter [November-April]) at each of the 12 IR camera trap sites (6 affected sites, and 6 control sites). Analyses were not constrained to a minimum number of operational days per site/season combination. Box plots of annual RAIs are used to visualize differences between IR camera trap treatments (i.e., potentially affected sites vs. control sites). Welch's t-tests were performed to test for differences between RAI treatment means for each species by season and treatment (for deer) and pooled by treatment (for bear, wolf and coyote) (Welch 1947).

5.0 RESULTS

The following sections describe the results of post-construction camera trap surveys (2020-2023) conducted. Figure 1-Figure 3 shows a red fox, sharp-tailed grouse, and fisher, respectively, captured during camera trap surveys. Data has been grouped into treatment categories (e.g., potentially affected vs control) to facilitate comparison during the post-construction (operation) phase. All null and alternate hypotheses were evaluated and tested resulting in the current acceptance of the null hypotheses that there are no detectible Project effects on the distribution of ungulates and predators and no indication of decreased ungulate densities because of increased mortality.

Figure 1: A red fox captured during camera trap surveys

Figure 2: A sharp-tailed grouse captured during camera trap surveys

Figure 3: An American marten captured during camera trap surveys

5.1 Camera Trap Survey

A total of 11,166 camera-days from 12 cameras (as indicated above, one camera was excluded from analysis) were assessed between winter 2020-21 and August 2023 to determine RAI between potentially affected sites and control sites (Appendix 2, Table 1). There were no moose or elk observations, and data discussed hereafter pertain to white-tailed deer, black bear, gray wolf, and coyote. There was a total of 3,214 wildlife events recorded between the winter 2020-August 2023 study periods, including 2,491 white-tailed deer events (3,453 individuals), 581 black bear events (784 individuals), 55 gray wolf events (87 individuals), and 87 coyote events (104 individuals). Statistical analyses and boxplots were conducted on the dataset divided into winter (November – April) and summer (May – October) study periods. Table 1 provides a summary of camera trap survey events and individual species recorded during the post-construction monitoring period. Detailed trail camera data and results of statistical analyses are provided in Appendix 2.

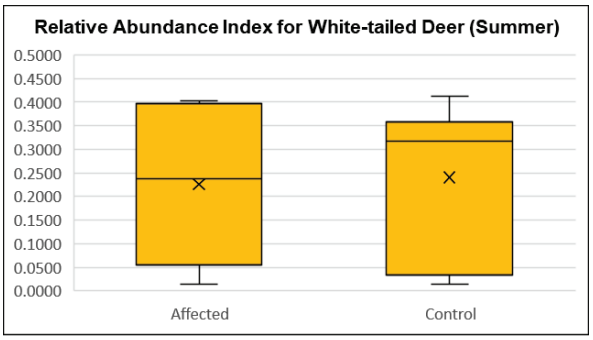
Table 1: Summary of camera trap survey events and individuals in affected and control areas recorded during post-construction monitoring between November 2020 and August 2023

		White-tailed Deer		Black Bear		Gray Wolf		Coyote	
Year		**Affected**	**Control**	**Affected**	**Control**	**Affected**	**Control**	**Affected**	**Control**
2020	Observation Days	558	312	558	312	558	312	558	312
	Events	121	414	9	155	10	9	6	7
	# of Individuals	154	567	13	185	14	12	6	7
2021	Observation Days	2190	2183	2190	2183	2190	2183	2190	2183
	Events	571	615	58	76	9	10	26	15
	# of Individuals	845	853	76	85	17	13	34	18
2022	Observation Days	2078	2077	2078	2077	2078	2077	2078	2077
	Events	205	330	17	170	5	7	10	19
	# of Individuals	246	452	23	242	7	8	12	22
2023	Observation Days	884	884	884	884	884	884	884	884
	Events	134	101	20	76	1	4	3	1
	# of Individuals	190	146	22	138	1	15	3	2
Total	**Observation Days**	**5710**	**5456**	**5710**	**5456**	**5710**	**5456**	**5710**	**5456**
	Events	**1031**	**1460**	**104**	**477**	**25**	**30**	**45**	**42**
	# of Individuals	**1435**	**2018**	**134**	**650**	**39**	**48**	**55**	**49**

White-tailed Deer

White-tailed deer was observed at all 12 sites during summer and 8 of 12 sites in winter 2020-2023 (Map 2 and 3, Figure 4). There was no significant difference between RAI means during summer with 0.23 ± 0.17 and 0.24 ± 0.17 for potentially affected and control sites, respectively ($p = 0.89$ Figure 5a). Similarly, there was no significant difference between RAI means during winter with 0.12 ± 0.06 and 0.14 ± 0.08 for potentially affected and control sites, respectively ($p= 0.54$; Figure 5b).

