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Date: 2026-01-12

Reference from
NexGen Energy Ltd.

In the matter of

NexGen Energy Ltd.

Licence application to prepare a site for and construct its Rook 1 uranium mine and mill project

Commission Public Hearing
Part 2

February 9-12, 2026

Référence de
NexGen Energy Ltd

À l'égard de

NexGen Energy Ltd.

Demande de permis concernant la préparation de l'emplacement et la construction de son projet de mine et d'usine de concentration d'uranium Rook I

Audience publique de la Commission
Partie 2

Les 9 - 12 février 2026

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Canada

Volume 2, Part 5: Rook I Project Environmental Impact Statement Baseline Annexes

Part 1

- Annex I, Atmospheric Baseline Report
- Annex II, Noise and Light Baseline Report
- Annex III, Hydrogeology Baseline Report

Part 2

- Annex IV, Hydrology Baseline Road Map
  - Annex IV.1, Regional Meteorological and Hydrological Characterization Report
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Part 5

- **Annex VIII, Wildlife Baseline Road Map**
  - **Annex VIII.1, Wildlife Baseline Report 1 (Mammals, Waterfowl, and Raptors)**
  - **Annex VIII.2, Wildlife Baseline Report 2 (Amphibians, Birds, and Bats)**
  - **Annex VIII.3, Wildlife Baseline Report 3 (Bird Migration and Bats)**
- **Annex IX, Heritage Resources Impact Assessment and Cover Letter**
- **Annex X, Socio-economic Baseline Report**
- **Annex XI, Geology Baseline Report**

Rook I Project

Environmental Impact Statement

Annex VIII: Wildlife Baseline Road Map

GOLDER
MEMBER OF WSP

WILDLIFE BASELINE ROAD MAP FOR THE ROOK I PROJECT

Prepared for:

NexGen Energy Ltd.

Prepared by:

Golder Associates Ltd.

March 2022

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APPENDICES

1 INTRODUCTION

This road map provides an overview of the wildlife baseline program undertaken by NexGen Energy Ltd. (NexGen) for the Rook I Project (Project). Section 2, Ecological Setting, describes the location of the proposed Project in relation to its regional ecozone and landscape areas. Section 3, Joint Working Group Feedback, provides context on NexGen's approach to engagement and where feedback related to the wildlife baseline program from the Joint Working Group (JWG) meetings can be found. Section 4, Wildlife Baseline Document Map, provides information on the scope of each baseline report and identifies where key topics associated with the wildlife baseline program can be found in the reports appended to this road map.

The characterization of baseline wildlife and wildlife habitat for the Project was based on desktop analyses, field studies, habitat suitability mapping and feedback from First Nations and Métis Groups (collectively referred to as Indigenous Groups). The various baseline reports, presented as Annexes VIII.1 through VIII.3, are part of the comprehensive baseline programs that were designed to collect information to characterize wildlife, including species of conservation concern, and their habitats within the near vicinity and broader local and regional areas of the proposed Project. Annexes are generally presented in order of descending species size, from larger (e.g., mammals) to smaller (e.g., toads) animals:

- Wildlife Baseline Report 1 (Mammals, Waterfowl, and Raptors)
- Wildlife Baseline Report 2 (Amphibians, Birds, and Bats)
- Wildlife Baseline Report 3 (Bird Migration and Bats)

Wildlife Baseline Report 1 was completed by Omnia Ecological Services (Omnia) and Wildlife Baseline Reports 2 and 3 were completed by Canada North Environmental Services (CanNorth). Generally, Wildlife Baseline Report 1 covered studies completed in 2018, 2019, and 2020, and focused on larger mammals, waterfowl, and raptors using transect surveys, aerial surveys, cameral traps, and provincial data reviews for furbearers and caribou habitat mapping. Wildlife Baseline Report 2 covered studies completed in 2018 and focused on breeding bird point count surveys and acoustic surveys using autonomous recording units for amphibians, birds, and bats. Wildlife Baseline Report 3 covered studies completed in 2019 and focused on bird migration surveys and acoustic bat surveys to complement the 2018 baseline and focus on the previously contemplated locations for proposed wind turbines. The scopes of the baseline reports are complementary to cover all aspects of the wildlife baseline with some overlap on birds, species of conservation concern, and incidental wildlife observations.

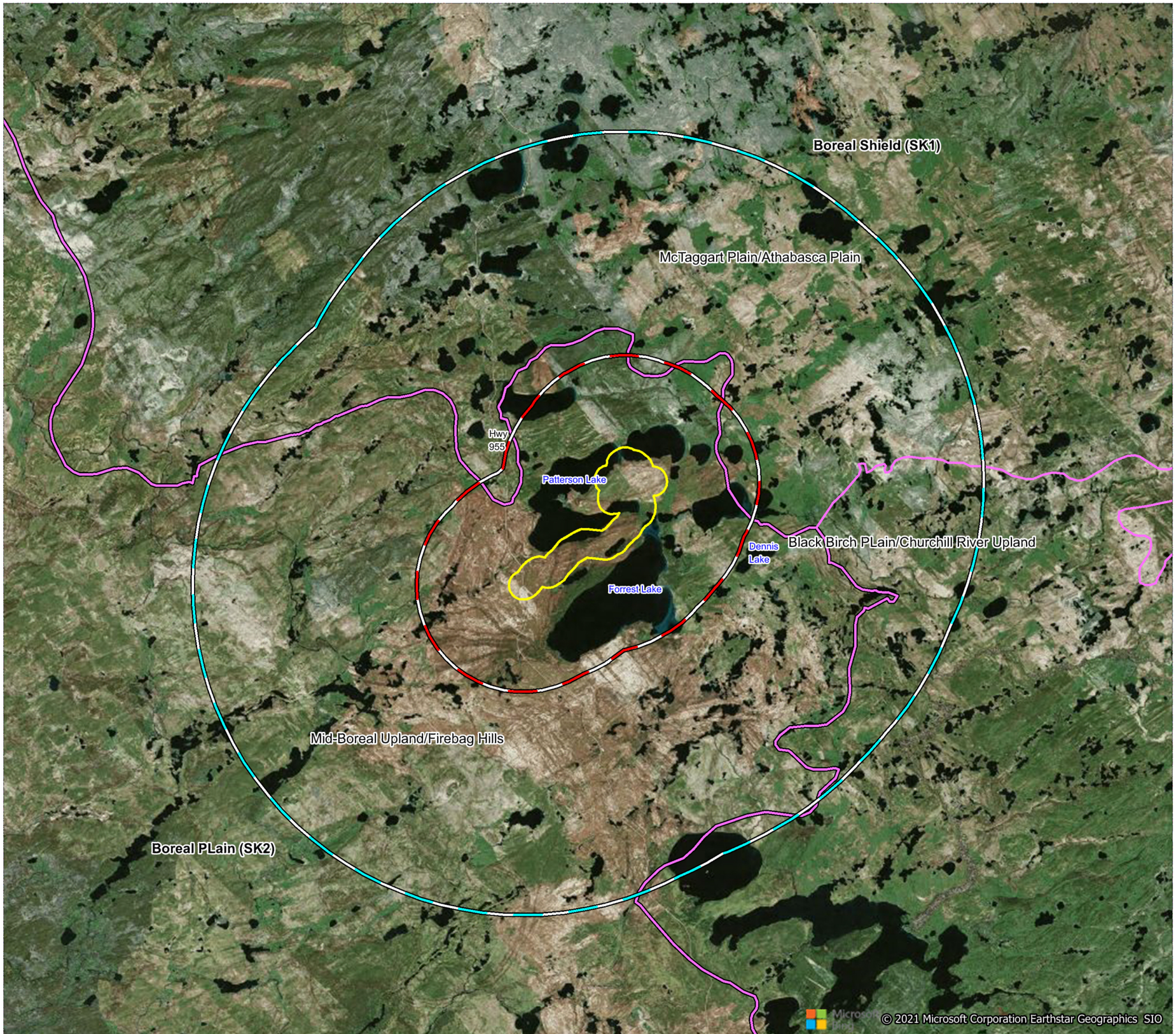
2 ECOLOGICAL SETTING

The proposed Project is located within the Boreal Plain Ecozone, near the boundary between Boreal Plain and Boreal Shield Ecozones. The area of the Project overlaps both the Boreal Shield Ecozone and the Boreal Plain Ecozone. The Boreal Shield Ecozone extends across Canada from the Atlantic coast to northern Alberta (Government of Canada 2019). In Saskatchewan, the Boreal Shield Ecozone is located between the Boreal Plain Ecozone to the south and the Taiga Shield Ecozone to the north (Acton et al. 1998). The Boreal Shield Ecozone consists of boreal forest associated with the Canadian Shield and has two ecoregions: the Athabasca Plain and Churchill River Upland. Where soil conditions allow moderate tree growth, the climax (i.e., final stable stage plant community) vegetation community is closed black spruce (*Picea mariana)* forest with understory (i.e., vegetation layer below the forest canopy) of feather mosses. Mixed stands of jack pine (*Pinus banksiana*) and black spruce grow on thin upland soils, and tamarack (*Larix laricina*) are typically found within poorly drained lowlands. Fire has historically been the dominant disturbance mechanism. White spruce (*Picea glauca*), balsam fir (*Abies balsamea*), trembling aspen (*Populus tremuloides*), and balsam poplar (*Populus balsamifera* spp. *balsamifera*) grow on more productive sites.

The Boreal Plain Ecozone covers portions of Manitoba, Saskatchewan, and Alberta, with minor extensions into British Columbia and the Northwest Territories (Government of Canada 2019). Most of the ecozone is covered by boreal forest, though a portion along the southern boundary has been converted to agricultural cropland (Acton et al. 1998). In Saskatchewan, the Boreal Plain Ecozone has three ecoregions: Mid-Boreal Upland, where the proposed Project would be located; Mid-Boreal Lowland; and Mid-Boreal Transition. The climate of the Boreal Plain Ecozone is warmer than the Boreal Shield Ecozone, and consequently the productivity is higher, and the diversity of vegetation is greater. Climax communities include closed-crown mixedwood and coniferous forest with trembling aspen, balsam poplar, and paper birch (*Betula papyrifera*) in the Mid-Boreal Transition Ecoregion and white and black spruce, tamarack, and jack pine in the Mid-Boreal Upland and Mid-Boreal Lowland ecoregions.

The ecological setting in the vicinity of the proposed Project is shown in Figure 1.

Figure 1. Ecological Setting in the Vicinity of the Project



Legend

- Local Study Area (LSA)
- Regional Study Area (RSA)
- Caribou Regional Study Area (CRSA)
- Ecoregion / Landscape Area
- Ecozone

N
W E
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0 7.5 15
kilometers
Scale = 1 : 270,000

OMNIA ECOLOGICAL SERVICES

Produced by RA, Dec. 2018
Ref# O-F736_12-18

3 INDIGENOUS GROUP FEEDBACK

Since exploration at the Project site commenced in 2013, NexGen has engaged regularly and established relationships with local Indigenous Groups and northern communities, specifically those closest and with greatest access to the proposed Project.

An important component of engagement to date has been the establishment of JWGs to support the gathering and incorporation of Indigenous Knowledge throughout the Environmental Assessment (EA) process. A summary of feedback from JWGs related to the wildlife baseline program is presented in Appendix A of this road map, and includes feedback from the Birch Narrows Dene Nation, Buffalo River Dene Nation, Clearwater River Dene Nation, and Métis Nation – Saskatchewan. Indigenous and Local Knowledge was also included, where appropriate, from Project-specific studies completed by Indigenous Groups, which included Traditional Land Use and Occupancy studies, Traditional Knowledge and Use studies, Indigenous Rights and Knowledge studies (henceforth referred collectively as Indigenous Knowledge and Traditional Land Use [IKTLU] Studies[1]) (TSD II: BNDN, TSD III: BRDN, TSD IV: MN-S, TSD V.1: CRDN, TSD VI: YLNR)). Baseline wildlife surveys provided pertinent data on the presence and relative abundance of wildlife species that were identified as culturally important by Indigenous Peoples in the region through IKTLU studies and JWGs.

4 WILDLFE BASELINE DOCUMENT MAP

Table 1 provides a summary of key topics related to the wildlife baseline program and cross references to where analysis and discussion of key topics are located within the individual wildlife baseline reports. Table 1 also lists the location of baseline studies designed to characterize the habitat of species identified as valued components in the EA. The topics in Table 1 are listed in roughly descending order from regional spatial scale to smaller areas, and larger species to smaller species, generally consistent with the order of the wildlife baseline reports. Section 4.1 through Section 4.10 provide context and direction to where information related to key wildlife topics can be found.

[1] Referred to as TLU Studies in the baseline reports.

Table 1: Wildlife Baseline Key Topic Location Summary

Key Topic	EIS Appendix or Baseline Report Title	Baseline Report Section Reference	Approach to Topic[1]
Woodland Caribou	Annex VIII.1 Wildlife Baseline Report 1 (Mammals, Waterfowl, and Raptors)	Section 3.0 Study Area Section 4.0 Winter Track Count Survey Section 5.0 Winter Backtrailing Survey Section 6.0 Spring Ungulate Pellet Group/ Browse Availability Survey Section 10.0 Covert Camera Survey Section 11.0 Species at Risk and Sensitive Species Section 13.0 Saskatchewan ENV Caribou Habitat Mapping	Primary and applied data sources
	Annex VIII.2 Wildlife Baseline Report 2 (Amphibians, Birds, and Bats)	Section 9.0 Incidental Wildlife Observations	Primary data source
Moose	Annex VIII.1 Wildlife Baseline Report 1 (Mammals, Waterfowl, and Raptors)	Section 4.0 Winter Track Count Survey Section 5.0 Winter Backtrailing Survey Section 6.0 Spring Ungulate Pellet Group/ Browse Availability Survey Section 10.0 Covert Camera Survey	Primary data source
	Annex VIII.2 Wildlife Baseline Report 2 (Amphibians, Birds, and Bats)	Section 9.0 Incidental Wildlife Observations	Primary data source
Black bear, grey wolf, beaver	Annex VIII.1 Wildlife Baseline Report 1 (Mammals, Waterfowl, and Raptors)	Section 4.0 Winter Track Count Survey Section 5.0 Winter Backtrailing Survey Section 6.0 Spring Ungulate Pellet Group/ Browse Availability Survey Section 8.0 Semi Aquatic Furbearing Mammal Shoreline Survey Section 10.0 Covert Camera Survey Section 12.0 Regional Fur Harvest Data	Primary and applied data sources
	Annex VIII.2 Wildlife Baseline Report 2 (Amphibians, Birds, and Bats)	Section 9.0 Incidental Wildlife Observations	Primary data source
Little brown myotis	Annex VIII.2 Wildlife Baseline Report 2 (Amphibians, Birds, and Bats)	Section 2.0 Conservation Database Search and Existing Information Section 8.0 Bat Surveys Section 10.0 Species of Conservation Concern	Primary and applied data source
	Annex VIII.3 Wildlife Baseline Report 3 (Bird Migration and Bats)	Section 3.0 Bat Surveys	Primary data source
Olive-sided flycatcher, rusty blackbird	Annex VIII.2 Wildlife Baseline Report 2 (Amphibians, Birds, and Bats)	Section 2.0 Conservation Database Search and Existing Information Section 7.0 Breeding Bird Surveys	Primary and applied data source

Table 1: Wildlife Baseline Key Topic Location Summary

Key Topic	EIS Appendix or Baseline Report Title	Baseline Report Section Reference	Approach to Topic[1]
Olive-sided flycatcher, rusty blackbird	Annex VIII.3 Wildlife Baseline Report 3 (Bird Migration and Bats)	Section 2.0 Avian Migration Surveys	Primary data source
Common goldeneye, mallard	Annex VIII.1 Wildlife Baseline Report 1 (Mammals, Waterfowl, and Raptors)	Section 9.0 Aerial Waterfowl and Raptor Stick Nest Surveys	Primary data source
	Annex VIII.2 Wildlife Baseline Report 2 (Amphibians, Birds, and Bats)	Section 7.0 Breeding Bird Surveys	Primary data source
	Annex VIII.3 Wildlife Baseline Report 3 (Bird Migration and Bats)	Section 2.0 Avian Migration Surveys	Primary data source
Canadian toad	Annex VIII.2 Wildlife Baseline Report 2 (Amphibians, Birds, and Bats)	Section 2.0 Conservation Database Search and Existing Information Section 4.0 Amphibian Acoustic Surveys	Primary data source
Other species of conservation concern	Annex VIII.1 Wildlife Baseline Report 1 (Mammals, Waterfowl, and Raptors)	Section 9.0 Aerial Waterfowl and Raptor Stick Nest Surveys Section 11.0 Species at Risk and Sensitive Species	Primary data source
	Annex VIII.2 Wildlife Baseline Report 2 (Amphibians, Birds, and Bats)	Section 2.0 Conservation Database Search and Existing Information Section 5.0 Common Nighthawk Surveys Section 6.0 Yellow Rail Surveys Section 7.0 Breeding Bird Surveys Section 8.0 Bat Surveys Section 9.0 Incidental Wildlife Observations Section 10.0 Species of Conservation Concern	Primary data source
	Annex VIII.3 Wildlife Baseline Report 3 (Bird Migration and Bats)	Section 2.0 Avian Migration Surveys Section 3.0 Bat Surveys	Primary data source
Tissue chemistry	Annex VIII.1 Wildlife Baseline Report 1 (Mammals, Waterfowl, and Raptors)	Section 7.0 Small Mammal Trapping Survey and Tissue Analysis	Primary data source
Habitat Suitability	All wildlife baseline reports	All sections	Primary and applied data source

[1]Approach to Topic is noted as either primary data source or applied data source. Primary data source refers to field data collected for the Project. Applied data source refers to modelling, analysis or characterization of conditions informed by primary and second-hand data sources (e.g., government).

4.1 Woodland Caribou

Woodland caribou (*Rangifer tarandus caribou*) is an important species ecologically, culturally, and socio-economically. Woodland caribou is listed as Threatened under Schedule 1 of the Species at Risk Act (SARA; Government of Canada 2021) and provincially ranked as S3 (i.e., vulnerable / rare to uncommon; SKCDC 2021). Baseline field programs that targeted woodland caribou included winter track count surveys (2018, 2020), a winter backtrailing survey (2019), spring ungulate pellet group / browse availability surveys (2018, 2019), and a covert camera survey (2018). These programs are presented in Wildlife Baseline Report 1 (Annex VIII.1). Incidental woodland caribou observations are also presented in Wildlife Baseline Report 2 (Annex VIII.2).

Provincial habitat mapping for woodland caribou was also accessed to assess available habitat surrounding the Project.

4.2 Moose

Moose (*Alces alces*) are important species ecologically, culturally, and socio-economically. Baseline field programs that targeted moose included winter track count surveys (2018, 2020), a winter backtrailing survey (2019), spring ungulate pellet group / browse availability surveys (2018, 2019), and a covert camera survey (2018). These programs are presented in Wildlife Baseline Report 1 (Annex VIII.1). Incidental moose observations are also presented in Wildlife Baseline Report 2 (Annex VIII.2).

4.3 Grey Wolf, Black Bear, and Beaver

Grey wolf (*Canis lupus*), black bear (*Ursus americanus*), and beaver (*Castor canadensis*) are important species ecologically, culturally, and socio-economically. Wolves are a furbearer in Saskatchewan and are of importance from a conservation perspective because they prey on large ungulates and influence prey population dynamics. Black bears are hunted by Indigenous communities and rely on a vast array of food types. Baseline field programs that targeted grey wolf and black bear included winter track count surveys (2018, 2020), a winter backtrailing survey (2019), browse availability surveys (2018, 2019), and a covert camera survey (2018). Beavers are hunted and trapped by Indigenous communities, and are a representative species for effects on other semi-aquatic mammals such as muskrat and river otter. A semi aquatic furbearing mammal shoreline survey targeting beaver was completed in 2018. A review of regional fur harvest data was also conducted for all species. Results from all data searches and surveys for grey wolf, black bear, and beaver are presented in Wildlife Baseline Report 1 (Annex VIII.1). Incidental observations are also presented in Wildlife Baseline Report 2 (Annex VIII.2).

4.4 Little brown myotis

Little brown myotis (*Myotis lucifugus*) is listed as Endangered under Schedule 1 of the SARA (Government of Canada 2021) and provincially ranked as S4B/S4N (i.e., apparently secure as it applies to the breeding and non-breeding population; SKCDC 2021). Bat surveys using acoustic bat detectors were conducted as part of the baseline field programs in 2018 and 2020. These programs are presented in Wildlife Baseline Reports 2 and 3 (Annex VIII.2 and Annex VIII.3).

4.5 Olive-sided Flycatcher and Rusty Blackbird

Olive-sided flycatcher (*Contopus cooperi*) is listed under Schedule 1 of the SARA as Threatened (Government of Canada 2021) and is provincially ranked as S4B/S4M (i.e., apparently secure as it applies to the breeding and migratory population; SKCDC 2021). Rusty blackbird (*Euphagus carolinus*) is listed under Schedule 1 of the SARA as Special Concern (Government of Canada 2021) and provincially ranked as S3B/SUN/S3M (i.e., vulnerable/rare to uncommon as it applies to the breeding and migratory populations, but its status is uncertain due to conflicting information; SKCDC 2021).

Baseline field programs that targeted olive-sided flycatcher and rusty blackbird included breeding bird surveys (conducted in 2018) and avian migration surveys (conducted in 2020). Results are presented in Wildlife Baseline Reports 2 and 3 (Annex VIII.2 and Annex VIII.3).

4.6 Common Goldeneye and Mallard

Common goldeneye (*Bucephala clangula*) depends on aquatic environments for successful breeding and foraging. Mallard (*Anas platyrhynchos*) is an important species ecologically, culturally, and socio-economically. Mallard can be found in almost any wetland or waterbody varying from lakes to ephemeral (i.e., temporary) wetlands, and some Indigenous communities have indicated that mallard are hunted for food.

Baseline field programs that targeted waterfowl include an aerial waterfowl and raptor stick nest survey, conducted in 2018. Observations were also made during the 2018 breeding bird survey, 2020 avian migration surveys, and incidentally during other wildlife surveys. Results from these programs are presented in the Wildlife Baseline Reports 1, 2, and 3 (Annex VIII.1, Annex VIII.2, and Annex VIII.3).

4.7 Canadian toad

The geographical range of Canadian toad (*Anaxyrus hemiophrys*) overlaps the anticipated area of the Project. Canadian toads are not a listed sensitive species, but there are provincial activity restriction guidelines. Amphibian acoustic surveys were conducted in 2018 targeting Canadian toad with results presented in Wildlife Baseline Report 2 (Annex VIII.2).

4.8 Other Species of Conservation Concern

Lists of potential species of conservation concern in the area of the Project were determined from literature searches as documented in Wildlife Baseline Reports 1 and 2 (Annex VIII.1 and Annex VIII.2). Field surveys and incidental observations were made from 2018 to 2020. Species-specific surveys were completed for some species of conservation concern including common nighthawk, yellow rail, and bats. Results are documented in all three Wildlife Baseline Reports (Annex VIII.1, Annex VIII.2, and Annex VIII.3).

4.9 Tissue Chemistry

Small mammal tissue chemistry was analyzed for metals and radionuclides to develop a baseline of bio-indicators that can be used for long-term monitoring. Tissues were collected from vole, mice, and shrew species in 2018. Results are included in Wildlife Baseline Report 1 (Annex VIII.2).

4.10 Habitat Suitability

Habitat suitability mapping was completed to characterize the availability and distribution of habitat for wildlife species in the EIS. Survey data from all three wildlife baseline reports were used to inform the habitat suitability mapping. Results from ecosites mapping presented in Vegetation Baseline Report 1 (Annex VII.1), combined with field survey data and literature linking species occurrence with habitat characteristics, were used to develop wildlife habitat suitability index models in the EIS (Section 14, Wildlife and Wildlife Habitat; Appendix 14B, Wildlife Habitat Models). Habitat modelling for woodland caribou used and expanded on the Saskatchewan's habitat suitability mapping as presented in Wildlife Baseline Report 1 (Annex VIII.1). The habitat suitability mapping supported the calculation of magnitude and distribution of effects in the EIS.

APPENDIX A

Joint Working Group Feedback Applicable to Wildlife Baseline

Table A-1 presents the comments and feedback NexGen has received from members of local Indigenous communities through established JWG meetings. Where appropriate, feedback from local Indigenous communities was considered within the baseline and/or EA processes or tracked as issues or concerns for resolution. NexGen continues to engage with communities, and the feedback presented in Table A-1 reflects comments and feedback received through March 2020 that were related to baseline vegetation or the comprehensive baseline program generally.

Table A-1: Joint Working Group Feedback Related to Baseline Wildlife

Community	Comment
Birch Narrows Dene Nation (BNDN)	Should black bear be on the list [of VCs]?
	Perhaps also lynx, coyote, fisher, marten, or otter.
	I find that interesting, even with bears. There was a market with bears, Americans come up and shoot bears, but for some reason the population is increasing – just like the pickerel, even though those are the preferred species for harvesting.
	Someone I know who lives close to Rabbit Lake mine, saw a moose with two heads, but he never said a word until a year ago. He had a commercial fishing camp, saw fish that were deformed.
	Don't contradict the bear, you don't know the bear. They're intelligent and selected eaters. Bear is the best eating meat if you know how to cook it.
	I don't think mallards would be good, they're migratory birds so who knows what they're eating when they're down south.
	The Canada Goose used to be all the way up north; as the years went by people didn't kill that much – just for their needs. Now today they started moving south, all the way to the Gulf of Mexico and are knocked down by the thousands just for sport.
	For a Human Health Risk Assessment, it may mess it up because you're not getting the results form the area because they migrate; people do eat mallards though.
	I don't know what a goldeneye is; mallards have green heads. Seasonally we change what's consumed; it's about the same between beaver and muskrats.
	Agreed, about the same beaver is consumed as muskrat – changes seasonally. Fall for beaver, spring for muskrats and then they're left alone. People do eat goose. The feed in the water, not so much on land.
	There is a migration route for moose, caribou, and bear at the narrows between the intake and discharge for the mine.
	All my life growing up here, I must have seen 40 caribou in our area. In Wollaston when I taught there in 1999, I saw thousands of caribou. When I went back five years ago, and in the last couple of years, Wollaston people had to go 7-13 hours east to catch a caribou. I asked some of the Elders, and some Elders have different opinions; one says blame mining and exploration; another said they have a dumb leader that took a different route. Who has the numbers regarding caribou populations in this area? If we don't have concrete numbers, how do we assess or monitor without a starting point?
	We have more moose than caribou. I've seen more than 40 moose. Why not mention moose rather than caribou?
	People say caribou are all moving north to the south shore of Lake Athabasca. Our country's all burned, there's no food left, or for some reason they've moved north. There used to be trails across the road, you do not see those anymore, not even one track.
	There's two places – that stretch by the tower, and towards Buffalo – that are like a crossing. That's the only time I've seen those. One was in the middle of the road; I pressed the horn and he walked off.
	How can you or I know exact numbers and the exact reasons why caribou move and behave as they do. It's impossible to tell. All we can do is minimize the disturbance.
	Disturbance is not only human, it's fire too, and with climate change and the drastic weather we've been getting more fires.
	These two Elders have killed caribou. Others killed a couple here and there.

Table A-1: Joint Working Group Feedback Related to Baseline Wildlife

Community	Comment
Birch Narrows Dene Nation (BNDN)	I shot one this summer, in June.
	On the east side, the Fish River leads to the Clearwater River. [A local community member] had a cabin up there, towards Lloyd Lake. We stayed five days at Lloyd Lake Lodge a few years ago; there were lots of caribou, moose, all kinds of animals. We stayed at the cabin across from [local community member] but we had no motor so we couldn't go across.
	Do you have access to population numbers of caribou in the area today? That would at least give us an idea.
	Fires have a lot to do with it. They've driven a lot of caribou off their habitat. It's strange that on one hand the government says they're endangered, yet they burn off their habitat. Let it Burn. Some of the places we've traditionally hunted now have no caribou. They're moving around to different areas to find food. The food is rapidly declining too; it takes 50 years or so before their habitat comes back to where it needs to be to sustain them. Fires are the biggest culprit. Also their habitat is huge.
	Why pick caribou when moose would be of more interest to us?
	Will there be a health study on animals?
	Caribou stay all together in a bunch, not like a moose. When you talked about burns, if the animals have nothing to eat they have to leave. There are too many of them there. That's why they keep moving north. There are lots further north, but hardly any around our community. There used to be a lot but they're not there now, just a few tracks. They don't like too much noise. Skidoos, 4-wheelers, stuff like that.
	By the time you see them, they're gone. All you see is their butts! They're not like barren land caribou.
	You used to see them at that straightaway in La Loche, by the tower. When I used to teach in Bear Creek and go for mail, I'd see them, but I haven't seen them for four or five years. They would stand in the middle of the road.
	How do you research the numbers? Do you go on the land and look at them?
Buffalo River Dene Nation (BRDN)	Elders are concerned that the water quality will be negatively affected by the Project.
	Is wildlife monitored in the area?
	I've never heard of golden-eye, people eat mallards. We eat more whitefish, and they are more delicate, you see their skin has issues and they get worms, I think they should be looked at instead of northern pike.
	Do you study water ducks also?
	Are we talking about the populations [of caribou] being down? Since when?
	We were talking about woodland caribou the other day too, in Vermette Lake. The reason why isn't the people that are killing it. In Dillon, maybe one or two got killed. In our area there are lots of caribou. I would blame one thing: timber wolves are killing all our game - deer, moose, woodland caribou. I would like to ask the government to do something about it. The fur price is down and it's not worth it to trap for wolves.
	I went to Barney Lake 10 days ago. Along that river there's lots of caribou tracks. Maybe some places there's no woodland caribou.
	One concern is I don't know how far north the bobcats go when they're released. There was one killed in Meadow – a cougar. If they go that far north a caribou is nothing for them to catch.
	Did we tell you we saw caribou at km 130 today?
	If they've gone further north, It's nothing for them to kill a caribou.
	I saw one between Ile a la Crosse and Buffalo. They had one killed by Meadow Lake and it was massive – as big as you.
	It was trapped accidentally about a month ago, so they got to keep it.

Table A-1: Joint Working Group Feedback Related to Baseline Wildlife

Community	Comment
Buffalo River Dene Nation (BRDN)	I saw woodland caribou with the big horn, that were killed by the timber wolves. I was surprised they'd kill a big horned caribou. It was in the winter. We did a survey for the government about five years ago by Dillon. We went around 50 miles and that's where they were. Since I was a kid I would go with my brother, and they were caribou there all the time. Even now they are there. Maybe one day they will move if there's too much population. They don't like noise; they don't stay in areas where people are. Government should put something on the timber wolves.
	it isn't overharvesting from us; we just harvest moose.
	There's hardly any [wolverines]. They are scarce. Someone caught one about two years ago.
	They're cheap though. I looked for my dad and a guy in Dorintosh said he would pay $200 for it. That one my dad got had a perfect white diamond on it; that would bring $4,000 at one time.
	Yes, if he Elders say we can release [BRDN's caribou study], I will send you a copy.
	Caribou once came down to Dillon, right onto the lake. I heard that from the Elders. I don't know if [BRDN member] remembers.
	Yes, I remember that, that was the northern barren land caribou that came. It's like it visited and now it hasn't come back again since.
	I brought it up because I shot two ptarmigans. My grandma said there use to be a lot more when the caribou used to come. There were lots of ptarmigan following or ahead of them. Right now, they don't go any lower than Fond-Du-Lac. There are two herds now, one towards Manitoba, the Lac Brochet guys and Tadoule; they were that close last year but now they're a lot closer to Fond-Du-Lac. They harvest like 5,6,7 and it's shared amongst many.
	You would probably have to sit down with the Elders in Dillon; we sat with three of them in their eighties, to get that information before they pass.
	It's in the [IK]TLU report, the interview with the Elders. And the range report too.
	I've never seen caribou killed myself, and I'm 46 years old. I've only seen moose and deer.
	No, they said there is a decline, blaming that on the timber wolves.
	The moose are near the border [showed on map], past Quill Lake, there's a small area that's crazy with moose. They have no predators, there's no wolves on the prairie, and they multiply like crazy.
	Near Barney Lake, you can hear the Alberta loggers working. When we went down 2-3 years ago, we went to the border [showed on map] and you could hear the machines in the middle of nowhere. There is noise everywhere. We didn't see caribou, but we saw tracks.
	I would like to report one more thing about a beaver. There is a river coming from Barney Lake through Dillon Lake, and from there to Dillon. Every spring our water, before the water plant came in, the water was like a poison, no one wanted to drink it. Beavers along that river all the way have beaver houses; they pee and whatever there all winter, just like people, and in the springtime, it flows into the lake where we live. Every spring the water isn't any good. I tried to report it to Environment, but no one seems to listen.
	Until all that stuff flows out, I guess. When its spring breakup, that's when it starts flowing.
	There's no price on beaver right now, that's why no one harvests it. There's beaver overpopulation. They do a lot of damage, plug up the culverts, they're over-flowing. The Department of Highways spends lots of money on the roads.
	At one point they tried to blast the dams all the way up the river as far as they could, using dynamite, but it was only one year.
	Yes, they come right back.
	Do woodland caribou have migration routes?
	The government's report [caribou range report] is more technical and scientific information; ours is indigenous knowledge our Elders gave us.

Table A-1: Joint Working Group Feedback Related to Baseline Wildlife

Community	Comment
Buffalo River Dene Nation (BRDN)	When we were in Vermette Lake, the Elders said collared caribou are dying because they use steel collars, and the winter their neck freezes, and it is killing them. He's seen caribou with collars that froze to death.
	About the caribou, the government put a collar on the neck and it's killing the caribou. They don't get used to that. It bothers them, and they die.
	Stress to the animals is probably part of it; either routes or noise – reproduction probably went down.
	It says avoid flying over caribou, but that's how they do caribou surveys.
	That's just over calving areas where they need zero stress.
	They do a lot of other testing that's not very humane, like the collars and the droppings collections for DNA testing and stuff. Alberta has data they collect over the years, but they won't release it to Saskatchewan. The U of S has done studies and given us information.
	When they did the pellet collection in 2010-2014 they put out salt to attract them. You don't know if their bodies are used to that! They found some that had died and they don't know if it was that, but maybe there is something in the salt that isn't good for their system but that's how they're attracting them.
	We ran into caribou at Little Sandy Lake. We were having sandwiches and tea, and out of the corner of my eye I saw something move, not even 20 feet away.
	I also acknowledge we are in Treaty 10 traditional territory, where we get our food, medicines, water different species some of which grow only in that area which none of you are familiar with but our Elders know that. They fish there. The caribou – we saw 11 recently at km 140 – haven't been around for a long, long time. They're very sensitive. The migration routes – we haven't seen them for a long time, and it was nice to see them. The comparison: when we go to a farmer's back yard, the farmer wouldn't want you to start drilling in his back yard. It's the same with our traditional territory. Treaty 10 was signed for the whole area, not parts of it. That's recognized on the maps.
	I have a copy [local caribou Study]. We brought it up at the Elders gathering, and they said not until the second report is finished. The second report includes mapping and highlighting lake names in Dene. They want to make sure they have everything, so we will wait till it's done. We need money to do it; I lobbied for the first report and the government gave me $25K to do an Elders gathering; we took them to Vermette. We had to put a lot of money into that. We hope to do the second one before the end of March. It costs $22,000 to run a 4-day workshop. We will take the Elders out there as soon as we get money. They enjoyed it there, no interruptions or disturbance. It was a lot of information. They want to put it all together first; to them it's not complete.
	[The BRDN caribou study shows] the areas used by the caribou, highlighted by the Elders, and the traditional territory. The second part is mapping the traditional territory and naming the lakes in Dene, as well as cabin sites, traditional gathering grounds, burial sites. The third part is to see if they can get a status change for the Buffalo River
	You guys have done a caribou study? Do they have a route through the mine site?

