Birtle Transmission Project

Appendix D

Biophysical Existing Environment Technical Report

Transmission Planning & Design Division

Licensing & Environmental Assessment

January 2018

Prepared for:

Environmental Approvals Branch

Manitoba Hydro

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1.0 Introduction

Manitoba Hydro is proposing to construct and operate the Birtle Transmission Project (the "Project"), a 230kV transmission line from Birtle Station, located south of the community of Birtle, to the Manitoba-Saskatchewan border. The Project is required to fulfill a 20-year agreement to sell 100 megawatts of renewable hydroelectricity to Saskatchewan. The Project will require a Licence from Manitoba Sustainable Development under *The Environment Act* and is a Class II development. SaskPower will be responsible for constructing and operating the transmission line in Saskatchewan from the Manitoba-Saskatchewan border to its station in Tantallon, Saskatchewan.

This report provides a description of the desktop and field studies that were conducted to describe and document the existing biophysical environmental in the Project Footprint, Local and Regional Assessment Areas. Information contained in this report was used to supplement the Environmental Assessment (EA) report prepared for the proposed project for submission to regulatory authorities for review and approval.

The following biophysical components are discussed in this report:

- Soils and Terrain;
- Fish;
- Vegetation;
- Terrestrial Invertebrates, Amphibians and Reptiles;
- Birds; and
- Mammals.

For each biophysical component the following information was considered for development of the existing environment:

- Description of the methods and data sources used including literature review, engagement process information, field studies (reconnaissance and detailed surveys), and data gaps and limitations;

- Information on priority species including their status (conservation concern and traditional use), biology and habitat preferences; and

- Current status of the environment in the assessment areas including regional distribution, typical species and trends

In addition to the above, a summary of the routing process and role of the terrestrial information in selecting alternative routes and the preferred route is also provided.

2.0 Project summary and study area

2.1 Project components

The Project includes the following project components:

- Construction of a 230 kV transmission line within a 40 to 60 m right-of-way (RoW) from Birtle South Station to the Manitoba-Saskatchewan border;
- Anticipated use of self supporting suspension steel lattice towers and tubular steel “H” frame structures for tower design; and
- Minor upgrades to the Birtle South Station.

2.2 Routing process

Manitoba Hydro uses a transmission line routing process that is based on an internationally recognized methodology. This process has been used on Manitoba Hydro projects such as the St. Vital Transmission Complex and the Manitoba-Minnesota Transmission Project. This process incorporates routing preferences from human, environmental and engineering perspectives and uses these perspectives to help minimize overall potential effects of the project.

Throughout the transmission line route selection process, the planning, gathering of feedback, analyzing information and evaluation of the route is ongoing. Feedback that is obtained throughout the process is used to identify criteria that will be considered by the Project team speciailists and Manitoba Hydro for evaluation of the route options. With respect to the natural envrironment, the criteria that was selected and used for evaulation included: intactness, acres of natural forest, acres of wetland, acres of native grassland, and stream/river crossings. A more detailed description of the routing process can be found in Appendix A and in Chapter 6.0 in the Environmental Assessment Report.

2.3 Spatial boundaries

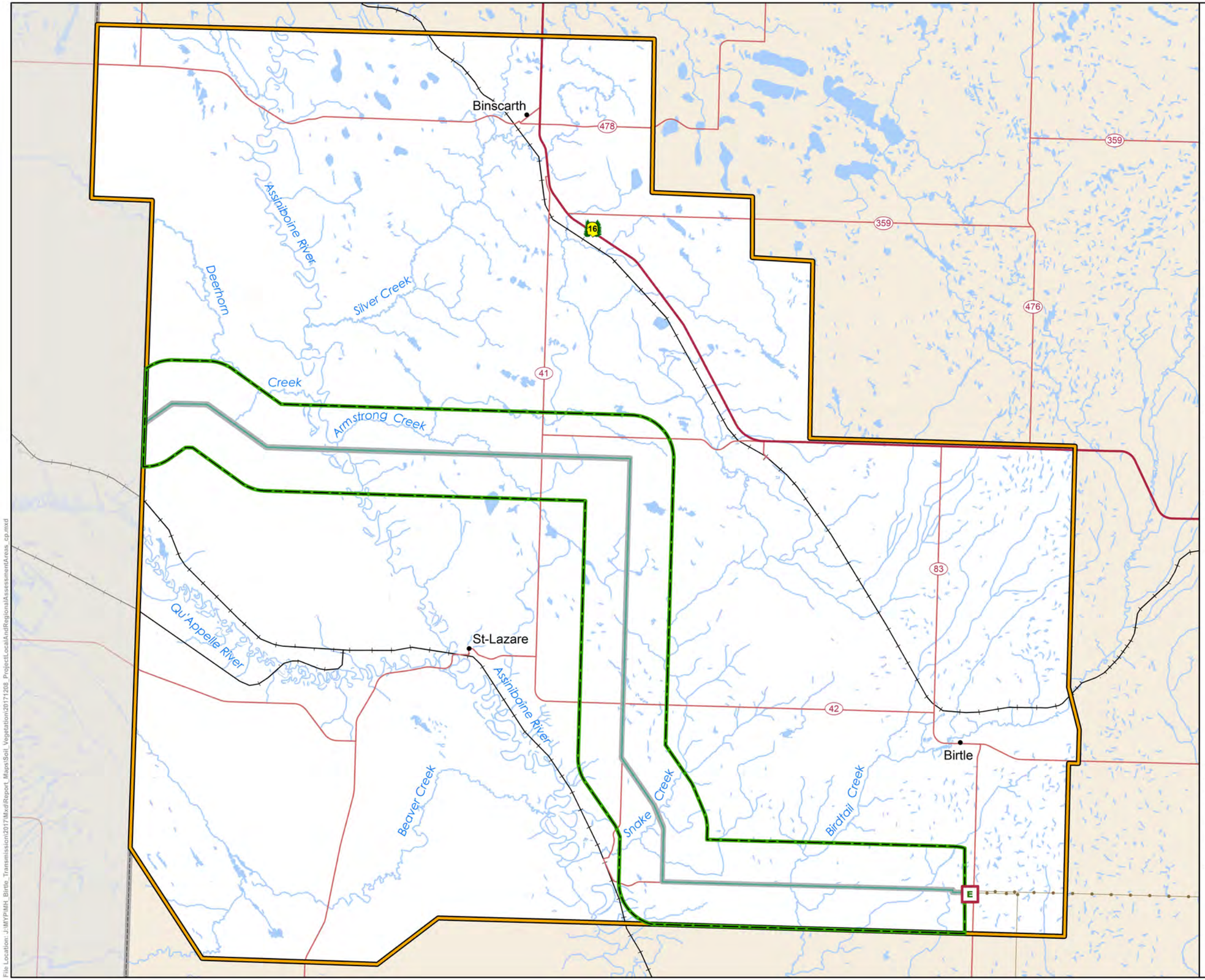
The spatial boundaries for the environmental assessment of the proposed Project consists of the project, local and regional assessment areas as described below.

Project Footprint (PF): Footprint of the proposed Project including the transmission line RoW. The total area of these components is approximately 185 ha (Map 2-1). Potential direct effects of the project can occur in the Project Footprint.

Local Assessment Area (LAA): The LAA is a one mile buffer from RoW centreline around the project components. (Map 2-1). The size of the LAA was based on the potential for indirect effects to occur such as dust, vehicle emissions and noise from the project on the environment. The approximate area of the LAA is 14,623 ha.

Regional Assessment Area (RAA): The RAA is the route planning area (Map 2-1) that was used in the initial steps of the transmission line routing process to identify opportunities and

constraints for the Project, leading to the identification of alternative routes and eventually a final preferred route. The approximate area of the RAA is 96,915 ha.



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Birtle Transmission Project

Project Infrastructure
- E — Birtle South Station
- Final Preferred Route

Assessment Areas
- Project Footprint
- Local
- Regional

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 11, 2017

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Project, Local and Regional Assessment Areas

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Map 2-1 Project Footprint, Local and Regional Assessment Areas.

3.0 Soils and terrain

3.1 Methods and data sources

3.1.1 Literature Review

The following data sources were used to describe the regional and local soils and terrain in the assessment areas identified for the project:

- Soil Agricultural Interpretation Database (Soil AID) published by Western Land Resource Group, Agriculturel and Agri-Food Canada (2002) in conjunction with the Soil Series Descriptions produced by the Government of Manitoba Agriculture, Food and Rural Iniatives was reviewed for detailed information, descriptions and analysis of the soils in the assessment areas as well as provide information on slope and terrain.
- Soils and Terrain Information Bulletins for the Rural Municipalities (RM) of Birtle, Ellice, Russell and Silver Creek (Land Resource Unit of Agriculture and Agri-Food Canada) provided existing information on physiography, soils, terrain and slope classes in the RAA, LAA and Project Footprint.
- Manitoba Industry, Economic Development and Mines Surficial Geology Map 62K (Manitoba Geological Survey) and the Soil Landcover Surficial Geology (Manitoba Hydro, 2010) was reviewed to describe the surficial geology of the assessment areas.
- Canadian System of Soil Classification provided supporting information on the description of soils.
- Manual for Describing Soils in the Field (Smith et. al, 2007) was reviewed to summarize slope and terrain types.
- The St. Lazare Area of Manitoba: A Biodiversity Hotspot report (Hamel and Reimer) provided high level information on site description of the Spy Hill –Ellice Community Pasture.

3.1.2 Engagement process information

As part of the engagement process for the Project, Manitoba Hydro corresponded and interacted with the public, Indigenous communities and organizations, and stakeholders. Reports from the Values and Interests survey / workshops conducted in Canupawakpa Dakota Nation (Manitoba Hydro 2017a), Gambler First Nation (Manitoba Hydro 2017b), Waywayseecappo First Nation (Manitoba Hydro 2017c), and the Manitoba Metis Federation draft MLOUS report (MNP 2017) as well as the Manitoba Hydro Public Engagement Summary document were reviewed and information relevant to soils was incorporated into the existing environment where possible.

3.1.3 Field studies (reconnaissance and detailed surveys)

No reconnaissance or detailed field surveys were required for soils and terrain for the Project as there is current existing literature available to provide a detailed description of the soils and terrain in the project footprint, and local and regional assessments area (Section 3.1.1). Manitoba Hydro will also conduct LIDAR surveys to map the terrain and will conduct geotechnical studies along the right-of-way at tower locations prior to finalizing tower foundation

design.

3.1.4 Data gaps and limitations

The following data gap and limitation was identified for soils and terrain for the Project:

- Information compiled to describe the soils in the Project area, was summarized from existing literature. Detailed soil surveys were not conducted along the final preferred route to provide supplemental soil information in the assessment areas.

3.2 Terrain and surficial geology

The following summarizes the regional and local terrain and surficial geology for the Project.

3.2.1 Regional terrain and surficial geology

3.2.1.1 Terrain

The majority of the RAA encompasses large portions of the Rural Municipality (RM) of Ellice-Archie and Municipality of Prairie View. A minor portion of the assessment area is found within the southern part of the Municipality of Russell-Binscarth and RM of Riding Mountain West. Elevations in the RAA range from approximately 400 masl to 540 masl (Land Resource Unit, 1998a, b, c and d). Typically lower elevations are found near major watercourses such as the Assiniboine River, Snake Creek and Birdtail Creek. The entire RAA occurs in the Saskatchewan Plain, specifically the Newdale and St. Lazare Plain subsections (Land Resource Unit, 1998a, b, c and d).

The Newdale Plain, in the eastern portion of the RAA, has relief ranging from three to eight metres with near level and gently undulating terrain with slopes of two to five percent, to areas with five to nine percent slopes on hummocky to gently rolling topography (Land Resource Unit, 1998a and d). Closer to the Assiniboine River, relief ranging from three to eight percent with hummocky terrain can be found. The hummocky terrain is characterized by numerous undrained depressions varying in size from small potholes and sloughs to large meadows and intermittent and shallow lakes (Land Resource Unit, 1998b).

The St. Lazare Plain, found in the western portion of the RAA is characterized as having dominantly level to very gently undulating relief less than three metres with slopes less than two percent. In areas of sand dunes, greater relief can be found (Land Resource Unit, 1998a, b and d).

Areas of greatest relief and slopes found in the RAA occur along the Assiniboine River and Birdtail Creek where steeply sloping valleys ranging from 45 to 60 m in depth for Birdtail Creek and 50 to 90 m in depth for the Assiniboine River are present. Slopes exceeding 30% are also evident along the valley walls. Land located in the bottoms of these river valleys are commonly near level to very gently undulating (Land Resource Unit, 1998a and b).

3.2.1.2 Surficial geology

Surficial geology in the RAA is dominantly till comprised of calcareous clay diamicton (poorly sorted sediment) that is mainly derived from shale from the Mesozoic era. Thickness of sediments ranges from one to 75 m thick on areas of low relief. There are areas where the till is covered by discontinuously thin veneers (less than one metre) of glaciolacustrine and glaciofluvial sediments (Matile and Keller, 2004).

Inclusions of distal glaciofluvial sediments occur in the RAA adjacent to watercourses and within the Spy Hill-Ellice Community Pasture. These sediments ranging from one to 75 m in thickness are comprised of fine sand, minor gravel, and thin silt and clay interbeds. There are areas that the glaciofluvial sediments have often been shaped by wave erosion and reworked by the wind (Matile and Keller, 2004).

Eolian sediments in the RAA are common in the Spy Hill-Ellice Community Pasture, adjacent to the Assiniboine river and is characterized as sand and minor silt in dunes, blowouts and on undulating plains. These sediments typically overly deltaic sediments that are either coarse lacustrine sediments or glaciofluvial deposits (Matile and Keller, 2004).

Alluvial sediments and areas of exposed rock are characteristic of rivers and creeks and are associated with watercourses found in the RAA. Alluvial sediments consist of sand and gravel, sand, silt, clay and organic detritus, approximately one to 20 m thick, that are reworked by existing rivers and are deposited as bars. The areas identified as rock, are typically 75% bedrock outcrop and are comprised of cretaceous shales or Paleozoic carbonate-dominated rocks (Matile and Keller, 2004).

3.2.2 Local terrain and surficial geology

3.2.2.1 Terrain

The terrain in the local assessment area and along the final preferred route in the Spy Hill Community Pasture is dominantly level to undulating with slopes ranging from zero to five percent. In areas with dune development on the eastern edge of the community pasture, hummocky terrain can be found with gentle slopes approximately 7.5%.

East of the Assiniboine River crossing, heading west to the crossing of Armstrong Creek along the final preferred route, slopes are level to very gently sloping, ranging from 0.5 to 3.5%. Level to hummocky terrain with slopes ranging from 0.5 to 7.5 percent can be found along the preferred route, west of Armstrong Creek to Birtle Station.

Areas along the final preferred route with slopes greater than 30% include the eroded slopes of the Assiniboine River, Snake Creek, and Birdtail Creek. Slopes approximately 37.5% can be found along the Assiniboine River with greater slopes of 85 percent along Snake Creek. Within the Assiniboine River floodplain however, slope percent decreases to 0.5 to 3.5% (nearly level to very gentle slopes). Slopes along Birdtail Creek range from 22.5% on the east side to 85% on the west side.

3.2.2.2. Surficial geology

The surficial geology along the final preferred route is dominantly till from the east side of the Assiniboine River to Birtle Station. In Spy Hill-Ellice Community Pasture, glaciofluvial sediments are dominant with eolian sediments present in the dune areas on the west side of the Assiniboine River. Glaciofluvial sediments are also present where the final preferred route traverses Snake and Birdtail creek while alluvial sediments are dominant at the crossing of the Assiniboine River. Areas of rock are also traversed by the final preferred route and are found adjacent to the Assiniboine River, Snake and Birdtail Creeks (Matile and Keller, 2004).

3.3 Soils

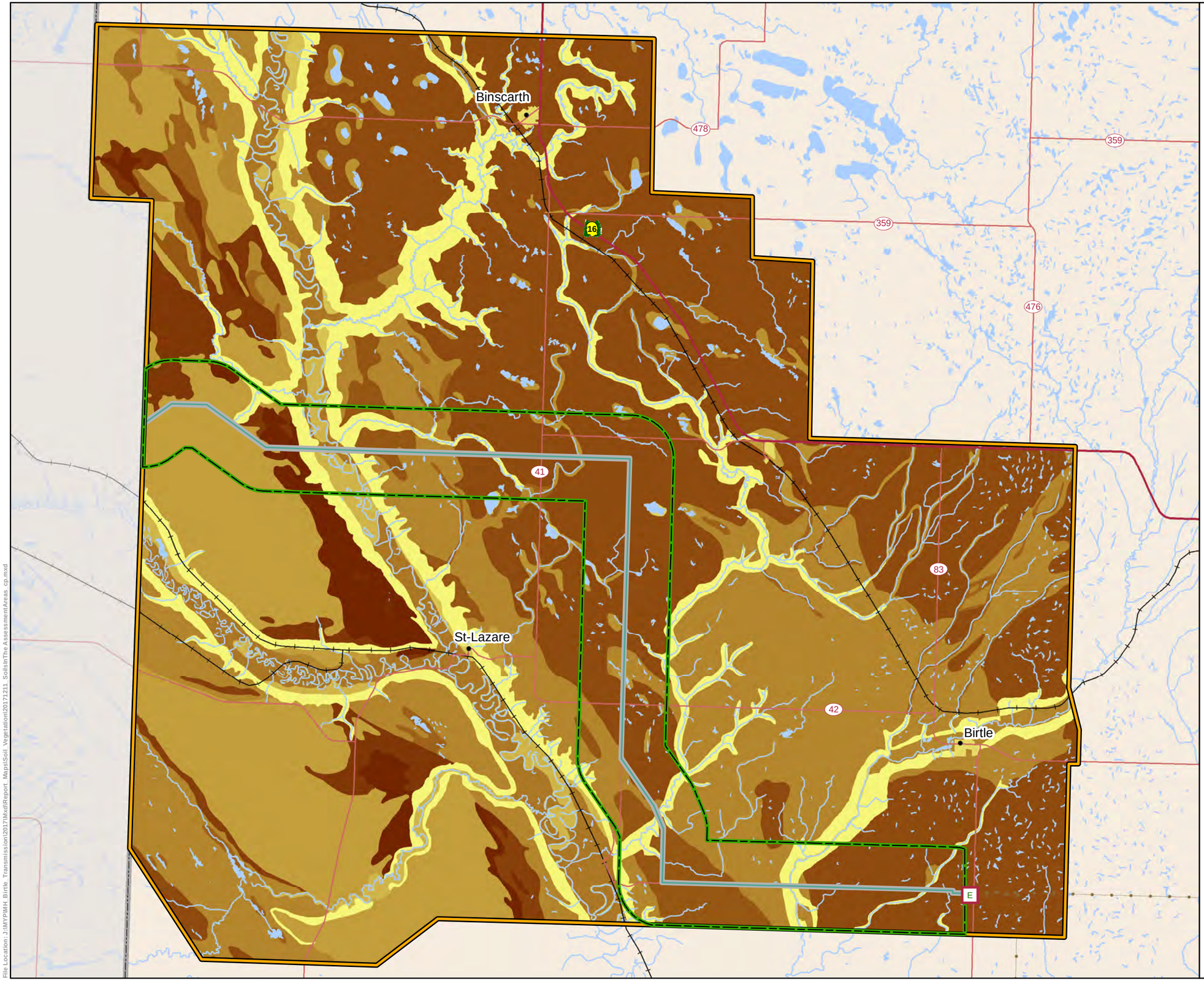
3.3.1 Regional soils and local soils

Soils found in the RAA and those traversed by the final preferred route (local soils) are described in detail below.

3.3.1.1 Regional soils

The dominant soil materials found in the RAA consist mainly of loamy textured glacial till (morainal deposits) (Land Resource Unit, 1998a, b, c and d). Areas of water-worked and eroded glacial till can be found associated with river valleys and channels such as the Assiniboine River and Birdtail Creek. Large areas of glaciofluvial deposits consisting of sand and gravel are present where the Assiniboine and Qu-Appelle Rivers meet in these areas sand covers the glaciofluvial deposits that have been modified by wind and resulted in the formation of sand dunes. Table 3.3-1 shows the areas and relative proportions of soils found in the RAA.

The dominant soils in the RAA are typically well drained Black Chernozems of the Dorset, Jaymar, Miniota, Newdale and Stockton soil series which comprise 75% of the total area of the RAA (Map 3.1). In areas adjacent to Birdtail Creek valley, the Black Chernozems are stony as a result of the deposition of coarse sand, gravels and stones from stream erosion. Minor inclusions of Gleysolic soils from the Basker, Bornett, Drokan, Lowery, Marsden and Sewell soil series (5.4%) and organic soils from the Perillo soil series (0.6%) occur in areas of poorly drained soils located within depressional areas in hummocky terrain. In these depressions, runoff from the surrounding landscape collects and the formation of shallow ponds and small lakes may occur especially during spring snowmelt or during time of high rainfall amounts (Land Resource Unit, 1998a and b). The Gleysolic soils are generally not suitable for growing crops because of high water levels as well as the possible presence of high levels of salinity.



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Project Infrastructure

- Birtle South Station
- Final Preferred Route

Assessment Areas

- Project Footprint
- Local
- Regional

Soil Series

$ER	LEI
$QQ	LOW
$UR	MDN
$ZZ	MXI
BEO	NDL
BKR	PER
BOR	SCK
DOT	SEE
DRO	SHX
JAY	

Infrastructure

- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase

- Community
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
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Soils in the Assessment Areas

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Map 3-1 Soils found in the Project Footprint, and Local and Regional Assessment Areas.

Table 3.3-1: Soils found in the RAA.

SOIL_CODE	Soil Series	Classification	Area (ha)	Percent (%)
$ER	Eroded Slopes	Eroded Slopes	10920.5	11.3
$QQ	-	Unclassified	20.0	0.03
$UR	-	Unclassified	119.2	0.13
$ZZ	-	Water	712.9	0.73
DOT	Dorset	Orthic Black Chernozem	13270.2	13.7
JAY	Jaymar	Orthic Black Chernozem	20465.8	21.1
MXI	Miniota	Orthic Black Chernozem	2186.3	2.3
NDL	Newdale	Orthic Black Chernozem	34590.3	35.7
SCK	Stockton	Orthic Black Chernozem	2570.3	2.7
BKR	Basker	Humic Gleysol	1444.3	1.5
BOR	Bornett	Rego Humic Gleysol	243.3	0.3
DRO	Drokan	Rego Humic Gleysol	1924.2	2.0
LOW	Lowry	Rego Humic Gleysol	246.1	3
MDN	Marsden	Rego Humic Gleysol	1485.8	1.5
SEE	Sewell	Humic Gleysol	122.5	0.1
PER	Perillo	Terric Mesisol	551.8	0.6
LEI	Levine	Gleyed Cumulic Regosol	3632.6	3.7
SHX	Shilox	Orthic Regosol	2035.0	2.1
BEO	Benton	Dark Gray Solonetz	360.7	0.4
		Total:	**96,902.0**	**100**

Regosolic soils from the Levine and Shilox soil series, characterized as weakly developed soils (Soils Classification Working Group, 1998), occur in association with Black Chernozems on the level to gently inclined benchlands near Birdtail Creek; on the eroded slopes of the Assiniboine River and Armstrong, Snake and Birdtail Creeks; along the Assiniboine River floodplain; and in areas of dune development. Rapid drainage is generally found in the area of sand dunes, along steep valley slopes and in soils that are comprised dominantly of sand and gravel deposits. These Regolsolic soils comprise 5.9% of the total area of the RAA.

A very small percentage of solonetz soils, from the Benton soil series, are found in the northeastern part of the RAA (>1%). These soils have developed on a thin veneer of clay, or weather shale that overlies non to weakly calcaroues shale bedrock. These soils are high in soluble salts and are typically located on gently sloping to hummocky landscapes where three to nine percent slopes are common (Government of Manitoba, 2010).

3.3.1.2 Local soils

Table 3.3-2 below summarizes the areas and relative proportions of soils that are found in the LAA and Project Footprint. Map 3.1 shows the distribution of soils in the LAA and Project Footprint.

Orthic Black Chernozems are the dominant soil found in the LAA (11,829.7 ha and 80.9%) and

PF (156.3 ha and 84.6%). Soils found on eroded slopes of watercourses comprise 1,408.7 ha (9.6%) and 13.0 ha (7.0%) in the LAA and PF respectively. Regosols amount to 442.7 ha (3.0%) of the LAA and 12.2 ha (6.6%) of the PF, while Gleysols comprise 544.1 ha (3.7%) and 2.9 ha (1.6%) of the PF, respectively.

Table 3.3-2: Soils found in the LAA and PF.

SOIL_ CODE	Soil Series	Classification	LAA		PF	
			Area (ha)	Percent (%)	Area (ha)	Percent (%)
$ER	Eroded Slopes	Eroded Slopes	1408.7	9.6	13.0	7.0
$ZZ	-	Water	104.6	0.7	-	0.2
DOT	Dorset	Orthic Black Chernozem	1356.0	9.3	32.0	17.3
JAY	Jaymar	Orthic Black Chernozem	2343.1	16.0	23.4	12.7
MXI	Miniota	Orthic Black Chernozem	1491.1	10.2	21.2	11.5
NDL	Newdale	Orthic Black Chernozem	6639.5	45.4	79.0	42.8
SCK	Stockton	Orthic Black Chernozem	292.9	2.0	0.6	0.3
BKR	Basker	Rego Humic Gleysol	236.1	1.6	0.8	0.8
DRO	Drokan	Rego Humic Gleysol	230.8	1.6	2.1	1.1
MDN	Marsden	Rego Humic Gleysol	77.3	0.5	-	-
LEI	Levine	Gleyed Cumulic Regosol	89.5	0.6	6.0	3.3
SHX	Shilox	Orthic Regosols	353.2	2.4	6.1	3.3
		Total:	**14622.7**	**100**	**184.7**	**100**

Detailed descriptions of the soil series (Government of Manitoba, 2010) encountered along the final preferred route, from the Manitoba-Saskatchewan border to Birtle Station are provided below.

Spy Hill-Ellice Community Pasture (NW-6-18-29W to NW-3-18-29W)

The dominant soils found along the final preferred route in the Spy Hill-Ellice Community Pasture are Orthic Black Chernozoms from the Dorset soils series. Minor inclusions of Orthic Black Cheronozems from the Stockton soil series are also present along the preferred route. A small percentage of Orthic Regosols from the Shilox soil series are also found along the eastern edge of the Spy Hill-Ellice Community Pasture.

The Dorset soils are moderately well to well drained and have developed on moderately to strongly calcareous deep stratified sandy outwash and glaciofluvial deposits. The Dorset soil series tend to occur on upper positions of slopes on hummocky landscapes and have very rapid permeability and a low water table during the growing season. Their soil profile is characterized by a very dark gray Ah horizon (12 to 18 cm thick) followed by a dark brown Bm horizon (15 to 22 cm thick), a Cca horizon (6 to 12 cm thick) and a light brown Ck horizon. These fine textured soils are susceptible to drought and wind erosion (Hamel and Reimer, n.d.).

The Stockton soils series have developed on moderately well to well drained weakly to moderate calcareous sandy lacustrine sediments. These soils can generally be found in the upper and lower Assiniboine Delta on very gently sloping to irregular undulating topography. Wind erosion of these soils is very common if the soils are not protected by a surface residue such as vegetation. The Stockton soils have a profile characterized by a very dark gray to very dark grayish brown Ah (18 to 25 cm thick) followed by a brown to grayish brown Bm horizon approximately 12 o 22 cm thick, a pale brown to light yellowish brown BC (8 to 12 cm thick), then a pale brown Ck horizon. . The permeability of these soils is classified as rapid.

The Shilox series have developed on weakly to noncalcareous deep, uniform sandy eolian deposits. These soils tend to occur in the middle and upper positions of moderately to strong slopes on hummocky to duned landscapes. Permeability of these soils is rapid to very rapid with minimal surface runoff and a low water table during the growing season. These soils are severely eroded from wind.

Spy Hill-Ellice Community Pasture (NW-3-18-29W) to the West Side of Assiniboine River Crossing (NW-2-18-29W)

Soils that can be found between the Spy Hill-Ellice Community pasture and the west side of the Assiniboine River include the Eroded Slopes Complex, which occur on the valley walls and the Levine and Basker soil series, occurring on the Assiniboine River floodplain.

Soils of the Eroded Slopes Complex are found on eroded slopes of river valleys and walls, incised stream channels and ravines that have been down-cut through surface desposits and bedrock. These soils are typically well drained and occur on strongly to steeply sloping landforms. Soils types range from Orthic Black Chernozens to Regosols. There is the potential for the soils of the Eroded Slopes Complex to be influenced by mass wasting processes such as slump, creep, solifluction and erosion if vegetation is absent.

The Levine soils series occur immediately adjacent to the Assiniboine River (on both the west and east sides) and are characterized as Gleyed Cumulic Regosols that have developed on moderately to strongly calcareous deep, stratified coarse loamy to fine loamy alluvial deposits. These soils tend to occur on floodplains on level slopes and have rapid permeability, moderately slow surface runoff and a medium water table during the growing season. They are occasionally saline and are subject to flooding during spring runoff or after heavy rains. The majority of these soils are used for crop production. Soils profiles of the Levine series are described as a dark gray Ah horizon (10 to 20 cm thick), and a light yellowish brown Ck horizon.

The Basker soil series occur between the Eroded Slopes Complex and the Levine soil series and are characterized as Rego Humic Gleysols that have developed on moderately to strongly calcareous, fine sandy loam, very fine sandy loam, loam, silty loam or silty clay loam alluvial deposits. These Rego Humic Gleysols are found in depressions on nearly level slopes of the Assiniboine River Floodpain. Permeability of these soils is slow, with very slow surface run-off and a high water table in the growing season. Vegetation typical of these soils includes sedges, rushes and willows and these areas are susceptible to flooding and are saturated during the

spring. The soil profile of the Basker series is characterized as having a light grayish brown Ahk (5 to 20 cm thick) followed by an olive brown Ckg horizon. Organic layers may also occur within the soil profile.

East side of Assiniboine River (NE-2-18-29W) to the West Side of Armstrong Creek (NE-5-18-28W)

Similar to the west side of the Assiniboine River, soils of the Levine soil series can be found immediately adjacent to the Assiniboine River on the east side. Other soils that occur between the Assiniboine River and Armstrong Creek almost equally in amount include Miniota, Jaymar and Newdale soil series. All three soil series are classified as Orthic Black Chernozems with slight differences in soil composition and topographic location.

The Miniota soil series are characterized as being moderately well to well drained Orthic Black Chernozems that have developed on thin layers of moderately to strongly calcareous very fine sand to fine sandy loam textured sediments. These sediments are underlain by moderately to strongly calcareous medium sand to gravelly textured deposits. These soils occur on gently sloping to irregular moderately rolling topography and permeability is rapid in the sandy layers and very rapid in the lower layers. The Miniota soils have a very dark gray to very dark grayish brown Ah horizon that is 12 to 20 cm thick, followed by a dark brown to brown Bm (10 to 18 cm thick), pale brown BC horizon, then a Cca horizon (lime accumulation).

The Jaymar soils series are well drained Orthic Black Chernozems and have developed on stratified materials that are made up of a thin mantel approximately 40 to 70 cm thick of moderately to strongly calcareous loamy lacustrine sediments. Underlying the lacustrine sediments is a 30 to 60 cm contact zone comprised of sandy materials that overly moderately to strongly calcareous loamy glacial till whose origin is shale, limestone and granitic rock. Soils profiles of the Jaymar soil series have very dark gray Ah horizons (10 to 15 cm thick) underlain by a dark brown to brown Bm horizon (8 to 15 cm thick). Similar to the Minota soil series, a lime accumulation layer (Cca horizon) can be found underlying the Bm horizon. These soils occur on very gently to gently sloping topography and permeability is moderate to rapid in the upper layers and moderate to slow in the underlying till.

Newdale soils in the LAA and in the project footprint are similar to the Jaymar soils in that they occur on moderately to strongly calcerous loamy-clay loam morainal till comprised of limestone, granite and shale. The soils are moderately well to well drained and are found in areas with topography ranging from undulating to hummocky. Permeability of these soils is considered slow and a majority of these soils are presently under cultivation. There are some areas where aspen and grassland vegetation can be found on these soils. The soils are characterized as having a very dark gray Ah that is 15 to 35 cm thick, followed by a dark brown Bm (10 to 30 cm thick), BC horizon (3 to 15 cm thick). A lime carbonate horizon approximately 10 to 15 cm thick may be found in soils that are shallower.

Soils of the Eroded Soil Complex are traversed by the final preferred route at the crossing of Armstrong Creek. A detailed description of these soils can be found above.

East Side of Armstrong Creek (NE-5-18-28W) to west side of Snake Creek (NE-25-16-28W)

The dominant soils encountered from the east side of Armstrong Creek to the west side of Snake Creek are the Newdale Soil Series (see above). Small inclusions of Drokan, Jaymar (see above) and Miniota soil series (see above) can also be found.

The Drokan soils are classified as Rego Humic Gleysols that have developed on moderately to strongly calcareous loamy morainal till. These soils have poor to very poor drainage and tend to be found in depressions in undulating to hummocky terrain. These soils may remain in a ponded condition and native vegetation is comprised of sedges, cattails, rushes and willows.

The soils profile is identified as having a moderately decomposed organic layer that is approximately 2 to 5 cm thick followed by a very dark gray Ah horizon (10 to 18 cm thick), an AC horizon 4 to 8 cm thick and an accumulation layer of lime that ranges from 8 to 12 cm thick. A C horizon that is olive gray to olive underlies the lime accumulation layer.

Soils of the Eroded Soil Complex are traversed by the final preferred route at the crossing of Snake Creek. A detailed description of these soils can be found above.

West side of Snake Creek (NE-25-16-28W) to East Side of Birdtail Creek (SE-21-16-27W)

Soils traversed by the final preferred from the west side of Snake Creek to the East Side of Birdtail Creek are dominantly from the Miniota and Jaymar soil series (see descriptions above). Soils of the Eroded Soil Complex (see above) are traversed by the final preferred route at the crossing of Birdtail Creek.

East side of Birdtail Creek (SE-21-16-27W) to Birtle Station (NE-18-16-26W)

The dominant soil series encountered by the final preferred route from the east side of Birdtail Creek to Birtle Station are the Newdale soil series (see above for description). Minor inclusions of Orthic Black Chernozems from the Jaymar soil series are also present. Soils of the Eroded Soil Complex (see above) are traversed by the final preferred route at the crossing of a tributary to Birdtail Creek in SE24-16-27W.

3.4 Pathways of effect

The effects of the construction and operation of transmission lines on terrain and soils have been documented by the Public Service Commission of Wisconsin (2009), Bonnyville Power Administration, and various Manitoba Hydro Projects (2011, 2012a, 2012b, 2013a, 2013b, and 2015). The main potential effects identified include: soil compaction, increased potential for soil erosion from both wind and water, and the contamination of soils from accidental spills and releases during construction and maintenance activities.

The proposed Birtle Transmission Project may have potential effects on soils during construction, and maintenance stages. Potential environmental effects include the following:

Soil compaction

Soil compaction is a result of the compression of soil particles, which reduces the amount of space available for air and water (Alberta Energy, 2010; and MAFRI, 2008). One cause of soil compaction is the use of heavy equipment on soils that are most susceptible to compaction including those soils that are moist, low in organic matter, have low amounts of vegetation cover, and with poor structure (Manitoba Government, 2017). Impacts of soil compaction include an increase in the density of soil resulting in the reduction of water infiltration and air movement, and a reduction in root growth and plant development (University of Minnesota, Government of Manitoba, Alberta Energy).

Soil erosion

The loss of topsoil can result in a significant loss in soil productivity (MAFRI, 2008). This is mainly a result of organic matter and nutrient loss which can change the physical properties of soils (MAFRI, 2008, Alberta Agriculture and Forestry, 2001). The following outlines the types of erosion that can affect the soils found in the PF:

a) Soils that are very susceptible to wind erosion are those comprised of dominantly sand textures (Alberta Forestry and Agriculture, 2001). In the project footprint, these soils include the Dorest soil series (sandy outwash and glaciofluvial sediments), Stockton soils (glaciolacustrine sediments) and Shilox soil series (eolian/duned deposits) which occur in the Spy Hill-Ellice community pasture. All three soil series are susceptible to wind erosion (Hamel and Reimer, n.d.) especially if vegetation is absent. There is the potential for increased wind erosion risk in areas where clearing of vegetation occurs during construction activities.

b) Water erosion is the movement or removal of soil during runoff of water on the landscape (MAFRI, 2008). Texture, organic matter content, size and shape of soil particles affect the erodibility of soils by water. Typically soils that have textures comprised of clay or loam are more susceptible to water erosion (MAFRI, 2008). Factors that influence the amount of water erosion of soils include the amount of precipitation, the duration of the precipitation event, slope length and slope steepness (MAFRI, 2008). In the PF, steep slopes (ranging from >30% on the Assiniboine River to >75% on the Snake and Birdtail Creeks) and clay loam to loam soil textures can be found, which increases the water erosion risk if vegetation is disturbed or removed from slopes during construction activities.

c) Mass wasting of materials, such as slumping, on steep slopes, during construction activities. Mass wasting is the slow downward movement of rock, soil and debris by gravity on slopes and can occur, when steep and/or unstable slopes are disturbed by activities such as vegetation clearing and use of construction equipment (Nelson, 2010). In the PF, steep slopes can be found along the Assiniboine River, Snake and Birds Creek valleys, where slopes range from >30% to 85%. The disturbance or removal of vegetation during construction activities may result in decreased slope stability

(Manitoba Government, 2010) on the soils of the Eroded Slopes Complex found in these areas.

Soil contamination

Contamination of soils from accidental spills and releases of fuels or hazardous substances as a result of construction and maintenance activities. The accidental release of fuels or hazardous substances during construction and maintenance activities can have negative effects on the environment, such as damage to soils (Wildlife Resources Consulting Services Inc. 1995). The contamination of soils can result in stress and mortality to vegetation (Seburn et. al. 1996).

4.0 Fish

4.1 Methods and data sources

Field and desktop data were analyzed to characterize the existing in-water and riparian physical environment and habitat suitability for fish as well as fish presence and distribution. Known and potential commercial recreational aboriginal (CRA) fisheries were identified.

4.1.1 Literature review

A review was conducted of existing fish and fish habitat data for the RAA. Based on a review of desktop mapping, eleven watercourse crossings were identified within the Project Footprint (Map 4-1). A document (Milani 2013) published by Fisheries and Oceans Canada (DFO) was used as a primary data source to identify watercourses with the potential to support fish habitat. Based on DFO's habitat classification system, watercourses classified as Type A, B, C, and D have this potential. A list of fish species potentially inhabiting watercourses crossed by the Project was compiled through a desktop review of government information sources, primary scientific literature and publications and watershed reports.

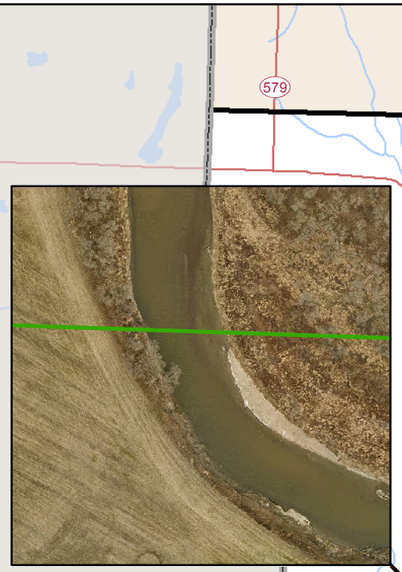
4.1.2 Engagement process information

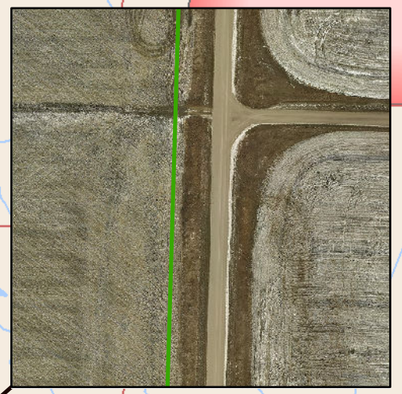
The community reports from the Values and Interests survey / workshops held in Canupawakpa Dakota Nation (Manitoba Hydro 2017a), Gambler First Nation (Manitoba Hydro 2017b), Waywayseecappo First Nation (Manitoba Hydro 2017c), and the draft MLOUS from the Manitoba Metis Federation (MNP 2017) provided information on fishing activities within the Project area. Members from Gambler First Nation (Manitoba Hydro 2017b) fish along the Assiniboine River. Oak Lake is an important fishing area, primarily harvesting in the spring, for Canupawakpa Dakota Nation (Manitoba Hydro 2017a). The Manitoba Metis Federation (MNP 2017) identified that within the regional assessment area, members fish for northern pike (*Esox lucius*), walleye (*Sander vitreus*), goldeye (*Hiodon tergisus*), lake sturgeon (*Acipenser fulvesncens*) and suckers (*Catostomaus* spp.).

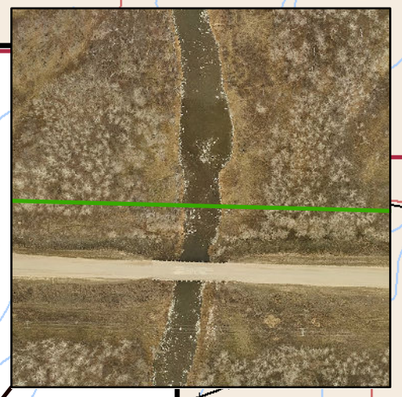
4.1.3 Field studies

Watercourse crossings were selected for detailed field assessment based on their DFO classification (Milani 2013). Field assessments were performed at watercourse crossings that cross the preferred route and were classified as type A, B, C or D. These designations corresponded to areas that provide direct fish habitat. There were 5 watercourse crossings classified as providing direct fish habitat as follows:

- Assiniboine River;
- Birdtail Creek;
- Snake Creek;
- Armstrong Creek; and
- Unnamed Tributary of Snake Creek.







Manitoba Hydro

Birtle Transmission Project

Project Infrastructure

- Birtle South Station
- Final Preferred Route

Infrastructure

- Transmission Line

Stream Crossings

- Milani A or C Type Stream Crossing
- Milani E Type Stream Crossing

Planning Area

- Route Planning Area

Landbase

- Community
- Yellowhead Highway
- Road
- Railway Line
- First Nation
- Wildlife Management Area
- Province of Manitoba Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 13, 2017
Available in accessible formats upon request.

N

0 4 8 Kilometres
0 2 4 Miles

1:150,000

Stream Crossings

Map 7-1

Waywayseecappo First Nation
Binscarth
Gambler First Nation
Silver Creek
Armstrong Creek
Assiniboine River
Qu'Appelle River
St-Lazare
Beaver Creek
Snake Creek
Birdtail Creek
Birtle
Birtle South Station
SASKATCHEWAN
MANITOBA
22
579
478
475
16
83
600
41
545
42
568
308

Field studies were conducted in early September of 2017 to establish in-water and riparian environment conditions at each of the above watercourse crossings.

4.1.4 GIS assessment

Riparian land cover was characterized at each potential fish-bearing watercourse crossing. Existing land cover within the ROW was categorized as described in Table 4.1-1. Determination of land cover type was based primarily on the Province of Manitoba's ortho photography, ortho_refresh database (image date September 29, 2007). This was compared to a landcover dataset created for the project which was developed from several land cover datasets as well as information gathered during the field surveys.

A riparian area was created by digitizing the waters edge (if visible) and adding a 30 m buffer. If the water was not visible, a centreline was created and a 3 m buffer placed on that to create the "wetted channel". Then a 30 m buffer was placed on that to create the riparian area. The area (and percent total) of each land cover type was then determined.

Table 4.1-1: Land cover classes used to describe riparian vegetation

Land Cover Class	Land Cover Definition
Annual cropland	Agricultural land, including annual and perennial crops (excluding grassland).
Broadleaf forest	Predominantly broadleaf/deciduous forests or treed areas.
Grassland	Predominantly native grasses and other herbaceous vegetation, may include some shrubland cover.
Mixedwood	Forest that is a combination of both the coniferous and broadleaf classes.
Shrubland	Predominantly woody vegetation of relatively low height (generally +/-2 meters). May include grass or wetlands with woody vegetation, regenerating forest.
Undifferentiated Forest	Predominantly forested or treed areas. This class is mapped only if the distinction of sub-forest covers is not possible.
Water	Water bodies (lakes, reservoirs, rivers, streams, salt water, etc).
Wetland	Land with a water table near/at/above soil surface for enough time to promote wetland or aquatic processes (semi-permanent or permanent wetland vegetation, including fens, bogs, swamps, sloughs, marshes etc).

4.1.5 Data gaps and limitations

There are different methods of data collection or data management that exist between provincial government, watershed conservation districts and community conservation groups, which has led to incomplete or dated information in the databases. Multiple sources were researched to find the most current data available, and field assessments were conducted to ground-truth and fill data gaps.

Fish sampling was not conducted as part of the field assessment so fish presence data were sourced from desktop data. The potential effects of the project are related to aquatic habitat which, in general, will affect all aquatic species, therefore sampling to determine what species are present would not enhance the assessment. In addition, the project has low potential for

negative impacts from construction and operation. A one-time sample may add to the known presence of fish but is not sufficient to thoroughly describe the fish community.

A one-time field survey was conducted rather than a multi-season survey. Desktop data were compiled with field survey data to expand the temporal scale.

4.2 Results

4.2.1 Priority species

Priority species were identified through discussions with Indigenous communities, regulators, and the public, and include species of conservation concern, species important for Indigenous peoples, and invasive species. Species of conservation concern include those listed by the Manitoba Conservation Data Centre (MBCDC), the Manitoba Endangered Species and Ecosystems Act (ESEA), the federal Species at Risk Act (SARA), and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The Species at Risk public registry and the MBCDC website were reviewed to determine species presence in the regional assessment area. Two aquatic species of conservation concern are potentially present:

- chestnut lamprey;
- silver chub;
- bigmouth buffalo; and
- mapleleaf mussel.

In addition to the specific species discussed below, additional considerations are commercial, recreational, Aboriginal fisheries, which are protected by the *Fisheries Act* and invasive species such as the zebra mussels (Dreissena polymorpha).

The Fisheries Act requires that projects avoid causing serious harm to fish. This applies to work being conducted in or near waterbodies that support fish that are part of or that support a commercial, recreational or Aboriginal fishery.

Zebra mussels are currently known to have invaded the north and south basins of Lake Winnipeg, Cedar Lake, and the Red River in the US (Manitoba Sustainable Development 2017). The zebra mussel is capable of heavily colonizing hard and soft surfaces (Fisheries and Oceans Canada 2017b). Ecological impacts associated with zebra mussel invasions include changes to the physical habitat (e.g. water clarity), chemical habitat (e.g. particulate nutrients, suspended sediments), biota (e.g. phytoplankton, zooplankton) and biodiversity (e.g. unionid mussels, species at risk) (Therriault et. al. 2013).

4.2.1.1 Chestnut Lamprey

The Chestnut Lamprey (*Ichthyomyzon castaneus*) was assessed as Vulnerable (Special Concern) by the COSEWIC in April 1991 and is currently listed as Special Concern on Schedule 3 of SARA (COSEWIC 2010). The chestnut lamprey has been found historically in the Qu'Appelle and Assiniboine Rivers, but has not been captured since 2001 in either (COSEWIC

2010). Sightings in Saskatchewan by anglers on the Assiniboine and Qu'Appelle rivers indicate they may still be present in the area (COSEWIC 2010). Lamprey are not effectively sampled by any collection gear so may be more common and widespread than current data suggests (Stewart and Watkinson 2004). The presence of suitable hosts is likely the most important factor for habitat suitability for adults (Stewart and Watkinson 2004). Larval chestnut lamprey burrow in firm sand-mud substrates in fast flowing water (Scott and Crossman 1979). Potential threats to the chestnut lamprey include: destruction of spawning habitat through soil erosion and concomitant siltation, eutrophication through runoff of fertilizers and pesticides and herbicide pollution affecting both chestnut lamprey and its hosts (COSEWIC 2010).

4.2.1.2 Silver Chub

COSEWIC considered the Silver Chub populations a single unit and designated it Special Concern in April 1985 and May 2001 (COSEWIC 2012). In May 2012, the "Great Lakes - Upper St. Lawrence populations" unit was designated Endangered and the "Saskatchewan - Nelson River populations" unit was designated Not at Risk (COSEWIC 2012). Therefore the Silver Chub population in Manitoba is currently considered not at risk. Factors limiting the abundance of Silver Chub include habitat degradation, water temperature, sediment and nutrient loadings, oxygen levels, food, predators, and exotic species (COSEWIC 2012).

4.2.1.3 Bigmouth Buffalo

The bigmouth buffalo is listed as special concern under Schedule I of the Species at Risk Act. A disjunct population of the Bigmouth Buffalo is found in the Assiniboine River drainage (COSEWIC 2009). In Manitoba, it is found mainly in the lower reaches of the Assiniboine River downstream of Portage la Prairie (Stewart and Watkinson 2004). The Saskatchewan Water Security Agency (2014) lists the bigmouth buffalo as being present in the lower reaches of the Qu'Appelle River. Based on the distribution map (COSEWIC 2009) it is unlikely to occur in the study area. As successful reproduction appears to be associated with flooding of shoreline vegetation, loss of spawning habitat associated with regulated water levels is a threat to Bigmouth Buffalo (COSEWIC 2009).

4.2.1.4 Mapleleaf Mussel

The mapleleaf mussel (*Quadrula quadrula*) is listed as endangered under Schedule I of the Species at Risk Act (COSEWIC 2006). It is listed as Endangered under Schedule I of the *Species at Risk Act* and under *The Endangered Species and Ecosystems Act* (Manitoba).

In Manitoba, the species is found in the Red River and some tributaries, the Assiniboine River, and Lake Winnipeg and some tributaries (COSEWIC 2016).

In the late 1990s mussels were sampled at 185 sites all along the Assiniboine River and larger tributaries, including sites as far upstream as Silver Creek and the Qu'Appelle River (Watson et al. 1998). Mapleleaf were captured at six sites, all downstream of Portage la Prairie. In 2007, as a consequence of a bridge construction project and subsequent mussel survey and relocation, four live mapleleaf were recorded near the city of Brandon, providing evidence that mapleleaf

distribution spans the Assiniboine River both above and below the Portage Diversion (Bouvier and Morris 2011). Presence of mapleleaf in the regional assessment area is unknown. Based on this and as a precautionary approach for this assessment it will be assumed they are present.

In Manitoba, this species is threatened by habitat loss and degradation and the effects of invasive species, particularly Zebra mussel (COSEWIC 2016). Zebra Mussels now threaten Q. quadrula in Manitoba, with Zebra Mussel populations becoming established in the Red River, Lake Winnipeg, and in reservoirs in the Red River watershed in North Dakota and Minnesota (COSEWIC 2016). Habitat changes associated with Zebra Mussels and modifications to the banks of the Red and Assiniboine rivers (e.g., rip-rap and dikes) that alter the flow hydrology of these rivers are threats (COSEWIC 2017).

4.2.2 Current status

The Project crosses 11 watercourses within the Assiniboine-Birdtail sub-watershed, five of which are classified as Type A-D and therefore fish bearing. Riparian vegetation was characterized at the five fish bearing watercourse crossings. In addition, where data was available fish species presence is described. Table 4.2-1 provides details on the land cover at each of the five watercourse crossings.

Table 4.2-1: Land cover classification

Watercourse Name	Existing Land Cover within the Riparian PF (% of Riparian PF)			
	Agriculture	Wetland	Grassland / Shrubland	Forested
Assiniboine River	31%	0%	53%	16%
Birdtail Creek	0%	38%	0%	62%
Snake Creek	0%	0%	50%	50%
Armstrong Creek	33%	0%	67%	0%
Snake Creek trib.	100%	0%	0%	0%

Table 4.2-2 provides details on the field data collected at four of the watercourse crossing sites.

Table 4.2-2: Watercourse crossing field data

Parameter	Birdtail Creek	Snake Creek	Armstrong Creek	Assiniboine River	Snake Creek trib.
Channel width (m)	14	8	2	41	NA
Wetted width (m)	12	4	1	22	0
Max depth (m)	0.5	0.4	0	2	0
Left bank stability	High	Moderate	High	High	High
Right bank stability	High	Moderate	High	None	High
Riparian vegetation (RB)	Grasses, Shrubs, Deciduous	Grasses	Grasses	Grasses, Shrubs, Deciduous	Annual cropland
Riparian vegetation (LB)	Grasses, Shrubs, Deciduous	Grasses / Shrubs	Grasses	Grasses / Shrubs	Annual cropland
Dominant riparian vegetation	Willow, MB Maple	Willow	Grass	Willow, MB Maple	Annual cropland

4.2.2.1 Assiniboine River

The Assiniboine River and its tributaries have 65 species of fish (Cleator et. al. 2010), including many recreationally important species (Nelson and Franzin 2000). The Assiniboine River can be characterized as a low-gradient, turbid, prairie river (Nelson and Franzin 2000). Twelve species of freshwater mussels were found in the Assiniboine River drainage (Watson 2000). Mapleleaf mussel accounted for 1.2% of the total mussels collected by Watson (2000).

McCulloch and Franzin (1996) captured 45 species of fish in the Assiniboine River. Cleator et al. (2010) stated that thirty-eight fish species have been identified in the mainstem which increases to 65 when the tributaries are included.

The Assiniboine River at the final preferred route is over 40 m wide. The east bank is stable, covered primarily with grasses and shrubs. The west bank is highly unstable, covered primarily with grasses, shrubs and trees.

4.2.2.2 Snake Creek

Milani (2013) sampled three locations along Snake Creek (Map 4-1). Eight species of fish were captured including: brook stickleback, fathead minnow, common shiner, creek chub, Iowa darter, johnny darter, western blacknose dace, and white sucker.

Snake Creek at the final preferred route is 8 m wide. The banks are highly stable, covered primarily in grasses, shrubs and trees.

4.2.2.3 Birdtail Creek

Milani (2013) sampled one site on Birdtail Creek and several tributaries to Birdtail Creek (Map 4-1). Several species of fish were captured including: brook stickleback, Iowa darter, blackside darter, fathead minnow, northern redbelly dace, and white sucker.

Birdtail Creek at the final preferred route is 14 m wide. The banks are moderately stable, covered primarily in grasses, shrubs and trees.

4.2.2.4 Armstrong Creek

There was no historical fish species information for Armstrong Creek. Armstrong Creek at the final preferred route is 2 m wide and the creek was dry at the time of the fieldwork. The banks are highly stable, covered primarily in grasses.

4.2.2.5 Unnamed tributary of Snake Creek

There was no historical fish species information for the unnamed tributary of Snake Creek. Snake Creek tributary at the final preferred route has no defined channel (except a culvert under the road) and was dry at the time of the fieldwork.

4.3 Pathways of effect

Figure 4.3-1 shows the pathways of effects, modified from Fisheries and Oceans Canada (2017) pathways of effects diagrams. Potential effects of the construction, and operation and maintenance of the Project on fish habitat are described below.

Loss of riparian vegetation

The removal of riparian vegetation could lead to changes in shade leading to changes in water temperatures, changes to external nutrient / energy input leading to changes in food supply and nutrient concentrations, addition / removal of in stream organic structure leading to a change in habitat structure and cover, exposed soils leading to changes in bank stability and increase erosion potential and instream sedimentation.

Change in water quality

The use of industrial equipment could lead to hazardous materials spills and leaks leading to a change in contaminant concentrations. The use of herbicides during vegetation clearing or management could lead to changes in contaminant concentration.

Increased fishing pressure

The presence of a transmission line and the cleared right-of-way, could lead to increased access leading to increased fishing pressure and potential decrease in fish populations.

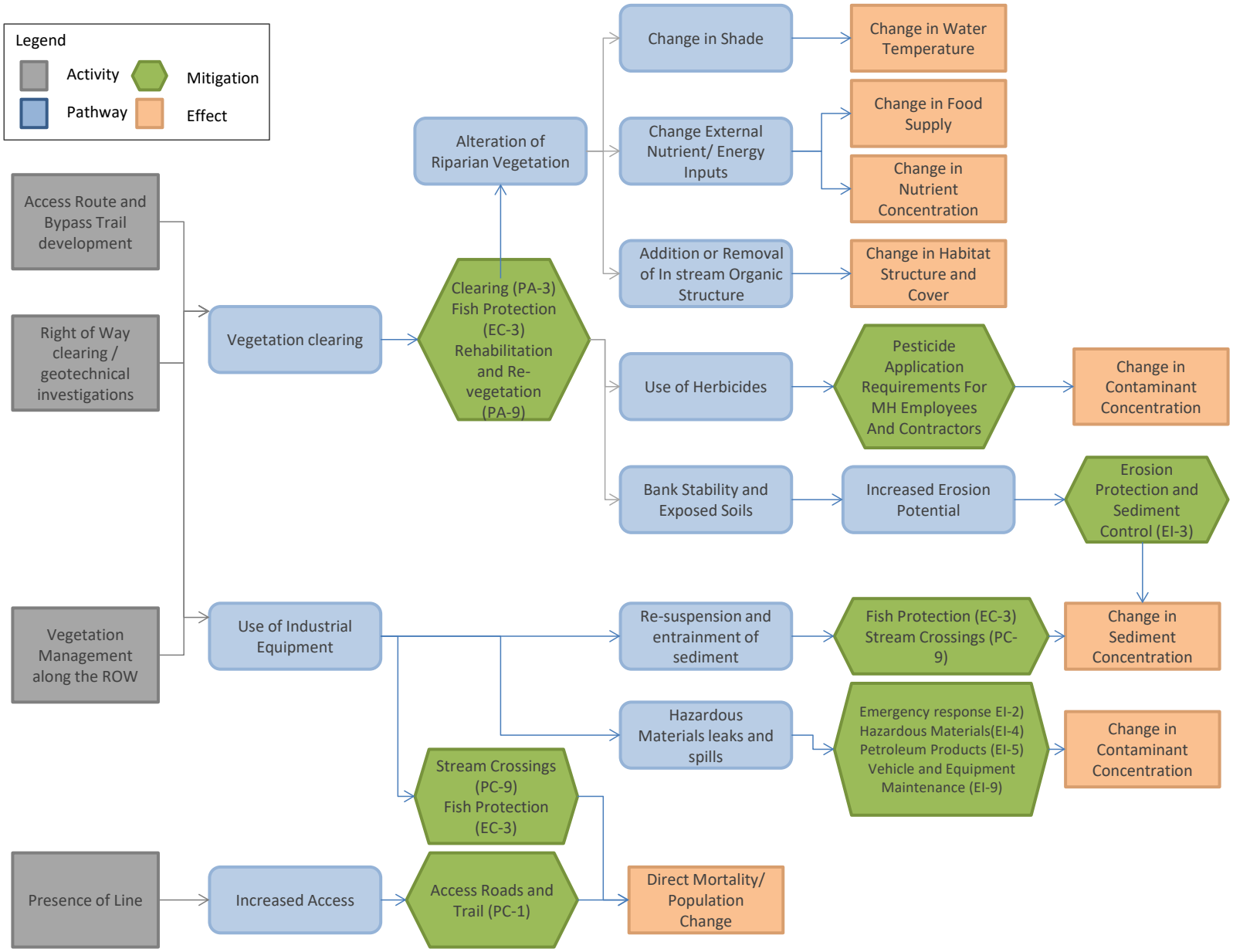


Figure 4.3-1: Diagram of pathway of effects for fish habitat (Fisheries and Oceans Canada, 2017).