Figure 4: A white-tailed deer captured during camera trap surveys



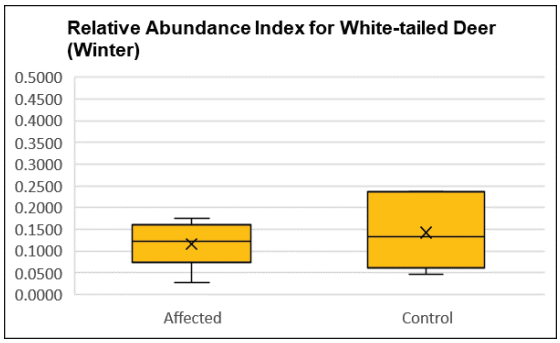


Figure 5a and 3b: Box plot of white-tailed deer relative abundance index (RAI) for potentially affected and control sites, for summer (Figure 5a on left, May-October of 2021, 2022, and 2023 combined) and winter (Figured 5b on right, November-April of 2020/21, 2021/22, and 2022/23 combined).

Black Bear

Black bear was observed at all 12 sites during summer and 8 of 12 sites during winter 2020-2023 (Map 4, Figure 6). However, most black bear events occurred during summer as they typically spend the winter months hibernating, therefore data was combined for winter and summer. There was no significant difference between RAI means with 0.03 ± 0.02 and 0.11 ± 0.17 for potentially affected and control sites, respectively (p = 0.17; Figure 7).

Figure 6: A black bear captured during camera trap surveys

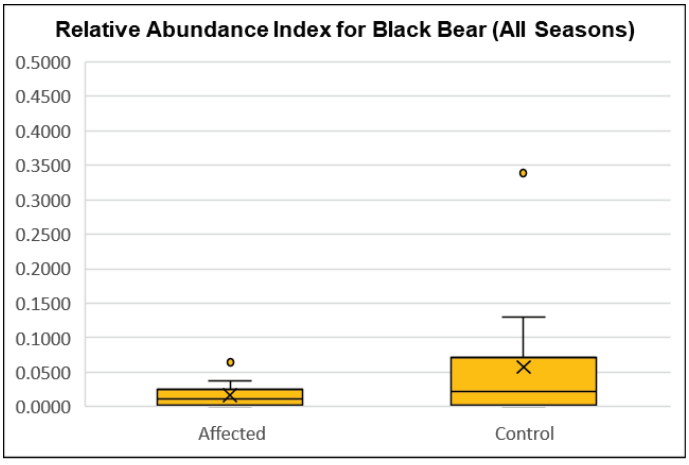


Figure 7: Box plot of black bear relative abundance index (RAI) for potentially affected and control sites between November 2020 and August 2023, summer and winter combined

Gray Wolf and Coyote

Gray wolf was observed at 4 of 12 sites during summer and 7 of 12 sites during winter (Map 5, Figure 8) and coyote was observed at 7 sites during both periods (Map 4, Figure). The was no significance in the RAI for control and affected sites for these species (p=0.77 and p=0.78 for wolf and coyote respectively), however even when pooled, there are few non-zero gray wolf and coyote observations resulting in less-robust estimates for p. Boxplots for gray wolf and coyote were not provided as data are insufficient to provide a statistical result.

Figure 8: A gray wolf captured during camera trap surveys

Figure 9: A coyote captured during camera trap surveys

6.0 DISCUSSION

Camera trap surveys assessed during the final year of monitoring identified no significant variation between affected and control RAI with the acceptance of the null hypothesis that distribution and numbers of white-tailed deer are not being affected by the project through re-distribution or predator-based mortality. No significance was detected between Project Phases and seasons on white-tailed deer distribution or mortality. Low numbers of gray wolves and coyotes were observed during all phases of the MMTP. Annual monitoring has supported the null hypotheses described. Additional analysis of annual variation from pooled data across all years could be expanded upon, however, the significance of findings would be expected to remain unchanged.

The potential effects on regional white-tailed deer distribution, density and population status from hunting, predation and weather would be valuable, however are outside the scope of monitoring for this project with hunter kill data from licensed and rights-based hunting are currently not available. Additional monitoring of white-tailed deer through periodic aerial surveys, demographic and population trends would be valuable in the overall management of deer within the region.