Table A-1: Joint Working Group Feedback Related to Baseline Wildlife

Community	Comment
Buffalo River Dene Nation (BRDN)	We all have to learn to listen and be respectful to each one of us. You cut the Elder off a few times, and you cut me off when I was talking. The Elder mentioned it. We don't want to leave this table feeling we've been disrespected, with bad feelings. That might not be your intention, but you really have to be careful to listen. We want to feel like we're getting our message across. We got a lot of information; a lot of information is being asked for – we feel a little overwhelmed when we leave here. I know it's not your intention; this business requires a lot of information. But to make information flow and reflect the peoples' best interests requires more that the short time we're here. We can't speak on behalf of everyone all the time. What I think is totally different than somebody twice my age, or the youth, or our grandmothers and grandfathers. Translating the information requires a lot of resources. We really want to provide those answers (re: caribou) but we want to be fair to the people, be respectful when we ask these questions. We take them to the lodge, do an offering of tobacco, and have a ceremony. We often have ceremonies when we have these types of discussions. Resources are limited up north; it's a challenge getting people around to gatherings, even as close as Buffalo Narrows. Not everyone has $50-60 to throw in for gas. Our kids go to school and some are hungry, not like everyone around this table. I'm sure everyone made sure their children and grandchildren were fed his morning; everyone was wearing gloves to school and their lunch was packed. It's not like that everywhere. It's a true blessing that a lot of people here have that opportunity, but not all of our kids have that, and it's not their fault. I look forward to those kinds of arrangements in the best interests of our kids. I speak my mind; I realize you speak your mind too. There's no guessing, ands, ifs or buts in what I want to relate to someone. That's the kind of straightforwardness in communication we have to have around this table. We can't guess what the other person's thinking; if it's not clear to us, even if it's in plain English, we have a tough time knowing what's meant on paper. It's very important to be clear on paper and clear in speaking. The message has to be clear. It's evident today that some of these messages aren't clear.
Clearwater River Dene Nation (CRDN)	You're doing what you're supposed to do – lessons learned form the mines. You should also learn lessons from the First Nations – have your hunting areas decreased? Can you eat the fish, the moose? [response from CRDN: it has decreased a lot]. You guys are learning lessons on structures and that stuff, but the realities I look at in environmental impact is taking a look at learning those lessons. You're taking more area – six new companies coming up that way – nobody takes a look at the real impacts to the Nation and the people. That's what I see as an environmental review. The people are getting less and less land; the fear of eating moose and fish, the fear of having this released back into the lake because you guys say it's safe. You have to get this sold to the Elders and the community.
	You talk about hunting areas; that picture we took when we did the tour up north one summer. From where we were standing we shot a moose standing 40 m away, on the north end of the lake. It was a few years back before anything happened there. We chased that moose right up the hill and got him on the hill. That was 40 m from where we stood during the tour. That gives you an idea of the hunting that goes on in there.
	We had moose chasing guys into the lake. Fission was collecting plants and soil; the guys came back to camp early and said they could not go back out, because they were chased by two bull moose. We hired gunmen – three of my brothers – to protect them. That was right in your area.
	There's also that study being done by the U of S for the CWD [chronic wasting diseas]). The science of determining the affiliation with industry development, knowing that there might be some impacts leading towards that. The science is not there yet but that's something we should also consider long-term. There's major migration of your caribou, also moose. They've found CWD in moose and caribou. Knowing the delicacy of Aboriginal people using bone marrow and all parts of the animal, that's scary to think about.
	Right now, I would not want to drink water from Cluff Lake, whoever told me it was safe. We've been hunting there for a long time, but I've never shot a moose from that area. Or eaten the berries. It's all messed up.
	Yes it does [in response to does the list of traditional foods make sense to you]. What we consume is ducks, geese, chickens, ptarmigans.

Table A-1: Joint Working Group Feedback Related to Baseline Wildlife

Community	Comment
Clearwater River Dene Nation (CRDN)	Caribou kidney, guts [fried intestines of moose, considered a delicacy]; moose nose; when you're consuming moose, almost every part of the moose is consumed, right down to the bone marrow. Caribou not so much anymore; more or less in the far north – we hardly see them in our area. The woodland caribou around us are endangered, and they have a smell. Deer and elk are more southern; rabbit, beaver [mostly the Elders smoke them, or can be fried or oven-cooked, very tender]. We eat a lot of different things.
	Woodland caribou is coming back slowly. My expediting guys are seeing them – a few, not big herds. We have never had huge herds.
	What are the rare species?
	How did you come up with those?
	A lot of the species you listed we use for food – bear, lynx, beaver, muskrats, ducks, fish. When these animals are affected in the area, that information should be readily available so people know if it's going to have an impact on the food we harvest in the area.
	It's an important phase to gather the right information on the right species. From the last community meeting we had, there were two members who expressed concerns about chickens. They said there was a time we used to go into a couple of areas with a sling and a pellet, carry a few supplies and get chickens. I assume chickens is spruce grouse. Is there a reason why spruce grouse isn't a valued component at this point?
	We also use ptarmigan a lot. Good white meat.
	Ptarmigan is usually during the winter months.
	Up north, I usually see chickens on the side of the road that have been hit by vehicles that don't even slow down. That's not acceptable, because people should slow down instead of hitting them.
	In these studies, is there any animal tagging involved?
	How do you do a baseline? I hear so much about Cluff Lake, that people won't eat the moose or the animals, even though they're back in the area. How do you get past that fear, even if you say the animals are healthy? To the lake that was logged out and there's no more pickerel in there. The fear is there, and it is real.
	There is a big herd right now between Lloyd Lake and Preston – estimated about 150-200 head. Those are numbers we got – it could be less. We have guys working in there, and their first trip in, that's what they encountered.
	You talked about how you're collecting the baseline information; I've never understood how you quantify the numbers of different birds and animals that are out there.
	Are there any herds you've worked on in mitigation, creating an environment – I haven't seen any caribou increasing in Alberta at all. I don't see companies cleaning up another area to mitigate. You're just the first part; there will be another mine and another mine. The biggest thing was the noise; they found out a year or two ago that the humming from the buildings affected them. They're just starting to realize that, so it's not like they're going to come back, or go to another area that's been cleaned up. They'll never come back, just get smaller and smaller.
	[In response to comment on caribou management and mitigation implemented by the province of Saskatchewan] Which has not been successful yet.
	We frown on people that take more than they have to when they hunt. We think about the rest of us and the population of the animals. That's how we see the land - it's not just the land, it's our animals. We have to depend on those, so we have to look after them. But your study – how many animals are there? What's going to happen to them? How will they be affected? Never mind us – we live on what's there, so we need to be involved in this study. Like the Chief said, we care what will happen.
Métis-Nation Saskatchewan (MN-S)	We are seeing lots of effects from the oil sands – water is changing, plants and animals are dying.
	How do you study wildlife?
	Lynx isn't on there? Wolves don't eat bobcats or chickens.
	You need to understand the health of the animals in the region, such as moose and muskrat, and how the Project may affect their health.

Table A-1: Joint Working Group Feedback Related to Baseline Wildlife

Community	Comment
Métis-Nation Saskatchewan (MN-S)	The local people are noticing that the animals are acting differently than in the past.
	There are increases in the number of bears, and the wolf incidents in the region, suggesting changes are due to humans.
	We eat moose not caribou.
	Beaver would be better VC than muskrat.
	Include goldeneye as a VC.
	Is there a way to get information on the testing they did on the animals, like moose. On one of our visits, they said they hire a person or persons to kill the moose, then they check them over.
	They won't give you very much information. I did one of the moose kills, took all the stuff they wanted and sent it in. I got a letter back that said do not eat kidneys and liver but they did not say why. How much farther does it go? I've lived in the Cluff Lake area for more than 30 years and I see a change in the moose – the livers, intestines. The moose around Buffalo Narrows do not have growths and abnormalities. I see a lot of abnormal stuff in that area compared to other areas. But they will not tell you the truth.
	When they killed that moose at Cluff Lake, the Saskatchewan government said it's OK to eat, but those guys sent the sample somewhere else and said if you eat it, it will kill you right there – there's so much arsenic in that liver. Nobody told us about that until this one lady did surveys for us. They never came back to us. With results of animal testing. Even fish testing in Cluff Lake – nobody ever brought the results back to the community. We're not just worried about this area; we're worried about the whole north, today and tomorrow.
	These are very important to us. Do I take my children and grandchildren to Cluff Lake – what am I subjecting them to. Nobody will tell me the truth about what is there, but when I look, I know something is not right. My grandmother knew lightning wakes up earth in the spring. She didn't understand the process, but she knew it. Today we see the same things; we see the problems Cluff Lake has created in the animals. If it can do that in the animals, why is it not doing it in us? We just don't want to see that anymore. Not that we have anything against what you do; we need a cleaner environment. Without it we will just destroy ourselves anyway. All we can ask is, be honest with us, be upfront, and if we give you some direction, listen to us.
	At the last meeting there was a question on what animals should be tested. When it came to the birds, they mentioned the mallard, but it's a garbage eater so you don't know where the pollutants came from. You should also use a bird that eats fish as a main food source like the loon or merganser. What's inside that loon will come from the fish. We need these types of animals to tell us the accurate proof of what is in the fish. If the fish in Patterson Lake get contaminated, the loon will tell you that by his body.
	They're not up in my area. The loon also eats straight fish; he doesn't eat much else. The loon is protected; may be hard to get a permit to get one, but it is the most reliable because the loon lives in all of the lakes. He flies between lakes and eats fish there, so it's not 100%, but it gives you an idea to understand our fish. I know you also catch fish and study them, but something that consumes it constantly will show better, like the jackfish, eats all the fish. So he's the best one, where a sucker eats off the bottom and will tell you what's on the bottom. The jackfish eats everything.
	We use the animals for many things. My father said the other day, I don't think it's going to be a very cold winter because the squirrels are not piling the pinecones as high. We use them in many ways to understand what is coming tomorrow. The loon will make a certain call. When I was young the Elders always said the loon is calling for rain. I didn't really understand it then, but after living out there a number of years, I started to understand the language. When he made a certain call and it rained right after that, I realized that every time I heard that call it was going to rain. I told one client to pack up and go home because it was going to rain. He looked around and saw sun, no clouds, and he looked at me as if I was an idiot. We camped for the night, didn't rain; next morning I said we have to get back to camp because I don't want to get everything wet. We went back to camp and about noon a big cloud came in and it poured. He asked me how did you know? I said the loon told me. He again looked at me! We use the animals for many reasons, not just for food, clothing, etc.
	One wise old man from Buffalo told us the same thing about the weather. He said the beaver houses are not very big this year. That's the guy that found the airplane after 59 years – he heard it go down 59 years ago, and he told them where it was. He's 95 years old now, and still up on the trapline.

Table A-1: Joint Working Group Feedback Related to Baseline Wildlife

Community	Comment
Métis-Nation Saskatchewan (MN-S)	[MN-S member] provided a history of commercial fishing and trapping on Patterson Lake.
	You said the caribou population is decreasing by 45%? Do you have numbers?
	They can't even do an accurate caribou count when a fire goes through in spring or early summer because when calves are small there's nothing left - you can't count them. There's no way to find out how many calves.
	There are other factors like beavers and the lack of trapping. Beaver dams create backwaters, which are also a big factor for caribou. I went to some of the caribou meetings – there are a lot of factors affecting them.
	In the past two-three years, how many have been seen around here?
	Back when my dad was around here there were herds everywhere. Now, from last year to today, you're talking nothing. 15-20 years back I saw a herd on (Dixon) Lake, but I've never seen a herd since then. I've got a few but I've left a few.
	A lot of people don't leave a few – they go up north and see 6 or 7 and shoot them all.
	It's a lot to do with policies and monitoring. We all have to be conservative amongst ourselves. Wolves are another impact, and there are a lot more wolves around today because government won't let the people kill them.
	We have to consider the impact from 20 years to today – you guys weren't here, Cenovus and Oilsands Quest were here, Cluff Lake was there, Purepoint has been here for 10 years – so what happened in between? Was it forest fires or some other elements that created conditions for caribou to stay away from this area? How did conditions change?
	The barren land caribou don't come down very far any more. People used to go from Turnor Lake to Uranium City to hunt, but the last couple of times they got nothing. Uranium City had to go to the Territories. Is it something to do with migration?
	How is the 65% determined – if the caribou population has decreased by that amount and they aren't coming through here as much, how is that percentage determined?
	So 15-20 years ago, herds coming in, no activities around here, it declined, yet we're at a threshold of 65%.
	There's activity now in this area; caribou have not been around here. They are following a standard that does not make sense to me.
	Aircraft are considered a disturbance? You see survey planes often.
	Caribou use trails and natural crossings. Just out of La Loche where [a community member] used to live there's a big muskeg on the south side – they were always seeing small herds of them. Right on the lake in Buffalo too. There are lots of natural crossings.
	South of Bear Creek, too [there is a caribou crossing].
	There's no real local hunt [for caribou] - if people happen to see one they might shoot it.
	What's the objective? Are we just trying to find a base for the amount of caribou out there and go higher or lower in the future? Is it called for by the government, or for your own purposes?
	How fast is the growth of caribou moss?
	You've already disturbed them; if you see them that's rare because they're probably avoiding you.
	We're taking about caribou as a major species - I assume you also do this for moose and migrating birds. There were no ducks this fall. The moose have all gone south!! What's happening?
	Small songbirds, chickadees are dying all over. There's disturbance all over.
	Before the caribou migration and offsetting plan is shown to regulators, will we get a chance to review it with you?
	One young guy from Buffalo Narrows got 14 moose last fall. No seniors got any meat. There's a lot more than the wolves getting all the moose. The human factor has got to be looked at.

Table A-1: Joint Working Group Feedback Related to Baseline Wildlife

Community	Comment
Métis-Nation Saskatchewan (MN-S)	You live here and you listen to all the cars, horns etc. There's no peace. Out in the wilderness you hear the grass rustling, the wind blowing. The only disturbance is the rumbling jets that fly over. It was so quiet during 9-11! The animals are not scared of you because they don't know you, they're isolated from the human factor so you can get close and communicate with them, and they become your friend. Semi -isolation is a good word because we do have the jets that break the isolation.
	Moose is our main dietary animal.
	They're [moose] all moving south.
	They [moose] are in places they've never been before. Those are just warning signs to us that we'd better take a look at what's going on. Whether you can do anything about it is another question.
	In the last few years, I notice that change in the nature. Around NexGen and Fission, the animals are changing – there used to be a lot of rabbits and chickens. The last few years I've been hunting in fall, and there's not many anymore. The animals are not there like they used to be.
	When we came back from the last trip, we could have loaded my vehicle with spruce hens and ptarmigans, from camp all the way to the Clearwater!
	I saw a lot of ptarmigan when I went up there, but they weren't there long.
	Saskatchewan Environment did a plan on the caribou?
	What's Saskatchewan's [estimate] on the caribou population up north?
	What are the existing numbers?
	We didn't see any around our communities, but there are tracks all over the place elsewhere. Are they dying off, or moving somewhere else?
	There was a herd at Hodge Lake; every spring they went across the lake and headed west. Now they're gone. In our fall hunting place by [our] camp we saw two or three.
	A lot of fires happen around the communities. I understand caribou are dependent on caribou moss, and it takes 50 years for it to come back.
	They might avoid those areas; they're migratory animals. They just go somewhere else.
	They live on caribou moss. If the moss burns and it's not coming back for 50 years, they go somewhere else.
	They can't go much further north because that's all burned too.
	It's mainly the food, for everything. We put seeds out, all kinds of birds come. Food is the main item of why things move around; water's the second one. Because of the Let it Burn policy, fire destroyed their food habitat. It's gone, and I don't know what I could tell you to change that. Go and find caribou moss is the simplest solution I could tell you. In the NWT, pipelines affect them – they are a big barrier.
	It's also pollution. We used to see all kinds of wild flowers; we hardly see butterflies or grasshoppers now; there used to be thousands. Now we might see one or two. There's lots we've lost from Fort McMurray.
	Why are we concentrating on caribou; where's the moose?
	Not just moose, it's everything. How many deer did you see when you travelled down from La Loche? 10 -15 years ago from Green Lake to Big River, deer were a problem. Now there's nothing through that area. It's not just caribou.
	On our lake, we have algae on the surface of the water that never was there; what's promoting that algae to grow like that in our lakes? Those are the answers to solve. One day all the fish leave because we can't take notice and say we have to change or we will lose it. I don't know what to say on the caribou; that's been going since I was young and they put caribou in CITES. Still today they have no answers on how to protect the caribou so they don't go extinct. Government has been involved in it all over, but nothing changes; they're still declining. All the things we do to try to protect and enhance mean nothing if we're going backwards. The biggest thing is to find the cause – why is it? Probably the main thing is pollution.
	Where does this requirement [for a caribou plan] come from?

Table A-1: Joint Working Group Feedback Related to Baseline Wildlife

Community	Comment
Métis-Nation Saskatchewan (MN-S)	Have you come across any caribou in that area in your studies? They don't live in hilly areas.
	The habitat is a little farther north. I don't think it's a caribou area. People who live there, like [MN-S member] will know. Caribou habitat is mostly in low areas and flat lands. As soon as there's hills, you don't see caribou.
	Lack of trapping beaver affects caribou. The fur's not worth money so no one traps. They are overpopulating, building their dams and flooding caribou habitat.
	The most you could do is look to see where the caribou habitats are. Noise is one of the things that affects animals. If you are crossing farther north, you will run into caribou paths. If you're working in that area, that's when you have to be aware of how you disturb the animals. Noise is very powerful. I love the silence of the north. Helicopters, jets etc. takes away from that. It disturbs me, but not to the extent it disturbs animals. I've watched a moose in the water; if a helicopter flies by, it doesn't know which way to run. It's confused, lost, scared. If you scare an animal bad enough, it will die. You capture it and hold it, it will die. It's called capture myopathy.

Rook I Project

Environmental Impact Statement

Annex VIII.1: Wildlife Baseline Report 1 (Mammals, Waterfowl, and Raptors)

NexGen Energy Ltd.
Rook I Project

Terrestrial Environment
Wildlife Baseline Report 1
(Mammals, Waterfowl, and Raptors)

June 2024

OMNIA
ECOLOGICAL SERVICES

Terrestrial Environment
Wildlife Baseline Report 1 (Mammals, Waterfowl, and Raptors)

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LIST OF ACRONYMS

VC – valued component
LSA – local study area
RSA – regional study area
CRSA – caribou regional study area
GPS – global positioning system
UTM – Universal Transverse Mercator
SRC – Saskatchewan Research Council
DBH – diameter at breast height
SK2 – Saskatchewan Boreal Plain Woodland Caribou Range
SK1 – Saskatchewan Boreal Shield Woodland Caribou Range
ASPB – Alberta Society of Professional Biologists

LIST OF UNITS

ha – hectare
km – kilometre
m – metre
cm – centimetre
km-day – kilometre day

1.0 INTRODUCTION

The Rook I Project (Project) is a proposed new uranium mining and milling operation that is 100% owned by NexGen Energy Ltd. (NexGen). The Project would be located in northwestern Saskatchewan, approximately 40 kilometres (km) east of the Alberta-Saskatchewan border, 130 km north of the town of La Loche, and 640 km northwest of the city of Saskatoon. The Project would reside within Treaty 8 territory and within the Métis Homeland. At a regional scale, the Project would be situated within the southern Athabasca Basin adjacent to Patterson Lake, and along the upper Clearwater River system. Access to the Project would be from an existing road off Highway 955. The Project would include underground and surface facilities to support the extraction and processing of uranium ore from the Arrow deposit, a land-based, basement-hosted, high-grade uranium deposit.

The wildlife baseline report represents a component of a comprehensive baseline program that documents the natural and socio-economic environments in the anticipated area of the Project. The wildlife baseline program was undertaken to provide context from which Project environmental wildlife effects could be assessed in the Environmental Impact Statement (EIS).

Since exploration at the Project commenced in 2013, NexGen has engaged regularly and established relationships with local First Nation and Métis Groups (collectively referred to as Indigenous Groups) and northern communities, specifically those closest and with greatest access to the proposed Project. NexGen respects the rights of Indigenous Peoples and the unique relationship Indigenous Peoples have with the environment, and recognizes the importance of full and open discussion with interested or potentially affected Indigenous communities regarding the development, operation, and decommissioning of the proposed Project. Engagement activities to date, as well as future planned engagement activities, reflect the value NexGen places on meaningful engagement with Indigenous and northern communities who could be potentially affected by the proposed Project. Engagement mechanisms have included, but are not limited to: meetings with leadership, workshops and community information sessions, Project site tours, establishing Joint Working Groups to support the gathering and incorporation of Indigenous and Métis Knowledge throughout the Environmental Assessment (EA) process, and providing funding for Traditional Land Use (TLU) Studies[1] to understand how the proposed Project may interact with the Indigenous communities' traditional use of the anticipated area of the Project.

Feedback received during engagement activities was documented for contribution to the EIS for the Project; examples of feedback received include discussion of concerns, interests, potential adverse effects, mitigation, and design alternatives. Many baseline studies were initiated in advance of formal engagement on the EA for the Project; however, engagement during the execution of baseline studies has helped inform the understanding of baseline conditions and confirmed components of the natural and socio-economic environments that required study. A summary of feedback related to the wildlife baseline program is presented in Appendix A of the Wildlife Baseline Road Map (Annex VIII).

[1] Traditional Land Use (TLU) Studies include all land use studies developed by the Project's affected Indigenous Groups, including Traditional Land Use and Occupancy studies, Traditional Knowledge and Use studies, and Indigenous Rights and Knowledge studies, henceforth referred collectively as TLU Studies.

2.0 STUDY OBJECTIVES

Omnia Ecological Services (Omnia) was retained by NexGen in February 2018 to collect terrestrial (wildlife and vegetation resources) baseline data in support of the proposed development of the Rook I Project. The terrestrial baseline data were used to support the environmental effects assessment for the Project.

The objectives of the wildlife baseline surveys were to:

- characterize the existing terrestrial environment in the Project area (natural and anthropogenic elements);
- gather information required to inform environmental effects and technical assessments;
- ensure the baseline studies meet all provincial and federal regulatory requirements for effects assessments;
- inventory wildlife species occurrence;
- capture information from community engagements and stakeholder considerations;
- establish a framework to facilitate future environmental effects monitoring; and
- support the development of Project specific mitigation strategies.

This report documents and summarizes baseline conditions for wildlife elements including waterfowl, terrestrial and semi-aquatic furbearers, and baseline chemistry of small mammals obtained during field programs completed in 2018, 2019, and 2020.

3.0 STUDY AREA

3.1 Study Area Selection

The Project is located approximately 130 km north of La Loche, Saskatchewan along Patterson Lake near the northern edge of the Boreal Plain Ecozone, in the Mid-Boreal Uplands Ecoregion. The regional study areas extend into the Boreal Shield Ecozone. These terrestrial baseline surveys were established using three nested study areas to guide impact assessments of Project-specific and cumulative impacts on potential wildlife valued components (VCs). These included a local study area (LSA), a regional study area (RSA), and a caribou regional study area (CRSA) (Figure 3.1-1). These study areas were developed to account for the entire Project footprint and surrounding regions to help assess both local and regional impacts.

Specifically, the LSA was 41 km^2 and sized to account for direct Project effects and includes a sensory buffer (1.0 km) for the proposed mine access road and mine site development footprint. The 1.0 km buffer was selected to take into account potential habitat alienation effects on large mammals from mining activity, construction noise and road traffic as per Cristescu et al. (2016); Gill et al. (2001); Benítez-López et al. (2010).

The RSA was 400 km^2 and designed to account for the potential cumulative effects of the Project at a sub-regional scale (including species with larger home ranges). The RSA was also designed to support future impact assessments on VCs and includes areas with potential direct and indirect effects of the Project in addition to suitable reference areas. The size of the RSA was selected to align with those from several other regional woodland caribou studies across Northern Saskatchewan as outlined by McLoughlin et al. (2016).

Both LSA and RSA boundaries are of an appropriate size and location for the inventory and assessment of both local and regional effects on vegetation and wildlife from existing and planned activities.

The CRSA was 2,380 km^2 and accounts for the mean annual home range size of woodland caribou (*Rangifer tarandus caribou*) in the region, and to provide regional context for caribou occurrence and habitat supply as mapped by ECCC (2018) and the ENV (2018).

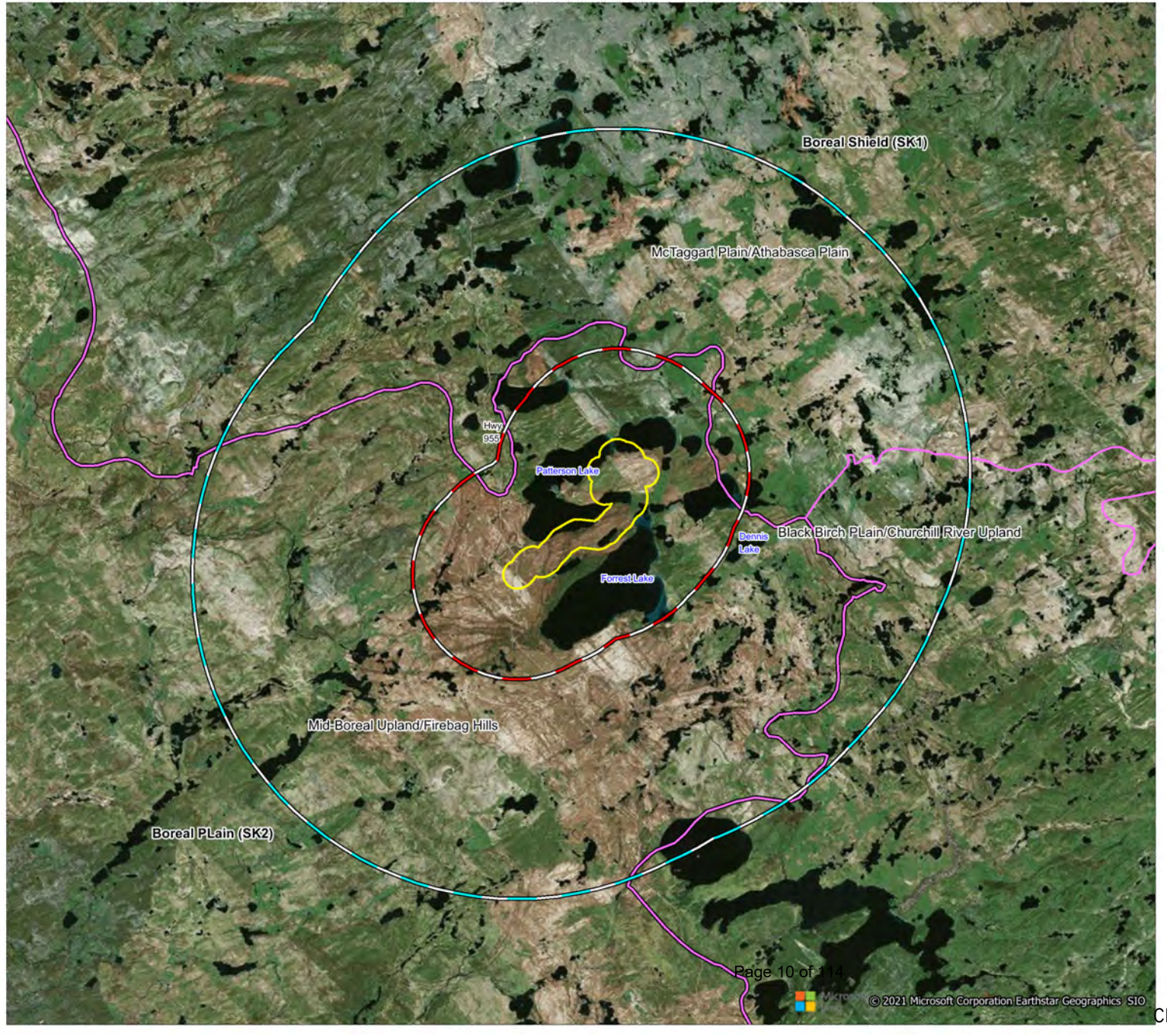

Figure 3.1-1 Omnia Terrestrial Baseline Study Areas of the Project

Legend

- Local Study Area (LSA)
- Regional Study Area (RSA)
- Caribou Regional Study Area (CRSA)
- Ecoregion / Landscape Area
- Ecozone

N
W E
S

0 7.5 15
kilometers
Scale = 1 : 270,000

OMNIA ECOLOGICAL SERVICES

Produced by RA, Dec. 2018
Ref# O-F736_12-18

No woodland caribou home range data is available for the area of the Project. However, a study in the Boreal Shield to the east of the study area completed by McLoughlin et al. (2016) estimated the mean annual home range to be 407 km^2. The mean diameter (24 km) of the home range (McLoughlin et al., 2016) was used as a buffer for the proposed mine access road and mine site development and to delineate the CRSA.

3.2 Ecological Setting

3.2.1 Ecoregions and Landscape Areas

The Project study areas straddle two Ecozones, three Ecoregions, and three Landscape Areas (Acton et al. 1998) (Table 3.2-1, Figure 3.1-1). The entire LSA is situated within the Firebag Hills Plain Landscape Area (E1) in the Mid-Boreal Upland Ecoregion of the Boreal Plain Ecozone. The RSA is situated within the Firebag Hills Plain Landscape Area (93.7%) of the Boreal Plain, and the McTaggart Plain Landscape Area (C3) (6.3%), in the Athabasca Plain Ecoregion of the Boreal Shield Ecozone. The CRSA is situated within the Firebag Hills Landscape Area (58.8%) of the Boreal Plain, the McTaggart Plain Landscape Area of the Boreal Shield (approximately 33.5%), and the Black Birch Plain Landscape Area (D1) (7.6%), in the Churchill River Upland Ecoregion of the Boreal Shield.

Table 3.2-1 Distribution of Project Study Areas within Ecozones, Ecoregions & Landscape Areas.

Ecozone		Boreal Shield		Boreal Plain	**Total Area (km^2)**
Ecoregion		Athabasca Plain	Churchill River Upland	Mid Boreal Upland	
Landscape Area		McTaggart Plain (C3)	Black Birch Plain (D1)	Firebag Hills (E1)	
LSA	km^2	0	0	41.1	**41.1**
	%	0	0	100.0	**100.0**
RSA	km^2	25.1	0	375.0	**400.1**
	%	6.3	0	93.7	**100.0**
CRSA	km^2	798.4	181.2	1400.1	**2,379.7**
	%	33.6	7.6	58.8	**100.0**

Source: Acton et al. 1998.

3.2.2 Landforms

All three Landscape Areas (C3, D1, and E1) have similar landforms characterized by hummocky, sandy glacial till and glaciofluvial deposits, with large areas of bogs and peatlands (Acton et al. 1998). The landforms in these areas are more representative of Boreal Shield landforms than Boreal Plain landforms. Typically, the Boreal Plain usually contains more clay-sized materials and has a more diverse mineralogy (Acton et al. 1998).

3.2.3 Regional Vegetation

The three Landscape Areas are also similar in that jack pine (*Pinus banksiana*) with a lichen understory is prevalent due to the sandy surface materials and frequency of the fire regime. A mixture of black spruce (*Picea mariana*) and jack pine can be found on the slopes of eskers and closed stands of black spruce are found in the boggy lowland areas, with occasional tamarack (*Larix laricina*) trees found in fens (Acton et al. 1998).

Fire in lichen-dominated systems generally does not increase the amount of deciduous shrub, and the vegetation in this area is typical of the Boreal Shield where frequent fires have promoted the dominance of jack pine. The forests of the Boreal Plain (and particularly the Mid-Boreal Upland Ecoregion) are more commonly represented by a mixture of deciduous and coniferous trees, with closed stands of trembling aspen (*Populus tremoloides*), jack pine, black spruce, white spruce (*Picea glauca*), and balsam poplar (*Populus balsamifera*); these species are listed in order of dominance (Acton et al. 1998).

3.2.4 Regional Wildlife

Vertebrate wildlife species known, expected, or with the potential to occur within the area of the Project are summarized in Table 3.2-2 and listed in Appendix A. The list of species with potential to occur within the area of the Project was developed using information from regional and provincial references (Banfield 1974, Smith 1996, Sibley 2014, SKCDC 2019), field data collected in support of the Project, and the author's experience. All species observed during field investigations were noted in Appendix A, with all provincial and federally sensitive or species at risk designations noted where applicable (SKCDC 2019, GOC 2020). Many of these species were also identified as occurring in the region by traditional land use studies, community engagement, and working group discussions (WD Lewis 2020, Ya'thi Néné Lands and Resources 2020, McCullough 2020, and Olson and Firelight 2019a,b).

Table 3.2-2 Vertebrate Wildlife Species Groups Known, Expected or with Potential to Occur Within the Area of the Project

Species Group	Unique Species (n)	Species Group	Unique Species (n)
Shrews	5	Hares	1
Bats	5	Rodents	14
Dog Family	3	Bears	1
Weasel Family	8	Cat Family	1
Ungulates	3	Amphibians/ Reptiles	5
Waterfowl	27	Vireos	4
Grouse, Quails and Allies	4	Jays, Magpies, Crows, and Ravens	4
Loons	2	Larks	1
Grebes	3	Martins and Swallows	4
Herons, Ibis and Allies	2	Tits, Chickadees and Titmice	2
Pelicans	1	Nuthatches	1
Cormorants and Anhingas	1	Wrens	2
Vultures, Hawks and Allies	9	Kinglets	2
Falcons and Caracaras	4	Thrushes	5
Rails, Gallinules, and Allies	3	Starlings and Mynas	1
Cranes	2	Wagtails and Pipits	1
Shorebirds	23	Waxwings	2
Gulls, Terns and Skimmers	11	Wood-warblers	19
Owls	7	Cardinals, Grosbeaks and Allies	1
Nightjars	1	New World Sparrows	14
Kingfishers	1	Old World Sparrows	1
Woodpeckers	7	Longspurs and Snow Buntings	3
Tyrant Flycatchers: Pewees, Kingbirds and Allies	7	Blackbirds	6
Shrikes	1	Finches, Euphonias, and Allies	8

4.0 WINTER TRACK COUNT SURVEY

4.1 Study Objectives

The primary objectives of the winter track count survey were to:

- determine the presence/non-absence of winter-active animals;
- determine the relative abundance of winter-active animals;
- enhance the Project specific area understanding of species-ecosite affiliations; and
- provide a scientifically defensible baseline for effects assessments and potential follow-up/monitoring requirements.

4.2 Methods

Winter track count surveys were completed from 27 March 2018 to 30 March 2018 and 15 December 2018 to 19 December 2018 and replicated between 15 January 2020 to 20 January 2020. Three types of winter track count surveys were utilized. The first was recording all intersections of animal trails along the existing and proposed road alignments. The second method utilized triangle-shaped transects. Triangle transects measured 7.5 km in length (2.5 km per side) and were laid out randomly across the LSA and RSA. The third method was a series of opportunistic riparian transects of approximately 500 m to ensure representation from this less common vegetation cover type.

Data were collected at 50-m intervals (termed a 'sub-transect') along each transect. Methodology was developed with guidance from the Saskatchewan Ministry of Environment *Species Detection Survey Protocol: Snow Track Surveys* (2014) and the tracking triangle approach was adopted from long-term monitoring techniques originating in Finland (Linden et al. 1996) and adopted by the Alberta Biodiversity Monitoring Program (Shank and Farr 1999). Hand-held global positioning systems (GPS) were used for navigation and orientation purposes and to measure transect and sub-transect lengths. The transect routes were recorded using the track-log function in a hand-held GPS, recording points every 10 metres.