5.0 Vegetation

5.1 Methods and data sources

5.1.1 Literature review

Existing biophysical information was used to describe the regional environment for the Project (e.g., Rowe 1959; Smith et al. 1998). Rowe (1959) provides a geographic description of regions that includes distinctive patterning of vegetation, with information on major species transitioning with prairie habitat. The existing ecological land classification was identified for the RAA and described from Smith et al. (1998). Here, ecological regions are delineated that are relatively homogeneous in overlapping patterns of climate, as expressed in vegetation, and geology, physiography, and soil development.

Botanical and vegetation information was described from numerous available data sources. Smith et al. (1998) describes vegetation at all levels of classification (i.e., ecozone to ecodistrict). Georeferenced specimens available from the Manitoba Museum herbaria were identified for the region. Reimer and Hamel (2003) provides information on surveys conducted in the St. Lazare area for rare plant species. Other literature identifying species composition included Houston (1993 and 1996), Mansell and Moore (1999), and vegetation survey data from the Ellice-Archie Community Pasture Field Reports (1993 and 2006) and the Spy Hill-Ellice Community Pasture Field Reports (1987, 1995 and 2011).

Within the assessment areas (Regional, Local, Project Footprint), the Manitoba Land Cover Classification (Manitoba Hydro, 2017) was used to determine land cover, and was the primary data source used in the assessment of desktop vegetation. The Manitoba Land Cover is the most current available and has complete coverage for the project. The ecological land classification (Smith et al. 1998) was also utilized for spatial information.

A review of recent relevant transmission projects in the province was completed to understand potential environmental effects. Recent transmission projects include the Bipole III Transmission Project (Manitoba Hydro 2011), Dorsey to Portage South 230 kV Transmission Line (2012a), Tyndall 115 kV Transmission Line and Distribution Supply Centre (2013), St. Vital Transmission Complex (2014) and the proposed Manitoba-Minnesota Transmission Project (Manitoba Hydro 2015).

5.1.2 Engagement process information

Information on vegetation concerns and interests were identified from the Engagement process and environmental assessment process. Community reports form the Values and Interests survey / workshops conducted in Canupawakpa Dakota Nation (Manitoba Hydro 2017a), Gambler First Nation (Manitoba Hydro 2017b), Waywayseecappo First Nation (Manitoba Hydro 2017c), and the draft MLOUS report from the Manitoba Metis Federation (MNP 2017) as well as the Manitoba Hydro Public Engagement Summary document were reviewed for botanical, vegetation and ecological feedback (i.e., public concerns and local interests) as a result of the

Project and considered during the analysis and evaluation of the transmission line routing process, and the vegetation assessment. Shared information included:

- Identification of pristine vegetation locations (Public Engagement process);
- Areas of important plants such as cacti species (Public Engagement process);
- Concern for the sensitive community pasture and preservation of orchid species (Native Orchid Conservation);
- Concern on limiting fragmentation and conserving the ecologically sensitive community pasture for listed and endangered species (Manitoba Sustainable Development);
- Concern for the delicate ecology and potential damage that may result to the community pasture (Nature Manitoba);
- Concern from workshop and open house participants to protect the natural and wildlife areas in all three Rural Municipalities (Public Engagement Process);
- Concern from stakeholders on the ecologically sensitive sites, such as grasslands and areas with sensitive flora and fauna (Public Engagement Process); and
- Identification of traditional botanical and vegetation resources (Indigenous Engagement).

5.1.3 Field studies

5.1.3.1 Reconnaissance survey

A reconnaissance survey was conducted on June 22 and 23, 2016. The purpose of this survey was to visit the RAA and potential border crossings to understand the landscape and identify vegetation types to assist in 2017. The main highways and roads (Provincial Trunk Highway 41 and 42, Provincial Road 478, Yellowhead Route 16) and several mile roads were driven to view the study area and vegetation. Plant species were recorded at roadside visits to assist with a regional species list. Notable areas visited included the Birtle South Station, Spy Hill-Ellice Community Pasture, Ellice-Archie Community Pasture Qu'Appelle River Valley and the Assiniboine River.

5.1.3.2 Detailed surveys

Locally, detailed botanical and vegetation information was collected from field studies along the preferred route. To select potential sample sites for detailed surveys, MHOrientis map viewer was used to view recent footprint imagery (digital ortho-rectified imagery). MHOrientis included information on vegetation cover (Manitoba Land Cover), species of conservation concern, and other biophysical attributes (e.g., soils, terrain), that were used in the selection of sites. Sites selected on private lands required landowner permission for access. Fieldwork occurred on the preferred route from May 31 to June 2, June 20 to 23, and July 26 to 27, 2017. Fieldwork

involved native vegetation surveys and rare plant surveys in selected vegetation types along the preferred route. Invasive plants and traditional use plants were recorded during surveys.

5.1.3.2.1 Native vegetation survey

The vegetation cover was interpreted for sampling using available imagery and data sources (e.g., Manitoba Land Cover), available in MHOrientis. The initial plan was to stratify the sampling of native vegetation among the broad cover types. Types of vegetation to sample for the project were anticipated to include forest stands, riparian areas, wetlands and grasslands. The grasslands are known to be very important for conservation, scientific interest and public concern.

The objective of the native vegetation survey was to acquire information on community types in the Project Footprint. Sampling occurred along the preferred route (and northern evaluation segments) in different vegetation types and increased where variations in floristic composition were high within communities, but attempted to reduce repeated sampling of similar vegetation. For some types (e.g., wetlands) there was a lack of stands available for sampling.

The native vegetation survey consisted of establishing sample plots on sites with relatively homogenous vegetation. Vegetation was sampled for composition, abundance and structure. Sampling of selected sites followed methods outlined by Redburn and Strong (2008) and involved the establishment of five 2.5 m by 2.5 m quadrats with a 1 m by 1 m nested quadrat spaced at 5 m increments along a 30 m transect for shrubs 1 - 2.5 m tall and herbs and low shrubs ≤1 m tall, respectively. The first quadrat was placed at the 5 m mark. The composition of tree cover >2.5 m tall was estimated using a 20 m by 30 m plot centered on each transect. Plant cover was estimated to the nearest 1% for species <15% cover and nearest 5% for those with higher cover. Other incidentally observed species were recorded. Ground cover estimates (%) were recorded and included exposed soil, litter, rock, water and wood. Site condition measurements included slope and aspect. GPS coordinates and photographs were taken at each sampling site.

Where sampling occurred in the forest community, descriptions further included tree age of dominants (where growth ring counts could be determined), height (measured at 20 m), and diameter at breast height (dbh). Canopy cover is defined as closed (>60%), open (>25-60%) and sparse (10-25%).

Roadside surveys were completed for privately owned lands where permissions were not received at the time of the surveys. The roadside assessments provided a qualitative description of vegetation. Traditional plant use species and invasive and non-native species were both recorded as part of the native vegetation survey and roadside surveys.

Data preparation and analyses

After field sampling was completed, the data was digitized and verified for accuracy. For each plot with quantitative sampling, mean values for vegetation percent cover were calculated for

plots with a tall shrub stratum, herb and low shrub stratum, non-vascular stratum, as well as inanimate ground cover. All sites were stratified by vegetation type.

Species richness and total species cover was determined for each plot. Species diversity was calculated using the Shannon diversity index and equitability was calculated to determine the evenness of species in their distribution within the site (Kent and Coker 1996, p97). Diversity and evenness measures were calculated using Excel spreadsheets.

To characterize the local vegetation resources, the vegetation community descriptions are presented by vegetation type where sampling occurred. Sites are described by identifying community types based on plant species composition and abundance. Where vegetation community types are listed, naming was based on their structure and species dominance by stratum. Species separated by a dash (-) indicates similar abundance within the stratum.

Collection guidelines and plant identification

All vascular plants were recorded and those unidentifiable in the field were collected, as voucher specimens, where the population size permits. Identification of vascular plants followed Flora of North America (1993+) and Scoggan (1978), and verification with herbarium specimens located at the Manitoba Museum. Plant nomenclature for species discussed in this report will follow the Manitoba Conservation Data Centre (MBCDC) provincial species list.

5.1.3.2.2 Rare plant survey

Rare plant surveys (species of conservation concern) are conducted to identify and document all occurrences of any rare plant species in a Project area. These plants include species that are rare, disjunct or at risk throughout their range or in Manitoba. Rare plant species relevant to the proposed project are species:

- Listed under the Species at Risk Act (SARA);
- Listed by The Committee on the Status of Endangered Wildlife in Canada (COSEWIC);
- Listed under the Endangered Species and Ecosystems act of Manitoba (ESEA); and
- Ranked as very rare (S1) to uncommon (S3) by the MBCDC.

Surveys initially involved the review of species of conservation concern previously known to occur in the assessment area (MBCDC database/MHOrientis) and other relevant literature. A database search of the MBCDC provincial records for known locations of species of conservation concern in the vicinity of the Project was requested in the spring of 2016.

Flowering times and preferred habitat for species of conservation concern known to occur in the RAA were reviewed. Areas with high potential to support species of conservation concern were identified for surveys (i.e., targeted surveys purposely located in areas of ecological interest, including possible protected species). Where possible, survey units were positioned to achieve good interspersion across the Project Footprint. Within the community pasture, a systematic

survey occurred for grasslands (approximately 5km stretch) where surveys were located at 500m intervals.

In the field, a combination of meander and transect searches were used which follow methods outlined by the Alberta Native Plant Council (2012). Parallel transects were favoured in more open and homogenous landscapes such as grasslands, while meander searches were conducted in areas of difficult terrain, unique habitats, and where unusual landscape features occur. Rare plant locations were recorded using a Global Positioning System (GPS) receiver. Where encountered, rare plant individuals were counted, population extent was estimated, and phenology was recorded. Photographs were captured in the field.

The global (G) and sub-national (S) rarity ranking of species used by the MBCDC, according to a standardized procedure used by all Conservation Data Centres and Natural Heritage Programs is as follows:

1: Very rare throughout its range or in the province (5 or fewer occurrences, or very few remaining individuals) -may be especially vulnerable to extirpation.

2: Rare throughout its range or in the province (6 to 20 occurrences) - may be vulnerable to extirpation.

3: Uncommon throughout its range or in the province (21 to 100 occurrences).

4: Widespread, abundant, and apparently secure throughout its range or in the province, with many occurrences, but the element is of long-term concern (> 100 occurrences).

5: Demonstrably widespread, abundant, and secure throughout its range or in the province, and essentially impossible to eradicate under present conditions.

An element with a range between two numeric ranks (e.g., S2S3) denotes a range of uncertainty about the exact rarity of the species. A question mark following the rank (e.g., S2?) denotes inexactness or uncertainty of the numeric rank.

The conservation status categories for SARA, COSEWIC and ESEA are as follows:

- Special Concern: A species that may become threatened or endangered because of a combination of biological characteristics and identified threats.
- Threatened: A species likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
- Endangered: A species facing imminent extirpation or extinction.
- Extirpated: A species no longer existing in the wild in Canada but exists elsewhere.
- Extinct: A species that no longer exists.

5.1.4 Data gaps and limitations

The following data gaps and limitations were identified for the Project botanical and vegetation resources:

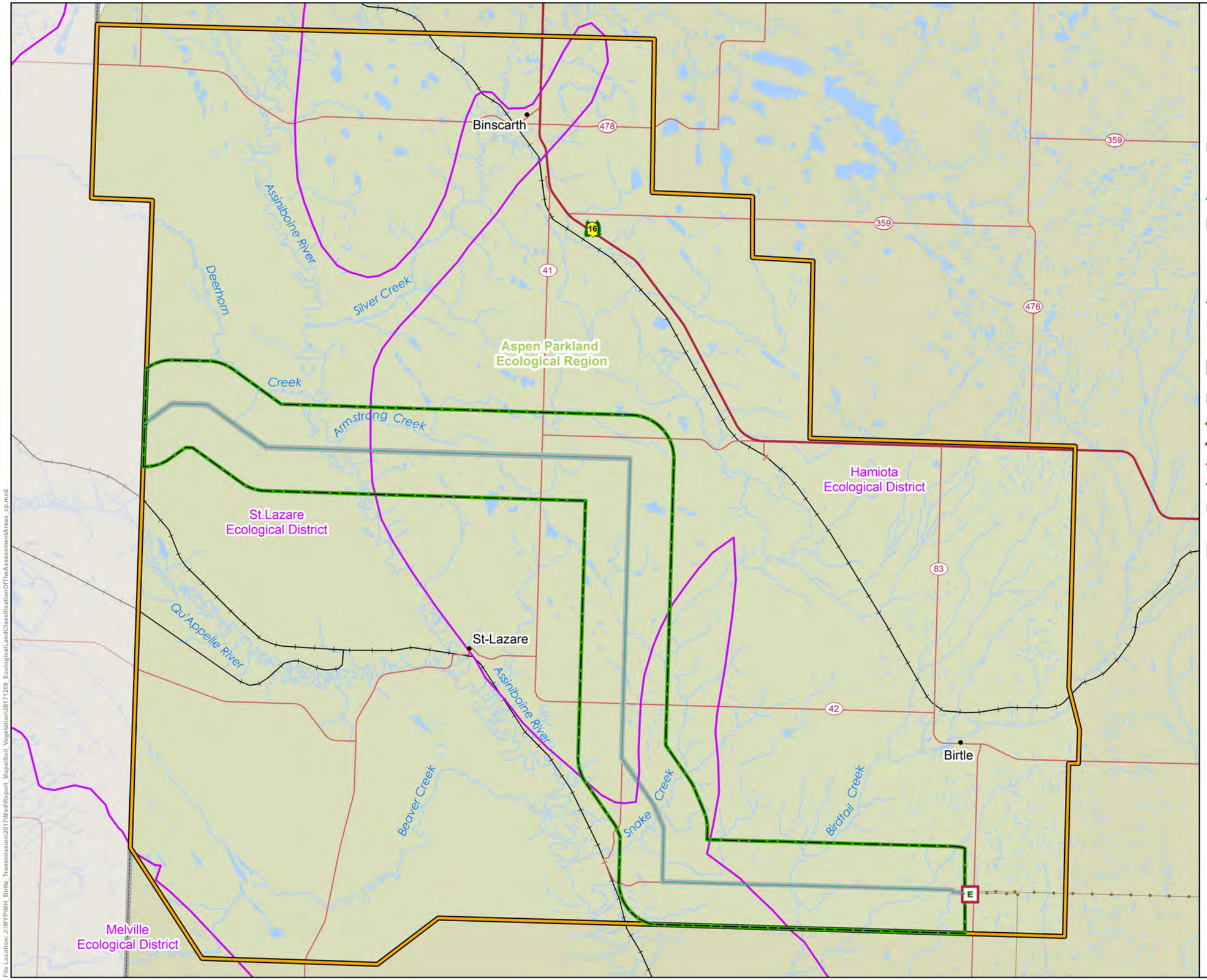
- The existing land cover data for the region is based on remote sensing or data interpretation without confirmation sampling;
- Fourteen land use/land cover classes are delineated from the Manitoba Land Cover Classification. These types are broadly identified and do not provide information on species composition and vegetation structure;
- Existing information on species of conservation concern in the region is based on single data points or polygons, with limited information on species extent and habitat detail;
- Several private lands were unable to be accessed to survey the vegetation, as a result of permissions not being received; and
- Preconstruction rare plant surveys should occur in areas of Project adjustment prior to construction activities.

5.2 Results

5.2.1 Priority species

The following section discusses priority species for the Project including plant species of conservation concern, invasive plant species and traditional use plants. The rationale for priortorizing these species is described below. The identification of the Ecological Land Classification and regional flora information precedes this discussion to provide the ecological and botanical background for the Project.

The proposed Project lies within the Prairies Ecozone, which extends north from the Canada-United States border and stretches from Alberta to eastern Manitoba (Smith et al. 1998). The proposed Project occurs almost entirely within both the Hamiota and St. Lazare Ecodistricts; the Melville Ecodistrict occupies a minor portion (Map 5-1) (Table 5.2-1). The Hamiota Ecodistrict is bordered to the north by the slopes leading to Riding Mountain and extends nearly to the Assiniboine River in the south. The St. Lazare Ecodistrict straddles the border with Saskatchewan. This area falls within a subdivision of the Grassland Transition Ecoclimatic Region that lies between the driest subdivision to the southwest and the most humid subdivision to the east (Smith et al. 1998). Short, warm summers and long, cold winters are characteristic of this ecoclimatic region.



North/South Consultants Inc.
Aquatic Environment Specialists

Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Ecological Region & District Bounds
- Natural Ecological Region - Aspen Parkland
- Natural Ecological Districts

Assessment Areas
- Project Footprint
- Local
- Regional

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 11, 2017

N

0 2 4 6 Kilometres
0 1 2 3 Miles

1:135,000

Ecological Land Classification of the Assessment Areas

File Location: J:\MKP\MH_Birtle_Transmission\2017\Mxd\Report_Maps\Soil_Vegetation\20171208_EcologicalLandClassificationOfTheAssessmentAreas_cp.mxd

Map 5-1 Ecological Land Classification of the assessment areas.

Table 5.2-1: Area (ha) and percent of land within ecodistricts among assessment areas.

Ecodistrict	Project		Local		Regional	
	Area (ha)	%	Area (ha)	%	Area (ha)	%
Hamiota	108.5	58.8	9,079.7	62.1	53,652.3	55.4
St. Lazare	76.2	41.2	5,545.5	37.9	43,001.0	44.4
Melville	-	-	-	-	262.1	0.3

A list of potential plant species expected to occur within the regional assessment area was compiled from available information sources including provincial data (MBCDC 2016a and 2016b), herbarium records (The Manitoba Museum 2016), regional flora (i.e., Spy Hill-Ellice Community Pasture Field Reports 1987, 1995 and 2011; Ellice-Archie Community Pasture Field Reports 1993 and 2006; Robson 2013), and existing literature (i.e., Vance et al. 1984; Houston 1993 and 1996; Reimer and Hamel 2003; Hamel and Reimer 2004). This flora includes about 245 vascular species from over 57 families, occurring in terrestrial and wetland habitats (see Appendix I, Table 1).

5.2.1.1 Species of Conservation Concern

Species of conservation concern are plants ranked provincially as very rare to uncommon by the Manitoba Conservation Data Centre (MBCDC), and include species listed by the Manitoba *Endangered Species and Ecosystems Act* (ESEA), the federal *Species at Risk Act* (SARA), or the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). These plants have the potential to be adversely affected during clearing, construction, and maintenance activities for the proposed Project.

Based on records from the MBCDC and other sources identified above, several species of conservation concern (about 46) are known to occur in the RAA and surroundings, with increased concentrations located in the vicinity of St. Lazare. The uplands and river valleys in this region support a number of species considered provincially rare in the province (Hamel and Reimer 2004). In 2002, surveys in the Qu'Appelle Valley near the town of St. Lazare, and within the Spy Hill-Ellice and Ellice-Archie Community Pastures resulted in 41 new or updated occurrences of 11 species of conservation concern. Information was collected on one nationally rare plant species in this area, roundleaf monkey-flower (*Mimulus glabratus*) (Reimer and Hamel 2003). Table 5.2-2a lists these species with information on flowering times and habitat.

According to provincial sources and existing literature (identified above), there are about 172 species of conservation concern that can be expected to range within the greater Aspen Parkland Ecoregion, Appendix I, Table 2. Of these, there are eight species at risk listed in the ecoregion, with ESEA, SARA, or COSEWIC. These include rough purple false-foxglove (*Agalinis aspera*), buffalograss (*Bouteloua dactyloides*), hackberry (*Celtis occidentalis*), smooth goosefoot (*Chenopodium subglabrum*), small white lady's-slipper (*Cypripedium candidum*), hairy prairie-clover (*Dalea villosa*), smooth monkeyflower (*Mimulus glabratus*) and western spiderwort (*Tradescantia occidentalis*). Only one of these species is known to occur in the RAA, roundleaf monkey-flower. Table 5.2-2b provides information on these species including status, habitat and

range in Manitoba. No ecosystems currently listed with the Manitoba ESEA (e.g., alvar, tall grass prairie) are known to occur in the RAA.

Table 5.2-2a: Known plant species of conservation concern in the RAA and surroundings

Scientific Name	Common Name	MBCDC Rank	Flowering Time	Habitat
Achnatherum hymenoides	Indian Rice Grass	S2	July, August	Dry prairie, sand dunes, gravel pits
Achnatherum richardsonii	Richardson Needle Grass	S1S2	July, August	South-facing hillsides, dry sites
Allium textile	Prairie Onion	S3	May, June	Eroded slopes, dry prairie, clay hillsides
Andropogon hallii	Sand Bluestem	S2	July, August	Sandy soil, sand dunes
Artemisia cana	Silver Sagebrush	S1	August	Uplands, overgrazed areas
Astragalus australis	Indian Milkvetch	S1S2	May, June	Hillsides, prairie, dry rock
Astragalus bisulcatus	Two-grooved Milkvetch	S3	June	Dry prairie, coulees
Astragalus pectinatus	Narrow-leaved Milkvetch	S2	early June	Sandy gravel soil, dry prairie, roadsides
Calamagrostis montanensis	Plains Reed Grass	S3	June, July	Pine woods eskers
Calamagrostis rubescens	Pine Reed Grass	S1	August	Pine forests
Carex inops	Long-stolon Sedge	S1?	June	Prairie, gravel
Chenopodium pratericola	Goosefoot	S3	July, August	Sandy gravel, dunes, disturbed areas
Corispermum americanum	American Bugseed	S2S3	July	Sand dunes, sandy and gravely shores
Corispermum villosum	Hairy Bugseed	S1S2	July	Sand dunes, disturbed roadsides, under jack pines, riparian dunes
Cyperus schweinitzii	Schweinitz's Flatsedge	S2	June, July	Bare sand, roadsides
Dichanthelium linearifolium	White-haired Panic-grass	S2?	August	Sandy ridge
Dichanthelium wilcoxianum	Fall rosette grass; Sand millet	S2	June, July	Dry slopes, sand dunes, open pine woods
Epilobium brachycarpum	Annual Willowherb	S1S2	Summer	Light and sandy soil
Erigeron caespitosus	Tufted Fleabane	S1	July	Dry prairie hillsides, sand
Eriogonum flavum	Yellow Eriogonum	S3	June	Dry eroded areas, hillsides
Euphorbia geyeri	Prostrate Spurge	S1	July, August,	Sand hills, dunes,

Table 5.2-2a: Known plant species of conservation concern in the RAA and surroundings				
Scientific Name	Common Name	MBCDC Rank	Flowering Time	Habitat
			September	gravel pits
Euphorbia serpyllifolia	Thyme-leaved Spurge	S3	June, July, August	Sandy roadsides, railway gravel, disturbed areas
Festuca hallii	Plains Rough Fescue	S3	June, July	Grazed prairie, sandy soils
Guttierrezia sarothrae	Match-brush	S3	June, July	Eroded hills, dry prairie, roadsides
Hesperostipa curtiseta	Western Porcupine Grass	S3	July, August	Dry prairie, sand hills
Linum sulcatum	Grooved Yellow Flax	S3	July, August	Dry prairie, pasture
Lithospermum incisum	Linear-leaved Puccoon	S3	May, June	Open prairie, moist sites
Lomatium macrocarpum	Long-fruited Parsley	S3	May	Sandy prairie, grassy south-facing slopes
Mimulus glabratus	Smooth Monkeyflower	S1	July	Shady streambanks
Mirabilis linearis	Hairy Umbrellawort	S1S2	July, August	Sand hills, mixed prairie, dunes
Muhlenbergia asperifolia	Scratchgrass	S3	May to September	Prairie, moist meadows, alkali areas
Nassella viridula	Green Needle Grass	S3	July	Dry prairie and slopes
Oenothera serrulata	Shrubby Evening-primrose	S3	May, June, July	Open prairie, roadsides, railway grades, disturbed areas
Orobanche ludoviciana	Louisiana broomrape	S2	June to September	Sandy soil, eroded hillsides
Oxytropis campestris var. spicata	Showy Locoweed	S1	July	Ungrazed prairie, south-facing hillsides
Oxytropis sericea	Early Yellow Locoweed	S1	May	Dry prairie
Penstemon nitidus	Smooth Beard-tongue	S2	May, June	Sandy soil, eroded hillsides
Penstemon procerus	Slender Beard-tongue	S1?	June, July	Uplands
Phlox hoodii	Moss Pink	S3	late May	Open prairie, dry eroded hillsides
Plantago elongata ssp. elongata	Linear-leaved Plantain	S2	June, July, August	Clay hills
Sceptridium multifidum	Leathery Grape-fern	S3	late July, August	Rock crevices, edge of ditch by black spruce

Table 5.2-2a: Known plant species of conservation concern in the RAA and surroundings

Scientific Name	Common Name	MBCDC Rank	Flowering Time	Habitat
Selaginella densa	Prairie Spike-moss	S3	June, July, August	Dry eroded slopes, sand hills, dry prairie
Solidago mollis	Velvety Goldenrod	S3	August, September	Ravines, dry slopes, S-facing slopes
Streptopus amplexifolius	White Mandarin	S2?	July	Moist stream banks, mixed woods, rich soil
Thermopsis rhombifolia	Golden Bean	S2	May, June	Sand hills, shale slopes, railway gradients
Townsendia exscapa	Silky Townsend Daisy	S2	May, June	Sunny slopes, dry hills, sparsely vegetated sand hills

Source includes Flora of North America 1993+.

Table 5.2-2b: Plant species at risk listed in the Aspen Parkland Ecoregion

Scientific Name	Common Name	Conservation Status	Habitat	Range in Manitoba
Agalinis aspera	Rough Agalinis	ESEA - Endangered SARA – Endangered COSEWIC - Endangered	Low prairie meadows that are wet, exposed patches of bare stony soil and limestone gravel, oil disturbance is tolerated	South Interlake west to Brandon
Bouteloua dactyloides	Buffalograss	ESEA - Threatened SARA – Special Concern COSEWIC – Special Concern	Short grass prairie, meadows, pastures	Western Manitoba in valleys of the Souris and Blind Rivers
Celtis occidentalis	Hackberry	ESEA - Threatened	Dry prairie and sandhills	Scattered locations, Lauder Sandhills to Delta Beach
Chenopodium subglabrum	Smooth Goosefoot	ESEA - Endangered SARA – Threatened COSEWIC - Threatened	Prairie sand areas	Sandhills of Oak Lake and Routledge
Cypripedium candidum	Small White Lady's-Slipper	ESEA - Endangered SARA – Endangered COSEWIC - Threatened	Prairie openings in wooded grasslands or in more open sites in calcareous sandy loam soil	Southern Manitoba
Dalea villosa	Hairy Prairie-clover	ESEA - Threatened SARA – Special Concern COSEWIC – Special Concern	Active sand or sandhill blowouts and partially stable sandy sites	Southwestern Manitoba, south to Shilo
Mimulus glabratus	Smooth Monkeyflower	ESEA – Special Concern	Cool moving water, mineral springs and seeps in moss, slightly shaded areas	St. Lazare, Spruce Woods Provincial Park and Aweme
Tradescantia occidentalis	Western Spiderwort	ESEA - Threatened SARA – Threatened COSEWIC – Threatened	Sandy soils, in open to partially stabilized dune systems	Routledge Sandhills and Lauder Sandhills, northeast of Melita

Note: Manitoba Endangered Species and Ecosystems Act (ESEA), Species at Risk Act (SARA), Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

5.2.1.2 Invasive Species

A number of non-native and invasive species are expected to occur across the RAA. Non-native species are plants growing outside of their normal range, while invasive species out compete native species when introduced outside of their natural setting. Generally, many species are introduced along roads, rivers and streams, and generally follow human activities. Introduced species grow outside of their region of origin and generally thrive on disturbed sites, are often prolific seed producers, and can tolerate poor or disturbed soils (Langor et al. 2014). Where they become established, non-native and invasive plants can impact ecosystem diversity, structure, and function. Invasive species compete with native species, forming dense populations that may subsequently spread to other areas. Displacement of native species can change the floristic composition of an ecosystem, potentially endangering species of concern. Invasive species have been cited as risk factors for species of conservation concern (Canadian Food and Inspection Agency 2008).

Within the preliminary list of species expected to occur in the RAA, there are 10 introduced species, occurring as non-native and invasive, and ranked SNA (conservation status rank is not applicable, with the exception of one species) by the MBCDC (Table 5.2-3). Non-native and invasive plants in the region are commonly perennial herbs and grasses, particularly from among the Asteraceae (composites), Fabaceae (legumes), and Poaceae (grasses) families. Invasive plant species were sourced from White et al. (1993), Catling and Mitrow (2005, 2012), Catling et al. (2014, 2017), the Canadian Food Inspection Agency (2008), and the Invasive Species Council of Manitoba (2017). The Invasive Species Council of Manitoba identifies nearly 20 plant species listed under Category 2; Category 1 invasive plants are not present in Manitoba. Pathways for these plants are present in Manitoba and these plants are capable of further spread. Greater than 20 species are also listed as “other terrestrial invasive plants”.

Table 5.2-3: Invasive species known to occur in the region.

Family	Scientific Name	Common Name	MBCDC Rank
ASTERACEAE	*Artemisia absinthimum*	Wormwood	SNA
ASTERACEAE	*Cirsium arvense*	Canada Thistle	SNA
ASTERACEAE	*Sonchus arvensis*	Field Sow-thistle	SNA
EUPHORBIACEAE	*Euphorbia esula*	Leafy Spurge	SNA
FABACEAE	*Medicago sativa*	Alfalfa	SNA
FABACEAE	*Melilotus officinalis*	Yellow Sweetclover	SNA
POACEAE	*Agropyron cristatum*	Crested Wheatgrass	SNA
POACEAE	*Bromus inermis*	Smooth Brome	SNA
POACEAE	*Poa compressa*	Canada Blue Grass	SNA
POACEAE	*Poa pratensis*	Kentucky Blue Grass	S5

In Manitoba, The Noxious Weeds Regulation lists 90 plant species identified as noxious under *The Noxious Weeds Act* (Manitoba Government 2017). These weeds are a threat to both agricultural and natural areas, and are listed in Appendix I, Table 3, also with potential to occur. Currently, *The Noxious Weeds Act* provides for three tiers of noxious weeds. A plant is

designated as tier 1, 2 or 3 noxious weed (present or not yet present) if it is likely to negatively affect any aspect of the provinces economy, environment or the well-being of residents should the spread not be controlled or plant destroyed. The Act requires that noxious weeds be controlled by landowners and persons who occupy land. A range of action, from destruction to control, is provided for depending on the class and the size of the area of infestation. Under the current Act, Tier 1 noxious weeds include the most threatening species.

5.2.1.3 Traditional Use Plants

Traditional use species are plants that have been gathered and harvested from the RAA for subsistence, medicine and cultural purposes. Traditional knowledge can be considered a dynamic process of learning from elders and observing from nature, while adapting this knowledge to enhance the quality of Life (Marles et al. 2000). Primarily preserved by oral traditions passed down through generations, the documentation of traditional knowledge, particularly when led by individual Aboriginal communities, can help preserve local knowledge and culture for generations to come. A great deal of Indigenous traditional knowledge concerns plants and their use as food, medicines, for handicrafts, and technology. Country foods and medicines increase dietary quality and generally consist of animals, wild berries or nuts, and wild plants (Fieldhouse and Thompson 2012). Aboriginal people have been sustainably gathering and harvesting plants in Canada for thousands of years, and in that time, have accumulated a body of local, cultural and traditional knowledge (Marles et. al. 2000).

Traditionally important plant species identified from the Indigenous engagement for the Project were sourced from values and interest workshops from Canupawakpa Dakota Nation (Manitoba Hydro 2017a), Gambler First Nation (Manitoba Hydro 2017b), and Waywayseecappo First Nation (Manitoba Hydro 2017c). Plant and tree species currently used in the RAA are also identified in the Metis land use and occupancy study (MNP 2017).

The report on the values and interest workshop held in Canupawakpa Dakota Nation (Manitoba Hydro 2017a) identified harvesting of medicinal plants as important. Information about plants was shared generally and areas of plant gathering were not mapped. Along the Assiniboine River where creeks and rivers branch off into marshlands, these areas are noted as important for gathering plants. Tree species and red willow (*Salix* spp.) are used for medicines and willow is also used in ceremonies. Berries such as chokecherries (*Prunus virginiana*) and Saskatoons (*Amelanchier alnifolia*) are mashed and mixed with deer meat. Plums (*Prunus* sp.) are also mentioned as being abundant along creeks. A purple cedar plant that grows in light soil is identified as an important species for the community. The concern for forested and natural areas was noted.

Members of Gambler First Nation identified that the pasture is full of wildflowers that are not found elsewhere (Manitoba Hydro 2017b). Areas with tiger lilies (*Lilium philadelphicum*) and crocuses (*Anemone patens*) are always visited throughout the year. Community members indicated areas east and west of Gamblers where they gather raspberries (*Rubus idaeus*), Saskatoon berries, pin cherries (*Prunus pensylvanica*), strawberries (*Fragaria virginiana*), chokecherries and cranberries (*Viburnum* spp.). Community members freeze, make jam and can berries. Concern was identified for trees, berry picking areas, and traditional medicines.

A recent workshop in Waywayseecappo First Nation (Manitoba Hydro 2017c) discussed specific plant species that have been and continue to be considered important by members of the community. Important plants cited for the community include sweetgrass (*Anthoxanthum* sp.), sage (*Artemisia* spp.) and Weke (*Acorus americanus*), which is found in the valley. Tea is also part of an important cultural harvesting activity. Plants and trees are valued for culture and the environment, while berry picking and medicine gathering are important activities. The concern for forest areas and the community pasture was noted.

The Metis land use and occupancy study (MNP 2017) identify traditionally important species from both previous data collection and Project specific use and occupancy sites. Species are noted for their activity type (i.e., subsistence, medicinal, cultural, and economic), seasons gathered or harvested and general location of activity. Plants identified for berry gathering include pin cherry, raspberry and strawberry, while plants used for medicinal or general gathering include common sweet clover (*Melilotus* spp.), dandelion (*Taraxacum officinale*), prairie turnip (*Brassica napus*), rat root (*Acorus americanus*), seneca root (*Polygala senega*), stinging nettle (*Urtica dioica*), thistle (*Cirsium* spp.), wild mint (*Mentha arvensis*), wild onion (*Allium* spp.), wild rose (*Rosa* spp.), lamb's quarter (*Chenopodium album*), bulrush (*Schoenoplectus* spp.), cattail (*Typha* spp.), purple coneflower (*Echinacea angustifolia*) and hazelnut (*Corylus* spp.). Bur oak (*Quercus macrocarpa*) and white poplar (*Populus tremuloides*) are trees frequently used. A potential change in the availability of species as a result of the Project was a concern identified.

Indigenous communities and local resource users have long histories of using the land, as well as an appreciation for the plants growing in their resource area. As a result of the workshops and land use study, 29 species (two trees, nine shrubs, 18 herbs) were identified from the communities and land use study as important for sustenance, medicinal and cultural practices (Table 5.2-4). Some activities such as berry picking and medicinal plant gathering were unspecified in plant species. Vegetation such as trees, forests, and pastures were identified as important. Plant naming and spelling observed in the values and interest workshop reports, and land use and occupancy study are preserved.

Table 5.2-4: Traditional use plants identified from Indigenous engagement and land use studies.

Traditional Plants	Scientific Name	Form
Bur Oak	*Quercus macrocarpa*	Tree
White Poplar	*Populus tremuloides*	Tree
Saskatoon	*Amelanchier alnifolia*	Shrub
Pin Cherry	*Prunus pensylvanica*	Shrub
Plum	*Prunus* sp.	Shrub
Chokecherry	*Prunus virginiana*	Shrub
Raspberry	*Rubus idaeus*	Shrub
Red Willow	*Salix* sp.	Shrub
Cranberry	*Viburnum* sp.	Shrub
Wild Rose	*Rosa* spp.	Shrub
Hazelnut	*Corylus* spp.	Shrub
Weke/Rat Root	*Acorus americanus*	Herb
Crocus	*Anemone* sp.	Herb
Sweetgrass	*Anthoxanthum* sp	Herb
Sage	*Artemisia* sp.	Herb
Strawberry	*Fragaria virginiana*	Herb
Tiger Lily	*Lilium philadelphicum*	Herb
Common Sweet Clover	*Melilotus* spp.	Herb
Dandelion	*Taraxacum officinale*	Herb
Prairie Turnip	*Brassica napus*	Herb
Seneca Root	*Polygala senega*	Herb
Stinging Nettle	*Urtica dioica*	Herb
Thistle	*Cirsium* spp.	Herb
Wild Mint	*Mentha arvensis*	Herb
Wild Onion	*Allium* spp.	Herb
Lamb's Quarter	*Chenopodium album*	Herb
Bulrush	*Schoenoplectus* spp.	Herb
Cattail	*Typha* spp.	Herb
Purple Coneflower	*Echinacea angustifolia*	Herb

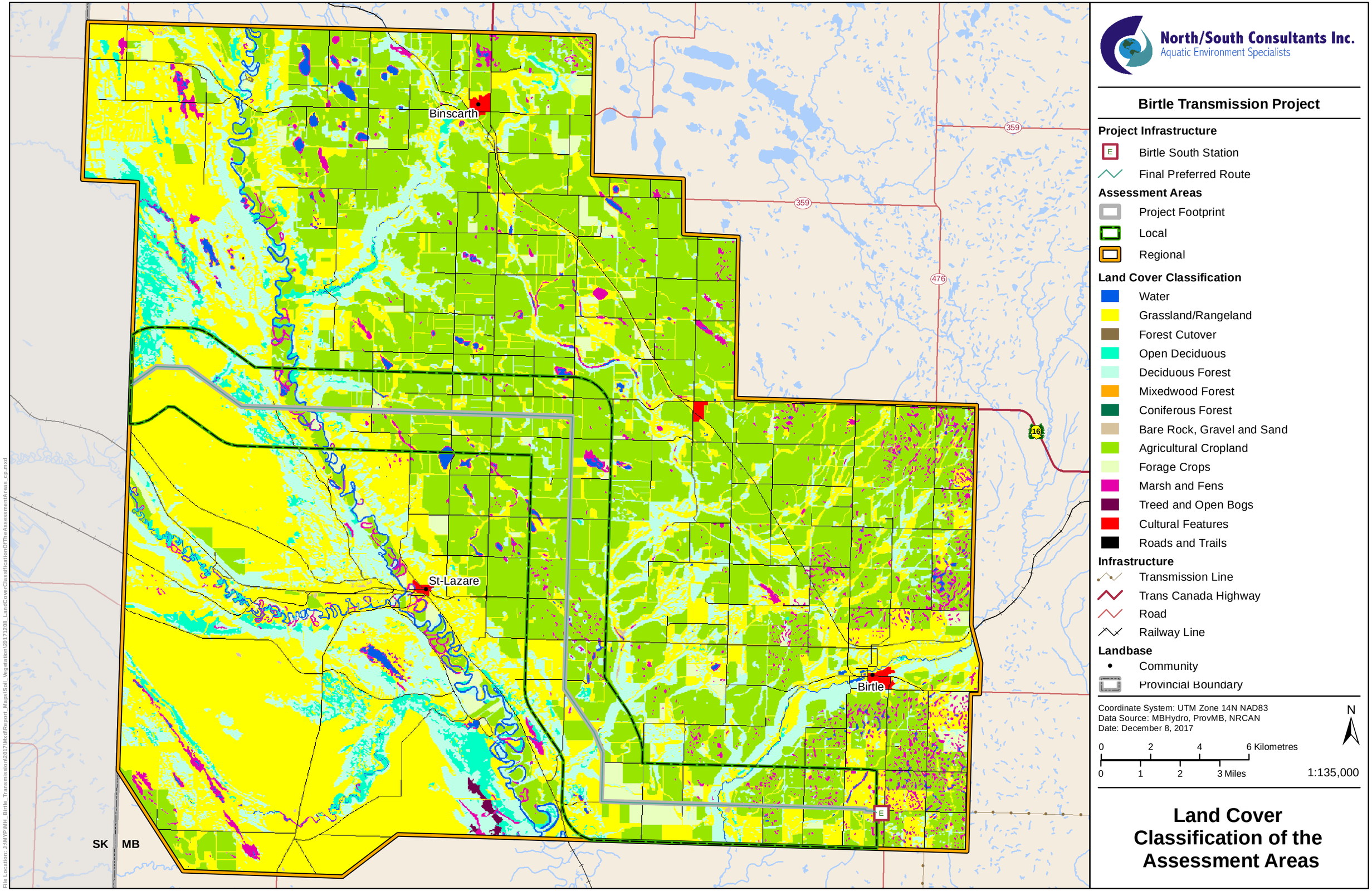
* Plants identified from values and interest workshops (Manitoba Hydro 2017a; 2017b; 2017c).

5.2.2 Current status

5.2.2.1 Land cover classification

Within the assessment areas (Project Footprint, Local, Regional), 14 land use/land cover classes are identified from the Manitoba Land Cover Classification. These classes include native vegetation of grassland, wetlands, and coniferous, deciduous and mixedwood forests. The water class includes rivers and streams. Agricultural cropland, cultural features and roads are also identified. The land use/land cover was determined (calculated) for classes by assessment area. Map 5-2 illustrates the distribution of the land use/land cover classes for the RAA.

The area (ha) and percent of land use/land cover classes found in the Project Footprint, LAA and RAA is shown in Table 5.2-5. The RAA is dominated by agricultural cropland and



Map 5-2 **Land Cover Classification of the assessment areas.**

grassland/rangeland, covering 37.8% and 33.7%, respectively. The percent covers are similar for these classes at the local and project levels. Deciduous forest is also common within the regional (16.8%), local (13.3%) and project (12.3%) assessment areas. Water features (0.3 - 1.5%) and wetlands (1.4 – 2.9%) are relatively rare for all levels of assessment.

Table 5.2-5: Area (ha) and percent of land use/land cover classes by assessment area.

Land Use/ Land Cover Classes	Project		Local		Regional	
	Area (ha)	%	Area (ha)	%	Area (ha)	%
Agricultural Cropland	69.0	37.3	6,619.1	45.3	36,666.8	37.8
Deciduous Forest	22.8	12.3	1,948.6	13.3	16,244.7	16.8
Water	0.5	0.3	135.7	0.9	1,448.2	1.5
Grassland/Rangeland	61.5	33.3	4,387.0	30.0	32,648.7	33.7
Mixedwood Forest	-	-	-	-	3.0	<0.1
Marsh and Fens	2.5	1.4	299.9	2.1	2,694.3	2.8
Treed and Open Bogs	-	-	-	-	78.3	0.1
Coniferous Forest	-	-	-	-	0.4	<0.1
Open Deciduous	5.9	3.2	443.5	3.0	2,908.5	3.0
Forage Crops	5.9	3.2	502.5	3.4	2,019.7	2.1
Cultural Features	-	-			183.6	0.2
Forest Cutover	-	-	1.8	<0.1	6.5	<0.1
Bare Rock, Gravel and Sand	-	-	4.3	<0.1	35.7	<0.1
Roads and Trails	16.6	9.0	281.0	1.9	1,977.2	2.0

5.2.2.2 Grasslands

Overview

Historically, across North America grassland ecosystems existed over large areas (Sampson and Knopf 1994), yet few undisturbed natural areas remain today, as losses to grasslands have exceed those of other major biomes (Hoekstra et al. 2005). Although at a slower pace, grasslands losses continue in some areas. The health and persistence of native grasslands is threatened by a combination of agricultural expansion, energy development, fire suppression, trembling aspen encroachment, invasion of exotic species, and fragmentation. Despite these pressures, remnant grasslands remain important habitats for threatened species, and their preservation is vital to conserve biodiversity.

In Manitoba, mixed-grass prairie, generally found within the aspen parkland, is a climatic and geographic transition between the tall-grass prairie to the south and the drier short-grass prairie (Anderson 2006) further to the west in Saskatchewan and Alberta. It occurs on sandy to well-drained soils with annual precipitation approximately 440-530 mm (Smith et al. 1998). Once covering over 24 million hectares from Alberta to southwestern Manitoba, today less than 25% of these prairies remain (Manitoba Sustainable Development 2017). Often found on land too hilly, stony or coarse textured for agriculture, native prairies require responsible management practices to in order to persist.

Few intact examples remain of mixed-grass prairie in Manitoba; the largest include the Spy Hill-Ellice and Ellice-Archie Community Pastures (Reimer and Hamel 2003), and the training areas at CFB Shilo (Wilson and Shay 1990). Tracts of mixed-grass prairie are also found in Manitoba's extreme southwest (Lindgren and De Smet 2001). Fescue prairies, once common across the northern prairies, are now almost entirely lost (e.g., Otfinowski, Pinchbeck and Sinkins 2017). Although still poorly understood, distribution of fescue prairie is generally restricted in Manitoba to remnant pockets within in uplands at the western edge of the province (Thorpe 2010; Looman 1969). An estimated 2,100 ha of fescue prairie remains in Manitoba, primarily within the Riding Mountain area; good quality fescue prairie is considered Very Rare (S1) in Manitoba (Friesen and Krause 2008).

Two intact native mixed-grass prairies exist in the region, which include approximately 23,000 ha in the Ellice-Archie (15,260 ha) and Spy Hill-Ellice (8,400 ha) Community Pastures (Reimer and Hamel 2003). These large prairie landscapes were a result of the Community Pasture Program, a land-management service provided in the prairie provinces, created in the 1930s to reclaim poor quality cultivated land that was badly eroded during the prairie drought back to grass cover. The objectives of the program were to manage a productive, bio-diverse rangeland and promote environmentally responsible land use practices, and to utilize the resource to complement livestock production. The Association of Manitoba Community Pastures (AMCP) was formed in 2014 after the federal government (Agriculture and Agri-Food Canada) began transitioning community pasture management to the province. The AMCP is made up of patrons who pay fees to use these pastures. The pastures provide grazing and breeding space for livestock but also protect natural prairie ecosystems and protect the land from impacts due to drought or intensive cropping.

The Ellice-Archie and Spy Hill-Ellice Community Pastures on both sides of the Qu'Appelle River Valley are flat, open grasslands with occasional stands of trembling aspen. Soils in this area are largely of the Marringhurst Association, which consists of coarse textured sandy loam soils developed on glacial outwash deposits (Ehrlich et al. 1956). This area occurs well within the Black Chernozemic zone, although the coarse textured parent material causes locally arid soils, which defines the native vegetation. These areas are known to support high diversity of species including both flora and fauna species at risk.

There are in excess of 150 species of plants known to occur in mixed grass prairie, each adapted in its own way to topography and changes in temperature, precipitation, fire, and grazing. Typical grasses and forbs of the mixed grass prairie include little bluestem (*Schizachyrium scoparium*), spear grasses (*Hesperostipa* spp.), blue grama (*Bouteloua gracilis*), prairie crocus (*Anemone patens*), dotted blazingstar (*Liatris punctata*) and purple coneflower (*Echinacea angustifolia*).

The area (ha) and percent cover of grasslands for the project is shown above in Table 5.2-5 Grasslands from the Manitoba Land Cover Classification represent 33.7% (32,648.7 ha) of the RAA, 30% (4,387.0 ha) of the LAA and 33.3% (61.5 ha) of the Project Footprint. Of the total grasslands within the project footprint, 13.6% (25.2 ha) occur within the Spy Hill-Ellice Community Pasture. The Critical Wildlife Habitat Program, involving the Government of

Manitoba and a variety of other agencies, inventoried and compiled information on remaining mixed-grass prairie in Manitoba. From 1992 to 2011, over 78,000 ha were inventoried with 60% of these considered to be in good condition (Manitoba Sustainable Development 2017). The mixed grass prairie inventory identifies 17.7% (32.6 ha) of land cover within the Project Footprint. Lower total percent cover values occur at the local and regional levels with 7.1% (1,033.4 ha) and 7.6% (7,324.7 ha), respectively.

Grassland Community Types

Ten sites were sampled in the Spy Hill-Ellice Community Pasture mixed-grass prairie, in areas dominated by native grasses, with a diversity of native forbs and low shrubs, and the absence of trees or tall shrubs (Photograph 5-1). Very few non-native species were recorded in plots. Eight sites are original native grassland, while two sites are transitional grassland, recently cleared of trees.

Photograph 5-1: Mixed-grass prairie in the Spy Hill-Ellice Community Pasture.

Overall within eight grassland sites, the most commonly occurring grasses were blue grama (*Bouteloua gracilis);* speargrasses (*Hesperostipa curtiseta* and *H. spartea)*, slender wheat grass (*Elymus trachycaulus),* June grass (*Koeleria macrantha),* Hooker's oat grass (*Avenula hookeri),* sand grass (*Calamovilfa longifolia),* and plains rough fescue (*Festuca hallii)*. Common forbs were prairie crocus (*Anemone patens),* pasture sage (*Artemisia frigida*)*,* prairie clover (*Dalea purpurea*)*,* great-flowered gaillardia (*Gaillardia aristata*)*,* three-flowered avens (*Geum triflorum*), hoary puccoon (*Lithospermum canescens*), and rose (*Rosa* spp.). Dead plant litter cover was moderate (67.9%) and comprised mainly of grass thatch, while bare soil cover was very low (1.3%).

Widespread in grassland sites, a non-vascular ground cover was noted as a tightly meshed community of mosses, lichens, and fungi, accounting for an average of 20.6% ground cover

across sites. In some places, this appeared as a continuous mat or crust from which the vascular plants grow, resulting in very little bare ground observed in plots. The presence and persistence of this type of non-vascular ground cover under grassland with a long-established grazing regime seems unusual and significant, as any vigorous ground disturbance (e.g. heavy grazing, vehicle traffic) would displace the shallowly rooted non-vascular system.

Within this mixed-grass prairie pasture there is a mosaic of vegetation associations loosely dependent on conditions at each site. The flat open sandy sites along the original preferred route (BT-32 through -38) were generally made up of western porcupine (*Hesperostipa curtiseta)* and blue grama grasses, with areas of slender wheatgrass or sand dropseed (*Sporobolus cryptandrus*), while a ridge top area (sites BT-39, -40, -41) is dominated by speargrasses and plains rough fescue, with patches of little bluestem (*Schizachyrium scoparium*). All ten grassland sites are thus roughly classed into six vegetation associations, based on dominant vegetation composition. A summary of the total percent vegetation cover, number of species recorded, and diversity measures is shown in Table 5.2-6a below.

The two transitional grassland sites (BT-44, -45) were cleared of forest within the last 10 years. Transitional sites were intermediate between forest and grassland sites, sharing species in common with both, including species generally restricted to closed [e.g. white-grained mountain rice grass (*Oryzopsis asperfolia*), wild peavine (*Lathyrus venosus*)] and open (e.g., prairie clover; hoary puccoon) habitats.

Table 5.2-6a: Grassland vegetation associations sampled in the Spy Hill-Ellice Community Pasture.

Site	Vegetation associations	Total Cover (%)	Species Richness	Diversity	Evenness
BT-26	Blue grama - Western porcupine	75.8	33	2.08	0.60
BT-29	Blue grama - Western porcupine	58.8	42	2.45	0.65
BT-32	Blue grama - Western porcupine	84.2	38	2.16	0.59
BT-28	Wheatgrass - Western porcupine	81.2	45	2.70	0.71
BT-38	Western porcupine - Sand dropseed	64.4	34	2.09	0.59
BT-39	Speargrasses - Plains rough fescue	51.2	32	2.11	0.61
BT-41	Speargrasses - Plains rough fescue	39	32	3.02	0.87
BT-40	Little blue stem - Speargrasses	55.2	28	2.42	0.73
BT-44	Transitional grassland (cleared)	38.6	32	2.92	0.84
BT-45	Transitional grassland (cleared)	52.4	39	2.33	0.64

Transitional sites were characterized by increased woody growth, including aspen regeneration, in the herb and low shrub layer, and increased ground cover of woody debris. Cattle activity, as measured by cover of dung, plant litter and bare ground, was consistent with grassland sites. Transitional sites had lower graminoid species richness and cover values than grassland sites,

as well as a low occurrence (3.0% cover) of the non-vascular crust so prevalent in the grassland sites, characters more consistent with forested sites.

Eighteen rare and uncommon species were recorded in or incidental to ten grassland sites (Table 5.2-6b). Nine species were unique to the open grassland sites, while one species was unique to the transitional (i.e., cleared) grassland sites. Overall, fewer species of conservation concern were recorded in the transitional grassland sites (Photograph 5-2). The diversity of grassland sites was quite high, averaging 2.42 for pasture sites. For reference, diversity values generally fall between 1.5 (low diversity) and 3.5 (Kent and Coker 1996), while the evenness value (with an upper limit of 1) shows that species abundance in each community is fairly evenly distributed.

Photograph 5-2: Mixed-grass prairie surveyed for species of conservation concern.

Within the grassland sites in the pasture, only two non-native species were recorded. Common dandelion (*Taraxacum officinale*) was recorded in a single transect, and goat's beard (*Tragopogon* spp.) was recorded in three rare plant surveys (SCC) as incidentals.

Nine grasslands were assessed from private land roadside assessments, where most were converted to pasture (four sites), currently cropped (four sites), or used as hay storage (one site). Previous Table 5.2.5 identifies area (ha) and percent cover of all grassland/rangeland for the project. The quality of pastures at these sites did not match sites within the community pasture, and appeared to be dominated by non-native species. Two pastures were shrubby with regenerating aspen (BT-1, -3), while two were grazed (BT-9, -13). Three cropped sites had small treed or shrubby bluffs that had not been cleared, but were surrounded by cropped land (BT-8, -17). The remaining sites were simply cropped (BT-14) or with a natural area reduced to small shrubby depression (BT-19). A single site was used to store hay (BT-11). Access permissions were available in four sites at the time of surveys, however no further assessment of these sites is required.

Table 5.2-6b: Species of conservation concern, found in eight grassland (G) and two transitional (T) or cleared grassland sites of the Spy Hill-Ellice Community Pasture.			
Broad-leaved Herb Species	**Common Name**	**Rank**	**Found**
Erysimum asperum	Prairie-rocket Wallflower	S3S4	G/--
Helianthus pauciflorus ssp. *subrhomboideus*	Beautiful Sunflower	S3S4	G/--
Houstonia longifolia	Long-leaved Bluets	S3S5	G/T
Lithospermum incisum	Narrow-leaved Puccoon	S3	G/T
Oenothera serrulata	Shrubby Evening-primrose	S3	G/--
Pediomelum esculentum	Indian Breadroot	S3S4	G/T
Penstemon gracilis	Lilac-flowered Beard-tongue	S3S4	--/T
Phlox hoodii	Moss Pink	S3	G/--
Selaginella densa	Prairie Spike-moss	S3	G/T
Grass and Sedge Species			
Avenula hookeri	Hooker's Oat Grass	S3S4	G/T
Calamovilfa longifolia	Sand Grass	S3S5	G/--
Carex duriuscula	Low Sedge	S3S4	G/T
Carex filifolia var. filifolia	Thread-leaved Sedge	S3S4	G/--
Dichanthelium wilcoxianum	Sand Millet	S2?	G/--
Festuca hallii	Plains Rough Fescue	S3	G/--
Hesperostipa curtiseta	Western Porcupine Grass	S3	G/--
Schizachyrium scoparium	Little Bluestem	S3S4	G/T
Sporobolus crytandrous	Sand Dropseed	S3S5	G/--

5.2.2.3 Upland forest

Overview

The Aspen Parkland Ecoregion is a matrix of grassland, wetlands, upland forests, and land under agriculture uses. The Canadian National Forest Inventory lists forest cover at approximately 4.2% of the Prairies Ecozone (Federal, Provincial and Territorial Governments of Canada 2010). Trembling aspen is the prevalent species in the region, occurring as small patches of trees surrounding depressions (Rowe 1959). Within the Aspen Parkland, patches of good-growth closed forest occur where conditions are suitable (Rowe 1959). Deciduous and mixedwood forests of trembling aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) occur on moist sites, while bur oak (*Quercus macrocarpa*) is common on drier sites (Smith et al. 1998). Balsam poplar is found locally throughout the region, while bur oak is sporadic in its distribution, occurring along rivers and south or west slopes. Other tree species growing in the region include American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), Manitoba maple (*Acer negundo*), eastern cottonwood (*Populus deltoides*), black ash (*Fraxinus nigra*) and basswood (*Tilia americana*) (Rowe 1959). Forest communities anticipated to occur in the RAA are described in Zoladeski et al. (1995) and include stands of trembling aspen hardwood, balsam poplar hardwood-mixedwood, and other hardwoods.

Rowe (1959) reported a vegetational shift of forest cover encroaching on grasslands and attributed the movement to the elimination of prairie fires and the reduction of grazing pressure, as well as climatic fluctuations. Over the years, others have noted this trend where the Aspen Parkland vegetation which forms the transition between the boreal forest and the grasslands has expanded southwards into the grasslands, possibly due to the suppression of natural prairie fires since settlement (Smith et al. 1998).

As the extent of woody forest cover has increased within areas of natural vegetation, at a regional level overall forest cover has decreased (Federal, Provincial and Territorial Governments of Canada 2010). Vegetation trends in the Aspen Parkland are predicted to show a gradual reduction in tree cover and an increase in grasslands in the drier sites (Sauchyn et al. 2010), possibly a result of climate change.

The area (ha) and percent cover of upland forest for the project is shown above in Table 5.2-5. Upland forest from the Manitoba Land Cover Classification represents 19.8% (19,156.6 ha) of the regional assessment area (deciduous, mixed and coniferous), 16.4% (2,392.1 ha) of the local assessment area (deciduous) and 15.5% (28.7 ha) of the project footprint (deciduous).

Upland Forest Community Types

Three upland forest sites were sampled in the Spy Hill-Ellice Community Pasture, and classed as Aspen Hardwood communities based on vegetation composition and structure (Table 5.2-7). One site was an open trembling aspen stand with a presence of bur oak, while two sites were sparsely treed trembling aspen stands. In sites, the tallest aspen were 7, 11 and 14 m in height, with dbh of 10.9, 28.9 and 26.5 cm, respectively. In one site, a large bur oak measured 8 m tall and 18 cm at dbh. A lone oak, the largest seen in the pasture on the RoW, was measured at 47.9 cm dbh, although somewhat stunted in height. Trembling aspen was aged at 72 years in one stand. Photograph 5-3 shows sampling in upland forest.

Table 5.2-7: Upland Aspen Hardwood forest sites sampled in the Spy Hill-Ellice Community Pasture.

Site	Total Species Cover (%)	Species Richness	Diversity	Evenness
BT-25	70.2	40	2.33	0.63
BT-27	41.4	37	3.20	0.89
BT-43	36.8	25	2.61	0.81

Photograph 5-3: Sampling of upland forest

Tall shrubs included regenerating aspen saplings, Saskatoon (*Amelanchier alnifolia*), pincherry (*Prunus pensylvanica*), American hazel (*Corylus americana*), snowberry (*Symphoricarpos albus*) and rose. The understory was composed of typical forest forbs such as two-leaved Solomon's-seal (*Maianthemum canadense*), wild peavine (*Lathyrus venosus*) and veiny meadow-rue (*Thalictrum venulosum*). Forested sites were characterized by lower diversity of grasses, (7 species), with white-grained mountain-rice grass and purple oat grass (*Schizachne purpurascens*) dominating. Forested sites had a distinctively high mean litter cover (94.8%), the highest presence of woody debris (2.5%), and very little bare ground (0.5%) or moss (0.3%) covering. The non-vascular ground crust seen elsewhere in the pasture was absent from forested sites.

Four uncommon species were observed in forested sites in the Community Pasture, including beautiful sunflower *(Helianthus pauciflorus ssp. subrhomboideus,* S3S4); low sedge (*Carex duriuscula,* S3S4); western porcupine grass *(Hesperostipa curtiseta,* S3) and little bluestem *(Schizachyrium scoparium,* S3S4).