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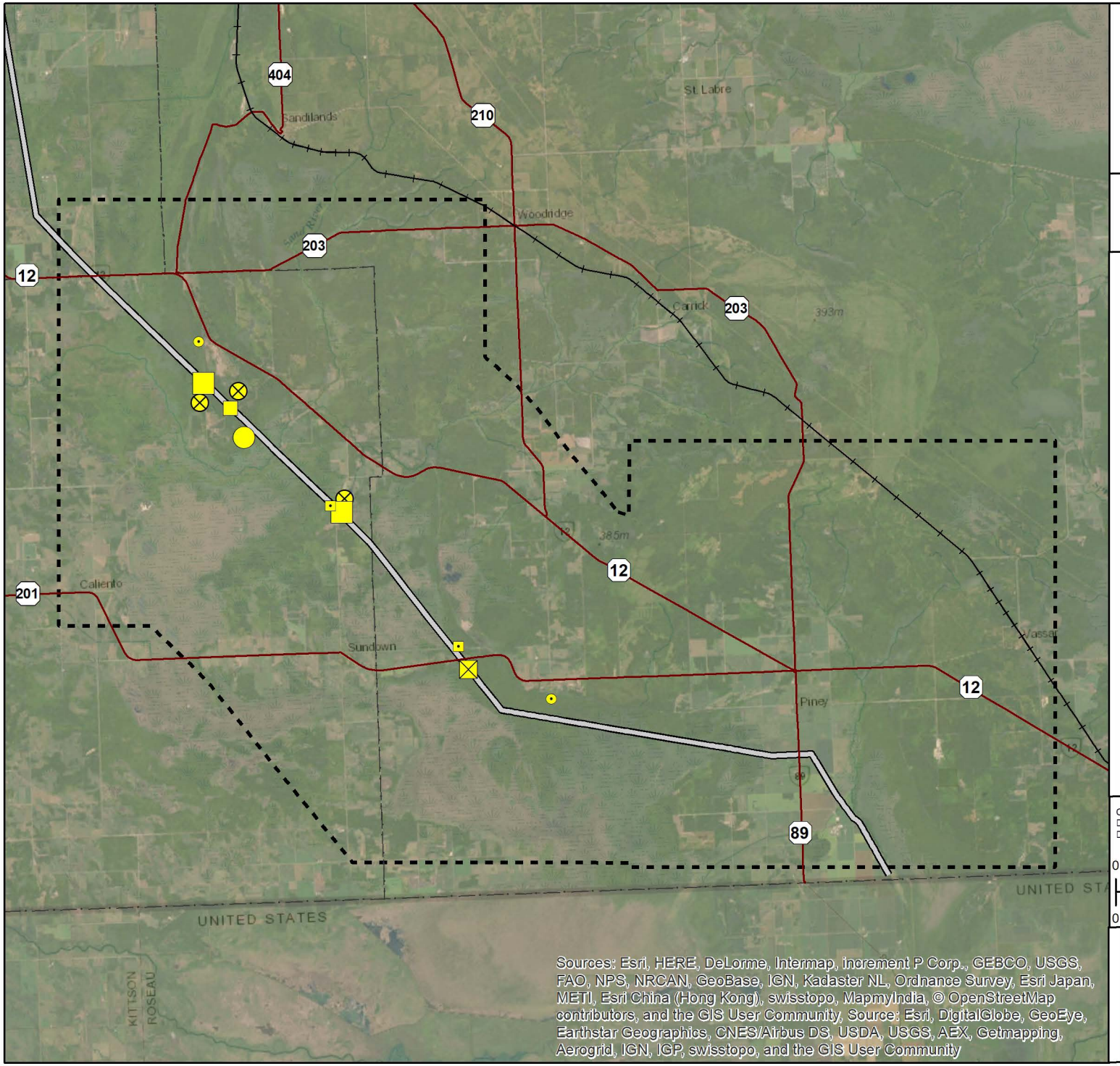
APPENDIX 1: MAPS



Manitoba Hydro

Joro Consultants

Manitoba - Minnesota Transmission Project

White-tailed Deer RAI Values (Summer)

Control		Affected
⊙	0.000	⊡
⊙	0.001 - 0.125	⊡
●	0.126 - 0.250	■
⊗	0.251 - 0.375	⊠
●	0.376 - 0.500	■

Mammal Survey

- MMTP Transmission Line
- Mammal Aerial Survey Area

Landbase Data

- Provincial Road / Highway
- Railway

Coordinate System: NAD 1983 UTM Zone 14N
Data Source: MB Hydro, Joro, ESRI, NRCAN
Date Created: Nov 9, 2021