Data were collected by a two person team, with each team including at least one Professional Biologist (registered with the Alberta Society of Professional Biologists (ASPB) proficient in wildlife snow track identification. The number of fresh animal trails crossing the transect path since the last snowfall event were recorded for each species. Animal tracks were identified to species by print, stride, and straddle. Multiple-pass hare and red squirrel trails were enumerated as five animals, consistent with Thompson et al. (1989). Fresh bed sites (i.e., since last snowfall event), squirrel middens, and ungulate foraging events (i.e., current winter browse associated with fresh trails) were recorded within a 3-m band on either side of the transect path. Scat and/or scent posts were recorded within 1 m of the transect path. Detailed information on anthropogenic features (e.g., cut lines, roads) were also recorded at the end of each 50-m sub-transect; this information included occurrence, human use, and wildlife use. Wildlife tracking data were collected a minimum of 24 hours after a snowfall event and continued until the track record was obliterated by wind, snow melt, or new snowfall. Tracking data, snow depth measurements, and incidental wildlife observations (e.g., grouse flushes) were recorded at the end of each 50-m sub-transect. A Universal Transverse Mercator (UTM) coordinate marking the start and end of each 50-m sub-transect was recorded.

The number of kilometre-days (i.e., length of transect multiplied by the days since last snowfall) was calculated for each transect and sub-transect. The number of animal trails per km-day by species was calculated by Project area, ecosite type, and transect.

Survey design and field methodologies were guided by existing provincial protocols, where applicable, or peer-reviewed methodology, and were completed under Saskatchewan Government Research Permit/Species Detection #18FW031 and 18SD170.

4.3 Results

In 2018, a total of 10 triangle transects (approximately 75.3 km), four lakeshore/creek transects (approximately 2.1 km) and one road/anthropogenic transect (approximately 17.6 km) were completed. In 2020, all 10 triangle transects (approximately 75.2 km), three creek transects (approximately 1.5 km) and the road/anthropogenic transect (approximately 20.4 km) were replicated (Figure 4.3-1). Sampling intensity was approximately 216.5 km-days in 2018 and approximately 482.1 km-days in 2020 across the area of the Project. All surveyed lakes and creeks were frozen at time of surveys. Survey conditions are listed in Table 4.3-1. Fourteen species/species group trails were detected during winter tracking surveys across 21 ecosites (Table 4.3-2 and Table 4.3-3). Ecosite descriptions can be found in Table 4.3-4.

Figure 4.3-1 Winter Tracking Survey Transects

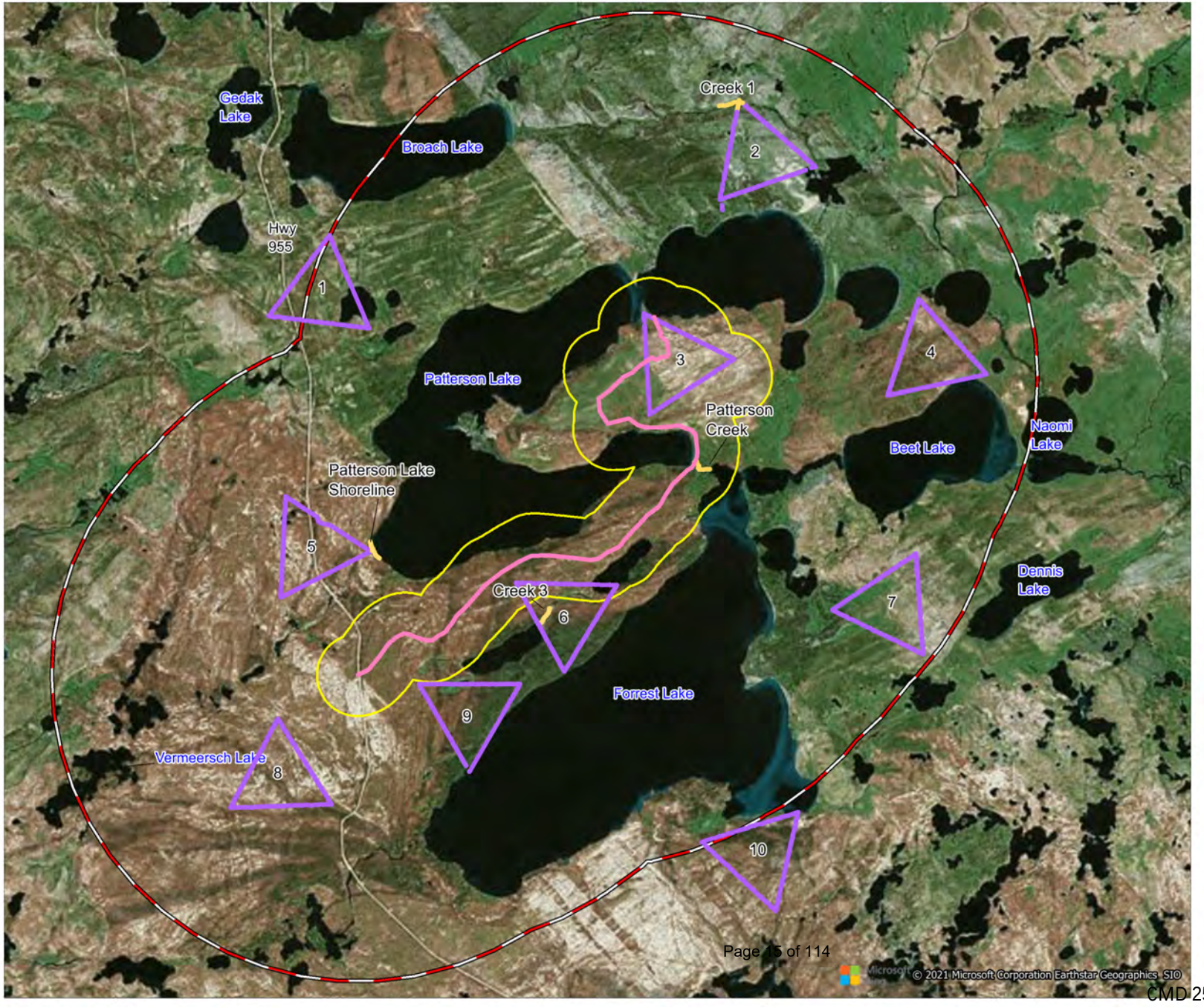

Table 4.3-1 Winter Tracking Survey Timing and Weather Summary.

Transect	Date		Average Temperature (°C)		Mean Snow Depth (cm)		Mean Snow Age (Days)	
	2018	2020	2018	2020	2018	2020	2018	2020
1	15 December	15 January	-4.5	-33.0	24.5	49.9	1.9	2.5
2	17 December	16 January	-9.0	-26.9	26.7	47.2	1.7	3.5
3	27 March	19 January	-14.5	-30.0	76.1	48.0	1.2	6.5
4	15 December	15 January	-4.5	-33.0	20.9	45.9	1.9	2.5
5	28 March	18 January	-15.0	-25.5	75.5	48.2	2.0	6.3
6	29 March	20 January	-30.0	-15.0	72.4	45.5	3.0	7.5
7	17 December	18 January	-9.0	-25.5	26.9	46.7	1.6	5.5
8	19 December	17 January	-9.0	-29.0	25.4	47.6	1.8	4.5
9	30 March	16 January	-23.9	-26.9	72.3	45.2	4.0	3.5
10	19 December	17 January	-9.0	-29.0	24.8	45.1	1.8	4.5
Patterson Lake Lakeshore	28 March	-	-15.0	-	63.4	-	2.1	-
Creek 1	17 December	16 January	-9.0	-26.9	35.3	37.4	1.7	3.6
Creek 3	29 March	20 January	-30.0	-15.0	50.6	44.0	3.0	7.5
Patterson Creek	17 December	20 January	-9.0	-15.0	27.6	46.0	1.8	7.6
Road/ Anthro	29 March	18-19 January	-30.0	-20.0	65.5	7.6	3.1	5.9

Table 4.3-2 Number of Trails per Km-day by Transect in the RSA – Winter 2018 & 2020.

Transect	Length (Km)		Km-days		Microtines (Trails/ Km-Day)		Red Squirrel (Trails/ Km-Day)		Snowshoe Hare (Trails/ Km-Day)		Grouse/ Ptarmigan (Trails/ Km-Day)		Ermine (Trails/ Km-Day)		Mink (Trails/ Km-Day)		Least Weasel (Trails/ Km-Day)	
	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020
1	7.47	7.49	14.56	18.67	0.14	0.05	1.30	0	0.34	0.21	0.07	0.37	0.41	0.16	0	0	0	0
2	7.54	7.26	12.46	25.49	0.32	0.27	0	0.16	0.08	3.06	0	0	0.08	0.27	0	0	0	0
3	7.51	7.54	8.64	49.18	0	0.16	0.23	0.12	15.85	9.09	0.93	0.02	0.46	0.24	0	0	0	0
4	7.54	7.52	14.99	18.66	0	0	0.07	0.05	0.27	0.86	0	0	0	0	0.07	0	0	0.05
5	7.56	7.60	15.03	48.15	0.27	0.04	0.67	0.56	12.71	13.31	1.86	0	0	0.04	0	0	0	0
6	7.51	7.53	22.72	56.80	0.04	0.30	1.19	0.18	0.13	0.44	0.26	0.14	0.22	0.26	0.35	0.04	0	0
7	7.55	7.52	12.33	41.28	0.32	0.22	0.32	0	0	0	0.24	0	0	0.05	0	0	0	0.05
8	7.56	7.57	13.40	34.37	0	0	2.84	0.09	59.66	1.11	0	0.03	0.75	0.03	0	0	0	0
9	7.51	7.56	30.27	26.44	0	0.15	1.19	0.04	0.03	0.68	0.03	0.04	0.07	0.64	0.07	0	0	0
10	7.57	7.56	13.55	34.30	0.22	0.06	2.80	0.06	0.15	0.03	0.07	0.06	1.48	0	0.44	0	0	0
Patterson Lake Lakeshore	0.55	-	1.14	-	0	-	0	-	0	-	16.61	-	0	-	2.62	-	0	-
Creek 1	0.50	0.51	0.84	1.81	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Creek 3	0.50	0.51	1.50	3.80	5.32	0	0	0	0	0	2.00	0	0	0	0	0.53	0	0
Patterson Creek	0.53	0.51	0.96	3.83	0	0.26	0	0	0	0	0	0.52	0	1.04	1.05	0.52	0	0
Road/ Anthro	17.56	20.40	54.06	119.27	0	0	0.91	0	3.33	0	0.76	0	0.11	0.02	0	0	0	0
Total / Average	**94.95**	**97.07**	**216.46**	**482.07**	**0.12**	**0.11**	**1.03**	**0.11**	**4.50**	**2.63**	**0.51**	**0.05**	**0.25**	**0.13**	**0.10**	**0.01**	**0**	**0.01**
Mean	**96.01**		**349.27**		**0.11**		**0.57**		**3.57**		**0.28**		**0.19**		**0.05**		**0.003**	

Note:
Dash = not sampled.

Table 4.3-2 Number of Trails per Km-day by Transect in the RSA – Winter 2018 & 2020 - cont.

Transect	Length (Km)		Km-days		Marten (Trails/ Km-Day)		Fisher (Trails/ Km-Day)		Otter (Trails/ Km-Day)		Fox (Trails/ Km-Day)		Coyote (Trails/ Km-Day)		Lynx (Trails/ Km-Day)		Moose (Trails/ Km-Day)	
	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020
1	7.47	7.49	14.56	18.67	0.14	0	0	0	0	0	0	0	0	0	0	0	0	0
2	7.54	7.26	12.46	25.49	3.13	0	0	0	0	0.04	0.08	0.04	0.16	0	0	0	0	0
3	7.51	7.54	8.64	49.18	0	0	1.27	0	0	0	0.69	0.18	0	0	0	0	0	0
4	7.54	7.52	14.99	18.66	0.27	0.43	0	0	0	0	0	0.27	0	0	0	0	0	0
5	7.56	7.60	15.03	48.15	0	0.25	0.20	0	0	0	0	0.04	0	0	0.07	0.04	0	0
6	7.51	7.53	22.72	56.80	0.13	0.58	1.10	0	0	0	0	0	0	0	0	0	0	0
7	7.55	7.52	12.33	41.28	0.08	0.05	0.08	0	0.32	0	0	0	0	0	0	0	0	0
8	7.56	7.57	13.40	34.37	0.22	0	0	0	0	0	0	0	0	0	0.22	0	0	0
9	7.51	7.56	30.27	26.44	0	0	1.32	0	0	0	0	0	0	0	0	0	0	0
10	7.57	7.56	13.55	34.30	3.69	0	0.07	0	0	0	0	0	0	0	0	0	0	0
Patterson Lake Lakeshore	0.55	-	1.14	-	0	-	0.87	-	0	-	0	-	0	-	0	-	0	0
Creek 1	0.50	0.51	0.84	1.81	0	2.76	0	0	0	0	0	0	0	0	0	0	0	0
Creek 3	0.50	0.51	1.50	3.80	0	0	1.33	0	0	0	0	0	0	0	0	0	0	0
Patterson Creek	0.53	0.51	0.96	3.83	0	0.52	0	0	0	0	0	0	0	0	0	0	0	0
Road/ Anthro	17.56	20.40	54.06	119.27	0.30	0.18	0.02	0	0	0	0.96	0.07	0	0	0.04	0.18	0	0.02
Total / Average	**94.95**	**97.07**	**216.46**	**482.07**	**0.55**	**0.17**	**0.39**	**0**	**0.02**	**0.002**	**0.27**	**0.05**	**0.01**	**0**	**0.03**	**0.05**	**0**	**0.004**
Mean	**96.01**		**349.27**		**0.36**		**0.20**		**0.01**		**0.16**		**0.005**		**0.04**		**0.002**	

Note:
Dash = not sampled.

Table 4.3-3 Number of Trails per Km-day by Ecosite in the RSA – Winter 2018 & 2020.

Ecosite*	Length (Km)		Km-days		Microtines (Trails/ Km-Day)		Red Squirrel (Trails/ Km-Day)		Snowshoe Hare (Trails/ Km-Day)		Grouse/ Ptarmigan (Trails/ Km-Day)		Ermine (Trails/ Km-Day)		Mink (Trails/ Km-Day)		Least Weasel (Trails/ Km-Day)	
	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020
BP02	8.77	8.55	17.27	38.44	0.06	0.03	1.79	0.47	0.87	1.61	0.17	0.08	0.12	0.08	0	0	0	0
BP03	3.71	3.62	11.66	13.71	0	0.36	2.14	0.07	0.09	0	0	0	0	1.17	0	0	0	0
BP04	0.42	0.41	1.40	2.72	0	0	0	1.10	0	0	0	0	0	1.10	0	0	0	0
BP12	2.51	2.64	8.32	17.11	0	0.94	1.32	0.23	0.12	0	0.36	0.41	0.12	0.41	0.24	0.06	0	0
BP14	0.61	0.56	2.03	3.17	0	0	8.85	0	0	0	0	0	0	0	2.46	0	0	0
BP16	0.50	0.51	1.50	3.80	5.32	0	0	0	0	0	2.00	0	0	0	0	0.53	0	0
BP19	1.24	0.85	3.68	3.80	0	1.05	0	0	0	0.26	0	0	0	0	0.27	0.26	0	0
BP20	1.90	2.01	3.50	8.81	0	0	0	0	0.29	0.23	0	0	0	0	0	0	0	0
BP22	0.15	0.16	0.25	0.85	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BP24	0.25	0.20	0.40	1.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BP25	0.59	0.82	1.00	4.12	0	0	0	0	0	0	0	0.49	0	0.97	0	0.49	0	0
BP26	0.09	0.10	0.37	0.36	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BS14	0.56	0.05	1.25	0.35	0	0	0	0	0	0	9.58	0	0	0	3.19	0	0	0
RF1-C	0.49	0.49	0.63	3.27	0	0.61	0	0	0	0	0	0	0	1.22	0	0	0	0
RF2-B	0.15	0.20	0.44	1.50	0	0	0	0	0	0	0	0	0	0	2.28	0	0	0
RF2-C	24.47	24.64	47.48	141.48	0.08	0.09	1.18	0.18	16.22	8.33	0.72	0.04	0.40	0.14	0	0	0	0
RF2-D	0.14	0.14	0.40	1.11	0	0	0	0	0	7.24	7.54	0	0	0.90	0	0	0	0
RF3-C	0.66	0.66	1.23	1.67	0	0	0	0	0	0	0	0	4.07	0	0	0	0	0
RF4	15.93	15.71	28.29	60.92	0.28	0.16	0.18	0.02	0.18	0.26	0.11	0	0.04	0.03	0.04	0	0	0.05
Lake	4.44	4.38	13.33	16.25	0	0	0	0	0	0	0.53	0	0	0	0.08	0	0	0
Anthropogenic	17.56	20.40	54.06	119.27	0	0	0.91	0	3.33	0	0.76	0	0.11	0.02	0	0	0	0
Total	**85.14**	**87.09**	**198.50**	**443.80**	**0.11**	**0.11**	**0.74**	**0.12**	**4.90**	**2.85**	**0.55**	**0.04**	**0.17**	**0.14**	**0.08**	**0.01**	**0**	**0.01**
Mean	**86.12**		**321.15**		**0.11**		**0.43**		**3.88**		**0.29**		**0.16**		**0.04**		**0.003**	

* Refer to Table 4.3-4 for ecosite code descriptions.

Table 4.3-3 Number of Trails per Km-day by Ecosite in the RSA – Winter 2018 & 2020 - cont.

Ecosite*	Length (Km)		Km-days		Marten (Trails/ Km-Day)		Fisher (Trails/ Km-Day)		Otter (Trails/ Km-Day)		Fox (Trails/ Km-Day)		Coyote (Trails/ Km-Day)		Lynx (Trails/ Km-Day)		Moose (Trails/ Km-Day)	
	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020
BP02	8.77	8.55	17.27	38.44	0.35	0.13	0.58	0	0	0	0	0.026	0.06	0	0.17	0	0	0
BP03	3.71	3.62	11.66	13.71	3.00	0	1.46	0	0	0	0	0	0	0	0	0	0	0
BP04	0.42	0.41	1.40	2.72	0	2.58	1.43	0	0	0	0	0	0	0	0	0	0	0
BP12	2.51	2.64	8.32	17.11	0.12	0.99	2.52	0	0	0	0	0	0	0	0	0	0	0
BP14	0.61	0.56	2.03	3.17	0.98	0.32	0.98	0	0	0	0	0	0	0	0	0	0	0
BP16	0.50	0.51	1.50	3.80	0	0	1.33	0	0	0	0	0	0	0	0	0	0	0
BP19	1.24	0.85	3.68	3.80	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BP20	1.90	2.01	3.50	8.81	0	0	0.29	0	0	0	0	0	0	0	0	0	0	0
BP22	0.15	0.16	0.25	0.85	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BP24	0.25	0.20	0.40	1.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BP25	0.59	0.82	1.00	4.12	0	1.46	0	0	0	0	0	0	0	0	0	0	0	0
BP26	0.09	0.10	0.37	0.36	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BS14	0.56	0.05	1.25	0.35	0	0	0.80	0	0	0	0	0	0	0	0	0	0	0
RF1-C	0.49	0.49	0.63	3.27	0	0	0	0	0	0	0	0.306	0	0	0	0	0	0
RF2-B	0.15	0.20	0.44	1.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RF2-C	24.47	24.64	47.48	141.48	0.06	0.11	0.55	0	0	0	0.13	0.06	0	0	0.02	0.01	0	0
RF2-D	0.14	0.14	0.40	1.11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RF3-C	0.66	0.66	1.23	1.67	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RF4	15.93	15.71	28.29	60.92	0.35	0.16	0.04	0	0.14	0.02	0.04	0.10	0.04	0	0	0	0	0
Lake	4.44	4.38	13.33	16.25	0	0.06	0	0	0	0	0	0	0	0	0	0	0	0
Anthropogenic	17.56	20.40	54.06	119.27	0.30	0.18	0.02	0	0	0	0.96	0.07	0	0	0.04	0.18	0	0.02
Total	**85.14**	**87.09**	**198.50**	**443.80**	**0.37**	**0.19**	**0.42**	**0**	**0.02**	**0.002**	**0.30**	**0.06**	**0.01**	**0**	**0.03**	**0.05**	**0**	**0.005**
Mean	**86.12**		**321.15**		**0.28**		**0.21**		**0.01**		**0.18**		**0.005**		**0.04**		**0.002**	

* Refer to Table 4.3-4 for ecosite code descriptions.

Table 4.3-4 Ecosites in the Area of the Project.

Ecosite Code		Ecosite Name/ Description	RSA (Ha)	LSA (Ha)	RSA (%)	LSA (%)
Boreal Plain	Boreal Shield					
RF4		Recent burn (Age: 1 year)	6,581.9	0.0	16.4	0.0
RF3-Coniferous		Regenerating coniferous forest - low shrub <1 m tall (15-20 years)	965.3	0.0	2.4	0.0
RF3-Bog		Regenerating bog- low shrub <1 m tall (15-20 years)	127.9	0.0	0.3	0.0
RF2-Coniferous		Regenerating coniferous forest - tall shrub 1-5 m tall (20-35 years)	10,636.5	2,123.6	26.6	51.6
RF2-Deciduous		Regenerating deciduous forest - tall shrub 1-5 m tall (20-35 years)	474.3	219.0	1.2	5.3
RF2-Bog		Regenerating bog - tall shrub 1-5 m tall (20-35 years)	343.5	52.6	0.9	1.3
RF1-Coniferous		Regenerating coniferous forest - treed >5 m tall (25-40 years)	612.9	20.6	1.5	0.5
RF1-Deciduous		Regenerating deciduous forest - treed >5 m tall (25-40 years)	919.8	133.7	2.3	3.3
BP2	BS3	Jack pine - lichen	3,729.2	282.3	9.3	6.9
BP3	BS4	Jack pine / feathermoss	1,972.4	187.8	4.9	4.6
BP4	BS6	Jack pine - trembling aspen / prickly rose / grass	173.1	104.5	0.4	2.5
BP12	BS4	Jack pine - spruce / feathermoss	216.2	0.0	0.5	0.0
N/A	BS14	White birch / lingonberry - Labrador tea	74.6	0.8	0.2	0.0
BP14	N/A	Black spruce / Labrador tea / feathermoss	132.2	28.8	0.3	0.7
BP16	BS16	Balsam poplar - trembling aspen / prickly rose	33.2	0.6	0.1	0.0
BP19	BS17	Black spruce treed bog	499.1	59.4	1.2	1.4
BP20	BS18	Labrador tea shrubby bog	1,321.2	95.6	3.3	2.3
BP21	BS19	Graminoid bog	25.3	0.0	0.1	0.0
BP22	BS20	Open bog	8.6	0.0	0.0	0.0
BP23	BS21	Tamarack treed fen	21.1	0.8	0.1	0.0
BP24	BS22	Leatherleaf shrubby poor fen	54.1	12.9	0.1	0.3
BP25	BS23	Willow shrubby rich fen	68.9	4.8	0.2	0.1
BP26	BS24	Graminoid fen	45.1	7.7	0.1	0.2
BP27	BS25	Open fen	55.6	0.0	0.1	0.0
N/A	BS26	Rush sandy shore	16.9	0.8	0.0	0.0
DL1		Disturbed lands - vegetated	0.3	0.0	0.0	0.0
LK		Water body	10,903.5	775.6	27.3	18.9
Total			**40,012.6**	**4,111.7**	**100.0**	**100.0**

Source: Annex VII.1 Vegetation Baseline Report 1 (Mapping).

Listed below in descending order are average species and trail densities from the winter 2018 and 2020 surveys, expressed as trails per km-day, for the RSA to provide an indication of relative abundance.

- Snowshoe hare (*Lepus americanus*) – 3.57 trails / km-day
- Red squirrel (*Tamiasciurus hudsonicus*) – 0.57 trails / km-day
- Marten (*Martes americana*) – 0.36 trails / km-day
- Grouse (*Phasianidea spp.*) or Ptarmigan (*Lagopus spp.*) – 0.28 trails / km-day
- Fisher (*Martes pennanti*) – 0.20 trails / km-day
- Ermine (*Mustela erminea*) – 0.19 trails / km-day
- Red fox (*Vulpes vulpes*) – 0.16 trails / km-day
- Microtine rodent species – 0.11 trails / km-day
- Mink (*Mustela vison*) – 0.05 trails / km-day
- Canada Lynx (*Lynx canadensis*) – 0.04 trails / km-day
- Otter (*Lontra canadensis*) – 0.01 trails / km-day
- Coyote (*Canis latrans*) – <0.01 trails / km-day
- Least Weasel (*Mustela nivalis*) – <0.01 trails / km-day
- Moose (*Alces alces*) – <0.01 trails / km-day

4.3.1 Carnivores

Nine species of carnivore trails were detected during winter tracking surveys: coyote; marten; ermine; least weasel; mink; fisher; red fox; lynx; and otter. Carnivore species were observed in approximately 86% (18/21) of Ecosites surveyed (Table 4.3-1 and Table 4.3-2). They were not detected in open bog (BP22), leatherleaf shrubby poor fen (BP24), or graminoid fen (BP26).

Marten trails were the most observed carnivore sign across both survey years. Trails were detected on all transect types (i.e., triangle, creek/lakeshore, and road/anthropogenic), with a mean density of 0.36 trails per km-day across both sampling years. Transect 10 (1.85 mean trails / km-day), Transect 2 (1.57 mean trails / km-day), and Creek 1 (1.38 mean trails / km-day) had the highest mean trail densities across both survey years. In 2018, the highest trail density was observed on Transect 10 (3.69 trails / km-day), while during the 2020 surveys the highest trail density was detected on Creek 1 (2.76 trails / km-day). Marten trails were detected in approximately 48% (10/21) of ecosites surveyed across both sampling years. The highest trail densities were observed in jack pine/feathermoss (BP3) (1.50 mean trails/ km-day), jack pine – trembling aspen/feathermoss (BP4) (1.3 mean trails/ km-day), and willow (*Salix spp.)* shrubby rich fen (BP25) (0.72 mean trails/ km-day) ecosites. In 2018, the highest trail density was observed in jack pine/feathermoss (BP3) (3.0 trails / km-day) ecosites, while during the 2020 sampling year the highest trail density was observed in jack pine – trembling aspen/feathermoss (BP4) (2.6 trails / km-day) ecosite.

Fisher trails were observed on all three transect types (i.e., triangle, creek/lakeshore, and road/anthropogenic) with a mean density of 0.20 trails per km-day across sampling years. Creek 3 (0.67 mean trails / km-day), Transect 9 (0.66 mean trails / km-day), and Transect 3 (0.64 mean trails / km-day) had the highest densities of trails. The highest trail density observed in 2018 was along Creek 3 (1.33 trails / km-day). No Fisher trails were detected in 2020. Fisher trails were detected in approximately 52% (11/21) of ecosites across both years. Trail densities were highest in ecosites BP12 (Jack pine – spruce/feathermoss) (1.26 mean trails / km-day), jack pine/feathermoss (BP3) (0.73 mean trails / km-day), and jack pine – trembling aspen/feathermoss (BP4) (0.71 mean trails / km-day) ecosites. Fisher trails were only observed in 2018 and not in 2020, with the highest density in ecosite jack pine – spruce/feathermoss (BP12) (2.52 trails / km-day).

Ermine trails were detected on all transect types (i.e., triangle, creek/lakeshore and road /anthropogenic), with a mean density of 0.19 trails per km-day across sampling years. Transects 10 (0.74 mean trails / km-day), Patterson Creek (0.52 mean trails / km-day), and Transect 8 (0.39 mean trails / km-day) had the highest trail densities across both sampling years. In 2018 the highest trail density was observed along Transect 10 (1.48 trails / km-day), while the highest trail density in 2020 was detected along Patterson Creek (1.04 trails / km-day). Ermine trails were detected in approximately 52% (11/21) of ecosites surveyed across both sampling years. The highest trail densities were observed in the regenerating coniferous forest – low shrub <1 m (RF3-C) (2.04 mean trails / km-day), regenerating coniferous forest - treed >5 m (RF1-C) (0.61 mean trails / km-day), and jack pine/feathermoss (BP3) (0.58 mean trails / km-day) ecosites. In 2018, the highest trail density was observed in regenerating coniferous forest – low shrub <1 m (RF3-C) (4.07 trails / km-day) ecosite, while during the 2020 sampling year the highest trail density was observed in the regenerating coniferous forest - treed >5 m (RF1-C) (1.22 trails / km-day) ecosite.

Red fox trails were detected on two transect types (i.e., triangle and road/anthropogenic) and averaged a density of 0.16 trails per km-day across sampling years. Road/anthropogenic (0.51 mean trails / km-day), Transect 3 (0.44 mean trails / km-day), and Transect 4 (0.13 mean trails / km-day) had the highest trail densities across both sampling years. The highest trail density in 2018 was observed along the road/anthropogenic transect (0.96 trails / km-day), while the 2020 sampling year detected the highest trail density along Transect 4 (0.27 trails / km-day). Red fox trails were detected in approximately 24% (5/21) of ecosites surveyed across both sampling years. The highest trail densities were observed in the linear and polygonal disturbance (anthropogenic) (0.51 mean trails / km-day), regenerating coniferous forest - treed >5 m (RF1-C) (0.15 mean trails / km-day), and regenerating coniferous forest – tall shrub 1-5 m (RF2-C) (0.13 mean trails / km-day) ecosites. In 2018, the highest trail density was observed in linear and polygonal disturbance (anthropogenic) (0.96 trails / km-day) ecosite, while during the 2020 sampling year the highest trail density was observed in the regenerating coniferous forest - treed >5 m (RF1-C) (0.31 trails / km-day) ecosite.

Mink trails were observed on two transect types (i.e., triangle and creek/lakeshore) with a mean density of 0.05 trails per km-day across sampling years. Patterson Creek (0.78 mean trails / km-day), Creek 3 (0.26 mean trails / km-day) and Transect 10 (0.22 mean trails / km-day) had the highest densities of trails across both sampling years. The highest trail density in 2018 was observed along the Patterson Lake Lakeshore (2.62 trails / km-day), while the 2020 survey detected the highest trail density along Creek 3 (0.53 trails / km-day). Mink trails were detected in approximately 43% (9/21) of ecosites surveyed across both sampling years. The highest trail densities were observed in the white birch (*Betula papyrifera*) /lingonberry (*Vaccinium vitis-idaea*) – Labrador tea (*Rhododendron groenlandicum*) (BS14) (1.60 mean trails / km-day), black spruce/Labrador tea/feathermoss (BP14) (1.23 mean trails / km-day), and regenerating bog – tall shrub 1-5 m (RF2-B) (1.14 mean trails / km-day) ecosites. In 2018, the highest trail density was observed in white birch/lingonberry – Labrador tea (BS14) (3.19 trails / km-day) ecosite while during the 2020 sampling year the highest trail density was observed in the balsam poplar – trembling aspen/prickly rose (*Rosa acicularis*) (BP16) (0.53 trails / km-day) ecosite.

Canada lynx trails were detected on triangle and road/anthropogenic transects with a mean density of 0.04 trails per km-day across sampling years. The road/anthropogenic transect had the highest trail density (0.11 mean trails / km-day), followed by Transect 8 (0.11 mean trails / km-day), and Transect 5 (0.05 mean trails / km-day). In 2018, trail density was highest along Transect 8 (0.22 trails / km-day), while trail density in 2020 was highest along the road/anthropogenic transect (0.18 trails / km-day). Canada lynx trails were detected in approximately 14% (3/21) of ecosites surveyed across both sampling years. The linear and polygonal disturbance (anthropogenic) (0.11 mean trails / km-day) ecosite had the highest trail density, followed by jack pine/lichen (BP2) (0.09 mean trails / km-day), and regenerating coniferous forest – tall

shrub 1-5 m (RF2-C) (0.02 mean trails / km-day) ecosites. In 2018, the highest trail density was observed in jack pine/lichen (BP2) (0.17 trails / km-day), while during the 2020 sampling year the highest trail density was observed in the linear and polygonal disturbance (anthropogenic) (0.18 trails / km-day) ecosite.

Otter trails were observed on Transect 7 (0.16 mean trails / km-day) and Transect 2 (0.02 mean trails / km-day) across both sampling years. Trails were detected in one (5%) ecosite across sampling years: the Recent burn (RF4) (0.08 mean trails / km-day).

Coyote trails were only observed on Transect 2 (0.08 mean trails / km-day) across sampling years. Coyote trails were detected in the jack pine/lichen (BP2) (0.03 mean trails / km-day) and recent burn (RF4) (0.02 mean trails / km-day) ecosites.

Least weasel trails were observed on Transects 4 and 7 in 2020 at a density of 0.05 trails per km-day. Least weasel trails were only detected in the recent burn (RF4) (<0.01 mean trail / km-day) ecosite.

4.3.2 Small Mammal Prey and Game Birds

The trails of four different species or species groups of small mammals and game birds were observed during winter tracking surveys including: snowshoe hare; red squirrel; grouse/ptarmigan; and microtine rodents. Small mammals/game birds were observed in approximately 76% (16/21) ecosites sampled across sampling years (Table 4.3-1 and Table 4.3-2). They were not detected in open bog (BP22), leatherleaf shrubby poor fen (BP24), graminoid fen (BP26), or regenerating bog - tall shrub 1-5 m tall (RF2-B).

Snowshoe hare trails were observed on two transect types (i.e., triangle and road/anthropogenic) averaging 3.57 trails per km-day across the study area. The highest densities of snowshoe hare trails were detected on Transect 8 (30.38 mean trails / km-day), Transect 5 (13.01 mean trails / km-day), and Transect 3 (12.47 mean trails / km-day) across both sampling years. The highest trail density during the 2018 survey was detected along Transect 8 (59.66 trails / km-day), while the 2020 survey detected the highest trail density along Transect 5 (13.31 trails / km-day). Snowshoe hare trails were observed in approximately 43% (9/21) of ecosites across sampling years. The highest trail densities were observed in the regenerating coniferous forest – tall shrub 1-5 m (RF2-C) (12.27 mean trails / km-day), regenerating deciduous forest – tall shrub 1-5 m (RF2-D) (3.61 mean trails / km-day), and linear and polygonal disturbance (anthropogenic) (1.66 mean trails / km-day) ecosites. In 2018 and 2020, the highest trail density was observed in the ecosite regenerating coniferous forest – tall shrub 1-5 m (RF2-C) at 16.22 and 8.33 trails per km-day, respectively.

Red squirrel trails were detected on two transect types (i.e., triangle and road/anthropogenic) across sampling years with a mean trail density of 0.57 trails per km-day across the study area. Transect 8 (1.46 mean trails / km-day), Transect 10 (1.43 mean trails / km-day), and Transect 6 (0.68 mean trails / km-day) had the highest trail densities across sampling years. The highest trail density during the 2018 survey was detected along Transect 8 (2.84 trails / km-day), while the 2020 survey detected the highest trail density along Transect 5 (0.56 trails / km-day). Red squirrel trails were observed in approximately 38% (8/21) of ecosites across sampling years. The highest trail densities were observed in the black spruce/Labrador tea/feathermoss (BP14) (4.42 mean trails / km-day), jack pine/lichen (BP2) (1.13 mean trails / km-day), and jack pine/feathermoss (BP3) (1.11 mean trails / km-day) ecosites. In 2018, the highest trail density was observed in black spruce/Labrador tea/feathermoss (BP14) (8.85 trails / km-day) ecosite, while during the 2020 sampling year the highest trail density was observed in the Jack pine – trembling aspen/feathermoss (BP4) (1.10 trails / km-day) ecosite.