Within the upland forest sites in the pasture, three non-native species were recorded. Common dandelion (*Taraxacum officinale*) was recorded in a three transects, sweetclover (*Melilotus* spp.) was recorded in one transect, and goat's beard (*Tragopogon* spp.) occurred in one rare plant survey.

A single upland forest site (BT-20) was assessed from roadside assessment in early June 2017. The forest was an open canopy with aspen and willows, with smooth brome along the ditch. No access permission was available for further assessment of this site.

In the vicinity of the Spy Hill-Ellice Community Pasture, to the north, a hardwood stand was visited during a reconnaissance survey in 2016. Vegetation cover was recorded roadside. At

this location, the tree canopy was composed dominantly of trembling aspen. A well-developed tall shrub stratum is composed of Saskatoon (*Amelanchier alnifolia*), downy arrow-wood (*Viburnum rafinesquianum*), chokecherry (*Prunus virginiana*), beaked hazel (*Corylus cornuta*), balsam poplar (*Populus balsamifera*) and willow species (*Salix* spp.). The herb and low shrub stratum was dominated by wild red raspberry (*Rubus idaeus*), prickly rose (*Rosa acicularis*), smooth wild strawberry (*Fragaria virginiana*), meadow-rue (*Thalictrum* sp.) and bluegrass (*Poa* sp.).

5.2.2.4 Riparian/riverbottom forest

Overview

In the RAA, two major rivers meet near the town of St. Lazare, the Assiniboine and Qu'Appelle Rivers. At this location, deep river valleys were carved by fluvial processes. The geographic setting in this area consists of flood plains with riparian forests and valley hillsides. The Birdtail River is another watercourse in the regional setting, draining into the Assiniboine River along with other smaller creeks and tributaries.

Typical hardwood stands occurring on floodplains of rivers and creeks include black ash (*Fraxinus nigra*), with an admixture of American elm (*Ulmus americana*), balsam poplar (*Populus balsamifera*) and Manitoba maple (*Acer negundo*) (Zoladeski et al. 1995). The shrub and herb layers of these forests are often species rich. The ground conditions vary from being periodically saturated with standing water pools to drier solid ground. Along river terraces, vegetation cover is generally composed of a mixture of deciduous species noted above and may also include bur oak (*Quercus macrocarpa*), green ash (*Fraxinus pennsylvanica*), white birch (*Betula papyrifera*) and trembling aspen (*Populus tremuloides*) (Zoladeski et al. 1995). The shrub and herb stratums are also usually well developed. According to Reimer and Hamel (2003), at the confluence of the Assiniboine and Qu'Appelle Rivers, sandy areas are dominated by shrub and herb species such as field wormwood (*Artemisia campestris*), sand grass (*Calamovilfa longifolia*), sand dropseed (*Sporobolus cryptandrus*), Holboell's rock cress (*Boechera holboellii*) and creeping juniper (*Juniperus horizontalis*). The lower river valleys support deciduous riparian forest.

On the upper valley slopes of the Assiniboine and Qu'Appelle rivers, fresh water springs are characterized by vegetation of deciduous trees such as balsam poplar, and dense shrub cover with an understory of moss species (Hamel and Reimer 2004). The south and west facing slopes support grassland vegetation, while a mixture of grass, shrub and tree vegetation (trembling aspen) occur on north and east-facing slopes (Smith et al. 1998). South-facing slopes of the Qu'Appelle River Valley are dominated by grassland species; areas of bur oak, trembling aspen and chokecherry (*Prunus virginiana*) also occur. The river valleys in this region are known to support a number of species that are considered provincially rare in Manitoba (Hamel and Reimer 2004).

The extent of riparian/river bottom forest within the RAA represents 4,577.1 ha, with 518.8 ha for the local assessment area and 4.6 ha for the project footprint. Riparian area was calculated

by buffering rivers, creeks and waterbodies 10 m from the water boundary line data (Manitoba Land Inventory 1:20,000).

Riparian/River Bottom Forest Community Types

Species including Manitoba maple, green ash, bur oak and willow trees (*Salix* spp.) were observed in the valley bottom during a reconnaissance survey in 2016.

Two riparian/river bottom forest sites were assessed, located at the Assiniboine River Valley crossing and the Birdtail River crossing. The Assiniboine River site (BT-24) was an aspen site with sub-dominant balsam poplar, with a rich tall shrub layer and herb understory, surrounded by crop land on the river terrace. Tall shrubs included Manitoba maple saplings, red-osier dogwood (*Cornus sericea*), chokecherry (*Prunus virginiana*), and highbush cranberry (*Viburnum opulus*). Small wet pools dominated by sedge and willows had formed in places due to beaver activity. Two species of conservation concern, Western Jewelweed (*Impatiens noli-tangere*, S1) and Yellow Twayblade (*Liparis loeselii*, S3S4) were found at this site, each restricted to single patch occurrences.

The Birdtail River site (BT-7) was a treed pasture of Manitoba maple, balsam poplar and bur oak, with a heavy tall shrub component, made up of hazelnut (*Corylus americana* and *C. cornuta*), red-osier dogwood, Saskatoon, willow (e.g. *Salix exigua, S. bebbiana*) and rose, with an understory of smooth brome (*Bromus inermis*), marsh reed grass (*Calamagrostis canadensis*) and Sprengel's sedge (*Carex sprengelii*) (Photograph 5-4). At the river's edge, the woody canopy gave way to an open habitat of reed canary grass (*Phalaris arundinacea*), smooth brome and Canada thistle (*Cirsium arvense*), Canada goldenrod (*Solidago canadensis*) and spotted joepyeweed (*Eutrochium maculatum*). No species of conservation concern were encountered.

Photograph 5-4: Vegetation cover at the Birdtail River site.

Within the pasture, immediately adjacent to the final proposed route, a fresh water spring forms a gully among trees growing along a slope. While the source of the spring is partially fenced, cattle have direct access to the water along the gully, and trampling and heavy grazing were apparent throughout. Yellow Twayblade (*Liparis loeselii*, S3S4) was found at this site, restricted to single individual occurrence. While this area is off the proposed route, a rare plant survey was conducted in the vicinity of the fresh water spring (BT-31). Surveys are important; particularly where potential near-by construction activities could affect the area.

An additional roadside assessment was made at a third site (BT-10), which appeared to drain off Snake Creek. This site was a trembling aspen, balsam poplar forested pasture, with smooth brome and crested wheatgrass (*Agropyron cristatum*) growing at the edge. No access permission was available for further assessment of this site.

5.2.2.5 Wetlands

Overview

In Canada, freshwater wetlands cover approximately 16% of the land area (Federal, Provincial and Territorial Governments of Canada 2010). Halsey et al. (1997) estimates that wetlands in Manitoba cover 233,340 km^2 or 43% of the terrestrial landscape, with peatlands representing 90% of all wetlands. In the RAA, the till plain is shaped by glaciation, and wetlands here commonly occur as ponds and sloughs, also known as prairie potholes. These mineral wetlands are classified as basin marshes according to the Canadian Wetland Classification System (National Wetlands Working Group 1997). Basin marshes are located topographically in well-defined depressions. They receive waters from groundwater discharge, surface runoff, and snowmelt, and some basin marshes have channelized inlets and outlets operating during periods of abundant surface flow (National Wetlands Working Group 1997).

Within the RAA, other wetland types present include bogs and fens. Bogs are characterized by an accumulation of peat. Precipitation and snowmelt are primary water sources, resulting in acidic waters low in dissolved minerals. Vegetation largely consists of *Sphagnum*-dominated peat mosses and ericaceous shrubs. Fens are peatlands with a fluctuating water table, rich in dissolved minerals due to ground and surface water movement. The greater nutrient availability in fens supports unique vegetation, often dominated by graminoids (e.g., sedges) and brown mosses (National Wetlands Working Group 1997).

Wetlands play an important role within the landscape and their ecological importance is well documented (e.g., Bond et al. 1992, Locky et al. 2005, Ducks Unlimited Canada 2015, Goldsborough 2015). Wetland functions or the processes carried out by wetlands include filtration and improving water quality, regulation of water levels, and providing habitat for aquatic and semi-aquatic species. Wetlands form important habitat for waterfowl, raptors, other birds, amphibians, small mammals and deer. Foster et al. (2004) noted the importance of calcareous wetlands (e.g. fens) and their potential to support species of conservation concern. Wetlands support grasses, sedges, rushes and cattails, and are often surrounded by willow species,

bordered up-slope by other shrubs (e.g., prairie rose - *Rosa arkansana*, silverberry - *Elaeagnus commutata*, and snowberry - *Symphoricarpos* spp.) and deciduous trees (Smith et al. 1998).

Over the years, wetlands have been reduced in number as a result of agricultural activities. Prior to 1990, the conversion of wetlands was rapid with an approximately 200,000 km^2 being removed. Although some wetlands are being conserved and restored, overall loss and degradation continue. (Federal, Provincial and Territorial Governments of Canada 2010). Threats to wetlands include agricultural runoff, drainage, forestry activities, off-road vehicles, peat extraction, and right-of-way activities (Foster et al. 2004).

The area (ha) and percent cover of wetlands for the project is shown above in Table 5.2-5. Wetlands from the Manitoba Land Cover Classification represents 2.9% (2,772.6 ha) of the RAA (marsh and fens, treed and open bogs), 2.1% (299.9 ha) of the LAA (marsh and fens) and 1.4% (2.5 ha) of the Project Footprint area (marsh and fens).

Wetland Community Types

Seven wetland sites were assessed from roadside in early June 2017. Four sites (BT-2, -5, -6, -15) were small, dry cattail depressions surrounded by crop or pasture land. A fifth site (BT-16) had open water with willows, cattails and graminoids (Photograph 5-5). One site (BT-18), appeared to be a treed willow patch, surrounded by crop, and seen only from the distance of the road (ca 400m). An aspen forest fringe with cattails (BT-4) was surrounded by cropped land. No access permissions were available for further assessment of these sites.

Photograph 5-5: Graminoid wetland with cattails and willows.

5.2.2.6 Botanical resources

5.2.2.6.1 Plants and distribution of species

Forty-one sites were visited to assess vegetation in the LAA; 19 in the community pasture and 22 private lands or roadside assessments. Several sites were visited more than one time for a total of 49 surveys. Map 5-3 shows the distribution of sites within the local assessment area, and the location of sites is included in Appendix I, Table 4.

A total of 174 plant taxa were observed in the LAA in 2017 (Appendix I, Table 5). There were 160 plants identified to the species level while 11 taxa (shrub and herbs) were identified to the genus level. Three non-vascular groups were identified (i.e., mosses, lichens, cryptogamic crust). Vascular plants identified only to the genus level were a result of absent or non-mature floral or fruiting parts when observed during the field assessment, which are used for identification.

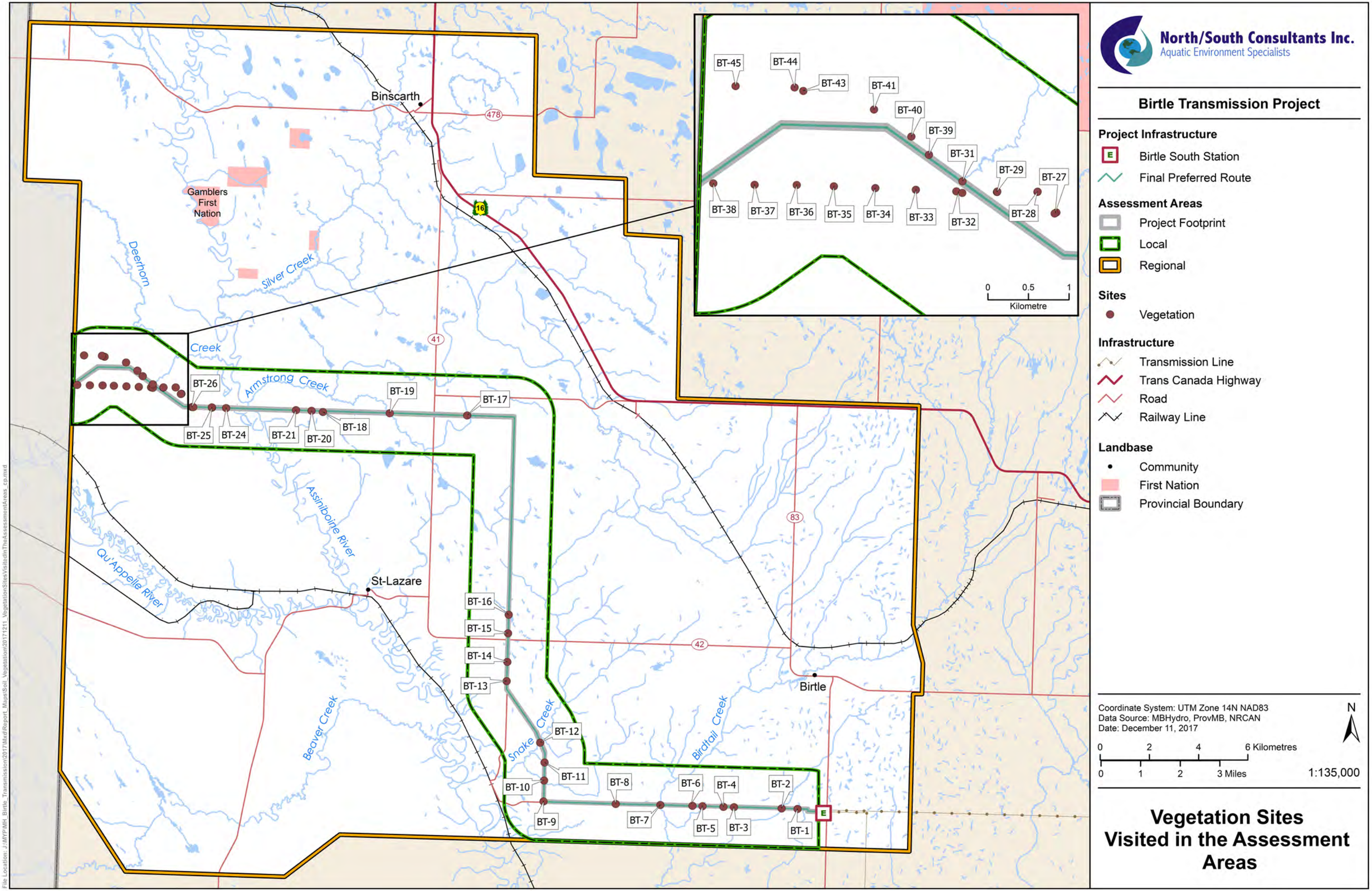
All plants were grouped by primitive vasculars (e.g., ferns and horsetails), gymnosperms (conifers), angiosperms (flowering plants) and non-vascular plants. Angiosperms were divided into monocotyledons and dicotyledons with this group (angiosperms) of plants representing the greatest number of species. There were 167 angiosperms (44 monocotyledons and 123 dicotyledons), two primitive vasculars, one gymnosperm, and four non-vasculars.

Vascular plants were distributed among 51 families, with the angiosperms representing 48 of these. The Aster (Asteraceae) family was the largest with 28 plant taxa, followed by the Grass (Poaceae), Rose (Rosaceae) and Pea (Fabaceae) families, with 24, 15 and 13, respectively. Four or more species were observed in each of the Sedge (Cyperaceae), Crowfoot (Ranunculaceae), Honeysuckle (Caprifoliaceae), Willow (Salicaceae) and Lily (Liliaceae) families. The primitive vasculars are distributed among two families including the Horestail (Equisetaceae) and Spikemoss (Selaginellaceae). Species within the gymnosperms were of the Cypress (Cupressaceae) family.

5.2.2.6.2 Species of Conservation Concern

The vegetation communities in the RAA support a wide range of species. Twenty-one documented species of conservation concern were observed during all surveys (ranked by the Manitoba Conservation Data Centre), shown in Table 5.2-8. A total of 19 species of conservation concern ranked S2?, S3, S3S4 and S3S5 have been recorded from the community pasture surveys, including seven grasses, two sedges, nine forbs and one spike moss. Two additional species of concern (forbs) were found on private land, under forest cover, ranked S1 and S3S4. Species of conservation concern were observed in one to several sites.

No species listed by the federal *Species at Risk Act*, the Manitoba *Endangered Species and Ecosystems Act* or listed by the Committee on the Status of Endangered Wildlife in Canada were observed during fieldwork.



North/South Consultants Inc.
Aquatic Environment Specialists

Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Assessment Areas
- Project Footprint
- Local
- Regional

Sites
- Vegetation

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- First Nation
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 11, 2017

N

0 2 4 6 Kilometres
0 1 2 3 Miles

1:135,000

Vegetation Sites Visited in the Assessment Areas

File Location: J:\MYP\MM_Birtle_Transmission\2017\Mxd\Report_Maps\Soil_Vegetation\20171211_VegetationSitesVisitedInTheAssessmentAreas_rp.mxd

Map 5-3 Vegetation sites visited in the assessment areas.

Table 5.2-8: Species of conservation concern observed during surveys in 2017 for the Project.

Family	Scientific Name	Common Name	MBCDC Rank
Fabaceae	*Astragalus crassicarpus*	Ground-plum	S3S4
Poaceae	*Avenula hookeri*	Hooker's Oat Grass	S3S4
Poaceae	*Calamovilfa longifolia*	Sand Grass	S3S5
Cyperaceae	*Carex duriuscula*	Low Sedge	S3S4
Cyperaceae	*Carex filifolia* var. *filifolia*	Thread-leaved sedge	S3S4
Poaceae	*Dichanthelium wilcoxianum*	Sand Millet	S2?
Brassicaceae	*Erysimum asperum*	Prairie-rocket Wallflower	S3S4
Poaceae	*Festuca hallii*	Plains Rough Fescue	S3
Asteraceae	*Helianthus pauciflorus* ssp. *subrhomboideus*	Beautiful Sunflower	S3S4
Poaceae	*Hesperostipa curtiseta*	Western Porcupine Grass	S3
Rubiaceae	*Houstonia longifolia*	Long-leaved Bluets	S3S5
Balsaminaceae	*Impatiens noli-tangere*	Western Jewelweed	S1
Orchidaceae	*Liparis loeselii*	Yellow Twayblade	S3S4
Boraginaceae	*Lithospermum incisum*	Narrow-leaved Puccoon	S3
Onagraceae	*Oenothera serrulata*	Shrubby Evening-primrose	S3
Fabaceae	*Pediomelum esculentum*	Indian Breadroot	S3S4
Scrophulariaceae	*Penstemon gracilis*	Lilac-flowered Beard-tongue	S3S4
Polemoniaceae	*Phlox hoodii*	Moss Pink	S3
Poaceae	*Schizachyrium scoparium*	Little Bluestem	S3S4
Selaginellaceae	*Selaginella densa*	Prairie Spike-moss	S3
Poaceae	*Sporobolus crytandrous*	Sand Dropseed	S3S5

The species of conservation concern recorded in the community pasture and one private site along the RoW are generally prairie species at the edge of their range in southwestern Manitoba, while one species is nationally rare (*Dichanthelium wilcoxianum*). Habitat and biological information is taken from the following references: Ames et al. 2005; Flora of North America 2017; Leighton 2012; Leighton and Harms 2014; Looman 1983; Looman and Best 1987; NatureServe 2017; and Scoggan 1957. Species consist of the following:

- *Astragalus crassicarpus* (Ground-plum) Grasslands, prairie and parklands. Recorded incidentally from grassland sites in the community pasture. S3S4; N5; G5

- *Avenula hookeri* (Hooker's Oat Grass) Dry-mesic, open, prairie slopes and flats, aspen grove margins and forest openings, especially in fescue grassland association sites. Recorded throughout pasture from eight grasslands (one transitional), with sparse occurrences. S3S4; N5; G5

- *Calamovilfa longifolia* (Sand Grass) Dry, open sandhills, sand dunes, and sandy prairie flats. Recorded very sparsely in small patches from six grassland sites. S3S5; N5; G5

- *Carex duriuscula* (Low Sedge) Dry prairies, sagebrush grasslands, openings in dry forests, fruits June-August. Recorded widespread throughout the pasture, but as a minor

component, from nine grassland sites (two transitional), and one forest site. S3S4; N5; G5

- *Carex filifolia* var. *filifolia* (Thread-leaved Sedge) Dry to dryish areas, stable silt-loam or gravel, on slopes, eroded areas, and swales; fruits April–June. Recorded from one grassland site. Sedges cannot be identified without fruiting bodies; this species likely commonly occurs in grassland sites. S3S4; N5; G5

- *Dichanthelium wilcoxianum* (Sand Millet) Dry, well-drained prairie slopes, pastures, sand dunes and open sandy pine woods. Recorded from four grassland sites, sparsely occurring. S2?; N2; G5. This nationally rare species is ranked very rare in Saskatchewan (S1).

- *Erysimum asperum* (Prairie-rocket Wallflower) Prairies, sand dunes, sandhills along stream banks, open plains, flowers April-June. Recorded incidentally in three grassland sites. S3S4; N5?; G5

- *Festuca hallii* (Plains Rough Fescue) Dry- mesic prairies. A climax species, slow growing from seed, but persists once established; can dominate in absence of fire or grazing disturbance, and decreases on sites under persistent, heavy grazing pressure. There is a significant decline and disappearance of fescue prairie, with low potential for recovery in Canada. Recorded from five grassland sites. S3; N4; G4

- *Helianthus pauciflorus* ssp. *subrhomboideus* (Beautiful Sunflower) Dry, open places. Recorded from four grassland sites, and one forested site. Flowers summer–early fall. S3S4; N5; G5T5

- *Hesperostipa curtiseta* (Western Porcupine Grass) Dry-mesic mixed-grass prairie, on light to clay-loam soils, a dominant species mixed-grass prairie in SK. Recorded from three grassland sites, and one forested site in the community pasture. This species is difficult to identify in absence of fruiting material. It was also present in other sites, in a mixture with *H*. *spartea*. S3; N5; G5

- *Houstonia longifolia* (Long-leaved Bluets) Found occasionally in dry prairie, rock outcrops and gravelly clearings. Recorded with sparse occurrences in seven grasslands sites (two transitional). S3S5; N5; G5

- *Impatiens noli-tangere* (Western Jewelweed) Forests, shores of rivers or lakes, swamps and wetland margins. Single patch occurrence recorded from one private forested site in the Assiniboine River valley, adjacent to small pools. Yellow orange blooms July-August. S1; N4; G4G5 (Photograph 5-6)

- *Liparis loeselii* (Yellow Twayblade) Cool, moist ravines, bogs, or fens, wet peaty or sandy meadows, and exposed sand along edges of lakes, often colonizing previously open or disturbed habitats; flowers May-August. Recorded in two riparian sites, in

pasture near fresh water springs (individual), and a small patch from one private forested site in the Assiniboine River valley. S3S4; N5; G5

- *Lithospermum incisum* (Narrow-leaved Puccoon) Dry prairie, sandhills, and clearings. Uncommon occurrence, recorded from four grassland sites (one transitional grassland). S3; N5; G5

- *Oenothera serrulata* (Shrubby Evening-primrose) Dry prairie and hillsides. Uncommon occurrence, recorded several individuals from two grassland pasture sites. S3; N5; G5

- *Pediomelum esculentum* (Indian Breadroot) Dry prairie. Fairly common throughout pasture, recorded in seven grassland sites (one transitional), and one forested site. S3S4; N5; G5 (Photograph 5-7)

- *Penstemon gracilis* (Lilac-flowered Beard-tongue) Dry to moist prairie, sandhills. One individual, recorded from a transitional grassland site, and incidentally in an open forested area in pasture. S3S4; N5; G5

- *Phlox hoodii* (Moss Pink) Eroded areas, shallow soils, dry prairie slopes and sandhills. Very inconspicuous without early spring flowers. Several individual clumps recorded from one grassland site, and incidentally in grassland in the community pasture. S3; N5; G5

- *Schizachyrium scoparium* (Little Bluestem) Open, mesic south-facing slopes in sandy prairies. Recorded as a dominant species from one grassland site, and sparsely occurring in the community pasture from two grasslands (one transitional) and one forested site. S3S4; N5; G5

- *Selaginella densa* (Prairie Spike-moss) Prairies, dry rocky slopes, rock crevices, sandstone, quartzite or granite rock, and dry gravelly, clayey or sandy soil. Recorded frequently as a minor component of eight grassland sites (two transitional) in community pasture. S3; N5; G5

- *Sporobolus crytandrous* (Sand Dropseed) Dryish, sandy prairies, washes, shrublands, open woods, shores, and rocky, calcareous slopes and ridges. Recorded in two grassland sites, as a patchy sub-dominant grass in one site, and as a single occurrence in another site. S3S5; N5; G5

Photograph 5-6: Western Jewelweed observed during surveys.

Photograph 5-7: Indian Breadroot observed during surveys.

5.2.2.6.3 Invasive species

Across all native and rare plant surveys, 10 species are considered non-native or invasive, see Table 5.2-9. Nine species are ranked SNA, conservation status rank not applicable (MBCDC 2017). Of these species, two are considered Tier 3 Noxious weeds, (*Cirsium arvense*, *Taraxacum officinale*) (The Noxious Weeds Act, Manitoba Government 2017), while *C. arvense* is also considered a Category 2 invasive terrestrial plant with the Invasive Species Council of Manitoba (2017). Canadian Food Inspection Agency (2008) lists *Bromus inermis, Melilotus* spp. and *Phalaris arundinaceae* (S5) as invasive. Three non-native or invasive species were recorded from the pasture, while eight species were observed at sites on private lands.

Preliminary roadside surveys were completed on private lands where no access permissions were available. Invasive species data from these roadside surveys is limited, due to the early timing of the field visit, and the fact that some roadside surveys were done at a distance from the preferred route.

Table 5.2-9: Non-native and invasive species observed during surveys, in Spy Hill-Ellice Community Pasture and surrounding privately owned lands.

Species	Common Name	Rank	Authority *	Ownership
Agrostis stolonifera	Creeping Bent Grass	SNA	MBCDC	Private
Bromus inermis	Smooth Brome	SNA	CFIA	Private
Cirsium arvense	Canada Thistle	SNA	NWA; ISCM	Private
Lemna minor	Lesser Duckweed	SNA	MBCDC	Private
Medicago lupulina	Black Medic	SNA	MBCDC	Private
Melilotus spp.	Sweetclovers	SNA	CFIA	AMCP
Phalaris arundinacea	Reed Canary Grass	S5	CFIA	Private
Taraxacum officinale	Common Dandelion	SNA	NWA	AMCP, Private
Tragopogon sp.	Goat's-beard	SNA	MBCDC	AMCP
Trifolium repens	White Clover	SNA	MBCDC	Private

*Authority: Manitoba Conservation Data Centre (MBCDC), Canadian Food Inspection Agency (CFIA), Manitoba Noxious Weeds Act (NWA), Invasive Species Council of Manitoba (ISCM).

5.2.2.6.4 Traditional Use Species

Traditional use plants such as those used for medicine, subsistence and cultural purposes were compiled from Indigenous engagement and land use for the Project. All plant species recorded during field surveys were assessed with the traditional use species from the values and interest workshops for Canupawakpa Dakota Nation (Manitoba Hydro 2017a), Gambler First Nation (Manitoba Hydro 2017b) and Waywayseecappo (Manitoba Hydro 2017c), as well as the Metis land use and occupancy study (MNP 2017).

As a result of field surveys in 2017, 21 of 29 plants listed (see previous Table 5.2.4.) as having traditional value from the Indigenous engagement workshops and land use study were observed in the LAA. Traditional use plant species observed included two trees, eight shrubs and 11 herbs. Species include the following, trees - bur oak (*Quercus macrocarpa*) and trembling aspen (*Populus tremuloides*); shrubs - Saskatoon (*Amelanchier alnifolia*), pin cherry (*Prunus pensylvanica*), chokecherry (*Prunus virginiana*), raspberry (*Rubus idaeus*), willows (*Salix bebbiana; S. exigua*), cranberries (*Viburnum lentago; V. opulus*), hazelnut (*Corylus americana; C. cornuta*) and rose species (*Rosa acicularis; R. arkansana*); and herbs - prairie crocus (*Anemone patens*), sages (*Artemisia campestris; A. frigida; A. ludoviciana*), strawberry (*Fragaria virginiana*), tiger lily (*Lilium philadelphicum*), sweet clover (*Melilotus* spp.), dandelion (*Taraxacum officinale*), stinging nettle (*Urtica dioica*), thistle (*Cirsium arvense; Cirsium muticum*), wild onion (*Allium stellatum*), bulrush (*Schoenoplectus tabernaemontani*) and cattail

(*Typha* sp.). Of the traditional use plant species identified, 15 were recorded in community pasture surveys. The most frequent species observed in pasture sample plots were the sages and rose species.

5.3 Pathways of effect

The potential effects of transmission facilities and transmission lines on vegetation have been reported by Nickerson et al. (1989), Jackson et al. (1994), Williams (2003), Public Service Commission of Wisconsin (2009) and Bonnyville Power Administration (2010). Effects include loss of protected plants or alteration of their habitat where conditions are left unfavorable for growth from construction and maintenance activities; changes to vegetation cover or a reduction in species diversity from transmission clearing and construction activities; loss of riparian vegetation and erosion issues created during construction; long term impacts on wetlands from construction activities; and increased potential for weed introduction from construction related ground disturbance. Other studies on hydropower development have identified adverse effects on non-target plant species from herbicide applications (e.g., Carvell 1975; Luken et al. 1994).

Potential environmental effects on vegetation from transmission clearing and construction have been reported on by Manitoba Hydro (e.g., 2001, 2007, 2012a, 2012b, 2014). Potential effects include removal of ground cover, increase in erosion potential, loss of species of concern, introduction of non-native species, and hazardous spills. Other potential effects on vegetation have been reported on for the Bipole III Transmission Project (Manitoba Hydro 2011) to include loss of native forest vegetation, fragmentation, modification of vegetation composition and structure adjacent to the RoW, reduced vegetation diversity, effects on plant harvesting areas, disturbance to wetlands and riparian areas, spread of non-native and invasive plant species and increased risk of wildfire. The Tyndall 115 kV Transmission Line and DSC Project (Manitoba Hydro 2013) reported potential effects on vegetation to also include tree and shrub clearing, plant mortality from herbicide use, and increased dust levels. Other potential effects on vegetation include a change in vegetation landscape intactness and change in wetland function (Manitoba Hydro 2015).

Environmental effects on vegetation from transmission clearing and construction have been documented by Manitoba Hydro and include the loss of native vegetation, temporary reduction in vegetation diversity, loss of species of conservation concern, fragmentation of communities, disturbance to wetlands and riparian areas, and the increase in the spread of non-native and invasive plant species (Szwaluk Environmental Consulting et. al 2015, 2016a, 2016b).

The Project may have potential adverse effects on botanical and vegetation resources during construction, operation and maintenance stages. Potential environmental effects include the following:

Physical Removal

Native vegetation (tree cover) in the Project Footprint will be removed due to clearing during construction and maintenance activities. Clearing will result in the fragmentation of vegetation,

and could reduce pollen quality and quantity from the isolation of vegetation communities (Duncan et al. 2004).

Composition and Structure Modification

Modification of vegetation composition and structure adjacent to the Project Footprint could occur due to clearing activities. The removal of native vegetation and the creation of new forest edges along a disturbance zone may result in changes to the nearby forest vegetation. Increased solar radiation exposure and a change in microclimate along these edges may cause changes in understory plant species composition and structure (Ecological Land Surveys Ltd. 1999). Windfall (blow-down) may also result along newly created forest edges due to trees being susceptible from increased exposure (Ecological Land Surveys Ltd. 2003; British Columbia Transportation Corporation 2010).

Diversity Reduction

Disturbance of native grasslands and reduced floristic diversity may occur within the Project Footprint due to construction and maintenance activities. Disturbance may result from tower foundation construction, equipment travel and possible use of rig matting. Project clearing of vegetation for construction activities in grassland communities could disturb the herb stratum, and soil disturbance and plant root damage may also occur. A non-vascular community of lichen/moss/fungi is present as a ground layer beneath vascular vegetation throughout the grassland pasture that would likely be sensitive to any ground disturbance.

Loss of Species of Concern

Potential loss of plant species of conservation concern may occur in the Project Footprint due to construction and maintenance activities. These plants include species listed by ESEA, SARA and COSEWIC, and plants listed by the MBCDC as very rare to uncommon. Environmental assessments on other transmission projects have identified that construction activities could result in adverse effects to species of conservation concern from project activities (e.g., Manitoba Hydro 2011, 2013 and 2015).

Non-Native/Invasive Species

Introduction and spread of non-native and invasive species in the Project Footprint may occur due to construction and maintenance activities. Construction equipment and granular material used for construction can be a source of non-native and invasive plant species which can become problematic for the native plant species. Many non-native species thrive in disturbed habitat (Kershaw 2003), and some species compete exceptionally well with desirable or native plants (Royer and Dickinson 1999). A number of non-native and invasive species have the potential to be introduced during Project activities, on disturbed ground.

Herbicide Effects

Loss or impairment of desirable plant species in the Project Footprint may occur from herbicide application during maintenance activities. Herbicides not only inhibit the growth of undesirable species but can also negatively affect desirable species by causing stress and possible mortality of vegetation that may be considered important for wildlife, traditional use, or have botanical value. Effects of herbicides (triclopyr and glyphosate) on vegetation have been noted by Bell et al. (1997).

Loss/Disturbance of Traditional Plants

Traditional use plant species may be disturbed or removed in the Project Footprint due to clearing and construction activities. Indigenous communities use a variety of plant species that were identified from Indigenous engagement and land use studies. Locally valued plant species that may be removed include various trees, shrubs and herbs used for berry picking, plant and medicinal gathering and cultural activities.

Fuel/Hazardous Material Spills

Loss or impairment of vegetation in the Project Footprint may occur from accidental releases of fuels or hazardous substances due to construction and maintenance activities. Hazardous spills could result in stress and mortality to vegetation, and affect soils. Effects of oil spills on vegetation have been identified by others (e.g., Seburn et al. 1996; Walker et al. 1978). Accidental spills may reduce floristic diversity in the Project Footprint.

Wetland Disturbance

Disturbance to wetlands could occur in the Project Footprint due to construction activities. Disturbance may include soil compaction and rutting from equipment use in wetlands or installation of tower foundations. Wetlands are highly connected systems that transport water and nutrients across the landscape. Water balances that have been altered in wetlands may result in increased drainage (i.e., drier moisture regime) or flooding that could affect species composition and abundance (Ecological Land Surveys Ltd. 1999).

6.0 Terrestrial invertebrates, amphibians and reptiles

6.1 Methods and data sources

6.1.1 Literature review

Published literature, grey literature, and various government resources were reviewed for information on terrestrial invertebrate, amphibian and reptile (TIAR) communities and habitats within the Project RAA as well as the local assessment area (LAA) surrounding the preferred route and the station upgrades. The literature review focused primarily on priority species of the TIAR community that may inhabit the RAA. Specific documents and data sources reviewed for information on TIAR communities and habitats, and priority species in particular, included:

- The Species at Risk Public Registry (Government of Canada 2017);
- The COSEWIC List of Canadian Wildlife Species at Risk (COSEWIC 2016a);
- The Manitoba Endangered Species and Ecosystems Act List of Species at Risk (Government of Manitoba 2017);
- The Save our Skinks database (NatureNorth 2017a);
- The Manitoba Conservation Data Centre Species and Plant Database (MBCDC 2017a);
- The Manitoba Herp Atlas (NatureNorth 2017b)

Additionally, the provincial landcover classification data layer was examined on MHs interactive mapping system Orientis, to obtain habitat information, and to identify wetlands and waterbodies within the RAA to be used as survey sites.

6.1.2 Engagement process information

The Manitoba Hydro public engagement process included a questionnaire for landowners to provide information on wildlife within the area (WSP Canada Group Limited 2017). Questions included the identification of breeding frogs, snake dens, turtle observations, turtle nesting sites, as well as salamanders on landowner properties. In addition, community reports from the Values and Interests survey / workshops conducted in Canupawakpa Dakota Nation (Manitoba Hydro 2017a), Gambler First Nation (Manitoba Hydro 2017b), Waywayseecappo First Nation (Manitoba Hydro 2017c), and the draft MLOUS from the Manitoba Metis Federation (MNP 2017) as well as the Manitoba Hydro Public Engagement Summary document were also reviewed and considered during analysis of TIAR in the project footprint and local and regional assessment areas.

During Values and Interests type meetings and surveys with the First Nations communities within the RAA, the Assiniboine River area was identified by members of the Canupawakpa Dakota Nation as a location where turtle shells are found during the route constraints mapping process (Manitoba Hydro 2017).

6.1.3 Field studies (reconnaissance and detailed surveys)

A two-day reconnaissance field trip was conducted with a Manitoba Hydro Biologist and other sub-consultants. The reconnaissance trip occurred June 22-23, 2016 to get a sense of the RAA and identify possible important areas for future fieldwork.

In conjunction with existing information and the reconnaissance trip, results from amphibian and reptile field studies were used to describe the current amphibian and reptile community in support of the Project's environmental assessment. Field studies included visual encounter surveys for both amphibians (May through September, 2017) and reptiles (May 2017), funnel traps for salamanders (July-August, 2017), and call surveys for anurans (i.e. frogs and toads, May 2017), with a focus on the northern leopard frog (*Lithobates pipiens*), western tiger salamander (*Ambystoma mavortium*) and red-sided garter snake (*Thamnophis sirtalis*). These field surveys were used to determine breeding and overwintering locations for amphibians and hibernaculum sites for garter snakes.

No formal fieldwork was planned or conducted for terrestrial invertebrates. Rather, a literature review was conducted to gather information on terrestrial invertebrate species at risk that potentially inhabit the RAA and LAA.

6.1.3.1 Incidental sightings

6.1.3.1.1 Amphibians

Incidental observations of amphibians included all auditory and visual observations of amphibians made when an amphibian visual encounter survey (VES), or call survey were not being conducted. All incidental amphibian observations, where possible, were enumerated and identified to species, photographed using a Nikon Coolpix AW110 GPS-linked camera, and location recorded using a Garmin GPSMAP 78 handheld GPS.

6.1.3.1.2 Reptiles

Incidental observations of reptiles included all observations of reptiles made when a reptile VES was not being conducted. This included the scanning of waterways and shoreline at large waterbodies for snapping turtles (*Chelydra serpentina*) prior to stream crossing surveys (i.e., Assiniboine River and Birdtail Creek). All incidental reptile observations, where possible, were enumerated and identified to species, photographed using a Nikon Coolpix AW110 GPS-linked camera, and location recorded using a Garmin GPSMAP 78 handheld GPS.

6.1.3.2 Visual encounter surveys

6.1.3.2.1 Amphibians

Wetlands within the LAA were identified using 25-50 cm ortho imagery and Land Cover Classification. Wetlands found within the LAA, and larger wetlands within 1 km of the LAA were selected for amphibian VES (Map 1). Surveys were used to help determine of use of wetlands for breeding by amphibians.

Amphibian VES were completed at accessible sites within the LAA, where landowner access had been granted, to identify the presence of the northern leopard frog and other frog adults, egg masses, and habitats. The VES were conducted during three time periods coincident with important frog life history stages of species found within the area, with a focus on northern leopard frogs: (1) in spring during the breeding season (May 12-13, 2017); (2) in mid-summer during the post-breeding season when eggs and larvae (tadpoles) are abundant (July 31-August 1, 2017); and (3) in fall during the pre-hibernation period (September 5-7, 2017).

VES were conducted during day-light hours between 10:00 hrs and 18:20 hrs. Prior to the start of the survey, the following attributes were recorded: ambient air temperature (°C), water temperature (°C), wind speed (km/hr), cloud cover (%), and precipitation (%). Two field biologists walked the perimeter of the wetland for a maximum of 20 min, or until the field crew encircled the entire circumference of the wetland, whichever came first. The start and end time and location were recorded, and the path walked was mapped using a Garmin GPSMAP 78 handheld GPS. The two field biologists walked side-by-side during the VES, along the wetland edge, with one individual disturbing the vegetation along the wetland edge and monitoring for amphibians while the other individual monitored and recorded all amphibians observed. All amphibians observed during the VES were identified to species, and where possible, photographed. In addition, the location of observation was recorded using a Garmin GPSMAP 78 handheld GPS. At the start and end locations, time and UTMs were recorded, and shoreline photographs were taken.

6.1.3.2.2 Reptiles

Potential garter snake hibernacula sites within the LAA were identified by first reviewing existing information. 25-50 cm ortho imagery and mining aggregate deposit data were reviewed to determine the presence of surficial or subsurface rock and aggregate areas that could potentially serve as hibernacula. The Spy Hill-Ellice Community Pasture Manager was interviewed for knowledge of snake hibernacula, congregations of snakes or suitable habitat (Fredbjornson pers. comm. 2017). Additionally, the Manitoba Sustainable Development Western Region Wildlife Biologist was also contacted for knowledge of any known hibernacula sites and habitats within the RAA (Krause Danielsen pers. comm. 2017).

Using the existing information and the ortho-imagery, VES for garter snake hibernacula were conducted May 12-13, 2017 at select sites within the LAA that had been identified as potentially suitable habitat and where landowner access had been granted. In the LAA, this was restricted to gravel pits, and shale and gravel cut-banks along creek sites and watercourse valleys 200 m at either side of the proposed route. This included the Assiniboine River and Birdtail Creek. At time of surveys, landowner access was not granted for Snake Creek.

VES were conducted during between daylight hours between 13:00 hrs and 15:00 hrs. Prior to the start of the survey, the following attributes were recorded: ambient air temperature (°C), water temperature (°C), wind speed (km/hr), cloud cover (%), and precipitation (%). Two field biologists performed a grid-like walk, recording the walked survey lines as a GPS track using a Garmin GPSMAP 78 handheld GPS. At the start and end locations, time and UTMs were recorded, and photographs were taken.

Where snakes, suitable hibernacula habitat or hibernacula were identified (i.e. rock piles, rock outcrops, crack or crevices in rock outcrops or pits), location was recorded using a Garmin GPSMAP 78 handheld GPS and photographs were taken with a Nikon Coolpix AW110 GPS-linked camera. All snakes observed were enumerated and identified to species where possible.

6.1.3.3 Call surveys

6.1.3.3.1 Amphibians

Wetlands within the LAA were identified using 25-50 cm ortho-imagery and Land Cover Classification. Wetlands found within the RoW, and larger wetlands within 1 km of the RoW were selected for further study.

Day and night-time breeding call surveys were conducted in spring (May 12-13, 2017) to determine the use of wetlands by breeding anurans, particularly the northern leopard frog, within the LAA. A number of pre-selected wetland sites were mapped using Google Earth (Google Earth 2017), Manitoba Backroad Mapbooks (Mussio 2015), and a Garmin handheld GPS to ensure each wetland site was accessible by truck, ATV or foot. A number of these selected sites were located on private land, and required permission to be accessed. Only when permission was granted by the landowner was private land accessed. When a site was not directly accessible, but field crews were able to get within 200 m of the targeted location, a call survey was conducted from the nearest access location.

Once a call survey site was established, its location was recorded using a Garmin GPSMAP 78 handheld GPS, as was the distance (up to 200 m) and direction to the targeted site location (e.g., 30m S of site). At each site, a number of physical parameters were collected, including: air temperature (°C); wind direction and speed (average and maximum; km/hr); cloud cover (%); and precipitation (%). Pictures of the site, including the location and direction, were taken during the day surveys using a Nikon Coolpix AW110 GPS-linked camera. Pictures were also taken of other surrounding wetlands (or other potential anuran habitat), and other interesting observations. Ecological information about each site was recorded, including habitat type (e.g., wetland, ditch, etc.), vegetation type (e.g., cattail, rushes, sedges, red osier dogwood, trembling aspen etc.), land use (e.g., pasture, cropland, forest, etc.), and water level (e.g., dry, open water, or inundated).

Each anuran call survey site was visited twice: 1) during the day to determine if it was accessible and to collect information that would be difficult to collect during the night-time call survey; and 2) at night, starting approximately 30 minutes after dusk when breeding calls are known to peak, and concluding before 01:00 hrs (Kendell 2002, Weir 2011). Call surveys were conducted according to standard protocol, under optimal survey conditions (Kendell 2002), and as such were conducted when temperatures were above 6°C, and winds were light or not existent. Each call survey was conducted for 5 min, during which time each species heard and a corresponding call rank for each species was recorded. Call ranks ranged from 1 to 4, with:

1 = one individual calling;
2 = calls not overlapping, and distinguishable (several individuals);

3 = calls overlapping but still distinguishable (several + individuals calling); and
4 = calls overlapping and indistinguishable (full chorus)

The approximate number of individuals of each species calling and their approximate location was also estimated and recorded, if possible. All anuran calls heard outside of the site were noted and recorded as well.

6.1.3.4 Larval surveys

6.1.3.4.1 Amphibians

Wetlands within the LAA were identified using 25-50 cm ortho-imagery and Land Cover Classification.

Summer larval amphibian surveys were conducted July 31 to August 2, 2017 at wetland ponds that were identified as being potentially suitable for salamanders (i.e. no fish, not marshy). At each wetland, a number of physical parameters were collected, including: air temperature (°C); wind direction and speed (average and maximum; km/hr); cloud cover (%); and precipitation (%). Pictures of the wetland, including the location and direction, were taken using a Nikon Coolpix AW110 GPS-linked camera.

At each wetland, one light-baited funnel-trap was set at five locations along the shoreline (Map 2). Funnel-traps were set in the evening partially submerged in approximately 15-25 cm deep water, left overnight, and checked the following morning. In addition to funnel traps, where conditions permitted, a number of wetland sites were sampled for larval salamanders using a seine net. The seine net used was 20 m in length by 1.5 m in depth, and was deployed from shore using a one-person canoe. Each funnel trap and/or seine net location was recorded using a Garmin GPSMAP 78 handheld GPS. All larval amphibians captured were measured for snout-length and total length. All tiger salamanders captured had a tissue sample clipped from the tail tip for submittal to the Manitoba Conservation Data Centre (MBCDC) for DNA analysis. Tissue sample collection and storage adhered to the MBCDC protocol (MBCDC 2017b). All larval amphibians were removed, identified to species and released back to the wetland. Amphibian trapping was conducted under Wildlife Scientific Permit WB201514.

6.1.4 Data gaps and limitations

A review of the existing literature and information (as described in Section 6.1.1) on TIAR species within the RAA and LAA revealed a number of data gaps, including:

- Information on northern leopard frog (and frogs in general) and western tiger salamander breeding and overwintering sites within the RAA and LAA;
- Information on summering sites for northern leopard frogs and western tiger salamanders within the RAA and LAA; and
- The distribution of garter snake hibernacula within the RAA and LAA.

To address these data gaps, studies were completed in:

- Spring 2017 to locate northern leopard frog breeding sites, and garter snake hibernacula within the RAA and LAA;
- Early summer 2017 to identify western tiger salamander breeding sites, as well as wetlands used by northern leopard frogs during the summer months; and
- Late summer 2017 to identify northern leopard frog overwintering sites within the RAA and LAA.

Additionally, landowner permissions were not granted in some cases, prohibiting surveys to be conducted at some suitable habitats, e.g. Snake Creek.

6.2 Results

6.2.1 Priority species

6.2.1.1 Terrestrial invertebrates

The following five terrestrial invertebrate species have been selected as priority species in the context of the Project, based on range overlap and their status as listed species:

- Gypsy cuckoo bumble bee (*Bombus bohemicus*);
- Yellow-banded bumble bee (*Bombus terricola*);
- Transverse lady beetle (*Coccinella transversoguttata*);
- Nine-spotted lady beetle (*Coccinella novemnotata*); and
- Monarch butterfly (*Danaus plexippus*)

The gypsy cuckoo bumble bee and the yellow-banded bumble bee are both found in a diverse range of habitats, foraging on flowers from a variety of plant genera for pollen and nectar (COSEWIC 2014, 2015). The gypsy-cuckoo bumble bee is a nest parasite, inhabiting open meadows, mixed farmlands, urban areas, boreal forest and montane meadows where its hosts the western bumble bee (*Bombus occidentalis*) and the yellow-banded bumble bee can be found (COSEWIC 2014). There has been a large observed decline in the relative abundance of the species in the past 20-30 years. Primary threats include decline of the host species, pesticide use, and introduced pathogens from escaped non-native bees (COSEWIC 2014).

The yellow-banded bumble bee was historically one of the most common bumble bee species in Canada, inhabiting mixed woodlands, farmlands, urban areas, montane meadows, prairie grasslands and boreal habitats (COSEWIC 2015). Recent mass declines in southern Canada have occurred. Causes of decline remain unclear but are likely the result of a combination of factors, including habitat conversion, pesticide use, and introduced pathogens from escaped non-native bees (COSEWIC 2015).

The transverse lady beetle and the nine-spotted lady beetle are both known as habitat

generalists that have seen a reduction in geographical range in Canada. The decline in relative abundance of both of these native lady beetles is concurrent with the arrival of non-native species such as the seven-spotted lady beetle (*Coccinella septempunctata*) and the multicoloured Asian lady beetle (*Harmonia axyridis*) (COSEWIC 2012a). The transverse lady beetle inhabits agricultural areas (COSEWIC 2012a). The nine-spotted lady beetle inhabits areas of shrubs or small trees interspersed with open grassy areas, often tracking changes in aphid abundance across habitats (COSEWIC 2016a). Habitats include agricultural areas, suburban gardens, parks, coniferous and deciduous forests, prairie grasslands, meadows, riparian areas and other natural open areas (COSEWIC 2016b).

The monarch butterfly has a large distribution range, associated with plant species such as milkweed (*Asclepias* spp.) (COSEWIC 2010). The breeding habitat of the monarch is confined to sites where milkweed grows, as it is the sole food of the caterpillar. The monarch's main host plant is the common milkweed (*A. syriaca*), widespread throughout southern Manitoba. This plant is not protected and is considered a noxious weed in Manitoba (OMAFRA 2017, Schappert 1996). Other larval food milkweed species found in Manitoba include swamp milkweed (*A. incarnata*), showy milkweed (*A. speciosa*), and low or dwarf milkweed (*A. ovalifolia*), (Crolla and Lafontaine 1996). Milkweeds grow in a variety of environments, including meadows in farmlands, along roadsides and in ditches, open wetlands, dry sandy areas, short and tall grass prairie, river banks, irrigation ditches, arid valleys, and south-facing hillsides. Milkweeds are also often planted in gardens (COSEWIC 2010). The majority of the monarch butterfly population overwinters in the Oyamil Fir Forest of Central Mexico, where forest degradation is likely the biggest threat facing the species (COSEWIC 2010).

6.2.1.2 Amphibians

In general, amphibians in Canada all face similar threats, including the loss, degradation and fragmentation of habitat required for terrestrial adult and aquatic larval phases. In the context of the Project, the following two species have been selected as priority species:

- Western tiger salamander (*Ambystoma mavortium*); and
- Northern leopard frog (*Lithobates pipiens*).

The western tiger salamander has recently been designated as a separate species from the eastern tiger salamander (*Ambystoma tigrinum*), and inhabits a variety of open habitats, including moist grasslands or woodlands near wetlands in south-central Manitoba (COSEWIC 2012b). Juveniles can be found in ponds, and emerged terrestrial individuals can be found underground, burrowed into soil, leaf litter, or utilizing small mammal burrows. Key habitat features include sandy or crumbly soils surrounding semi-permanent to permanent water bodies lacking predatory fish (COSEWIC 2012b).

The northern leopard frog is widely distributed throughout the southern two-thirds of Manitoba. In Manitoba, it has recently been identified as two separate designatable units (the western boreal/prairie population and the eastern population, COSEWIC 2009). This grassland species requires three distinct habitat types throughout its life cycle (Kendell 2002). Breeding occurs

April through May, usually in waterbodies with some degree of permanence, shallow shores and no predatory fish (Merrell and Rodell 1968). This includes ponds, quiet backwaters of streams, marshes, roadside ditches, borrow pits, channels and permanently flooded meadows (Eddy 1976, Merrell 1977, Seburn and Seburn 1998). After the breeding season, the northern leopard frog widely disperses to its summering range, which can include a variety of terrestrial habitats, including grasslands and wet woods (Preston 1982). Hibernation occurs at the bottom of lakes, rivers, and other permanent water bodies that are well-oxygenated and do not freeze solid (Eddy 1976), limiting overwintering opportunities. Overwintering sites tend to be within 1.6 km of breeding ponds (Hine et al. 1981).

Massive declines in the northern leopard frog had occurred across western Canada in the 1970's. The species has since recovered in Manitoba, but not to the same historical densities (Koonz 1992). The northern leopard frog is threatened by emerging diseases such as *chytridiomycosis*, introduced fish predators, and invasive plants, habitat loss and fragmentation, environmental contamination, as well as drought (COSEWIC 2009).

6.2.1.3 Reptiles

The following two reptile assemblages have been selected as priority species in the context of the Project, based on range overlap and vulnerability to disturbance:

- Snapping turtle (*Chelydra serpentine*); and
- Garter snakes (*Thamnophis sirtalis* and *radix*).

The snapping turtle inhabits slow-moving, permanent waters, such as rivers, streams, lakes and ponds, with a preference for mud bottoms and dense vegetation (COSEWIC 2008). Although widespread and somewhat abundant in Canada, this turtle species is primarily limited by its life-history strategy, which is characterized by slow recruitment, late maturity, long lifespan, and high adult survival, and by its dependence on long warm summers for hatching success. As such, the snapping turtle has an unusual susceptibility to anthropogenic threats during its adult stage (COSEWIC 2008). Primary threats to adult individuals include harvesting and road mortality, but also include ongoing loss of habitat, decreased reproductive success due to environmental contamination, nest predation, boat propeller strikes, as well as "bycatch" from fishing and other commercial practices (COSEWIC 2008).

Although garter snakes are currently not a listed species, the dependency of garter snakes on overwintering den sites leaves snake populations vulnerable to disturbance, degradation and local extirpation (Kendell 1998). The red-sided garter snake inhabits the southern half of the province, associated with grasslands and mesic vegetation, often at margins of ponds or further upland, likely dictated by the presence of food in these areas (Preston 1982). In the fall, red-sided garter snakes congregate in the thousands in suitable hibernation sites such as limestone sinks (Preston 1982, Gregory 1977).

The western plains garter snake (*Thamnophis radix*) is found in the agricultural areas of the southwestern third of Manitoba, overlapping the range of the red-sided garter snake over much

of its provincial distribution range. Western plains garter snakes have been found hibernating in ant mounds (Preston 1982) but will also share denning sites with red-sided garter snakes in northern-most population ranges (i.e., central Manitoba), where availability of suitable hibernacula becomes limited (Shine et al. 2004).

6.2.2 Current status

6.2.2.1 Terrestrial invertebrates

The entire RAA falls under the Prairie Ecozone, Aspen Parkland Ecoregion, overlapping the St Lazare, Hamiota, and Melville Ecodistricts. Prairie invertebrate species in this ecozone are often associated with grasslands and agricultural lands. A review of COSEWIC (2016), the SARA Public Registry (Government of Canada 2017), the Manitoba Species at Risk registry (Government of Manitoba 2017) and the MB CDC (2017a) revealed five terrestrial invertebrate species of concern with the potential to occur within the RAA (Appendix II, Table 1).

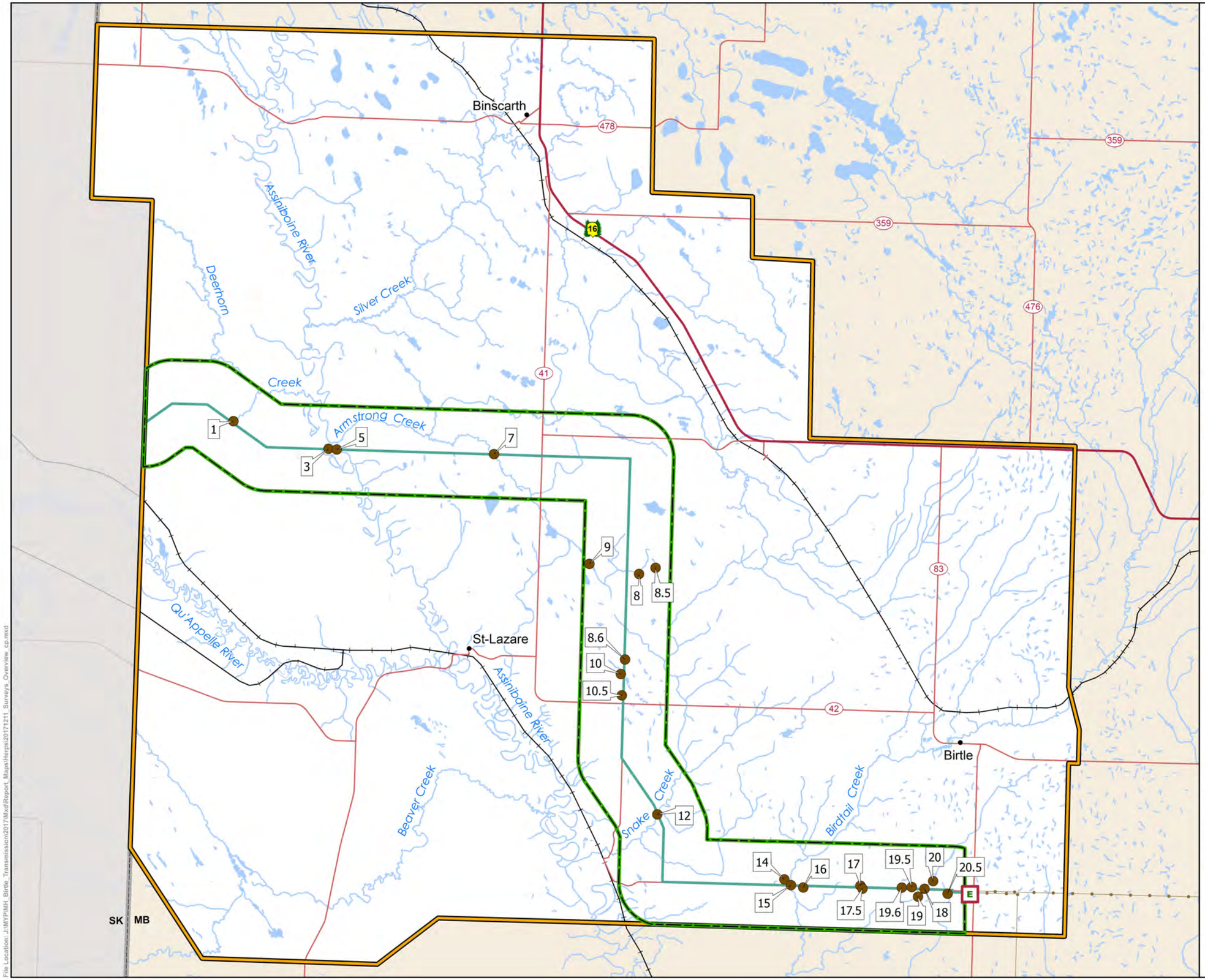
Both the gypsy cuckoo bumble bee and the transverse lady beetle are designated as Special Concern by COSEWIC (COSEWIC 2014, 2012a, respectively). The nine-spotted lady beetle and the yellow banded bumble bee are both designated by COSEWIC as Endangered (COSEWIC 2016b, 2015, respectively). All four species inhabit a variety of diverse habitats including grasslands and agricultural areas, habitats which are not unique to the RAA and LAA.

The monarch butterfly is designated as Endangered by COSEWIC and of Special Concern under SARA (COSEWIC 2010). Although its host plant milkweed was not observed during field studies (Szwaluk, pers. comm. 2017), milkweed grows in a variety of habitats including farmlands, ditches, wetlands, grasslands, and gardens; habitats not unique to the RAA and LAA.