N

0 6 Kilometers

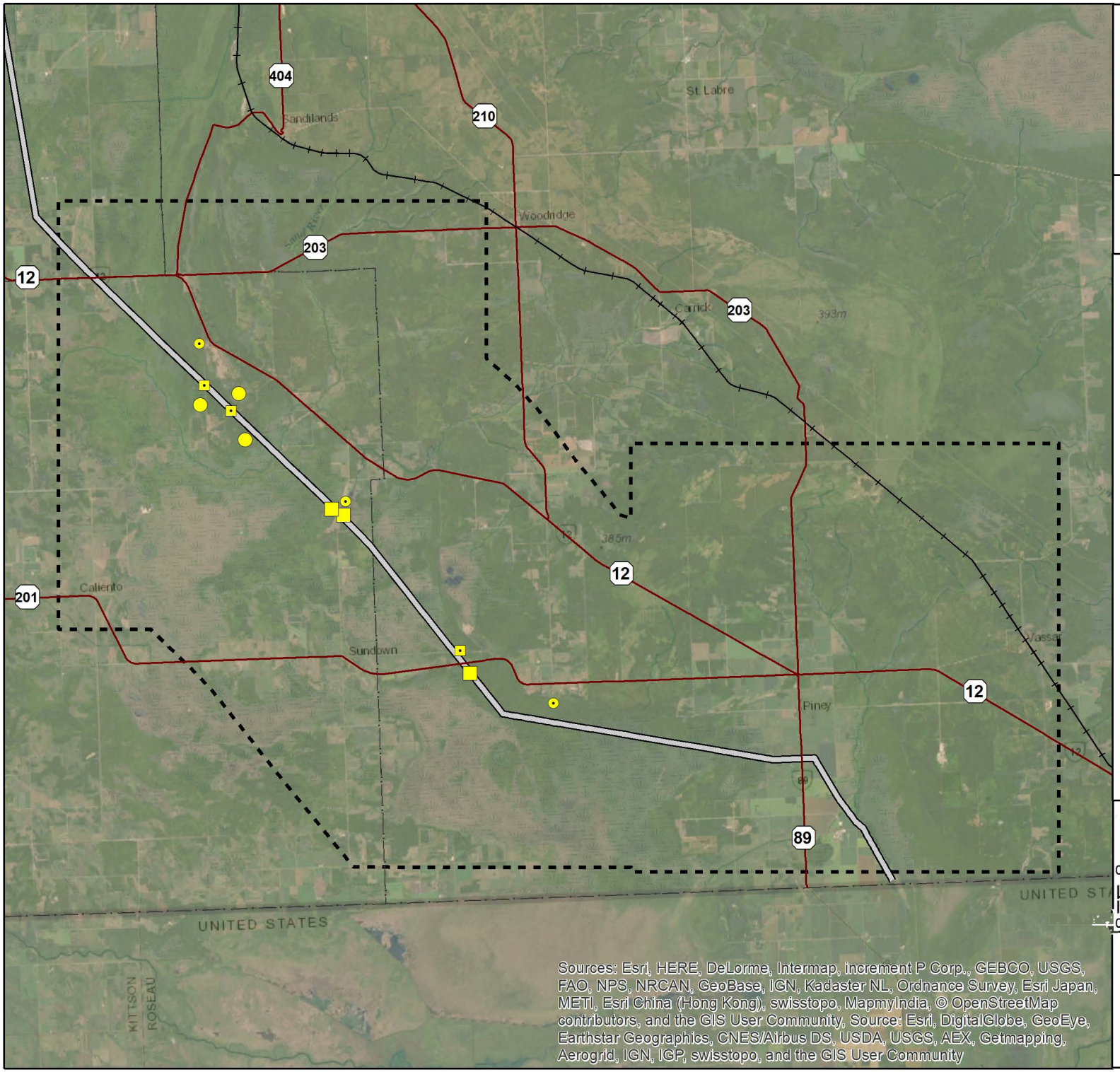
1:250,000

0 3 6 Miles

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Camera Trap Results 2021-2023 White-tailed Deer - Summer

Map 2



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Manitoba Hydro

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White-tailed Deer RAI Values (Winter)

Control		Affected
	0.000	
	0.001 - 0.125	
	0.126 - 0.250	
	0.251 - 0.375	
	0.376 - 0.500	

Mammal Survey

- MMTP Transmission Line
- Mammal Aerial Survey Area

Landbase Data

- Provincial Road / Highway
- Railway

Coordinate System: NAD 1983 UTM Zone 14N
Data Source: MB Hydro, Joro, ESRI, NRCAN
Date Created: Nov 9, 2021