Grouse/ptarmigan trails were observed on all three transect types (i.e., triangle, road/anthropogenic and creek/lakeshore) averaging 0.28 trails per km-day across sampling years. The highest density of grouse/ptarmigan trails were detected on Creek 3 (1.00 mean trails / km-day), Transect 5 (0.93 mean trails

/ km-day), and Transect 3 (0.47 mean trails / km-day). In 2018, the highest trail density was observed along Patterson Lake lakeshore (16.61 trails / km-day), while during the 2020 sampling year, the highest trail density was observed along Patterson Creek (0.52 trails / km-day). Grouse/ptarmigan trails were observed in approximately 48% (10/21) of ecosites across sampling years. The highest trail densities were observed in the white birch/lingonberry – Labrador tea (BS14) (4.79 mean trails / km-day), regenerating deciduous forest – tall shrub 1-5 m (RF2-D) (3.77 mean trails / km-day), and balsam poplar –trembling aspen/prickly rose (BP16) (1.00 mean trails / km-day) ecosites. In 2018, the highest trail density was observed in white birch/lingonberry – Labrador tea (BS14) (9.58 trails / km-day) ecosite, while during the 2020 sampling year the highest trail density was observed in the willow shrubby rich fen (BP25) (0.49 trails / km-day) ecosite.

Microtine rodent trails were observed on two transect types (i.e., triangle and creek/lakeshore) and averaged 0.11 trails per km-day across sampling years. The highest density of microtine rodent trails was observed along Creek 3 (2.66 mean trails / km-day), Transects 2 (0.30 mean trails / km-day), and Transect 7 (0.27 mean trails / km-day). In 2018, the highest trail density was observed along Creek 3 (5.32 trails / km-day), while during the 2020 sampling year the highest trail density was observed along Transect 6 (0.30 trails / km-day). Microtine rodent trails were observed in approximately 38% (8/21) of ecosites across sampling years. The highest trail densities were observed in the balsam poplar –trembling aspen/prickly rose (BP16) (2.66 mean trails / km-day), black spruce treed bog (BP19) (0.53 mean trails / km-day), and jack pine – spruce/feathermoss (BP12) (0.46 mean trails / km-day) ecosites. In 2018, the highest trail density was observed in balsam poplar –trembling aspen/prickly rose (BP16) (5.32 trails / km-day) ecosite, while during the 2020 sampling year the highest trail density was observed in the black spruce treed bog (BP19) (1.05 trails / km-day) ecosite.

Figure 10 presented by the Athabasca Denesųłiné also highlights the importance of the area and "represents the areas that were identified as small game and furbearing harvesting areas. Specific species identified were rabbits, mink, beaver, fisher, marten, muskrat, fox, wolf, otter, wolverine, squirrel, weasel, porcupine, and bears." (Ya'thi Nene Lands and Resources 2020, pages 15 and 30).

4.3.3 Ungulates

The trails of one ungulate species were encountered during the winter track count surveys: moose. Moose trails were only encountered during the 2020 sampling year along the road/anthropogenic transect. The density of moose trails across sampling years was 0.002 trails per km-day (Table 4.3-2 and Table 4.3-3).

Although ungulate trails were less common than other species' trails, traditional land use studies indicated that the area was important and well used for the harvesting of big game species. Specifically:

- The Metis Nation Saskatchewan Northern Region II indicated that "the area is still used, mostly to hunt moose (WD Lewis 2020)."
- The Athabasca Denesųłiné have indicated that "the area was identified for harvesting of big game including caribou, moose and whitetail deer" (Ya'thi Nene Lands and Resources 2020).
- During working group engagement, it was also indicated that "there is a migration route for moose, caribou and bear at the narrows between the intake and discharge for the mine" (NexGen 2020, BNDN-183).

5.0 WINTER BACKTRAILING SURVEY

5.1 Study Objectives

Winter backtrailing surveys of mammal species in the RSA and LSA was completed to gather information on local habitat/anthropogenic use by ungulates and ungulate-associated predator species. The objectives of this survey were to:

- collect data on the use and avoidance of natural and manmade features;
- collect data on the ecosite use by ungulates and the associated predators; and
- provide a scientifically defensible baseline for potential follow-up/monitoring requirements.

5.2 Methods

Candidate trails for backtrailing were detected through systematic surveys along linear features with winter vehicle access within the RSA and LSA between 30 March 2019 and 1 April 2019. A total of 120 km were surveyed. Survey conditions are listed in Table 5.2-1. All trails of target species (i.e., moose, woodland caribou, and wolf (*Canis lupus*)) encountered were documented using a handheld GPS to mark a waypoint. Due to limited number of trails observed, all trails encountered were selected to be backtrailed. It is understood that this survey has limitations, and in-depth statistics cannot be completed for the data set. It does however provide information on local habitat/anthropogenic use by species within the RSA.

The animal(s) path of travel was mapped by two observers using the track-log function in a handheld GPS unit. Observers included a Professional Biologists and an assistant, both proficient in wildlife snow track identification. Track point intervals were recorded every three seconds. The track-log points delineate fine-scale travel paths, record habitat use, and document behavioural observations (e.g., response to and use of linear features). Recorded observations included: direction of travel; bedding; feeding; defecation; trail interactions with other species; and general behaviour. Caribou feeding craters were recorded according to Stepaniuk (1997) as small (<2 m in diameter), medium (2 to 5 m in diameter), large (>5 m), or as complex (many craters over a large area). The frequency of each crater size was recorded at feeding bouts. The UTM coordinates marked the locations of documented observations. Interactions with and distance travelled on linear features, such as all-season roads, seasonal roads, trails, conventional cut lines, and hand-cut lines, were recorded. The length of each backtrail event per ecosite phase travelled was calculated.

Survey design and field methodologies were guided by peer-reviewed methodology and were completed under Saskatchewan Government Research Permit/Species Detection #18FW031 and 18SD170.

Table 5.2-1 Winter Backtrailing Survey Timing and Weather Summary

Backtrailing Event (Species)	Date	Temperature (°C)		Mean Snow Depth (cm)
		Minimum	Maximum	
Woodland Caribou	31-March-2019	-7.3	-1.0	19.0
Moose	1-Apil-2019	-9.8	-1.2	20.0
Wolf	30-March-2019	-16.2	0.2	19.0

5.3 Results

Three species, woodland caribou, moose, and grey wolf were backtrailed in the area of the Project (Figure 5.3-1).

Four woodland caribou travelling together were backtrailed for a total of 10.1 km in the RSA. The most utilized ecosites/vegetation cover types were recent burn (RF4) (54%) and Labrador tea shrubby bog (BP20) (38%). Woodland caribou did not utilize any ecosites/vegetation cover types that overlapped with use by predators (e.g., wolves) or alternate prey (e.g., moose) in this survey (Table 5.3-1). One documented browse event in a residual Labrador tea shrubby bog (BP20) and four pellet groups were documented during the entirety of the backtrail event. The First Nation Community engagement database indicated that “there is a migration route for moose, caribou and bear at the narrows between the intake and discharge for the mine.” (NexGen 2020, BNDN-183).

Two wolves were backtrailed for a total of 4.2 km within the LSA. The wolves utilized linear features for 99% of the backtrail event. The ecosites/vegetation cover types most frequently travelled were regeneration – deciduous tall shrub dominated (RF2-D) (48%) and regeneration – coniferous tall shrub dominated (RF2-C) (31%) (Table 5.3-1). One urination and one intercept of a prey species (e.g., moose) trail was observed during the entirety of the backtrail event.

One moose was backtrailed for a total of 7.1 km within the LSA and RSA. The entire backtrail event occurred with the regeneration – coniferous tall shrub dominated (RF2-C) (Table 5.3-1); however, observers noted patches of deciduous vegetation with heavy use along the backtrail event. In particular, 28 bed-sites, 19 browse events, and 16 pellet groups occurred within these patches, suggesting continued multi-day use of the area. The browse events occurred most frequently on white birch trees and shrubs (84%), with a small amount of browse occurring on alder (*Alnus spp.*) and jack pine shrubs.

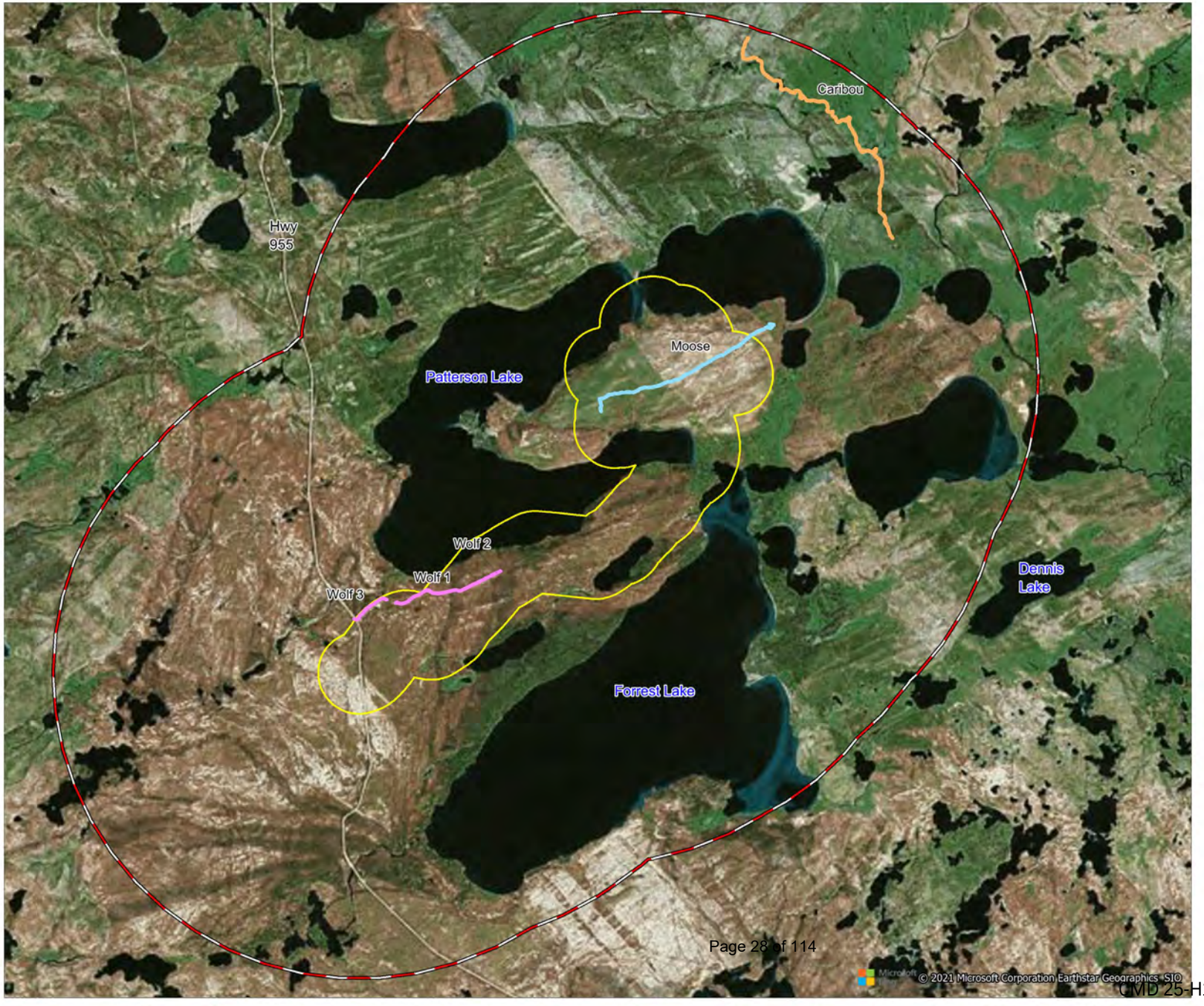

Figure 5.3-1 Winter Backtrail Surveys

Legend

- Caribou Trail
- Moose Trail
- Wolf Trail
- Regional Study Area (RSA)
- Local Study Area (LSA)

N
W E
S

0 5 10

kilometers
Scale = 1 : 90,000

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Produced by RA, Dec. 2019
Ref# O-F736_12-18

Table 5.3-1 Winter Backtrail Events in the RSA – March 30-April 1, 2019.

Species	Total Distance (km)	Distance in LSA (km)	Distance in RSA (km)	Distance on Linear Feature (km)	Distance (km) by Ecosite/Vegetation Cover Type								
					BP2	BP3	BP20	BP26	BP27	RF2-C	RF2-D	RF4	Lake
Woodland Caribou	10.1	0	10.1	0	0	0	3.8	0.04	0.4	0	0	5.5	0.4
Moose	7.1	5	2.1	0	0	0	0	0	0	7.1	0	0	0
Wolf	4.2	4.1	0.1	4.1	0.6	0.3	0	0	0	1.3	2.0	0	0

6.0 SPRING UNGULATE PELLET GROUP/BROWSE AVAILABILITY SURVEY

6.1 Study Objectives

Pellet group/browse availability surveys were completed between 6 June 2018 and 15 June 2018 and replicated between 21 May 2019 and 30 May 2019 along the same transects established for the winter track count surveys. The objectives of this survey were to:

- collect data on the presence of ungulates (i.e., moose and woodland caribou) and carnivores in the Project area by transect and ecosite;
- collect data on the relative abundance of ungulates (i.e., moose and woodland caribou) and carnivores in the Project area by transect and ecosite;
- collect data on browse availability and use of woody forage species for moose;
- describe the frequency of occurrence and abundance of terrestrial and arboreal lichen for woodland caribou;
- collect data on the presence and relative abundance of game birds (e.g., grouse/ptarmigan species); and
- develop a scientifically defensible baseline to support effects assessments and to allow for potential future follow up/monitoring requirements.

6.2 Methods

Handheld GPS and satellite imagery were used to navigate the pre-established transects (i.e., same transects used for winter track counts) and to measure sub-transect lengths. Observers searched for ungulate pellet groups and carnivore scats one metre on either side of the transect line. Data were collected by a Professional Biologist registered with the ASPB, proficient in pellet and vegetation identification, and an assistant. Each transect was broken into 50-m sub-transects. The UTM coordinates for the start and end points of each 50-m sub-transect were recorded. Winter (i.e., non-growing season) pellet groups were recorded separately from summer (i.e., growing season) pellet groups based on shape and texture. Observed pellet groups that were deposited before the previous winter were also recorded but were labelled as “Old”.

In addition to pellets, systematic records of squirrel midden locations and grouse flushes were also recorded to collect information on the occurrence, spatial distribution, relative abundance, and ecosite affiliations of these important prey species. Squirrel middens were recorded within 3 m of the transect patch and grouse flushes were recorded using the methods adapted from the Government of BC (1997).

At the end of each 50 m sub-transect, a detailed browse availability/use plot was completed using a 5.6-m radius (100 m^2) plot. Terrestrial and arboreal lichen are important forage for woodland caribou, and woody browse species are important forage for moose and deer. The percent cover class of each woody shrub species available within the plot was recorded. Cover classes included: nil (0%); very low (0 to 5%); low (5 to 25%); moderate (25 to 50%); and high (>50%) (Daubenmire 1959). An estimate of the percent of available twigs browsed was also completed using the same classes. The browse use classes measured forage use of woody plants by all ungulates and did not make a distinction as to the species of ungulate using these plants. Terrestrial lichen cover was estimated using a representative 1-m x 1-m plot nested within the larger 5.6-m radius plot. Arboreal lichen cover was estimated using five relative abundance cover classes as per the methods of Armleder et al. (1992).

Pellet group/browse survey transects were overlain onto ecosite mapping within a geographic information system (GIS). Each sub-transect was assigned an ecosite type using field notes and GIS query data. Pellet counts were made for the number of pellets or scats per sub-transect (50-m x 2-m, or 100 m^2) and for all

segments and transects. The resultant measure of ungulate use was the number of pellet groups/ha per animal species and ecosite type. Frequency of occurrence (i.e., constancy) and mean percent canopy coverage (i.e., midpoints of canopy closure classes) of each available woody browse species were calculated for sub-transects by vegetation cover type. These two values were multiplied to provide an availability index value for each browse species and vegetation type. The frequency of use and mean percent browsing (i.e., midpoints of vegetation cover classes) of woody browse species were calculated for each species and vegetation cover type. These two values were multiplied to determine a browse use index value for each woody browse species and ecosite type.

Survey design and field methodologies were guided by Neff (1968), and were completed under Saskatchewan Government Research Permit/Species Detection #18FW031 and 18SD170.

6.3 Results

A total of 10 triangle shaped transects and three riparian transects were surveyed. A total of approximately 15 hectares (ha) was searched each year (Figure 6.3-1 and Table 6.3-1). Six species or species groups were detected across the surveys (Table 6.3-1). Listed below in descending order are the mean pellet group and scat densities, expressed as pellet groups or scats per hectare in the RSA for each species detected:

- Grouse/ptarmigan – 13.8/ha
- Moose – 1.0/ha
- Black bear (*Ursus americanus*) – 1.0/ha
- Woodland caribou – 0.8/ha
- Mink – 0.03/ha
- Otter – 0.03 ha

Additional observations included squirrel middens, detected at a frequency of 2.7/ha and grouse flushes detected at a frequency of 0.1/ha.

6.3.1 Pellet Group Densities

Ungulates

Two species of ungulate pellet groups were observed during the survey: moose; and woodland caribou.

Moose winter pellet groups were observed along seven different transects and summer pellet groups along two transects across both years. Winter pellet groups were detected most frequently on Transect 9 (4.1 pellet groups/ha), Transect 5 (3.9/ha), and Transect 6 (2.6/ha) in 2018. Winter pellet groups were most frequently detected along Creek 3 (10/ha), Transect 9 (2.1/ha), and Transect 5 (2.0/ha) in 2019. Summer pellet groups were observed along Patterson Creek (10.0/ha) in 2018 and Transect 9 (0.7/ha) in 2019. (Figure 6.3-1 and Table 6.3-1).

Moose winter pellet groups were detected in approximately 42% (10/24) ecosites/vegetation cover types and summer pellet groups were detected in approximately 8% (2/24) ecosite/vegetation cover types across both survey years. Ecosites/vegetation cover types with the highest densities of winter pellet groups in 2018 included: willow shrubby rich fen (BP25) (200 pellet groups/ha); Labrador tea shrubby bog (BP20) (5.5/ha); and regeneration – coniferous low shrub dominated (RF3-C) (4.4/ha). The ecosites/vegetation cover types with the highest pellet densities in 2019 included: regeneration – deciduous tall shrub dominated (RF2-D) (11.8/ha); tamarack treed fen (BP23) (5.9/ha); and jack pine/feathermoss (BP3) (1.5/ha). Summer pellet groups were detected in the black spruce treed bog (BP19) (4.6/ha) and the regeneration – deciduous tall

shrub dominated (RF2-D) (11.8/ha) ecosite/vegetation cover types in 2018 and 2019, respectively (Table 6.3-2).

Traditional land use studies all indicated that area was important and well used for the harvesting of big game species. Specifically:

- The Metis Nation Saskatchewan Northern Region II indicated that “the area is still used, mostly to hunt moose" (WD Lewis 2020, p. 10).
- The Athabasca Denesųłiné have indicated that “the area was identified for harvesting of big game including caribou, moose and whitetail deer” (Ya’thi Nene Lands and Resources 2020).

Woodland caribou pellet groups were observed along four transects, with only winter pellet groups detected. Winter pellet groups were detected on Transect 9 (8.8/ha), Transect 6 (3.9/ha), and Transect 7 (1.3/ha) in 2018 and at a Transect 1 (0.6/ha) in 2019 (Figure 6.3-1 and Table 6.3-1). Woodland caribou pellet groups were detected in five ecosites/vegetation cover types and were detected most frequently in the open bog (BP22) (100.0/ha) and black spruce/Labrador tea/feathermoss (BP14) (31.0/ha) ecosite/vegetation cover types in 2018, while in 2019 the highest pellet density was also detected in the black spruce/Labrador tea/feathermoss (BP14) (2.6/ha) ecosite/vegetation cover type (Table 6.3-2).

The First Nation Community engagement database indicated that “there is a migration route for moose, caribou and bear at the narrows between the intake and discharge for the mine.” (NexGen 2020, BNDN-183).

Carnivores

Three species of carnivore scat was detected during pellet group surveys: black bear; otter; and mink. Black bear scat was detected on eight transects. The highest densities of black bear scat were detected on Creek 1 (50 scat/ha), Transect 6 (4.6 scat/ha) and Transect 5 (3.9 scat/ha) in 2018 and along Patterson Creek (10 scat/ha) in 2019. Mink scat was detected on Transect 6 (0.7 scat/ha) in 2018 and no detections in 2019. Otter scat was only detected in 2019, along Patterson Creek (10 scat/ha) (Figure 6.3-1 and Table 6.3-1).

Black bear scat was widespread and observed in approximately 46% (11/24) ecosites/vegetation cover types. Black bear scat densities were highest in the willow shrubby rich fen (BP25) (100.0 scat/ha), tamarack treed fen (BP23) (21.4 scat/ha) and jack pine-trembling aspen/feathermoss (BP4) (12.5 scat/ha) ecosites/vegetation cover types in 2018. The highest scat density was detected in the black spruce treed bog (BP19) (4.2 scat/ha) ecosite/vegetation cover type in 2019. Mink scat was detected in the Labrador tea shrubby bog (BP20) (1.8 scat/ha) and black spruce/Labrador tea/feathermoss (BP14) (1.7 scat/ha) ecosites/vegetation cover types. Otter scat was detected in the black spruce treed bog (BP19) (4.2 scat/ha) ecosite/vegetation cover type (Table 6.3-2).

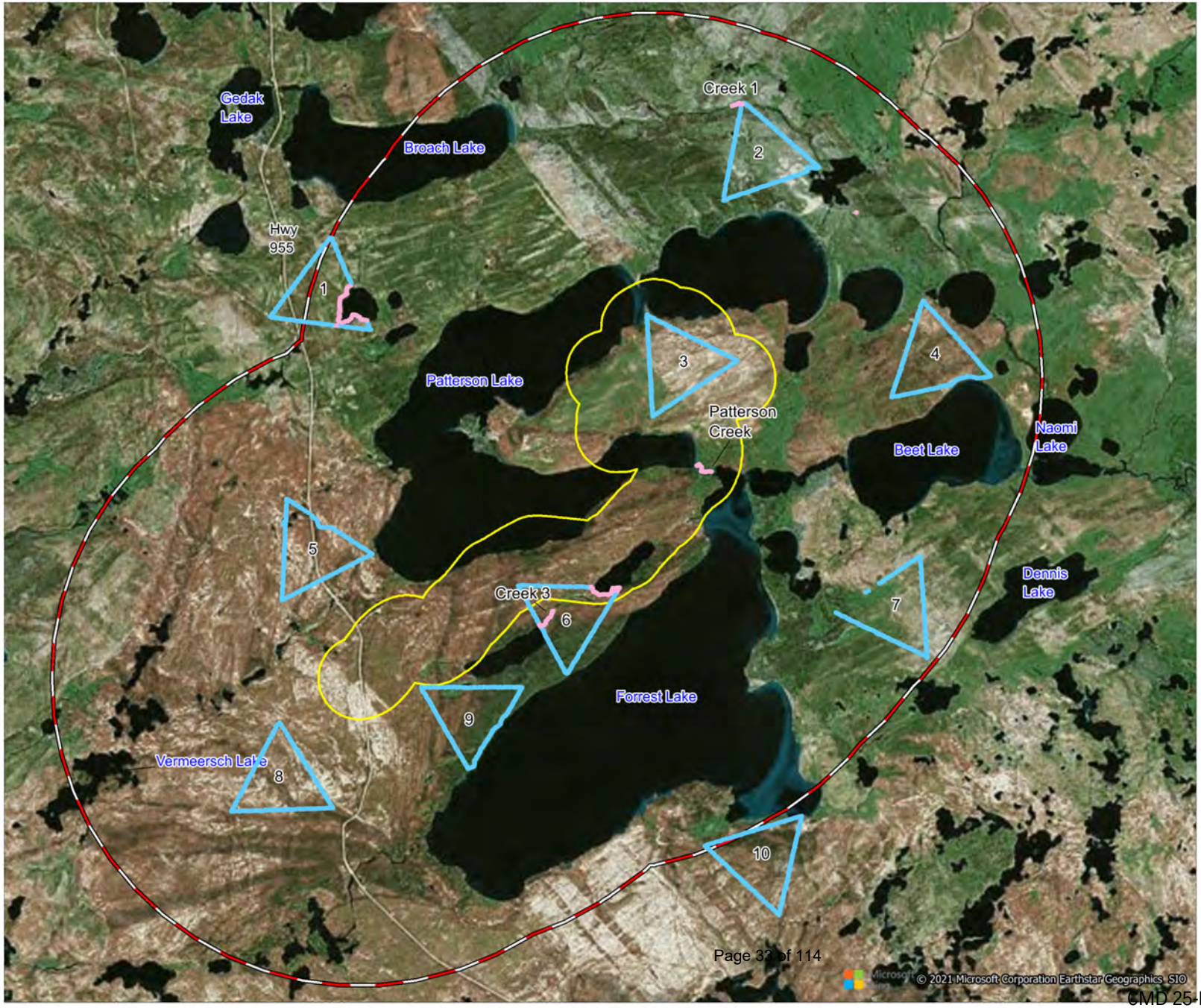

Figure 6.3-1 Pellet Group Survey Transects

Legend

Transect Type

- Triangle
- Riparian / Shoreline
- Regional Study Area (RSA)
- Local Study Area (LSA)

N
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kilometers
Scale = 1 : 90,000

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Ref# O-F736_12-18

Table 6.3-1 Pellet Groups per Hectare by Transect in the RSA – June 2018 and May 2019.

Transect	Area (HA)		Species																			
			Winter Moose (Pellets/HA)		Summer Moose (Pellets/HA)		Winter Caribou (Pellets/HA)		Summer Caribou (Pellets/ HA)		Grouse (Pellets/ HA)		Bear (Scats /HA)		Mink (Scats /HA)		Otter (Scats/HA)		Squirrel Midden/HA		Grouse Flush/HA	
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
1	1.60	1.68	1.88	0.00	0.00	0.00	0.00	0.60	0.00	0.00	9.38	22.62	3.13	0.00	0.00	0.00	0.00	0.00	0.63	1.79	0.00	0.00
2	1.47	1.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.21	13.79	0.68	0.00	0.00	0.00	0.00	0.00	2.72	1.38	0.68	0.00
3	1.51	1.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.15	54.30	2.65	0.00	0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.66
4	1.51	1.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00
5	1.53	1.54	3.92	1.95	0.00	0.00	0.00	0.00	0.00	0.00	4.58	17.53	3.92	0.00	0.00	0.00	0.00	0.00	3.27	6.49	0.00	0.00
6	1.54	1.54	2.60	0.00	0.00	0.00	3.90	0.65	0.00	0.00	14.29	3.25	4.55	1.30	0.65	0.00	0.00	0.00	9.75	1.95	0.00	0.00
7	1.51	1.33	1.32	0.00	0.00	0.00	1.32	0.00	0.00	0.00	1.99	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00
8	1.51	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.62	15.33	0.00	0.00	0.00	0.00	0.00	0.00	1.32	3.33	0.00	0.00
9	1.47	1.46	4.08	2.05	0.00	0.68	8.84	0.00	0.00	0.00	13.61	2.05	0.00	0.00	0.00	0.00	0.00	0.00	5.44	3.42	0.68	0.00
10	1.51	1.50	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	25.83	12.67	1.32	0.00	0.00	0.00	0.00	0.00	3.31	6.67	0.00	0.00
Creek 1	0.04	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Creek 2	0.03	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Creek 3	-	0.10	-	10.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00
Patterson Creek	0.10	0.10	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	10.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
Total area surveyed (HA)	**15.32**	**15.32**																				
Average (Pellets / HA)			**1.37**	**0.52**	**0.07**	**0.07**	**1.37**	**0.13**	**0.00**	**0.00**	**13.25**	**14.30**	**1.83**	**0.20**	**0.07**	**0.00**	**0.00**	**0.07**	**2.81**	**2.55**	**0.13**	**0.07**

Note:
Dash = not sampled.

Table 6.3-2 Pellet Groups per Hectare by Ecosite in the RSA – June 2018 and May 2019.

Ecosite Type	Area (ha)		Species																			
			Winter Moose (Pellets/HA)		Summer Moose (Pellets/HA)		Winter Caribou (Pellets/HA)		Summer Caribou (Pellets/HA)		Grouse (Pellets/HA)		Bear (Scats/HA)		Mink (Scats/HA)		Otter (Scats/HA)		Squirrel Middens/HA		Grouse Flush/HA	
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
BP2	1.93	1.63	0.52	0.00	0.00	0.00	0.52	0.00	0.00	0.00	29.53	28.83	2.59	0.00	0.00	0.00	0.00	0.00	3.11	2.45	0.52	0.00
BP3	1.02	1.37	0.00	1.46	0.00	0.00	0.00	0.00	0.00	0.00	4.90	6.57	2.94	0.00	0.00	0.00	0.00	0.00	6.86	6.57	0.00	0.00
BP4	0.16	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.25	0.00	12.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BP11	0.09	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	1.04	-	0.00	-	0.00	-	11.63	-	0.00	-
BP12	0.57	0.63	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.58	3.17	8.77	0.00	0.00	0.00	0.00	0.00	14.04	6.35	0.00	0.00
BP14	0.58	0.39	0.00	0.00	0.00	0.00	31.03	2.56	0.00	0.00	17.24	5.13	1.72	0.00	1.72	0.00	0.00	0.00	12.07	5.13	0.00	0.00
BP18	0.08	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
BP19	0.22	0.24	0.00	0.00	4.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.17	0.00	0.00	0.00	4.17	0.00	0.00	0.00	0.00
BP20	0.55	0.46	5.45	0.00	0.00	0.00	1.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BP21	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BP22	0.01	0.01	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BP23	0.14	0.17	0.00	5.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BP24	0.05	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
BP25	0.01	-	200.00	-	0.00	-	0.00	-	0.00	-	0.00	-	100.00	-	0.00	-	0.00	-	0.00	-	0.00	-
BP26	0.01	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
DL1	0.01	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
DL2	0.02	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RF1c	0.27	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.70	9.09	3.70	0.00	0.00	0.00	0.00	0.00	0.00	9.09	0.00	0.00
RF1d	-	0.06	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00
RF2c	5.95	6.25	1.85	0.48	0.00	0.16	0.00	0.16	0.00	0.00	12.94	22.72	0.84	0.32	0.00	0.00	0.00	0.00	1.85	2.56	0.17	0.00
RF2d	-	0.17	-	11.76	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	5.88	-	0.00
RF2b	-	0.15	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	6.67
RF3c	0.45	0.33	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.67	12.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RF4	3.23	3.13	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.60	3.19	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0.32	0.00	0.00
Total (HA)	**15.32**	**15.32**																				
Average (Pellets/HA)			**1.37**	**0.52**	**0.07**	**0.07**	**1.37**	**0.13**	**0.00**	**0.00**	**13.25**	**14.30**	**1.83**	**0.20**	**0.07**	**0.00**	**0.00**	**0.07**	**2.81**	**2.55**	**0.13**	**0.07**

Note:
Dash = not sampled.

6.3.2 Upland Game Birds and Squirrel Middens

Grouse/ptarmigan pellet groups were observed frequently in the area of the Project, with detections along 10 transects. Transect 2 (27.2 pellet groups/ha), Transect 3 (27.1 pellet groups/ha), and Transect 10 (25.8 pellet groups/ha) had the highest densities of pellet groups in 2018. Transect 3 (54.3/ha), Transect 1 (22.6 pellet groups/ha) and Transect 5 (17.5 pellet groups/ha) had the highest densities of pellet groups in 2019. No pellet groups were observed along the riparian transects. Grouse were recorded twice in 2018, along Transects 2 and 9 and once in 2019 along Transect 3. Squirrel middens were observed with the highest densities in Transect 6 (9.8 middens/ha) and Transect 9 (5.4 middens/ha) in 2018, while the highest densities in 2019 occurred in Transect 10 (6.7 midden/ha) and Transect 5 (6.5 midden/ha) (Figure 6.3-1 and Table 6.3-1).

Grouse/ptarmigan pellet groups were detected in approximately 48% (10/21) of ecosites/vegetation cover types. The ecosites/vegetation cover types with the highest density of pellet groups in 2018 were jack pine –spruce/feathermoss (BP12) (31.9 pellet groups/ha), jack pine/lichen (BP2) (29.5 pellet groups/ha), and black spruce/Labrador tea/feathermoss (BP14) (14 pellet groups/ha). The ecosites/vegetation cover types with the highest density pellet groups in 2019 were jack pine/lichen (BP2) (28.8 pellet groups/ha), regeneration – coniferous tall shrub dominated (RF2-C) (22.7 pellet groups/ha) and disturbed lands – non-vegetated (DL2) (14.3 pellet groups/ha). Squirrel middens were observed with the highest densities in jack pine –spruce/feathermoss (BP12) (14.0 middens/ha) and black spruce/Labrador tea/feathermoss (BP14) (12.1 middens/ha) in 2018, while densities in 2019 were highest in regeneration – coniferous tree dominated (RF1-C) (9.1 middens/ha) and jack pine feathermoss (BP3) (6.6 middens/ha). Grouse were flushed in jack pine/lichen (BP2) and tall shrub coniferous regenerating forests (RF2-C) in 2018 and regeneration – bog tall shrub dominated (RF2-B) in 2019 (Table 6.3-2).

6.3.3 Woody Browse and Lichen Availability

Terrestrial Lichen

Terrestrial lichen occurred in approximately 79% (19/24) of ecosite/vegetation cover types encountered. Frequency of occurrence was very high (greater than 90%) in the following ecosites/vegetation cover types: disturbed lands – vegetated (DL1); jack pine – lichen (BP2); regeneration – bog tall shrub dominated (RF2-B); and regeneration – coniferous tall shrub dominated (RF2-C); however, it should be noted the sampling intensity was low for disturbed lands – vegetated (DL1). Terrestrial lichen importance values (i.e., frequency of occurrence multiplied by mean cover) were highest in disturbed lands – vegetated (DL1), jack pine – lichen (BP2) and regeneration – coniferous tree dominated (RF1-C). The area of the Project as whole, where sampled, had a 70% terrestrial lichen frequency of occurrence and a mean cover of approximately 25% (Appendix B).

Arboreal Lichen

Arboreal lichen occurred in approximately 79% (19/24) of ecosites/vegetation cover types encountered. Arboreal lichen occurred very frequently (greater than 95%) in the following ecosites/vegetation cover types: disturbed lands – vegetated (DL1); jack pine – lichen (BP2); spruce/Labrador tea//feathermoss (BP14); and jack pine/feathermoss (BP3); however, it should be noted that sampling intensity in the disturbed lands – vegetated (DL1) was low as a result of the disbursed and generally small patch size nature of the mapped type. Where sampling occurred, arboreal lichen was present in 37% of the Project area with a class 3 loading encountered 33% of the time, class 2 encountered 27% of the time, and class 4 encountered 24% of the time (Appendix B).

Woody Browse

The availability and browse use importance values of 10 species or species groups of woody browse encountered in the area of the Project are detailed in (Appendix C). The most encountered species were alder species (44% of segments), paper birch (12% of segments), and willow species (7% of segments). Alder spp. was observed in approximately 83% (20/24) of ecosites/vegetation cover types, paper birch was observed in approximately 79% (19/24) ecosites/vegetation cover types, and willow was observed in approximately 79% (19/24) of ecosites/vegetation cover types. Alder spp., paper birch, willow spp., birch spp. and sweet gale (*Myrica gale*) were the only species browsed. Willow spp. was browsed at a frequency of 4%, while all other species were less than 1%.

7.0 SMALL MAMMAL TRAPPING SURVEY AND TISSUE ANALYSIS

7.1 Study Objectives

Mice, voles, and shrews are primary prey for several mammalian carnivore species including fisher, marten, and ermine (Pattie and Fisher 1999). Avian raptors such as owls and hawks also rely on small mammals as prey. Small mammals are often also used as bio-indicators. In support of the Project, the objectives of this survey were to:

- determine the species composition and relative abundance of voles, mice and shrews;
- determine ecosite-small mammal habitat associations for the study area;
- collect micro-habitat information at trap sites to assist in the future development of optimum reclamation targets geared towards small mammal species;
- collect small mammal specimens for baseline/background metal and radionuclide tissue analysis; and
- provide a scientifically defensible baseline for potential follow-up/monitoring requirements.