6.2.2.2 Amphibians

There are 16 amphibian species found within Manitoba, five of which have distribution ranges overlapping the RAA (Appendix II, Table 2). Amphibians were observed during amphibian VESs (Map 1), as incidental observations during reptile VESs and stream crossing assessments, and as by-catch during salamander funnel trap surveys (Appendix II, Tables 3, 5, and 6, Map 6-1).

Four of the five amphibian species were observed at survey sites within the RAA (Appendix II, Table 3, Map 6-1, 6-2 and 6-3 and Map 6-4), including the western tiger salamander, northern leopard frog, wood frog (*Lithobates sylvaticus*), and boreal chorus frog (*Pseudacris maculata*). Canadian toads (*Anaxyrus hemiophrys*) were not observed during the course of surveys.



North/South Consultants Inc.
Aquatic Environment Specialists

Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Assessment Areas
- Local
- Regional

Sites
- Survey Site

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 11, 2017

N

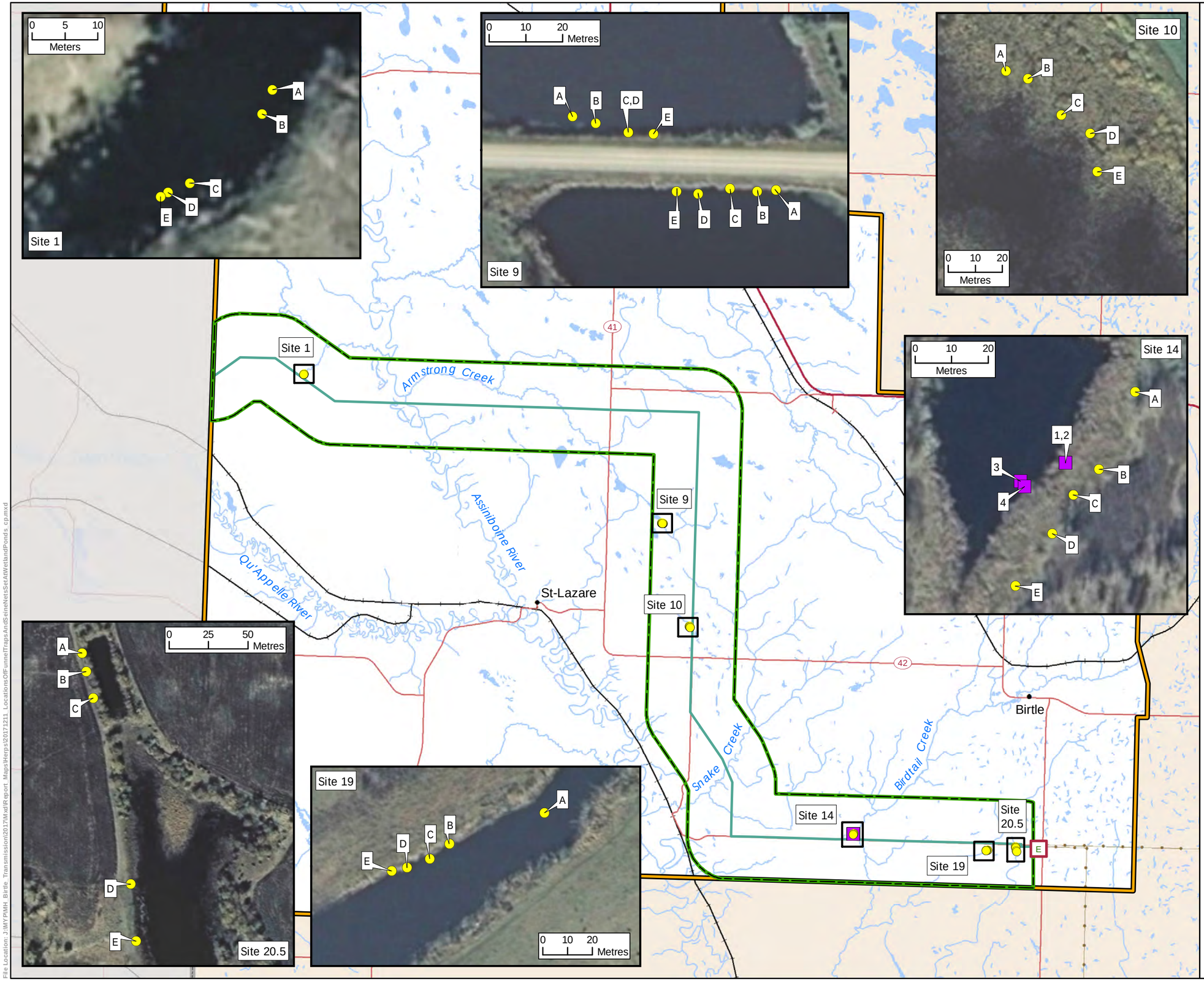
0 2 4 6 Kilometres
0 1 2 3 Miles

1:135,000

Survey Sites
Overview

File Location: J:\MYPM\M_Birtle_Transmission\2017MediReport_Maps\Vergis\20171211_Surveys_Overview_cp.mxd

Map 6-1 Amphibian and reptile survey sites within the Regional Assessment Area.



North/South Consultants Inc.
Aquatic Environment Specialists

Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Gear Type
- Funnel Trap
- Seine Net

Assessment Areas
- Local
- Regional

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 11, 2017

N

0 2 4 6 Kilometres
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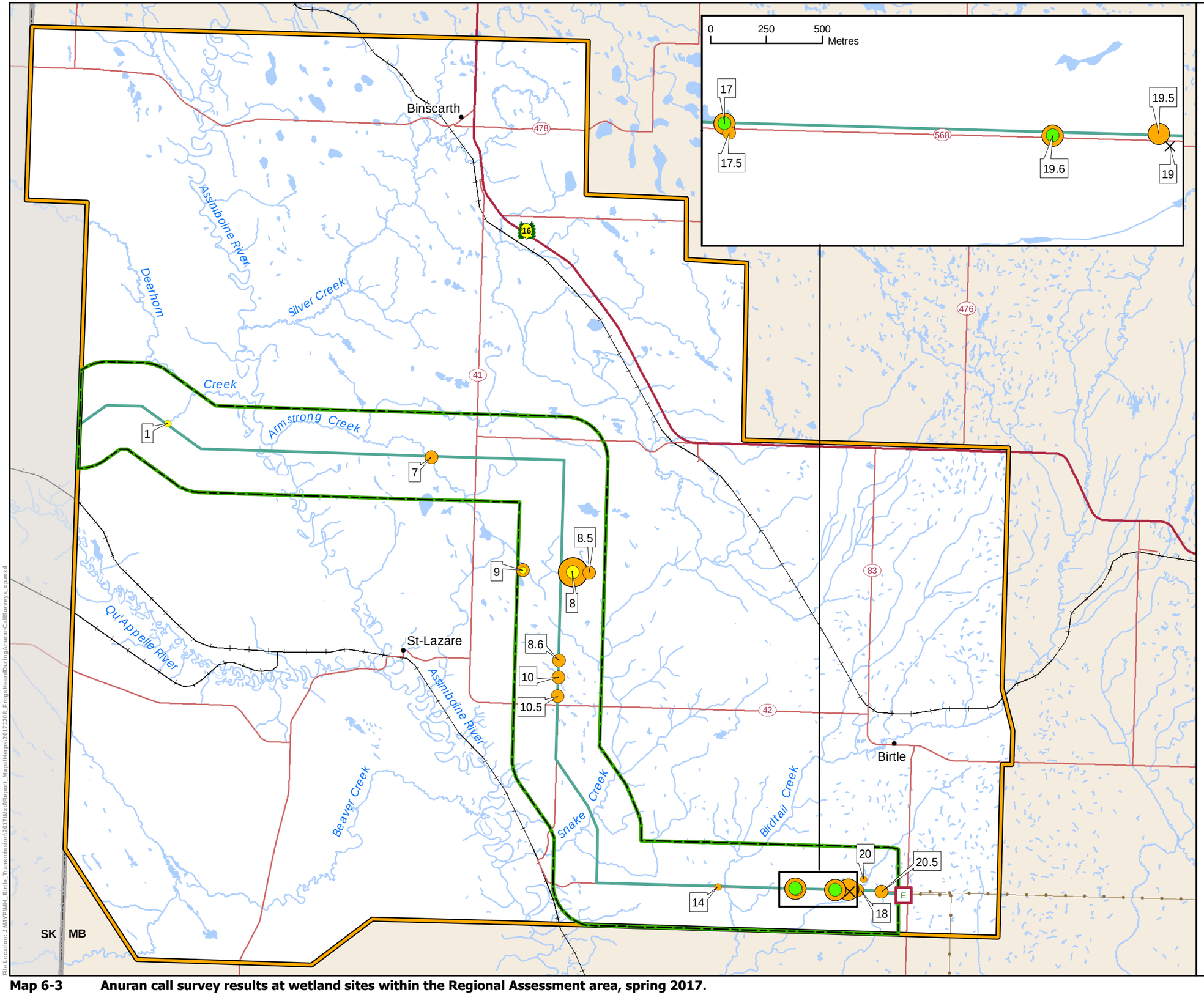
Location of Funnel Traps and Seine Nets Set at Wetland Ponds
July - August 2017

File Location: J:\MY PMH_Birtle_Transmission\2017\Mxd\Report_Maps\Vers\20171211_LocationsOfFunnelTrapsAndSeineNetsSetAtWetlandPonds_cp.mxd

Map 6-2 Sites where salamander funnel traps and seine net surveys were conducted within the Birtle Transmission Project Regional Assessment area.



File Location: J:\MYP\MH_Birtle_Transmission\2017\Mxd\Report_Maps\Herps\20171208_FrogsHeardDuringAnuranCallSurveys_ep.mxd

Map 6-3 **Anuran call survey results at wetland sites within the Regional Assessment area, spring 2017.**

North/South Consultants Inc.
Aquatic Environment Specialists

Birtle Transmission Project

Project Infrastructure

- E — Birtle South Station
- Final Preferred Route

Call Rank

- 0

Wood Frog	Boreal Chorus Frog	Northern Leopard Frog
1	1	1
2	2	2
3	3	3
4	4	4

Call Ranks:
0 = no individuals calling
1 = one individual calling
2 = calls not overlapping and distinguishable (several individuals)
3 = calls overlapping but still distinguishable (several and individuals)
4 = calls overlapping and indistinguishable (full chorus)

Assessment Areas

- Local
- Regional

Infrastructure

- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase

- Community
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 10, 2017

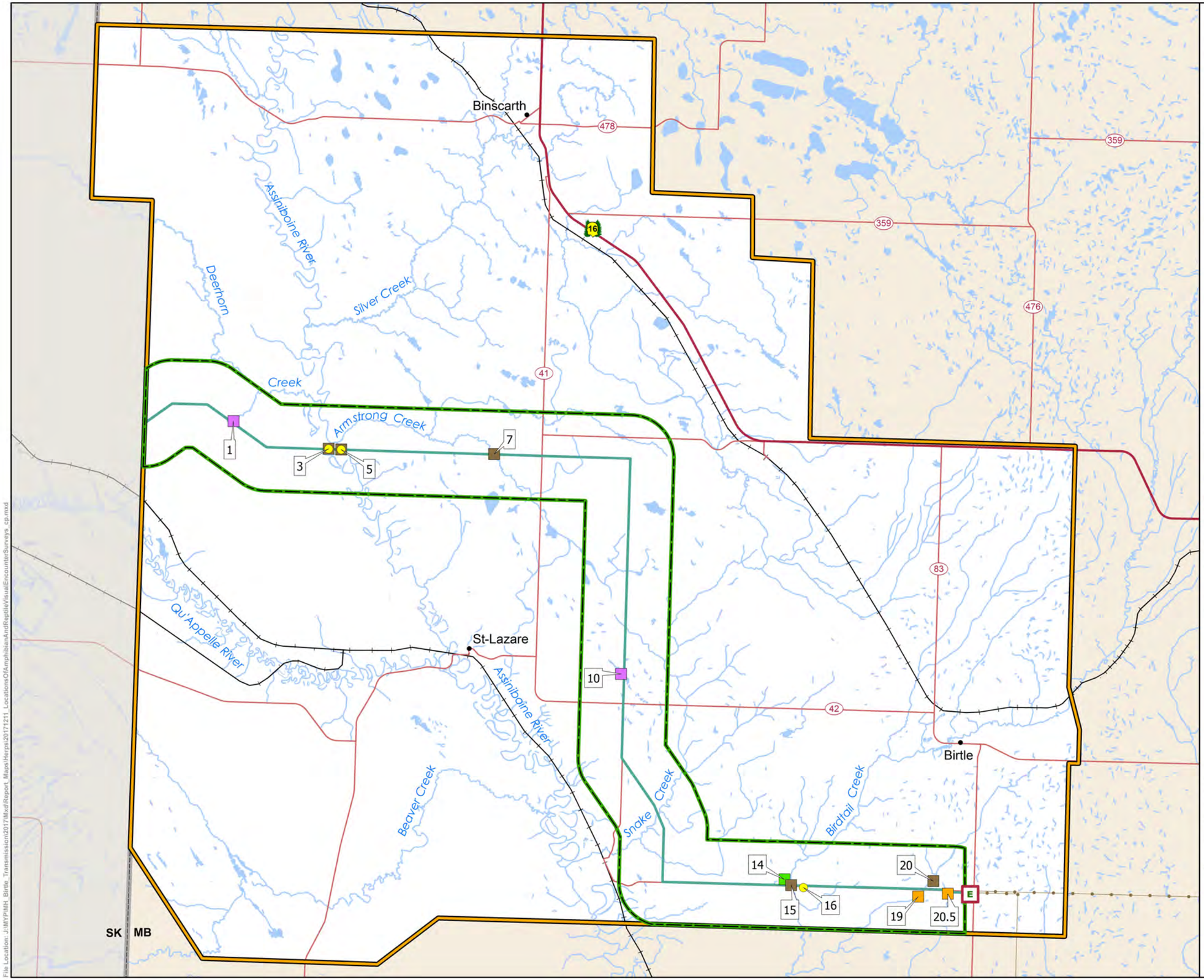
N

0 2 4 6 Kilometres
0 1 2 3 Miles

1:135,000

Frogs Heard During Anuran Call Surveys

May 2017



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Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Visual Encounter Survey
- Amphibian - Fall
- Amphibian - Fall & Spring
- Amphibian - Fall, Spring & Summer
- Amphibian - Summer
- Reptile - Spring

Assessment Areas
- Local
- Regional

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 11, 2017

N

0 2 4 6 Kilometres
0 1 2 3 Miles

1:135,000

Locations of Amphibian and Reptile Visual Encounter Surveys
May-September 2017

File Location: J:\MYP\MH_Birtle_Transmission\2017\MxdReport_Maps\Herps\20171211_LocationsOfAmphibianAndReptileVisualEncounterSurveys_cp.mxd

Map 6-4 Visual encounter survey sites within the Regional Assessment Area, 2017.

All amphibians with distribution ranges within the RAA require wetlands during at least some part of their life cycle. Within the LAA, 407 ha (2.8%) of the habitat is classified as wetlands (Appendix II, Table 4). Within the RAA, 3331 ha (3.4%) of habitat is wetlands. The PF contains 4 ha (1.9%) wetlands.

The western tiger salamander is designated by COSEWIC as Special Concern (2012b) and overlaps the southwestern corner of Manitoba, including the RAA. Salamanders were found at three sites within the RAA (Appendix II, Table 3 and 5, Map 6-1 and 6-2). Site 9 is located over 1 km from the PF and at the upstream end of a tributary of Armstrong Creek and connected by a culvert across a mile-by-mile road. While Site 9 north of the road is dense with vegetation, the site south of the road contains open water beyond the submerged vegetation (Photographs 6-1 and 6-2, providing ideal habitat suitable for salamanders. Site 10 is a wetland immediately west of the PF, containing dense shoreline submergent and emergent vegetation. Site 20.5, approximately 130 m from the PF consists of two ponds that may be connected in high water years. Unlike the smaller north pond, the larger south pond contains both submerged vegetation and open water (Photographs 6-3 and 6-4), making it ideal habitat for salamanders.

Photograph 6-1: Site 9 north of the mile-by-mile road, dense with submerged vegetation and funnel trap set.

Photograph 6-2: Site 9 south of the mile-by-mile road, with suitable salamander habitat: open water and submerged shore vegetation.

Photograph 6-3: Small north pond of Site 20.5, lacking submerged vegetation.

Photograph 6-4: Larger south pond of Site 20.5, containing suitable salamander habitat: open water and submerged shore vegetation.

The northern leopard frog (western boreal/prairie population) has been designated as Special Concern by COSEWIC and under SARA (COSEWIC 2009). This species has a distribution range overlapping the southern two-thirds of the province, west of Lake Winnipeg, including the RAA. Within the RAA, the northern leopard frog was observed at ten of 22 sites surveyed, with high abundances (total numbers of 10 or greater) at four sites (Site 10, 14, 15, and 19, Appendix II, Table 3, 6 and 7; Map 6-1 and 6-3; Photograph 6-5). High abundances were seen during fall VESs at both Sites 14 (n = 130) and 15 (Birdtail Creek, n = 91) (Appendix II, Table 6), suggesting these sites may be used as overwintering habitats. At Site 10, no individuals were observed during the fall VES, suggesting the south part of this wetland complex nearest the PF may not be suitable as an overwintering site (Appendix II, Table 6). High numbers in summer suggest use of the area as summering grounds. It is possible that although no individuals were seen or heard during spring surveys, that breeding may have occurred outside of survey times, or in sections of the large wetland complex further north that were not surveyed during VESs or the call surveys.

Overall, the number of sites surveyed during the spring was limited as permissions to access many of the private lands were not yet granted at this time.

Photograph 6-5: Northern leopard frog observed during fall visual encounter surveys at Site 20.5.

6.2.2.3 Reptiles

There are eight reptile species found within Manitoba. Of these, five have distributions that overlap the RAA (Appendix II, Table 8). Snapping turtles and garter snakes (red-sided garter snake and unidentified species) were observed within the RAA during reptile visual encounter surveys (Map 1), as incidental observations during amphibian visual encounter surveys and stream crossing assessments, and as by-catch during salamander funnel trap surveys (Appendix II, Table 3, 5, and 6; Map 6-1).

The snapping turtle has been designated as a species of Special Concern by COSEWIC and under SARA (Appendix II, Table 8) and has a distribution range overlapping the southern third of the province, including the RAA. At the Assiniboine River crossing (i.e. Site 5), one young-of-year individual was observed incidentally on the west shore, 80 m north of the LAA (Photograph 6-6). The Assiniboine River has slow moving permanent water with a mud bottom, making it ideal snapping turtle habitat.

The western plains garter snake and the red-sided garter snake are widely distributed throughout the southern half of Manitoba, both with ranges overlapping the RAA. COSEWIC has not assessed the status of these garter snakes, nor are they listed under SARA (COSEWIC 2017; Government of Canada 2017; Appendix II, Table 8). During site surveys, a total of five garter snakes were observed (Sites 10, 16, 19, and 20.5, Appendix II, Table 3, 5 and 6). At Site 20, the snake was identified as a red-sided garter snake; this site was completely dry. Hibernacula were not found within the RAA during the course of surveys.

Photograph 6-6: Young-of-year snapping turtle observed along the Assiniboine River (Site 5).

6.3 Pathways of effect

Transmission line project-related activities that may affect terrestrial invertebrates, amphibians and reptiles include the clearing and maintenance of habitat along the transmission line RoW, the installation of permanent transmission line towers, and increased vehicular traffic during construction and operation phases of a transmission project and possible seasonal access trails.

Effects of transmission project-related activities can generally be divided into two broad categories:

- Alteration of habitat resulting from transmission line RoW clearing and maintenance, and installation of permanent towers; and
- Primary and secondary construction vehicle effects, increased use of seasonal access trails and RoWs, and other traffic and machinery-related effects.

Terrestrial invertebrates

Habitat alteration effects

Some of the most notable ecological effects of habitat alteration and fragmentation likely occur within the invertebrate community (Meffe and Carroll 1997). For example, habitat alteration is among the key factors frequently cited when describing the declines observed among many Lepidopteran species (Thomas 1984).

Habitat fragmentation can cause isolation of populations; flightless species and poor dispersers such as carabid beetles (Niemalä et al 1998, de Vries and den Boer 1990) and spiders (Hopkins and Webb 1984) are especially vulnerable.

Specialized, isolated species are at a greater risk of population declines than are larger populations in contiguous habitat as isolated populations of the species and its host plants are unlikely to be re-founded by natural dispersal following population declines (COSEWIC 2003). For such specialist species, habitat alterations may result in the loss of key adult and larval food resources. Habitat alteration at tower footprints can have permanent effects for sensitive habitats and associated invertebrate species.

For some species, maintenance of desired low plant-cover along a RoW may aid in preserving desired early-successional key adult and larval food resources. As such, RoWs may provide important habitat for some invertebrate species such as butterflies and skippers in areas where such early-successional habitats are limited (Lanham and Nichols 2002). Milkweed, the sole food for the monarch butterfly caterpillar, grows most abundantly in disturbed habitats, and may therefore grow well in RoWs (Lanham and Nichols 2002).

Due to small home ranges, relatively low mobility, and use of microhabitats, the alteration of habitats and subsequent edge effects and changes in microclimate affects invertebrate species at a more local scale than other taxa (Klein 1989, Didham et al 1996). Edge effects can inhibit movement and dispersal patterns and reduce population sizes (Holmquist 1998, Strong et al 2002); loss or changes in understory plant composition and abundance can also occur (Samways 1994, Danks and Foottit 1989). Alterations in microhabitat include surface litter, abundance of dead wood, soil composition, and the availability of water (Danks and Foottit 1989). Changes in microclimate associated with such changes can include temperature, humidity, level of evaporation, and increases in salinity (Danks and Foottit 1989).

Traffic and Machinery-Related Effects

Traffic and machinery-related effects can have both primary and secondary effects, ranging from direct mortality to sensory disturbances. Vehicular traffic and machinery may crush and cause mortality of a small number of individuals. Secondary effects resulting in sensory disturbance effects include exhaust emissions, noise, dust, headlight illumination, as well as spills and leaks. Overall, traffic levels on a transmission line RoW are relatively low during construction and negligible during RoW maintenance.

Amphibians

Habitat Alteration Effects

Amphibians rely on high quality water and land environments and can act as bioindicators of environment condition, habitat change, and ecosystem imbalance (Barinaga 1990, Blaustein & Wake 1990, Wake 1991). Varying breeding, summering, and overwintering habitat requirements make amphibians particularly susceptible to anthropogenic habitat change; habitat loss, habitat fragmentation, environmental contamination and increased incidence and severity of drought are all threats (COSEWIC 2009).

In a forested habitat, RoW clearing may alter forest gap dynamics and overall habitat composition. Such habitat alterations have the ability to increase habitat fragmentation, and

change the distribution, movement patterns, and overall abundance of amphibian species. Forest fragmentation has been known to impede amphibian juvenile dispersal rates between local populations (Rothermal and Semlitsch 2002) and has been identified as one of the many possible causes of amphibian declines. The opening of a canopy can result in changes in microclimate, including a greater fluctuation in air and soil temperature, relative humidity, light intensity and wind speed (Blymyer and McGinnes 1977, Bury 1983, Enge and Marion 1986, Welsh and Lind 1988). Additionally, such changes also reduce or remove amphibian microhabitat produced by leaf litter and coarse woody debris (Bury 1983, Corn and Bury 1990). Because of their need for adequate moisture (due to small body size and permeable skin), newly metamorphosed juvenile amphibians dispersing through dry, open canopy areas are at risk of dehydration and desiccation (Graeter et al. 2008, McLeod and Gates 1998, Semlitsch 1981). Overall, canopy cover and understory is an important structural element of forest habitat (deMaynadier and Hunter 1999) for anurans like the wood frog and American toad (*Anaxyrus americanus*) (Kamstra et al 1995, Rothermal and Semlitsch 2002, Walston and Mullin 2007).

The drying of ponds is also accelerated in open areas, resulting in a potential loss of anuran breeding sites such as wetlands. Loss of small, temporary wetlands (<4.0 ha) has been found to be detrimental to amphibians as it can severely impair completion of larval metamorphosis (Semlitsch 2000). Loss of wetlands also increases the average distance between neighboring breeding ponds, which together with land and road development can result in isolated anuran populations (Seburn and Seburn 2000). Given the potential for philopatry in frogs and species such as the Western Tiger Salamanders, the destruction of a single breeding site has the potential to eliminate an entire population (COSEWIC 2012).

Undisturbed buffer zones of riparian vegetation along wetlands and streams are important in providing cover and breeding habitat for anurans (Seburn and Seburn 2000). Such buffers are often zones of variable environmental conditions and high biodiversity. The loss of buffers may also increase potential for sedimentation and accidental spills to enter the waterways; densities of amphibians have been found to be significantly lower in streams impacted by construction sediment than in unaffected streams (Welsh and Ollivier 1998). Overall, these buffers are important in both undisturbed forests as well as in cleared RoWs (Bélisle et al 2002). The loss or alteration of such buffer habitat would have a strong negative effect on stream and pond-breeding anurans, reducing connectivity to breeding pools, woody debris and cover, and overall amphibian persistence (Semlitsch 2000).

Some amphibian species do not appear to be significantly impacted by construction activity such as the clearing of a RoW; salamanders have been shown to use surrounding forest areas and RoWs equally (Yahner et al. 2001a, 2001b); American toad has likewise been found in both the RoW (Yahner 2001b) and in surrounding forested habitat (Yahner 2001a). Bélisle et al. (2002) found spring peepers, wood frogs, and American toads to be present in stream buffers within both the RoW and in the adjacent undisturbed forest habitat. Thibodeau and Nickerson (1986) found no long-term negative effects of power utility RoWs on wooded wetlands, such as those that may be used by wood frogs and other forest-dwelling amphibians.

Traffic and Machinery-Related Effects

Traffic, such as that associated with Row construction and increased use of RoW and seasonal access trails, can have negative effects on anuran populations, with greater traffic volumes resulting in greater negative effects (Ashley and Robinson 1996, Aresco 2005). Noise from vehicles has been shown to change anuran call behaviour (Barrass 1985, Sun and Narins 2005), and to decrease mating (Barrass 1985). Traffic associated with clearing of a transmission line, installation of towers, and the utilization of seasonal access trails is less than that of roads, but may still result in direct mortality of a small number of amphibians (Fahrig et al 1995). Active anuran species and those with longer dispersal and migration distances, such as the northern leopard frog, have been found to be more vulnerable to road mortality than less active species (Carr and Fahrig 2001). During northern leopard frog migrations, road mortality can be particularly high when roads with traffic intersect such migrations (Palis 1994, Linck 2000). Traffic density within 1.5 km of ponds has been found to have a significant negative effect on northern leopard frog abundance (Carr and Fahrig 2001). Road densities have greatly increased the potential for road mortality in tiger salamanders as well, during seasonal migrations between breeding sites and terrestrial overwintering and foraging habitats (COSEWIC 2012).

In addition to direct mortality, traffic and machinery-related activity may play a secondary role; secondary effects include increases in vehicular noise, light pollution, traffic volume, dust, spills and leaks, exhaust fumes and vehicle emissions.

Anurans depend upon a specific range of illumination as visual cues for activities such as foraging (Jaeger and Hailman 1981, Hailman 1984, Buchanan 1993) and possibly mating. Excess illumination or noise at breeding ponds may therefor impact amphibian reproductive success. Accidental spillage or leaks of petroleum products such as gasoline, diesel or heating oil which may occur during construction-related activities have the potential to contaminate waterbodies and soils in areas used by amphibians as breeding, summering, or overwintering habitat.

High-traffic roads have higher anuran mortality rates than low-traffic roads (Hels and Buchwald 2001) and forestry roads with very low traffic have found to have no effect on anuran movements (deMaynadier and Hunter 2000). Overall, the construction and operation of transmission line RoWs and associated infrastructure results in traffic levels comparable to trails and forestry roads. As such, effects are expected to be more similar to the effects of trail paths than of high-traffic roads.

Reptiles

Habitat Alteration Effects

Changes in habitat connectivity, resulting in new linear features, habitat fragmentation and forest gap dynamics that may occur during clearing of a transmission line RoW may cause changes in the distribution, movement and overall abundance of some reptile species.

In limiting habitats, habitat alteration or loss can result in population declines of associated specialist species. Habitat alteration also occurs during the installation of permanent towers, as excavation into soil results in habitat loss at tower footprints, and has greatest impacts in sensitive and isolated habitats.

Behavioral changes can also occur as a result of the addition of linear features. Garter snakes have been found to avoid roads or take the shortest route possible, and mate-searching males can be less likely to follow pheromone trails left by females if those trails crossed a road in grassland habitat (Shine et al. 2004). Conversely, less intense habitat alteration such as the removal of tree basal area may increase snake species abundances and richness in an area, possibly offering greater opportunities for thermoregulation in these open areas than in closed canopy stands (Ross et al. 2000). Overall, the effects of new linear features on a landscape may depend on the severity of the feature, as roads severely limit the presence of microhabitats, while RoWs allow more opportunities for thermoregulation while still providing shelter from desiccation and predators. Snakes such as the smooth green snake (*Opheodrys vernalis*), northern redbelly snake (*Storeria occipitomaculata*), and garter snakes may use transmission line RoWs exclusively (e.g. for migration and movement between feeding and hibernation sites) compared to surrounding forest habitat (Yahner 2001a, 2001b),

Traffic and Machinery-Related Effects

Traffic can have a negative effect on reptile populations (Aresco 2005). Traffic and mechanical activities associated with clearing of a transmission line, installation of towers, and the use of seasonal access trails may result in direct mortality or injury of individuals, as well as changes in distribution and movement patterns on a long-term basis.

Construction activity occurring in the proximity of suitable snake den habitat (e.g. limestone) exists may negatively affect garter snake populations at overwintering hibernacula sites through mortality. Such underground caves, dens and fissures make the area more fragile and therefore more vulnerable to cave-ins by heavy equipment.

Sensory disturbances associated with vehicular traffic and machinery use includes vehicular noise, exhaust fumes, vehicular emissions, dust, spills, leaks, and vibrations. Some of these effects may also occur during the installation of permanent RoW towers. Species within the snake families Colubridae, Crotalidae, and Boidae have an auditory system that is very sensitive to head vibration (Hartline 1971). Information about the effects of such vibrations is lacking, but potential consequences may include disorientation of prey and predator locations by summering individuals, and incurred stress or disruption of hibernation during the overwintering phase. This may also be the case for other species as well, that use habitat in close proximity to construction activity for overwintering.

7.0 Birds

In order to assess potential Project effects on birds, baseline field studies were conducted in the region where the proposed Birtle Transmission Project is to be constructed. The future right-of-way, described as the Project Footprint, is 185 hectares (ha) in area and is where most direct effects are expected to occur (Map 7-1). A one-mile buffer surrounding the centrelineis defined as the Local Assessment Area (LAA), which is 14,623 ha in size and where indirect Project effects on birds could occur. A Regional Assessment Area (RAA) of 96,915 ha in size encompasses the nested Project Footprint and LAA, and defines the area where population-level effects on birds could occur.

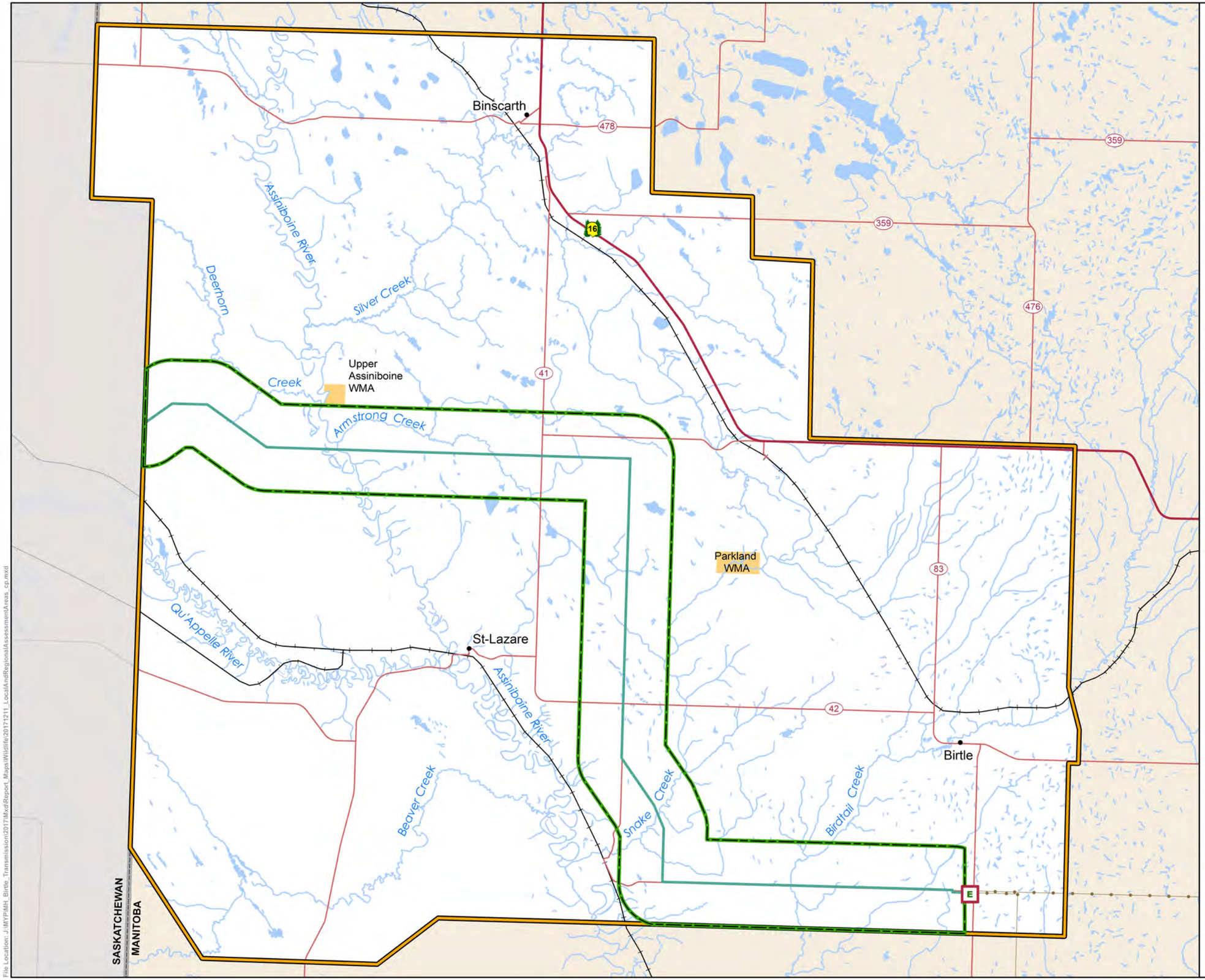
The RAA is highly fragmented, particularly east of the Assiniboine River, and is dominated by agricultural lands and residential areas. Conversely, west of the Assiniboine River in the St. Lazare Area of Manitoba, the Qu'Appelle River Valley is a biodiversity hotspot (Hamel and Reimer 2004). Geographic Information System (GIS) measurements indicate there are approximately 834 km of linear features including roads, railways, and transmission lines within, for a density of 0.66 km/km² in the RAA. Linear feature density in the RAA west of the Assiniboine River is 0.28 km/km² and east of the river is 0.84 km/km². Intact habitat (forest and grassland/rangeland) is defined as patches of habitat at least 200 ha in size (Environment Canada 2013a). Most of the intact habitat in the RAA is within the Spy Hill-Ellice Community Pasture, west of the Assiniboine River. There are currently 14 patches of intact forest habitat and 22 patches of intact grassland/rangeland habitat in the RAA. Intact forest patches range in size from 212 to 1,621 ha, and intact grassland patches range from 202 to 4,550 ha.

7.1 Methods and data sources

7.1.1 Literature review

Several sources were reviewed for information about birds in the region:

- Avibase (Lepage 2017), and eBird (Audubon and The Cornell Lab of Ornithology 2017), to develop a list of all bird species that have been reported in the Western Manitoba Region;
- The *Bird Conservation Strategy for Bird Conservation Region 11 in the Prairie and Northern Region* (Environment Canada 2013), to identify other bird species whose ranges may overlap the Western Manitoba Region;
- The Manitoba Breeding Bird Atlas (2017), which is a compilation of breeding bird survey data collected in the province from 2010 to 2014, to identify bird species and particularly species of conservation concern in the Southwest region of Manitoba and in the vicinity of the transmission line route (survey squares 14LA29, 14LA39, 14LA48, 14LA49, 14LA58);
- North American Breeding Bird Survey - Canadian Trends Website (Environment and Climate Change Canada 2017), to identify population trends in bird species of conservation concern in the Prairie Pothole Region of Manitoba;



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Birtle Transmission Project

Project Infrastructure
- E — Birtle South Station
- Final Preferred Route

Assessment Areas
- Local
- Regional

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Wildlife Management Area (WMA)
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 11, 2017

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Local and Regional Assessment Areas

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Map 7-1 Local and Regional Assessment Areas.

- *The Birds of Manitoba* (P. Taylor ed. 2003), Birds of North America (The Cornell Lab of Ornithology 2017), and the Guide to North American Birds (The National Audubon Society 2017), to confirm the ranges of birds reported by Avibase (Lepage 2017) and eBird (Audubon and The Cornell Lab of Ornithology 2017), and to identify their breeding status and general habitat preferences;
- The Species at Risk Public Registry (Government of Canada 2017), to identify bird species of conservation concern listed under the federal *Species at Risk Act* (SARA; Government of Canada 2002) that could occur in the region;
- *The Endangered Species and Ecosystems Act* of Manitoba (Government of Manitoba 2015), to identify provincially listed bird species of conservation concern that could occur in the RAA;
- The Manitoba Conservation Data Centre (Manitoba Sustainable Development 2016), to identify the status of bird species in the province and to identify historic records of priority species in the RAA; and
- Important Bird Areas (IBAs) of Canada (Bird Studies Canada 2017), to locate Important Bird Areas in the region.

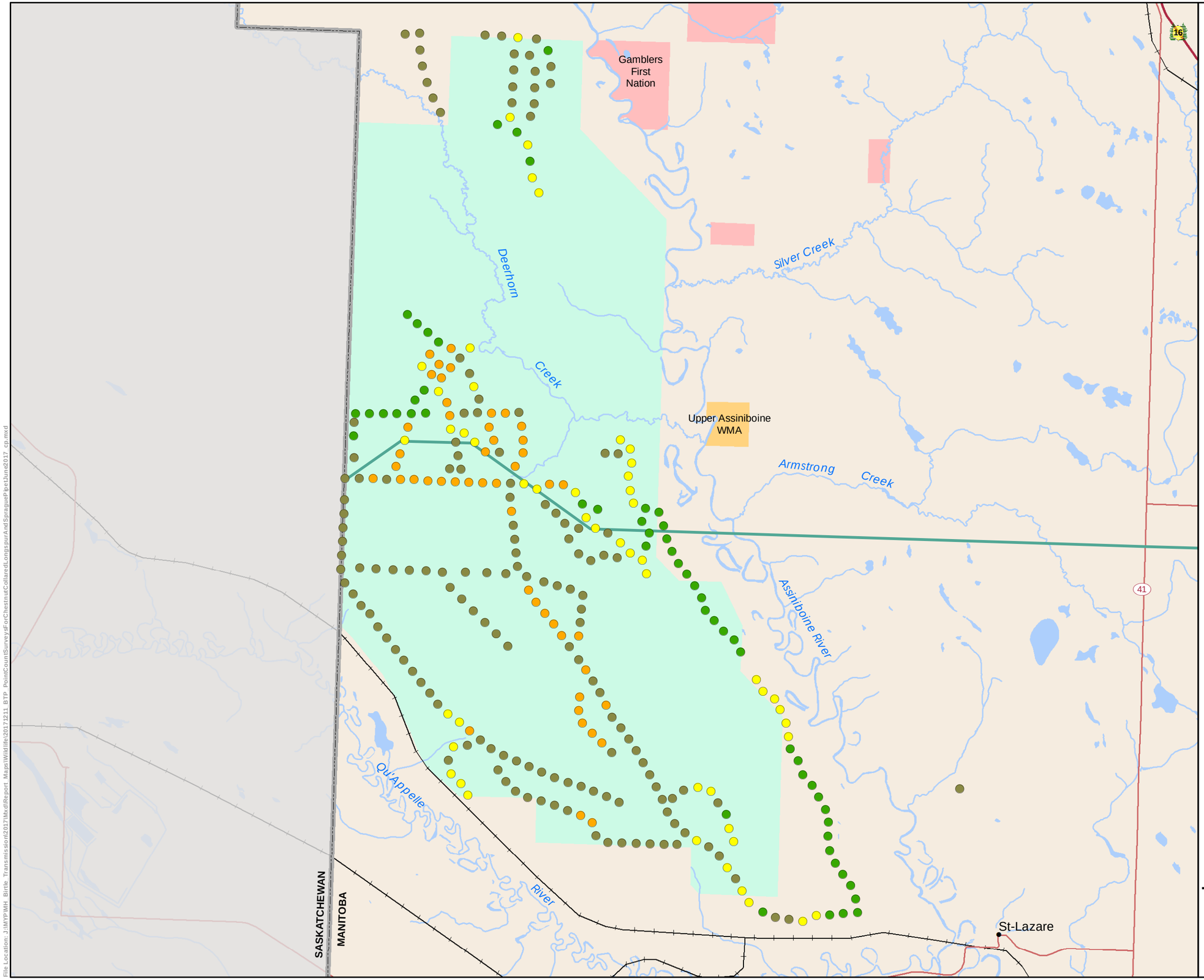
7.1.2 Engagement process information

Public and Indigenous engagement processes were undertaken to share information, gather and understand local interests and concerns to assist in the determination of a final preferred route and to enhance environmental assessment work. The engagement process included two rounds to gather and understand local interests and concerns from potentially affected landowners, stakeholders, and local community members. Manitoba Hydro engaged Canupawakpa Dakota Nation, Gambler First Nation, and Waywayseecappo First Nation in late 2016 and 2017 to share project information, obtain feedback for use in the environmental assessment process, gather and understand local interests and concerns. As part of the engagement process, Manitoba Hydro held values and interests workshops with Canupawakpa Dakota Nation, Gambler First Nation and Waywayseecappo First Nation. (Manitoba Hydro 2017a,b,c). The Metis Land Use and Occupancy Study: Baseline Information was reviewed to provide information about the Manitoba Metis Community's use of the area surrounding the proposed Project route (MNP LLP 2017). The resulting draft reports were reviewed and information relative to birds was incorporated into the existing environment where possible.

7.1.3 Field studies (reconnaissance and detailed surveys)

7.1.3.1 Breeding bird surveys

Ten-minute point counts for species of conservation concern, particularly chestnut-collared longspur (*Calcarius ornatus*) and Sprague's pipit (*Anthus spragueii*), were conducted in the Spy Hill-Ellice Community Pasture from June 24 to 30, 2017, generally following the design protocols of Ralph et al. (1995). A total of 299 locations spaced a minimum of 250 m apart and distributed among forest (n = 54), forest-grassland transition (n = 50), grassland (n = 147), and shrubland (n = 48) habitats were surveyed (Map 7-2).



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Birtle Transmission Project

Project Infrastructure
- Final Preferred Route

Habitat
- Forest
- Grassland
- Forest-Grassland Transition
- Shrubland

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Community Pasture
- First Nation
- Wildlife Management Area (WMA)
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN, WRCS
Date: December 10, 2017

N

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Ten-minute Point Count Surveys for Chestnut-collared Longspur and Sprague's Pipit
June 2017

File Location: J:\MYP\MH_Birtle_Transmission\2017\Mxd\Report_Maps\Wildlife\20172211_BTP_PointCountSurveysForChestnutCollaredLongspurAndSpragueePipit3June2017_rp.mxd

Map 7-2 **Ten-minute count surveys for chestnut-collared longspur and Sprague's pipit, June 2017.**

Observers recorded visual and auditory detections of chestnut-collared longspur and Sprague's pipit. The purpose of the survey was to locate these species and map their distribution in the RAA. Hand-held Tascam DR-100mkII audio recorders (Photograph 7-1) were used to record bird songs, so that other species in the bird community could be identified at a later date.

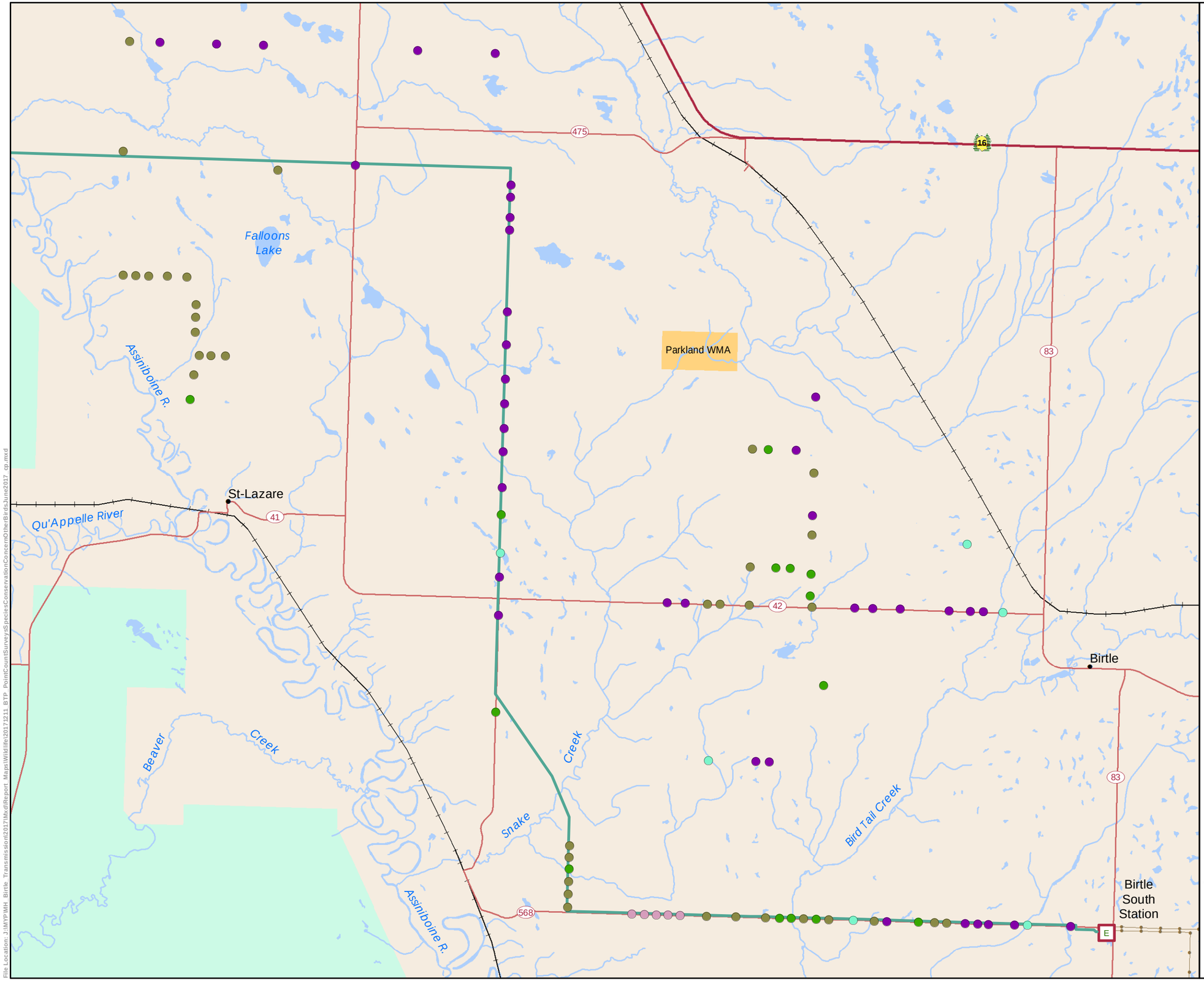
Photograph 7-1: Hand-held audio recorder.

Three-minute point counts for species of conservation concern and other birds were conducted in the developed area east of the Spy Hill-Ellice Community Pasture on June 29 and 30, 2017, generally following the protocols of the North American Breeding Bird Survey (Environment Canada no date [n.d.]). A total of 99 locations spaced a minimum of 250 m apart and distributed among agriculture (n = 38), agriculture forage (n = 5), forest (n = 14), forest/wetland (n = 6), and grassland (n = 36) habitats were surveyed (Map 7-3). The purpose of the survey was to locate species of conservation concern in addition to chestnut-collared longspur and Sprague's pipit, and to validate existing information of other bird species breeding in the RAA.

7.1.3.2 Migration surveys

Surveys for migrating birds, with a focus on raptors, were conducted April 6 to 9, 2016 and April 11 to 13, 2017. The purpose of the surveys was to identify and enumerate raptor species migrating through the RAA. At each of 12 pre-selected sites (Map 7-4), observers watched for raptors and other bird species using spotting scopes and binoculars. Surveys ranged from one to four hours at each site, three of which were visited both years. Incidental observations of other bird species were also recorded.

Reconnaissance aerial surveys for waterfowl were conducted April 10 and September 21, 2017, to identify waterfowl species and the areas where they congregate during the spring and fall migration periods. A helicopter flew along the preferred route, following intersecting streams or creeks for approximately 1 km on either side of it (Map 7-5, Map 7-6). Wetlands near the preferred route and a portion of the Assiniboine River were also surveyed.



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Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Habitat
- Agriculture
- Agriculture Forage
- Forest
- Forest/Wetland
- Grassland

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Community Pasture
- First Nation
- Wildlife Management Area (WMA)

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN, WRCS
Date: December 10, 2017

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Three-minute Point Count Surveys for Species of Conservation Concern and Other Birds
June 2017

File Location: J:\MYP\MH_Birtle_Transmission\2017\MxdReport_Maps\Wildlife\20172211_BTP_PointCountSurveysfSpeciesofConservationConcernsOtherBirdsJune2017_rp.mxd

Map 7-3 Three-minute point count surveys for species of conservation concern and other birds, June 2017.

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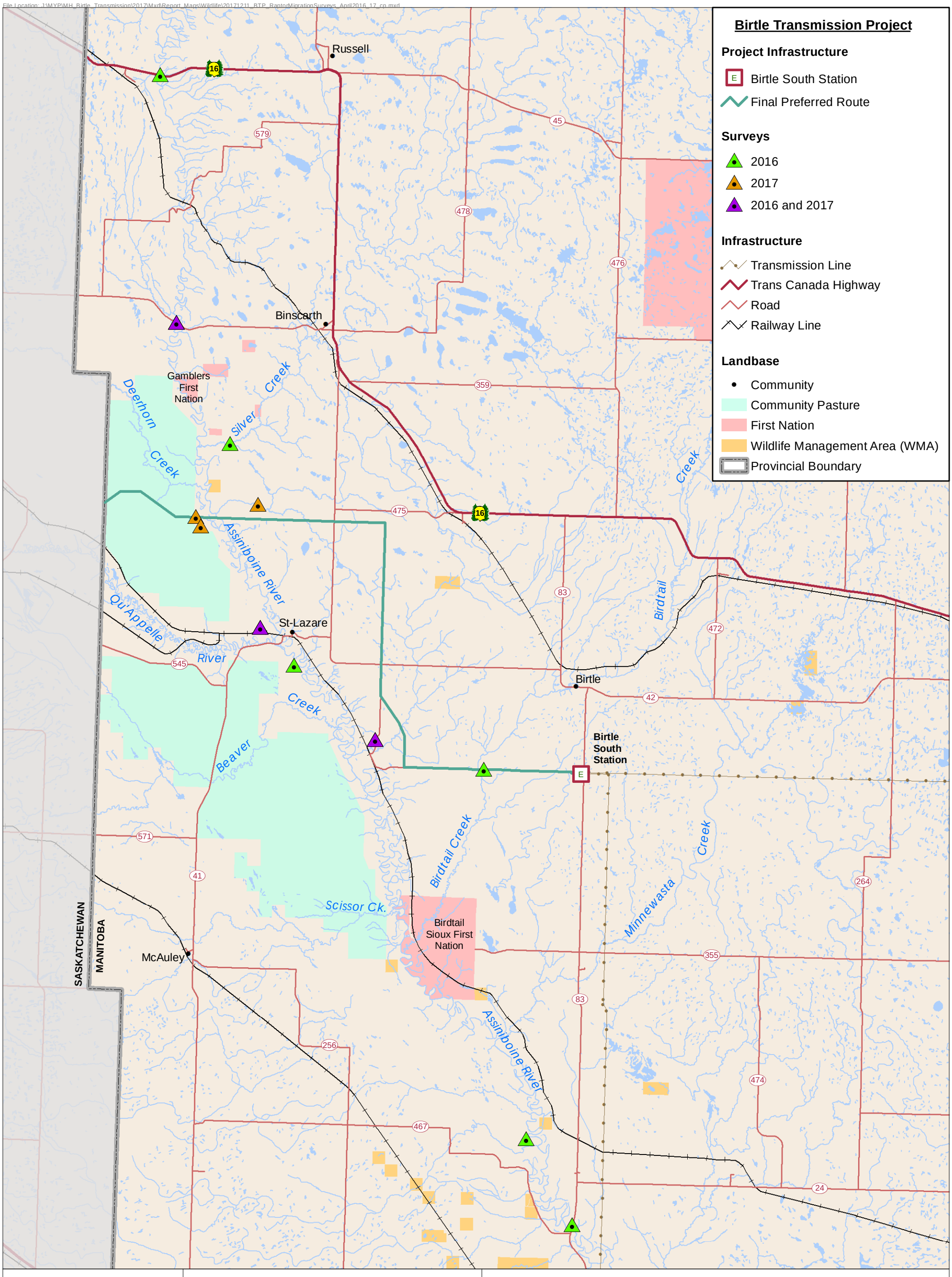

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Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 10, 2017

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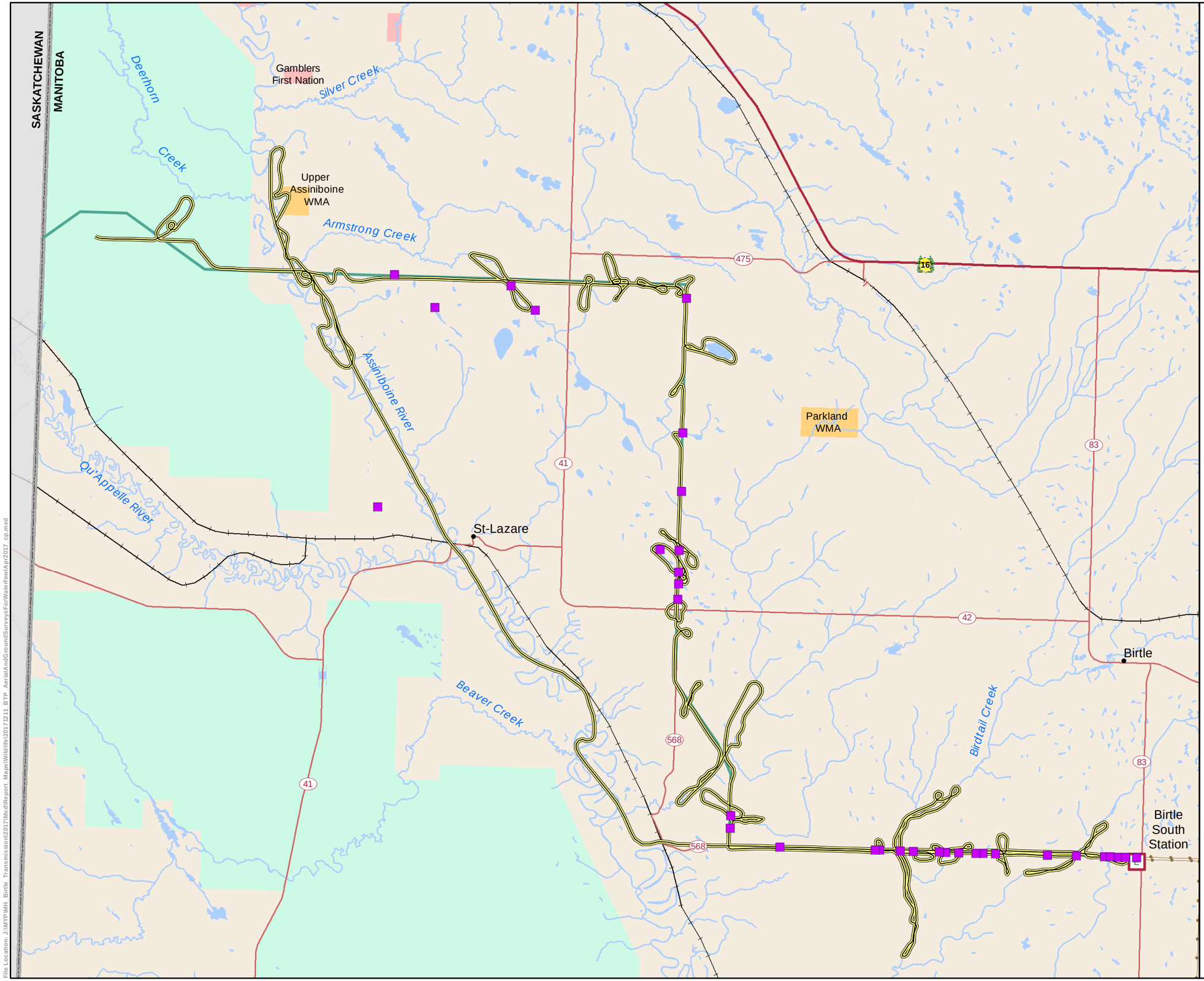
Raptor Migration Surveys
April 2016 and 2017

Map 7-4 Raptor migration surveys, April 2016 and 2017.