N

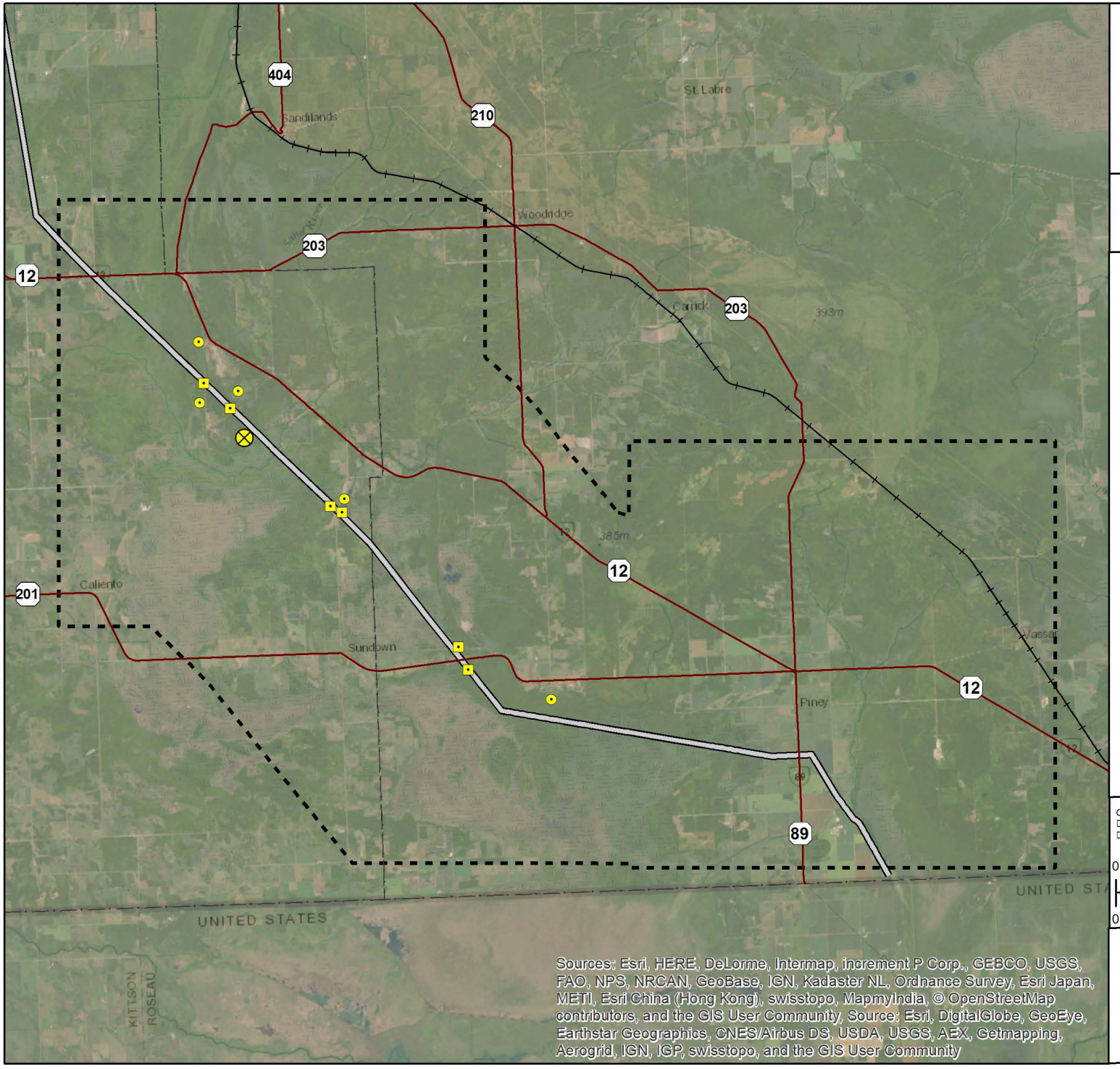
0 6 Kilometers

1:250,000

0 3 6 Miles

Camera Trap Results 2020-2023 White-tailed Deer - Winter

Map 3



Manitoba Hydro

Joro Consultants

Manitoba - Minnesota Transmission Project

Black Bear RAI Values

Control		Affected
⊙	0.000	⊡
⊙	0.001 - 0.125	⊡
○	0.126 - 0.250	□
⊗	0.251 - 0.375	⊠
◯	0.376 - 0.500	▢