7.2 Methods

The small mammal trapping program was completed between 12 September 2018 and 21 September 2018. A total of 26 trap-lines were established to sample 19 different ecosites/vegetation cover types, resulting in a total trapping effort of 2,552 trap nights. The small mammal trap-lines were stratified by three general areas: future Project footprint, future exposure, and reference sites. The survey was completed by a Professional Biologist and a Biologist in Training (ASPB), proficient in species and habitat identification.

7.2.1 Trapping/Inventory

Sampling was stratified by ecosite and completed in areas with potential to be affected by the proposed Project footprint and in suitable reference areas. Small mammal trap-lines consisted of 15 trap stations spaced 10 m apart. Each trap station consisted of two Victor snap traps spaced 3 m apart. In addition, three pit-fall traps were deployed along the transect for the capture of shrews, which are not always readily captured using snap-traps. The pit-fall traps were equally spaced along the trap-line. Snap traps and pit-falls were left in place for three consecutive trap nights. Snap traps and pit-fall traps were baited with a mixture of peanut butter and rolled oats. Trap-lines were checked once a day and all captures were recorded. Captured animals were collected using zip-lock bags and were marked with the date of capture, species, trap-line, and trap station. Specimens were frozen and sent to the Saskatchewan Research Council (SRC) for homogenization and laboratory analysis. Survey design and field methodologies were completed under Saskatchewan Government Research Permit/Species Detection #18FW031.

7.2.2 Habitat Characterization

Vegetation cover and structure plots (5 m x 2 m) were established at each trapping station to quantify habitat attributes present along each trap-line and at each trap station. The objective was to quantify and describe the micro-habitat characteristics of each ecosite/vegetation cover type. Micro-habitat associations can then be used to help guide future reclamation prescriptions to accommodate small mammal species and the associated predators. At each trap site, measurements/estimates of the following variables were completed:

- percent cover of graminoids;
- percent cover of forbs;
- percent cover of shrubs (<2.5 m);
- percent cover of shrubs (2.5-5 m);
- percent cover of trees (>5 m);
- tree diameter at breast height (dbh);
- tree species composition;
- percent cover of surface litter;
- surface litter depth (cm);
- graminoid height (cm);
- forb height (cm);
- low shrub height (cm);
- tall shrub height (m);
- percent cover of bare soil;
- percent cover of deadfall (0-10 cm);
- percent cover of deadfall (10-25 cm);
- percent cover of deadfall (>25 cm);
- percent cover of rock;
- percent cover of standing water;
- percent cover of sphagnum;
- percent cover of feather moss; and
- percent cover of lichen.

Data for all variables were pooled and summarized by ecosite/vegetation cover type.

7.2.3 Baseline Tissue Analysis – Metals and Radionuclides

All specimens captured during the small mammal trapping program were collected, frozen, and sent to the SRC laboratory for metal and radionuclide analysis and subsets of the specimens were selected for analysis. Red-backed voles (*Myodes gapperi)* were selected as the species to be analyzed because of the species' abundance, spatial location of specimen, and the suitability of this species for follow-up programs in the future. Samples collected from proposed development were combined to provide six composite samples to quantify baseline metal and radionuclide levels. The reference sites were sub-divided into four composited samples. Table 7.2-1 details the composited sample locations and specimen count.

The metals/parameters that were analyzed included:

- Aluminum
- Antimony
- Arsenic
- Barium
- Beryllium
- Boron
- Cadmium
- Chromium
- Cobalt
- Copper
- Iron
- Lead
- Manganese
- Molybdenum
- Nickel
- Selenium
- Silver
- Strontium
- Thallium
- Tin
- Titanium
- Uranium
- Vanadium
- Zinc

The radionuclide parameters that were analyzed included:

- Lead-210
- Polonium-210
- Radium-226
- Thorium-230

The metal parameters were analyzed by inductively coupled plasma – mass spectronomy, and radionuclides were analyzed by extraction and beta counting (Pb-210), or alpha spectroscopy (Po-210, Ra-226, Th-230). All analysis was completed by the Saskatchewan Research Council (SRC) in the fall of 2018.

Table 7.2-1 Small Mammal Composited Sample Locations and Specimen Count.

Lab Sample Grouping	Transect #	Site	Total # of Specimens	Comments
1	1, 2, and 6	Footprint - Exposure	24	Composite includes 8 specimens from all 3 transects
2	3 and 5	Footprint - Exposure	20	Total from both transects
3	8	Exposure	26	Total
4	9	Reference	22	Total
5	11 and 18	Exposure	24	12 specimens from both transects
6	12,13, and 14	Reference	17	Total
7	20 and 21	Exposure	27	Total
8	22, 25, and 26	Exposure	16	Total
9	16	Reference	23	Total
10	10	Reference	26	Total

7.3 Results

7.3.1 Trapping/Inventory and Habitat Characterization

A total of 484 individual small mammals of six species were captured over the 26 trap lines (Figure 7.3-1). Red-backed voles were most abundant with 401 captures (15.7 captures/100 trap nights), followed by deer mice (*Peromyscus maniculatus* - 1.37 captures/100 trap nights), and masked shrews (*Sorex cinerus* - 0.9 captures/100 trap nights). The overall capture rate was 19.0 captures per 100 trap nights.

Red-backed Vole

Red-backed voles were captured along approximately 96% (25/26) of trap-lines and in all ecosites/vegetation cover types sampled. The most productive ecosites/vegetation cover types included white birch/lingonberry –Labrador tea (BS14) (37.9 captures/100 trap nights), black spruce/Labrador tea/feathermoss (BP14) (34.4 captures/100 trap nights), and regeneration – coniferous tree dominated (RF1-C) (28.3 captures/100 trap nights) (Table 7.3-1 and Table 7.3-2).

The three ecosites/vegetation cover types yielding the highest capture rates also had some of the highest percentages of coarse woody debris and average shrub cover as determined during the microsite habitat assessment (Table 7.3-3). Coarse woody debris and shrub cover are two major components of red-backed vole habitat (Carey and Johnson 1995, Sullivan et al. 2011) and could be incorporated into future reclamation considerations.

Meadow Vole

Meadow voles (*Microtus pennsylvanicus*) were captured along approximately 42% (11/26) of trap-lines and in approximately 56% (10/18) ecosites/vegetation cover types (56%) sampled. The most productive ecosites/vegetation cover types were tamarack treed fen (BP23) and graminoid fen (BP26), with capture rates of 6.2 and 3.0 per 100 trap nights respectively (Table 7.3-1 and Table 7.3-2).

The relative abundance of meadow voles was highest in two ecosites/vegetation cover types: tamarack treed fen (BP23); and graminoid fen (BP26). These ecosites/vegetation cover types had the highest percentage of graminoid species ground cover. In addition, these two cover types were wetter, as evidenced by the presence of open water and/or sphagnum moss (Table 7.3-3). Peles and Barrett (1996) found that standing vegetation and litter abundance are key components in habitat selection for meadow voles, while Dehn et al. (2017) found that meadow voles were more active, foraged more, and produced more offspring in vegetation types with a higher density of cover. The results of the current study support the findings of Peles and Barrett (1996) and Dehn et al. (2017) and suggest that providing a well-developed ground cover (shrub or graminoid) with substantial litter cover could be a useful strategy for reclamation objectives focussed on small mammals and important micro-habitat elements.

Masked and Water Shrews

Masked shrews were captured along approximately 42% (11/26) of trap-lines and in 50% (9/18) ecosites/vegetation cover types (50%) sampled. The most productive ecosites/vegetation cover types were willow shrubby rich fen (BP25), white birch/lingonberry – Labrador tea (BS14) and tamarack treed fen (BP23), with capture rates of 4.0, 4.0, and 2.1 per 100 trap nights respectively (Table 7.3-1 and Table 7.3-2).

A single water shrew (*Sorex palustris*) was captured along Transect 14 in the tamarack treed fen (BP23) ecosite (Table 7.3-1 and Table 7.3-2).

Shrews were captured across several ecosites/vegetation cover types, with highest capture rates in wetter ecosite types. The ecosites/vegetation cover types noted above all had high percentages of low shrub cover and willow shrubby rich fen (BP25) and tamarack treed fen (BP23) and had patches of open water and/or extensive cover of sphagnum moss. The white birch/lingonberry – Labrador tea (BS14) is not a high moisture regime ecosite; however, it had the highest percentage of feather moss cover (Table 7.3-3). Whitaker Jr. (1963) found that moss is an important component in shrew habitat, while Wrigley et al. (1979) found hydric habitats dominated by either shrubs or graminoid/sedge were most suitable for shrews. The presence of interspersed wet habitats, such as fens and riparian areas, which include a combination of graminoid cover, shrub cover, and moss, helps provide essential habitat for a variety of shrew species.

Meadow Jumping Mouse

A single meadow jumping mouse (*Zapus hudsonius)* was captured along Transect 1 in the white birch/lingonberry – Labrador tea (BS14) ecosite (Table 7.3-1 and Table 7.3-2).

The white birch/lingonberry – Labrador tea (BS14) ecosite is not representative of typical meadow jumping mouse habitat. Previous small mammal studies have shown the occurrence of meadow jumping mice in shrubby riparian areas with extensive sedge and grass cover, graminoid wetlands, sedge fens, cattail wetlands, and generally, in wet areas with an extensive ground cover herbaceous layer (Banfield 1974). Whitaker (1963) and Getz (1961) both concluded that an adequate herbaceous ground cover layer is necessary for the maintenance of this species. Wetland habitats with abundant shrub and graminoid/herbaceous layers benefit meadow jumping mice.

Deer Mouse

Deer mice were captured along approximately 35% (9/26) trap-lines and in approximately 39% (7/18) ecosites/vegetation cover types sampled. The most productive ecosites/vegetation cover types were disturbed lands – non-vegetated (DL2), rush sandy shore (BS26) and regeneration – coniferous tall shrub dominated (RF2-C), with capture rates of 5.1, 3.7 and 2.8 per 100 trap nights respectively (Table 7.3-1 and Table 7.3-2).

The deer mouse is a generalist species and known to thrive across a variety of habitats (Eder and Gregory 2011); however, evidence suggests a preference for disturbance, anthropogenic, and open habitats (Eder and Gregory 2011, Martell 1983, Baker 1968). The disturbed lands – non-vegetated (DL2) and rush sandy shore (BS26) ecosites/vegetation cover types had the highest percent of bare ground and lowest cover low shrub/graminoid species (Table 7.3-3). No focal reclamation targets are noted for this species.

Baseline Tissue Analysis – Metals and Radionuclides

A total of 225 red-backed vole specimens in 10 composite samples were submitted to the Saskatchewan Research Council (SRC) for metal and radionuclide analysis. The composites were arranged in three groupings: future Project footprint, future exposure, and reference sites. Two composites were submitted from Transects 1, 2, 3, 5, and 6 to represent future footprint/exposure (Figure 7.3-1). Four composites were submitted from Transects 8, 11, 18, 20, 21, 22, 25, and 26 to represent future potential exposure areas (Figure 7.3-1). Four composites were submitted from Transects 9, 10, 12, 13, 14, and 16 to represent reference locations (Figure 7.3-1). A summary of the results of the metals and radionuclide analysis are presented in Table 7.3-4. Adequate sample composites and material was processed to scientifically inform background/baseline conditions.

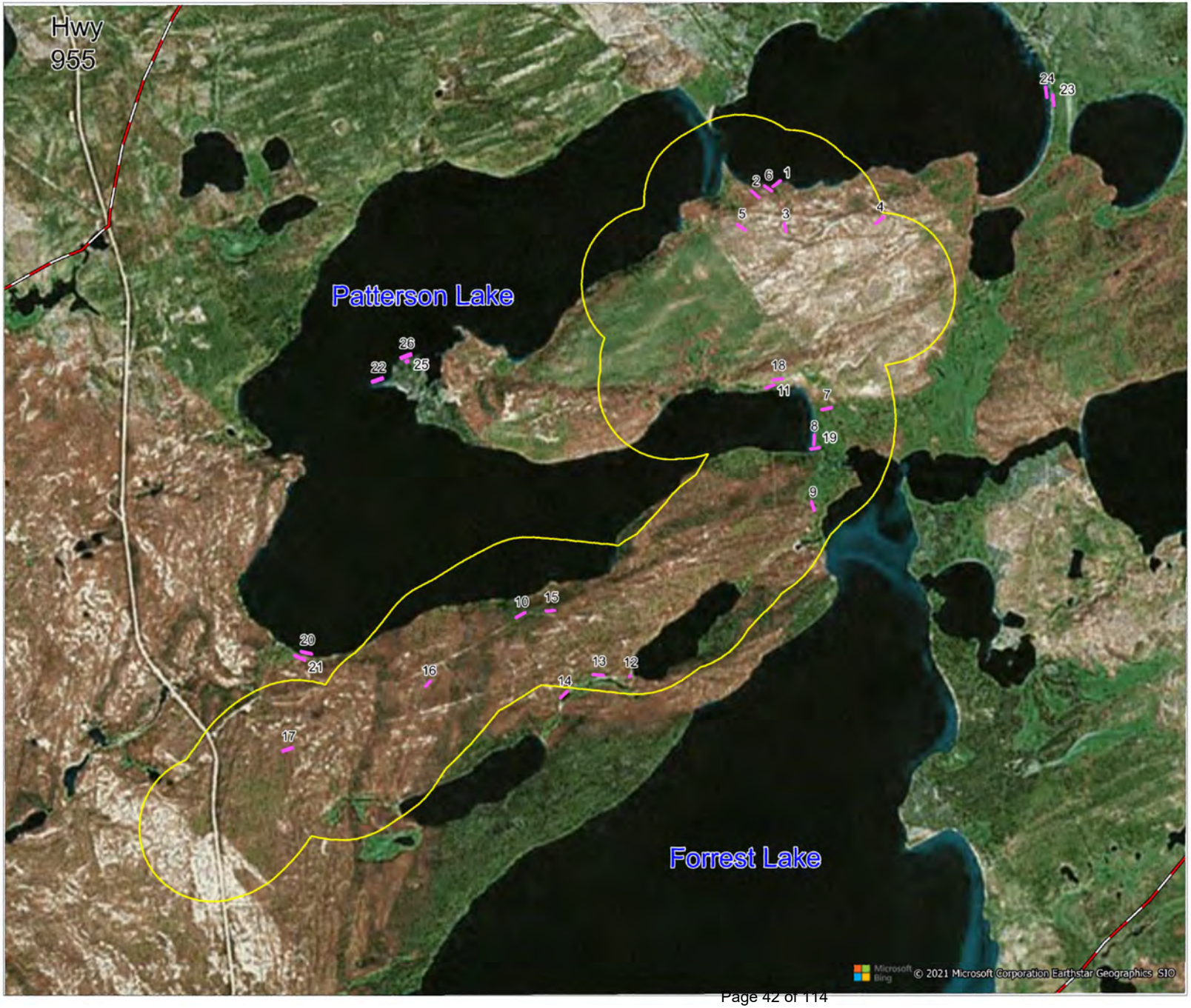

Figure 7.3-1 Small Mammal Trapping Transects

Legend

- Trapping Transect
- Regional Study Area (RSA)
- Local Study Area (LSA)

N
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0 5 10
kilometers
Scale = 1 : 50,000

OMNIA
ECOLOGICAL SERVICES

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Ref# O-F736_12-18

Table 7.3-1 Small Mammal Captures per Transect in the LSA and Reference Sites – September 2018.

Transect	Total Trapping Effort (# of trap nights)	Trapping Success (# of individuals caught per 100 trap nights)						
		Red-Backed Vole	Meadow Vole	Masked Shrew	Water Shrew	Deer Mouse	Meadow Jumping Mouse	Unknown[a]
1	99	61.62	1.01	6.06	0.00	2.02	1.01	0.00
2	99	19.19	1.01	1.01	0.00	7.07	0.00	0.00
3	99	15.15	1.01	0.00	0.00	4.04	0.00	0.00
4	99	3.03	0.00	0.00	0.00	0.00	0.00	0.00
5	99	5.05	0.00	0.00	0.00	10.10	0.00	0.00
6	97	29.90	1.03	1.03	0.00	2.06	0.00	0.00
7	99	19.19	1.01	1.01	0.00	0.00	0.00	0.00
8	99	26.26	1.01	1.01	0.00	0.00	0.00	0.00
9	99	23.23	1.01	2.02	0.00	0.00	0.00	0.00
10	91	27.47	0.00	0.00	0.00	0.00	0.00	0.00
11	98	41.84	0.00	1.02	0.00	1.02	0.00	1.02
12	99	10.10	1.01	0.00	0.00	1.01	0.00	0.00
13	99	3.03	3.03	1.01	0.00	0.00	0.00	0.00
14	97	4.12	6.19	2.06	1.03	0.00	0.00	0.00
15	98	9.18	0.00	0.00	0.00	0.00	0.00	1.02
16	99	24.24	0.00	0.00	0.00	0.00	0.00	0.00
17	99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	99	28.28	0.00	0.00	0.00	1.01	0.00	0.00
19	99	11.11	1.01	4.04	0.00	0.00	0.00	0.00
20	99	14.14	0.00	2.02	0.00	0.00	0.00	0.00
21	99	13.13	0.00	0.00	0.00	0.00	0.00	0.00
22	93	1.08	0.00	0.00	0.00	0.00	0.00	0.00
23	97	1.03	0.00	0.00	0.00	0.00	0.00	0.00
24	99	3.03	0.00	0.00	0.00	7.07	0.00	0.00
25	99	2.02	0.00	0.00	0.00	0.00	0.00	0.00
26	99	13.13	0.00	0.00	0.00	0.00	0.00	0.00
Total/ Average	**2552**	**15.60**	**0.71**	**0.86**	**0.04**	**1.37**	**0.04**	**0.08**

a) Not enough of specimen to ID

Table 7.3-2 Small Mammal Captures by Ecosite in the LSA and Reference Sites – September 2018.

Ecosite Code	Ecosite Name	Total Trapping Effort (# of trap nights)	Trapping Success (# of individuals caught per 100 trap nights)		
			Red-Backed Vole	Meadow Vole	Masked Shrew
BP2	Jack pine / Lichen: Moderately fresh sand	197	11.17	0.00	0.00
BP3	Jack pine / Feathermoss: Moderately fresh loamy sand	91	27.47	0.00	0.00
BP14	Black spruce / Labrador tea / Feathermoss: Very moist sandy clay loam	195	34.36	0.51	1.03
BP15	Balsam poplar - White spruce / Feathermoss: Very moist silty loam	99	10.10	1.01	0.00
BP19	Black spruce treed bog: Moderately wet fibric organic	99	26.26	1.01	1.01
BP20	Labrador tea shrubby bog: Wet fibric organic	99	19.19	1.01	1.01
BP23	Tamarack treed fen: Wet fibric organic	97	4.12	6.19	2.06
BP25	Willow shrubby rich fen: Wet humic organic	99	11.11	1.01	4.04
BP26	Graminoid fen: Wet humic organic	99	3.03	3.03	1.01
BP27	Open fen: Wet fibric organic	99	2.02	0.00	0.00
BS14	White birch / Lingonberry - Labrador Tea: Moderately dry sand	198	37.88	0.51	4.04
BS26	Rush sandy shore: Very moist sand	192	2.08	0.00	0.00
RF1-C	Regeneration - Coniferous tree dominated	99	28.28	0.00	0.00
RF2-B	Regeneration bog - Tall shrub dominated	99	23.23	1.01	2.02
RF2-C	Regeneration - Coniferous tall shrub dominated	396	15.15	0.51	0.25
RF4	Regeneration - Recent burn < 5 years	97	1.03	0.00	0.00
DL1	Disturbed land - Vegetated	99	13.13	0.00	0.00
DL2	Disturbed land - Non-vegetated	198	2.53	0.00	0.00
Total / Average		**2552**	**15.60**	**0.71**	**0.86**

Table 7.3-2 Small Mammal Captures by Ecosite in the LSA and Reference Sites – September 2018– cont.

Ecosite Code	Ecosite Name	Total Trapping Effort (# of trap nights)	Trapping Success (# of individuals caught per 100 trap nights)			
			Water Shrew	Deer Mouse	Meadow Jumping Mouse	Unknown[a]
BP2	Jack pine / Lichen: Moderately fresh sand	197	0.00	0.00	0.00	0.51
BP3	Jack pine / Feathermoss: Moderately fresh loamy sand	91	0.00	0.00	0.00	0.00
BP14	Black spruce / Labrador tea / Feathermoss: Very moist sandy clay loam	195	0.00	1.54	0.00	0.51
BP15	Balsam poplar - White spruce / Feathermoss: Very moist silty loam	99	0.00	1.01	0.00	0.00
BP19	Black spruce treed bog: Moderately wet fibric organic	99	0.00	0.00	0.00	0.00
BP20	Labrador tea shrubby bog: Wet fibric organic	99	0.00	0.00	0.00	0.00
BP23	Tamarack treed fen: Wet fibric organic	97	1.03	0.00	0.00	0.00
BP25	Willow shrubby rich fen: Wet humic organic	99	0.00	0.00	0.00	0.00
BP26	Graminoid fen: Wet humic organic	99	0.00	0.00	0.00	0.00
BP27	Open fen: Wet fibric organic	99	0.00	0.00	0.00	0.00
BS14	White birch / Lingonberry - Labrador Tea: Moderately dry sand	198	0.00	1.01	0.51	0.00
BS26	Rush sandy shore: Very moist sand	192	0.00	3.65	0.00	0.00
RF1-C	Regeneration - Coniferous tree dominated	99	0.00	1.01	0.00	0.00
RF2-B	Regeneration bog - Tall shrub dominated	99	0.00	0.00	0.00	0.00
RF2-C	Regeneration - Coniferous tall shrub dominated	396	0.00	2.78	0.00	0.00
RF4-B	Regeneration bog - Recent burn < 5 years	97	0.00	0.00	0.00	0.00
DL1	Disturbed land - Vegetated	99	0.00	0.00	0.00	0.00
DL2	Disturbed land - Non-vegetated	198	0.00	5.05	0.00	0.00
Total / Average		**2552**	**0.04**	**1.37**	**0.04**	**0.08**

a) Not enough of specimen to ID

Table 7.3-3 Small Mammal Micro-Habitat Assessment– September 2018.

Habitat Attribute	Transect ID / Ecosite																	
	15/26	10	6/11	12	8	7	14	19	13	25	1/20	22/24	18	9	2/3/4/16	23	21	5/17
	BP2	BP3	BP14	BP15	BP19	BP20	BP23	BP25	BP26	BP27	BS14	BS26	RF1-C	RF2-B	RF2-C	RF4	DL1	DL2
Mean % Trees (>5m)	21.00	38.67	26.33	70.33	1.40	0.00	2.00	1.00	0.00	0.00	23.83	0.07	16.00	0.00	0.00	0.00	0.00	0.00
Mean Tree Diameter at breast height (dbh) (cm)	10.60	10.19	14.22	8.78	7.72	-	10.03	11.45	-	-	9.37	5.10	5.63	-	-	-	-	-
Mean Tree Height (m)	7.15	7.79	9.01	7.60	6.56	-	6.10	11.75	-	-	7.67	6.00	5.21	-	-	-	-	-
Mean % Shrubs (<2.5m)	11.43	35.33	35.50	10.33	66.00	76.00	41.67	57.67	19.00	6.50	26.17	4.83	21.67	83.00	49.67	8.20	5.63	0.28
Mean % Shrubs (2.5-5m)	0.37	0.40	5.77	3.47	18.40	0.00	7.67	3.67	0.00	0.00	22.57	0.23	14.00	0.07	9.32	0.00	0.00	0.00
Mean Low Shrub Height (cm)	16.90	87.33	66.00	86.67	76.67	47.00	98.67	121.33	45.33	30.00	100.33	72.73	130.00	109.33	106.75	22.00	29.67	12.55
Mean Tall Shrub Height (m)	2.80	2.50	3.33	3.92	3.04	-	3.47	3.05	-	-	3.32	2.75	3.60	2.50	3.04	-	-	-
Mean % Forbes	0.00	0.00	0.37	7.40	2.07	0.33	0.47	0.30	0.60	0.73	1.88	1.78	0.00	0.83	0.07	0.43	0.07	0.02
Mean Forb Height (cm)	-	-	13.31	8.00	14.36	9.00	6.22	9.11	7.18	5.00	13.78	23.75	-	12.47	6.13	7.08	10.00	10.00
Mean % Graminoids	0.00	0.00	0.03	3.37	0.67	1.50	13.13	15.23	38.87	11.20	0.63	7.40	0.00	0.17	0.00	0.00	5.73	0.22
Mean Graminoid Depth (cm)	-	-	50.00	35.38	30.00	23.40	66.33	65.33	74.00	24.00	40.91	36.00	-	25.00	-	-	22.86	19.00
Mean % Litter	27.97	16.93	5.90	82.67	1.87	0.93	0.83	7.27	0.87	0.00	47.13	1.78	65.33	3.93	39.28	0.40	2.83	1.95
Mean Litter Depth (cm)	2.30	3.73	2.93	3.27	1.80	2.14	1.78	2.73	2.50	-	3.37	2.39	2.80	2.73	2.98	1.13	2.00	3.15
Mean % Bare Soil	0.57	5.87	2.85	0.33	0.93	0.70	0.00	2.33	0.00	0.00	5.65	85.17	6.13	3.47	3.99	45.33	55.67	87.20
Mean % Deadfall (0-10 cm)	8.27	5.80	2.47	3.40	0.30	1.23	2.50	0.17	0.43	0.00	3.95	0.18	12.67	1.10	9.25	2.93	5.37	1.97
Mean % Deadfall (10-25 cm)	4.83	0.40	2.57	2.53	0.00	0.00	0.07	0.00	0.00	0.00	1.57	0.00	2.40	0.00	0.98	0.40	1.00	0.00
Mean % Deadfall (>25cm)	0.00	0.00	0.17	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.02	0.00	0.00	0.00
Overall % Deadfall	9.23	6.20	5.20	6.27	0.30	1.23	2.57	0.17	0.43	0.00	5.12	0.18	15.27	1.10	10.25	3.33	6.37	1.97
Mean % Rock	0.38	0.03	0.87	0.93	0.00	0.00	0.00	0.00	0.00	0.00	4.32	0.00	3.07	0.00	5.89	0.00	0.36	10.77
Mean % Water	0.00	0.00	0.00	0.00	0.00	0.00	18.33	7.47	4.07	29.67	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean % Sphagnum	0.00	0.00	0.00	0.00	54.00	80.60	60.67	20.27	64.67	49.27	2.90	0.00	0.00	56.67	0.00	49.33	0.00	0.00
Mean % Feathermoss	2.83	55.47	77.50	0.27	23.43	0.00	0.00	0.33	0.00	0.00	5.48	2.30	0.00	0.00	0.00	0.00	0.00	0.00
Mean % Terrestrial Lichen	42.50	1.37	1.15	0.00	11.80	5.87	0.00	0.00	0.00	0.00	0.33	0.57	1.53	14.27	20.93	0.03	0.23	0.00

Table 7.3-4 Summary of Red-backed Vole Metals and Radionuclide Analysis– September 2018.

Parameter	Units	Future Project Footprint		Future Exposure				Reference Sites			
Composite Transects		1, 2, 6	3, 5	8	11, 18	20, 21	22, 25, 26	9	12, 13, 14	16	10
Physical Properties											
Moisture	%	74.86	74.81	74.31	74.49	74.63	74.19	73.65	73.51	75.22	74.69
Metals and Trace Elements											
Aluminum	µg/g	19	27	8.6	13	16	8.7	3.0	5.6	52	12
Antimony	µg/g	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic	µg/g	0.02	0.03	0.01	0.02	0.01	0.02	<0.01	0.02	0.02	<0.01
Barium	µg/g	9.6	20.2	11.5	23.2	9.9	8.0	22.3	6.6	23.2	34.1
Beryllium	µg/g	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	µg/g	0.5	0.3	0.4	0.4	0.5	0.3	0.4	0.5	0.2	0.3
Cadmium	µg/g	0.064	0.036	0.033	0.062	0.078	0.13	0.072	0.096	0.11	0.035
Chromium	µg/g	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	µg/g	0.038	0.053	0.060	0.058	0.069	0.045	0.061	0.066	0.070	0.058
Copper	µg/g	2.3	2.5	2.5	3.2	3.5	2.6	2.5	2.9	2.4	2.5
Iron	µg/g	69	78	67	66	77	65	60	78	100	59
Lead	µg/g	0.089	0.048	0.032	0.020	0.039	0.020	0.012	0.015	0.033	0.017
Manganese	µg/g	12	12	12	10	12	13	14	12	6.8	10
Molybdenum	µg/g	0.14	0.13	0.10	0.11	0.12	0.06	0.10	0.13	0.12	0.08
Nickel	µg/g	0.10	0.07	0.10	0.09	0.11	0.09	0.08	0.10	0.08	0.07
Selenium	µg/g	0.56	0.83	0.18	0.56	0.46	0.24	0.50	0.49	0.55	0.41
Silver	µg/g	0.024	0.027	<0.002	0.012	0.005	0.009	0.003	0.004	0.006	0.002
Strontium	µg/g	2.8	4.5	2.7	6.4	3.6	2.2	4.9	3.0	8.3	7.7
Thallium	µg/g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Tin	µg/g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Titanium	µg/g	0.86	0.77	0.59	0.66	0.62	0.48	0.33	0.33	1.8	0.56
Uranium	µg/g	0.076	0.034	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001
Vanadium	µg/g	0.04	0.04	0.02	<0.02	0.03	<0.02	<0.02	<0.02	0.08	<0.02
Zinc	µg/g	22	24	26	26	22	25	27	26	23	26
Radionuclides											
Lead-210	Bq/g	0.006	0.005	0.019	0.006	0.003	0.007	0.004	0.003	0.005	0.006
Polonium-210	Bq/g	0.014	0.018	0.041	0.017	0.011	0.011	0.010	0.010	0.012	0.017
Radium-226	Bq/g	0.0058	0.0043	0.0003	0.0011	0.0006	0.0008	0.0007	0.0005	0.0005	0.0005
Thorium-230	Bq/g	<0.0003	0.0009	<0.0003	<0.0003	<0.0003	0.0005	<0.0003	<0.0003	<0.0003	<0.0003

8.0 SEMI AQUATIC FURBEARING MAMMAL SHORELINE SURVEY

8.1 Study Objectives

Semi-aquatic furbearing mammals (muskrat (*Ondatra zibethicus*), mink, beaver (*Castor canadensis*), and otter) are important species for fur trapping and traditional lifestyles/traditional land use. In addition, muskrats for example, have a widespread distribution, are generally abundant, are adaptable, and are a good indicator of aquatic ecosystem health (Westworth Associates 2002). Semi-aquatic furbearer shoreline surveys were completed to:

- provide quantitative data on the occurrence and relative abundance of semi-aquatic furbearing mammals;
- provide spatial data on the distribution of semi-aquatic furbearer sign within and across the study area; and
- provide a scientifically defensible baseline for potential follow-up/monitoring requirements.

8.2 Methods

Semi-aquatic furbearer shoreline surveys were completed between 12 September 2018 and 16 September 2018 along the shorelines of select creeks, lakes, and ponds. Two observers paddled the shorelines of pre-selected sites and detailed notes were recorded to document the location and type of semi-aquatic mammal sign including:

- territorial scent stations;
- foraging platforms and/or sign of foraging;
- resting platforms;
- scat; and
- houses/lodges, dams, or runs.

The perimeters of select water bodies were paddled and the survey routes were mapped using the track-log function in a hand-held GPS unit. The locations of all observations, including incidental sightings, were recorded with UTM coordinates. The survey was completed by a Professional Biologist (ASPB) proficient in species use identification and an assistant. The track-log route path data were recorded at five second intervals. All observations were summarized by species and water body. The resultant measure was the number of observations per km of shoreline.

Survey design and field methodologies were guided by existing provincial protocols, where applicable, or peer-reviewed methodology, and were completed under Saskatchewan Government Research Permit/Species Detection #18FW031 and 18SD170.

8.3 Results

A total of 14 water bodies were surveyed (9 lakes/lake sections and 5 creek portions) (Figure 8.3-1). The total distance of shoreline surveyed was 75 km, with approximately 19 km in the LSA and 56 km in the RSA. Signs of three target species, muskrat, beaver, and mink, were observed during the survey.

Muskrat sign was noted in both the LSA and RSA. Muskrat sign was grouped into three types of observations including: burrows/houses; run/feeding sign; and scat. A total of approximately 57% (8/14) of water bodies hosted muskrat sign. The most observed run/feeding sign consisted of sedge clippings, tuber/roots, and various emergent and submergent aquatic vegetation chewing/harvesting and runs along the shore. Muskrat sign averaging 0.41 observations per km for the entire survey, with densities in the LSA

and RSA were 0.36/km and 0.43/km, respectively. Creek 3 (6.8 observations/km), Patterson/Forest Creek (5.9 observations/km), and Creek 2 (4.6 observations/km) had the highest run/feeding sign densities. Scat was observed along the shores of approximately 43% (6/14) of water bodies at a rate of 0.15 observations/km in the LSA and 0.20/km in the RSA. Creek 4 (4.3 observations/km), Patterson/Forest Creek (3.6 observations/km), and Jed Creek (1.9 observations/km) had the highest scat detection rates. One muskrat was observed swimming in Forest Lake; no muskrat houses or burrows were detected (Table 8.3-1).

Beaver sign was grouped into four types of observations including: runs/feeding sign; active houses; old/inactive houses; and dams. Beaver sign was observed in both the LSA and RSA. Run/feeding sign was observed at a rate of 0.46/km in the LSA and 1.5/km in the RSA. Run/feeding sign was observed along the shores of approximately 57% (8/14) of the water bodies surveyed, with the highest concentrations at Creek 2 (21.7/km), Creek 4 (18.8/km), and Lake 1 (10.0/km). Active beaver houses (i.e., those currently occupied by beavers), and old/inactive beaver houses (i.e., classed as such by the dilapidated, overgrown appearance and lack of fresh sign or feed beds), were observed across the LSA and RSA. Active beaver houses were detected at a rate of 0.05/km in the LSA and 0.07/km in the RSA, while old/inactive beaver house were at rates of 0.10/km in the LSA and 0.13/km in the RSA. A total of approximately 29% (4/14) of the water bodies surveyed had active beaver houses present and old/inactive beaver houses were present on approximately 36% (5/14). Creek 2 (1.5/km), Creek 3 (0.5/km), and Jed Lake (0.2/km) had the highest densities of active beaver house. Lake 3 (0.4/km), Lake 1 (0.3/km), and Jed Lake (0.3/km) had the highest densities of old/inactive beaver houses. Beaver dams were observed in both the LSA and RSA, but only on two water bodies, Creek 2 (3.1/km) and Lake 1 (0.3/km) (Table 8.3-1).

Mink sign was detected in the RSA, along two water bodies: Jed Creek (0.6/km); and Lake 4 (0.4/km). Mink sign was only detected in the form of tracks along the shoreline (Table 8.3-1).

Figure 10 presented by the Athabasca Denesųłiné also highlights the importance of the area for semi-aquatic furbearers as “it represents the areas that were identified as small game and furbearing harvesting areas”. Specific species identified were mink, beaver, otter and muskrat. (Ya’thi Nene Lands and Resources 2020, p. 15 & 30).

The Birch Narrows Dene also indicated that the area was important for “food and furs” including semi-aquatic furbearers such as “mink, beaver and muskrat” (Olson and Firelight 2019a, p. 28).