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Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Surveys
- Ground
- Aerial Survey Track

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Community Pasture
- First Nation
- Wildlife Management Area (WMA)
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN, WRCS
Date: December 10, 2017

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0 1 2 Miles

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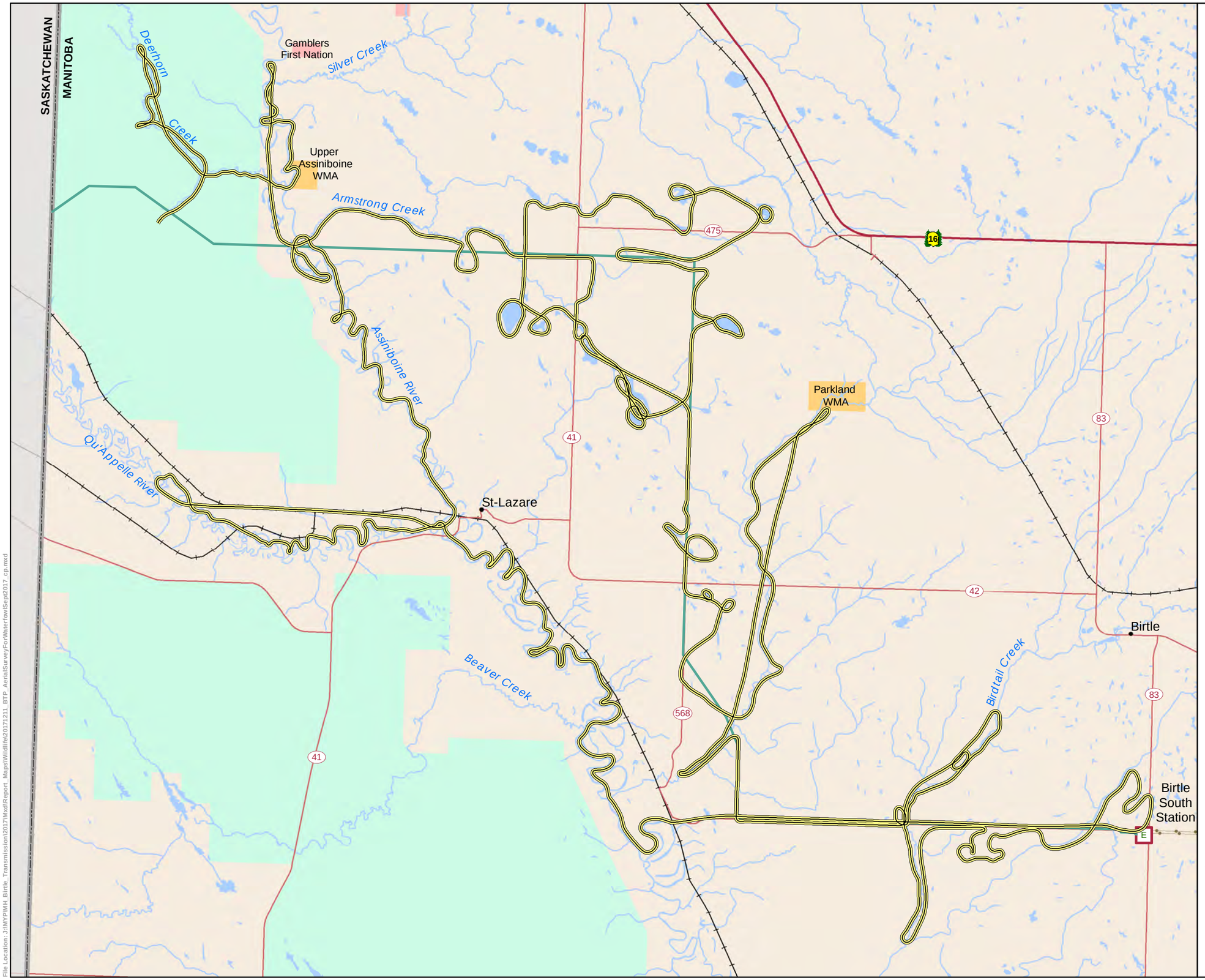
Aerial and Ground Surveys for Waterfowl
April 2017

Map 7-5 Aerial and ground surveys for waterfowl, April 2017.



North/South Consultants Inc.
Aquatic Environment Specialists

Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Surveys
- Aerial Survey

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Community Pasture
- First Nation
- Wildlife Management Area (WMA)
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN, WRCS
Date: December 11, 2017

N

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0 1 2 Miles

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Aerial Survey for Waterfowl
September 2017

File Location: J:\MYP\MH_Birtle_Transmission\2017\Mxd\Report_Maps\Wildlife\20171211_BTP_AerialSurveyForWaterfowlSept2017_cp.mxd

Map 7-6 Aerial survey for waterfowl, September 2017.

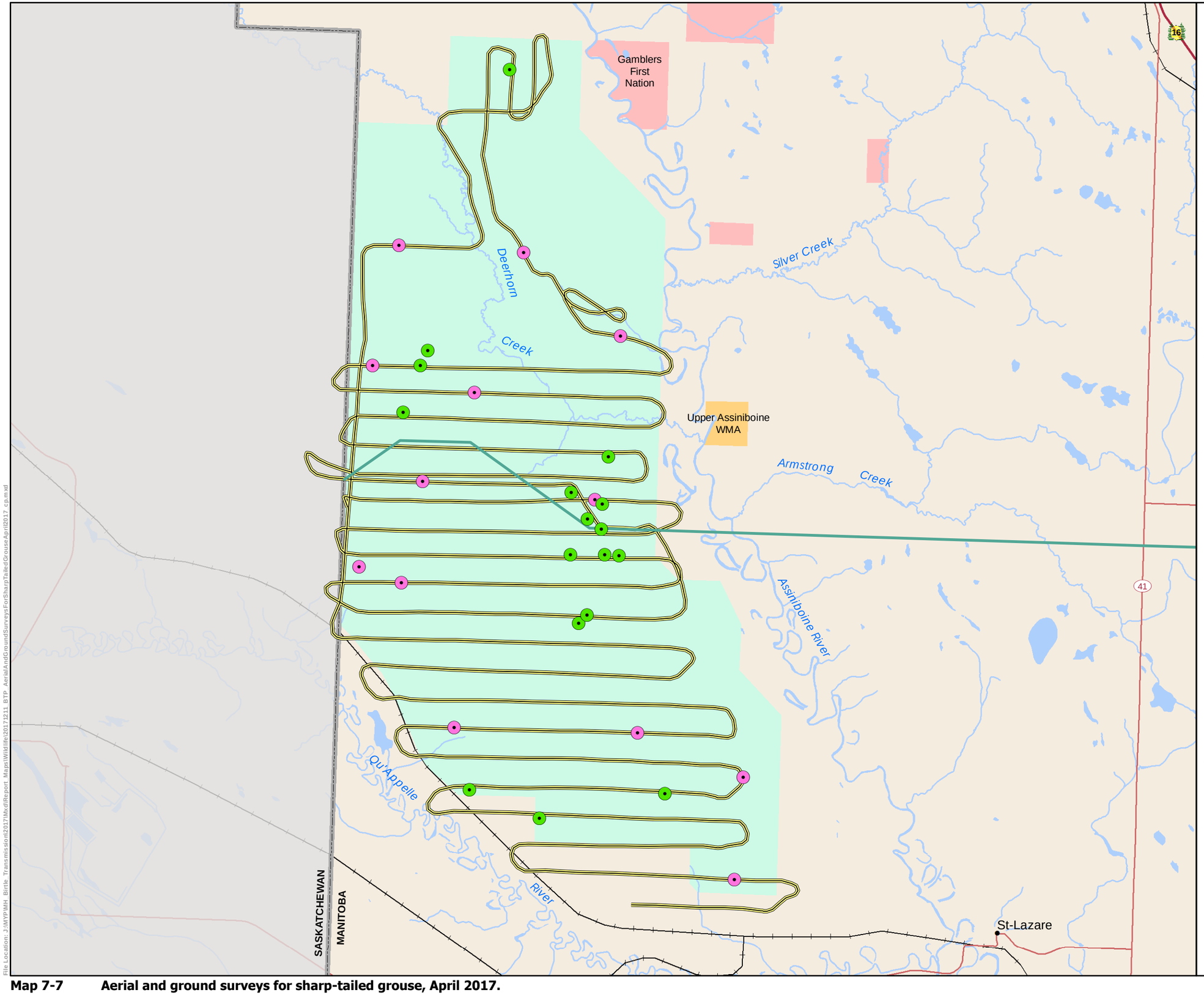
Observers recorded all waterfowl species; other bird species were recorded incidentally. Ground surveys for waterfowl were conducted April 12 to 14, 2017, to supplement information gathered during the reconnaissance aerial survey. Three-minute point counts were conducted at 33 pre-determined wetland sites on and near the preferred route including marshes, creeks, and ditches (Map 7-5). Observers recorded all waterfowl species; other bird species were recorded incidentally.

7.1.3.3 Sharp-tailed Grouse Lek surveys

A reconnaissance aerial survey for sharp-tailed grouse (*Tympanuchus phasianellus*) was conducted April 10, 2017. A helicopter systematically covered a portion of the Spy Hill-Ellice Community Pasture (Map 7-7), including the westernmost section of the preferred route (March 2017). Grasslands among forested areas were also surveyed opportunistically. Concentrations of sharp-tailed grouse were noted as potential indicators of the presence of leks (mating grounds).

Locations identified as potential leks during the aerial survey for sharp-tailed grouse were visited from April 11 to 15, 2017 (Photograph 7-2). Observers listened and watched for sharp-tailed grouse mating activity for five minutes at 17 sites (Map 7-7). The presence or absence of sharp-tailed grouse was noted, as were the mating activities (dancing, cooing, and rattling by males to attract females) that signify a lek. Observers approached active leks and flushed out the birds (e.g., Drummer et al. 2011) to count the number of males. Leks other than those observed from the air were also recorded when they were encountered opportunistically.

Photograph 7-2: Potential sharp-tailed grouse lek.



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Aquatic Environment Specialists

Birtle Transmission Project

Project Infrastructure
- Final Preferred Route

Surveys
- Aerial Survey

Lek Type
- Potential
- Surveyed on ground

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Community Pasture
- First Nation
- Wildlife Management Area (WMA)
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN, WRCS
Date: December 10, 2017

N

0 1 2 3 Kilometres
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Aerial and Ground Surveys for Sharp-tailed Grouse
April 2017

File Location: J:\MYP\Mtl_Birtle_Transmission\2017\Mxd\Report_Maps\Wildlife\20171211_BTP_AerialAndGroundSurveysForSharpTailedGrouseApril2017_cp.mxd

Map 7-7 Aerial and ground surveys for sharp-tailed grouse, April 2017.

7.1.3.4 Incidental sightings

All bird species observed during field studies were recorded, whether or not they were the focus of a particular survey. Species of conservation concern were recorded wherever they were observed and large stick nests were noted during aerial surveys for sharp-tailed grouse and waterfowl. Although these sightings were incidental, they were considered as input for routing and evaluation purposes.

7.1.4 Data gaps and limitations

Field studies for birds focused mainly on diurnal species (those active during the day). For this reason, no studies specific to common nighthawk (*Chordeiles minor*), eastern whip-poor-will (*Antrostomus vociferus*), short-eared owl (*Asio flammeus*), and yellow rail (*Coturnicops noveboracensis*), which are most active at dusk, night, or dawn, were conducted. All are species of conservation concern. Incidental observations, point counts, the Manitoba Breeding Bird Atlas, discussions with regulators, and literature were used to supplement potential data limitations.

Bird survey design was habitat-based, tended to be broadly distributed over the RAA, and was considered to be sufficient for describing the existing environment for birds. It should be noted, however, that many survey points used to describe the LAA were selected along a March 2017 preferred route. Fewer point counts were conducted on the final preferred route, where direct Project effects will occur, and evaluation segments. Pre-construction surveys and an appropriate monitoring design should be used to supplement this potential data gap.

7.2 Results

The Project is located in Environment and Climate Change Canada's (ECCC) Bird Conservation Region 11: Prairie Pothole, where at least 341 bird species occur (Environment Canada 2013a). The Prairie Pothole Region consists mainly of agricultural development, but also of forested areas and wetlands, many of which are the prairie potholes created by ancient glacial deposits (Environment Canada 2013a). On a smaller scale, the Western Manitoba Region outlined by Avibase (Lepage 2017) and eBird (Audubon and The Cornell Lab of Ornithology 2017) includes the transmission line route and the Southwest region of the Manitoba Breeding Bird Atlas (2017). Of the 281 bird species whose year-round, breeding, or migration ranges currently overlap the Western Manitoba Region, 210 have been recorded in the Southwest Region by the Manitoba Breeding Bird Atlas (Appendix III, Table 1).

7.2.1 Priority species

Priority bird species are of conservation concern, specifically those listed by the federal *Species at Risk* Act and/or by *The Endangered Species and Ecosystems Act* of Manitoba. There are 33 species of conservation concern in Manitoba. In all, 27 could occur in the RAA (Lepage 2017). Species of conservation concern that may migrate through the region but that do not breed within (red knot [*Calidris canutus rufa*], peregrine falcon [*Falco peregrinus*], buff-breasted

sandpiper [*Calidris subruficollis*], rusty blackbird (*Euphagus carolinus*) and whooping crane [*Grus americana*]) were not included, nor was piping plover (*Charadrius melodus*), whose sandy beach breeding habitat does not occur in the region. Trumpeter swans (*Cygnus buccinator*), listed as Endangered in Manitoba by *The Endangered Species and Ecosystems Act,* have been observed to the southeast (Audubon and The Cornell Lab of Ornithology 2017) and north of the RAA (Manitoba Breeding Bird Atlas 2017), but not within it. The breeding ranges of 20 bird species of conservation concern overlap the RAA (Table 7.2-1), although habitat for the chimney swift (*Chaetura pelagica*) is likely limited to nearby towns that have chimneys as potential nesting habitat. Brandon is the city nearest the study area with confirmed nesting (Manitoba Breeding Bird Atlas 2017).

Table 7.2-1: Federally and provincially listed priority bird species that could occur in the region

Species	Federal Listing[1]	Provincial Listing[2]
Baird's sparrow	Special Concern	Endangered
Bank swallow	Threatened	None
Barn Swallow	Threatened	None
Bobolink	Threatened	None
Burrowing owl	Endangered	Endangered
Canada warbler	Threatened	Threatened
Chestnut-collared longspur	Threatened	Endangered
Chimney swift	Threatened	Threatened
Common nighthawk	Threatened	Threatened
Eastern whip-poor-will	Threatened	Threatened
Eastern wood-pewee	Special Concern	None
Ferruginous hawk	Threatened	Endangered
Golden-winged warbler	Threatened	Threatened
Horned grebe	Special Concern	None
Loggerhead shrike	Threatened	Endangered
Olive-sided flycatcher	Threatened	Threatened
Red-headed woodpecker	Threatened	Threatened
Short-eared owl	Special Concern	Threatened
Sprague's pipit	Threatened	Threatened
Yellow rail	Special Concern	None

1. *Species at Risk Act*
2. *The Endangered Species and Ecosystems Act* of Manitoba

Baird's sparrow (*Ammodramus bairdii*), bobolink (*Dolichonyx oryzivorus*), chestnut-collared longspur, loggerhead shrike (*Lanius ludovicianus excubitorides*), Sprague's pipit, burrowing owl (*Athene cuniculaira*), ferruginous hawk (*Buteo regalis*), and short-eared owl inhabit and breed in grassland. With the exception of short-eared owl, all are at the edge of their ranges in the RAA (K. De Smet pers. comm.). Grassland bird populations are experiencing large declines, mainly due to the loss of native prairie habitat to agriculture (North American Bird Conservation Initiative Canada 2012). Well-managed pasturelands are important for these species, as livestock grazing can maintain suitable grassland habitat (North American Bird Conservation Initiative Canada 2012).

Species profiles on the Species at Risk Public Registry (2017) describe particular breeding habitat for grassland birds. Baird's sparrows select mid-height, native mixed grass habitat with few shrubs. Bobolinks nest in hayfields, pastures, and various grassland habitats, preferably with tall vegetation. Chestnut-collared longspurs prefer to breed in recently mowed or grazed short- or mixed-grass prairie. Grassy areas with a few shrubs or trees are selected by loggerhead shrikes. Sprague's pipits select native grasslands of moderate height with some litter, typically in areas that are not heavily grazed. Hamel and Reimer (2004) observed Sprague's pipits in the open prairies surrounding the Qu'Appelle River valley in 72% of listening stops in appropriate habitat. Burrowing owls prefer open, grazed pastures or agricultural fields. Native grasslands are selected by ferruginous hawks, and aspen parkland is avoided. Short-eared owls select a wider variety of habitats than the other grassland species of conservation concern, mainly open areas such as grasslands, old pastures, tundra, and marshes (Species at Risk Public Registry 2017). The Spy Hill-Ellice Community Pasture is an extensive, intact area with a cattle grazing regime that provides suitable habitat for Baird's sparrow, chestnut-collared longspur, Sprague's pipit, and ferruginous hawk, the latter of which requires expansive open areas for foraging (K. De Smet pers. comm.). Critical habitat for chestnut-collared longspur was partially identified by ECCC (2017a). No critical habitat was specified in Manitoba, as the draft results were limited to southwestern Saskatchewan and not yet applied to all chestnut-collared longspur range.

All but one of the grassland bird populations in the Prairie Pothole Region of Manitoba decreased from 2005 to 2015 (ECCC 2017b). The ferruginous hawk population increased slightly over the ten-year period (ECCC 2017b). While the recognized breeding ranges of burrowing owl and ferruginous hawk include the RAA, and with at least one exception, all recent breeding evidence has been observed outside the RAA in the southwest corner of the province. Circa 2013, an unverified occurrence of a burrowing owl was reported southwest of Birtle along a road allowance that had suitable burrow owl breeding habitat. Mitigation involved establishing artificial nest burrows in an adjacent pasture to provide alternate suitable habitat (K. De Smet pers. comm.). There were no observations of either species in or near the RAA during the Manitoba Breeding Bird Atlas (Manitoba Breeding Bird Atlas 2017). Ferruginous hawk range has contracted since the 1980s. None were observed in the Spy Hill-Ellice Community Pasture during Manitoba Sustainable Development surveys and no nesting activity has been detected (K. De Smet pers. comm.). Sprague's pipits and chestnut-collared longspurs occurred in clusters in the Spy Hill-Ellice Community Pasture in the late 1980s and were so numerous they were difficult to count. These species are currently less widespread but remain in pockets of suitable habitat (K. De Smet pers. comm.). Loggerhead shrikes were found in the Birtle area in the 1980s but not in the community pastures. The lack of suitable nesting shrubs is most likely why they are absent from the pastures (K. De Smet pers. comm.).

The golden-winged warbler (*Vermivora chrysoptera*) inhabits early successional, shrubby areas surrounded by mature forest, including transmission line rights-of-way (Species at Risk Public Registry 2017). Its Manitoba population increased slightly from 2005 to 2015 (ECCC 2017b). Critical habitat for golden-winged warbler was identified by ECCC (2016), none of which is in the RAA. Further, there were no observations of this species in the RAA during the Manitoba Breeding Bird Atlas (Manitoba Breeding Bird Atlas 2017).

Forest-dwelling bird species of conservation concern include barn swallow (*Hirundo rustica*), Canada warbler (*Cardellina canadensis*), eastern wood-pewee (*Contopus virens*), olive-sided flycatcher (*Contopus cooperi*), and red-headed woodpecker (*Melanerpes erythrocephalus*). All populations decreased in the Prairie Pothole Region of Manitoba from 2005 to 2015 (ECCC 2017b). Species profiles on the Species at Risk Public Registry (2017) describe breeding habitat for forest birds. Barn swallows commonly nest on and in structures such as barns, garages, and bridges, and occasionally in caves or ledges on cliff faces. Canada warblers prefer wet mixed forest and riparian shrub forest. Forest clearings and edges and mature stands with open understories are selected by eastern wood-pewees. Open areas such as forest clearings or edges with nearby tall live or dead trees are required by olive-sided flycatchers. Red-headed woodpeckers select a range of habitats including forests, forest edges, pastures, and riparian forests (Species at Risk Public Registry 2017). No Canada warblers were observed in the RAA during the Manitoba Breeding Bird Atlas (Manitoba Breeding Bird Atlas 2017).

Chimney swift, common nighthawk, and eastern whip-poor-will are aerial insectivores that inhabit open forests (Species at Risk Public Registry 2017). These populations are declining more rapidly than other bird groups, mainly due to habitat loss and to pesticides' effects on the abundance of insects (North American Bird Conservation Initiative 2012). The chimney swift in particular has shifted from nesting in hollow logs to chimneys in urban and rural areas, because land clearing activities have limited its natural habitat (Species at Risk Public Registry 2017). There were no observations of this species or of eastern whip-poor-will in the RAA during the Manitoba Breeding Bird Atlas (Manitoba Breeding Bird Atlas 2017).

The breeding ranges of three wetland bird species of conservation concern overlap the RAA. The populations of horned grebe (*Podiceps auritus*) and yellow rail decreased in the Prairie Pothole Region of Manitoba from 2005 to 2015 (ECCC 2017b). Breeding habitat for these species is described by the Species at Risk Public Registry (2017). Horned grebes nest in freshwater ponds, marshes, and lake bays with a combination of open water and emergent vegetation. These water bodies may be in open areas or in forests. Yellow rails nest in shallow, grassy marshes that are mainly found in meadows and damp fields. The bank swallow (*Riparia riparia*) nests in vertical sandy banks along waterbodies and roads, and in sandpits, piles of sand and soil, and quarries. In Canada, 98% of its population has been lost over the last 40 years (Species at Risk Public Registry 2017).

In addition to species protected by the *Species at Risk Act* or by *The Endangered Species and Ecosystems Act*, priority species include those listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). These species may become threatened or endangered due to biological characteristics and identified threats (COSEWIC 2017), but are not protected by the federal or provincial acts. Five other priority species have been identified in the region (Table 7.2-2). Four are listed as Special Concern and one is listed as Threatened. Harris's sparrow (*Zonotrichia querula*) and red-necked phalarope (*Phalaroupus lobatus*) may migrate through the region, but do not breed within.

Table 7.2-2: Other priority bird species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC)	
COSEWIC Listing	**Species**
Special Concern	Evening grosbeak Harris' sparrow Red-necked phalarope Western grebe
Threatened	Lark bunting

7.2.2 Current status

The RAA is in the Aspen Parkland Ecoregion of the Prairies Ecozone and is dominated by agricultural cropland and grassland/rangeland. Deciduous forest is also common (Section 5.2.2). Despite the significance of the large community pastures to a number of rare grassland bird species in Manitoba, there are currently no Important Bird Areas in the RAA.

Of the 281 bird species that could occur in the RAA (including migrants), 130 were observed during field studies (Appendix III, Table 1). Ninety-four were observed during ten-minute breeding bird point counts (Appendix III, Table 2). The mean number of bird species observed per point was greatest in forest habitat, and was least in grassland (Table 7.2-3). The presence of small wetlands in some forested areas east of the Spy Hill-Ellice Community Pasture accounts for observations of waterfowl, other waterbirds, and songbird species such as swamp sparrow (*Melospiza georgiana*), which are typically found in wetlands, in forest habitat.

Many species are initially detected during surveys such as point counts, and then the number of additional species begins to decline as the survey progresses (Ugland et al. 2003). A species accumulation curve shows the relationship between the number of points surveyed and the number of bird species detected. The point at which the curve plateaus (that is, few or no additional species are detected) is an indication that the number of points surveyed has likely been sufficient to estimate species richness (the number of bird species) in an area. Comparing point count effort with the number of bird species detected indicated that 95% of the species in the Spy Hill-Ellice portion of the RAA were observed by approximately the 175th point of the 299 surveyed (Appendix III, Figure 1). The bird community in this area appears to be well defined because the result intersects with the plateau of the species accumulation curve. Adequate sampling also occurred by habitat type in the grassland community and probably the forest and forest-grassland transition habitats (Appendix III, Figure 2). The shrubland community could have been under-sampled because there was no defined plateau in the species accumulation curve.

Seventy-five bird species were observed during three-minute point counts (Appendix III, Table 3). The mean number of species observed per point was greatest in forest/wetland habitat, and was least in agriculture forage (Table 7.2-4).

Table 7.2-3: Bird species observed in four habitat types during ten-minute point counts, June 2017

Habitat	Number of Points	Number of Species	Mean Number of Species
Forest	54	67	14
Forest-grassland transition	50	64	12
Grassland	147	64	7
Shrubland	48	49	8

Table 7.2-4: Bird species observed in four habitat types during three-minute point counts, June 2017

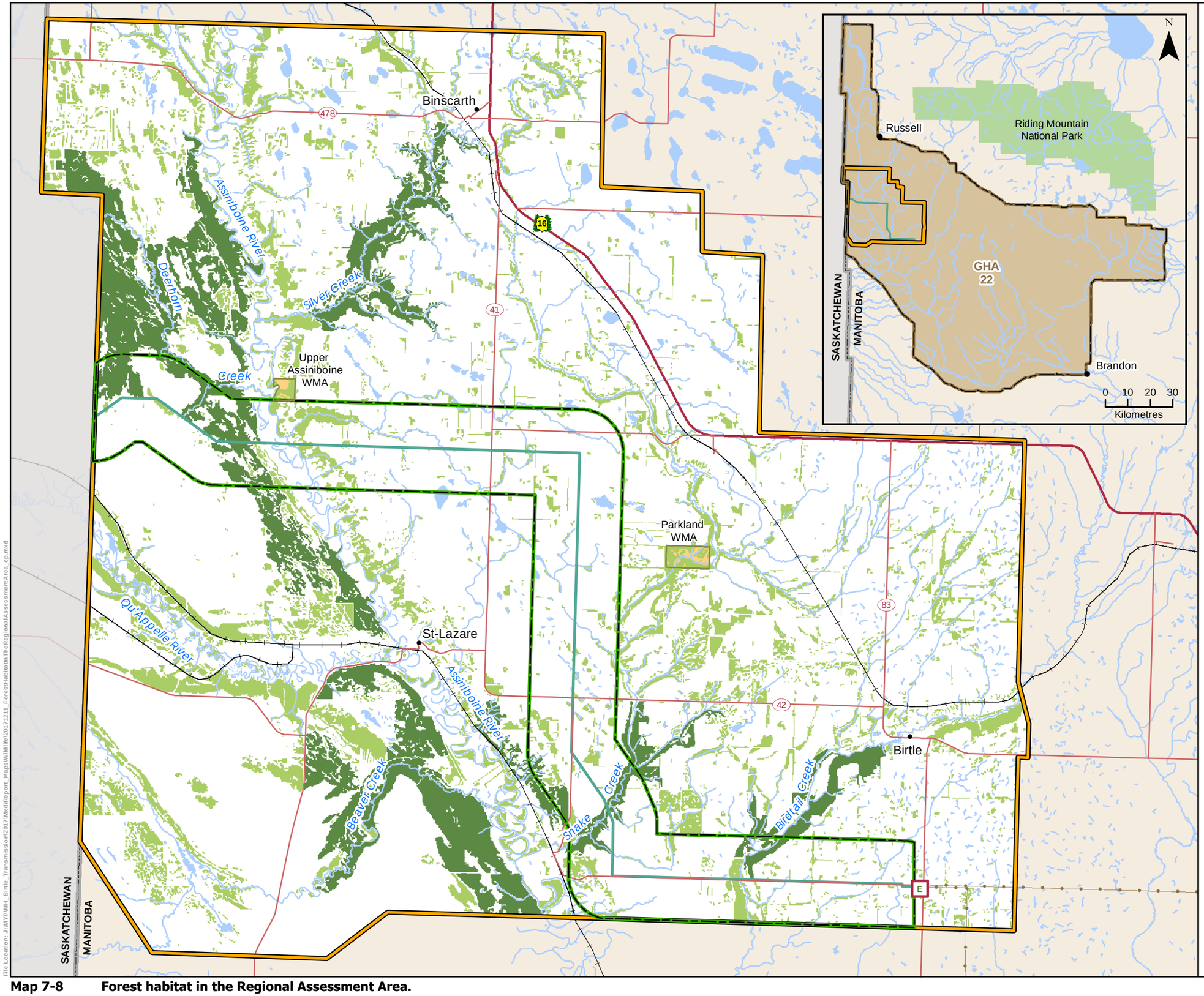
Habitat	Number of Points	Number of Species	Mean Number of Species
Agriculture	38	56	10
Agriculture forage	5	7	5
Forest	14	40	11
Forest/wetland	6	30	12
Grassland	36	53	11

7.2.2.1 Songbirds and other landbirds

Songbirds are a diverse group that includes blackbirds, sparrows, warblers, and wrens, among others (see Appendix III, Table 1). Other landbirds are swifts, hummingbirds, goatsuckers, doves, kingfishers, cuckoos, and woodpeckers. Songbirds and other landbirds occupy a range of habitats, which in the RAA can very generally be described as forest, shrubland, or grassland. Riverbottom forest is important for songbird nesting habitat and for migration (K. De Smet pers. comm.). Habitat edges, such as the transition between forest and grassland, are occupied by some species (e.g., brown-headed cowbird [*Molothrus ater*]) and are avoided by others (e.g., ovenbird [*Seiurus aurocapilla*]) that inhabit closed-canopy forest interiors.

Forest birds have benefited from the woody habitat created by fire suppression and human settlement in the region (North American Bird Conservation Initiative Canada 2012). Ninety-one species of forest songbirds and other landbirds could occupy the RAA. Of these, 48 were observed during field studies. The most commonly observed species during ten-minute and three-minute point counts were American crow (*Corvus brachyrhynchos*), least flycatcher (*Empidonax minimus*), and American goldfinch (*Spinus tristis*), with a total of 294, 257, and 219 detections, respectively. There is a total of 19,156.6 ha of forest habitat in the RAA, 2,392.1 ha of which is in the LAA (Map 7-8).

Brown-headed cowbirds are brood parasites that lay their eggs in other birds' nests and trick them into hatching and caring for their young, often at the expense of the host birds' own offspring (Holland and Taylor 2003). They are a potential source of mortality for species such as sparrows, chestnut-collared longspur, and Sprague's pipit (Shaffer et al. 2003). A total of 100 brown-headed cowbirds were detected during ten- and three-minute point counts, in all habitats but agriculture forage. They were most common in forest (n = 41) and forest-grassland transition (n = 20) habitats, and also in grassland habitat during ten-minute (n = 13) and three-minute (n = 12) point counts (see Appendix III, Table 2 and Table 3).



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North/South Consultants Inc.
Aquatic Environment Specialists

Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Assessment Areas
- Local
- Regional

Habitat
- Forest
- Intact Forest (>200 ha)

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Game Hunting Area (GHA)
- Wildlife Management Area (WMA)
- National/Provincial Park
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 10, 2017

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Forest Habitat in the Regional Assessment Area

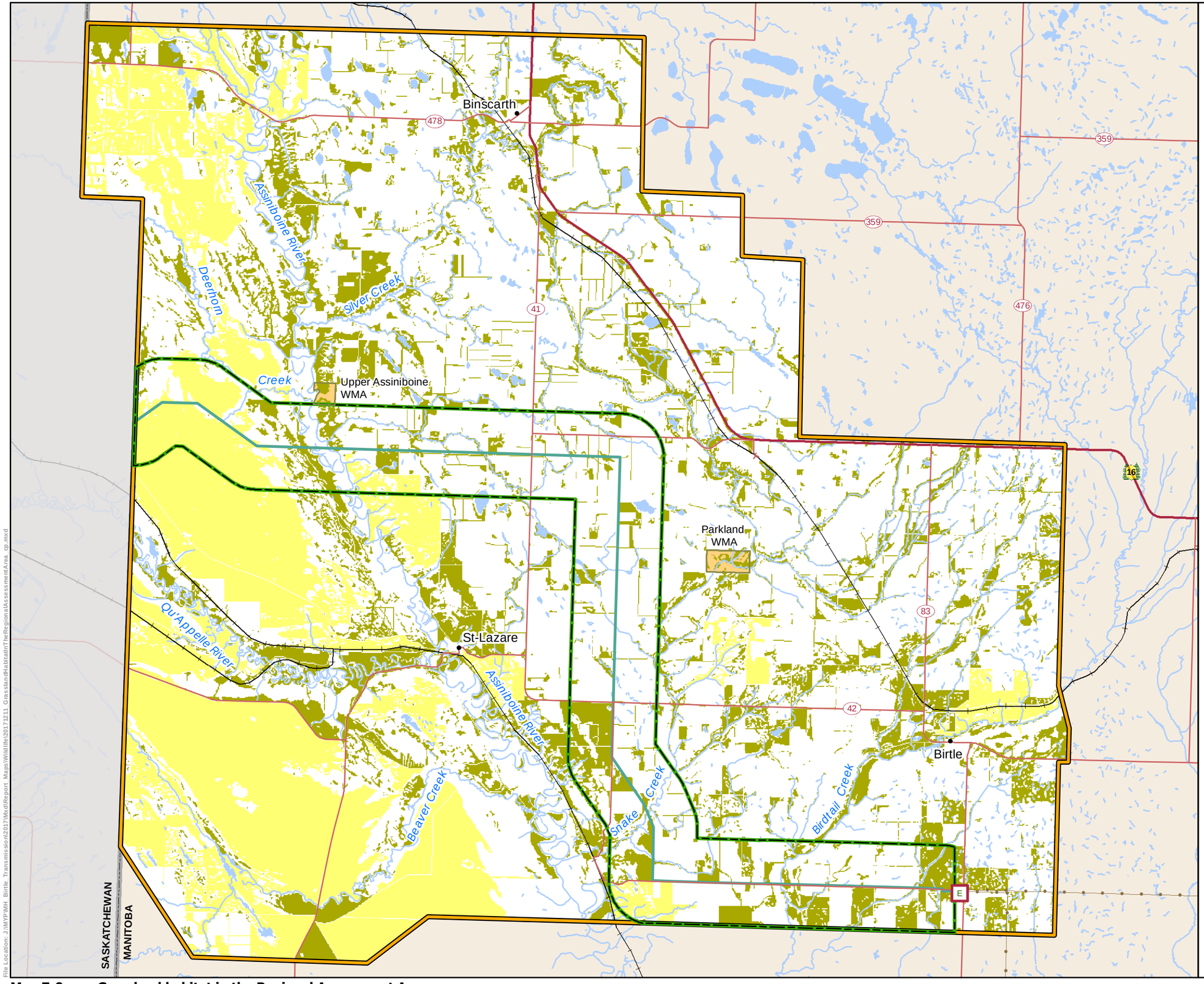
Map 7-8 Forest habitat in the Regional Assessment Area.

7.2.2.1.1 Priority grassland songbirds

There is a total of 32,648.7 ha of grassland habitat in the RAA (Photographs 7-3 to 7-5), 4,387 of which is in the LAA (Map 7-9). Sixty-nine chestnut-collared longspurs were observed during field studies, all during ten-minute point counts. All but one of the 143 Sprague's pipits observed were detected during ten-minute point counts; a single individual was counted during three-minute point counts. Most of the two priority grassland species were observed in grassland habitat (Table 7.2-5). A few were observed in forest-grassland transition and shrubland habitat and none were observed in forest. Both species were detected at 21 points, 20 in grassland and one in forest-grassland transition habitat. There were no observations of either species at 189 points (Map 7-10), all of which were in forest or forest-grassland transition habitat.

Photograph 7-3: Short grassland habitat in the Regional Assessment Area.

Photography 7-4: Moderate grassland habitat in the Regional Assessment Area.



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Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Assessment Areas
- Local
- Regional

Habitat
- Grassland
- Intact Grassland

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Wildlife Management Area (WMA)
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 10, 2017

N

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Grassland Habitat in the Regional Assessment Area

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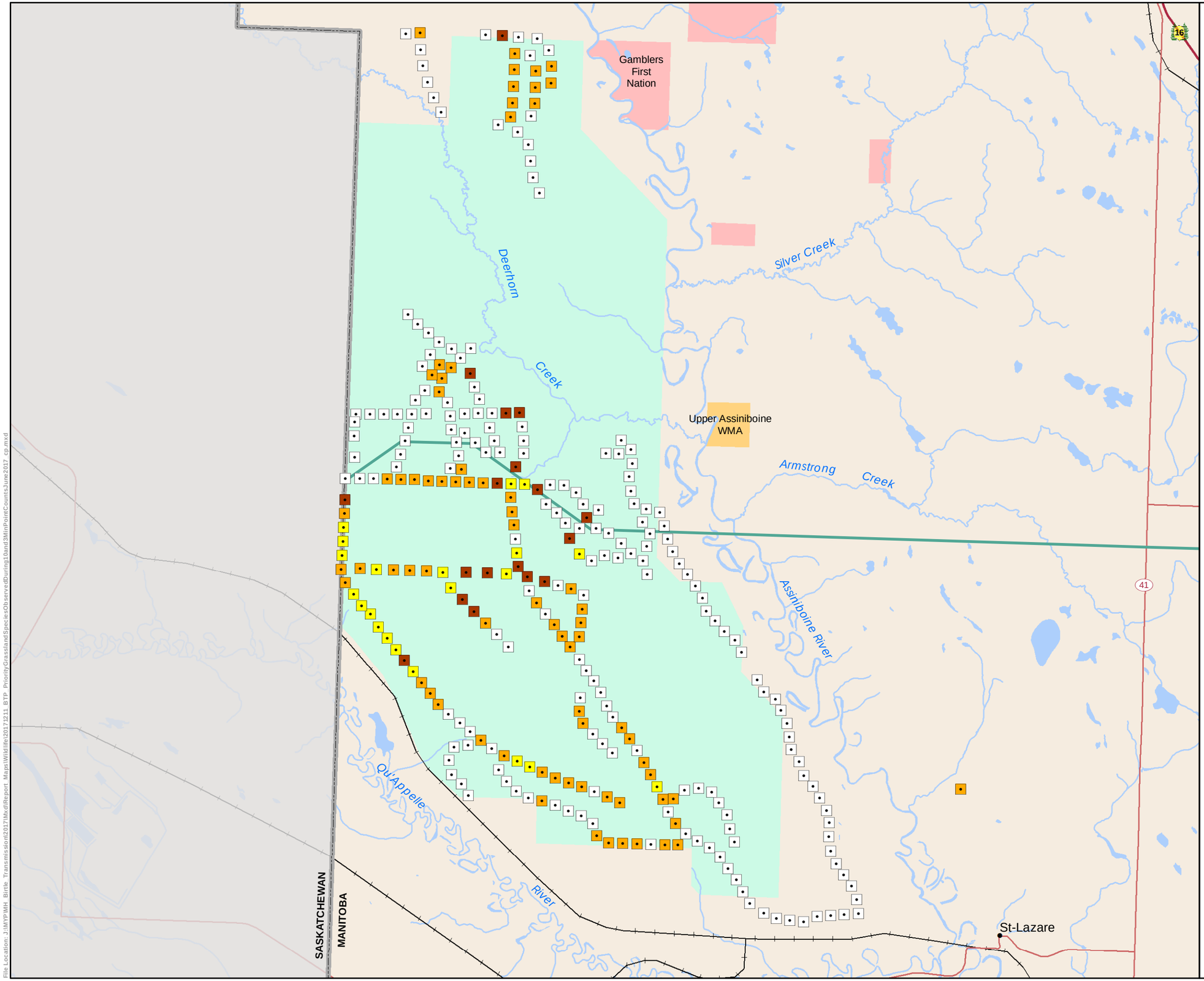
Map 7-9 Grassland habitat in the Regional Assessment Area.



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Birtle Transmission Project

Project Infrastructure
- Final Preferred Route

Species Observed
- Sprague's pipit
- Chestnut-collared longspur
- Both
- Neither

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Community Pasture
- First Nation
- Wildlife Management Area (WMA)
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN, WRCS
Date: December 10, 2017

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0 0.5 1 1.5 Miles

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Priority Grassland Species Observed During Ten-and Three-Minute Point Counts June 2017

Map 7-10 Priority grassland species observed during ten- and three-minute point counts, June 2017.

Photograph 7-5: Moderate to tall grassland habitat in the Regional Assessment Area.

Table 7.2-5: Chestnut-collared longspurs and Sprague's pipits observed in four habitat types during ten-minute point counts, June 2017

	Chestnut-collared Longspur		Sprague's Pipit	
Habitat	**Number of Individuals**	**Percentage of Individuals**	**Number of Individuals**	**Percentage of Individuals**
Forest	0	0	0	0
Forest-grassland transition	5	7	3	2
Grassland	61	88	109	77
Shrubland	3	4	30	21

Although detailed results are not yet available, concurrent Manitoba Conservation Data Centre studies in the Spy Hill-Ellice Community Pasture in June 2017, also found large numbers of chestnut-collared longspurs and Sprague's pipits in grassland habitats (C. Artuso, pers. comm.).

7.2.2.2 Raptors

Raptors are birds of prey that hunt and feed on animals such as rodents, birds, and fish (Photograph 7-6). The Qu'Appelle and Assiniboine river area is a migration corridor for raptors, but is not as heavily travelled as areas further south due to its more northern location (K. DeSmet pers. comm.). Of the 28 species that could occur in the RAA, six were observed during the raptor migration surveys in 2016 and 2017. Bald eagle (*Haliaeetus lecocephalis*; n = 83) and red-tailed hawk (*Buteo jamaicensis*; n = 33) were the most common in 2016 and red-tailed hawk (n = 25) and northern harrier (*Circus cyaneus*; n = 13) were the most common in 2017. Less common species were turkey vulture (*Carhartes aura*) with six observations in 2017 and American kestrel (*Falco sparveriusI*) with one observation in 2016.

Photograph 7-6: Raptor observed during migration survey, April 2016.

The greatest number of raptors (n = 35) was observed at a site west of St. Lazare, near the confluence of the Qu'Appelle and Assiniboine rivers in 2016 (Map 7-11). The fewest (n = 4) were observed at the same site in 2017. Relatively few (n = 9) raptors were observed at the site where the preferred route crosses Birdtail Creek. Twenty stick nests were observed incidentally during field studies (Map 7-11), ten of which were recorded as unoccupied.

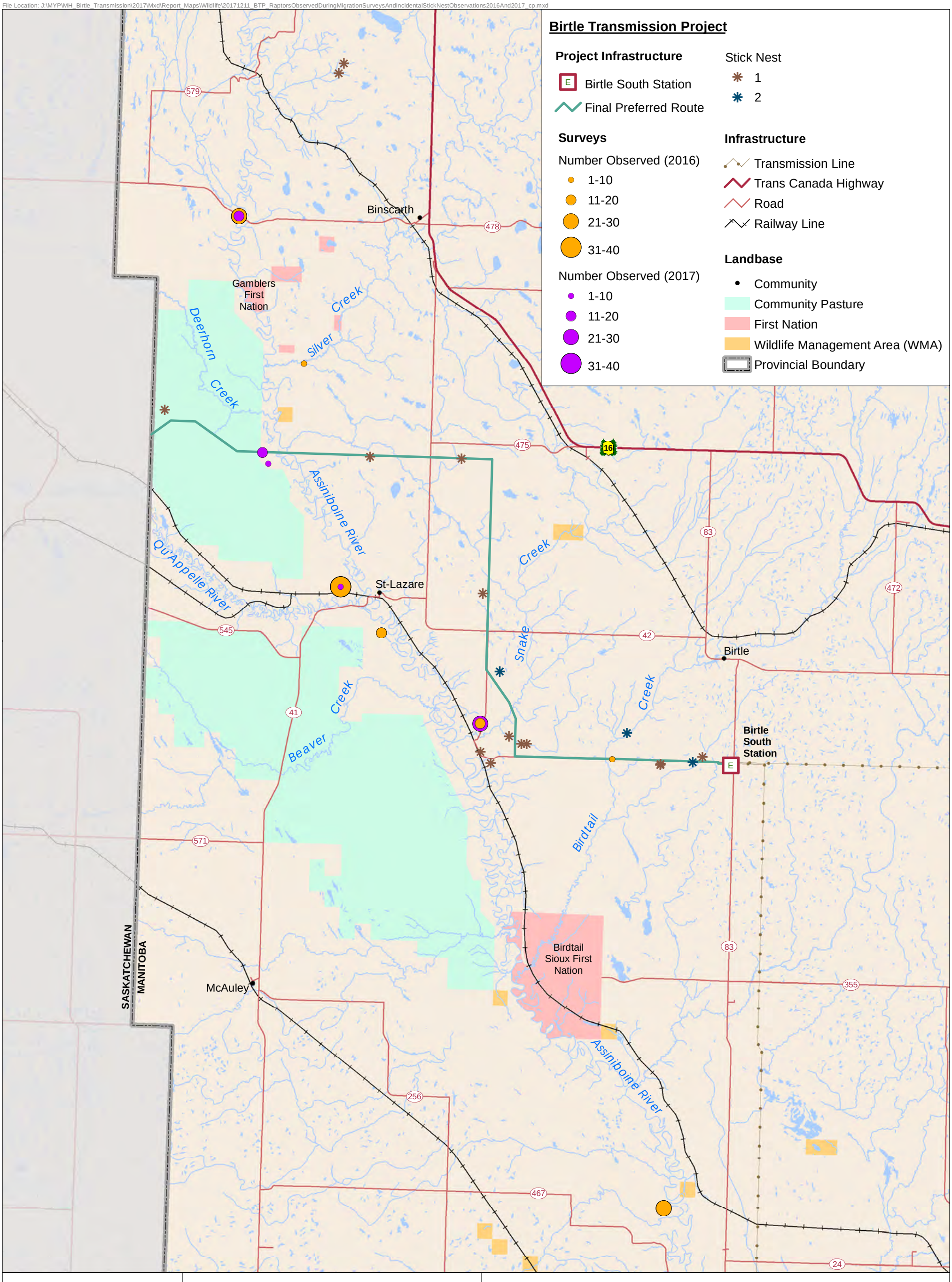
7.2.2.3 Upland game birds

Six species of upland game birds could occur in the region (see Appendix III, Table 1). Three species of grouse, sharp-tailed, ruffed (*Bonasa umbellus*), and spruce (*Falcipennis canadensis*) are year-round residents. Some members of Gambler First Nation noted that prairie chickens, or grouse, are harvested in the region (Manitoba Hydro 2017a).

The sharp-tailed grouse typically inhabits grasslands and aspen parkland (Taylor 2003). In spring, sharp-tailed grouse assemble at grassy areas called leks to mate (Baydack 1988). Nearby forest or shrubs are important for cover (Baydack 1988). All of these habitats are present in the region. Males dance, coo, and rattle to attract females during the spring breeding season (Connelly et al. 1998).

Thirty potential sharp-tailed grouse leks were identified during the aerial survey. Ground surveys were conducted at 17 of these sites and at 22 additional sites. In all, 29 leks, four of which may be satellites, were identified in the RAA (Map 7-12). When the best count at each lek (i.e., the greatest number) from either the aerial or ground survey was considered, a total of 185 sharp-tailed grouse were observed, including 10 observed at a lek near Birtle South station. Thirteen leks were within 1 km of the final preferred route centreline, one of which was directly on it.

File Location: J:\MYP\MH_Birtle_Transmission\2017\Mxd\Report_Maps\Wildlife\20171211_BTP_RaptorsObservedDuringMigrationSurveysAndIncidentalStickNestObservations2016And2017_cp.mxd



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Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 11, 2017

N

0 2.5 5 10 Kilometres
0 2.5 5 Miles

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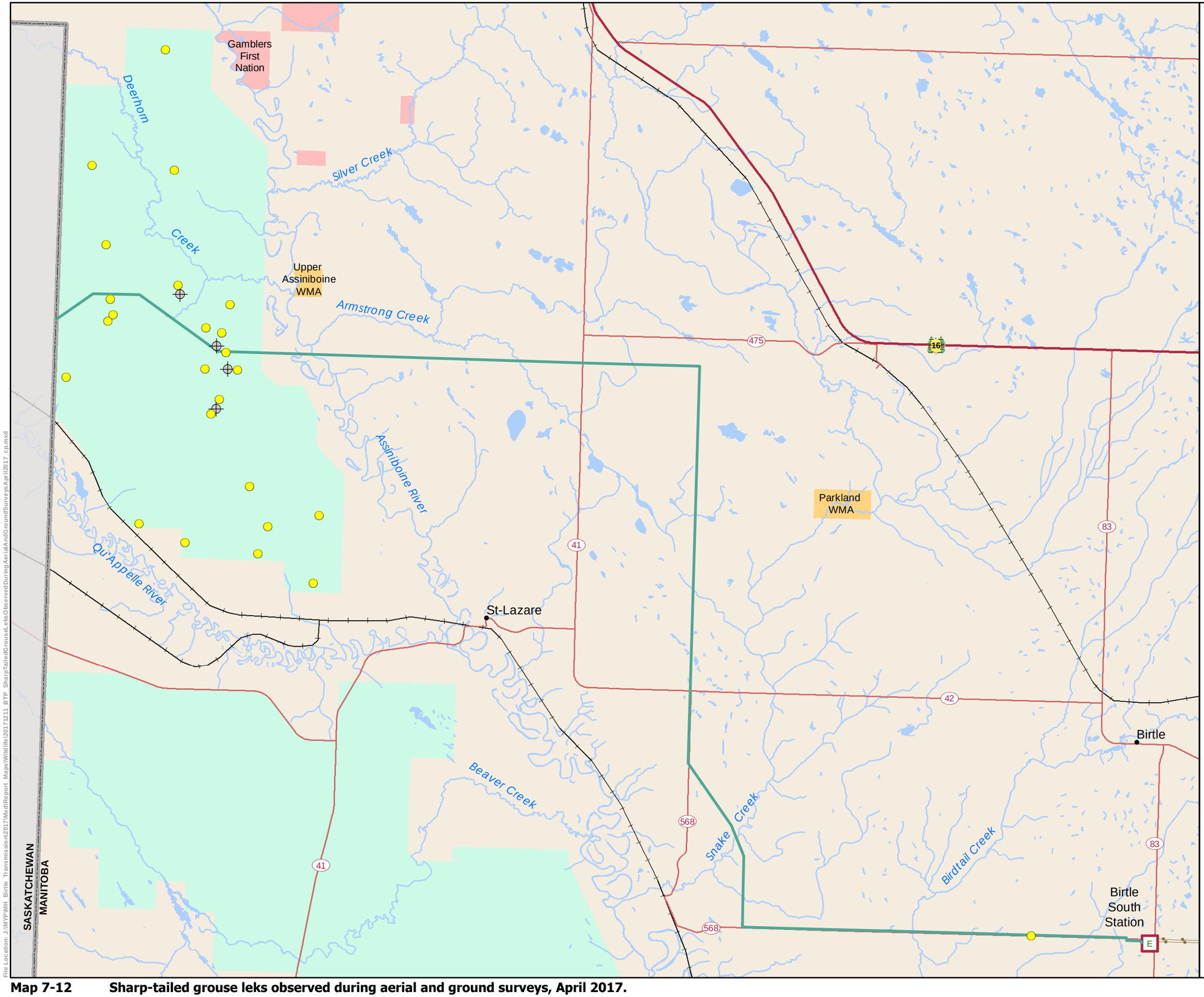
Raptors Observed During Migration Surveys and Incidental Stick Nest Observations

2016 and 2017

Map 7-11 Raptors observed during migration surveys and incidental stick nest observations, 2016 and 2017.



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Aquatic Environment Specialists

Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Survey
- Lek
- Satellite

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Community Pasture
- First Nation
- Wildlife Management Area (WMA)
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN, WRCS
Date: December 10, 2017

N

0 1 2 3 4 Kilometres
0 1 2 Miles

1:102,000

Sharp-tailed Grouse Leks Observed During Aerial and Ground Surveys
April 2017

Map 7-12 Sharp-tailed grouse leks observed during aerial and ground surveys, April 2017.

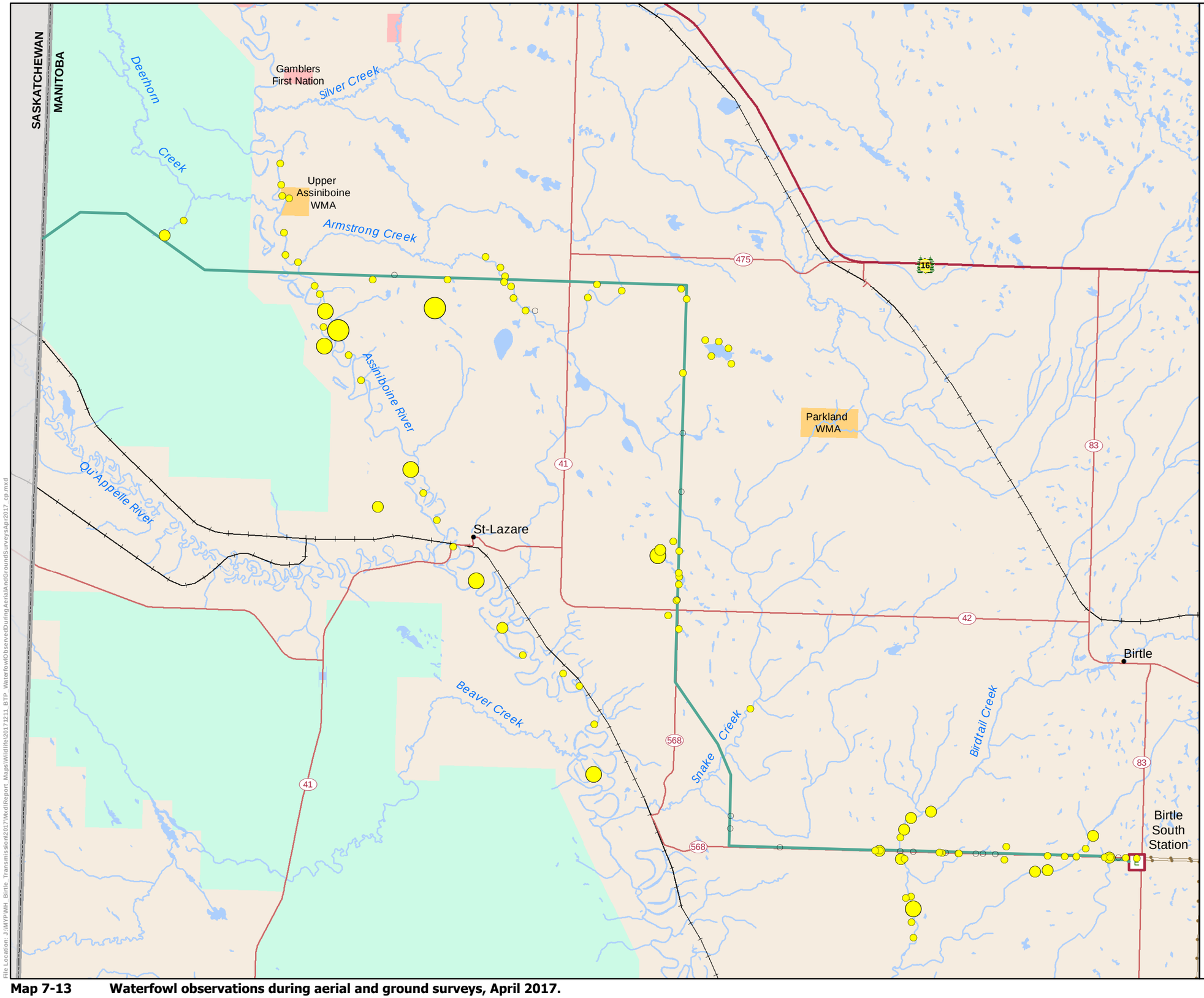
7.2.2.4 Waterfowl and other waterbirds

Waterfowl include ducks, geese, mergansers, and swans, most of which require wetlands or other water bodies for breeding (Photo 7-7). There are 2,722.6 ha of wetlands (marsh and fens, treed and open bog) in the RAA and 299.99 ha in the LAA. Wetland degradation has been a threat to many bird species in the Prairie Pothole Region (Environment Canada 2013a). However, the populations of many species of waterfowl are currently stable or increasing, due primarily to wetland conservation efforts (Environment Canada 2013a).

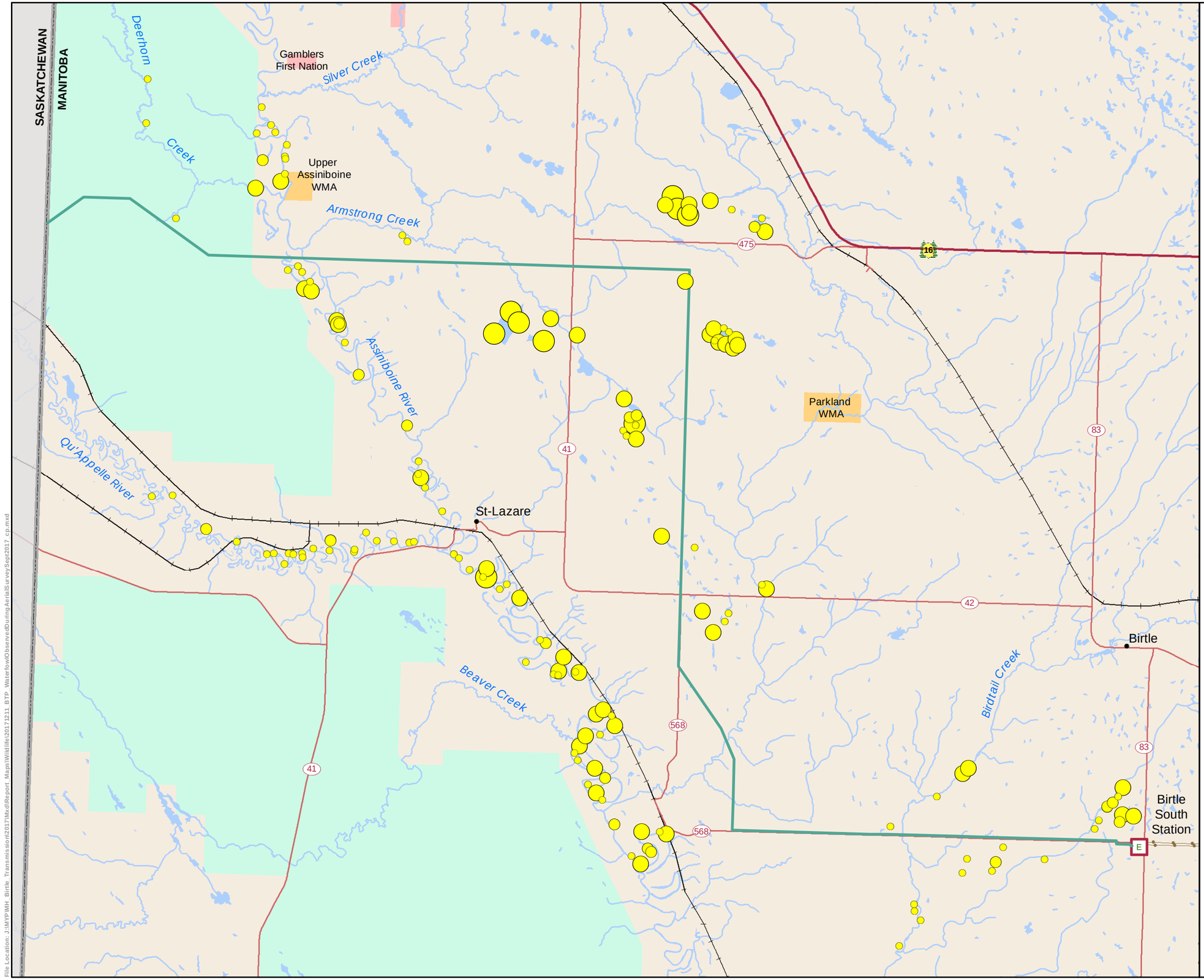
Photograph 7-7: Waterfowl observed during aerial survey, September 2017.

Fourteen species were observed during the aerial survey for waterfowl, the most common of which were mallard (*Anas platyrhynchos*; n = 525) and Canada goose (*Branta canadensis*; n = 108). During the ground survey, fewer than 20 individuals were typically observed at each site. Seven species were identified, the most common of which was mallard (n = 27). Areas with the largest concentrations of waterfowl (n ≥ 20) were generally along the Assiniboine River, where the largest number observed was 112 (Map 7-13). Approximately two hundred ducks were observed at a site northwest of Falloons Lake. Although most appeared to be mallards, this group was not identified to species. Two blue-winged teals (*Anas discors*) were also observed at the site. The density of waterfowl was greatest in marsh habitat (Table 7.2-6).

Twelve species were identified during the fall aerial survey for waterfowl, the most common of which were Canada goose (n = 2,270) and mallard (n = 475). Areas with the largest concentrations of waterfowl (n > 100) were generally marshes, where the largest number observed was approximately 530 dabbling duck species, including mallard and blue-winged teal, in a wetland northeast of St. Lazare (Map 7-14). The density of waterfowl was greatest in marsh habitat (Table 7.2-6).



Map 7-13 Waterfowl observations during aerial and ground surveys, April 2017.