Mammal Survey

MMTP Transmission Line

Mammal Aerial Survey Area

Landbase Data

Provincial Road / Highway

Railway

Coordinate System: NAD 1983 UTM Zone 14N
Data Source: MB Hydro, Joro, ESRI, NRCAN
Date Created: Nov 9, 2021

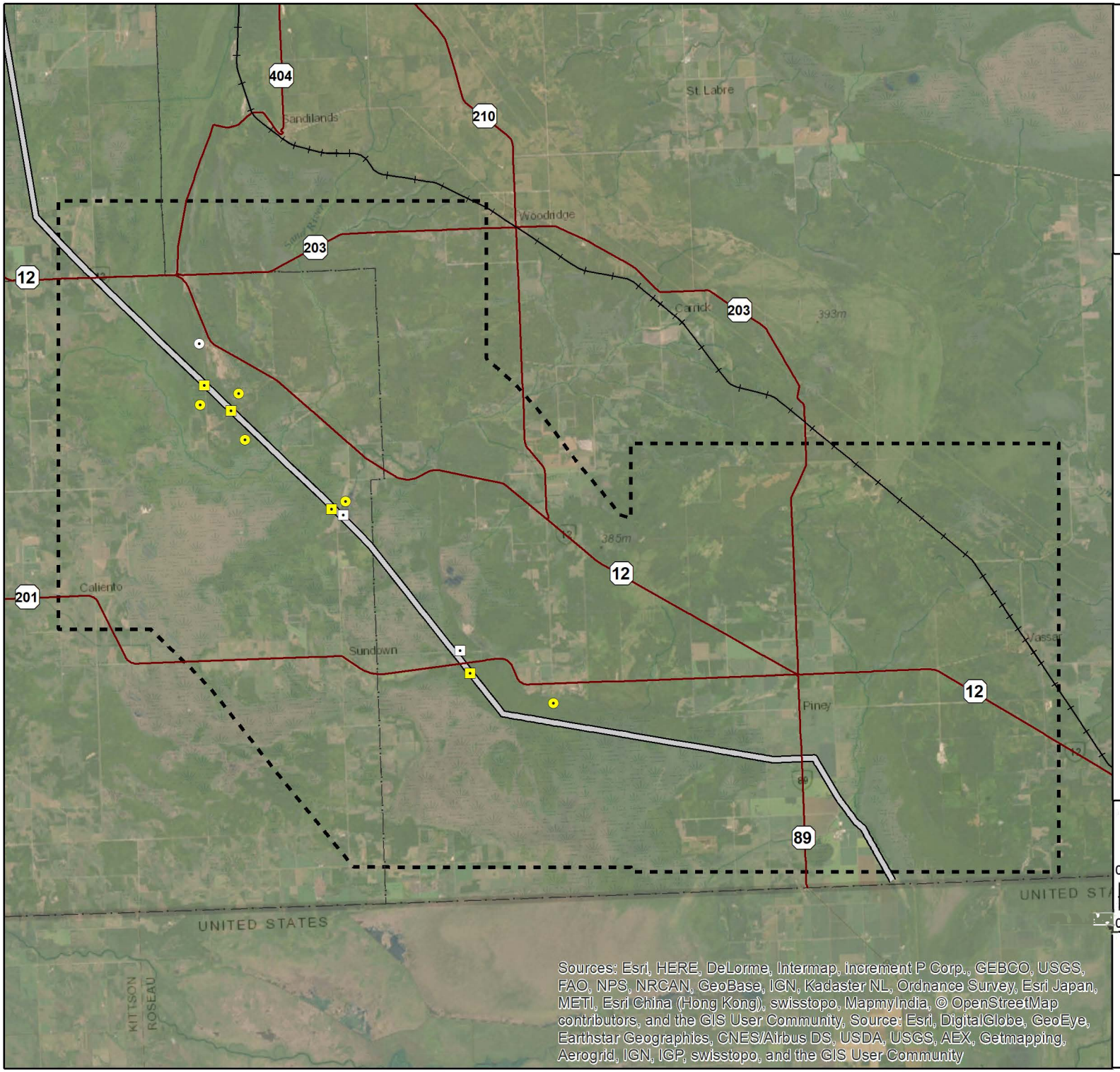
0 6 Kilometers

1:250,000

0 3 6 Miles

Camera Trap Results 2021-2023
Black Bear - Summer

Map 4



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Manitoba Hydro

Joro Consultants

Manitoba - Minnesota Transmission Project

Gray Wolf RAI Values

Affected	Control
0.000	
0.001 - 0.125	
0.126 - 0.250	
0.251 - 0.375	
0.376 - 0.500	