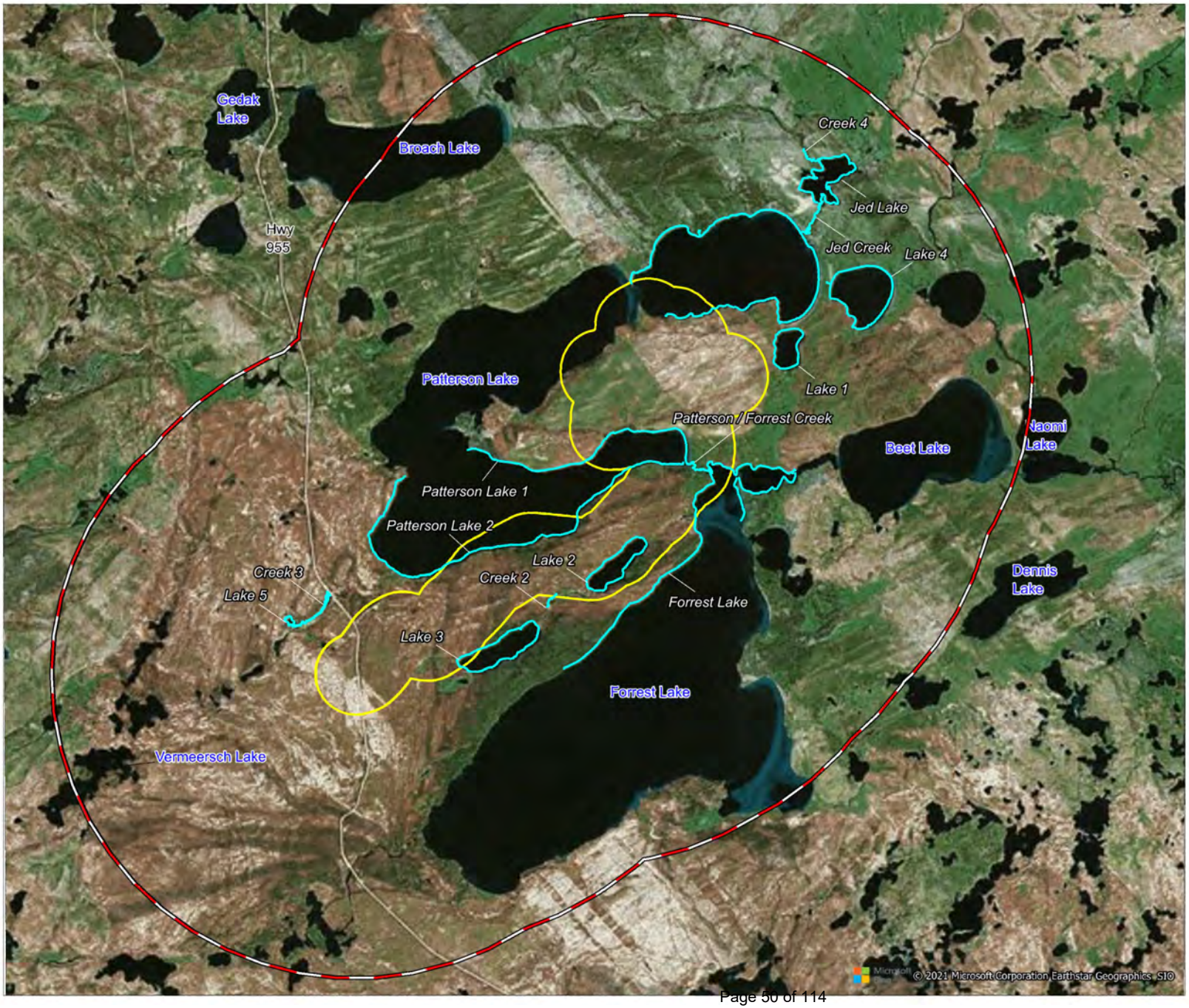

Figure 8.3-1 Semi-aquatic Furbearer Shoreline Survey Locations

Legend

- Shorelines Surveyed
- Regional Study Area (RSA)
- Local Study Area (LSA)

Shorelines Surveyed (table 8.3-1)

- Lake1
- Lake2
- Lake3
- Lake4
- Lake5
- Patterson Lake1
- Patterson Lake2
- Jed Lake
- Forrest Lake
- Patterson/Forrest Creek
- Jed Creek
- Creek2
- Creek3
- Creek4

N W E S

0 5 10

kilometers
Scale = 1 : 90,000

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Table 8.3-1 Semi-Aquatic Furbearer Shoreline Survey Observations– September 2018.

Waterbody ID	Shoreline (km)	Surveyed Length in Study Area (km)	Observations per km							
			Beaver				Muskrat			Mink
			Run/ Feed Sign	Active House	Inactive/ Old House	Dam	Run/ Feed Sign	Scat	Visual	Tracks
Lake 1	3.0	3.0 RSA	10.0	0	0.3	0.3	0	0	0	0
Lake 2	4.5	4.5 LSA	0	0	0.2	0	0	0	0	0
Lake 3	5.2	4.3 RSA 0.9 LSA	0.6	0	0.4	0	0.4	0	0	0
Lake 4	5.3	5.3 RSA	0	0	0	0	0	0	0	0.2
Lake 5	1.0	1.0 RSA	3.1	0	0	0	0	0	0	0
Patterson Lake 1	13	1.5 LSA 11.5RSA	0	0	0	0	0	0	0	0
Patterson Lake 2	18.3	8.8 LSA 9.5 RSA	0	0	0	0	0	0	0	0
Jed Lake	5.8	5.8 RSA	2.2	0.2	0.3	0	0.3	0.3	0	0
Forest Lake	13.7	2.8 LSA 10.9 RSA	0.9	0.1	0.2	0	0.1	0.1	0.1	0
Patterson/Forest Creek	0.8	0.8 LSA	0	0	0	0	5.9	3.6	0	0
Jed Creek	1.6	1.6 RSA	0	0	0	0	2.5	1.9	0	0.6
Creek 2	0.6	0.505 RSA 0.141 LSA	21.7	1.5	0	3.1	4.6	0	0	0
Creek 3	1.9	1.9 RSA	2.6	0.5	0	0	6.8	1.1	0	0
Creek 4	0.7	0.7 RSA	18.8	0	0	0	0	4.3	0	0
LSA (total area and average density of sign)	**19.5**		**0.5**	**0.1**	**0.1**	**0.1**	**0.4**	**0.2**	**0**	**0**
RSA (total area and average density of sign)	**56.0**		**1.5**	**0.1**	**0.1**	**<0.1**	**0.4**	**0.2**	**<0.1**	**<0.1**
Total (total area and average density of sign)	**75.4**		**1.2**	**0.1**	**0.1**	**<0.1**	**0.4**	**0.2**	**<0.1**	**<0.1**

9.0 AERIAL WATERFOWL AND RAPTOR STICK NEST SURVEY

9.1 Study Objectives

The aerial waterfowl and raptor stick nest survey was completed for the RSA to:

- document the presence, diversity, and abundance of waterfowl;
- document the occurrence of active, inactive, and old raptor nests (e.g., bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), red-tailed hawk (*Buteo jamaicensis*));
- document the occurrence of avian species at risk; and
- develop a scientifically defensible baseline to support effect assessments and to allow for potential future follow up/monitoring requirements.

9.2 Methods

Lakes, streams, and wetland areas were surveyed on 4 and 5 July 2018 by helicopter at the maximum altitude that allowed for identification of avian species including waterfowl, shore birds, and raptors. A total of three observers completed the survey, with two observers documenting waterfowl and shore birds and one observer documenting raptor and stick nest observations. Observers were Professional Biologists with the ASPB, proficient in waterfowl and raptor identification. Surveys were completed under appropriate environmental conditions that would not deter waterfowl from being observed in open water (i.e., low wind speed and no precipitation). Weather conditions were recorded at the beginning of each survey and monitored throughout. Survey conditions are listed in Table 9.2-1.

Table 9.2-1 Aerial Waterfowl Survey Timing and Weather Summary

Survey Bout	Survey Section ID #'s	Date	Cloud Cover (%)	Temperature (°C)	Precipitation	Wind
1	1-8	04-July-2018	70.0	15.0	0.0	Calm
2	9-20	04-July-2018	40	15	0.0	4-6 knots
3	21-28	04-July-2018	50.0	15.0	0.0	4-8 knots
4	29-38	05-July-2018	0.0	18.0	0.0	Calm

When possible, all birds observed were identified to species, and total observations by lake/river/wetland complex were recorded. Survey sections varied in area searched (combined area of water bodies) from < 1 ha to 4,246 ha. The number of water bodies per complex also varied (from 1 to 24). Therefore, the abundance (i.e., total number of birds observed) and species richness (i.e., number of unique avian species observed) in each survey complex was divided by area searched to allow comparison between search areas. For each survey complex, factors such as average size of water bodies, density of water bodies, and mapped ecosites within 100 m of each water body were considered when attempting to identify important attributes for avian species within the area of the Project.

Raptor nest locations were recorded using a hand-held GPS unit and nests were classified as active, inactive (i.e., intact but not currently occupied), or old (i.e. broken/damaged). Notes on the species and clutch size/number of eggs/young were recorded for all active nests.

Survey design and field methodologies were guided by Government of British Columbia (1999), and were completed under Saskatchewan Government Research Permit/Species Detection #18FW031 and 18SD170.

9.3 Results

A total of 38 complexes containing 182 water bodies and 20 sections of water courses were surveyed (Figure 9.3-1). The survey recorded 22 confirmed unique species and three species groups, for a total of 799 individual avian species observations (Table 9.3-1). The 10 most observed species were:

- Ring-necked Duck (*Aythya collaris*) – 189 observations;
- California gull (*Larus californicus)* – 99 observations;
- Common Merganser (*Mergus merganser*) – 82 observations;
- Mallard (*Anas platyrhynchos*) – 61 observations;
- Bonaparte's gull (*Chroicocephalus philadelphia*) – 61 observations;
- American white pelican (*Pelecanus erythrorhynchos*) – 44 observations;
- Sandpiper spp. (*Tringa / Actitis spp*.) – 33 observations;
- Bald Eagle – 28 observations;
- Common raven (*Corvus corax*) – 27 observations; and
- Common loon (*Gavia immer*) – 26 observations.

Waterfowl or raptors were observed within approximately 92% (35/ 38) survey sections. The survey sections with the highest species diversity were Section 6 (10 species), Section 1 (9 species), and Section 4 (9 species). The highest individual abundances were recorded in Section 5 (98 individuals), Section 1 (96 individuals), and Section 6 (81 individuals) (Table 9.3-2, Figure 9.3-1). However, based on the amount of area searched, the survey Section with the highest species diversity per hectare were survey Section 7 (3.9 species/ha), survey Section 19 (1.4 species/ha), survey Section 34 (1.3 species/ha), and survey Section 37 (1.2 species/ha). The highest individual abundances (density of birds per ha) were observed in survey Section 7 (30.0 birds/ha), Section 37 (7.9 birds/ha), Section 27 (3.3 birds/ha), and Section 19 (3.3 birds/ha). (Figure 9.3-1, Table 9.3-3).

A likely factor contributing to a high density of birds and species richness appears to be the size of the water body. All survey sections with the highest bird densities and species richness had water body sizes of 10 ha or less, and most were smaller than 5 ha, and the five largest water bodies (#1, #4, #6, #20 and #28) all had low density of birds (on average 0.04 birds birds/ha) and low species diversity (<0.01 species /ha) (Table 9.3-3). However, water courses (streams and rivers) were also important. Water courses only accounted for 17% of the total shoreline surveyed; however, four of eight sections with highest bird densities were water courses. Adjacent ecosite type did not appear to have a large effect on density or diversity, however two of the five survey sections with highest density and/or abundance had a relatively high percentage of adjacent shrubby fen (BP24, BP25) (Table 9.3-3).

A total of seven inactive nests were observed in the area of the Project (Figure 9.3-1, Table 9.3-4). Two of the seven inactive nests had evidence of recent use (e.g., presence of ravens near one and bald eagles near the other). Six active beaver houses and 33 inactive/old houses were also observed in the Project area (Figure 9.3-1, Table 9.3-4).

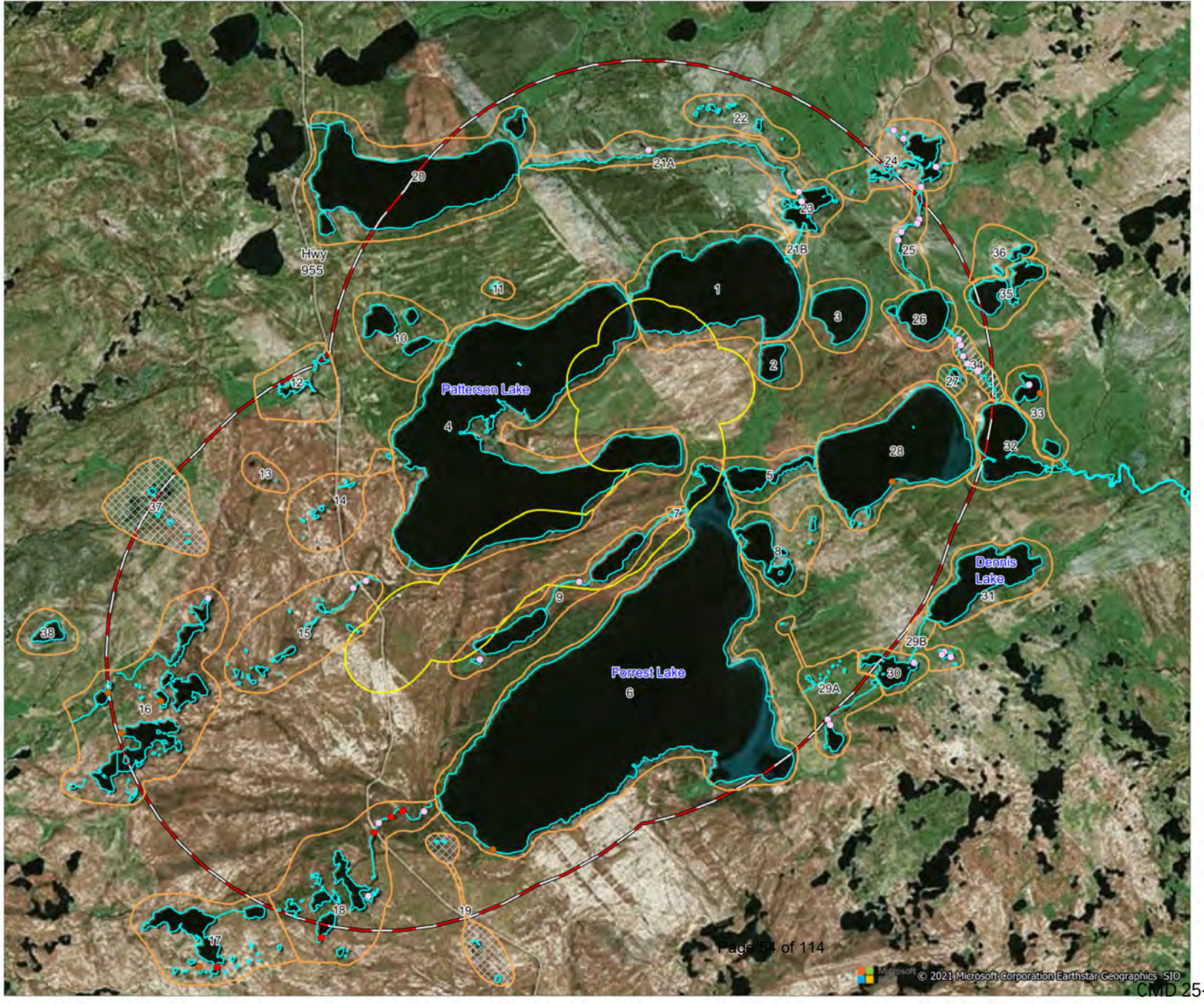

Figure 9.3-1 Aerial Waterfowl Sections, Stick Nest and Beaver Lodge Locations

Legend

- 11 Waterfowl Survey Sections
- 34 High Waterfowl Species Diversity (# species/ha)
- 27 High Waterfowl Abundance (# birds/ha)
- Waterbodies
- Regional Study Area (RSA)
- Local Study Area (LSA)

Observation Type

- Inactive/old stick nest
- Active beaver lodge
- Inactive/old beaver lodge

N W E S

0 2.5 5

kilometers

Scale = 1 : 100,000

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Ref# O-F736_12-18

Table 9.3-1 Aerial Waterfowl Survey Observations in Descending order of Abundance– July 2018.

Common Name	*Scientific Name*	Number of Pairs
Ring-necked Duck	*Aythya collaris*	189
California Gull	*Larus californicus*	99
Common Merganser	*Mergus merganser*	82
Mallard	*Anas platyrhynchos*	61
Bonaparte's Gull	*Chroicocephalus philadelphia*	61
American White Pelican	*Pelecanus erythrorhynchos*	44
Sandpiper Spp.	*Actitus or Tringa spp.*	33
Unknown White-headed Gull	*Larus spp.*	28
Bald Eagle	*Haliaeetus leucocephalus*	28
Common Raven	*Corvus corax*	27
Common Loon	*Gavia immer*	26
Canada Goose	*Branta canadensis*	24
Yellowleg Spp.	*Tringa spp.*	18
Bufflehead	*Bucephala albeola*	13
Unknown Diver	*Aythya, Bucephala, or Mergus spp.*	11
Unknown Gull	*Larus spp.*	10
Herring Gull	*Larus argentatus*	9
Common Goldeneye	*Bucephala clangula*	8
Lesser Scaup	*Aythya affinis*	4
Unknown	*n/a*	4
Sandhill Crane	*Antigone canadensis*	4
Unknown Dabbler	*Anas spp.*	3
Unknown Young	*n/a*	3
Osprey	*Pandion haliaetus*	3
Green-winged Teal	*Anas crecca*	2
American Coot	*Fulica americana*	1
Common Tern	*Sterna hirundo*	1
Red-throated Loon	*Gavia stellata*	1
Red-tailed Hawk	*Buteo jamaicensis*	1
Tundra Swan	*Cygnus columbianus*	1
Total		**799**

Table 9.3-2 Aerial Waterfowl and Stick Nest Survey Results – July 2018.

Species	Survey Section ID																		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
Canada Goose	9		3																
Mallard	2	1			9		5			1		3			1				
Common Merganser	48			2		26													
Ring-necked Duck		4			20		15	3				6		1	10	3	4	4	3
Lesser Scaup				2														2	
Bufflehead	2								7						1	3			
Common Goldeneye												3		1	3				1
American Coot																			
Common Loon	1			3			3	2		1		1				5		2	1
Herring Gull					4	5													
Bonaparte's Gull		1			2			3				1							
California Gull	24			8	56	10													
Common Tern					1														
Green-winged Teal						2													
Bald Eagle	4	1		8		1			1							1			
Red-tailed Hawk										1									
Osprey			1																
Common Raven				5	5	2													
Yellowleg Spp.				1		1									1	4			4
Sandpiper Spp.	1		4	1				1				4		5	1	1		1	3
Tundra Swan																		1	
American White Pelican	5					10									9				
Sandhill Crane																			
Red-throated Loon																			
Unknown white-headed Gull				1	1	23										1			
Unknown Dabbler															2				
Unknown Diver																		8	
Unknown Gull						1						1							
Unknown Young																			
Unknown			2									2							
Total	**96**	**7**	**10**	**31**	**98**	**81**	**23**	**9**	**8**	**3**	**0**	**21**	**0**	**7**	**28**	**18**	**4**	**18**	**12**

Table 9.3-2 Aerial Waterfowl and Stick Nest Survey Results– July 2018 cont.

Species	Survey Section ID																			
	20	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**Total**
Canada Goose						6												6		**24**
Mallard	12					3		10		3	6	3			2					**61**
Common Merganser		1							2	2									1	**82**
Ring-necked Duck		2	8	2	2		10			70	2				4			16		**189**
Lesser Scaup																				**4**
Bufflehead																				**13**
Common Goldeneye																				**8**
American Coot						1														**1**
Common Loon			1	2					2				1						1	**26**
Herring Gull																				**9**
Bonaparte's Gull								20	7				4	2				21		**61**
California Gull	1																			**99**
Common Tern																				**1**
Green-winged Teal																				**2**
Bald Eagle	6			1			1		1				3							**28**
Red-tailed Hawk																				**1**
Osprey							2													**3**
Common Raven	2								12								1			**27**
Yellowleg Spp.						1			2	2					1			1		**18**
Sandpiper Spp.						2	1					5						2	1	**33**
Tundra Swan																				**1**
American White Pelican	17												3							**44**
Sandhill Crane																	2	2		**4**
Red-throated Loon			1																	**1**
Unknown white-headed Gull									1									1		**28**
Unknown Dabbler										1										**3**
Unknown Diver			1		1										1					**11**
Unknown Gull									4			4								**10**
Unknown Young																		3		**3**
Unknown																				**4**
Total	**38**	**3**	**11**	**5**	**3**	**13**	**14**	**30**	**31**	**78**	**8**	**12**	**11**	**2**	**8**	**0**	**3**	**52**	**3**	**799**

Table 9.3-3 Information on Water Bodies Within Survey Sections for the Aerial Waterfowl Surveys– July 2018.

Survey Section ID	# Water Bodies			Total Area Searched (ha)	Average Water Body Size (ha)	Density (# birds /ha)	Species diversity (# species /ha)	Dominant Ecosites Within a 100 m Buffer Adjacent to Water Body (Rated by Composition[1])		
	Lakes/ Ponds	Creeks / Rivers	Total					1st	2nd	3rd
1	1	-	1	936.3	936.3	0.10	0.01	RF2-C	RF4	-
2	1	-	1	57.2	57.2	0.12	0.07	RF2-B	RF4	RF2-C
3	1	-	1	167.3	167.3	0.06	0.02	RF4	-	-
4	1	-	1	2832.2	2832.2	0.01	0.00	RF1-D	BP3	RF2-C
5	1	-	1	94.2	94.2	1.04	0.08	RF4	RF2-B	BP3
6	1	-	1	4246.1	4246.1	0.02	0.00	RF2-C	BP2	BP3
7	1	1	2	0.8	0.4	30.02	3.92	RF2-B	BP24	RF2-C
8	4	-	4	131.4	32.8	0.07	0.03	RF4	BP2	-
9	3	2	5	182.6	36.5	0.04	0.01	RF2-D	BP3	BP4
10	3	-	3	92.8	30.9	0.03	0.03	BP2	RF2-C	BP4
11	2	-	2	2.2	1.1	0.00	0.00	RF2-C	BP2	-
12	3	-	3	23.8	7.9	0.88	0.34	BP20	BP2	-
13	1	-	1	2.1	2.1	0.00	0.00	RF2-C	-	-
14	8	-	8	8.6	1.1	0.81	0.35	RF2-C	BP2	-
15	22	2	24	34.9	1.5	0.80	0.23	RF2-C	BP2	-
16	22	1	23	305.8	13.3	0.06	0.02	RF2-C	BP20	BP2
17	17	1	18	159.5	8.9	0.03	0.01	RF2-C	BP3	-
18	20	4	24	127.1	5.3	0.14	0.05	BP3	RF2-C	BP2
19	6	-	6	3.7	0.6	3.28	1.37	RF2-C	BP2	BP3
20	5	-	5	984.6	196.9	0.04	0.01	RF3-C	BP3	RF2-C
21	1	2	3	6.6	2.2	0.45	0.30	RF4	BP20	BP25
22	7	-	7	12.1	1.7	0.91	0.33	RF4	BP20	-
23	3	-	3	82.9	27.6	0.06	0.04	RF4	-	-
24	6	2	8	178.6	22.3	0.02	0.01	RF4	-	-
25	1	1	2	8.8	4.4	1.47	0.57	RF4	BP25	BP26
26	2	-	2	146.7	73.3	0.10	0.03	RF4	-	-
27	1	-	1	9.1	9.1	3.31	0.22	BP20	-	-
28	4	-	4	890.9	222.7	0.03	0.01	RF4	BP20	-
29	16	3	19	35.0	1.8	2.23	0.14	RF4	BP20	-
30	1	-	1	76.7	76.7	0.10	0.03	RF4	-	-
31	1	-	1	302.4	302.4	0.04	0.01	N/A	-	-
32	1	-	1	239.3	239.3	0.05	0.02	BP20	BP2	-
33	2	-	2	53.3	26.7	0.04	0.02	N/A	-	-
34	-	1	1	3.2	3.2	2.52	1.26	BP25	BP20	BP19
35	2	-	2	119.4	59.7	0.00	0.00	BP20	RF4	-
36	2	-	2	18.2	9.1	0.16	0.11	N/A	-	-
37	8	-	8	6.6	0.8	7.93	1.22	RF1-D	RF3-B	-
38	1	-	1	33.6	33.6	0.09	0.09	N/A	-	-

[1]Rated by surface area of specific Ecosite.

Table 9.3-4 Nest Sites & Beaver Lodges Observed During Aerial Waterfowl – July 2018.

Description	Location (NAD 83)
Stick nest, empty but ravens nearby	12 V 600160 6379849
Empty stick nest, bald eagle nearby, active this year	12 V 610928 6390272
Empty stick nest, likely used this year, large	12 V 614937 6392821
Empty stick nest	12 V 590884 6383737
Empty stick nest	12 V 589419 6383932
Empty stick nest	12 V 589809 6382823
Empty stick nest	12 V 592104 6376422
Active beaver lodge	12 V 592593 6376420
Active beaver lodge	12 V 595461 6377292
Active beaver lodge	12 V 596854 6380240
Active beaver lodge	12 V 597320 6380690
Active beaver lodge	12 V 597637 6380852
Active beaver lodge	12 V 602369 6387317
Inactive/old beaver lodge	12 V 599676 6385087
Inactive/old beaver lodge	12 V 602360 6387303
Inactive/old beaver lodge	12 V 596466 6387186
Inactive/old beaver lodge	12 V 596130 6386983
Inactive/old beaver lodge	12 V 592122 6386610
Inactive/old beaver lodge	12 V 596741 6378479
Inactive/old beaver lodge	12 V 596987 6380512
Inactive/old beaver lodge	12 V 598231 6380859
Inactive/old beaver lodge	12 V 603970 6399229
Inactive/old beaver lodge	12 V 608144 6398188
Inactive/old beaver lodge	12 V 608225 6397928
Inactive/old beaver lodge	12 V 611902 6398977
Inactive/old beaver lodge	12 V 610984 6399728
Inactive/old beaver lodge	12 V 610709 6399951
Inactive/old beaver lodge	12 V 611505 6398410
Inactive/old beaver lodge	12 V 611479 6397521
Inactive/old beaver lodge	12 V 611425 6397406
Inactive/old beaver lodge	12 V 610995 6397157
Inactive/old beaver lodge	12 V 610916 6396924
Inactive/old beaver lodge	12 V 609329 6383679
Inactive/old beaver lodge	12 V 609403 6383536
Inactive/old beaver lodge	12 V 612686 6385498
Inactive/old beaver lodge	12 V 612491 6385636
Inactive/old beaver lodge	12 V 612430 6385560
Inactive/old beaver lodge	12 V 611675 6385310
Inactive/old beaver lodge	12 V 611813 6385814
Inactive/old beaver lodge	12 V 611806 6385844
Inactive/old beaver lodge	12 V 614632 6393049
Inactive/old beaver lodge	12 V 613213 6393374
Inactive/old beaver lodge	12 V 612911 6393587
Inactive/old beaver lodge	12 V 612795 6393792
Inactive/old beaver lodge	12 V 612721 6394086
Inactive/old beaver lodge	12 V 612661 6394241

10.0 COVERT CAMERA SURVEY

10.1 Study Objectives

Covert camera surveys are an effective and non-invasive way to gather wildlife observation data. These cameras collect data remotely and continuously for a range of species and can be deployed in the field for months at a time with minimal maintenance. The primary objectives of this survey were to:

- determine the presence and spatial distribution of wildlife species within the Project RSA;
- identify the relative use of linear features (i.e., roads, trails, and hand-cut lines) in the Project RSA by wildlife and humans; and
- develop a scientifically defensible baseline to support effect assessments and to allow for potential future follow up/monitoring requirements.

10.2 Methods

A total of 24 Reconyx XP9 UltraFire Professional Covert Trap cameras were deployed between 26 March 2018 and 31 March 2018 within the area of the Project. Camera locations were determined using a stratified random approach to sample different disturbance feature types and reference sites. Cusack et al. (2015) found that camera placement (i.e., random versus game trail based) was unlikely to affect community level inferences, given adequate sampling effort. The cameras were located on four linear feature types including road, trail, hand-cut line, and undisturbed reference sites. Road sites were further divided into two sub-classes including an all-season road (i.e., plowed during winter) and a seasonal road. The feature types were defined as:

- road – a maintained or seasonally maintained road supporting truck traffic or larger;
- trail / conventional cutline – a cleared disturbance over 2 m in width;
- hand-cut line – a cleared disturbance under 2 m in width; and
- reference site – a site undisturbed by human alteration representing natural conditions.

Originally, the study area was divided into six geographic units to ensure spatial distribution of the covert cameras across the study area. Each unit was further broken into numbered 1-km^2 grid cells to enable random site selection. The grid cells were created only in areas that were safely accessible during both summer and winter seasons. Six cameras were located in each of: trail/conventional cutline, hand-cut line, and undisturbed reference sites within each unit of the study area. The six road cameras were located using a random number generator to select grid cells that coincided with roads. This was necessary since roads were only located in certain portions of the Project area. The initial intention was to place three cameras on all-season roads and three cameras on seasonal roads; however, all roads surveyed were all-season due to ongoing exploration activities by multiple companies in the study area.

Multiple camera thefts were discovered during the first two camera maintenance/data retrieval trips. Due to this ongoing issue, the original stratified random study design was changed. Cameras deemed to be in high theft risk locations were redistributed to areas specifically identified as low risk for theft. In addition, cameras were relocated along linear features with low sampling intensity due to theft. This program shift is not expected to have resulted in substantial changes in the baseline data collected. The camera data were complementary to the full suite of wildlife baseline data collection efforts.

Cameras were mounted on stable trees, 1.5 m above the ground to capture a variety of species and pointed towards the targeted linear feature or towards the most open area in the case of reference locations. All cameras faced north, or as close as feasible, to optimize lighting and avoid sun glare (Dunne 2007). Each

camera was tested at its field location to ensure proper function. Camera settings included: high sensitivity trigger and motion sensors, three photographs per activation, one second photograph intervals, and no quiet period between activations.

Camera photographs were examined by a Professional Biologist (ASPB) to determine the number of individuals of each species captured. Each animal photographed was considered as an individual, since most species present in the study area are not distinguishable by pelage (i.e., fur or hair type). Multiple photographs of the same individual (i.e., standing in front of camera, milling back and forth) were considered one observation event. Anthropogenic presence was also of interest; photographs containing humans/human use (e.g., vehicles, heavy equipment, recreational use) were also examined. The number of captures was divided by the number of camera deployment days to provide a relative abundance of species and human use.

It is noted that detections collected using covert cameras represent the minimum detection rate as cameras can malfunction or be misaligned due to tampering from animals or humans.

Survey design and field methodologies were guided by ABMI (2019) and were completed under Saskatchewan Government Research Permit/Species Detection #18FW031 and 18SD170.

10.3 Results

Twenty-four remote cameras were deployed in the area of the Project (Figure 10.3-1). A total of seven cameras were stolen during the program and six cameras were re-deployed in lower theft risk areas. Results over time were available from 27 camera locations, totaling 12,908 camera days. Across the study area, cameras averaged 3.5 captures per 100 camera days (including all species captured).

All-season roads had the highest frequency of wildlife detection at 5.22 captures per 100 camera days, followed by trails and hand-cut lines, each with and 3.36 captures per 100 camera days. Black bears (0.7/100 camera days), red squirrels (0.5/100 camera days), and snowshoe hare (0.4/100 camera days) were the most photographed species. Table 10.3-1 and Table 10.3-2 detail the wildlife capture results by camera, species, and feature type.

The study area averaged 46.5 human use events per 100 camera days across the study area. The highest frequency of human use occurred on all-season roads (383.3/100 camera days) and trails (10.3/100 camera days). Heavy equipment/passenger vehicles were the most detected human use at 28.9 detections per 100 camera days. Table 10.3-3 and Table 10.3-4 detail human use captures by camera, vehicle group and feature type.

A sample of game camera wildlife photograph captures can be viewed in Appendix D The covert camera survey was completed in September 2021.

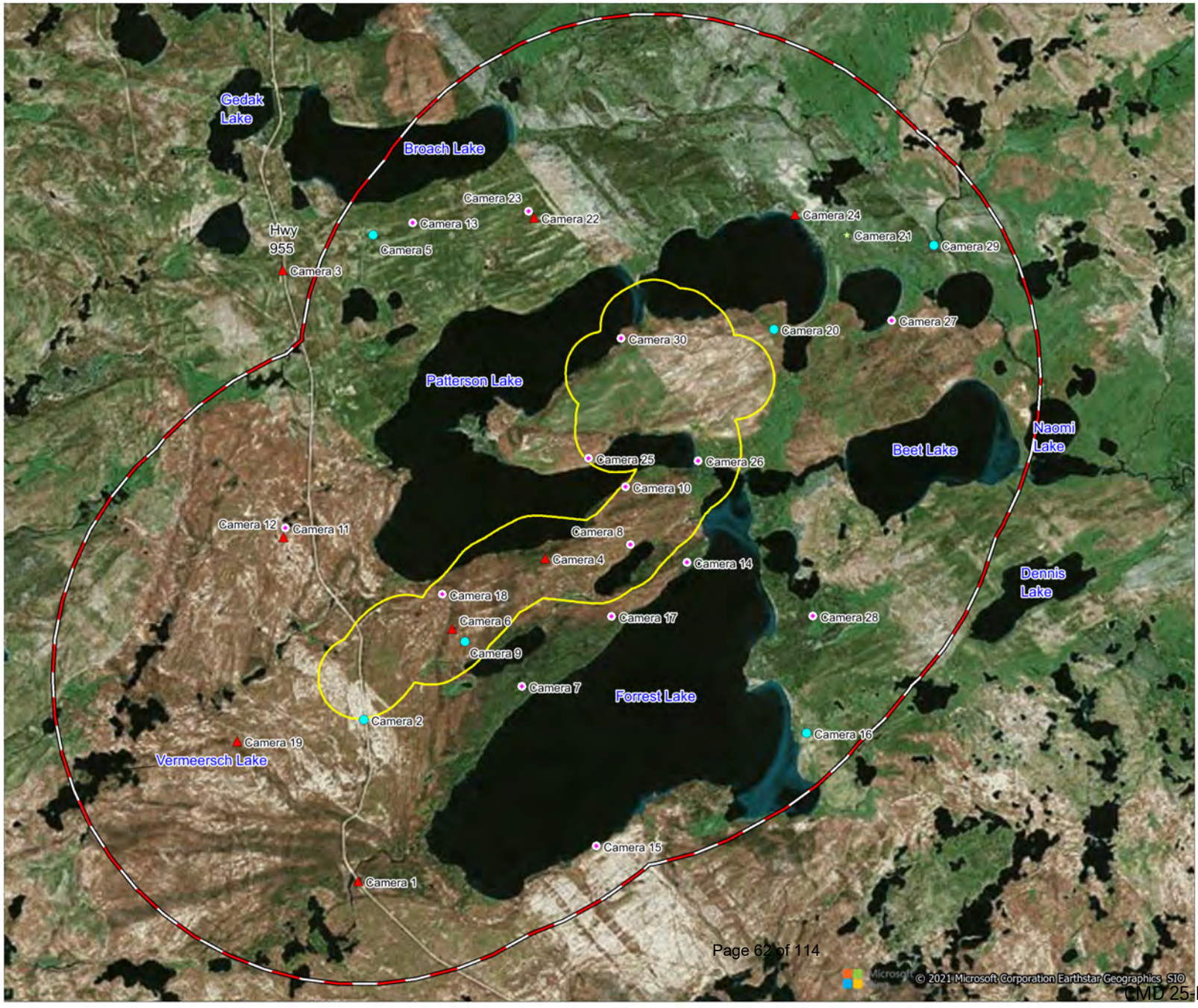

Figure 10.3-1 Covert Camera Locations

Legend

Covert Camera

- Camera Location
- Previous Location (Moved)
- Previous Location (Stolen)
- Previous Location (Taken down)
- Regional Study Area (RSA)
- Local Study Area (LSA)

N W E S

0 5 10

kilometers
Scale = 1 : 90,000

OMNIA ECOLOGICAL SERVICES

Produced by RA, Dec. 2018
Ref# O-F736_12-18

Table 10.3-1 Remote Camera Wildlife Capture Results - 2018 – 2021.