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Birtle Transmission Project

Project Infrastructure

- Birtle South Station
- Final Preferred Route

Surveys

Number Observed

- 1-10
- 11-20
- 21-100
- > 100

Infrastructure

- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase

- Community
- Community Pasture
- First Nation
- Wildlife Management Area (WMA)
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN, WRCS
Date: December 10, 2017

N

0 1 2 3 4 Kilometres
0 1 2 Miles

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Waterfowl Observed During Aerial Survey
September 2017

File Location: J:\MYP\MM_Birtle_Transmission\2017\Mxd\Report_Maps\Wildlife\20171211_BTP_WaterfowlObservedDuringAerialSurveySept2017_cp.mxd

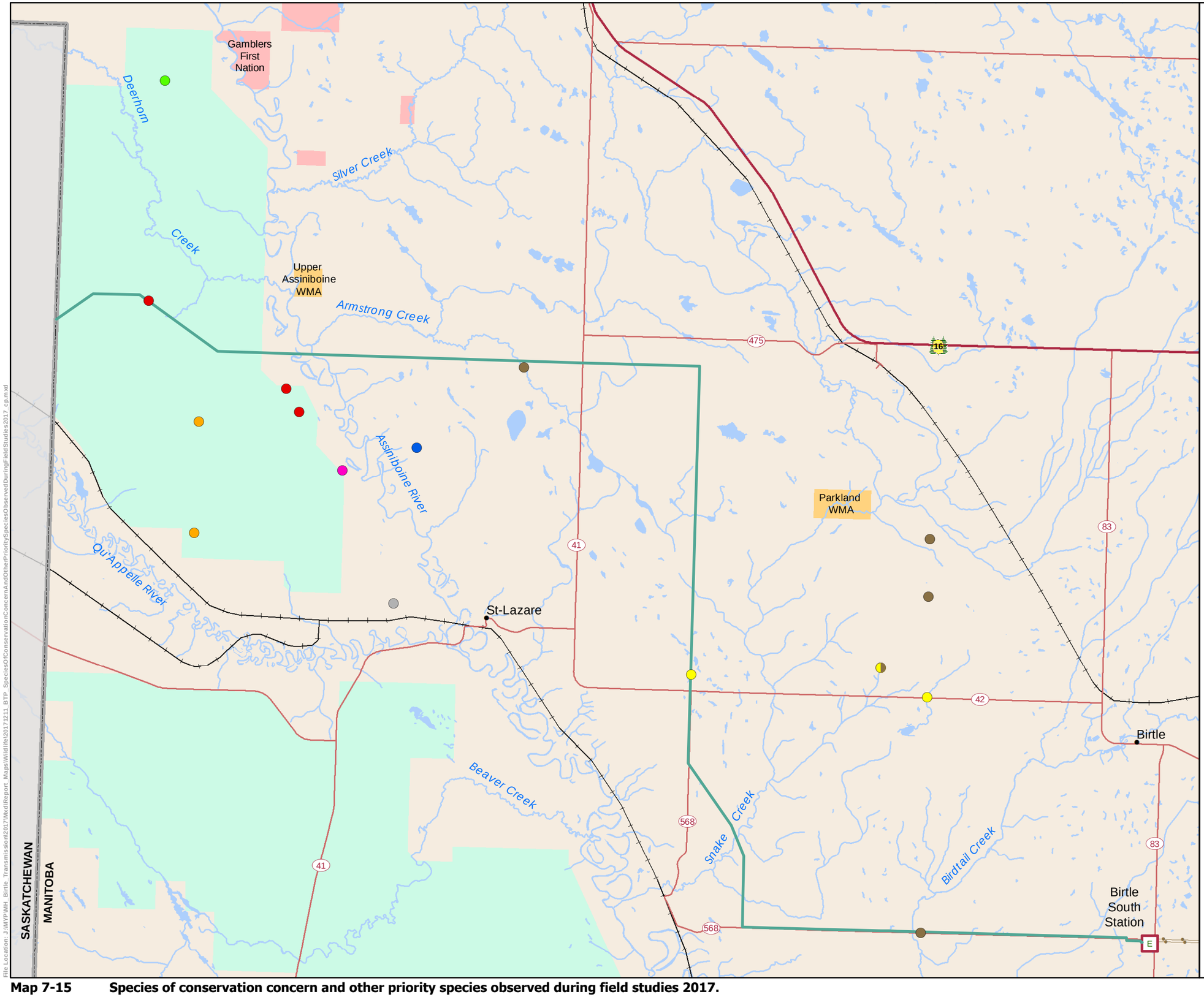
Map 7-14 Waterfowl observed during aerial survey, September 2017.

Table 7.2-6: Density of waterfowl observed in water habitat, spring and fall 2017						
	Spring			Fall		
Type of Habitat	Distance surveyed (km)	Number Observed	Density of Waterfowl (individuals/km)	Distance surveyed (km)	Number Observed	Density of Waterfowl (individuals/km)
Lake-intermittent	1.8	11	6.1	4.4	21	4.8
Lake - perennial	11.8	23	1.9	17.5	369	21.1
Marsh	21.7	228	10.5	40.8	2,980	73.0
River/stream - intermittent	14.4	62	4.3	30.2	201	6.7
River/stream - perennial	102.9	508	4.9	190.7	1,375	7.2
Total	152.7	832	5.4	283.6	4,946	17.4

7.2.2.5 Priority species

Eight species of conservation concern other than priority grassland species were observed during field studies and three more were observed incidentally (Table 7.2-7, Map 7-15). Few Baird's sparrows, a grassland bird species, were detected in the RAA, including in the Spy Hill-Ellice Community Pasture.

Table 7.2-7: Priority bird species observed in 2017			
Priority Species	Species	Total Number Observed During Field Studies	Total Number Observed Incidentally
Species of conservation concern	Baird's sparrow	2	0
	Bank swallow	0	0
	Barn swallow	13	1
	Bobolink	4	4
	Burrowing owl	0	0
	Canada warbler	1	0
	Chimney swift	0	0
	Common nighthawk	1	6
	Eastern whip-poor-will	3	0
	Eastern wood-pewee	1	1
	Ferruginous hawk	0	0
	Golden-winged warbler	0	0
	Horned grebe	0	1
	Loggerhead shrike	0	1
	Olive-sided flycatcher	1	1
	Red-headed woodpecker	0	0
	Short-eared owl	0	2
	Yellow rail	0	0
Other priority species	Evening grosbeak	0	0
	Harris' sparrow	0	0
	Lark bunting	0	0
	Red-necked phalarope	0	0
	Western grebe	0	0



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North/South Consultants Inc.
Aquatic Environment Specialists

Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Species of Conservation Concern
- Baird's sparrow
- Canada warbler
- Common nighthawk
- Eastern whip-poor-will
- Olive-sided flycatcher

Other Priority Species
- Barn swallow
- Bobolink
- Barn Swallow and Bobolink
- Eastern wood-pewee

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Community Pasture
- First Nation
- Wildlife Management Area (WMA)
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN, WRCS
Date: December 10, 2017

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Species of Conservation Concern and Other Priority Species Observed During Field Studies 2017

Map 7-15 **Species of conservation concern and other priority species observed during field studies 2017.**

Relatively large numbers have been detected in the Ellice-Archie Community Pasture compared with the Spy Hill-Ellice Community Pasture (C. Artuso pers. comm.), suggesting that grassland quality may be different in the two areas. Common nighthawk and eastern whip-poor-will were both detected in low numbers during field surveys, and it is possible that a small population of each resides in the RAA.

7.3 Pathways of effect

Potential pathways of effects on birds include habitat loss or alteration, increased mortality, and disturbance and displacement due to construction and maintenance activities. Potential effects on bird species that migrate through but do not breed in the affected area would likely be minimal.

Habitat loss or alteration

Habitat loss or alteration occurs where transmission line rights-of-way are cleared and where towers are constructed. Habitat alteration could benefit species such as song sparrow (*Melospiza melodia*) that select edge habitat and chestnut-sided warbler (*Setophaga pensylvanica*), which prefers the shrubby, early successional habitat that often regenerates on transmission line rights-of-way. Habitat generalists like chipping sparrow (*Spizella passerina*) would likely be less affected than habitat specialists that include Baird's sparrow, chestnut-collared longspur, and Sprague's pipit (Unruh 2015).

Effects of habitat alteration in grasslands on grassland birds vary by species and depend mainly on the height of vegetation on the right-of-way. Vegetation height is an important characteristic of habitat selected by grassland bird species (see Section 7.2.2.1), with the height of vegetation determining the composition of species in the bird community. For example, well-managed pasturelands are important for these species, as livestock grazing can maintain suitable grassland habitat (North American Bird Conservation Initiative Canada 2012). Effects of habitat loss or alteration on forest birds are likely mainly due to the loss of forest habitat along portions of a transmission line route.

Increased Mortality

Increased susceptibility to predation by land and avian predators and collisions with transmission wires could increase bird mortality. During construction of transmission projects, the risk of bird mortality due to collisions with vehicles could increase because of increased construction traffic. Songbirds appear to be the most susceptible to collisions with vehicles (Ashley and Robinson 1996; Bishop and Brogan 2013).

During transmission line operation, increased mortality due to collisions with transmission wires could affect birds. Large, heavy-bodied birds with limited manoeuvrability are at risk of collisions with transmission lines (e.g., Bevanger 1998; Avian Power Line Interaction Committee [APLIC] 2012). Waterbirds such as cranes, waterfowl such as ducks, and upland game birds such as grouse are particularly susceptible (Bevanger 1998). Some behaviours are also associated with

increased collision risk, but to a lesser extent. Examples include flocking and spending substantial amounts of time in flight, as with gulls and terns (APLIC 2012). Even raptors with good vision and manoeuvrability such as northern goshawk (*Accipiter gentilis*) may be susceptible to collisions with transmission wires, due to their speed in flight (APLIC 2012). Monitoring for transmission lines in northern Manitoba has recently been conducted. Bird collision mortality for the Wuskwatim outlet transmission lines was estimated at 43.10 birds/km during the breeding bird season and 21.55 birds/km during the fall migration period, similar rates to other collision studies (Manitoba Hydro unpublished report). Bird collision mortality for the Keeyask Transmission Project was estimated at 10.80 birds/km in the late breeding season and 10.32 birds/km during the fall migration period, which was lower than rates reported in the literature (Manitoba Hydro 2017b).

Predation is a substantial source of mortality and reproductive failure in grassland bird species (Unruh 2015). During operation, increased predation on some bird species could lead to increased mortality. Transmission towers could create perches or nesting sites (Steenhoff et al. 1993; K. De Smet pers. comm.) from which raptors hunt (Keough and Conover 2012; Hovick et al. 2014). These new perches could increase the mortality of prey species such as sharp-tailed grouse, particularly if perches are near leks. Nest predation by avian and terrestrial predators could affect the reproductive success of some bird species (Donovan et al. 1997).

In addition to nest predation, brood parasitism by brown-headed cowbirds is a potential source of reduced reproductive success for some birds (e.g., Shaffer et al. 2003; Rasmussen and Sealey 2006; Ludlow et al. 2014; K. De Smet pers. comm.). Project effects on habitat that benefit brown-headed cowbirds, which occupy a range of habitats including grasslands and forest edges in fragmented habitat (Donovan et al. 1997), could result in reduced nesting success for other songbirds, including priority grassland species.

Transmission line right-of-way clearing could result in improved access by hunters into some areas and possibly lead to increased mortality of harvested species of upland game birds and waterfowl and other waterbirds.

Disturbance and Displacement

In addition to the direct loss of habitat, potential pathways of effect include sensory disturbance that results in the displacement of some birds. There is uncertainty concerning how sensory disturbance may affect grassland bird populations (K. De Smet pers. comm.). Grassland birds may avoid areas with human disturbance; chestnut-collared longspur and Sprague's pipit, both species of conservation concern, are moderately tolerant and intolerant of disturbance, respectively (Hamilton et al. 2011). Some species such as savannah sparrow (*Passerculus sandwichensis*) are more sensitive to the presence of infrastructure than to noise (Bernath-Plaisted and Koper 2016). Noise disturbance during construction could result in birds avoiding otherwise suitable habitat, and the presence of machinery and construction workers could bring about changes in their daily movements. Noise from helicopters used during field studies, during tower construction, and for maintenance activities during operation could cause temporary

disturbances to birds in the vicinity, particularly during sensitive periods like the breeding bird season. The pathways of effect will vary by habitat occupied by birds, and by species.

8.0 Mammals

In order to assess potential Project effects on mammals, baseline field studies were conducted in the region where the Project is to be constructed. The future right-of-way was described as the Project Footprint, which is approximately 185 ha (hectares) in area and is where most direct effects are expected to occur (Map 8-1). A one-mile buffer surrounding the centreline was defined as the Local Assessment Area (LAA), which is 14,624 ha in size and where indirect Project effects on mammals could occur (Map 8-1). A Regional Assessment Area (RAA) 96,915 ha in size encompasses the nested Project Footprint and LAA, and defines the area where population-level effects on mammals could occur.

The RAA is highly fragmented, particularly east of the Assiniboine River, and is dominated by agricultural lands and residential areas. Conversely, west of the Assiniboine River in the St. Lazare Area of Manitoba, the Qu'Appelle River Valley is a biodiversity hotspot (Hamel and Reimer 2004). GIS measurements indicate there are approximately 834 km of linear features including roads, railways, and transmission lines within, for a density of 0.66 km/km². Linear feature density west of the Assiniboine River is 0.28 km/km² and east of the river is 0.84 km/km². Intact habitat (forest and grassland/rangeland) is defined as patches of habitat at least 200 ha in size (Environment Canada 2013a). Most of the intact habitat in the RAA is within the Spy Hill-Ellice Community Pasture, west of the Assiniboine River. There are currently 14 patches of intact forest habitat and 22 patches of intact grassland/rangeland habitat in the RAA. Intact forest patches range in size from 212 to 1,621 ha, and intact grassland patches range from 202 to 4,550 ha.

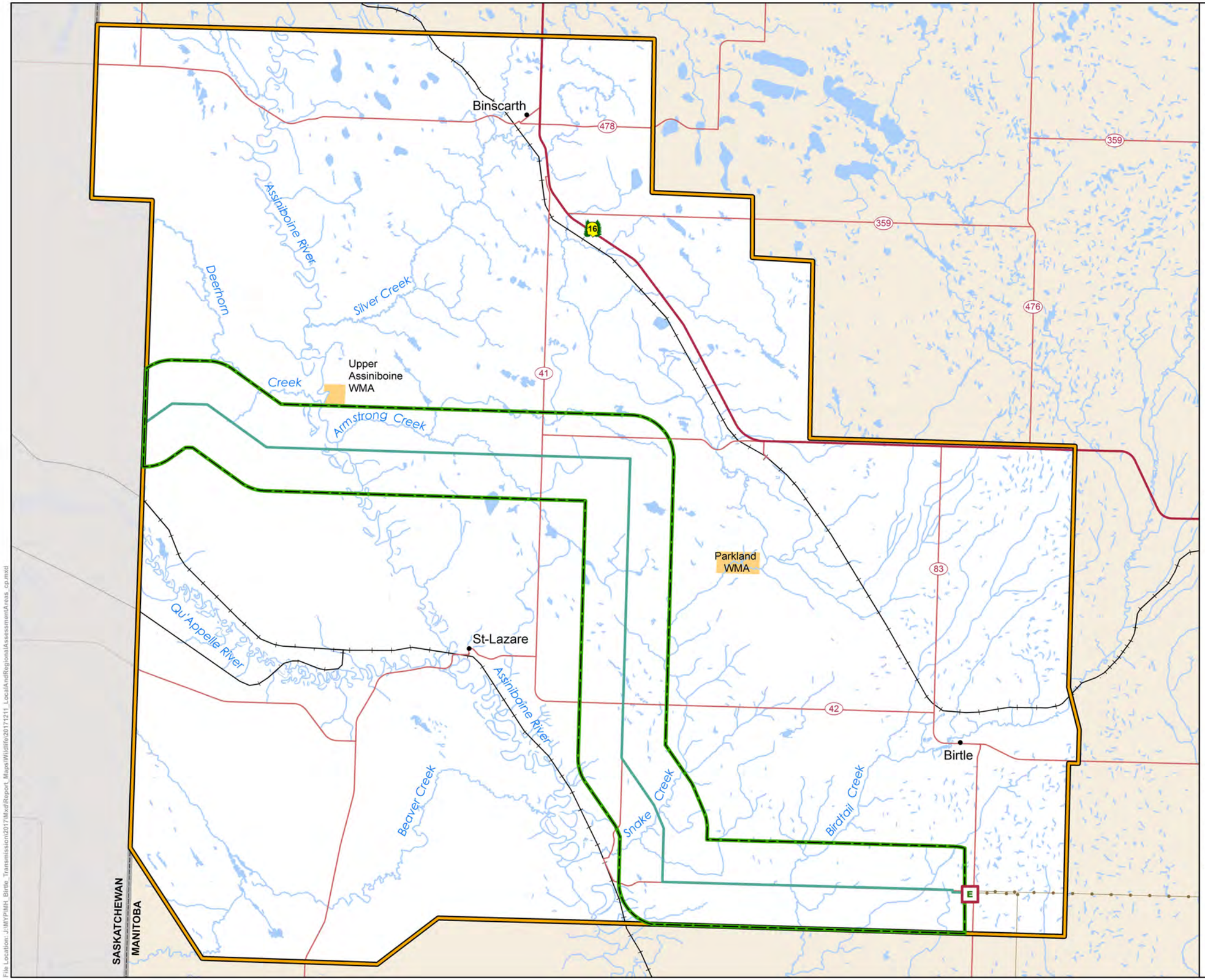
8.1 Methods and data sources

8.1.1 Literature review

Numerous sources were consulted to obtain information regarding mammal species in the Regional Study Area, including:

- The Species at Risk Public Registry (Government of Canada 2017), to identify mammals listed under the federal *Species at Risk Act* (SARA; Government of Canada 2002) that could occur in the RAA;
- Recovery strategies for species listed under the *Species at Risk Act* that could occur in the RAA, to identify habitat requirements for mammals of conservation concern;
- The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) list of Canadian wildlife species at risk (COSEWIC 2016), to identify mammals of conservation concern that have not been listed under the *Species at Risk Act* that could occur in the RAA;
- *The Endangered Species and Ecosystems Act* of Manitoba (Government of Manitoba 2015), to identify provincially listed mammals of conservation concern that could occur in the RAA;

  Smithsonian National Museum of Natural History (2017) website was reviewed to determine which mammal species were present in the RAA;



North/South Consultants Inc.
Aquatic Environment Specialists

Birtle Transmission Project

Project Infrastructure
- E — Birtle South Station
- Final Preferred Route

Assessment Areas
- Local
- Regional

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Wildlife Management Area (WMA)
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 11, 2017

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Local and Regional Assessment Areas

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Map 8-1 Local and Regional Assessment Areas.

- The Manitoba Mineral Resources (2017), Resource Development interactive map, to determine if active or abandoned mines or shafts were present in the RAA that could provide potential bat hibernacula; [
- The Manitoba Conservation Data Centre (Manitoba Sustainable Development 2016), to obtain the status of mammal species within the province and to identify historic records of mammal species in the RAA;
- Manitoba Sustainable Development (Manitoba Sustainable Development n.d.[a, b, c]) website was reviewed to obtain general species information and population numbers;
- Manitoba Hunting Guide (Manitoba Sustainable Development 2017), to determine the Game Hunting Areas (GHAs) that overlap the RAA; and
- Reports produced by Manitoba Sustainable Development (Chranowski 2001; Krause-Danielson and Harriman 2015, to obtain data from aerial surveys conducted in the area.

8.1.2 Engagement process information

Public and Indigenous engagement processes were undertaken to collect feedback to assist in the determination of a preferred route and to enhance environmental assessment work. The engagement process included two rounds to gather and understand local interests and concerns from potentially affected landowners, stakeholders, and local community members. Manitoba Hydro engaged Canupawakpa Dakota Nation, Gambler First Nation, and Waywayseecappo First Nation in late 2016 and 2017 to share project information, obtain feedback for use in the environmental assessment process, gather and understand local interests and concerns. As part of the engagement process, Manitoba Hydro held values and interests workshops with Canupawakpa Dakota Nation, Gambler First Nation and Waywayseecappo First Nation (Manitoba Hydro 2017 a, b, c) The Metis Land Use and Occupancy Study: Baseline Information was reviewed to provide information about the Manitoba Metis Community's use of the area surrounding the proposed Project route (MNP LLP 2017). The resulting draft reports were reviewed and information relative to mammals was incorporated into the existing environment where possible.

8.1.3 Field studies (reconnaissance and detailed surveys)

8.1.3.1 Ungulate aerial survey

An aerial survey for ungulates was conducted March 2 and 3, 2016 following the previously established survey routes of Manitoba Sustainable Development's chronic wasting disease monitoring (B. Kiss pers. comm.). Survey methodology was similar to what is conducted by Manitoba Sustainable Development. The purpose of the survey was to determine ungulate habitat use in winter within the RAA. The survey covered 728 km^2 within the southern portion of GHA 22 (Map 8-2). The survey was conducted in a Bell Jet Ranger 206 helicopter with three crew and pilot that travelled at a speed of 110 km/hr at about 125 metres (m) above ground level. Transects followed a north-south path and were spaced 500 m apart. All observed ungulate and large predator species in the survey area were counted.

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Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Surveys
- Aerial Survey Area

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Community Pasture
- First Nation
- Wildlife Management Area (WMA)
- Provincial Boundary

Assiniboine River
Binscarth
478
Gamblers First Nation
Deerhorn Creek
Silver Creek
16
Armstrong Ck.
475
Falloons Lake
Qu'Appelle River
St-Lazare
41
545
42
Birtle
568
Beaver Creek
Assiniboine River
Birdtail Creek
Birtle South Station
83
571
Birdtail Sioux First Nation
SASKATCHEWAN
MANITOBA
McAuley

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Aquatic Environment Specialists

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 10, 2017

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Ungulate Aerial Survey 2016

Map 8-2 Ungulate aerial survey 2016.

8.1.3.2 Ground tracking survey

In August 2017, a tracking survey was conducted to determine the presence and general habitat use of ungulates and other mammals in the western half of the RAA, with a focus on the final preferred route during summer (Map 8-3). Tracking transects were established in grassland-dominated habitat and forest-dominated habitat to compare the summer-fall use of ungulates in these areas. Transects were also established along the final preferred route to determine general ungulate use. Transects were triangle-shaped and 3 km long. A total of 30 transects (90 km) were surveyed, 14 in grassland habitat (42 km), 11 in forest habitat (33 km), and five along the final preferred route (15 km). Observers travelled on foot and recorded all mammal sign within approximately 1 m of either side of the transect. Transects were surveyed once.

8.1.3.3 Incidental sightings

All mammals observed during field studies were recorded, whether or not they were the focus of a particular survey. Although these sightings were incidental, they were considered as input for routing and evaluation purposes.

8.1.4 Data gaps and limitations

Field studies for the Project were mainly designed to detect large ungulate species and large species of carnivores and furbearers. Data regarding smaller species of mammals is limited to general abundance categories provided by the Manitoba Conservation Data Centre.

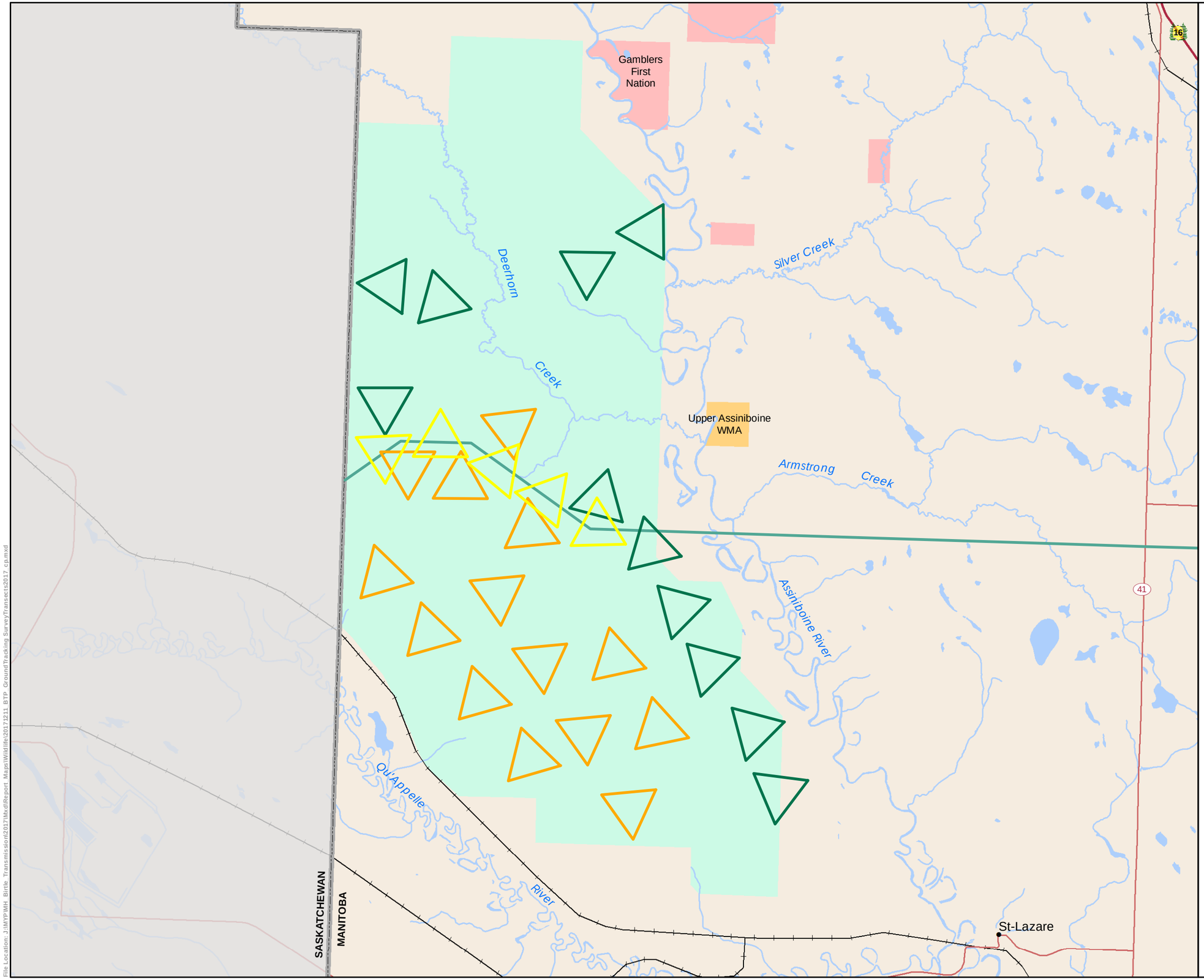
The ability to determine the effects of increased hunter access and subsequent changes to ungulate mortality is limited. Data on hunter effort are not available and would likely be highly variable annually.

8.2 Results

8.2.1 Priority species

There are seven mammal species of conservation concern in Manitoba, several of which are known to occur within the RAA.The RAA supports a small number of mule deer (*Odocoileus hemionus*) and is one of the few places in Manitoba where mule deer are present. Mule deer are uncommon in the province and are listed as Threatened under *The Endangered Species and Ecosystems Act* of Manitoba. Mule deer habitat is limited in the RAA to the area west of the Assiniboine River in the Spy Hill-Ellice Community Pasture.

Other species of conservation concern that could occur in the RAA are the little brown myotis (*Myotis lucifugus*) and northern myotis (*Mytois septentrionalis*). Both of these bat species have recently been listed as Endangered under Schedule 1 of the *Species at Risk Ac*t due to large mortality events caused by outbreaks of white-nose syndrome in North America. There is little information about breeding populations in the RAA and no bat hibernacula are known to occur within (W. Watkins pers. comm.); however, the region likely supports these species during the summer.



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Birtle Transmission Project

Project Infrastructure
- Final Preferred Route

Transect Habitat
- Forest
- Grassland
- Preferred Route

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Community Pasture
- First Nation
- Wildlife Management Area (WMA)
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN, WRCS
Date: December 10, 2017

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Ground Tracking Survey Transects 2017

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Map 8-3 Ground tracking survey transects 2017.

The American badger (*Taxidae taxus taxus*), which is proposed for listing as Special Concern under the *Species at Risk Act*, could also occur. The badger population is generally stable in southwestern Manitoba, including the RAA (D. Berezanski pers. comm). The Birtle area is considered within the core range for badger in Manitoba (D. Berezanski pers. comm.).

8.2.2 Current status

A minimum of 52 mammal species could occur within the RAA (Appendix IV, Table 1). Four species, including the pronghorn (*Antilocapra americana*), plains bison (*Bison bison bison*), swift fox, (*Vulpes velox*), and plains grizzly bear (*Ursus arctos*) have been extirpated from Manitoba and the RAA. The cougar (*Puma concolor*) has no officially recognized breeding population in Manitoba, but it is possible that one exists (W. Watkins pers. comm.). Members of Gamblers First Nation indicate that there are cougars in the area (Manitoba Hydro 2017a). Cougars have been documented in the Porcupine Hills to Riding Mountain area and in the Spruce Woods to Turtle Mountain area (W. Watkins pers. comm.).

8.2.2.1 Ungulates

Elk

Elk (*Cervus elaphus canadensis*) are a generalist species that use a wide range of habitats. Typically, deciduous forest is used for cover, while agriculture and haylands are used for foraging (Chranowski 2009). Elk typically avoid disturbances such as roads, forestry cut-blocks, and cattle (Chranowski 2009).

There are approximately 7,000 elk in Manitoba, primarily within the Riding Mountain, Duck Mountain, Porcupine Hills, southern Interlake, Spruce Woods, Red Deer River, and Swan River Valley areas (Manitoba Sustainable Development n.d.[a]). The elk population in Manitoba and in the RAA is currently considered stable (K. Rebizant pers. comm.). A small number of elk occur within the RAA, and have been observed during aerial surveys conducted by Manitoba Sustainable Development and during aerial surveys for the Project (Photograph 8-1).

Photograph 8-1: Elk observed during aerial survey, March 2016.

In 2015, a single elk was observed during aerial surveys of GHA 22. In 2016, 15 elk were observed during aerial surveys of the region (Appendix IV, Table 2). Seven elk signs were observed during the 2017 ground tracking survey, all in forest habitat (Appendix IV, Table 3). Ungulate observations (i.e., elk, moose and deer) from the 2016 aerial survey are shown in Map 8-4.

Moose

Moose (*Alces alces*) habitat typically consists of a mixture of early-succession forest interspersed with waterbodies and late-succession forest (Bowyer et al. 2003). This habitat is generally found within the aspen parkland and boreal forest regions of Manitoba and is strongly influenced by forest fires. There is a total of 19,156.6 ha ha of forest habitat in the RAA, 2,392.1 ha of which is in the LAA (Map 8-5).

Prior to 1750, the range of moose in Manitoba did not extend northward past Thompson or eastward past the east side of Lake Winnipeg (Bryant 1955). Due to normal, post-glacial expansion and habitat alteration caused by anthropogenic influences, moose range in Manitoba expanded over the next 200 years to include the northernmost edge of the boreal forest (Bryant 1955). Today, moose range from the agricultural transition zone in southern Manitoba to Hudson Bay in the north.

Historically, moose populations in the province were higher in comparison to today. In 1974, the moose population was an estimated 64,000 animals, with densities ranging from 0.1 moose/km^2 in the boreal forest to 1.1 moose/km^2 in the transition parkland, aspen parkland, and shrub meadow habitats (Krefting 1974). The most recent moose population estimate in Manitoba is 27,000 animals (Manitoba Sustainable Development n.d.[b]). In central and southern Manitoba, low moose numbers have resulted in closures of licensed and rights-based hunting in some GHAs. In 2017, 15 GHAs remained closed to all licensed and most rights-based moose hunting (Government of Manitoba 2017). While the moose population in Manitoba is generally decreasing, the population in the RAA is considered stable (K. Rebizant pers. comm.). Moose density in the RAA is greater than in some regions of the province, but is lower than in high-density areas such as Duck Mountain, Riding Mountain, and Porcupine Hills (K. Rebizant pers. comm.). There is no licensed moose hunting in GHA 22, which overlaps the RAA, but it is not closed to rights-based hunting.

Several aerial surveys have occurred in the region as part of ungulate monitoring in GHA 22 by Manitoba Sustainable Development, as well as field studies for the Project. Manitoba Sustainable Development conducted aerial surveys in 2013 and 2015 and observed 195 moose (0.27 moose/km^2) and 72 moose (density not available), respectively. During the 2016 survey, 165 moose (Photograph 8-2) were observed in the survey area (0.23 moose/km^2). The highest densities of moose observed during these surveys were along the Assiniboine River Valley. The riparian habitat along the river likely provides moose with high-quality habitat and due to the relatively low density of roads and other linear features, limiting hunter access, and proving ample forage and shelter.

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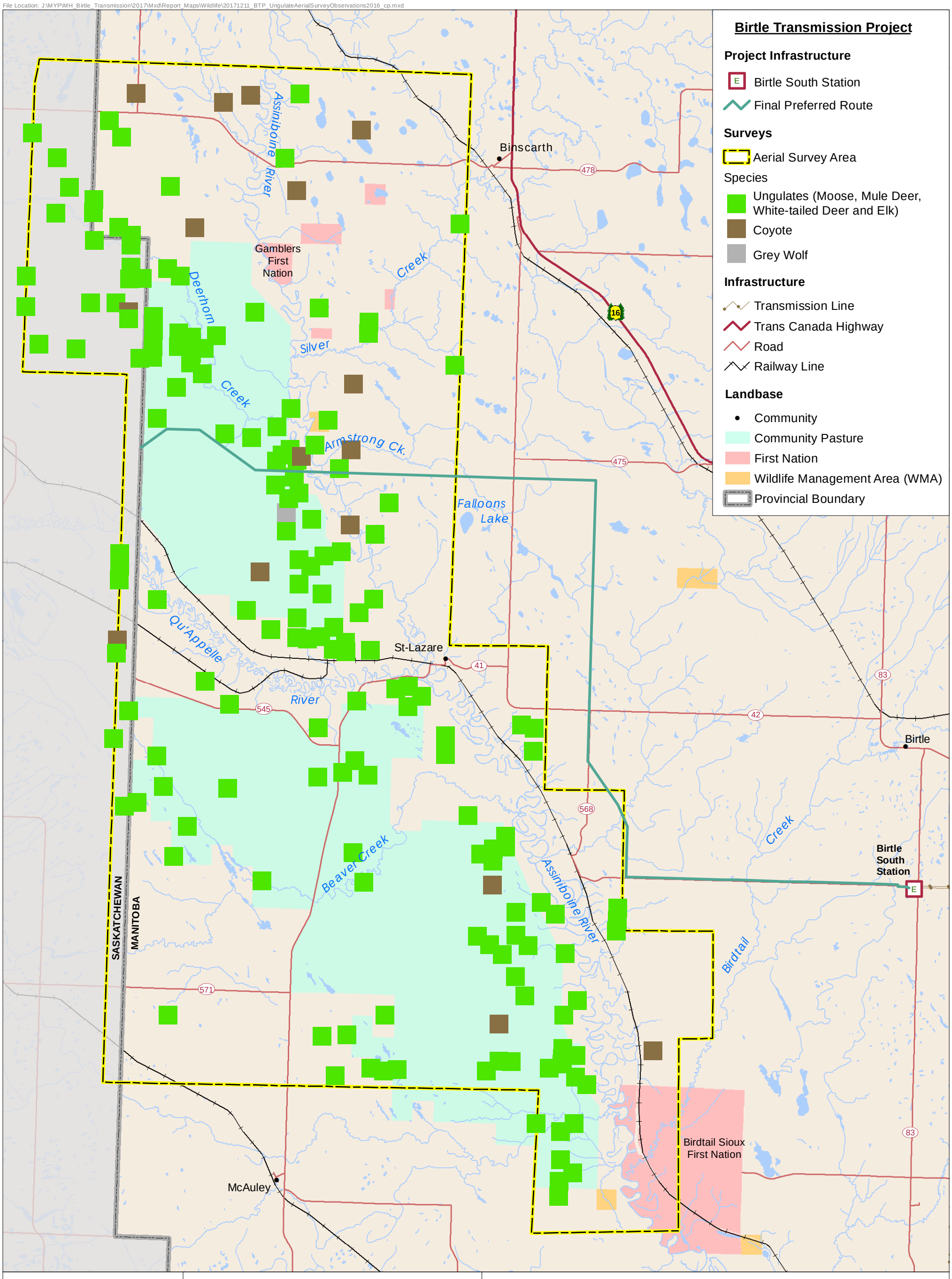

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Aquatic Environment Specialists

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 10, 2017

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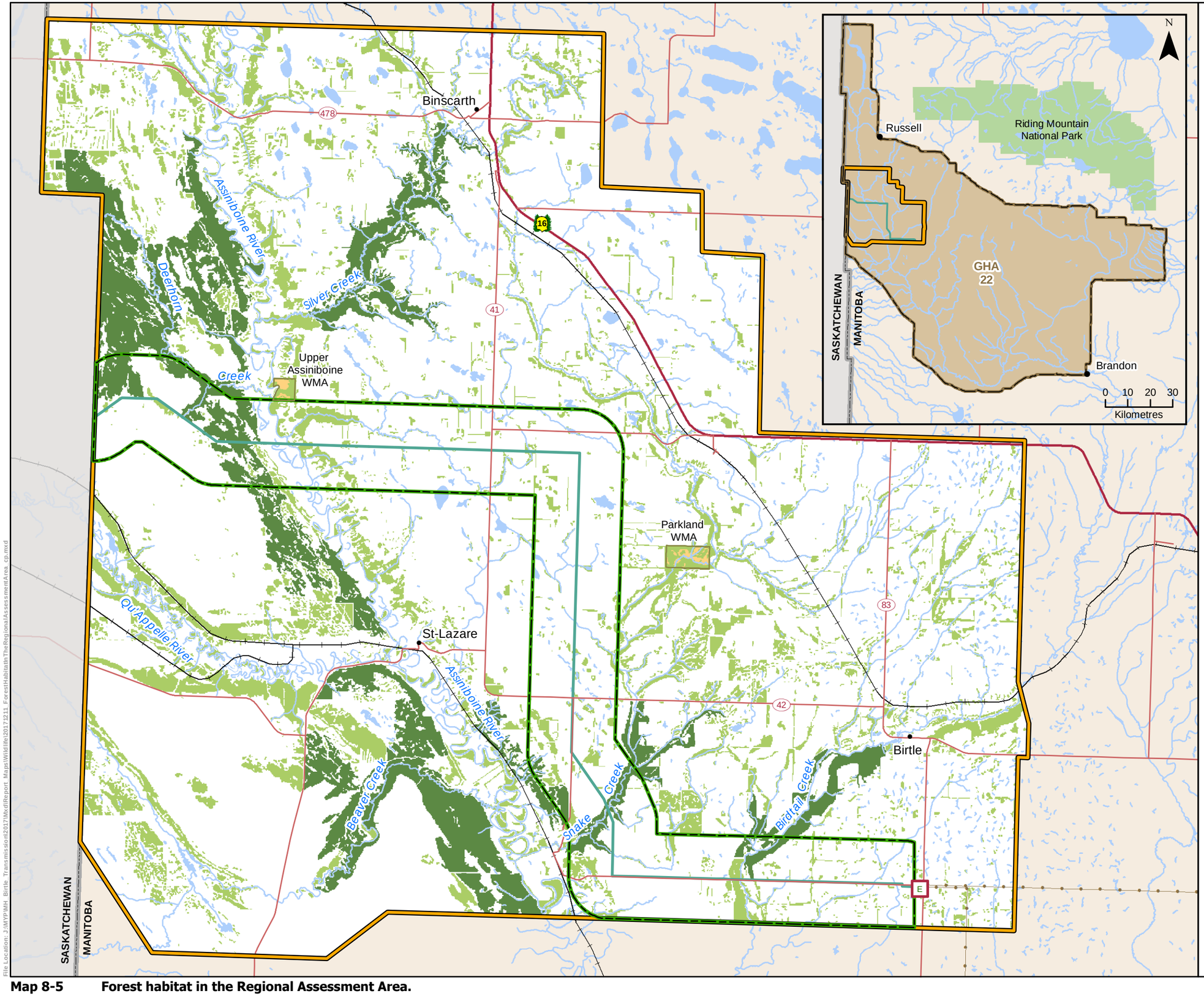
Ungulate Aerial Survey Observations 2016

Map 8-4 Ungulate aerial survey observations 2016.



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Birtle Transmission Project

Project Infrastructure
- Birtle South Station
- Final Preferred Route

Assessment Areas
- Local
- Regional

Habitat
- Forest
- Intact Forest (>200 ha)

Infrastructure
- Transmission Line
- Trans Canada Highway
- Road
- Railway Line

Landbase
- Community
- Game Hunting Area (GHA)
- Wildlife Management Area (WMA)
- National/Provincial Park
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 10, 2017

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Forest Habitat in the Regional Assessment Area

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Map 8-5 Forest habitat in the Regional Assessment Area.

A moose migration route was identified between Riding Mountain National Park to the Assiniboine River, and the RAA also provides seasonal habitat for moose (MNP LLP 2017). Moose signs were observed in forest and grassland habitat and along the final preferred route during the 2017 ground tracking survey (Appendix IV, Table 3).

White-tailed Deer

The white-tailed deer (*Odocoileus virginianus*) is a generalist species that occupies a wide range of habitats. In winter, dense forest is used for cover, while agriculture and haylands are often used for feeding (Miller et al. 2003). A landscape containing a mosaic of these habitats is typically ideal (Miller et al. 2003). White-tailed deer range throughout the province, as far as Flin Flon to the northwest and the Bloodvein River to the southeast (Manitoba Sustainable Development n.d.[c]). The most recent white-tailed deer population estimate within the province is 150,000-160,000 individuals (Manitoba Sustainable Development n.d.[c]). Populations in the province are heavily influenced by winter weather and have ranged from a low of 60,000 in 1974 to a high of 250,000 in 1995 (Manitoba Sustainable Development n.d.[c]). The white-tailed deer population in Manitoba and in the RAA is currently considered stable (K. Rebizant pers. comm.).

Between 1954 and 1965, historic estimates of the white-tailed deer population in the Assiniboine Valley portion of GHA 22 ranged from 311 to 1,146 animals. Aerial surveys of white-tailed deer occurred in the region in 1987, 1996, 2001, 2013, and 2015 as part of monitoring of GHA 22 by Manitoba Sustainable Development, and in 2016 for the Project. The population estimates from these surveys ranged from a low of 0.40 deer/km^2 in 2016 to a high of 2.3 deer/km^2 in 1996. The most recent population estimate (2014/15) provided by Manitoba Sustainable Development for GHA 22 is 8,997 at 90% C.I. is +/-11.65, with an overall density of 0.89 deer/km^2. During these winter surveys, white-tailed deer were typically observed in small groups within forested areas, particularly in the Assiniboine River Valley (Chranowski 2001; Krause-Danielson and Harriman 2015) and occasionally in agricultural land (Photograph 8-3). The riparian habitat along the river likely provides white-tailed deer with high-quality habitat and provides ample forage and shelter. The RAA provides important habitat for deer (MNP LLP 2017). White-tailed deer signs were observed in forest and grassland habitat and along the final preferred route during the 2017 ground tracking survey. Most signs (88%) were on forest transects. While it is difficult to distinguish white-tailed deer and mule deer tracks, all deer signs observed were presumed to be the former species because it is substantially more common in the region as indicated by the 2016 aerial survey (i.e., >99% of all observations) Appendix IV, Table 2).

Photograph 8-2: White-tailed deer observed during aerial survey, March 2016.

Mule Deer

Mule deer prefer dry, open forest or shrublands associated with rough terrain (Mackie et al. 2003). In the prairies of Canada and Manitoba, this habitat is typically found in deep river valleys with nearby agriculture.

Mule deer hunting is prohibited in Manitoba, and the species is listed as Threatened by *The Endangered Species and Ecosystems Act*. Small numbers of mule deer have been observed in the RAA. In 2013, as part of Manitoba Sustainable Development's chronic wasting disease monitoring, seven mule deer were observed during an aerial survey that covered 728 km^2 of GHA 22. During the 2016 aerial survey of the region, a single mule deer was observed (Appendix IV, Table 2). Sightings of mule deer by the public have been increasingly reported (W. Watkins pers. comm.). The population in southwestern Manitoba and in the RAA is currently considered stable (K. Rebizant).

8.2.2.2 Furbearers

Sixteen species of furbearers could occur within the RAA (see Appendix IV, Table 1). Fishers (*Martes pennanti*) and American mink (*Neovison vison*) are harvested in forested areas and riverbottom forests in the RAA (D. Berezanski pers. comm.). Other species that are commonly trapped include coyote (*Canis latrans*), muskrat (*Ondatra zibethicus*), rabbits, and short-tailed weasels (*Mustela erminea*) (MNP LLP 2017; D. Berezanski pers. comm.). While the long-tailed weasel (*Mustela frenata*) is not a species at risk, there is an ongoing concern about its populations in Manitoba (W. Watkins pers. comm.).

The most common species of furbearer within the RAA is the coyote. Aerial surveys conducted in 2001 by Manitoba Sustainable Development estimated coyote density within GHA 22 at 0.5 coyotes/$mile^2$ (0.2 coyotes/km^2) (Chranowski 2001). Twenty-two coyotes were observed in

the RAA during aerial surveys conducted in 2016. Coyotes are found throughout Manitoba and use a wide range of habitats (Bekhoff and Gese 2003). Typically, they avoid areas where other large carnivores, such as grey wolves (*Canis lupus*), are found as they may be preyed upon and outcompeted for resources (Bekhoff and Gese 2003). Coyotes prey upon large ungulates; however, they are opportunistic and feed on a variety of foods including small mammals, insects, and carrion (Bekhoff and Gese 2003).

In addition to coyote, there is likely a small group of resident grey wolves within the RAA (K. Rebizant pers. comm.). Two wolves were observed during aerial surveys in 2013 and a single wolf was observed during the 2016 aerial survey. Grey wolves occur throughout Manitoba, with the exception of the southwestern and south-central portions of the province that are predominantly agriculture (Manitoba Sustainable Development n.d.[d]). The most recent population estimate of grey wolves in the province was 4,000 individuals (Manitoba Sustainable Development n.d.[d]). Grey wolves occupy a wide range of habitats but are typically found in areas with limited human disturbance and sufficient ungulate prey (Paquet and Carbyn 2003).

Black bear (*Ursus americanus*) occur in low numbers in the RAA. Sixteen black bear signs were observed during the 2017 ground tracking survey, all on forest transects (Appendix IV, Table 3). The black bear is a widespread and adaptable carnivore found throughout Canada. Ideal black bear habitat consists of rough terrain with thick understory vegetation and abundant berry-producing plants (Pelton 2003). Black bears can be found throughout Manitoba, with the exception of the extreme southwest corner, where they may be occasional visitors (Manitoba Sustainable Development n.d.[e]). The most recent population estimate of black bears is 25,000-30,000 individuals (Manitoba Sustainable Development n.d.[e]).

Several species of furbearer or their sign were observed incidentally during field surveys, including striped skunk (*Mephitis mephitis*), white-tailed jackrabbit (*Lepus townsendii*), eastern cottontail (*Sylvilagus floridanus*), and snowshoe hare (*Lepus americanus*).

8.2.2.3 Small mammals

Thirty-two species of small mammals occur within the RAA (see Appendix IV, Table 1). Small mammals are widespread throughout Manitoba and use a variety of habitats. Many small mammals such as shrews, mice, voles, squirrels, hares, and chipmunks are prolific breeders and experience relatively regular population cycles (Boonstra *et al.* 1998). As small mammals are the base of many carnivore and omnivore food webs, these population cycles can influence local predator populations (Korpimaki and Krebs 1996). Three species of small mammals were observed incidentally during field surveys: thirteen-lined ground squirrel (*Ictidomys tridecemlineatus*), Richardson's ground squirrel (*Urocitellus richardsonii*), and red squirrel (*Tamiasciurus hudsonicus*).

8.3 Pathways of effect

Potential pathways of effects on mammals include habitat availability changes, an increase in wildlife mortality, and sensory disturbance and displacement.

Habitat Loss or Alteration

Transmission projects could reduce the amount of habitat available and alter existing habitat for mammals. Clearing of rights-of-way could reduce the amount of intact forest habitat and increase fragmentation. Species such as white-tailed deer that frequently use edges may benefit from these changes, but the amount of winter cover would be reduced for deer and other species of ungulates. Effects of habitat loss on ground squirrels could indirectly affect the badgers that prey on them (D. Berezanski pers. comm.).

Increased Mortality

Right-of-way clearing may lead to improved access by hunters into mammal habitat. Increased harvest could result in increased mortality of ungulates, especially if they are attracted to the right-of-way (K. Rebizant pers. comm.). Moose in particular can be attracted to food sources on transmission lines (K. Rebizant pers. comm.). Meningeal worm (*Parelapostrongylus tenuis*), a parasite tolerated by white-tailed deer but fatal in other ungulates (Anderson 1972), is a threat to moose populations. If white-tailed deer are also attracted to rights-of-way, the risk of transmission to moose could increase and negatively affect local populations (K. Rebizant pers. comm.).

Mortality of ungulates, furbearers, and other mammal species can increase due to increased vehicle traffic during the construction phase of transmission projects. The amount of construction-related traffic, including workers and equipment, will increase temporarily and could result in a greater risk of collisions with wildlife.

Sensory Disturbance and Displacement

In addition to physical habitat loss, effective habitat loss may also occur along transmission lines due to sensory disturbance. Effective habitat loss is temporary and mostly limited to the construction phase. Construction noise may deter animals from using habitat and can result in decreased activities such as foraging, maternal care, and reproduction (Lykkja et al. 2009; Shannon et al. 2014). The presence of machinery and construction workers could bring about changes in mammals' daily movements. Noise from helicopters used during field studies, during tower construction, and for maintenance activities during operation could cause temporary disturbances to mammals in the vicinity, particularly during sensitive periods like the calving and calf-rearing season for ungulates. Avoidance of affected areas by harvested species such as moose and white-tailed deer could result in the displacement of resource users and may reduce harvesting success (MNP LLP 2017).

9.0 Summary

9.1 Regional status

9.1.1 Soils and terrain

The dominant soils in the RAA are typically well drained Black Chernozems. Minor inclusions of Gleysolic and organic soils occur in areas of poorly drained soils located within depressional areas in hummocky terrain. Regosolic soils occur in association with Black Chernozems on the eroded slopes of the Assiniboine River and Armstrong, Snake and Birdtail Creeks; along the Assiniboine River floodplain; and in areas of dune development. A very small percentage of solonetz soils are found in the northeastern part of the RAA.

The regional terrain ranges from undulating topography with slopes of 2 to 5 % to hummcky terrain with slopes from 5 to 9%. Depressional areas can be found within the hummocky terrain as potholes and sloughs to intermittent ahd shallow lakes. Areas of the greatest relief and slopes occur along along watercourse such as the Assiniboine River and Birdtail Creek where slopes exceed 30 percent. Land located in the bottoms of these river valleys in the floodplains are commonly near level to very gently undulating.

9.1.2 Aquatic habitat

The Project is located predominantly within the Assiniboine-Birdtail sub-watershed, where aquatic habitat has been historically affected by agricultural activity. These agriculture and drainage practices continue to the present day throughout the region. Historical and present day land use practices have directly influenced existing ecological conditions, including fish and fish habitat. Long-term effects include changes in riparian ecosystem structure (i.e., decreased vegetation cover and bank stability) and surface water quality (i.e., increased sedimentation and water temperature).

9.1.3 Vegetation and ecological resources

Within the RAA, there are 14 broad land use/land cover classes identified from the Manitoba Land Cover Classification. These classes include native vegetation of grassland, wetlands, and coniferous, deciduous and mixedwood forests. The RAA area is dominated by agricultural cropland and grassland/rangeland, followed by deciduous forest cover.

There are about 245 vascular species from over 57 families, occurring in terrestrial and wetland habitats, expected to occur within the RAA. Based on provincial records, several species of conservation concern are known to occur in the RAA and surroundings, with increased concentrations located in the vicinity of St. Lazare. The uplands and river valleys in this region support a number of species considered provincially rare in the province.

A number of non-native and invasive species are expected to occur across the RAA. Non-native and invasive plants in the region are commonly perennial herbs and grasses, particularly from among the Asteraceae, Fabaceae, and Poaceae families.

Traditionally important plant species currently used in the RAA were identified from the Indigenous engagement process for the Project. Several species of trees, shrubs and herbs were identified from the communities and land use study as important for sustenance, medicinal and cultural practices.

9.1.4 Terrestrial invertebrates, amphibians and reptiles

9.1.4.1 Terrestrial invertebrates

There are five at-risk terrestrial invertebrate species with the potential to occur within the RAA. All five species are generalists inhabiting a diverse range of habitats not found to be limiting within the RAA.

9.1.4.2 Amphibians

There are five amphibian species that have distribution ranges overlapping the RAA, two of which are considered at-risk species. Amphibians inhabit a range of habitat types, but all species found within the RAA require wetlands for at least some part of their life cycle.

9.1.4.3 Reptiles

There are five reptile species with distributions overlapping the RAA, one of which is considered an at-risk species. Throughout their range, reptiles require a diverse range of habitats. The species found within the RAA are inhabitants of grasslands, wetlands and permanent waters.

9.1.5 Birds

There are 33 bird species of conservation concern in Manitoba, some of which require the undisturbed grassland habitat found in the southwest corner of the province. Others can be found in forest, agricultural areas, wetlands, and urban areas, among other habitats.

9.1.6 Mammals

There are seven mammal species of conservation concern in Manitoba. They occupy a range of habitats throughout the province, including the undisturbed grasslands in the southwestern corner.

9.2 Local status

9.2.1 Soils and terrain

The local terrain is dominantly level to undulating with slopes ranging from 0 to 5%. In areas with dune development on the eastern edge of the communtiy pasture, and west of Armstrong Creek, hummocky terrain can be found with gentle slopes approximatley 7.5%. Areas with slopes greater than 30% include the eroded slopes of the Assiniboine River, Snake Creek, and Birdtail Creek. Slopes approximately 37.5% can be found along the Assiniboine River with greater slopes of 85% along Snake Creek. Slopes along Birdtail Creek range from 22.5% on the

east side to 85% on the west side. Within the Assiniboine River floodplain however, slope percent descreases to 0.5 to 3.5% (nearly level to very gentle slopes).

The dominant soils in the LAA and PF are Orthic Black Chernozoms from the Dorset, Jaymar, Miniota, Newdale and Stockton soils series. Inclusions of Regosols, of the Shilox and Levine soils series can also be found in the LAA and PF. Gleysols are common in depressions in hummockey terrain and within the Assiniboine River floodplain. Soils of the Eroded Slopes Complex are found on eroded slopes of river valleys and walls, incised stream channels and ravines that have been down-cut through surface desposits and bedrock. Specifically these soils occur along the Assiniboine River, Snake and Birdtail Creeks and soil types range from well drained Orthic Black Chernozmes to Regosols.

Soils in the LAA and PF Project footprint that are comprised of dominantly sand textures are very susceptible to wind erosion (Alberta Forestry and Agriculture, 2001), especially if vegetation is absent. In the project footprint, these soils include the Dorest soil series, Stockton soils and Shilox soil series which occur in the Spy Hill-Ellice community pasture. Soils that are characterized as having clay or loam textures are more susceptible to water erosion. Steep slopes that occur in the project footprint in the areas of the Assiniboine River, Snake Creek and Birdtail Creek, increase the potential for water erosion more so if vegetation is disturbed or removed from slopes. Additional information on the wind and water erosion risks of soils in the PF, LAA and RAA can be found in (Reference agriculture section that discusses erosion).

9.2.2 Aquatic habitat

There are 12 stream crossings along the final preferred route. Five of these crossings are fish bearing, three of which have natural riparian areas that will be altered as part of the project.

There are four priority species that could potentially inhabit watercourses within the project development area. In addition, there are up to 65 fish species present that would form part of a commercial, recreational or Aboriginal fishery.

9.2.3 Vegetation and ecological resources

Botanical and vegetation surveys were conducted within the proposed LAA. Forty-one sites were visited, 19 within the community pasture and 22 private lands or roadside assessments. Vegetation was described for grasslands, upland forest, riparian and river bottom forest, and wetlands. Grasslands were classed into six vegetation types while, upland forests were classed as trembling aspen hardwood communities. Riparian and river bottom forest supported Manitoba maple, green ash, bur oak, aspen and balsam poplar. Wetlands were surrounded by crop or pasture land and were composed mainly of cattails and graminoid vegetation.

A total of 174 plant taxa were observed in the local assessment area in 2017. Twenty-one species of conservation were observed during surveys; 19 were recorded in the community pasture surveys with two additional species of conservation concern recorded on private land. Plants ranked very rare (S1) and rare (S2) included western jewelweed and sand millet, respectively. No species listed by the federal *Species at Risk Act*, the Manitoba *Endangered*

Species and Ecosystems Act or listed by the Committee on the Status of Endangered Wildlife in Canada were observed during fieldwork.

Across all native and rare plant surveys, 10 species are considered non-native or invasive. Of these species, two are considered Tier 3 Noxious weeds, (Canada thistle, common dandelion) by *The Noxious Weeds Act* of Manitoba. Only three non-native or invasive species were recorded from the community pasture surveys.

As a result of field surveys, 21 plants listed as having traditional value from the Indigenous engagement process were observed in the LAA. Traditional use plant species observed included two trees, eight shrubs and 11 herbs. Of the traditional plant species identified, 15 were recorded in community pasture surveys.

9.2.4 Terrestrial invertebrates, amphibians and reptiles

9.2.4.1 Terrestrial invertebrates

There are five at-risk terrestrial invertebrate species with the potential to occur within the LAA. All five species are generalists inhabiting a diverse range of habitats not found to be limiting within the LAA.

9.2.4.2 Amphibians

Four species of amphibians were observed at survey sites within the LAA, including the western tiger salamander, northern leopard frog, wood frog, and boreal chorus frog. Canadian toads were not observed during the course of surveys. Within the LAA, amphibians were observed at rivers (Assiniboine River), wetlands, and creeks (Birdtail Creek and Snake Creek).

Salamanders were observed at three wetlands. These sites had a combination of open water and submerged vegetation, making them ideal habitat. Northern leopard frogs were observed at nine of 21 sites surveyed, with highest abundances at four sites, all in the southern half of the Project area. Large numbers of individuals during the fall visual encounter surveys at two of the sites, in the vicinity of Birdtail Creek, indicate this area is very likely being used as overwintering habitat.

Wood frogs were observed at six sites, seen in high densities at two of these sites. Boreal chorus sites were observed at 15 sites, heard calling in large numbers at four sites.

9.2.4.3 Reptiles

During the course of field surveys within the LAA, only two species of reptiles were identified. One young-of year snapping turtle was observed in the Assiniboine River. This site has slow moving permanent water with a mud bottom, making it ideal snapping turtle habitat. Additionally, five garter snakes were identified at four sites. One of these garter snakes was identified to species, as a red-sided garter snake. Snakes were observed in both wetland areas and dry

sites. Hibernacula were not found within the LAA during the course of surveys. Northern redbelly snakes and western painted turtles (*Chrysemys picta bellii*) were not observed.

9.2.5 Birds

Of the 281 bird species whose year-round, breeding, or migration ranges currently overlap the RAA, 130 were observed during field studies, including 11 priority species, three of which were observed incidentally. The grassland habitat in the Spy Hill-Ellice Community Pasture is critically important habitat for a number of bird species, including chestnut-collared longspur and Sprague's pipit. Riverbottom forest along the Assiniboine and Qu'Appelle rivers is important habitat for breeding songbirds and for migration.

9.2.6 Mammals

A minimum of 52 mammal species could occur within the RAA. Larger mammals such as moose, white-tailed deer, and grey wolf were observed during field studies. Several species of furbearer or their sign were observed incidentally, including striped skunk, white-tailed jackrabbit, eastern cottontail, and snowshoe hare (*Lepus americanus*). Forest habitat is particularly important to many mammal species in the RAA.