Mammal Survey

- MMTP Transmission Line
- Mammal Aerial Survey Area

Landbase Data

- Provincial Road / Highway
- Railway

Coordinate System: NAD 1983 UTM Zone 14N
Data Source: MB Hydro, Joro, ESRI, NRCAN
Date Created: Nov 9, 2021

N

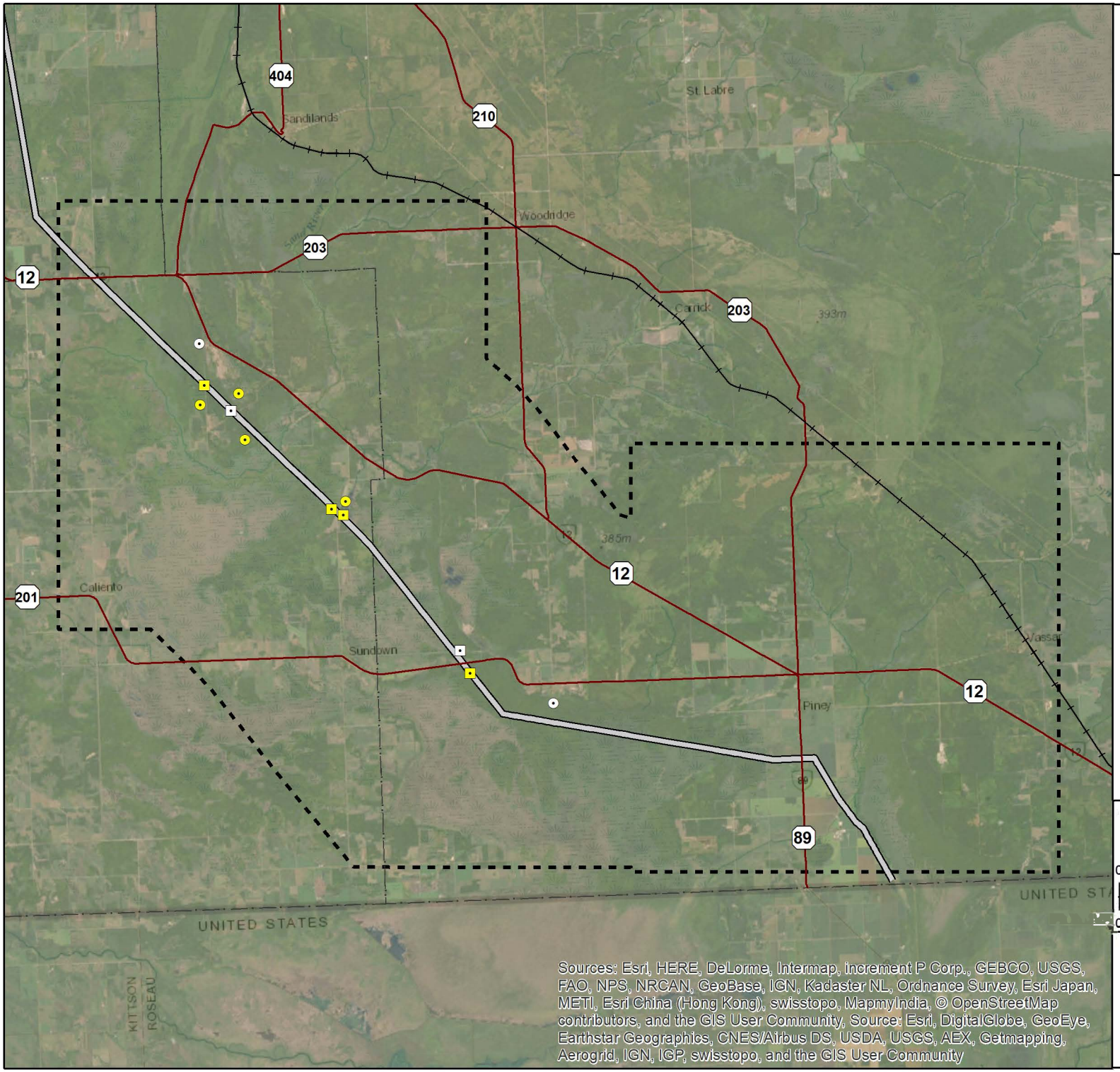
0 6 Kilometers

1:250,000

0 3 6 Miles

Camera Trap Results 2020-2023 Gray Wolf

Map 5



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Manitoba Hydro

Joro Consultants

Manitoba - Minnesota Transmission Project

Coyote RAI Values

Affected	Control
0.000	
0.001 - 0.125	
0.126 - 0.250	
0.251 - 0.375	
0.376 - 0.500	