Camera ID	Associated Feature	Zone	Easting	Northing	Camera Days	Species Observations per 100 Camera Days								
						All Species	Bear	Bear Young	Caribou	Caribou Young	White-tailed deer	Moose	Moose Young	Lynx
Camera 1	All-season road	12 V	597048	6380084	315	0.95	0.32	-	0.32	-	-	-	-	-
Camera 2	All-season road	12 V	597096	6384086	242	4.13	0.41	-	0.41	-	-	0.41	-	-
Camera 3	All-season road	12 V	594825	6395153	-	-	-	-	-	-	-	-	-	-
Camera 4	All-season road	12 V	601497	6388190	200	1.50	0.50	1.00	-	-	-	-	-	-
Camera 5	All-season road	12 V	597036	6396071	107	14.95	1.87	-	-	-	-	-	-	1.87
Camera 6	All-season road	12 V	599230	6386391	443	9.26	1.81	2.03	-	-	-	0.23	0.23	0.68
Camera 7	Reference	12 V	600999	6385003	1,276	1.88	0.16	-	-	-	-	0.15	-	-
Camera 8	Hand-cut	12 V	603595	6388583	426	9.62	1.41	0.23	-	-	-	1.17	-	-
Camera 9	Reference	12 V	599553	6386080	125	1.60	0.80	-	-	-	-	-	-	-
Camera 10	Reference	12 V	603439	6390002	721	2.50	0.14	-	-	-	-	0.97	-	-
Camera 11	Hand-cut	12 V	595034	6388784	784	3.57	0.89	-	-	-	-	-	-	0.64
Camera 12	Trail	12 V	594993	6388557	363	4.41	1.38	0.28	-	-	0.28	-	-	1.10
Camera 13	Reference	12 V	598011	6396397	522	0.96	-	-	-	-	-	-	-	-
Camera 14	Trail	12 V	605011	6388177	955	0.84	0.31	-	0.10	-	-	0.35	-	-
Camera 15	Reference	12 V	602938	6381097	1,138	3.60	0.62	-	-	-	0.17	0.17	-	0.33
Camera 16	Trail	12 V	608092	6384032	240	13.75	4.58	-	2.08	-	-	2.08	-	-
Camera 17	Hand-cut	12 V	603178	6386795	1,130	1.33	0.44	-	-	-	-	0.37	-	-
Camera 18	Hand-cut	12 V	598965	6387234	317	9.15	2.84	0.33	-	-	-	1.64	-	-
Camera 19	Trail	12 V	593966	6383478	39	17.95	10.26	2.56	-	-	-	-	-	2.56
Camera 20	Reference	12 V	607012	6393994	363	10.47	1.38	0.28	-	-	-	0.55	-	-
Camera 21	Hand-cut	12 V	608756	6396376	494	3.64	1.01	0.20	1.01	0.20	-	0.40	-	-
Camera 22	Trail	12 V	601007	6396597	-	-	-	-	-	-	-	-	-	-
Camera 23	Hand-cut	12 V	600865	6396756	862	0.46	0.23	-	-	-	-	0.12	-	-
Camera 24	Trail	12 V	607466	6396853	-	-	-	-	-	-	-	-	-	-
Camera 25	Trail	12V	602510	6390690	434	1.61	0.23	-	-	-	-	0.46	-	-
Camera 26	All-season road	12V	605226	6390697	168	2.38	0.60	-	-	-	-	-	-	0.60
Camera 27	Trail	12V	609924	6394290	551	1.09	0.54	0.18	0.18	-	-	0.18	-	-
Camera 28	Trail	12V	608170	6386929	300	3.67	-	-	0.67	-	-	-	-	-
Camera 29	Trail	12V	610921	6396177	142	5.63	2.82	-	0.70	-	-	1.41	-	-
Camera 30	Trail	12V	603241	6393669	251	5.58	-	-	-	-	-	0.40	-	-
Total/ Average					**12,908**	**3.49**	**0.74**	**0.17**	**0.13**	**0.01**	**0.02**	**0.39**	**0.01**	**0.17**

Table 10.3-1 Remote Camera Wildlife Capture Results - 2018 – 2021- cont.

Camera ID	Associated Feature	Zone	Easting	Northing	Camera Days	Species Observations per 100 Camera Days							
						Fox	Hare	Wolf	Coyote/ Wolf	Marten	Porcupine	Squirrel	Unknown / Other
Camera 1	All-season road	12 V	597048	6380084	315	-	-	0.32	-	-	-	-	-
Camera 2	All-season road	12 V	597096	6384086	242	-	0.41	-	-	-	-	-	1.90
Camera 3	All-season road	12 V	594825	6395153	-	-	-	-	-	-	-	-	-
Camera 4	All-season road	12 V	601497	6388190	200	-	-	-	-	-	-	-	-
Camera 5	All-season road	12 V	597036	6396071	107	4.67	2.80	-	-	0.93	0.93	-	1.87
Camera 6	All-season road	12 V	599230	6386391	443	1.13	0.23	1.13	-	-	-	1.13	0.68
Camera 7	Reference	12 V	600999	6385003	1,276	-	-	-	-	0.31	-	1.02	0.31
Camera 8	Hand-cut	12 V	603595	6388583	426	0.23	-	0.23	-	-	-	5.63	0.70
Camera 9	Reference	12 V	599553	6386080	125	-	-	-	-	0.80	-	-	-
Camera 10	Reference	12 V	603439	6390002	721	-	-	0.14	-	0.28	-	0.28	0.69
Camera 11	Hand-cut	12 V	595034	6388784	784	0.13	1.66	-	-	-	-	-	0.26
Camera 12	Trail	12 V	594993	6388557	363	-	0.83	-	0.28	-	-	-	0.28
Camera 13	Reference	12 V	598011	6396397	522	-	0.19	-	-	-	-	-	0.77
Camera 14	Trail	12 V	605011	6388177	955	-	-	-	-	0.21	-	-	-
Camera 15	Reference	12 V	602938	6381097	1,138	-	1.14	-	-	0.26	-	0.97	0.26
Camera 16	Trail	12 V	608092	6384032	240	2.08	0.83	0.42	-	-	-	0.83	0.83
Camera 17	Hand-cut	12 V	603178	6386795	1,130	0.12	-	-	-	0.27	-	-	0.27
Camera 18	Hand-cut	12 V	598965	6387234	317	-	3.15	-	-	0.63	-	0.63	-
Camera 19	Trail	12 V	593966	6383478	39	-	-	2.56	-	-	-	-	-
Camera 20	Reference	12 V	607012	6393994	363	-	1.93	-	-	4.68	-	0.83	0.83
Camera 21	Hand-cut	12 V	608756	6396376	494	-	-	-	-	-	-	0.20	0.61
Camera 22	Trail	12 V	601007	6396597	-	-	-	-	-	-	-	-	-
Camera 23	Hand-cut	12 V	600865	6396756	862	-	0.12	-	-	-	-	-	-
Camera 24	Trail	12 V	607466	6396853	-	-	-	-	-	-	-	-	-
Camera 25	Trail	12V	602510	6390690	434	-	-	-	-	0.23	-	-	0.69
Camera 26	All-season road	12V	605226	6390697	168	0.60	-	-	-	-	-	-	0.60
Camera 27	Trail	12V	609924	6394290	551	-	-	-	-	-	-	-	-
Camera 28	Trail	12V	608170	6386929	300	-	-	-	-	0.67	-	0.33	2.00
Camera 29	Trail	12V	610921	6396177	142	-	-	0.70	-	-	-	-	-
Camera 30	Trail	12V	603241	6393669	251	-	-	-	-	-	-	-	5.18
Total/ Average					**12,908**	**0.17**	**0.43**	**0.10**	**0.01**	**0.29**	**0.01**	**0.50**	**0.52**

Table 10.3-2 Remote Camera Wildlife Capture Results by Feature Type - 2018 – 2021.

Associated Feature	Total Camera Days	Species Observations Per 100 Camera Days																
		All Species	Bear Adult	Bear Young	Caribou Adult	Caribou Young	White-tailed Deer	Moose Adult	Moose Young	Lynx	Fox	Hare	Wolf	Coyote/ Wolf	Marten	Porcupine	Squirrel	Unknown / Other
All-season road	1,475	5.22	0.95	0.75	0.14	0.00	0.00	0.14	0.07	0.41	0.75	0.34	0.41	0.00	0.07	0.07	0.34	0.81
Hand-cut line	4,013	3.36	0.85	0.07	0.12	0.02	0.00	0.40	0.00	0.12	0.07	0.60	0.02	0.00	0.12	0.00	0.67	0.27
Reference	4,145	3.09	0.39	0.02	0.00	0.00	0.02	0.27	0.00	0.05	0.00	0.51	0.02	0.00	0.65	0.00	0.70	0.46
Trail	3,275	3.36	0.95	0.09	0.31	0.00	0.03	0.40	0.00	0.15	0.15	0.15	0.09	0.03	0.15	0.00	0.09	0.76
Total/Average	**12,908**	**3.49**	**0.74**	**0.14**	**0.13**	**0.01**	**0.02**	**0.33**	**0.01**	**0.14**	**0.15**	**0.43**	**0.09**	**0.01**	**0.29**	**0.01**	**0.50**	**0.52**

Table 10.3-3 Remote Camera Anthropogenic Capture Results - 2018 – 2021.

Camera ID	Associated Feature	Zone	Easting	Northing	Camera Days	All Anthropogenic	Vehicles (heavy equipment, passenger)	ATVs / Snowmobiles	Human (non-motorized)	Unknown Vehicle[a]
Camera 1	All-season road	12 V	597048	6380084	315	614.29	362.86	2.54	-	248.89
Camera 2	All-season road	12 V	597096	6384086	242	436.78	307.85	3.31	-	125.62
Camera 3	All-season road	12 V	594825	6395153	-	-	-	-	-	-
Camera 4	All-season road	12 V	601497	6388190	200	140.50	77.50	3.00	-	60.00
Camera 5	All-season road	12 V	597036	6396071	107	25.23	19.63	1.87	-	3.74
Camera 6	All-season road	12 V	599230	6386391	443	524.38	312.42	1.81	0.68	209.48
Camera 7	Reference	12 V	600999	6385003	1,276	0.08	-	-	0.08	-
Camera 8	Hand-cut	12 V	603595	6388583	426	1.64	-	-	1.64	-
Camera 9	Reference	12 V	599553	6386080	125	0.00	-	-	-	-
Camera 10	Reference	12 V	603439	6390002	721	0.28	-	-	0.28	-
Camera 11	Hand-cut	12 V	595034	6388784	784	0.00	-	-	-	-
Camera 12	Trail	12 V	594993	6388557	363	85.67	68.32	1.93	-	15.43
Camera 13	Reference	12 V	598011	6396397	522	0.00	-	-	-	-
Camera 14	Trail	12 V	605011	6388177	955	0.00	-	-	-	-
Camera 15	Reference	12 V	602938	6381097	1,138	0.00	-	-	-	-
Camera 16	Trail	12 V	608092	6384032	240	0.00	-	-	-	-
Camera 17	Hand-cut	12 V	603178	6386795	1,130	0.00	-	-	-	-
Camera 18	Hand-cut	12 V	598965	6387234	317	0.00	-	-	-	-
Camera 19	Trail	12 V	593966	6383478	39	2.56	-	-	-	2.56
Camera 20	Reference	12 V	607012	6393994	363	0.00	-	-	-	-
Camera 21	Hand-cut	12 V	608756	6396376	494	0.00	-	-	-	-
Camera 22	Trail	12 V	601007	6396597	-	-	-	-	-	-
Camera 23	Hand-cut	12 V	600865	6396756	862	0.00	-	-	-	-
Camera 24	Trail	12 V	607466	6396853	-	-	-	-	-	-
Camera 25	Trail	12V	602510	6390690	434	5.99	0.46	0.69	4.84	-
Camera 26	All-season road	12V	605226	6390697	168	17.86	16.67	-	-	1.19
Camera 27	Trail	12V	609924	6394290	551	0.00	-	-	-	-
Camera 28	Trail	12V	608170	6386929	300	0.00	-	-	-	-
Camera 29	Trail	12V	610921	6396177	142	0.00	-	-	-	-
Camera 30	Trail	12V	603241	6393669	251	0.00	-	-	-	-
Total/ Average					**12,908**	**46.49**	**28.87**	**0.33**	**0.26**	**17.04**

a) i.e., dust cloud, headlights, small portion of vehicle preventing more detailed identification.

Table 10.3-4 Remote Camera Anthropogenic Capture Results by Feature Type - 2018 – 2021.

Associated Feature	Total Camera Days	Captures per 100 Camera Days				
		All Human Use	Vehicles (heavy equipment, passenger)	ATVs / Snowmobiles	Human (non-motorized)	Unknown Vehicle
All-season road	1,475	383.25	235.66	2.17	0.20	145.22
Hand-cut line	4,013	0.17	0.00	0.00	0.17	0.00
Reference	4,145	0.07	0.00	0.00	0.07	0.00
Trail	3,275	10.32	7.63	0.31	0.64	1.74
Total/Average	**12,908**	**46.49**	**28.87**	**0.33**	**0.26**	**17.04**

11.0 SPECIES AT RISK AND SENSITIVE SPECIES

In addition to the vegetation and wildlife baseline data collected during formal surveys, species at risk and other sensitive species observations were also collected and compiled from incidental observations.

A total of 28 provincially listed sensitive plant species, tracked by the Saskatchewan Conservation Data Centre, were detected during field surveys in support of the Rook I Project. The list of species detected is provided in Table 11.0-1 and Figure 11.0-1 outlines the respective locations. No federally listed species-at-risk were detected.

Thirteen different sensitive or at-risk wildlife species were observed during field surveys, or incidentally, in support of the Project (Table 11.0-2), including:

- Common Loon (Aerial waterfowl and Incidentally)
- Red-throated Loon (Aerial waterfowl)
- Bald Eagle (Aerial waterfowl and Incidentally)
- Common Nighthawk (Incidentally)
- Barn Swallow (Incidentally)
- Olive-sided Flycatcher (Incidentally)
- Bonaparte's Gull (Aerial waterfowl)
- Herring Gull (Aerial waterfowl)
- Common Tern (Aerial waterfowl)
- American White Pelican (Aerial Waterfowl)
- Osprey (Aerial waterfowl and Incidentally)
- Woodland Caribou (Pellets, Vegetation survey, Covert camera, Backtrailing and Incidentally)
- River Otter (Winter tracking)

Figure 11.0-2 highlights the locations of wildlife species at risk observations and species/features (nests and breeding colonies) observed in the Project area.

Table 11.0-1 Sensitive and at Risk Plant Species Observations.

Common Name	Scientific Name	SKCDC Status	COSEWIC Status	SARA Status
Concentric ring lichen	*Arctoparmelia centrifuga*	S2	-	-
Subarctic ladyfern	*Athyrium filix-femina ssp. Angustatum*	S3	-	-
Low northern sedge	*Carex concinna*	S3	-	-
Iceland lichen	*Cetraria ericetorum*	S3	-	-
True Iceland lichen	*Cetraria islandica*	S3	-	-
Greater sulphur-cup	*Cladonia sulfurina*	S2	-	-
Red-fruited pixie-cup	*Cladonia pleurota*	S2	-	-
Lesser sulphur-cup	*Cladonia deformis*	S3	-	-
Organ-pipe lichen	*Cladonia crispata*	S3	-	-
Powdered funnel lichen	*Cladonia cenotea*	S3	-	-
Boreal pixie-cup	*Cladonia borealis*	S3	-	-
Common powderhorn	*Cladonia coniocraea*	S2	-	-
British soldiers	*Cladonia cristatella*	S3	-	-
Angle-leaved sundew	*Drosera anglica*	S3	-	-
White cotton grass	*Eriophorum scheuchzeri*	S2	-	-
Crinkled snow lichen	*Cetraria nivalis*	S3	-	-
Waldo Lake liverwort	*Jamesoniella autumnalis*	S3	-	-
Northern Labrador tea	*Rhododendron tomentosum*	S3	-	-
Lesser duckweed	*Lemna Minor*	S1	-	-
Creeping Fingerwort	*Lepidozia reptans*	S3	-	-
Lophozia liverwort	*Lophozia ventricosa*	S3	-	-
Anomalous flapwort	*Leiomylia anomala*	S3	-	-
Green starburst lichen	*Parmeliopsis ambigua*	S3	-	-
Gray starburst lichen	*Parmeliopsis hyperopta*	S3	-	-
Common freckle pelt	*Peltigera aphthosa*	S3	-	-
Apple Pelt	*Peltigera aphthosa*	S3	-	-
Naugehyde liverwort	*Ptilidium pulcherrimum*	S3	-	-
Green Map Lichen	*Rhizocarpon geographicum*	S2	-	-

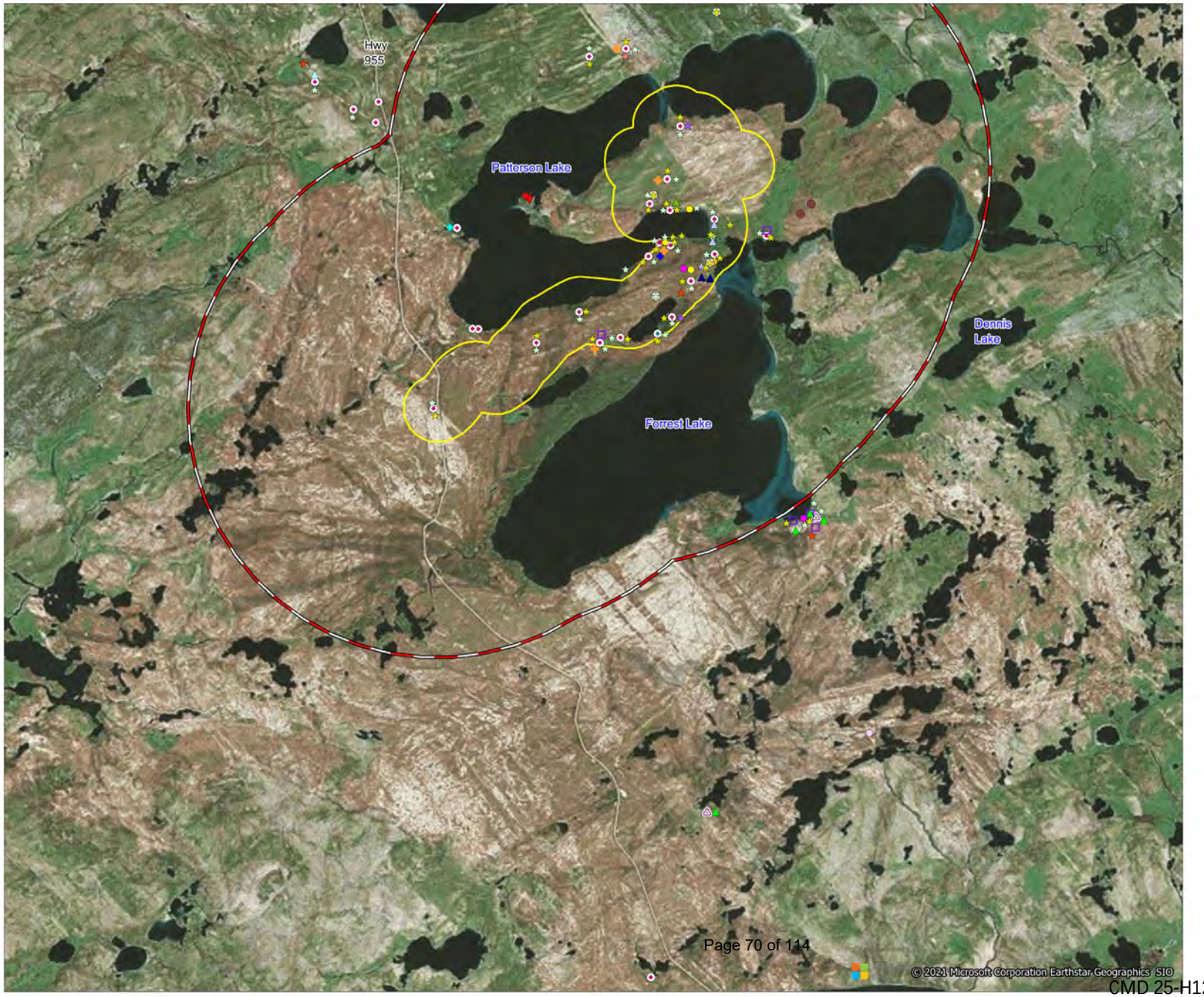

Figure 11.0-1 Plant Species at Risk Observations

Legend

Plant Common Name
- Angle-leaved sundew
- Anomalous flapwort
- Apple Pelt
- Boreal pixie-cup
- British soldiers
- Common freckle pelt
- Common powderhorn
- Concentric ring lichen
- Creeping Fingerwort
- Crinkled snow lichen
- Gray starburst lichen
- Greater sulphur-cup
- Green Map Lichen
- Green starburst lichen
- Iceland lichen
- Lesser duckweed
- Lesser sulphur-cup
- Lophozia liverwort
- Low northern sedge
- Naugehyde liverwort
- Northern Labrador tea
- Organ-pipe lichen
- Powdered funnel lichen
- Red-fruited pixie-cup
- Subarctic ladyfern
- True Iceland lichen
- Waldo Lake liverwort
- White cotton grass

Regional Study Area (RSA)
Local Study Area (LSA)

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kilometers
Scale = 1 : 110,000

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Produced by RA, Dec. 2018
Ref# O-F736_12-18

Table 11.0-2 Wildlife Sensitive and Species at Risk Observations.

Common Name	Scientific Name	SKCDC Status	COSEWIC Status	SARA Status
Common Loon[a]	*Gavia immer*	S5B,SUN, S5M	Not at Risk	-
Red-Throated Loon[a]	*Gavia stellata*	S1B, S1M	-	-
Woodland Caribou	*Rangifer tarandus caribou*	S3	Threatened	Threatened
River Otter	*Lontra canadensis*	S3	Not at Risk	Not at Risk
Bald Eagle	*Haliaeetus leucocephalus*	S5B, S5N, S4M	Not at Risk	-
Common Nighthawk	*Chordeiles minor*	S4B, S4M	Special Concern	Threatened
Barn Swallow	*Hirundo rustica*	S5B, S5M	Threatened	Threatened
Olive-sided Flycatcher	*Contopus cooperi*	S4B, S4M	Special Concern	Threatened
Bonaparte's Gull[1]	*Chroicocephalus philadelphia*	S4B, S4M	-	-
Herring Gull[1]	*Larus argentatus*	S5B, S5M	-	-
Common Tern[1]	*Sterna hirundo*	S5B, S5M	Not at Risk	-
American White Pelican[1]	*Pelecanus erythrorhynchos*	S5B, S5M	Not at Risk	-
Osprey	*Pandion haliaetus*	S2B, S2M	-	-

Note: SKCDC Rankings:
2 = Imperiled/Very rare
3 = Vulnerable/Rare to uncommon
4 = Apparently Secure
5 = Secure/Common

M = for a migratory species, rank applies to the transient (migrant) population
B = for a migratory species, applies to the breeding population in the province
N= for a migratory species, applies to the non-breeding population in the province
U= status is uncertain in Saskatchewan because of limited or conflicting information (unrankable)

a) Birds observed but no specific nests.

SARGSS: Saskatchewan Activity Restriction Guidelines for Sensitive Species.

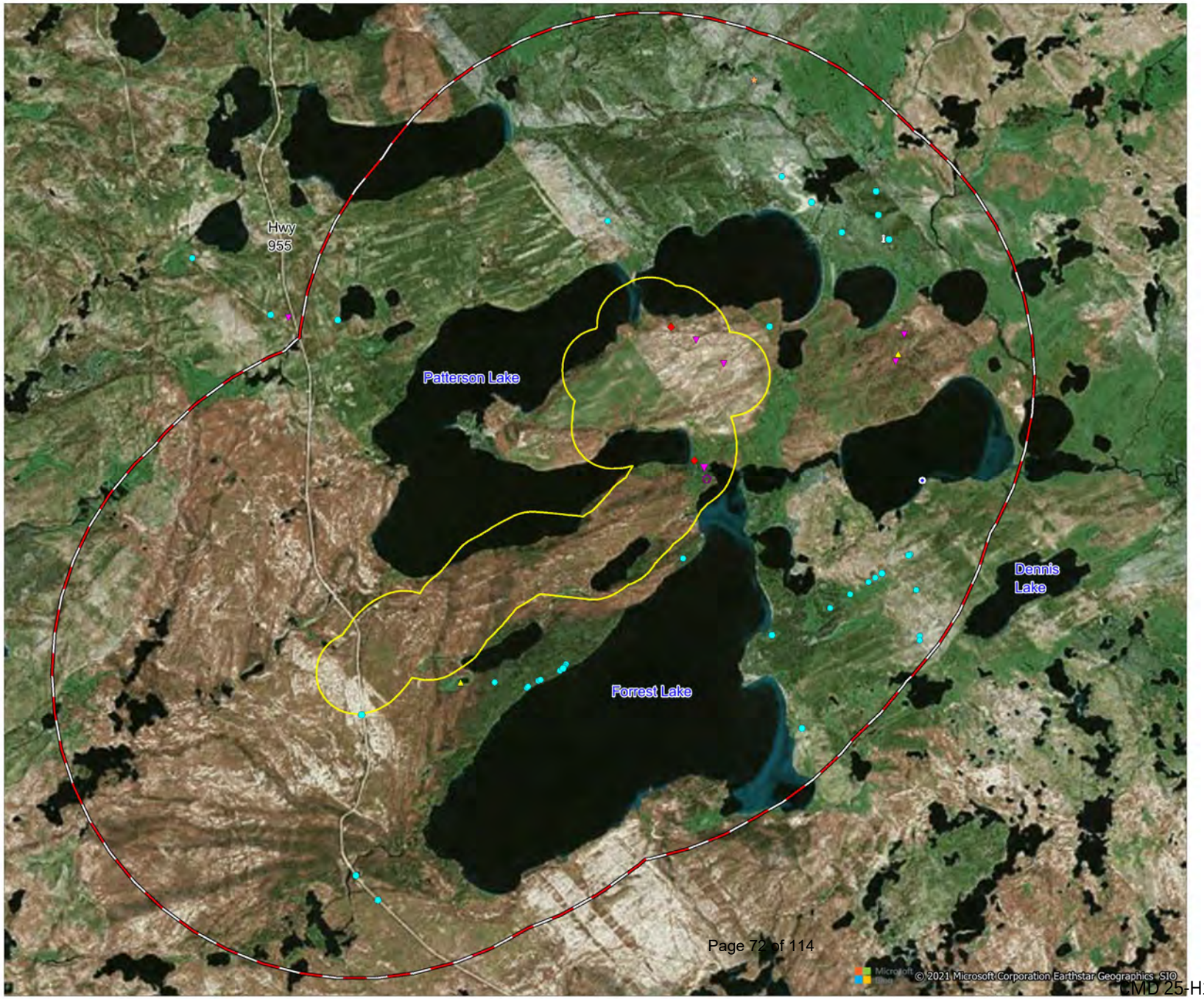

Figure 11.0-2 Wildlife Species at Risk Observations

Legend

Observation

- Woodland Caribou
- Common Nighthawk
- Olive-sided Flycatcher
- Barn Swallow
- Bald Eagle Nest
- Red-throated Loon
- River Otter
- Osprey Nest
- Regional Study Area (RSA)
- Local Study Area (LSA)

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kilometers
Scale = 1 : 90,000

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Ref# O-F736_12-18

12.0 Regional Fur Harvest Data

12.1 Study Objectives

The objectives of the compilation and description of regional fur trapping data were to:

- utilize existing publicly available data to further characterize the potential wildlife assemblages in the Fur Conservation Area (FCA) N-19; and
- utilize all possible data sources to complement and enhance Project-specific data collection efforts to support the development of a scientifically defensible baseline.

12.2 Methods

Fur harvest return information for the 1985/1986 to 2017/2018 (33 years) was obtained from Lois Koback, Fur and Problem Wildlife Support with the Ministry of Environment Fish, Wildlife and Lands Branch. Data were obtained and summarized for all species for Fur Conservation Area (FCA) N-19 (La Loche), which incorporated the entire study area. A summary of the total and average (plus minimum and maximum) annual number of furbearers harvested for FCA N-19 per year is provided (Table 12.2-1).

12.3 Results

From the period 1985/1986 to 2017/2018, fur returns for 18 different species/species groups in FCA N-19 were reported. These included, in descending order of total captures, red squirrel (43,723), muskrat (37,930), marten (8,355), weasel spp. (5,037), beaver (4,456), mink (3,158), fisher (2,539), lynx (1,516), fox spp. (1,345), badger (*Taxidea taxus*) (870), otter (621), coyote (121), wolf (88), black bear (32), and wolverine (8) (Table 12.2-1). The three species with the highest average capture rates per year over the 33-year period included red squirrel (1,324.9), muskrat (1,149.4), and marten (253.2).

Caution must be used when interpreting these data. Capture rates can vary widely and may reflect trapper effort and fur prices as much as animal abundance. It also relies on public reporting of annual catch.

The importance of the area was highlighted by traditional land use study findings and during joint working group stakeholder engagements. Each group highlighted the importance of the area and the degree of reliance. According to each document, the importance was listed as the following:

- the Métis Nation-Saskatchewan Northern Region II indicated that on “average 70% of their food comes from hunting, trapping, fishing, and gathering" (WD Lewis 2020, p. 17).
- The Clearwater River Dene Nation have also indicated that “the area which encompasses Patterson Lake (Upper and Lower Peilican Lake) is historically and currently recognized as a *good for everything* harvesting area which has sustained CRDN members through time beyond living memory” (McCullough 2020, p.10).
- For the Birch Narrows Dene Nation, it was indicated that “hunting and trapping have long been at the heart of Dene culture, and they remain central to the subsistence lifeways of members of the Birch Narrows Dene Nation. Members hunt for large and small game throughout BNDN territory, with locations depending on the seasonal availability of certain species” (Olson and Firelight 2019a, p. 23, 25, 28 and 32).
- The Buffalo Narrows Dene Nation indicated that “the Study Area and Patterson Lake also support BRDN trapping activities. Study participants recalled trapping and travelling in the Study Area, as well as stories of others trapping in the region.” (Olson and Firelight 2019b, p.21).

Table 12.2-1 Trapping Capture Rates per Year by Species for FCA N-19 (La Loche).

Year	N-19 La Loche																	
	1985-1986	1986-1987	1987-1988	1988-1989	1989-1990	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003
Badger	0	1	1	0	864	0	0	0	0	0	0	0	0	0	0	0	0	4
Beaver	491	668	624	250	254	89	130	28	112	158	160	179	233	44	21	23	171	42
Coyote	9	5	4	3	5	5	7	1	4	2	2	4	1	4	1	0	9	10
Fisher	151	123	107	142	122	159	337	196	173	117	37	93	53	35	58	27	102	82
Red Fox	52	56	57	47	29	15	66	22	14	16	3	14	6	6	8	15	25	14
Cross Fox	13	31	16	18	9	3	34	10	8	6	4	13	6	2	3	4	6	0
Silver Fox	0	2	408	1	0	1	1	0	2	1	1	1	8	0	1	2	0	0
Arctic Fox	0	9	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Fox	65	98	481	66	63	19	101	32	24	23	8	28	20	8	12	21	31	14
Lynx	49	47	15	0	44	49	93	61	29	23	9	63	64	49	40	52	153	77
Marten	165	218	307	506	452	284	460	410	226	190	120	288	258	299	140	326	204	120
Mink	199	295	480	270	163	127	171	139	75	122	72	131	176	102	68	71	27	22
Muskrat	5,844	6,421	6,582	1,614	1,123	3,571	757	58	307	507	1,283	166	616	261	12	5	747	104
Otter	52	49	52	28	33	10	29	27	16	43	29	19	37	23	7	20	26	5
Squirrel	4,509	4,241	17,581	1,817	863	931	1,309	984	1,442	1,294	532	1,172	2,943	275	141	154	280	216
Weasel	144	210	637	457	127	70	256	282	147	391	138	202	93	66	61	24	7	37
Wolf	8	6	6	4	1	5	3	4	1	4	0	3	2	4	0	0	0	3
Black Bear	3	8	0	4	4	0	3	1	2	0	0	0	1	2	1	0	1	0
Wolverine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**11,689**	**12,390**	**26,877**	**5,161**	**4,118**	**5,319**	**3,656**	**2,223**	**2,558**	**2,874**	**2,390**	**2,348**	**4,497**	**1,172**	**562**	**723**	**1,758**	**736**

Table 12.2-1 Trapping Capture Rates per Year by Species for FCA N-19 (La Loche)- cont.

Year	N-19 La Loche																
	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	Total	Mean Annual (Min, Max)[a]
Badger	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**870**	**217.5 (1, 864)**
Beaver	54	116	194	53	103	112	13	11	7	46	42	10	0	5	13	**4,456**	**139.3 (5, 668)**
Coyote	3	1	1	8	3	1	2	0	1	9	2	2	1	0	11	**121**	**4.0 (1, 11)**
Fisher	32	29	26	53	26	33	18	25	19	38	49	33	16	10	18	**2,539**	**76.9 (10, 337)**
Red Fox	10	7	6	17	12	11	2	6	14	48	18	13	4	3	15	**651**	**19.7 (2, 66)**
Cross Fox	6	0	2	2	3	4	0	1	5	8	2	6	1	0	1	**227**	**7.8 (1, 34)**
Silver Fox	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	**432**	**28.8 (1, 408)**
Arctic Fox	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**35**	**11.7 (1, 25)**
Total Fox	16	9	8	19	16	15	2	7	19	56	20	19	5	3	17	**1,345**	**40.8 (2, 481)**
Lynx	34	17	13	34	12	24	16	37	86	137	89	31	25	17	27	**1,516**	**45.9 (9, 153)**
Marten	90	145	199	345	330	256	172	198	270	337	404	193	147	127	169	**8,355**	**253.2 (90, 506)**
Mink	12	19	16	95	86	11	18	33	44	29	36	28	9	6	6	**3,158**	**95.7 (6, 480)**
Muskrat	969	1,745	2,142	917	58	133	645	54	90	187	518	254	74	56	110	**37,930**	**1,149.4 (5, 6582)**
Otter	18	12	25	7	3	9	4	7	4	5	6	7	3	2	4	**621**	**18.8 (2, 52)**
Squirrel	121	441	367	473	122	227	268	218	173	209	193	99	121	0	7	**43,723**	**1,366.3 (7, 17581)**
Weasel	59	36	86	393	309	107	86	94	100	114	172	86	39	6	1	**5,037**	**152.6 (1, 637)**
Wolf	2	3	2	1	1	3	2	1	2	5	3	5	0	1	3	**88**	**3.1 (1, 8)**
Black Bear	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	**32**	**2.7 (1, 8)**
Wolverine	2	0	0	0	0	1	0	1	0	1	0	2	0	1	0	**8**	**1.3 (1, 2)**
Total	**1,412**	**2,575**	**3,079**	**2,398**	**1,069**	**932**	**1,246**	**686**	**815**	**1,173**	**1,534**	**769**	**440**	**234**	**387**	**109,800**	**3,327.3 (234, 26877)**

Source: Lois Koback, Fur and Problem Wildlife Support with the Ministry of Environment Fish, Wildlife and Lands Branch.
a) Calculated when captures present.