9.3 Pathway of effects

9.3.1 Soils and terrain

The potential pathway of effects on soil and terrain include soil compaction, erosion of soils, and contamination from the accidential release of fuels and other hazardous substances. Potential effects can occur from both construction and maintenance activities. Soil compaction can result from the use of heavy equipment on soils that are most susceptible to compaction including those soils that are moist and have low amounts of vegetation cover. The potential for the risk of wind erosion of soils increases from clearing and construction activities in areas where sandy textured soils are found, specifically in the Spy Hill-Ellice communit pasture. There is the potential for increased water erosion in the project footprint as a result of the clay loam to loam textured soils, which are very susceptible to water erosion, and the steep slopes occurring near the Assiniboine River, Snake Creek and Birdtial Creek. The removal of vegetation during construction activities on steep slopes has the potential to increase the water erosion risk. Vegetation clearing of steep slopes may also result in the movement of material downward, or mass wasting, which is another form of soil erosion. Contamination of soils can occur from the accidential release of fuels and other hazardous substances during construction and maintenance acitivites, which may result in damage to soils potentially affecting the health of vegetation.

9.3.2 Fish

Potential effects of the construction, operation and maintenance of the Project on fish and fish habitat include: changes in shade leading to changes in water temperatures, changes to external nutrient / energy input leading to changes in food supply and nutrient concentrations,

addition / removal of in stream organic structure leading to a change in habitat structure and cover, exposed soils leading to changes in bank stability and increased erosion potential and instream sedimentation, changes in contaminant concentrations and increased access leading to increased fishing pressure.

9.3.3 Vegetation

Potential environmental effects from construction and maintenance activities include the following: removal of tree cover; modification of vegetation composition and structure adjacent to the disturbance zone; a reduce in species diversity; loss of species of concern; introduction and spread of non-native and invasive species; disturbance to wetlands; disturbance of traditional plants; and loss or impairment of desirable plant species from herbicide application and accidental releases of fuels or hazardous substances.

9.3.4 Terrestrial invertebrates, amphibians and reptiles

Terrestrial invertebrates

Potential pathways of effects on invertebrates include habitat alteration and traffic and machinery-related effects. Habitat alteration affects invertebrates at a more local scale than other taxa, and is especially detrimental to specialized species unlikely to be re-founded by natural dispersal following population declines. For species such as butterflies and skippers, the maintenance of desired low plant-cover along a RoW may aid in preserving early-successional food resources and thereby local invertebrate populations. Traffic and machinery-related effects include primary effects such as mortality, and secondary effects, such as sensory disturbance (e.g. exhaust emissions, noise, dust, headlight illumination, spills and leaks).

Amphibians

Potential pathways of effects on amphibians include habitat alteration, such as changes in local microclimate characteristics. Distribution, movement patterns, and overall abundance of amphibians may change where habitat alteration results in drier open canopy areas and the drying of ponds. The retention of riparian buffers along wetlands and streams is important in providing cover and breeding habitat for anurans, as well as preventing construction sediment run-off and possible spills from entering waterways. Traffic and machinery-related effects include primary effects such as mortality. Active anuran species and those with longer dispersal and migration distances such as the northern leopard frog and tiger salamander are most vulnerable. Secondary effects include increases in vehicular noise, light pollution, traffic volume, dust, spills and leaks, exhaust fumes, and vehicle emissions. Such effects can change anuran call behaviour and decrease mating, thus altering reproductive success.

Reptiles

Potential pathways of effects on reptiles include habitat loss/alteration and traffic and machinery-related effects. The creation of linear features such as RoWs create opportunities for thermoregulation while still providing shelter from desiccation and predators, and may provide

migration routes and movement between feeding and hibernation sites for some snakes (e.g. smooth green snake, northern redbelly snake, and garter snake). Traffic and mechanical-related activities may result in direct mortality or injury of individuals, as well as changes in distribution and movement patterns on a long-term basis. Construction activity may negatively affect garter snake populations where suitable snake den substrate exists as such areas are vulnerable to cave-ins by heavy equipment. Sensory disturbances associated with vehicular traffic and machinery use includes vehicular noise, exhaust fumes, vehicular emissions, dust, spills, leaks, and vibrations.

9.3.5 Birds

Potential pathways of effects on birds include habitat loss or alteration, increased mortality, and disturbance and displacement due to construction and maintenance activities. A small loss of grassland and forest habitat could affect bird species, including species at risk such as chestnut-collared longspur and Sprague's pipit. Nest predation and brood parasitism by brown-headed cowbird could increase songbird mortality and decrease nesting success. Transmission towers could provide perching habitat for raptors, which could result in increased sharp-tailed grouse mortality near leks. Sensory disturbance could result in the temporary displacement of birds during construction and during maintenance activities on an operational transmission line.

9.3.6 Mammals

Potential pathways of effects on mammals include habitat availability changes, an increase in wildlife mortality, and sensory disturbance and displacement. Transmission line right-of way clearing could reduce the amount of intact forest habitat and increase fragmentation in an area. Species such as white-tailed deer that frequently use edges could benefit from these changes, but the amount of winter cover would be reduced for deer and other species of ungulates. Right-of-way clearing could also lead to improved access by hunters into mammal habitat, possibly resulting in increased mortality of ungulates. Sensory disturbance could result in the temporary displacement of mammals during construction and during maintenance activities on a completed transmission line.

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APPENDIX I

VEGETATION

TABLE 1. A preliminary species list of flora expected to occur in the regional assessment area.		
FAMILY/SPECIES	**COMMON NAME**	**MBCDC Rank**
VASCULAR PLANTS		
Pteridophytes - Ferns and Allies		
EQUISETACEAE		
Equisetum arvense	Common Horsetail	S5
OPHIOGLOSSACEAE		
Botyrpus virginianus	Rattlesnake Fern	S4
Sceptridium multifidum	Leathery Grape-fern	S3
SELAGINELLACEAE		
Selaginella densa	Prairie Spike-moss	S3
Gymnosperms		
CUPRESSACEAE		
Juniperus horizontalis	Creeping Juniper	S5
Angiosperms - Monocotyledons		
ARACEAE		
Calla palustris	Water-arum	S4
CYPERACEAE		
Carex atherodes	Awned Sedge	S5
Carex duriuscula	Low Sedge	S3S4
Carex filifoia	Thread-leaved Sedge	S3S4
Carex inops	Long-stolon Sedge	S1?
Carex interior	Inland Sedge	S4?
Carex praegrailis	Graceful Sedge	S4
Carex rossii	Ross' Sedge	S4S5
Carex siccata	Dry-spike Sedge	S4S5
Carex stipata	Awl-fruited Sedge	S4
Cyperus schweinitzii	Schweinitz's Flatsedge	S2
Scirpus microcarpus	Small-fruited Bulrush	S5
JUNCACEAE		
Juncus arcticus var. balticus	Baltic Rush	S5
JUNCAGINACEAE		
Triglochin maritima	Seaside Arrow-grass	S5

TABLE 1. A preliminary species list of flora expected to occur in the regional assessment area.

FAMILY/SPECIES	COMMON NAME	MBCDC Rank
LILIACEAE		
Allium stellatum	Pink-flowered Onion	S5
Allium textile	Prairie Onion	S3
Maianthemum canadense	Canada May Flower	S5
Maianthemum stellatum	Solomon's Seal	S5
Streptopus amplexifolius	White Mandarin	S2?
ORCHIDACEAE		
Corallorhiza maculata	Large or Spotted Coralroot	S4
POACEAE		
Achnatherum hymenoides	Indian Rice Grass	S2
Achnatherum richardsonii	Richardson Needle Grass	S1S2
Agropyron cristatum	Crested Wheatgrass	SNA
Agropyron intermedium	name not found	?
Agrostis scabra	Ticklegrass	S5
Agrostis stolonifera	Creeping Bent	SNA
Andropogon hallii	Sand Bluestem	S2
Avenula hookeri	Hooker's Oat Grass	S3S4
Beckmannia syzigachne	Slough Grass	S5
Bouteloua gracilis	Blue Gramma	S4
Bromus ciliatus	Fringed Brome	S5
Bromus inermis	Smooth Brome	SNA
Bromus pumpellianus	Awnless or Hungarian Brome	S3S4
Calamagrostis montanensis	Plains Reed Grass	S3
Calamagrostis rubescens	Pine Reed Grass	S1
Calamagrostis stricta	Northern Reed Grass	S5
Calamovilfa longifolia	Prairie Sandreed	S3S5
Danthonia intermedia	Timber Oatgrass	SU
Danthonia spicata	Poverty Oatgrass	S4S5
Deschampsia caespitosa	Tufted Hairgrass	S4S5
Dichanthelium linearifolium	White-haired Panic-grass	S2?
Dichanthelium wilcoxianum	Fall rosette grass; Sand millet	S2
Distichlis stricta	Alkali Grass	S4S5
Elymus trachycaulus	Slender Wheatgrass	S5
Festuca hallii	Plains Rough Fescue	S3
Festuca trachyphylla	Hard Fescue	SNA
Glyceria grandis	Tall Manna Grass	S5
Hesperostipa comata	Spear Grass	S3S4

TABLE 1. A preliminary species list of flora expected to occur in the regional assessment area.		
FAMILY/SPECIES	**COMMON NAME**	**MBCDC Rank**
Hesperostipa curtiseta	Western Porcupine Grass	S3
Hesperostipa spartea	Porcupine Grass	S4
Hordeum jubatum	Foxtail Barley	S5
Koeleria macrantha	June Grass	S5
Muhlenbergia asperifolia	Scratchgrass	S3
Muhlenbergia richardsonis	Mat Muhly	S3S4
Nassella viridula	Green Needle Grass	S3
Oryzopsis asperifolia	Rice Grass	S5
Panicum capillare	Panicgrass	S4S5
Panicum virgatum	Switchgrass	S4
Piptatherum pungens	Northern Rice Grass	S4S5
Poa compressa	Canada Blue Grass	SNA
Poa glauca	Glaucous Blue Grass	S4S5
Poa palustris	Fowl Bluegrass	S5
Poa pratensis	Kentucky Bluegrass	S5
Psathyrostachys juncea	Rusian Wild Rye	S5
Schizachne purpurascens	False Melic	S5
Schizachyrium scoparium	Little Bluestem	S3S4
Scolochloa festucacea	Whitetop	S4S5
Sporobolus cryptandrous	Sand Dropseed	S3S5
Sporobolus heterolepis	Prairie Dropseed	S3S5
Angiosperms - Dicotyledons		
ANACARDIACEAE		
Toxicodendron rydbergii	Poison Ivy	S5
APIACEAE		
Lomatium macrocarpum	Long-fruited Parsley	S3
APOCYNACEAE		
Apocynum androsaemifolium	Spreading Dogbane	S5
ARALIACEAE		
Aralia nudicaulis	Wild Sarsaparilla	S5
ASCLEPIADACEAE		
Asclepias speciosa	Showy Milkweed	S3S5
ASTERACEAE		

TABLE 1. A preliminary species list of flora expected to occur in the regional assessment area.

FAMILY/SPECIES	COMMON NAME	MBCDC Rank
Achillea millefolium	Yarrow	S5
Agoseris glauca	False Dandelion	S4S5
Antennaria microphylla	Everlasting	S3S5
Artemisia absinthimum	Wormwood	SNA
Artemisia campestris	Field Sagewort	S4S5
Artemisia cana	Silver Sagebrush	S1
Artemisia frigida	Pasture Sage	S4S5
Artemisia ludoviciana	Prairie Sage	S5
Cirsium arvense	Canada Thistle	SNA
Cirsium flodmanii	Flodman's Thistle	S3S4
Cirsium sp.	Thistle	S4
Erigeron asper	Rough Fleabane	S4S5
Erigeron caespitosus	Tufted Fleabane	S1
Erigeron glabellus	Smooth Fleabane	S5
Gaillardia aristata	Great-flowered Gaillardia	S5
Grindelia squarosa	Curly-cup Gumweed	S5
Guttierrezia sarothrae	Match-brush	S3
Helianthus pauciflorus ssp. subrhomboideus	Beautiful Sunflower	S3S4
Heterotheca villosa	Hairy Golden-aster	S5
Lactuca sp.	Lettuce	?
Liatris punctata	Dotted Blazing Star	S4
Packera cana	Silvery Groundsel	S4
Petasites frigidus var. palmatus	Palmate-leaved Coltsfoot	S5
Petasites frigidus var. sagittatus	Arrow-leaved Coltsfoot	S5
Ratibida columnifera	Prairie Coneflower	S3S4
Rudbeckia hirta	Black-eyed Susan	S5
Solidago canadensis	Canada Goldenrod	S5
Solidago missouriensis	Low Goldenrod	S5
Solidago mollis	Velvety Goldenrod	S3
Sonchus arvensis	Field Sow-thistle	SNA
Symphyotrichum ciliolatum	Lindley's Aster	S4
Symphyotrichum ericoides	Many-flowered Aster	S4
Symphyotrichum laeve	Smooth Aster	S5
Taraxacum officinale	Common Dandelion	SNA
Townsendia exscapa	Silky Townsend Daisy	S2
Tragopogon dubius	Goat's-beard	SNA
BALSAMINACEAE		
Impatiens capensis	Spotted Touch-me-not	S5

TABLE 1. A preliminary species list of flora expected to occur in the regional assessment area.

FAMILY/SPECIES	COMMON NAME	MBCDC Rank
BETULACEAE		
Betula papyrifera	Paper Birch	S5
Corylus cornuta	Beaked Hazelnut	S5
BORAGINACEAE		
Lappula occidentalis	Flat-spine Sheepburr	S4
Lithospermum canescens	Hoary Puccoon	S5
Lithospermum incisum	Linear-leaved Puccoon	S3
BRASSICACEAE		
Arabis holboellii	Holboell's rock-cress	S5
Descurania pinnata	Tansy Mustard	S3S4
Draba nemorosa	Yellow Whitlow-grass	S5
Erysimum asperum	Prairie-rocket Wallflower	S3S4
Lepidium ramosissimum	Branched Pepper-grass	S4S5
Lesquerella ludoviciana	Sand Bladderpod	S4
Sinapis arvensis	Wild Mustard	SNA
CAMPANULACEAE		
Campanula rotundifolia	Harebells	S5
CANNABACEAE		
Humulus lupulus	Common Hop	S4
CAPRIFOLIACEAE		
Lonicera dioica	Limber or Twining Honeysuckle	S5
Symphoricarpos albus	Snowberry	S4S5
Symphoricarpos occidentalis	Western Snowberry	S5
Viburnum lentago	Nannyberry	S4
Viburnum opulus	High-bush Cranberry	S5
CARYOPHYLLACEAE		
Cerastium arvense	Field Chickweed	S5
Cerastium nutans	Long-stalked Chickweed	S4S5
CHENOPODIACEAE		
Chenopodiastrum simplex	Maple-leaved Goosefoot	S5
Chenopodium album	Lamb's-quarters	SNA

TABLE 1. A preliminary species list of flora expected to occur in the regional assessment area.		
FAMILY/SPECIES	**COMMON NAME**	**MBCDC Rank**
Chenopodium pratericola	Goosefoot	S3
Corispermum americanum	American Bugseed	S2S3
Corispermum villosum	Hairy Bugseed	S1S2
CORNACEAE		
Cornus canadensis	Bunchberry	S5
Cornus sericea	Red-osier Dogwood	S5
ELAEAGNACEAE		
Elaeagnus commutata	Wolf-willow	S4S5
Shepherdia canadensis	Canada Buffaloberry	S5
ERICACEAE		
Arctostaphylos uva-ursi	Bearberry	S5
EUPHORBIACEAE		
Euphorbia esula	Leafy Spurge	SNA
Euphorbia geyeri	Prostrate Spurge	S1
Euphorbia serpyllifolia	Thyme-leaved Spurge	S3
FABACEAE		
Astragalus agrestis	Field Milkvetch	S5
Astragalus australis	Indian Milkvetch	S1S2
Astragalus bisulcatus	Two-grooved Milkvetch	S3
Astragalus canadensis	Canada Milkvetch	S5
Astragalus crassicarpus	Ground-plum	S3S4
Astragalus flexuosus	Slender or Low Milkvetch	S3S4
Astragalus pectinatus	Narrow-leaved Milkvetch	S2
Dalea purpurea var. purpurea	Dalea purpurea var. purpurea	S5
Glycyrrhiza lepidota	Wild Licorice	S4S5
Lathyrus ochroleucus	Cream-coloured Vetchling	S5
Lathyrus venosus	Wild Peavine	S5
Medicago sativa	Alfalfa	SNA
Melilotus officinalis	Yellow Sweetclover	SNA
Oxytropis campestris var. spicata	Showy Locoweed	S1
Oxytropis sericea	Early Yellow Locoweed	S1
Pediomelon esculentum	Indian Breadroot	S3S4
Pediomelum argophyllum	Silvery Scurfpea	S3S5
Thermopsis rhombifolia	Golden Bean	S2

TABLE 1. A preliminary species list of flora expected to occur in the regional assessment area.

FAMILY/SPECIES	COMMON NAME	MBCDC Rank
Trifolium repens	White Clover	SNA
Vicia americana	American Vetch	S5
FAGACEAE		
Quercus macrocarpa	Bur Oak	S5
FUMARIACEAE		
Corydalis aurea	Golden Corydalis	S5
GENTIANACEAE		
Gentianella amarella	Northern Gentian	S5
GROSSULARIACEAE		
Ribes oxyacanthoides	Northern Gooseberry	S5
HIPPURIDACEAE		
Hippuris vulgaris	Common Mare's-tail	S5
IRIDACEAE		
Sisyrinchium montanum	Blue-eyed Grass	S5
LAMIACEAE		
Agastache foeniculum	Giant Hyssop	S5
Lycopus americanus	Water-horehound	S5
Mentha arvensis	Common Mint	S5
Monarda fistulosa	Wild Bergamot	S5
Stachys palustris	Marsh Hedge-nettle	S5
LINACEAE		
Linum sulcatum	Grooved Yellow Flax	S3
NYCTAGINACEAE		
Mirabilis linearis	Hairy Umbrellawort	S1S2
ONAGRACEAE		
Epilobium brachycarpum	Annual Willowherb	S1S2
Oenothera biennis	Evening Primrose	S5
Oenothera serrulata	Shrubby Evening-primrose	S3
Oenothera suffrutescens	Scarlet Gaura	S3S4

TABLE 1. A preliminary species list of flora expected to occur in the regional assessment area.		
FAMILY/SPECIES	**COMMON NAME**	**MBCDC Rank**
OROBANCHACEAE		
Orobanche ludoviciana	Louisiana broomrape	S2
OXALIDACEAE		
Oxalis stricta	Yellow Wood-sorrel	SNA
PLANTAGINACEAE		
Plantago elongata ssp. elongata	Linear-leaved Plantain	S2
POLEMONIACEAE		
Phlox hoodii	Moss Pink	S3
POLYGONACEAE		
Eriogonum flavum	Yellow Eriogonum	S3
PRIMULACEAE		
Androsace septentrionalis	Pygmyflower	S5
Lysimachia ciliata	Fringed Loosestrife	S5
Lysimachia thyrsiflora	Tufted Loosestrife	S5
Parnassia glauca	Glaucous Grass-of-parnassus	S4
PYROLACEAE		
Orthilia secunda	One-sided Wintergreen	S5
Pyrola asarifolia	Pink Wintergreen	S5
RANUNCULACEAE		
Anemone canadensis	Canada Anemone	S5
Anemone multifida	Cut-leaved Anemone	S5
Anemone patens	Prairie Crocus	S4
Caltha palustris	Marsh Marigold	S5
Geum triflorum	Three-flowered Avens	S4S5
Ranunculus macounii	Macoun's Buttercup	S5
Ranunculus sceleratus	Celery-leaved Buttercup	S5
Thalictrum venulosum	Veiny Meadowrue	S5
ROSACEAE		
Amelanchier alnifolia	Saskatoon	S5
Chamaerhodos erecta ssp. nuttallii	Chamaerhodos	S4

TABLE 1. A preliminary species list of flora expected to occur in the regional assessment area.

FAMILY/SPECIES	COMMON NAME	MBCDC Rank
Chammerhodos erecta	Chamaerhodos	S3S4
Drymocallis arguta	White or Tall Cinquefoil	S5
Fragaria virginiana	Smooth Wild Strawberry	S5
Potentilla anserina	Silver Weed	S5
Potentilla bipinnafitida	Prairie Cinquefoil	SU
Potentilla norvegica	Rough Cinquefoil	S5
Potentilla pensylvanica	Pennsylvania Cinquefoil	S5
Prunus pensylvanica	Pin Cherry	S5
Prunus pumila	Sand Cherry	S4S5
Prunus virginiana	Chokecherry	S5
Rosa acicularis	Prickly Rose	S5
Rosa arkansana	Low Prairie Rose	S4
Rosa woodsii	Wood's Rose	S4
Rubus idaeus	Raspberry	S5
Spiraea alba	Meadowsweet	S5
RUBIACEAE		
Galium boreale	Northern Bedstraw	S5
Galium trifidum	Small Bedstraw	S5
Galium triflorum	Sweet-scented Bedstraw	S5
Houstonia longifolia	Long-leaved Bluets	S3S5
SALICACEAE		
Populus balsamifera	Balsam Poplar	S5
Populus tremuloides	Trembling Aspen	S5
Salix spp.	Willows	?
SANTALACEAE		
Comandra umbellata	Bastard Toadflax	S5
Comandra umbellata ssp. pallida	Bastard Toadflax	S4S5
SAXIFRAGACEAE		
Heuchera richardsonii	Alumroot	S5
SCROPHULARIACEAE		
Castilleja sessiliflora	Downy Painted-cup	S3S4
Melampyrum lineare	Cow-wheat	S3S5
Mimulus glabratus	Smooth Monkeyflower	S1
Orthocarpus luteus	Owl's-clover	S4S5

TABLE 1. A preliminary species list of flora expected to occur in the regional assessment area.		
FAMILY/SPECIES	**COMMON NAME**	**MBCDC Rank**
Penstemon gracilis	Lilac-flowered Beard-tongue	S3S4
Penstemon nitidus	Smooth Beard-tongue	S2
Penstemon procerus	Slender Beard-tongue	S1?
Veronica americana	American Brooklime	S4
SOLANACEAE		
Solanum triflorum	Wild Tomato	SNA
VIOLACEAE		
Viola adunca	Early Blue Violet	S5
Viola cucullata	Marsh Blue Violet	SNA
Viola pedatifida	Purple Prairie Violet	S4

TABLE 2. Species of conservation concern recorded regionally and within the Aspen Parkland Ecoregion.

Scientific Name	Common Name	S Rank
Achnatherum hymenoides	Indian Rice Grass	S2
Achnatherum richardsonii	Richardson Needle Grass	S1S2
Acmispon americanus	Prairie Trefoil	S2S3
Agalinis aspera	Rough Agalinis	S2
Alisma gramineum	Narrow-leaved Water-plantain	S1
Allium textile	Prairie Onion	S3
Ambrosia acanthicarpa	Sandbur	S1
Andropogon hallii	Sand Bluestem	S2
Aristida purpurea var. longiseta	Red Three-awn	S1?
Arnica fulgens	Shining Arnica	S2
Artemisia cana	Silver Sagebrush	S1
Asarum canadense	Wild Ginger	S3S4
Asclepias lanuginosa	Hairy Milkweed	S2S3
Asclepias verticillata	Whorled Milkweed	S3
Asclepias viridiflora	Green Milkweed	S3
Astragalus australis	Indian Milkvetch	S1S2
Astragalus bisulcatus	Two-grooved Milkvetch	S3
Astragalus crassicarpus	Ground-plum	S3S4
Astragalus flexuosus	Slender or Low Milkvetch	S3S4
Astragalus gilviflorus	Cushion Milkvetch	S1
Astragalus pectinatus	Narrow-leaved Milkvetch	S2
Atriplex argentea	Silver Saltbush	S2
Avenula hookeri	Hooker's Oat Grass	S3S4
Bidens amplissima	Vancouver Island Beggar-ticks	SNA
Boltonia asteroides var. recognita	White Boltonia	S2S3
Botrychium campestre	Prairie Moonwort	S1
Bouteloua curtipendula	Side-oats Grama	S2
Bouteloua dactyloides	Buffalograss	S1
Bromus kalmii	Wild Chess	S2S3
Bromus porteri	Porter's Chess	S2S3
Bromus pumpellianus	Awnless or Hungarian Brome	S3S4
Calamagrostis montanensis	Plains Reed Grass	S3
Calamagrostis rubescens	Pine Reed Grass	S1
Callitriche heterophylla	Larger Water-starwort	S1?
Carex brevior	Fescue Sedge	S3S4
Carex cristatella	Crested Sedge	S1?
Carex cryptolepis	Northeastern Sedge	S1
Carex duriuscula	Low Sedge	S3S4
Carex echinodes	Quill Sedge	SNR
Carex emoryi	Emory's Sedge	S2?
Carex filifoia	Thread-leaved Sedge	S3S4
Carex gravida	Heavy Sedge	S1
Carex hallii	Hall's Sedge	S1S2
Carex hystericina	Porcupine Sedge	S3
Carex inops	Long-stolon Sedge	S1?
Carex parryana	Parry's Sedge	S3
Carex pedunculata	Stalked Sedge	S3
Carex prairea	Prairie Sedge	S3S4
Carex sterilis	Dioecious Sedge	S2
Carex supina ssp. spaniocarpa	Weak Sedge	S2S3

TABLE 2. Species of conservation concern recorded regionally and within the Aspen Parkland Ecoregion.

Scientific Name	Common Name	S Rank
Carex tetanica	Rigid Sedge	S3
Carex torreyi	Torrey's Sedge	S3S4
Carex xerantica	White-scaled Sedge	S2
Castilleja sessiliflora	Downy Painted-cup	S3S4
Celtis occidentalis	Hackberry	S1?
Chammerhodos erecta	Chamaerhodos	S3S4
Chenopodium pratericola	Goosefoot	S3
Chenopodium subglabrum	Smooth Goosefoot	S1
Circaea canadensis ssp. canadensis	Large Enchanter's-nightshade	S2
Cirsium flodmanii	Flodman's Thistle	S3S4
Clematis ligusticifolia	Western Virgin's-bower	S1
Clematis virginiana	Virgin's-bower	S2?
Coreopsis tinctoria	Common Tickseed	S1
Corispermum americanum	American Bugseed	S2S3
Corispermum hookeri var. hookeri	Hooker's Bugseed	S1
Corispermum pallasii	Pallas' Bugseed	SH
Corispermum villosum	Hairy Bugseed	S1S2
Cornus alternifolia	Alternate-leaved Dogwood	S3
Coryphantha vivipara	Pincushion Cactus	S1?
Cryptotaenia canadensis	Canadian Honewort	S1
Cycloloma atriplicifolium	Winged Pigseed	S2S3
Cymopterus glomeratus	Plains Cymopterus	S2S3
Cyperus houghtonii	Houghton's Umbrella-sedge	S2S3
Cyperus schweinitzii	Schweinitz's Flatsedge	S2
Cypripedium candidum	Small White Lady's-slipper	S1
Dalea villosa var. villosa	Hairy Prairie-clover	S2S3
Descurania pinnata	Tansy Mustard	S3S4
Desmodium canadense	Beggar's-lice	S2
Dichanthelium linearifolium	White-haired Panic-grass	S2?
Dichanthelium wilcoxianum	Fall rosette grass; Sand millet	S2
Drosera anglica	Oblong-leaved Sundew	S3S4
Eleocharis engelmannii	Engelmann's Spike-rush	S1S2
Elymus hystrix	Bottle-brush Grass	S2
Epilobium brachycarpum	Annual Willowherb	S1S2
Eragrostis hypnoides	Creeping Teal Love Grass	S3
Erigeron caespitosus	Tufted Fleabane	S1
Eriogonum flavum	Yellow Eriogonum	S3
Erysimum asperum	Prairie-rocket Wallflower	S3S4
Euphorbia geyeri	Prostrate Spurge	S1
Euphorbia serpyllifolia	Thyme-leaved Spurge	S3
Festuca hallii	Plains Rough Fescue	S3
Festuca subverticillata	Nodding Fescue	S1
Galium aparine	Cleavers	S3
Guttierrezia sarothrae	Match-brush	S3
Hackelia floribunda	Large Flowered Stickseed	SU
Helianthus nuttallii ssp. rydbergii	Tuberous-rooted Sunflower	S2
Helianthus pauciflorus ssp. subrhomboideus	Beautiful Sunflower	S3S4
Heliotropium curassavicum	Seaside Heliotrope	SH
Hesperostipa comata	Spear Grass	S3S4
Hesperostipa curtiseta	Western Porcupine Grass	S3

TABLE 2. Species of conservation concern recorded regionally and within the Aspen Parkland Ecoregion.

Scientific Name	Common Name	S Rank
Hypoxis hirsuta	Yellow Stargrass	S3S4
Juncus interior	Inland Rush	S1
Krascheninnikovia lanata	Winterfat	S1?
Leersia oryzoides	Rice Cutgrass	S3
Lemna turionifera	Turion Duckweed	S1
Leucophysalis grandiflora	Large White-flowered Ground-cherry	S3S4
Linum sulcatum	Grooved Yellow Flax	S3
Lithospermum incisum	Linear-leaved Puccoon	S3
Lomatium foeniculaceum	Hairy-fruited Parsley	S3
Lomatium macrocarpum	Long-fruited Parsley	S3
Lomatium orientale	White-flowered Parsley	S1S2
Lomatogonium rotatum	Marsh Felwort	S2S3
Malaxis monophyllos	White Adder's-mouth	S2?
Malaxis paludosa	Bog Adder's-mouth	S1?
Menispermum canadense	Canada Moonseed	S3
Mentzelia decapetala	Gumbo-lily	SH
Mertensia lanceolata	Tall Lungwort	S2
Mimulus glabratus	Smooth Monkeyflower	S1
Mirabilis linearis	Hairy Umbrellawort	S1S2
Muhlenbergia asperifolia	Scratchgrass	S3
Muhlenbergia richardsonis	Mat Muhly	S3S4
Musineon divaricatum	Leafy Musineon	S1S2
Myosurus minimus	Least Mousetail	S1?
Nassella viridula	Green Needle Grass	S3
Oenothera serrulata	Shrubby Evening-primrose	S3
Oenothera suffrutescens	Scarlet Gaura	S3S4
Orobanche ludoviciana	Louisiana broomrape	S2
Osmorhiza claytonii	Hairy Sweet Cicely	S2?
Ostrya virginiana	Hop-hornbeam	S2
Oxytropis campestris var. spicata	Showy Locoweed	S1
Oxytropis sericea	Early Yellow Locoweed	S1
Parietaria pensylvanica	American Pellitory	S3S4
Pediomelon esculentum	Indian Breadroot	S3S4
Penstemon gracilis	Lilac-flowered Beard-tongue	S3S4
Penstemon nitidus	Smooth Beard-tongue	S2
Penstemon procerus	Slender Beard-tongue	S1?
Phlox hoodii	Moss Pink	S3
Phryma leptostachya	Lopseed	S3
Piptatheropsis micrantha	Little-seed Rice Grass	S2
Plagiobothrys scouleri var. scouleri	Scouler's Popcornflower	S1
Plantago elongata ssp. elongata	Linear-leaved Plantain	S2
Platanthera orbiculata	Round-leaved Bog Orchid	S3S4
Poa cusickii	Mutton-grass	S2
Poa fendleriana	Mutton Grass	S2
Polanisia dodecandra ssp. dodecandra	Clammyweed	S1
Polanisia dodecandra ssp. trachysperma	Clammyweed	S1
Polygala verticillata	Whorled Milkwort	S2
Polygala verticillata var. isocycla	Whorled Milkwort	S2
Potamogeton amplifolius	Large-leaved Pondweed	S3
Potamogeton illinoensis	Illinois Pondweed	S1?

TABLE 2. Species of conservation concern recorded regionally and within the Aspen Parkland Ecoregion.

Scientific Name	Common Name	S Rank
Potentilla gracilis var. flabelliformis	Graceful Cinquefoil	S1
Potentilla plattensis	Platte River Cinquefoil	S2
Ratibida columnifera	Prairie Coneflower	S3S4
Rhynchospora alba	White Beakrush	S3
Rhynchospora capillacea	Horned Beakrush	S2S3
Sanguinaria canadensis	Blood-root	S2
Sceptridium multifidum	Leathery Grape-fern	S3
Schedonnardus paniculatus	Tumble-grass	S2
Schizachyrium scoparium	Little Bluestem	S3S4
Selaginella densa	Prairie Spike-moss	S3
Shinnersoseris rostrata	Annual Skeletonweed	S1S2
Sisyrinchium campestre	White-eyed Grass	S3
Sisyrinchium mucronatum	Michaux's Blue-eyed Grass	S1
Solidago mollis	Velvety Goldenrod	S3
Sporobolus neglectus	Annual Dropseed	S2S3
Streptopus amplexifolius	White Mandarin	S2?
Thermopsis rhombifolia	Golden Bean	S2
Townsendia exscapa	Silky Townsend Daisy	S2
Tradescantia occidentalis	Western Spiderwort	S1
Uvularia sessilifolia	Small Bellwort	S2
Verbena bracteata	Bracted Vervain	S3
Vitis riparia	Riverbank Grape	S3S4

TABLE 3. Plants in Manitoba listed by The Noxious Weeds Act.

Common name	Scientific name	Area for which designation applies
Designated tier 1 noxious weeds		
Amaranth, Palmer	*Amaranthus palmeri*	Whole province
Bartsia, red	*Odontites vernus*	All areas of the province outside the Municipality of Bifrost – Riverton and the Rural Municipalities of Armstrong, Fisher, Gimli, Rockwood, St. Andrews and St. Clements
Crupina, common	*Crupina vulgaris*	Whole province
Cupgrass, woolly	*Eriochloa villosa*	Whole province
Goatgrass, jointed	*Aegilops cylindrica*	Whole province
Hawkweed, orange	*Hieracium aurantiacum*	Whole province
Hogweed, giant	*Heracleum mantegazzianum*	Whole province
Hound's-tongue	*Cynoglassum officinale*	Whole province
Knapweed, diffuse	*Centaurea diffusa*	Whole province
Knapweed, Russian	*Acroptilon repens*	Whole province
Knapweed, spotted	*Centaurea stoebe*	Whole province
Knapweed, squarrose	*Centaurea virgata*	Whole province
Knotweed, Japanese	*Fallopia japonica*	Whole province
Mile-a-minute weed	*Persicaria perfoliata*	Whole province
Mustard, garlic	*Alliaria petiolata*	Whole province
Paterson's curse	*Echium plantagineum*	Whole province
Pigweed, smooth	*Amaranthus hybridus*	Whole province
Saltcedar	*Tamarix ramosissima*	Whole province
Star-thistle, yellow	*Centaurea solstitialis*	Whole province
Tussock, serrated	*Nassella trichotoma*	Whole province
Waterhemp, tall	*Amaranthus tuberculatus*	Whole province
Designated tier 2 noxious weeds		
Alyssum, hoary	*Berteroa incana*	Whole province
Baby's-breath	*Gypsophila paniculata*	Whole province
Bartsia, red	*Odontites vernus*	Municipality of Bifrost – Riverton and the Rural Municipalities of Armstrong, Fisher, Gimli, Rockwood, St. Andrews and St. Clements
Bouncingbet	*Saponaria officinalis*	Whole province
Brome, downy	*Bromus tectorum*	Whole province
Brome, Japanese	*Bromus japonicus*	Whole province
Campion, bladder	*Silene vulgaris*	Whole province
Chamomile, scentless	*Matricaria perforata*	Whole province
Common reed, invasive	*Phragmites australis australis*	Whole province
Daisy, ox-eye	*Leucanthemum vulgare*	Whole province
Nutsedge, yellow	*Cyperus esculentus*	Whole province
Scabious, field	*Knautia arvensis*	Whole province
Spurge, Cypress	*Euphorbia cyparissias*	Whole province
Spurge, leafy	*Euphorbia esula*	Whole province
St. John's-wort	*Hypericum perforatum*	Whole province
Tansy, common	*Tanacetum vulgare*	Whole province
Thistle, nodding	*Carduus nutans*	Whole province

TABLE 3. Plants in Manitoba listed by The Noxious Weeds Act.

Common name	Scientific name	Area for which designation applies
Toadflax, Dalmatian	*Linaria dalmatica*	Whole province
Designated tier 3 noxious weeds		
Absinth	*Artemisia absinthium*	Whole province
Barberry	*Berberis vulgaris*	Whole province
Barley, foxtail	*Hordeum jubatum*	Whole province
Bellflower, creeping	*Campanula rapunculoides*	Whole province
Buckthorn, European	*Rhamnus cathartica*	Whole province
Burdock, common	*Arctium minus*	Whole province
Burdock, greater	*Arctium lappa*	Whole province
Burdock, woolly	*Arctium tomentosum*	Whole province
Campion, biennial	*Silene dioica*	Whole province
Catchfly, night-flowering	*Silene noctiflora*	Whole province
Cleavers	*Galium aparine*	Whole province
Cleavers, false	*Galium spurium*	Whole province
Cockle, white	*Silene alba*	Whole province
Dandelion	*Taraxacum officinale*	Whole province
Dodder	*genus Cuscuta*	Whole province
Fleabane, Canada	*Conyza canadensis*	Whole province
Flixweed	*Descurainia sophia*	Whole province
Hawk's-beard, narrow-leaved	*Crepis tectorum*	Whole province
Hemlock, poison	*Conium maculatum*	Whole province
Hemp-nettle	*Galeopsis tetrahit*	Whole province
Hoary-cress	*Cardaria draba*	Whole province
Jimsonweed	*Datura stramonium*	Whole province
Kochia	*Kochia scoparia*	Whole province
Lamb's quarters	*Chenopodium album*	Whole province
Lettuce, prickly	*Lactuca serriola*	Whole province
Milkweed, common	*Asclepias syriaca*	Whole province
Milkweed, showy	*Aslepias speciosa*	Whole province
Mustard, wild	*Sinapis arvensis*	Whole province
Nightshade, American black	*Solanum americanum*	Whole province
Nightshade, cutleaf	*Solanum triflorum*	Whole province
Nightshade, hairy	*Solanum sarachoides*	Whole province
Parsnip, wild	*Pastinaca sativa*	Whole province
Ragweed, common	*Ambrosia artemisiifolia*	Whole province
Ragweed, false	*Iva xanthifolia*	Whole province
Ragweed, giant	*Ambrosia trifida*	Whole province
Sow-thistle, annual	*Sonchus oleraceus*	Whole province
Sow-thistle, perennial	*Sonchus arvensis*	Whole province
Sow-thistle, spiny annual	*Sonchus asper*	Whole province
Stinkweed	*Thlaspi arvense*	Whole province
Stork's bill	*Erodium cicutarium*	Whole province
Thistle, bull	*Cirsium vulgare*	Whole province
Thistle, Canada	*Circium arvense*	Whole province
Thistle, Russian	*Salsola kali*	Whole province
Thistle, Russian	*Salsola pestifer*	Whole province

TABLE 3. Plants in Manitoba listed by The Noxious Weeds Act.

Common name	Scientific name	Area for which designation applies
Toadflax, yellow	*Linaria vulgaris*	Whole province
Water hemlock, bulb-bearing	*Cicuta bulbifera*	Whole province
Water hemlock, northern	*Cicuta virosa*	Whole province
Water hemlock, spotted	*Cicuta maculata*	Whole province
Water hemlock, western	*Cicuta douglasii*	Whole province
Whitetop, hairy	*Cardaria pubescens*	Whole province
Whitetop, lenspod	*Cardaria chalepensis*	Whole province

TABLE 4. Location of sample plots and sites visited, 2017.

Site	UTM Zone	Easting	Northing
BT-25	14 U	330075	5598485
BT-26	14 U	329261	5598507
BT-27	14 U	328833	5599048
BT-28	14 U	328600	5599302
BT-29	14 U	328100	5599300
BT-32	14 U	327600	5599308
BT-33	14 U	327100	5599327
BT-34	14 U	326600	5599348
BT-35	14 U	326088	5599370
BT-36	14 U	325630	5599387
BT-37	14 U	325111	5599389
BT-38	14 U	324600	5599407
BT-1	14 U	353864	5582175
BT-10	14 U	343564	5583330
BT-11	14 U	343584	5584064
BT-12	14 U	343410	5584872
BT-13	14 U	342045	5587368
BT-14	14 U	342071	5588150
BT-15	14 U	342100	5589312
BT-16	14 U	342127	5590069
BT-17	14 U	340441	5598163
BT-18	14 U	334582	5598306
BT-19	14 U	337297	5598256
BT-2	14 U	353216	5582197
BT-20	14 U	334118	5598354
BT-21	14 U	333486	5598379
BT-3	14 U	351281	5582249
BT-4	14 U	350855	5582262
BT-5	14 U	349998	5582288
BT-6	14 U	349592	5582302
BT-7	14 U	348291	5582335
BT-8	14 U	346477	5582378
BT-9	14 U	343543	5582482
BT-32*	14 U	327672	5599289
BT-25*	14 U	330069	5598494
BT-27*	14 U	328812	5599035
BT-43*	14 U	325711	5600547
BT-44*	14 U	325603	5600590
BT-26*	14 U	329313	5598502
BT-28*	14 U	328602	5599304
BT-29*	14 U	328104	5599305
BT-31	14 U	327675	5599432
BT-40*	14 U	327044	5599983
BT-39*	14 U	327262	5599759
BT-45*	14 U	324876	5600607
BT-24	14 U	330650	5598465
BT-7	14 U	348291	5582335
BT-38*	14 U	324600	5599407
BT-41*	14 U	326583	5600318

TABLE 5. Flora recorded from native plant and rare plant surveys, 2017.		
Family/Species	**Common Name**	**MBCDC Rank**
VASCULAR SPECIES		
Pteridophytes – Ferns and Allies		
EQUISETACEAE	HORSETAIL FAMILY	
Equisetum hyemale	Common Scouring-rush	S5
SELAGINELLACEAE	SPIKEMOSS FAMILY	
Selaginella densa	Prairie Spike-moss	S3
Gymnosperms		
CUPRESSACEAE	CYPRESS FAMILY	
Juniperus horizontalis	Creeping Juniper	S5
Angiosperms - Monocotyledons		
CYPERACEAE	SEDGE FAMILY	
Carex atherodes	Awned Sedge	S5
Carex deweyana	Dewey's Sedge	S5
Carex duriuscula	Low Sedge	S3S4
Carex filifolia	Thread-leaf Sedge	S3S5
Carex pseudocyperus	Cyperus-like Sedge	S4
Carex retrorsa	Turned Sedge	S5
Carex siccata	Dry-spike Sedge	S5
Carex sprengelii	Sprengel's Sedge	S4
Carex stipata	Awl-fruited Sedge	S4?
Schoenoplectus tabernaemontani	Soft-stem Bulrush	S5
LEMNACEAE	DUCKWEED FAMILY	
Lemna minor	Lesser Duckweed	SNA
LILIACEAE	LILY FAMILY	
Allium stellatum	Pink-flowered Onion	S5
Lilium philadelphicum	Wood Lily	S4
Maianthemum canadense	Two-leaved Solomon's-seal	S5
Maianthemum stellatum	Star-flowerd Solomon's-seal	S5
LINACEAE	FLAX FAMILY	
Linum lewisii	Blue Flax	S4
ORCHIDACEAE	ORCHID FAMILY	

TABLE 5. Flora recorded from native plant and rare plant surveys, 2017.		
Family/Species	**Common Name**	**MBCDC Rank**
Cypripedium sp.	Lady's Slipper	
Liparis loeselii	Yellow Twayblade	S3S4
POACEAE	GRASS FAMILY	
Agrostis scabra	Ticklegrass	S5
Agrostis stolonifera	Creeping Bent Grass	SNA
Avenula hookeri	Hooker's Oat Grass	S3S4
Bouteloua gracilis	Blue Gramma	S4
Bromus ciliatus	Fringed Brome	S5
Bromus inermis	Smooth Brome	SNA
Calamagrostis canadensis	Canada Reed Grass	S5
Calamovilfa longifolia	Prairie Sandreed	S3S5
Cinna latifolia	Slender Woodreed	S4S5
Dichanthelium wilcoxianum	Sand Millet	S2?
Elymus trachycaulus	Slender Wheatgrass	S5
Festuca hallii	Plains Rough Fescue	S3
Festuca saximontana	Rocky Mountain Fescue	S4S5
Hesperostipa curtiseta	Western Porcupine Grass	S3
Hesperostipa spartea	Porcupine Grass	S4
Koeleria macrantha	June Grass	S5
Muhlenbergia cuspidata	Prairie Muhly	S4
Oryzopsis asperifolia	White-grained Mountain Rice Grass	S5
Phalaris arundinacea	Reed Canary Grass	S5
Piptatherum pungens	Northern Rice Grass	S4S5
Poa palustris	Fowl Bluegrass	S5
Schizachne purpurascens	Purple Oat Grass	S5
Schizachyrium scoparium	Little Bluestem	S3S4
Sporobolus cryptandrous	Sand Dropseed	S3S5
SPARGANIACEAE	BUR-REED FAMILY	
Sparganium eurycarpum	Broad-fruited Bur-reed	S4S5
TYPHACEAE	CAT-TAIL FAMILY	
Typha sp.	Cat-tail	S4/S5
Angiosperms – Dicotyledons		
ACERACEAE	MAPLE FAMILY	
Acer negundo	Manitoba Maple	S5

TABLE 5. Flora recorded from native plant and rare plant surveys, 2017.

Family/Species	Common Name	MBCDC Rank
ANACARDIACEAE	SUMAC FAMILY	
Toxicodendron rydbergii	Poison Ivy	S5
APIACEAE	CARROT FAMILY	
Sium suave	Water Parsnip	S5
APOCYNACEAE	DOGBANE FAMILY	
Apocynum androsaemifolium	Spreading Dogbane	S5
ARALIACEAE	GINSENG FAMILY	
Aralia nudicaulis	Wild Sarsaparilla	S5
ASTERACEAE	ASTER FAMILY	
Achillea alpina	Many-flowered Yarrow	S5
Achillea millefolium	Yarrow	S5
Agoseris glauca	False Dandelion	S4S5
Ambrosia psilostachya	Perennial Ragweed	S4S5
Antennaria sp.	Everlasting	
Artemisia campestris	Sage	S4S5
Artemisia frigida	Pasture Sage	S4S5
Artemisia ludoviciana	Prairie Sage	S5
Cirsium arvense	Canada Thistle	SNA
Cirsium muticum	Swamp Thistle	S4
Doellingeria umbellata	Flat-topped White Aster	S5
Erigeron sp.	Fleabane	
Eutrochium maculatum	Spotted Joepyeweed	S5
Gaillardia aristata	Great-flowered Gaillardia	S5
Helianthus pauciflorus ssp. *subrhomboideus*	Beautiful Sunflower	S3S4
Heterotheca villosa	Hairy Golden-aster	S5
Hieracium umbellatum	Northern Hawkweed	S5
Liatris ligulistylis	Meadow Blazing Star	S4
Liatris punctata	Dotted Blazing Star	S4
Packera cana	Silvery Groundsel	S4
Petasites frigidus var. *palmatus*	Palmate-leaved Colt's-foot	S5
Solidago canadensis	Canada Goldenrod	S5
Solidago nemoralis	Showy Goldenrod	S5
Solidago ptarmicoides	White Upland Aster	S4S5

TABLE 5. Flora recorded from native plant and rare plant surveys, 2017.

Family/Species	Common Name	MBCDC Rank
Symphyotrichum ciliolatum	Lindley's Aster	S5
Symphyotrichum laeve	Smooth Aster	S5
Taraxacum officinale	Common Dandelion	SNA
Tragopogon sp.	Goat's-beard	SNA
BALSAMINACEAE	TOUCH-ME-NOT FAMILY	
Impatiens noli-tangere	Western Jewelweed	S1
BETULACEAE	BIRCH FAMILY	
Corylus americana	American Hazelnut	S4
Corylus cornuta	Beaked Hazelnut	S5
BORAGINACEAE	BORAGE FAMILY	
Lithospermum canescens	Hoary Puccoon	S5
Lithospermum incisum	Linear-leaved Puccoon	S3
BRASSICACEAE	MUSTARD FAMILY	
Arabis sp.	Rock Cress	
Erysimum asperum	Prairie Rocket Wallflower	S3S4
CAMPANULACEAE	BELLFLOWER FAMILY	
Campanula rotundifolia	Harebells	S5
CANNABACEAE	HEMP FAMILY	
Humulus lupulus	Common Hop	S4
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY	
Lonicera dioica	Twining Honeysuckle	S5
Symphoricarpos albus	Snowberry	S4S5
Symphoricarpos occidentalis	Western Snowberry	S5
Viburnum lentago	Nannyberry	S4
Viburnum opulus	High-bush Cranberry	S5
CARYOPHYLLACEAE	PINK FAMILY	
Cerastium arvense	Field Chickweed	S5
CHENOPODIACEAE	GOOSEFOOT FAMILY	
Chenopodium sp.	Goosefoot	

TABLE 5. Flora recorded from native plant and rare plant surveys, 2017.

Family/Species	Common Name	MBCDC Rank
CORNACEAE	DOGWOOD FAMILY	
Cornus sericea	Red-osier Dogwood	S5
ELAEAGNACEAE	OLEASTER FAMILY	
Elaeagnus commutata	Wolf Willow	S5
Shepherdia canadensis	Canada Buffaloberry	S5
ERICACEAE	HEATH FAMILY	
Arctostaphylos uva-ursi	Bearberry	S5
FABACEAE	PEA FAMILY	
Astragalus agrestis	Field Milkvetch	S5
Astragalus alpinus	Alpine Milkvetch	S5
Astragalus crassicarpus	Ground-plum	S3S4
Astragalus laxmannii	Ascending Milkvetch	S5
Dalea purpurea	Purple Prairie-clover	S4
Lathyrus ochroleucus	Cream-coloured Vetchling	S5
Lathyrus venosus	Wild Peavine	S5
Medicago lupulina	Black Medic	SNA
Melilotus spp.	Sweetclovers	SNA
Oxytropis sp.	Locoweed	
Pediomelum esculentum	Indian Breadroot	S3S4
Trifolium repens	White Clover	SNA
Vicia americana	American Vetch	S5
FAGACEAE	BEECH FAMILY	
Quercus macrocarpa	Bur Oak	S5
GENTIANACEAE	GENTIAN FAMILY	
Gentiana sp.	Gentian	S5
GROSSULARIACEAE	CURRANT FAMILY	
Ribes americanum	Wild Black Currant	S5
Ribes oxyacanthoides	Northern Gooseberry	S5
Ribes triste	Swamp Red Currant	S5
IRIDACEAE	IRIS FAMILY	

TABLE 5. Flora recorded from native plant and rare plant surveys, 2017.

Family/Species	Common Name	MBCDC Rank
Sisyrinchium montanum	Blue-eyed Grass	S5
LAMIACEAE	MINT FAMILY	
Agastache foeniculum	Giant Hyssop	S5
Lycopus asper?	Western Water-horehound	S4
Monarda fistulosa	Wild Bergamot	S4
MYRSINACEAE	MYRSINE FAMILY	
Lysimachia ciliata	Fringed Loosestrife	S5
ONAGRACEAE	EVENING PRIMROSE FAMILY	
Chamerion angustifolium	Fireweed	S5
Circaea alpina	Small Enchanter's Nightshade	S5
Oenothera serrulata	Shrubby Evening Primrose	S3
POLEMONIACEAE	PHLOX FAMILY	
Phlox hoodii	Moss Pink	S3
PRIMULACEAE	PRIMROSE FAMILY	
Androsace septentrionalis	Pygmyflower	S5
PYROLACEAE	WINTERGREEN FAMILY	
Orthilia secunda	One-sided Wintergreen	S5
Pyrola asarifolia	Pink Wintergreen	S5
RANUNCULACEAE	CROWFOOT FAMILY	
Actaea rubra	Red Baneberry	S5
Anemone canadensis	Canada Anemone	S5
Anemone cylindrica	Thimbleweed	S5
Anemone multifida	Cut-leaved Anemone	S5
Anemone patens	Prairie Crocus	S4
Caltha palustris	Marsh Marigold	S5
Thalictrum dasycarpum	Hairy Meadowrue	S5
Thalictrum venulosum	Veiny Meadowrue	S5
RHAMNACEAE	BUCKTHORN FAMILY	
Rhamnus alnifolia	Alder-leaved Buckthorn	S5

TABLE 5. Flora recorded from native plant and rare plant surveys, 2017.

Family/Species	Common Name	MBCDC Rank
ROSACEAE	ROSE FAMILY	
Amelanchier alnifolia	Saskatoon	S5
Chamaerhodos erecta ssp. *nuttallii*	Chamaerhodos	S4
Crataegus chrysocarpa	Round-leaved Hawthorn	S4
Fragaria virginiana	Smooth Wild Strawberry	S5
Geum triflorum	Three-flowered Avens	S4S5
Potentilla anserina ssp. *anserina*	Silverweed	S5
Potentilla bipinnatifida	Prairie Cinquefoil	SU
Potentilla pensylvanica	Pennsylvania Cinquefoil	SU
Prunus pensylvanica	Pin Cherry	S5
Prunus pumila	Ground Cherry	S4S5
Prunus virginiana	Chokecherry	S5
Rosa acicularis	Prickly Rose	S5
Rosa arkansana	Prairie Rose	S4
Rubus idaeus	Raspberry	S5
Rubus pubescens	Trailing Dewberry	S5
RUBIACEAE	MADDER FAMILY	
Galium boreale	Northern Bedstraw	S5
Galium triflorum	Sweet-scented Bedstraw	S5
Houstonia longifolia	Long-leaved Bluets	S3S5
SALICACEAE	WILLOW FAMILY	
Populus balsamifera	Balsam Poplar	S5
Populus tremuloides	Trembling Aspen	S5
Salix bebbiana	Bebb's Willow	S5
Salix exigua	Sandbar Willow	S5
Salix sp.	Willow	
SANTALACEAE	SANDALWOOD FAMILY	
Comandra umbellata	Bastard Toadflax	S5
SAXIFRAGACEAE	SAXIFRAGE FAMILY	
Heuchera richardsonii	Alumroot	S5
Mitella nuda	Mitrewort	S5
SCROPHULARIACEAE	FIGWORT FAMILY	
Orthocarpus luteus	Owl's Clover	S4S5
Penstemon gracilis	Lilac-flowered Beard-tongue	S3S4

TABLE 5. Flora recorded from native plant and rare plant surveys, 2017.		
Family/Species	**Common Name**	**MBCDC Rank**
SMILACACEAE	GREENBRIAR FAMILY	
Smilax lasioneura	Carrion Flower	S4S5
URTICACEAE	NETTLE FAMILY	
Urtica dioica	Stinging Nettle	S5
VIOLACEAE	VIOLET FAMILY	
Viola adunca	Early Blue Violet	S5
NON-VASCULAR SPECIES		
Bryophytes		
Moss spp.	unknown mosses	
Lichens		
Cladina mitis	Green Reindeer Lichen	
Lichen spp.	unknown lichens	
Cryptogamic ground crust	Lichens, mosses, fungi	

APPENDIX II

TERRESTRIAL INVERTEBRATES, AMPHIBIANS AND REPTILES

Table 1. Status listing of at-risk terrestrial invertebrates species potentially found within the Birtle Transmission Project Regional Assessment area.

Family	Common Name	Scientific Name	Status Listings[1]		
			COSEWIC	SARA	MESEA
Apidae	Gypsy Cuckoo Bumble Bee	*Bombus bohemicus*	Endangered	No Status	Not Listed
	Yellow-banded Bumble Bee	*Bombus terricola*	Special Concern	No Status	Not Listed
Coccinellidae	Transverse Lady Beetle	*Coccinella transversoguttata*	Special Concern	No Status	Not Listed
	Nine-spotted Lady Beetle	*Coccinella novemnotata*	Endangered	No Status	Not Listed
Nymphalidae	Monarch	*Danaus plexippus*	Endangered	Special Concern	Not Listed

[1]COSEWIC – Committee on the Status of Endangered Wildlife in Canada; SARA – *Species at Risk Act* (Canada); MESEA- Manitoba *Endangered Species and Ecosystems Act*

Table 2. Status listings of amphibians potentially found within the Birtle Transmission Project Regional Assessment area.

Family	Common Name	Scientific Name	Status Listings[1]		
			COSEWIC	SARA	MESEA
Ambystomatidae	Western Tiger Salamander	*Ambystoma mavortium*	Special Concern	No Status	Not Listed
Bufonidae	Canadian Toad	*Anaxyrus hemiophrys*	Not at Risk	Not Listed	Not Listed
Hylidae	Boreal Chorus Frog	*Pseudacris maculata*	Not Listed	Not Listed	Not Listed
Ranidae	Northern Leopard Frog (western boreal/prairie population)	*Lithobates pipiens*	Special Concern	Special Concern	Not Listed
	Wood Frog	*Lithobates sylvaticus*	Not Listed	Not Listed	Not Listed

[1]COSEWIC – Committee on the Status of Endangered Wildlife in Canada; SARA – *Species at Risk Act* (Canada); MESEA- Manitoba *Endangered Species and Ecosystems Act*

Table 3. Amphibian and reptile observations at wetland sites within the Birtle Transmission Project Regional Assessment Area, 2017. Bolded species denote Priority Species.

Site	Species[1]	Survey Types[2]	>10 NLFR
1	WOFR, **NLFR**	FN, VES, CS	
3	WOFR	VES	
5	**NLFR, SNTU**	VES, SC	
7	BCFR	VES, CS	
8	WOFR, BCFR	CS	
8.5	BCFR	CS	
8.6	BCFR	CS	
9	**WETS**, BCFR, WOFR	FN, CS	
10	**NLFR,** BCFR, WOFR, **GASN, WETS**	FN, VES, CS	YES
10.5	BCFR	CS	
12	**NLFR**	SC	
14	**NLFR,** WOFR, BCFR	FN, SN, VES, CS	YES
15	**NLFR**	VES	YES
16	**GASN**	VES	
17	**NLFR,** BCFR	CS	
17.5	BCFR	CS	
18	BCFR	CS	
19	**GASN, NLFR**	FN, VES, CS	YES
19.5	BCFR	CS	
19.6	**NLFR,** BCFR	CS	
20	**NLFR**, BCFR	VES, CS	
20.5	**WETS, GASN,** BCFR	FN, CS	

NOTES:

[1] BCFR: boreal chorus frog; GASN: garter snake; NLFR: northern leopard frog; SNTU: snapping turtle; WETS: western tiger salamander; WOFR: wood frog

[2] CS call survey; FN: funnel trap; SN: seine net; SC: stream crossing survey; VES: visual encounter survey

Table 4. Landcover[1] within the Birtle Transmission Project Regional Assessment area.

Landcover	PF (Project Footprint)		LAA(Local Assessment Area)		RAA (Regional Assessment Area)	
	Area (ha)	Percent	Area (ha)	Percent	Area (ha)	Percent
Water	0.4	0.2	149	1.0	1764	1.8
Urban	9	5.1	343	2.3	2389	2.5
Shrubland	4	2.3	195	1.3	1992	2.1
Wetland	4	1.9	408	2.8	3331	3.4
Grassland	35	19.1	2682	18.3	18839	19.4
Pasture	6	3.1	863	5.9	4466	4.6
Annual Cropland	95	51.7	7320	50.1	41680	43.0
Undifferentiated Forest	6	3.0	482	3.3	3445	3.6
Coniferous	0.0	0.0	0.1	0.0	0.9	0.0
Broadleaf	25	13.5	2178	14.9	18964	19.6
Mixedwood	0.0	0.0	0.0	0.0	0.1	0.0

[1] Source - Manitoba Hydro -BTP_MH_LandcoverClassification_PY_2016 (Orientis)

Table 5. Results from sites investigated for salamanders using funnel traps (FN) and seine nets (SN) within the Birtle Transmission Project Regional Assessment area, July 2017.