Mammal Survey

- MMTP Transmission Line
- Mammal Aerial Survey Area

Landbase Data

- Provincial Road / Highway
- Railway

Coordinate System: NAD 1983 UTM Zone 14N
Data Source: MB Hydro, Joro, ESRI, NRCAN
Date Created: Nov 9, 2021

N

0 6 Kilometers

1:250,000

0 3 6 Miles

Camera Trap Results 2020-2023 Coyote

Map 6

APPENDIX 2: TABLES

Appendix 2, Table 1: Summary of the MMTP 2020-2023 mammal camera trap study results by season, treatment, and years combined

Camera ID	Treatment	Season	No. of Operation Days	Deer_No	Deer_event	Deer_RAI	Bear_no	Bear_event	Bear_RAI	Wolf_no	Wolf_event	Wolf_RAI	Coyote_no	Coyote_event	Coyote_RAI
MMTP_LTM_12	Affected	summer	366	6	5	0.0137	6	6	0.0164	0	0	0.0000	0	0	0.0000
MMTP_MONITORING_015	Affected	summer	366	44	25	0.0683	6	6	0.0164	0	0	0.0000	2	1	0.0027
MMTP_MONITORING_017	Affected	summer	481	260	190	0.3950	33	31	0.0644	0	0	0.0000	35	16	0.0333
MMTP_MONITORING_023	Affected	summer	466	256	188	0.4034	14	9	0.0193	0	0	0.0000	1	1	0.0021
MMTP_MONITORING_028	Affected	summer	617	125	85	0.1378	24	17	0.0276	0	0	0.0000	0	0	0.0000
MMTP_MONITORING_030	Affected	summer	481	214	162	0.3368	37	18	0.0374	6	5	0.0104	4	3	0.0062
MMTP_MONITORING_006	Control	summer	366	6	5	0.0137	8	8	0.0219	0	0	0.0000	0	0	0.0000
MMTP_MONITORING_008	Control	summer	366	18	15	0.0410	9	9	0.0246	0	0	0.0000	0	0	0.0000
MMTP_MONITORING_020	Control	summer	466	258	192	0.4120	213	158	0.3391	6	2	0.0043	5	5	0.0107
MMTP_MONITORING_022	Control	summer	466	177	140	0.3004	23	23	0.0494	1	1	0.0021	0	0	0.0000
MMTPCam1B	Control	summer	466	194	156	0.3348	26	11	0.0236	0	0	0.0000	1	1	0.0021
MMTPCam3B	Control	summer	481	212	163	0.3389	60	38	0.0790	5	2	0.0042	13	11	0.0229
MMTP_LTM_12	Affected	winter	365	19	10	0.0274	0	0	0.0000	0	0	0.0000	0	0	0.0000
MMTP_MONITORING_015	Affected	winter	378	79	57	0.1508	0	0	0.0000	10	3	0.0079	4	2	0.0053
MMTP_MONITORING_017	Affected	winter	556	104	87	0.1565	1	1	0.0018	0	0	0.0000	19	15	0.0270
MMTP_MONITORING_023	Affected	winter	539	60	52	0.0965	1	1	0.0019	6	3	0.0056	0	0	0.0000
MMTP_MONITORING_028	Affected	winter	692	79	62	0.0896	7	4	0.0058	3	2	0.0029	0	0	0.0000
MMTP_MONITORING_030	Affected	winter	556	123	98	0.1763	5	2	0.0036	8	7	0.0126	6	4	0.0072
MMTP_MONITORING_006	Control	winter	361	22	17	0.0471	6	6	0.0166	0	0	0.0000	0	0	0.0000
MMTP_MONITORING_008	Control	winter	298	40	20	0.0671	1	1	0.0034	4	3	0.0101	0	0	0.0000
MMTP_MONITORING_020	Control	winter	539	181	128	0.2375	109	70	0.1299	0	0	0.0000	8	7	0.0130
MMTP_MONITORING_022	Control	winter	539	183	127	0.2356	0	0	0.0000	11	7	0.0130	1	1	0.0019
MMTPCam1B	Control	winter	539	99	90	0.1670	2	1	0.0019	14	7	0.0130	7	7	0.0130
MMTPCam3B	Control	winter	556	61	56	0.1007	0	0	0.0000	0	0	0.0000	20	20	0.0360

Available in accessible formats upon request