Site	Trap Type	Northern Leopard Frog	Wood Frog	Garter Snake spp.	Western Tiger Salamander
1	FN	0	4	0	0
3			Dry Site, no traps set		
7			Dry Site, no traps set		
10	FN	3	0	0	4
10.5			Dry Site, no traps set		
14	FN	4	0	0	0
14	SN	2	0	0	0
19	FN	0	0	1	0
20			Dry Site, no traps set		
20.5	FN	0	0	1	6
9N	FN	0	0	0	0
9S	FN	0	0	0	11
		9	4	2	21

Table 6. Number of individual amphibians and reptiles observed during Visual Encounter Surveys (VES) at sites within the Birtle Transmission Project Regional Assessment Area, 2017.

VES Type	Site	Survey Period	Northern Leopard Frog	Boreal Chorus Frog	Wood Frog	Snapping Turtle	Garter Snake spp.
Amphibian	1	Spring	0	0	0	0	0
		Summer	0	0	19	0	0
		Fall	1	0	0	0	0
			1	0	19	0	0
	3	Fall	0	0	0	0	0
	5	Fall	4	0	0	1	0
	7	Fall	0	0	0	0	0
	10	Spring	0	1	0	0	0
		Summer	40	0	10	0	1
		Fall	0	0	0	0	0
			40	1	10	0	1
	14	Summer	39	0	5	0	0
		Fall	130	0	0	0	0
			169	0	5	0	0
	15	Fall	91	0	0	0	0
	19	Summer	5	0	0	0	1
		Fall	7	0	0	0	0
			12	0	0	0	1
	20	Fall	1	0	0	0	0
	20.5	Summer	0	0	1	0	0
		Fall	3	0	0	0	0
			3	0	1	0	0
			321	1	35	1	2
Reptile	3	Spring	0	0	1	0	0
	5	Spring	0	0	0	0	0
	16	Spring	0	0	0	0	1
			0	0	1	0	1

Table 7. Call ranks[1] of anurans heard calling during Anuran Call Surveys at sites within the Birtle Transmission Project Regional Assessment Area, May 2017.

Site	Northern Leopard Frog	Wood Frog	Boreal Chorus Frog
1	0	1	0
7	0	0	2
8	0	2	4
8.5	0	0	2
8.6	0	0	2
9	0	0	2
10	0	0	2
10.5	0	0	2
14	0	0	1
17	2	0	3
17.5	0	0	2
18	0	0	2
19	0	0	0
19.5	0	0	3
19.6	2	0	3
20	0	0	1
20.5	0	0	2
20.5b	0	0	2
9b	0	1	2

[1] 1 = one ind calling; 2 = calls not overlapping & distinguishable (sev inds); 3 = calls overlapping but still distinguishable (sev + inds calling); & 4 = calls overlapping & indistinguishable (full chorus)

Table 8. Status listings of reptiles potentially found within the Birtle Transmission Project Regional Assessment area.

Family	Common Name	Scientific Name	Status Listings[1]		
			COSEWIC	SARA	MESEA
Chelydridae	Snapping Turtle	*Chelydra serpentina*	Special Concern	Special Concern	Not Listed
Colubridae	Smooth Green Snake	*Opheodrys vernalis*	Not Listed	Not Listed	Not Listed
Emydidae	Western Painted Turtle	*Chrysemys picta belli*	Not at Risk	Not Listed	Not Listed
Natricidae	Northern Redbelly Snake	*Storeria occipitomaculata*	Not Listed	Not Listed	Not Listed
	Western Plains Garter Snake	*Thamnophis radix*	Not Listed	Not Listed	Not Listed
	Red-Sided Garter Snake	*Thamnophis sirtalis*	Not Listed	Not Listed	Not Listed

[1]COSEWIC – Committee on the Status of Endangered Wildlife in Canada; SARA – *Species at Risk Act* (Canada); MESEA- Manitoba *Endangered Species and Ecosystems Act*

APPENDIX III

BIRDS

Table 1: Bird species that could occur in the Regional Study Area

						Observations			Conservation Status			
Group	**Order**	**Habitat Association**	**Common Name**	**Scientific Name**	**Breeding Status**	**BBA SW Region**	**BBA Local Squares**	**Field Studies[1]**	**SARA Status[2]**	**COSEWIC Status[3]**	**MBESEA[4]**	**MBCDC Status[5]**
Raptors	Cathartiformes (Vultures)	Open forest	Turkey vulture	*Cathartes aura*	breeding	✓	✓	✓	NA	NA	none	S4S5B
	Falconiformes (Hawks and Falcons)	Interior forest	Broad-winged hawk	*Buteo platypterus*	breeding	✓			none	none	none	S5B
			Northern goshawk	*Accipiter gentilis*	breeding	✓			none	Not at Risk	none	S4B,S5N
			Sharp-shinned hawk	*Accipiter striatus*	breeding	✓	✓	✓	none	Not at Risk	none	S4B
		Open forest	Merlin	*Falco columbarius*	breeding	✓	✓	✓	none	Not at Risk	none	S5B
			Red-tailed hawk	*Buteo jamaicensis*	breeding	✓	✓	✓	none	Not at Risk	none	S5B
		Riparian forest	Bald eagle	*Haliaeetus leucocephalus*	nonbreeding	✓	✓	✓	none	Not at Risk	none	S5B,SUN
			Cooper's hawk	*Accipiter cooperii*	breeding	✓	✓	I	none	Not at Risk	none	S4B
		Grassland	American kestrel	*Falco sparverius*	breeding	✓	✓	✓	none	none	none	S4B
			Ferruginous hawk	*Buteo regalis*	breeding uncommon	✓			Threatened	Threatened	Endangered	S1B
			Golden eagle	*Aquila chrysaetos*	migration				none	none	none	S1B,S4N
			Northern harrier	*Circus cyaneus*	breeding	✓	✓	✓	none	Not at Risk	none	S5B
			Prairie falcon	*Falco mexicanus*	uncommon visitor				none	none	none	SNA
			Rough-legged hawk	*Buteo lagopus*	migration			✓	none	Not at Risk	none	S3B,SUM
			Swainson's hawk	*Buteo swainsoni*	breeding	✓	✓	I	none	none	none	S4B
		Other	Gyrfalcon	*Falco rusticolus*	nonbreeding				none	none	none	SUN
			Peregrine falcon	*Falco peregrinus*	migration	✓			Not at Risk	Special Concern	Endangered	S1B
		Wetland	Osprey	*Pandion haliaetus*	migration	✓			none	none	none	S4B
	Strigiformes (Owls)	Interior forest	Boreal owl	*Aegolius funereus*	breeding				none	Not at Risk	none	S4
			Long-eared owl	*Asio otus*	breeding	✓			none	none	none	S4B
			Northern saw-whet owl	*Aegolius acadicus*	breeding	✓			none	none	none	S4B
		Open forest	Barred owl	*Strix varia*	breeding	✓			none	none	none	S4
			Eastern screech-owl	*Megascops asio*	breeding	✓			none	Not at Risk	none	S4
			Great gray owl	*Strix nebulosa*	breeding	✓			none	Not at Risk	none	S4
			Great horned owl	*Bubo virginianus*	breeding	✓	✓	✓	none	none	none	S4
			Northern hawk owl	*Surnia ulula*	nonbreeding				none	Not at Risk	none	S4
		Grassland	Burrowing owl	*Athene cunicularia*	breeding	✓			Endangered	Endangered	Endangered	S1B
			Short-eared owl	*Asio flammeus*	breeding	✓		I	Special Concern	Special Concern	Threatened	S2S3B
			Snowy owl	*Bubo scandiacus*	winter				none	Not at Risk	none	S4N
Upland game birds	Galliformes (Gallinaceous Birds)	Interior forest	Ruffed grouse	*Bonasa umbellus*	breeding	✓	✓	✓	none	none	none	S4S5
			Spruce grouse	*Falcipennis canadensis*	breeding	✓			none	none	none	S4
		Open forest	Wild turkey	*Meleagris gallopavo*	slightly beyond range	✓	✓		none	none	none	SNA
		Grassland	Gray partridge	*Perdix perdix*	breeding	✓	✓	I	none	none	none	SNA
			Ring-necked pheasant	*Phasianus colchicus*	uncommon all seasons	✓		✓	none	none	none	SNA
			Greater prairie-chicken	*Tympanuchus cupido*	none				Extirpated	Extirpated	Extirpated	SX
			Sharp-tailed grouse	*Tympanuchus phasianellus*	breeding	✓	✓	✓	none	none	none	S5
Songbirds	Columbiformes (Doves)	Open forest	Mourning dove	*Zenaida macroura*	breeding	✓	✓	✓	none	none	none	S4B
		Other	Rock pigeon	*Columba livia*	breeding	✓	✓	✓	none	none	none	SNA
	Passeriformes (Perching Birds)	Interior forest	Bay-breasted warbler	*Setophaga castanea*	breeding				none	none	none	S5B
			Blackburnian warbler	*Setophaga fusca*	breeding	✓			none	none	none	S5B
			Black-throated green warbler	*Setophaga virens*	migration	✓			none	none	none	S4B
			Blue-headed vireo	*Vireo solitarius*	breeding	✓	✓		none	none	none	S5B
			Boreal chickadee	*Poecile hudsonicus*	breeding	✓			none	none	none	S4
			Brown creeper	*Certhia americana*	breeding	✓			none	none	none	S5B
			Cape May warbler	*Setophaga tigrina*	migration	✓	✓		none	none	none	S5B
			Evening grosbeak	*Coccothraustes vespertinus*	breeding	✓			No Status	Special Concern	none	S3
			Fox sparrow	*Passerella iliaca*	migration				none	none	none	S5B,S4M
			Golden-crowned kinglet	*Regulus satrapa*	migration	✓			none	none	none	S4B

Table 1: Bird species that could occur in the Regional Study Area

Group	Order	Habitat Association	Common Name	Scientific Name	Breeding Status	Observations			Conservation Status			
						BBA SW Region	BBA Local Squares	Field Studies[1]	SARA Status[2]	COSEWIC Status[3]	MBESEA[4]	MBCDC Status[5]
Songbirds	Passeriformes (Perching Birds)	Interior forest	Gray jay	*Perisoreus canadensis*	breeding				none	none	none	S5
			Gray-cheeked thrush	*Catharus minimus*	migration				none	none	none	S5B,S5M
			Hermit thrush	*Catharus guttatus*	breeding	✓	✓	✓	none	none	none	S5B
			Ovenbird	*Seiurus aurocapilla*	breeding	✓	✓	✓	none	none	none	S5B
			Philadelphia vireo	*Vireo philadelphicus*	migration	✓			none	none	none	S4B
			Pine grosbeak	*Pinicola enucleator*	nonbreeding				none	none	none	S4
			Pine siskin	*Spinus pinus*	breeding	✓	✓		none	none	none	S5
			Red crossbill	*Loxia curvirostra*	breeding	✓			none	none	none	S4B,SUN
			Red-breasted nuthatch	*Sitta canadensis*	breeding	✓		✓	none	none	none	S5
			Red-eyed vireo	*Vireo olivaceus*	breeding	✓	✓	✓	none	none	none	S5B
			Ruby-crowned kinglet	*Regulus calendula*	breeding	✓			none	none	none	S5B
			Scarlet tanager	*Piranga olivacea*	breeding	✓			none	none	none	S4B
			Swainson's thrush	*Catharus ustulatus*	breeding	✓			none	none	none	S5B
			Varied thrush	*Ixoreus naevius*	uncommon migrant				none	none	none	SNA
			Veery	*Catharus fuscescens*	breeding	✓	✓	✓	none	none	none	S5B
			White-winged crossbill	*Loxia leucoptera*	nonbreeding	✓			none	none	none	S5
			Winter wren	*Troglodytes hiemalis*	breeding				none	none	none	S5B
			Wood thrush	*Hylocichla mustelina*	rare migrant				none	none	none	SNA
			Yellow-bellied flycatcher	*Empidonax flaviventris*	migration	✓			none	none	none	S5B
			Yellow-rumped warbler	*Setophaga coronata*	breeding	✓		I	none	none	none	S5B
			Yellow-throated vireo	*Vireo flavifrons*	breeding	✓	✓	✓	none	none	none	S4B
		Open forest	American crow	*Corvus brachyrhynchos*	breeding	✓	✓	✓	none	none	none	S5B,SUN
			American goldfinch	*Spinus tristis*	breeding	✓	✓	✓	none	none	none	S5B
			American redstart	*Setophaga ruticilla*	breeding	✓	✓	✓	none	none	none	S5B
			American robin	*Turdus migratorius*	breeding	✓	✓	✓	none	none	none	S5B
			Baltimore oriole	*Icterus galbula*	breeding	✓	✓	✓	none	none	none	S4B
			Black-and-white warbler	*Mniotilta varia*	breeding	✓	✓	✓	none	none	none	S5B
			Black-capped chickadee	*Poecile atricapillus*	breeding	✓	✓	✓	none	none	none	S5
			Blackpoll warbler	*Setophaga striata*	migration	✓			none	none	none	S5B,SUM
			Blue jay	*Cyanocitta cristata*	breeding	✓	✓	✓	none	none	none	S5
			Bohemian waxwing	*Bombycilla garrulus*	nonbreeding				none	none	none	S4B,SUN
			Brown-headed cowbird	*Molothrus ater*	breeding	✓	✓	✓	none	none	none	S5B
			Canada warbler	*Cardellina canadensis*	breeding			✓	Threatened	Threatened	Threatened	S3B
			Cedar waxwing	*Bombycilla cedrorum*	breeding	✓	✓	✓	none	none	none	S5B,SUN
			Chipping sparrow	*Spizella passerina*	breeding	✓	✓	✓	none	none	none	S5B
			Common grackle	*Quiscalus quiscula*	breeding	✓	✓	✓	none	none	none	S5B
			Common raven	*Corvus corax*	nonbreeding	✓	✓	✓	none	none	none	S5
			Connecticut warbler	*Oporornis agilis*	breeding				none	none	none	S4B
			Dark-eyed junco	*Junco hyemalis*	nonbreeding	✓		✓	none	none	none	S5B,SUN
			Eastern bluebird	*Sialia sialis*	breeding	✓	✓	✓	none	Not at Risk	none	S4B
			Eastern phoebe	*Sayornis phoebe*	breeding	✓	✓	✓	none	none	none	S5B
			Eastern wood-pewee	*Contopus virens*	breeding	✓	✓	✓	Special Concern	Special Concern	none	S4B
			Eastern towhee	*Pipilo erythrophthalmus*	uncommon breeding	✓	✓	✓	none	none	none	S4B
			Great crested flycatcher	*Myiarchus crinitus*	breeding	✓	✓	✓	none	none	none	S4B
			House wren	*Troglodytes aedon*	breeding	✓	✓	✓	none	none	none	S5B
			Indigo bunting	*Passerina cyanea*	breeding	✓	✓		none	none	none	S4B
			Least flycatcher	*Empidonax minimus*	breeding	✓	✓	✓	none	none	none	S5B
			Magnolia warbler	*Setophaga magnolia*	migration	✓			none	none	none	S5B
			Nashville warbler	*Oreothlypis ruficapilla*	migration	✓		✓	none	none	none	S5B
			Northern mockingbird	*Mimus polyglottos*	uncommon all seasons	✓			none	none	none	S2

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						Observations			Conservation Status			
Group	**Order**	**Habitat Association**	**Common Name**	**Scientific Name**	**Breeding Status**	**BBA SW Region**	**BBA Local Squares**	**Field Studies[1]**	**SARA Status[2]**	**COSEWIC Status[3]**	**MBESEA[4]**	**MBCDC Status[5]**
Songbirds	Passeriformes (Perching Birds)	Open forest	Northern shrike	*Lanius excubitor*	nonbreeding			✓	none	none	none	S3B,S5N,SUM
			Olive-sided flycatcher	*Contopus cooperi*	breeding	✓		✓	Threatened	Threatened	Threatened	S3B
			Orange-crowned warbler	*Oreothlypis celata*	breeding	✓	✓	I	none	none	none	S5B
			Purple finch	*Haemorhous purpureus*	breeding	✓	✓	I	none	none	none	S5B
			Rose-breasted grosbeak	*Pheucticus ludovicianus*	breeding	✓	✓	✓	none	none	none	S5B
			Rusty blackbird	*Euphagus carolinus*	migration			I	Special Concern	Special Concern	none	S4B
			Song sparrow	*Melospiza melodia*	breeding	✓	✓	✓	none	none	none	S5B
			Spotted towhee	*Pipilo maculatus*	rare breeding	✓		✓	none	none	none	SUB
			Tennessee warbler	*Oreothlypis peregrina*	breeding	✓			none	none	none	S5B
			Warbling vireo	*Vireo gilvus*	breeding	✓	✓	✓	none	none	none	S5B
			Western tanager	*Piranga ludoviciana*	occasional migrant				none	none	none	SNA
			White-breasted nuthatch	*Sitta carolinensis*	breeding	✓	✓	✓	none	none	none	S5
			White-throated sparrow	*Zonotrichia albicollis*	breeding	✓	✓	✓	none	none	none	S5B
		Riparian forest	Barn swallow	*Hirundo rustica*	breeding	✓	✓	✓	Endangered	Threatened	none	S4B
			Northern rough-winged swallow	*Stelgidopteryx serripennis*	uncommon breeding	✓	✓		none	none	none	S4B
			Western wood-pewee	*Contopus sordidulus*	breeding				none	none	none	S3B
		Grassland	American pipit	*Anthus rubescens*	migration				none	none	none	S3B
			Baird's sparrow	*Ammodramus bairdii*	breeding	✓		✓	Special Concern	Special Concern	Endangered	S□B
			Bobolink	*Dolichonyx oryzivorus*	breeding	✓	✓	✓	Endangered	Threatened	none	S4B
			Brewer's blackbird	*Euphagus cyanocephalus*	breeding	✓	✓	✓	none	none	none	S5B
			Chestnut-collared longspur	*Calcarius ornatus*	breeding	✓	✓	✓	Threatened	Threatened	Endangered	S2B
			Clay-colored sparrow	*Spizella pallida*	breeding	✓	✓	✓	none	none	none	S5B
			Dickcissel	*Spiza americana*	uncommon breeding	✓			none	none	none	SNA
			Eastern kingbird	*Tyrannus tyrannus*	breeding	✓	✓	✓	none	none	none	S4B
			European starling	*Sturnus vulgaris*	breeding	✓	✓	✓	none	none	none	SNA
			Grasshopper sparrow	*Ammodramus savannarum*	beyond range	✓	✓	✓	none	none	none	S3B
			Horned lark	*Eremophila alpestris*	breeding	✓	✓	✓	none	none	none	S3B,SUM
			Lark bunting	*Calamospiza melanocorys*	uncommon	✓			No Status	Threatened	none	S1B
			Lark sparrow	*Chondestes grammacus*	uncommon breeding	✓	✓	✓	none	none	none	S4B
			Loggerhead shrike	*Lanius ludovicianus excubitorides*	breeding	✓		I	Threatened	Threatened	Endangered	S1B
			Mountain bluebird	*Sialia currucoides*	breeding	✓	✓	✓	none	none	none	S2S3B
			Savannah sparrow	*Passerculus sandwichensis*	breeding	✓	✓	✓	none	none	none	S5B
			Scissor-tailed flycatcher	*Tyrannus forficatus*	occasional visitor				none	none	none	SNA
			Sprague's pipit	*Anthus spragueii*	breeding	✓	✓	✓	Threatened	Threatened	Threatened	S2B
			Vesper sparrow	*Pooecetes gramineus*	breeding	✓	✓	✓	none	none	none	S5B
			Western kingbird	*Tyrannus verticalis*	breeding	✓	✓	✓	none	none	none	S5B
			Western meadowlark	*Sturnella neglecta*	breeding	✓	✓	✓	none	none	none	S3S4B
		None	Passenger pigeon	*Ectopistes migratorius*	none				NA	Extinct	NA	SXB
		Other	American tree sparrow	*Spizelloides arborea*	migration			✓	none	none	none	S5B
			Common redpoll	*Acanthis flammea*	winter	✓			none	none	none	S4B,S5N
			Harris's sparrow	*Zonotrichia querula*	migration				No Status	Special Concern	none	S4B,S5M
			Hoary redpoll	*Acanthis hornemanni*	nonbreeding				none	none	none	S3B,S5N
			House finch	*Haemorhous mexicanus*	uncommon breeding	✓	✓		none	none	none	S5B
			House sparrow	*Passer domesticus*	breeding	✓	✓	I	none	none	none	SNA
			Lapland longspur	*Calcarius lapponicus*	migration			I	none	none	none	S4B,SUM,SUN
			Say's phoebe	*Sayornis saya*	uncommon breeding	✓			none	none	none	S3B
			Smith's longspur	*Calcarius pictus*	migration				none	none	none	S3B,SUM
			Snow bunting	*Plectrophenax nivalis*	nonbreeding			✓	none	none	none	S4N,SUM

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Group	**Order**	**Habitat Association**	**Common Name**	**Scientific Name**	**Breeding Status**	**BBA SW Region**	**BBA Local Squares**	**Field Studies[1]**	**SARA Status[2]**	**COSEWIC Status[3]**	**MBESEA[4]**	**MBCDC Status[5]**
Songbirds	Passeriformes (Perching Birds)	Shrubland	Black-billed magpie	*Pica hudsonia*	breeding	✓	✓	✓	none	none	none	S4
			Brown thrasher	*Toxostoma rufum*	breeding	✓	✓	✓	none	none	none	S4B
			Chestnut-sided warbler	*Setophaga pensylvanica*	breeding	✓	✓	✓	none	none	none	S5B
			Golden-winged warbler	*Vermivora chrysoptera*	breeding				Threatened	Threatened	Threatened	S3B
			Gray catbird	*Dumetella carolinensis*	breeding	✓	✓	✓	none	none	none	S5B
			Mourning warbler	*Geothlypis philadelphia*	breeding	✓	✓	✓	none	none	none	S5B
			Orchard oriole	*Icterus spurius*	uncommon breeding	✓	✓	✓	none	none	none	S5B
			White-crowned sparrow	*Zonotrichia leucophrys*	migration				none	none	none	S5B
			Willow flycatcher	*Empidonax traillii*	uncommon breeding	✓			none	none	none	S3B
		Wetland	Alder flycatcher	*Empidonax alnorum*	breeding	✓	✓	✓	none	none	none	S5B
			Bank swallow	*Riparia riparia*	breeding	✓	✓		Endangered	Threatened	none	S5B
			Cliff swallow	*Petrochelidon pyrrhonota*	breeding	✓	✓	I	none	none	none	S4B
			Common yellowthroat	*Geothlypis trichas*	breeding	✓	✓	✓	none	none	none	S5B
			Le Conte's sparrow	*Ammodramus leconteii*	breeding	✓	✓	✓	none	none	none	S5B
			Lincoln's sparrow	*Melospiza lincolnii*	migration	✓			none	none	none	S5B
			Marsh wren	*Cistothorus palustris*	breeding	✓	✓	✓	none	none	none	S5B
			Nelson's sparrow	*Ammodramus nelsoni*	breeding	✓	✓		none	Not at Risk	none	S5B
			Northern waterthrush	*Parkesia noveboracensis*	breeding	✓	✓	✓	none	none	none	S5B
			Palm warbler	*Setophaga palmarum*	migration				none	none	none	S5B
			Purple martin	*Progne subis*	breeding	✓	✓	✓	none	none	none	S4B
			Red-winged blackbird	*Agelaius phoeniceus*	breeding	✓	✓	✓	none	none	none	S5B
			Sedge wren	*Cistothorus platensis*	breeding	✓	✓	✓	none	none	none	S5B
			Swamp sparrow	*Melospiza georgiana*	breeding	✓	✓	✓	none	none	none	S5B
			Tree swallow	*Tachycineta bicolor*	breeding	✓	✓	✓	none	none	none	S4B
			Wilson's warbler	*Cardellina pusilla*	migration				none	none	none	S5B,SUM
			Yellow warbler	*Setophaga petechia*	breeding	✓	✓	✓	none	none	none	S5B
			Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	breeding	✓	✓	✓	none	none	none	S4B
Other landbirds	Apodiformes (Swifts and Hummingbirds)	Open forest	Chimney swift	*Chaetura pelagica*	breeding	✓			Threatened	Threatened	Threatened	S2B
			Ruby-throated hummingbird	*Archilochus colubris*	breeding	✓		✓	none	none	none	S5B
	Caprimulgiformes (Goat Suckers)	Open forest	Common nighthawk	*Chordeiles minor*	breeding	✓	✓	✓	Threatened	Threatened	Threatened	S3B
			Eastern whip-poor-will	*Antrostomus vociferus*	breeding			✓	Threatened	Threatened	Threatened	S3B
	Columbiformes (Doves)	Other	Eurasian collared-dove	*Streptopelia decaocto*	year-round	✓		I	none	none	none	SNA
	Coraciiformes (Kingfishers)	Wetland	Belted kingfisher	*Megaceryle alcyon*	breeding	✓	✓	I	none	none	none	S5B
	Cuculiformes (Cuckoos)	Open forest	Black-billed cuckoo	*Coccyzus erythropthalmus*	breeding	✓	✓	✓	none	none	none	S5B
	Piciformes (Woodpeckers)	Interior forest	American three-toed woodpecker	*Picoides dorsalis*	breeding			I	none	none	none	S5
			Red-bellied woodpecker	*Melanerpes carolinus*	rare all seasons				none	none	none	SNA
		Open forest	Black-backed woodpecker	*Picoides arcticus*	breeding				none	none	none	S5
			Downy woodpecker	*Picoides pubescens*	breeding	✓	✓	✓	none	none	none	S5
			Hairy woodpecker	*Picoides villosus*	breeding	✓	✓	✓	none	none	none	S5
			Northern flicker	*Colaptes auratus*	breeding	✓	✓	✓	none	none	none	S5B
			Pileated woodpecker	*Dryocopus pileatus*	breeding	✓	✓	✓	none	none	none	S5
			Red-headed woodpecker	*Melanerpes erythrocephalus*	breeding	✓	✓		Threatened	Threatened	Threatened	S3B
			Yellow-bellied sapsucker	*Sphyrapicus varius*	breeding	✓	✓	✓	none	none	none	S5B
Waterfowl and waterbirds	Anseriformes (Waterfowl)	Wetland	American black duck	*Anas rubripes*	uncommon breeding	✓			none	none	none	S3B
			American wigeon	*Anas americana*	breeding	✓	✓	I	none	none	none	S4B
			Barrow's goldeneye	*Bucephala islandica*	occasional visitor				none	none	none	SNA
			Blue-winged teal	*Anas discors*	breeding	✓	✓	✓	none	none	none	S4B
			Bufflehead	*Bucephala albeola*	breeding	✓	✓	✓	none	none	none	S4B
			Cackling goose	*Branta hutchinsii*	migration	✓			none	none	none	S2B
			Canada goose	*Branta canadensis*	breeding	✓	✓	✓	none	none	none	S5B

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Group	**Order**	**Habitat Association**	**Common Name**	**Scientific Name**	**Breeding Status**	**BBA SW Region**	**BBA Local Squares**	**Field Studies[1]**	**SARA Status[2]**	**COSEWIC Status[3]**	**MBESEA[4]**	**MBCDC Status[5]**
Waterfowl and waterbirds	Anseriformes (Waterfowl)	Wetland	Canvasback	*Aythya valisineria*	breeding	✓	✓	✓	none	none	none	S4B
			Common goldeneye	*Bucephala clangula*	breeding	✓	✓	✓	none	none	none	S5B,SUN
			Common merganser	*Mergus merganser*	breeding	✓		✓	none	none	none	S5B
			Gadwall	*Anas strepera*	migration	✓	✓	✓	none	none	none	S5B
			Greater scaup	*Aythya marila*	migration				none	none	none	S5B,SUM
			Greater white-fronted goose	*Anser albifrons*	migration			✓	none	none	none	SUM
			Green-winged teal	*Anas crecca*	breeding	✓	✓	✓	none	none	none	S4B
			Hooded merganser	*Lophodytes cucullatus*	breeding	✓	✓	✓	none	none	none	S5B
			Lesser scaup	*Aythya affinis*	breeding	✓	✓		none	none	none	S5B
			Long-tailed duck	*Clangula hyemalis*	occasional				none	none	none	S4B
			Mallard	*Anas platyrhynchos*	breeding	✓	✓	✓	none	none	none	S5B
			Northern pintail	*Anas acuta*	breeding	✓	✓	✓	none	none	none	S5B
			Northern shoveler	*Anas clypeata*	breeding	✓	✓	✓	none	none	none	S5B
			Red-breasted merganser	*Mergus serrator*	migration				none	none	none	S4B
			Redhead	*Aythya americana*	breeding	✓	✓	✓	none	none	none	S4B
			Ring-necked duck	*Aythya collaris*	breeding	✓	✓	✓	none	none	none	S5B
			Ross's goose	*Chen rossii*	migration				none	none	none	S3S4B,S4M
			Ruddy duck	*Oxyura jamaicensis*	breeding	✓	✓	✓	none	none	none	S5B
			Snow goose	*Chen caerulescens*	migration	✓		✓	none	none	none	S5B,S5M
			Surf scoter	*Melanitta perspicillata*	uncommon migrant				none	none	none	S3B
			Trumpeter swan	*Cygnus buccinator*	possible migrant				none	Not at Risk	Endangered	S1B
			Tundra swan	*Cygnus columbianus*	migration	✓		✓	none	none	none	S4B,SUM
			White-winged scoter	*Melanitta fusca*	breeding				none	none	none	S4B
			Wood duck	*Aix sponsa*	breeding	✓	✓	✓	none	none	none	S5B
		Open forest	American woodcock	*Scolopax minor*	breeding	✓			none	none	none	S4B
		Grassland	Killdeer	*Charadrius vociferus*	breeding	✓	✓	✓	none	none	none	S5B
			Marbled godwit	*Limosa fedoa*	breeding	✓	✓	✓	none	none	none	S4B
		Other	Arctic tern	*Sterna paradisaea*	occasional migrant				none	none	none	S4B
			Ruddy turnstone	*Arenaria interpres*	migration				none	none	none	SUM
		Wetland	American avocet	*Recurvirostra americana*	breeding	✓	✓		none	none	none	S4B
			American golden-plover	*Pluvialis dominica*	migration				none	none	none	S4B,SUM
			Baird's sandpiper	*Calidris bairdii*	migration				none	none	none	SUM
			Black tern	*Chlidonias niger*	breeding	✓	✓	✓	none	Not at Risk	none	S4B
			Bonaparte's gull	*Chroicocephalus philadelphia*	breeding				none	none	none	S5B
			Buff-breasted sandpiper	*Calidris subruficollis*	migration				Special Concern	Special Concern	none	SNA
			California gull	*Larus californicus*	breeding				none	none	none	S3B
			Caspian tern	*Hydroprogne caspia*	migration				none	Not at Risk	none	S3B
			Common tern	*Sterna hirundo*	breeding				none	Not at Risk	none	S5B
			Curlew sandpiper	*Calidris ferruginea*	accidental				none	none	none	SNA
			Dunlin	*Calidris alpina*	migration				none	none	none	S3B,SUM
			Forster's tern	*Sterna forsteri*	breeding	✓	✓		none	none	none	S4B
			Franklin's gull	*Leucophaeus pipixcan*	breeding	✓	✓		none	none	none	S4B
			Greater yellowlegs	*Tringa melanoleuca*	migration	✓		✓	none	none	none	S5B,SUM
			Herring gull	*Larus argentatus*	migration				none	none	none	S4B
			Hudsonian godwit	*Limosa haemastica*	migration				none	none	none	S3B
			Least sandpiper	*Calidris minutilla*	migration				none	none	none	S4B,SUM
			Lesser yellowlegs	*Tringa flavipes*	migration	✓			none	none	none	S4B,SUM
			Long-billed dowitcher	*Limnodromus scolopaceus*	migration				none	none	none	SUM
			Pectoral sandpiper	*Calidris melanotos*	migration	✓			none	none	none	S4M
			Piping plover	*Charadrius melodus*	beyond range	✓			Endangered	Endangered	Endangered	S1B

Table 1: Bird species that could occur in the Regional Study Area

Group	Order	Habitat Association	Common Name	Scientific Name	Breeding Status	Observations			Conservation Status			
						BBA SW Region	BBA Local Squares	Field Studies[1]	SARA Status[2]	COSEWIC Status[3]	MBESEA[4]	MBCDC Status[5]
Waterfowl and waterbirds	Charadriiformes (Shorebirds and Gulls)	Wetland	Red knot	*Calidris canutus rufa*	rare migrant				Endangered	Endangered	Endangered	SNA
			Red-necked phalarope	*Phalaropus lobatus*	migration	✓			No Status	Special Concern	none	S4B,SUM
			Ring-billed gull	*Larus delawarensis*	breeding	✓		✓	none	none	none	S5B
			Semipalmated plover	*Charadrius semipalmatus*	migration	✓			none	none	none	S4B,SUM
			Semipalmated sandpiper	*Calidris pusilla*	migration				none	none	none	S3B,SUM
			Short-billed dowitcher	*Limnodromus griseus*	migration	✓			none	none	none	S4B
			Solitary sandpiper	*Tringa solitaria*	migration	✓	✓		none	none	none	S4B,SUM
			Spotted sandpiper	*Actitis macularius*	breeding	✓	✓		none	none	none	S5B
			Stilt sandpiper	*Calidris himantopus*	migration				none	none	none	S4B,SUM
			Upland sandpiper	*Bartramia longicauda*	breeding	✓	✓	✓	none	none	none	S4B
			Whimbrel	*Numenius phaeopus*	uncommon migrant				none	none	none	S4B
			White-rumped sandpiper	*Calidris fuscicollis*	migration				none	none	none	SUM
			Willet	*Tringa semipalmata*	breeding	✓	✓	✓	none	none	none	S4B
			Wilson's phalarope	*Phalaropus tricolor*	breeding	✓	✓		none	none	none	S4B
			Wilson's snipe	*Gallinago delicata*	breeding	✓	✓	✓	none	none	none	S5B
	Ciconiiformes (Herons and Bitterns)	Wetland	American bittern	*Botaurus lentiginosus*	breeding	✓	✓		none	none	none	S5B
			Black-crowned night-heron	*Nycticorax nycticorax*	breeding	✓			none	none	none	S4B
			Great blue heron	*Ardea herodias*	breeding	✓	✓	✓	none	none	none	S5B
			Great egret	*Ardea alba*	rare breeding	✓			none	none	none	S2S3B
	Gaviiformes (Loons)	Wetland	Common loon	*Gavia immer*	breeding	✓	✓	I	none	Not at Risk	none	S5B
			Pacific loon	*Gavia pacifica*	accidental				none	none	none	S4B
	Gruiformes (Cranes and Allies)	Wetland	American coot	*Fulica americana*	breeding	✓	✓	✓	none	Not at Risk	none	S5B
			Sandhill crane	*Antigone canadensis*	breeding			✓	none	Not at Risk	none	S5B
			Sora	*Porzana carolina*	breeding	✓	✓	✓	none	none	none	S5B
			Virginia rail	*Rallus limicola*	breeding	✓		✓	none	none	none	S5B
			Whooping crane	*Grus americana*	rare migrant				Endangered	Endangered	Endangered	SXB,S1M
			Yellow rail	*Coturnicops noveboracensis*	breeding	✓			Special Concern	Special Concern	none	S3B
	Pelecaniformes (Pelicans)	Wetland	American white pelican	*Pelecanus erythrorhynchos*	breeding	✓		I	none	Not at Risk	none	S4B
			Cattle egret	*Bubulcus ibis*	breeding	✓			none	none	none	S2B
			Double-crested cormorant	*Phalacrocorax auritus*	breeding	✓	✓	I	none	Not at Risk	none	S5B
			White-faced ibis	*Plegadis chihi*	occasional visitor	✓			none	none	none	S1B
	Podicipediformes (Grebes)	Wetland	Clark's grebe	*Aechmophorus clarkii*	breeding	✓			none	none	none	S1B
			Eared grebe	*Podiceps nigricollis*	breeding	✓	✓		none	none	none	S4B
			Horned grebe	*Podiceps auritus*	breeding	✓	✓	I	Special Concern	Special Concern	none	S4B
			Pied-billed grebe	*Podilymbus podiceps*	breeding	✓	✓	✓	none	none	none	S5B
			Red-necked grebe	*Podiceps grisegena*	breeding	✓	✓	I	none	Not at Risk	none	S5B
			Western grebe	*Aechmophorus occidentalis*	breeding	✓			No Status	Special Concern	none	S4B

[1] ✓= observation during surveys for birds; I = incidental observation during field studies
[2] Status according to the *Species at Risk Act*; all species with SARA status are listed under Schedule 1
[3] Status according to the Committee on the Status of Endangered Wildlife in Canada
[4] Status according to *The Endangered Species and Ecosystems Act* of Manitoba
[5] Species ranking in the Manitoba Conservation Data Centre as of Dec. 1, 2016. Rankings defined below:
G - Global rank.
S - Manitoba rank.
1 - Very rare throughout its range or in the province (5 or fewer occurrences, or very few remaining individuals). May be especially vulnerable to extirpation.
2 - Rare throughout its range or in the province (6 to 20 occurrences). May be vulnerable to extirpation.
3 - Uncommon throughout its range or in the province (21 to100 occurrences).
4 - Widespread, abundant, and apparently secure throughout its range or in the province, with many occurrences, but the element is of long-term concern (> 100 occurrences).
5 - Demonstrably widespread, abundant, and secure throughout its range or in the province, and essentially impossible to eradicate under present conditions.
U - Possibly in peril, but status uncertain; more information needed.
X - Believed to be extinct; historical records only, continue search.
SNA - A conservation status rank is not applicable to the element.
B - Breeding status of a migratory species. Example: S1B,SZN - breeding occurrences for the species are ranked S1 (critically imperilled) in the province, nonbreeding occurrences are not ranked in the province.
N - Non-breeding status of a migratory species. Example: S1B,SZN - breeding occurrences for the species are ranked S1 (critically imperilled) in the province, nonbreeding occurrences are not ranked in the province.
NA - Not applicable.

Table 2: Bird species observed during ten-minute point counts, June 2017

Group	Species	Number of Points at Which Observed				Total Number of Birds Observed
		Forest	Transition	Grassland	Shrubland	
Raptors	American kestrel	1	1	0	0	2
	Merlin	0	0	1	0	1
	Northern harrier	0	0	3	1	4
	Red-tailed hawk	1	4	1	1	7
	Sharp-shinned hawk	1	0	0	0	1
	Turkey vulture	0	0	1	0	1
Upland game birds	Sharp-tailed grouse	0	1	7	5	16
Songbirds and other landbirds	Alder flycatcher	0	0	1	0	1
	American crow	33	26	79	30	197
	American goldfinch	27	30	58	25	149
	American redstart	23	12	0	1	45
	American robin	20	12	18	4	58
	Baird's sparrow[1]	**0**	**0**	**1**	**1**	**2**
	Baltimore oriole	4	5	1	2	12
	Barn swallow[1]	*1*	*1*	*2*	*1*	*6*
	Black-and-white warbler	4	5	0	1	11
	Black-billed cuckoo	2	7	6	0	15
	Black-billed magpie	0	1	4	1	8
	Black-capped chickadee	15	13	3	1	35
	Blue jay	3	2	1	3	10
	Brewer's blackbird	0	2	4	0	10
	Brown thrasher	1	2	6	1	10
	Brown-headed cowbird	33	20	13	1	75
	Canada warbler	**0**	**1**	**0**	**0**	**1**
	Cedar waxwing	19	9	6	1	41
	Chestnut-collared longspur	**0**	**3**	**33**	**3**	**69**
	Chestnut-sided warbler	17	9	1	0	31
	Chipping sparrow	3	1	2	0	8
	Common grackle	2	1	1	2	243
	Clay-colored sparrow	50	44	54	22	12
	Common nighthawk	**1**	**0**	**0**	**0**	**1**
	Common raven	7	5	3	4	22
	Common yellowthroat	3	0	2	0	5
	Downy woodpecker	2	3	2	1	8
	Eastern bluebird	3	0	0	1	4
	Eastern kingbird	4	1	2	0	7
	Eastern phoebe	1	0	0	0	1
	Eastern towhee	16	13	5	2	47
	Eastern whip-poor-will	**2**	**0**	**0**	**1**	**3**
	Grasshopper sparrow	0	0	12	3	16
	Gray catbird	12	9	0	2	25
	Great crested flycatcher	25	12	7	5	52
	Hairy woodpecker	6	2	2	0	10
	Hermit thrush	10	7	0	3	23
	Horned lark	0	2	30	12	58
	House wren	24	25	21	15	104
	Lark sparrow	1	0	0	0	1
	Least flycatcher	50	42	28	10	196
	Marsh wren	0	1	0	0	1
	Mourning dove	37	12	7	4	72
	Mourning warbler	1	0	0	0	1
	Northern flicker	2	5	5	0	1
	Nashville warbler	0	1	0	0	12
	Northern waterthrush	12	3	0	0	18
	Olive-sided flycatcher	**0**	**1**	**0**	**0**	**1**
	Orchard oriole	0	1	0	0	1
	Ovenbird	8	4	4	0	17
	Pileated woodpecker	1	2	0	0	3
	Purple martin	1	0	0	0	1
	Red-breasted nuthatch	1	0	0	0	1

Group	Species	Number of Points at Which Observed				Total Number of Birds Observed
		Forest	Transition	Grassland	Shrubland	
Songbirds and other landbirds	Red-eyed vireo	40	29	37	15	140
	Red-winged blackbird	13	7	5	5	44
	Rose-breasted grosbeak	21	18	10	5	55
	Savannah sparrow	2	26	117	45	291
	Sedge wren	2	0	0	0	2
	Song sparrow	3	4	3	0	10
	Spotted towhee	3	1	0	0	4
	Sprague's pipit	**0**	**3**	**71**	**18**	**142**
	Swamp sparrow	1	0	0	0	1
	Veery	28	20	14	1	78
	Vesper sparrow	15	25	54	32	158
	Warbling vireo	34	23	26	13	116
	Western kingbird	0	0	0	1	1
	Western meadowlark	2	16	129	33	304
	White-breasted nuthatch	4	4	0	0	8
	White-throated sparrow	5	0	1	0	6
	Yellow warbler	39	34	21	5	128
	Yellow-bellied sapsucker	18	1	2	5	30
	Yellow-headed blackbird	0	0	1	0	1
	Yellow-throated vireo	3	1	0	0	4
Waterfowl and other waterbirds	American coot	0	0	1	0	1
	Black tern	1	0	1	0	2
	Canada goose	1	0	0	0	1
	Great blue heron	0	0	1	0	1
	Greater yellowlegs	0	0	1	0	1
	Killdeer	4	1	3	1	11
	Mallard	1	0	1	0	2
	Marbled godwit	0	0	12	7	20
	Pied-billed grebe	0	1	0	0	1
	Sandhill crane	0	0	1	0	1
	Sora	3	0	1	0	4
	Upland sandpiper	3	7	76	27	130
	Willet	0	1	0	1	2
	Wilson's snipe	18	5	4	0	31
Total number of birds observed		752	1,031	590	384	3,524

1. **Bold** indicates a priority species of conservation concern.
2. *Italics* indicate an other priority species.

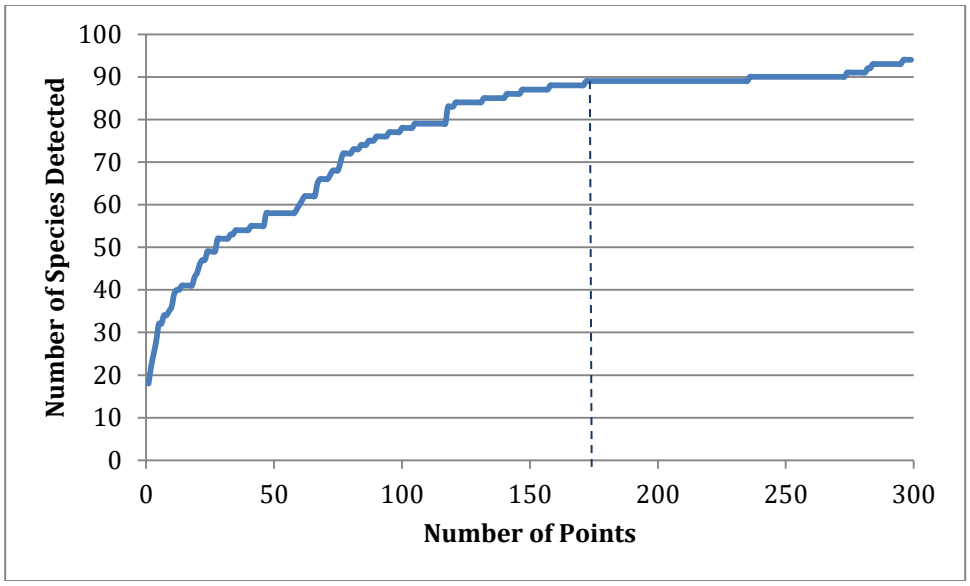

Figure 1: Species accumulation curve for ten-minute point counts

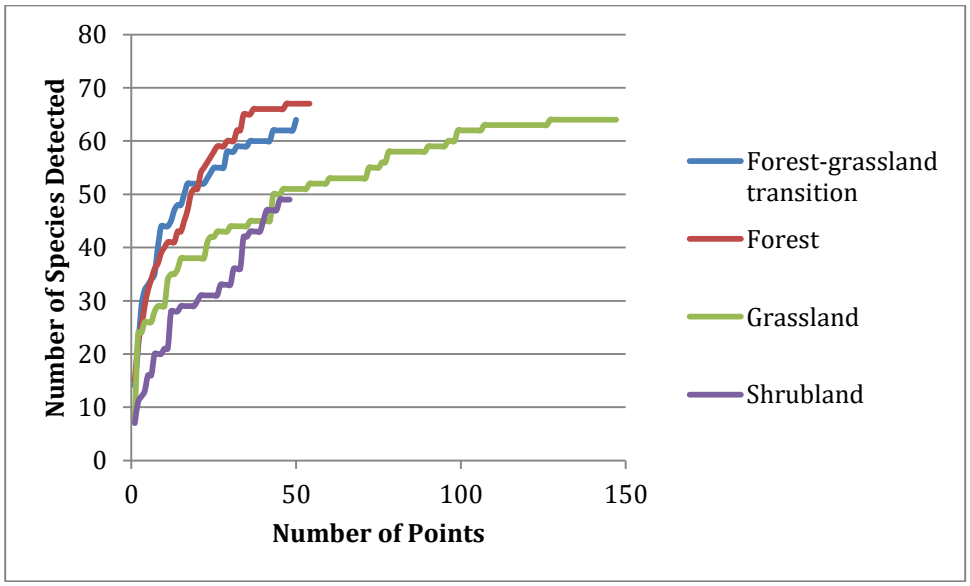

Figure 2: Species accumulation curve for ten-minute point counts by habitat

Table 3: Bird species observed during three-minute point counts, June 2017

Group	Species	Number of Points at Which Observed					
		Agriculture	Agriculture Forage	Forest	Forest/ wetland	Grassland	Total Number of Birds Observed
Raptors	American kestrel	3	0	0	0	0	3
	Great horned owl	0	0	0	1	0	2
	Red-tailed hawk	2	0	1	1	3	4
Upland game birds	Ruffed grouse	0	0	1	0	0	1
	Sharp-tailed grouse	0	0	0	0	2	2
Songbirds and other landbirds	Alder flycatcher	1	0	0	0	0	1
	American crow	31	4	5	2	15	97
	American goldfinch	18	0	9	2	23	70
	American redstart	0	0	3	0	0	4
	American robin	15	2	6	2	14	46
	Baltimore oriole	1	0	0	1	6	8
	Barn swallow[1]	*1*	*0*	*0*	*0*	*4*	*7*
	Black-and-white warbler	0	0	3	0	0	4
	Black-billed magpie	6	0	2	0	4	14
	Black-capped chickadee	1	0	4	1	2	10
	Blue jay	3	0	1	0	0	5
	Bobolink	*1*	*0*	*0*	*0*	*2*	*4*
	Brewer's blackbird	5	0	1	0	2	23
	Brown thrasher	0	0	0	0	6	6
	Brown-headed cowbird	4	0	5	3	11	25
	Cedar waxwing	0	0	3	0	3	7
	Chestnut-sided warbler	0	0	2	0	0	2
	Chipping sparrow	1	0	0	0	1	2
	Clay-colored sparrow	13	2	11	5	26	122
	Common raven	3	0	1	2	5	19
	Common yellowthroat	7	0	4	4	5	28
	Eastern bluebird	0	0	1	0	3	4
	Eastern kingbird	0	0	1	0	4	5
	Eastern phoebe	1	0	5	0	2	9
	Eastern wood-pewee	*0*	*0*	*0*	*0*	*1*	*1*
	Grasshopper sparrow	0	0	0	0	2	2
	Gray catbird	6	0	4	1	12	25
	Great crested flycatcher	2	0	1	0	2	5
	Horned lark	11	2	0	0	3	26
	House wren	15	0	7	6	22	61
	Le Conte's sparrow	0	0	0	0	2	4
	Least flycatcher	7	0	10	4	16	61
	Mourning dove	8	0	5	3	10	30
	Northern flicker	1	0	1	0	2	4
	Red-eyed vireo	11	0	6	1	11	35
	Red-winged blackbird	34	0	7	4	23	221
	Rock pigeon	1	0	0	0	0	1
	Rose-breasted grosbeak	1	0	1	1	1	4
	Ruby-throated hummingbird	0	0	0	0	1	1
	Savannah sparrow	32	5	2	0	12	97
	Sedge wren	2	0	0	0	2	5
	Song sparrow	3	0	4	5	7	24
	Sprague's pipit	**0**	**0**	**0**	**0**	**1**	**1**
	Tree swallow	0	0	1	0	2	3
	Veery	1	0	4	1	1	8
	Vesper sparrow	28	5	1	1	23	96
	Warbling vireo	6	0	10	5	13	34
	Western meadowlark	8	4	2	1	17	53
	White-breasted nuthatch	0	0	0	0	2	2
	Yellow warbler	14	0	12	3	23	83
	Yellow-bellied sapsucker	2	0	5	2	3	12
	Yellow-headed blackbird	1	0	0	0	0	5
Waterfowl and other waterbirds	American coot	1	0	0	0	0	1
	Black tern	1	0	0	0	0	2

Group	Species	Number of Points at Which Observed					Total Number of Birds Observed
		Agriculture	Agriculture Forage	Forest	Forest/ wetland	Grassland	
	Blue-winged teal	2	0	0	0	0	4
Waterfowl and other waterbirds	Canada goose	1	0	0	0	0	17
	Common goldeneye	1	0	0	0	0	1
	Gadwall	1	0	0	0	0	1
	Killdeer	14	0	0	0	9	30
	Mallard	10	0	0	1	1	66
	Northern pintail	1	0	0	0	0	1
	Northern shoveler	2	0	0	0	0	5
	Pied-billed grebe	1	0	0	1	2	4
	Ring-billed gull	1	0	0	0	0	1
	Ruddy duck	1	0	0	0	0	1
	Sora	4	0	1	2	1	8
	Upland sandpiper	0	0	0	0	1	1
	Virginia rail	0	0	0	1	0	1
	Wilson's snipe	16	0	4	3	1	41
	Wood duck	1	0	0	0	0	2
Total number of birds observed		656	48	252	114	558	1,628

1. **Bold** indicates a priority species of conservation concern.

APPENDIX IV

MAMMALS

Table 1: Mammal that could occur in the Regional Study Area

Family	Common name	Scientific Name	SARA Status	Schedule[2]	COSEWIC Status[3]	MBESEA[4]	MBCDC Status[5]
Antilocapridae	Pronghorn	*Antilocapra americana*	NA	NA	NA	Extirpated	Extirpated
Bovidae	Plains bison	*Bison bison bison*	No Status	No Schedule	Threatened	Extirpated	Extirpated
Cervidae	Moose	*Alces alces*	NA	NA	NA	NA	S5
	White-tailed deer	*Odocoileus virginianus*	NA	NA	NA	NA	S5
	Mule deer	*Odocoileus hemionus*	NA	NA	NA	Threatened	S3
	Elk	*Cervus elaphus canadensis*	NA	NA	NA	NA	S3, S4
Canidae	Grey wolf	*Canis lupus*	NA	NA	Not at Risk	NA	S5
	Coyote	*Canis latrans*	NA	NA	NA	NA	S5
	Red fox	*Vulpes vulpes*	NA	NA	NA	NA	S5
	Swift fox	*Vulpes velox*	Threatened	Schedule 1	Threatened	Extirpated	Extirpated
Felidae	Bobcat	*Lynx rufus*	NA	NA	NA	NA	S3
	Lynx	*Lynx canadensis*	NA	NA	Not at Risk	NA	S5
	Cougar	*Puma concolor*	NA	NA	NA	NA	SNA
Ursidae	Black bear	*Ursus americanus*	NA	NA	Not at Risk	NA	S5
	Grizzly bear (plains)	*Ursus arctos*	Extirpated	Schedule 1	Special Concern	Extirpated	Extirpated
Mephitidae	Striped skunk	*Mephitis mephitis*	NA	NA	NA	NA	S5
Mustelidae	Ermine/short-tailed weasel	*Mustela erminea*	NA	NA	NA	NA	S5
	Long-tailed weasel	*Mustela frenata*	NA	NA	Not at Risk	NA	S3
	American mink	*Neovision vison*	NA	NA	NA	NA	S5
	American badger	*Taxidea taxus taxus*	NA	NA	Special Concern	NA	S4
Procyonidae	Raccoon	*Procyon lotor*	NA	NA	NA	NA	S5
Vespertilionidae	Big brown bat	*Eptesicus fuscus*	NA	NA	NA	NA	S4B, S5B
	Silver-haired bat	*Lasionycteris noctivagans*	NA	NA	NA	NA	S3, S4B
	Hoary bat	*Lasiurus cinereus*	NA	NA	NA	NA	3B
	Northern myotis	*Mytois septentrionalis*	Endangered	Schedule 1	Endangered	Endangered	S3, S4N, S4B
	Little brown myotis	*Myotis lucifugus*	Endangered	Schedule 1	Endangered	Endangered	S2N, S5B

Family	Common name	Scientific Name	SARA Status	Schedule[2]	COSEWIC Status[3]	MBESEA[4]	MBCDC Status[5]
Leporidae	Snowshoe hare	*Lepus americanus*	NA	NA	NA	NA	S5
	White-tailed jackrabbit	*Lepus townsendii*	NA	NA	NA	NA	S4
	Eastern cottontail	*Sylvilagus floridanus*	NA	NA	NA	NA	S5
Castoridae	American beaver	*Castor canadensis*	NA	NA	NA	NA	S5
Cricetidae	Prairie vole	*Microtus ochrogaster*	NA	NA	NA	NA	S3
	Meadow vole	*Microtus pennsylvanicus*	NA	NA	NA	NA	S5
	Southern red-backed vole	*Myodes gapperi*	NA	NA	NA	NA	S5
	Common muskrat	*Ondatra zibethicus*	NA	NA	NA	NA	S5
	Northern grasshopper mouse	*Onychomys leucogaster*	NA	NA	NA	NA	S3
	North American deer mouse	*Peromyscus maniculatus*	NA	NA	NA	NA	S5
	Northern bog lemming	*Synaptomys borealis*	NA	NA	NA	NA	S5
Dipodidae	Meadow jumping mouse	*Zapus hudsonius*	NA	NA	NA	NA	S5
	Western jumping mouse	*Zapus princeps*	NA	NA	NA	NA	S3
Erethizodontidae	North American porcupine	*Erethizon dorsatum*	NA	NA	NA	NA	S5
Geomyidae	Northern pocket gopher	*Thomomys talpoides*	NA	NA	NA	NA	S5
Sciuridae	Thirteen-lined ground squirrel	*Ictidomys tridecemlineatus*	NA	NA	NA	NA	S5
	Woodchuck	*Marmota monax*	NA	NA	NA	NA	S5
	Franklin's ground squirrel	*Poliocitellus franklinii*	NA	NA	NA	NA	S5
	Eastern grey squirrel	*Sciurus carolinensis*	NA	NA	NA	NA	S5
	Eastern fox squirrel	*Sciurus niger*	NA	NA	Not at Risk	NA	S3
	Least chipmunk	*Tamias minimus*	NA	NA	NA	NA	S5
	Eastern chipmunk	*Tamias striatus*	NA	NA	NA	NA	S5
	Red squirrel	*Tamiasciurus hudsonicus*	NA	NA	NA	NA	S5
	Richardson's ground squirrel	*Urocitellus richardsonii*	NA	NA	NA	NA	S5

Family	Common name	Scientific Name	SARA Status[1]	Schedule[2]	COSEWIC Status[3]	MBESEA[4]	MBCDC Status[5]
Soricidae	Northern short-tailed shrew	*Blarina brevicauda*	NA	NA	NA	NA	S5
	Arctic shrew	*Sorex arcticus*	NA	NA	NA	NA	S5
	Cinereus shrew	*Sorex cinereus*	NA	NA	NA	NA	S5
	Hayden's shrew	*Sorex haydeni*	NA	NA	NA	NA	S4
	American pygmy shrew	*Sorex hoyi*	NA	NA	NA	NA	S5
	American water shrew	*Sorex palustris*	NA	NA	NA	NA	S5

[1] Status according to the *Species at Risk Act*
[2] Schedule classification according to the *Species at Risk Act*
[3] Status according to the Committee on the Status of Endangered Wildlife in Canada
[4] Status according to *The Endangered Species and Ecosystems Act* of Manitoba
[5] Species ranking in the Manitoba Conservation Data Centre as of Dec. 1, 2016. Rankings defined below:
1 - Very rare throughout its range or in the province (5 or fewer occurrences, or very few remaining individuals). May be especially vulnerable to extirpation.
2 - Rare throughout its range or in the province (6 to 20 occurrences). May be vulnerable to extirpation.
3 - Uncommon throughout its range or in the province (21 to 100 occurrences).
4 - Widespread, abundant, and apparently secure throughout its range or in the province, with many occurrences, but the element is of long-term concern (> 100 occurrences).
5 - Demonstrably widespread, abundant, and secure throughout its range or in the province, and essentially impossible to eradicate under present conditions.
S - Sub-national (provincial) status.
B - Breeding status of a migratory species. Example: S1B,SZN - breeding occurrences for the species are ranked S1 (critically imperilled) in the province, nonbreeding occurrences are not ranked in the province.
N - Non-breeding status of a migratory species. Example: S1B,SZN - breeding occurrences for the species are ranked S1 (critically imperilled) in the province, nonbreeding occurrences are not ranked in the province.
NA- Not applicable.

Table 2: Number and sex of ungulates and furbearers observed during aerial surveys in 2016

Species	Male	Female	Unknown Sex	Total	Density (individuals/km^2)
White-tailed Deer	1	3	283	290	0.40
Moose	6	38	83	165	0.23
Elk	8	5	0	15	0.02
Mule Deer	0	0	1	1	<0.01
Coyote	0	0	22	22	0.03
Grey Wolf	0	0	1	1	<0.01

Table 3: Ground tracking survey results, August 2017

Habitat	Species	Number of Signs Observed	Sign Frequency (signs/100 m²)
Forest	Elk	7	0.01
	Moose	46	0.07
	White-tailed deer	152	0.23
	American badger	5	0.01
	American black bear	16	0.02
	Coyote	3	<0.01
Grassland	Moose	3	<0.01
	White-tailed deer	8	0.01
	American badger	21	0.03
	Red fox	4	<0.01
Preferred route	Moose	3	0.01
	White-tailed deer	12	0.04
	American badger	6	0.02
	Coyote	1	<0.01

Available in accessible formats upon request