13.0 Saskatchewan ENV Caribou Habitat Mapping

13.1 Study Objectives

The objectives of the use of this mapping include:

- utilize existing government data to highlight woodland caribou habitat potential for the area of the Project;
- utilize existing government data to map woodland caribou habitat suitability for the area of the Project; and
- utilize all possible data sources to complement and enhance Project specific data collection efforts to support the development of a scientifically defensible baseline.

13.2 Methods

Analyze and compile the existing provincial government data sources and data sets. This involved a download, clip, and display of existing government mapping (ENV 2017a).

13.3 Results

Woodland caribou habitat potential within the provincial forest of central and northern Saskatchewan has been identified by ENV using a forest ecosite geographic information system layer, which has been mapped for SK2 (ENV 2017a). Forest ecosites represent information about a site's tree species, plant-abundance, and soil and site characteristics (McLaughlan et al. 2010). According to ENV (2017a), forest ecosite habitat potential ranks were assigned by individually evaluating the ecosite's potential to provide forage, refuge, and calving habitat. The ecosite rankings were completed by a panel of biologists with expertise on woodland caribou habitat use in Saskatchewan (ENV 2017b). These data are currently only available for the SK2 region. Therefore, the analysis has only been completed for the Project RSA and LSA where mapping is available. Currently, no detailed mapping is available for the CRSA.

Habitat potential refers to the capability of a habitat type (excluding water/lake ice) to support a wildlife species for its various life requirements and potential, and does not consider the current state of the habitat (e.g., recently burned or harvested), but rather its potential optimal state (ENV 2017a). The woodland caribou habitat potential for the LSA, RSA and CRSA are provided in Figure 3.1-1. Within the LSA, 777.1 ha (23.3%) is mapped as having high potential; 2,530.4 ha (80%) as having moderate potential; and 22.5 ha (0.7%) as having low potential for providing woodland caribou habitat. Within the parts of the RSA where data are available, the corresponding values are 6,475.9 ha (24.6%), 19,641.8 ha (74.6%), and 253.3 ha (1%), for high, moderate, and low potential, respectively (Table 13.3-1).

Table 13.3-1 Overview of Potential Versus Suitable Woodland Caribou Habitat in the Parts of the LSA and RSA Where Data are Available

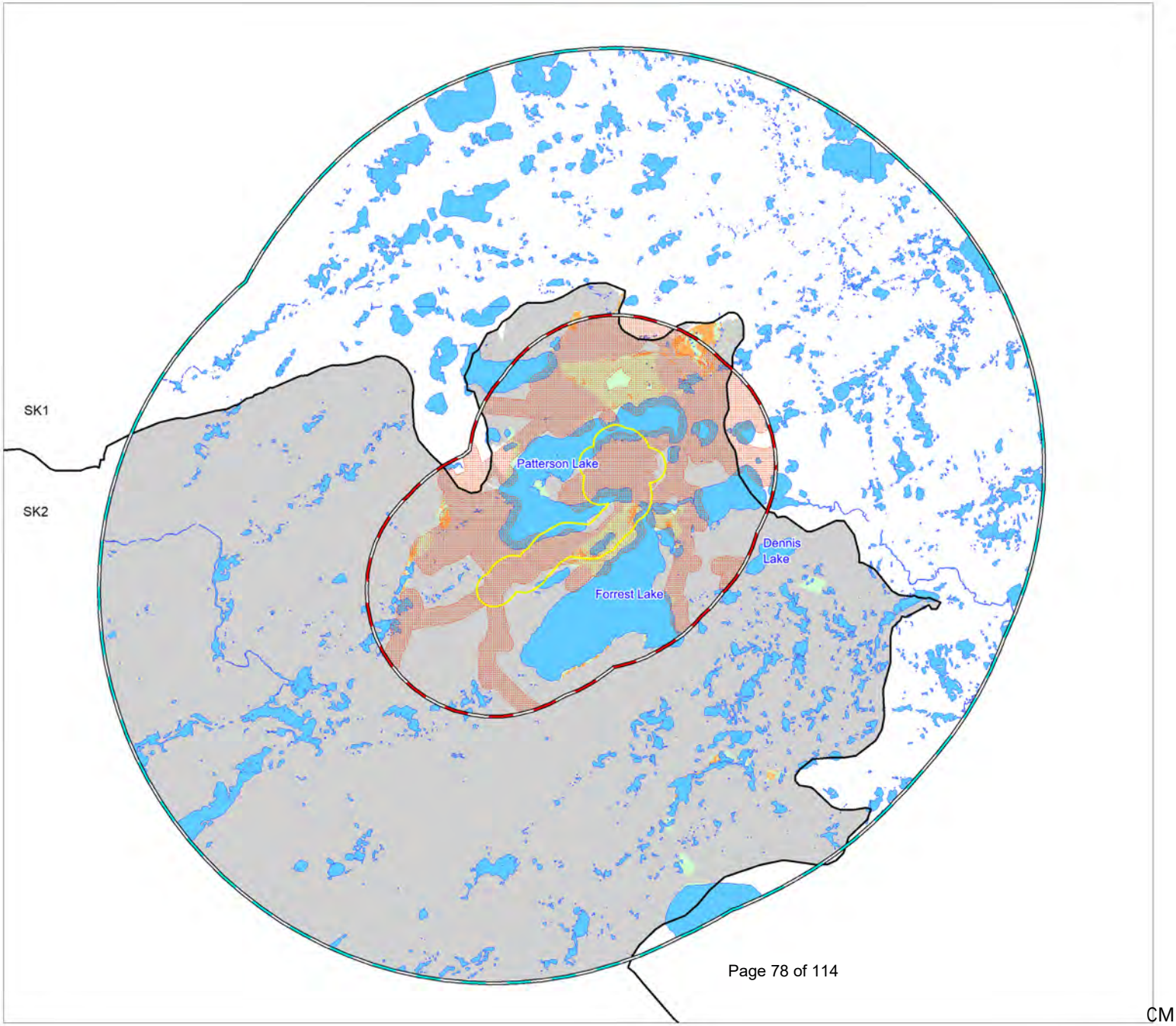
Study Area	Rating	Potential Habitat (ha)	Suitable Habitat (ha)	Area Reduced (ha)
LSA	High	777.1	0.0	-777.1
	Moderate	2,530.4	2.9	-2,527.5
	Low	22.5	0.6	-21.9
RSA	High	6,475.9	58.0	-6,417.9
	Moderate	19,641.8	446.5	-19,195.3
	Low	253.3	173.9	-79.5

Source: HabiSask 2018.

In comparison, habitat suitability reflects the status of the habitat and includes the effects of fire or forest harvesting on seral stage (i.e., sequence of vegetation development over time), habitat loss, reduced use of a habitat by caribou resulting from sensory disturbance adjacent to human land use features, increased risk of mortality, and other factors (ENV 2017a). The status of the habitat is therefore the habitat potential layer as discussed above, with the disturbance (plus buffer) removed (Gigi Pittoello, pers. comm.). By removing the layers covered by fires younger than 40 years and mapped anthropogenic disturbance, including the 500-m buffer, the current suitability is reduced to a few fragmented patches of suitable habitat (Figure 13.3-1). The current areas of suitable habitat in the LSA are <0.1 ha (high suitability), 2.9 ha (moderate suitability), and 0.6 ha (low suitability). In the RSA the suitable areas are 58.0 ha (high suitability), 446.5 ha (moderate suitability), and 173.9 ha (low suitability).

The CRSA straddles both the Boreal Plain (59%) and the Boreal Shield (41%) Ecozones relatively evenly (Figure 13.3-1). Population and species distribution objectives differ between the Boreal Shield and the Boreal Plain in Saskatchewan (ECCC 2020). In the Boreal Plain, the published goal is to achieve at least 65% undisturbed habitat, and in the Boreal Shield (SK1) the published goal is to achieve at least 40% undisturbed habitat. Because the Landscape Areas in this portion of the Boreal Plain are more representative of the Boreal Shield, and because land uses (e.g., lack of commercial logging) in the CRSA are also more like those in the Boreal Shield, it may be appropriate, from a woodland caribou perspective, to manage woodland caribou using Boreal Shield criteria and objectives.

Figure 13.3-1 Woodland Caribou Habitat Potential



Legend

Habitat Rating
- Low
- Moderate
- High
- Data N/A
- Waterbody
- 500m Anthropogenic Linear Buffer
- Wildfire from 1978 - 2018
- Caribou Regional Study Area (CRSA)
- Regional Study Area (RSA)
- Local Study Area (LSA)

source: HabiSask

N W E S

0 5 10
kilometers
Scale = 1 : 210,000

OMNIA ECOLOGICAL SERVICES

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14.0 SUMMARY

This report documents and summarizes baseline conditions for wildlife elements including: waterfowl, terrestrial and semi-aquatic furbearers and baseline chemistry of small mammals obtained during field programs completed in 2018, 2019 and 2020. This wildlife baseline data will be used to support future pre-feasibility studies, technical assessments, Project layout, and environmental effects assessments related to the to the mining of the Arrow deposit and the development of associated Project infrastructure.

The objectives of the wildlife baseline surveys were to:

- characterize the existing terrestrial environment in the area of the Project (natural and anthropogenic elements);
- inform environmental effects and technical assessments;
- ensure the baseline studies meet all provincial and federal regulatory requirements for the effects assessment;
- inventory wildlife species occurrence;
- capture information from community engagements and stakeholder considerations;
- establish a framework to facilitate future environmental effects monitoring; and
- support the development of Project specific mitigation strategies.

All field work was completed under approved Government of Saskatchewan Species Detection and Research Permits.

The terrestrial baseline surveys were established using three nested study areas to guide impact assessments of Project-specific and cumulative impacts on potential wildlife valued components. Several baseline field investigations were undertaken including:

- winter track counts;
- winter backtrailing;
- ungulate pellet group/carnivore scat and browse surveys;
- small mammal trapping and habitat assessments;
- small mammal tissue collection and chemistry analysis;
- semi-aquatic furbearer surveys;
- waterfowl and raptor surveys; and
- covert camera surveys.

Relevant mapping and database searches were also completed to complement data collected specifically for the Rook I Project. A desktop assessment and evaluation indicated that there was the potential for 194 different species of wildlife to occur within our study area. Field investigations were comprehensive and documented 73 different wildlife species. Of these, 13 sensitive or at risk vertebrate species were documented including: common loon, red-throated loon, woodland caribou, river otter, bald eagle, common nighthawk, barn swallow, olive-sided flycatcher, Bonaparte's gull, hearing gull, common tern, American white pelican and osprey.

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16.0 APPENDICES

Appendix A.

Appendix A. List of Vertebrates Known or With Potential to Occur in the Area of the Project.

Common Name	Scientific Name	At Risk Designation			Detected/Program*
		SKCDC	COSEWIC	SARA	
BIRDS					
Greater White-fronted	*Anser albifrons*				Not detected
Snow Goose	*Anser caerulescens*				Incidental
Canada Goose	*Branta canadensis*	S2N			Aerial Waterfowl, Incidental
Cackling Goose	*Branta hutchinsii*				Not detected
Ross' Goose	*Anser rossii*				Not detected
Tundra Swan	*Cygnus columbianus*				Aerial Waterfowl
American Black Duck	*Anas rubripes*				Not detected
American Wigeon	*Mareca americana*				Not detected
Mallard	*Anas platyrhynchos*				Aerial Waterfowl
Gadwall	*Mareca strepera*				Not detected
Canvasback	*Aythya valisineria*	S2N			Not detected
Ruddy Duck	*Oxyura jamaicensis*				Not detected
Blue-winged Teal	*Spatula discors*				Not detected
Northern Shoveler	*Anas clypeata*				Not detected
Northern Pintail	*Anas acuta*				Not detected
Green-winged Teal	*Anas crecca*				Aerial Waterfowl
Redhead	*Aythya american*	S2N			Not detected
Ring-necked Duck	*Aythya collaris*				Aerial Waterfowl
Greater Scaup	*Aythya marila*				Not detected
Lesser Scaup	*Aythya affinis*	S3N			Aerial Waterfowl
Surf Scoter	*Melanitta perspicillata*	S3M			Not detected
White-winged Scoter	*Melanitta fusca*	S3M			Not detected
Long-tailed Duck	*Clangula hyemalis*				Not detected
Bufflehead	*Bucephala albeola*	S1N,S3M			Aerial Waterfowl, Incidental
Common Goldeneye	*Bucephala clangula*	S3N,S3M			Aerial Waterfowl
Common Merganser	*Mergus merganser*	S2N			Aerial Waterfowl

Appendix A cont.

Common Name	Scientific Name	At Risk Designation			Detected/Program*
		SKCDC	COSEWIC	SARA	
Red-breasted Merganser	*Mergus serrator*				Not detected
Ruffed Grouse	*Bonasa umbellus*				Not detected
Spruce Grouse	*Falcipennis canadensis*				Incidental
Willow Ptarmigan	*Lagopus lagopus*				Game Camera
Sharp-tailed Grouse	*Tympanuchus*				Not detected
Red-throated Loon	*Gavia stellata*	S1B, S1M			Aerial Waterfowl
Common Loon	*Gavia immer*		Not at Risk		Aerial Waterfowl, Incidental
Red-necked Grebe	*Podiceps grisegena*		Not at Risk		Not detected
Horned Grebe	*Podiceps auritus*	S5B, S5M	Special	Special	Not detected
Pied-billed Grebe	*Podilymbus podiceps*				Not detected
American Bittern	*Botaurus lentigenosis*				Not detected
Black-crowned Night-	*Nycticoraz nycticorax*				Not detected
American White Pelican	*Pelecanus*		Not at Risk		Aerial Waterfowl
Double-crested	*Phalacrocorax auritus*		Not at Risk		Not detected
Osprey	*Pandion haliaetus*	S2B, S2M			Aerial Waterfowl, Incidental
Bald Eagle	*Haliaeetus leucocephalus*		Not at Risk		Aerial Waterfowl, Incidental
Northern Harrier	*Circus hudsonius*		Not at Risk		Not detected
Golden Eagle	*Aquila chrysaetos*	S3B,S3N,S4M	Not at Risk		Not detected
Sharp-shinned Hawk	*Accipiter striatus*	S2N	Not at Risk		Not detected
Northern Goshawk	*Accipiter gentilis*	S3N	Not at Risk		Not detected
Broad-winged Hawk	*Buteo platypterus*	S3M			Not detected
Red-tailed Hawk	*Buteo jamaicensis*	S1N	Not at Risk		Aerial Waterfowl, Incidental
Rough-legged Hawk	*Buteo lagopus*		Not at Risk		Not detected
American Kestrel	*Falco sparverius*	S1N			Not detected
Merlin	*Falco columbarius*		Not at Risk		Not detected
Gyrfalcon	*Falco rusticolus*		Not at Risk		Not detected
Peregrine Falcon	*Falco peregrinus*	S1B,SNRM	Not at Risk	Special	Not detected

Appendix A cont.

Common Name	Scientific Name	At Risk Designation			Detected/Program*
		SKCDC	COSEWIC	SARA	
Sora	*Porzan carolina*				Not detected
Yellow Rail	*Coturnicops*	S3B, S3M	Special Concern	Special	Not detected
American Coot	*Fulica americana*		Not at Risk		Aerial Waterfowl
Sandhill Crane	*Antigone canadensis*				Aerial Waterfowl, Incidental
Whooping Crane	*Grus americana*	SXB, S1M	Endangered	Endangered	Not detected
Black-bellied Plover	*Pluvialis squatarola*				Not detected
American Golden-Plover	*Pluvialis dominica*				Not detected
Semipalmated Plover	*Charadrius sempalmatus*				Not detected
Killdeer	*Charadrius vociferus*				Not detected
Spotted Sandpiper	*Actitis macularia*				Not detected
Solitary Sandpiper	*Tringa solitaria*				Not detected
Greater Yellowlegs	*Tringa melanoleuca*				Not detected
Lesser Yellowlegs	*Tringa flavipes*				Not detected
Hudsonian Godwit	*Limosa haemastica*	S4M	Threatened		Not detected
Ruddy Turnstone	*Arenaria interpres*				Not detected
Sanderling	*Calidris alba*				Not detected
Semipalmated Sandpiper	*Calidris pusilla*				Not detected
Least Sandpiper	*Calidris minutilla*				Not detected
White-rumped Sandpiper	*Calidris fuscicollis*				Not detected
Baird's Sandpiper	*Calidris bairdii*				Not detected
Pectoral Sandpiper	*Calidris melanotos*				Not detected
Stilt Sandpiper	*Calidris himantopus*				Not detected
Buff-breasted Sandpiper	*Calidris subruficollis*	S4M	Special Concern	Special	Not detected
Eskimo Curlew	*Numenius borealis*	SXB,SXM	Endangered	Endangered	Not detected
Short-billed Dowitcher	*Limnodromus griseus*				Not detected
Long-billed Dowitcher	*Limnodramus scolopaceus*				Not detected
Wilson's Snipe	*Gallinago delicata*				Incidental

Appendix A cont.

Common Name	Scientific Name	At Risk Designation			Detected/Program*
		SKCDC	COSEWIC	SARA	
Red-necked Phalarope	*Phalaropus lobatus*	S4B, S3M	Special	Special	Not detected
Franklin's Gull	*Leucophaeus pipixcan*				Not detected
Bonaparte's Gull	*Chroicocephalus philadelphia*				Aerial Waterfowl
Ring-billed Gull	*Larus delawarensis*				Not detected
California Gull	*Larus californicus*				Aerial Waterfowl
Herring Gull	*Larus argentatus*				Aerial Waterfowl
Sabine's Gull	*Xema sabini*				Not detected
Thayer's Gull	*Larus thayeri*				Not detected
Caspian Tern	*Hydroprogne caspia*	S2B, S2M	Not at Risk		Not detected
Black Tern	*Chlidonias niger*		Not at Risk		Not detected
Common Tern	*Sterna hirundo*		Not at Risk		Aerial Waterfowl
Arctic Tern	*Sterna paradisaea*	S3B, S3M			Not detected
Great Horned Owl	*Bubo virginianus*				Not detected
Snowy Owl	*Bubo scandiacus*		Not at Risk		Not detected
Northern Hawk Owl	*Surnia ulula*	S3B, S5N	Not at Risk		Not detected
Short-eared Owl	*Asio flammeus*	S3B, S2N,	Special	Special	Not detected
Barred Owl	*Strix varia*	S3			Not detected
Great Grey Owl	*Strix nebulosa*	S3	Not at Risk		Not detected
Boreal Owl	*Aegolius funereus*	S3	Not at Risk		Not detected
Common Nighthawk	*Chordeiles minor*	S4B, S4M	Special	Threatened	Incidental
Belted Kingfisher	*Megaceryle alcyon*				Incidental
Yellow-bellied	*Sphyrapicus varius*				Game Camera
Downy Woodpecker	*Picoides pubescens*				Not detected
Hairy Woodpecker	*Picoides villosus*				Not detected
Three-toed Woodpecker	*Picoides dorsalis*				Incidental
Black-backed	*Picoides arcticus*				Incidental
Northern Flicker	*Colaptes auratus*				Not detected

Appendix A cont.

Common Name	Scientific Name	At Risk Designation			Detected/Program*
		SKCDC	COSEWIC	SARA	
Pileated Woodpecker	*Dryocopus pileatus*	S3			Not detected
Olive-sided Flycatcher	*Contopus cooperi*	S4B, S4M	Special	Threatened	Incidental
Western Wood-Pewee	*Contopus sordidulus*				Not detected
Yellow-bellied Flycatcher	*Empidonax flaviventris*				Not detected
Alder Flycatcher	*Empidonax alnorum*				Incidental
Least Flycatcher	*Empidonax minimus*				Incidental
Eastern Phoebe	*Sayornis phoebe*				Not detected
Eastern Kingbird	*Tyrannus tyrannus*				Not detected
Northern Shrike	*Lanius borealis*	S1B, S4N, S4M			Not detected
Blue-headed Vireo	*Vireo solitarius*				Not detected
Warbling Vireo	*Vireo gilvus*				Incidental
Philadelphia Vireo	*Vireo philadelphicus*				Not detected
Red-eyed Vireo	*Vireo olivaceus*				Incidental
Blue Jay	*Cynocitta cristata*				Not detected
Canada Jay	*Perisoreus canadensis*				Pellet, Game Camera, Incidental
American Crow	*Corvus brachyrhynchos*				Not detected
Common Raven	*Corvus corax*				Aerial Waterfowl
Horned Lark	*Eremophila alpestris*	S3N			Not detected
Tree Swallow	*Tachycineta bicolor*				Not detected
Bank Swallow	*Riparia riparia*	S4B, S5M	Threatened	Threatened	Not detected
Cliff Swallow	*Petrochelidon pyrrhonota*				Not detected
Barn Swallow	*Hirundo rustica*	S5B, S5M	Threatened	Threatened	Incidental
Black-capped Chickadee	*Poecile atricapillus*				Not detected
Boreal Chickadee	*Poecile hudsonicus*				Not detected
Red-breasted Nuthatch	*Sitta canadensis*				Incidental
Winter Wren	*Troglodytes troglodytes*				Not detected
Marsh Wren	*Cistothorus palustris*				Not detected

Appendix A cont.

Common Name	Scientific Name	At Risk Designation			Detected/Program*
		SKCDC	COSEWIC	SARA	
Ruby-crowned Kinglet	*Regulus calendula*				Incidental
Golden-crowned Kinglet	*Regulus satrapa*				Incidental
Gray-cheeked Thrush	*Catharus minimus*				Not detected
Swainson's Thrush	*Catharus ustulatus*				Incidental
Hermit Thrush	*Catharus guttatus*				Incidental
Mountain Bluebird	*Sialia currocoides*				Not detected
American Robin	*Turdus migratorius*				Incidental
European Starling	*Sturnus vulgaris*				Not detected
American Pipit	*Anthus rubescens*				Not detected
Bohemian Waxwing	*Bombycilla garrulus*				Not detected
Cedar Waxwing	*Bombycilla garrulus*				Not detected
Tennessee Warbler	*Oreothlypis peregrina*				Not detected
Orange-crowned Warbler	*Oreothlypis celata*				Not detected
Yellow Warbler	*Setophaga petechia*				Not detected
Magnolia Warbler	*Setophaga magnolia*				Not detected
Black-and-white Warbler	*Mniotilta varia*				Not detected
Black-throated Green Warbler	*Setophaga virens*				Not detected
Canada Warbler	*Cardellina canadensis*	S4B, S3M	Threatened	Threatened	Not detected
Cape May Warbler	*Setophaga tigrina*				Not detected
Yellow-rumped Warbler	*Setophaga coronata*				Incidental
Palm Warbler	*Setophaga palmarum*				Not detected
Bay-breasted Warbler	*Setophaga castanea*				Not detected
Blackpoll Warbler	*Setophaga striata*				Not detected
Connecticut Warbler	*Oporornis agilis*	S2B, S2M			Not detected
Mourning Warbler	*Geothlypis philadelphia*				Not detected
Ovenbird	*Seiurus aurocapillus*				Not detected
Northern Waterthrush	*Parkesia noveboracensis*				Not detected

Appendix A cont.

Common Name	Scientific Name	At Risk Designation			Detected/Program*
		SKCDC	COSEWIC	SARA	
Common Yellowthroat	*Geothlypis trichas*				Not detected
Wilson's Warbler	*Cardellina pusilla*				Not detected
American Redstart	*Setophaga ruticilla*				Not detected
Western Tanager	*Piranga ludoviciana*				Not detected
American Tree Sparrow	*Spizella arborea*				Not detected
Chipping Sparrow	*Spizella passerina*				Not detected
Clay-colored Sparrow	*Spizella pallida*				Not detected
House Sparrow	*Passer domesticus*				Not detected
Vesper Sparrow	*Pooecetes gramineus*				Not detected
Savannah Sparrow	*Passerculus sandwichensis*				Not detected
Le Conte's Sparrow	*Ammodramus leconteii*				Incidental
Fox Sparrow	*Passerella iliaca*				Incidental
Song Sparrow	*Melospiza melodia*				Not detected
Lincoln's Sparrow	*Melospiza lincolnii*				Not detected
Swamp Sparrow	*Melospiza georgiana*				Not detected
White-throated Sparrow	*Zonotrichia albicollis*				Incidental
Harris' Sparrow	*Zonotrichia querula*	SUB, S5M	Special		Not detected
White-crowned Sparrow	*Zonotrichia leucophrys*				Not detected
Dark-eyed Junco	*Junco hyemalis*				Incidental, Game Camera
Lapland Longspur	*Calcarius lapponicus*				Not detected
Smith's Longspur	*Calcarius pictus*				Not detected
Snow Bunting	*Plectrophenax nivalis*				Not detected
Red-winged Blackbird	*Agelaius phoeniceus*				Not detected
Yellow-headed Blackbird	*Xanthocephalus*				Not detected
Rusty Blackbird	*Euphagus carolinus*	S3B,SUN,S3M	Special	Special	Not detected
Common Grackle	*Quiscalus quiscula*				Not detected
Brewer's Blackbird	*Euphagus cyanocephalus*				Not detected

Appendix A cont.

Common Name	Scientific Name	At Risk Designation			Detected/Program*
		SKCDC	COSEWIC	SARA	
Brown-headed Cowbird	*Molothrus ater*				Not detected
Pine Grosbeak	*Pinicola enucleator*	S2B, S4N			Not detected
Rose-breasted Grosbeak	*Pheucticus*				Not detected
Purple Finch	*Haemorhous purpureus*				Not detected
Red Crossbill	*Loxia curvirostra*				Not detected
White-winged Crossbill	*Loxia leucoptera*	S3N			Not detected
Common Redpoll	*Acanthis flammea*				Not detected
Hoary Redpoll	*Acanthis hornemanni*				Not detected
Pine Siskin	*Spinus pinus*				Incidental
Mammals					
Masked Shrew	*Sorex cinereus*				Small Mammal Trapping
Dusky Shrew	*Sorex monticolus*				Not detected
Common Water Shrew	*Sorex palustris*				Small Mammal Trapping
Arctic Shrew	*Sorex arcticus*				Not detected
Pygmy Shrew	*Sorex hoyi*				Not detected
Little Brown Bat	*Myotis lucifugus*	S4B, S4N	Endangered	Endangere	Not detected
Northern Bat	*Myotis septentrionalis*	S3	Endangered	Endangere	Not detected
Silver-haired Bat	*Lasionycteris noctivagans*				Not detected
Big Brown Bat	*Eptesicus fuscus*				Not detected
Hoary Bat	*Lasiuris cinereus*				Not detected
Snowshoe Hare	*Lepus americanus*				Winter Tracking, Game Camera
Least Chipmunk	*Tamias minimus*				Not detected
Woodchuck	*Marmota monax*				Not detected
Red Squirrel	*Tamiasciurus hudsonicus*				Pellet, Winter Tracking, Game Camera,
Northern Flying Squirrel	*Glaucomys sabrinus*				Not detected
North American Beaver	*Castor canadensis*				Aerial Waterfowl, Shoreline
Deer Mouse	*Peromyscus maniculatus*				Small Mammal Trapping

Appendix A cont.

Common Name	Scientific Name	At Risk Designation			Detected/Program*
		SKCDC	COSEWIC	SARA	
Southern Red-backed	*Myodes gapperi*				Small Mammal Trapping
Eastern Heather Vole	*Phenacomys ungava*				Not detected
Meadow Vole	*Microtus pennsylvanicus*				Small Mammal Trapping
Yellow-cheeked Vole	*Microtus xanthognathus*				Not detected
Muskrat	*Ondatra zibethicus*				Shoreline
Northern Bog Lemming	*Synaptomys borealis*				Not detected
Meadow Jumping Mouse	*Zapus hudsonius*				Small Mammal Trapping
North American Porcupine	*Erethizon dorsatum*				Not detected
Coyote	*Canis latrans*				Winter Tracking
Grey Wolf	*Canis lupus*				Incidental, Game Camera
Red Fox	*Vulpes vulpes*				Winter Tracking, Incidental
Black Bear	*Ursus americanus*		Not at Risk		Aerial Waterfowl, Pellet, Game Camera, Incidental
American Marten	*Martes americana*				Winter Tracking, Game Camera
Fisher	*Pekania pennanti*				Winter Tracking
Short-tailed Weasel	*Mustela erminea*				Winter Tracking
Least Weasel	*Mustela nivalis*				Not detected
American Mink	*Neovison vison*				Pellet, Winter Tracking, Shoreline
Wolverine	*Gulo gulo*	S2	Special	Special	Not detected
Striped Skunk	*Mephitis mephitis*				Not detected
River Otter	*Lontra canadensis*	S3			Winter Tracking
White-tailed Deer	*Odocoileus virginianus*				Game Camera
Canada Lynx	*Lynx canadensis*		Not at Risk		Winter Tracking, Game Camera
Moose	*Alces alces*				Aerial Waterfowl, Pellet, Winter Tracking, Game Camera Tracking, Incidental
Woodland Caribou	*Rangifer tarandus*	S3	Threatened	Threatened	Pellet, Vegetation Survey, Game Camera, Incidental

Appendix A cont.

Common Name	Scientific Name	At Risk Designation			Detected/Program*
		SKCDC	COSEWIC	SARA	
Amphibians/ Reptiles					
Canadian Toad	*Anaxyrus hemiophrys*		Not at Risk		Not detected
Boreal Chorus Frog	*Pseudacris triseriata*		Not at Risk		Not detected
Wood Frog	*Lithobates sylvaticus*				Not detected
Northern Leopard Frog	*Lithobates pipiens*	S3	Special	Special Concern	Not detected
Red-sided Garter Snake	*Thamnophis sirtalis*				Not detected

* Species detections included visual/auditory observations, scat/pellet groups, winter tracking trails and general sign.

B: for a migratory species, applies to the breeding population in the province.

N: for a migratory species, applies to the non-breeding population in the province.

M: for a migratory species, rank applies to the transient (migrant) population.

U: status is uncertain in Saskatchewan because of limited or conflicting information (unrankable).

X: believed to be extinct or extirpated from the province.

NR: rank is not yet assigned or species has not yet been assessed (not ranked).

1: Critically Imperiled/ Extremely rare.

2: Imperiled/Very rare.

3: Vulnerable/Rare to uncommon.

4: Apparently Secure.

5: Secure/Common.

Saskatchewan Conservation Data Centre (SK CDC) go to: http://www.biodiversity.sk.ca.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and its recommendations for listing, go to: http://www.cosewic.gc.ca.

Species at Risk Act (SARA) and its registry of protected species go to: http://www.sararegistry.gc.ca.

Appendix B.

Appendix B. Terrestrial and Arboreal Lichen Occurrence by Ecosite Type in the Area of the Project- 2018/2019.

Ecosite Type	Total Sampling Area (ha)	n	Arboreal Lichen							Terrestrial Lichen		
			% Frequency Occurrence	Frequency by Cover Class						% Frequency Occurrence	Mean % Cover[a]	Importance Value
				1	2	3	4	5	Mean Cover Class[1]			
BP2	3.55	347	98.27	1.17	20.23	34.31	32.55	11.73	3.33	96.85	59.00	5714.04
BP3	2.38	233	96.14	0.89	23.66	45.98	26.79	2.68	3.07	68.67	10.32	708.67
BP4	0.18	18	61.11	27.27	9.09	45.45	18.18	0.00	2.55	77.78	6.36	494.67
BP11	0.09	9	33.33	0.00	33.33	33.33	0.00	33.33	3.33	11.11	3.00	33.33
BP12	1.19	116	66.27	11.82	42.73	31.82	11.82	1.82	2.49	75.00	21.86	1639.50
BP14	0.96	94	97.87	0.00	16.30	29.35	34.78	19.57	3.58	54.26	16.14	875.68
BP18	0.03	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BP19	0.47	45	91.11	0.00	7.32	9.76	41.46	41.46	4.17	37.78	9.12	344.53
BP20	1.01	93	34.41	0.00	6.25	40.63	34.38	18.75	3.66	53.76	16.46	884.95
BP21	0.04	4	25.00	0.00	0.00	0.00	100.00	0.00	4.00	0.00	0.00	0.00
BP22	0.02	2	50.00	0.00	0.00	0.00	100.00	0.00	4.00	0.00	0.00	0.00
BP23	0.31	34	85.29	0.00	34.48	27.59	10.34	27.59	3.31	11.76	33.75	397.06
BP24	0.05	5	80.00	0.00	0.00	25.00	50.00	25.00	4.00	20.00	3.00	60.00
BP25	0.01	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BP26	0.01	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DL1	0.01	1	100.00	0.00	0.00	100.00	0.00	0.00	3.00	100.00	70.00	7000.00
DL2	0.09	9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.44	16.00	711.11
RF1c	0.49	46	82.61	44.74	36.84	15.79	0.00	2.63	1.79	82.61	37.95	3135.00
RF1d	0.06	6	16.67	0.00	100.00	0.00	0.00	0.00	2.00	33.33	2.00	66.67
RF2c	12.20	1202	10.82	25.38	47.69	21.54	4.62	0.77	2.08	93.09	21.46	1997.82
RF2d	0.17	18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.89	4.07	158.28
RF2b	0.15	15	20.00	0.00	66.67	33.33	0.00	0.00	2.33	93.33	28.57	2666.53
RF3c	0.77	77	5.19	25.00	50.00	25.00	0.00	0.00	2.00	81.82	10.94	895.09
RF4	6.36	625	8.80	20.00	29.09	29.09	18.18	3.64	2.56	22.40	10.76	241.02
Total	**30.62**	**3004**	**37.32**	**7.49**	**26.58**	**32.74**	**24.00**	**9.19**	**3.01**	**70.27**	**25.46**	**1789.15**

a) when lichen is present.

Appendix C.

Appendix C. Woody Browse Availability and Use Summary by Ecosite in the Area of the Project- 2018/2019.

Ecosite Phase	n	Alder Spp. (*Alnus spp.*)						Prickly Rose (*Rosa acicularis*)				
		Frequency %	Mean PC[1]	Importance Value	% Browsed[a]	Importance Value		Frequency %	Mean PC[1]	Importance Value	% Browsed[a]	Importance Value
BP2	347	48.99	9.15	448.27	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP3	233	91.42	22.85	2088.86	0.01	0.91		0.43	2.50	1.07	0.00	0.00
BP4	18	72.22	18.27	1319.50	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP11	9	33.33	22.83	761.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP12	116	73.28	10.94	801.64	0.00	0.00		0.86	2.50	2.16	0.00	0.00
BP14	94	71.28	7.75	552.39	0.04	2.85		0.00	0.00	0.00	0.00	0.00
BP18	3	100.00	22.83	2283.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP19	45	2.22	2.50	5.56	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP20	93	13.98	12.88	180.04	0.19	2.66		0.00	0.00	0.00	0.00	0.00
BP21	4	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP22	2	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP23	34	41.18	16.68	686.82	0.36	14.82		0.00	0.00	0.00	0.00	0.00
BP24	5	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP25	1	100.00	2.50	250.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP26	1	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
DL1	1	100.00	2.50	250.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
DL2	9	11.11	2.50	27.78	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF1c	46	89.13	11.84	1055.30	0.38	33.87		0.00	0.00	0.00	0.00	0.00
RF1d	6	83.33	17.30	1441.67	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF2c	1202	44.93	10.57	474.86	0.08	3.59		0.00	0.00	0.00	0.00	0.00
RF2d	18	77.78	9.64	749.78	0.18	14.00		0.00	0.00	0.00	0.00	0.00
RF2b	15	40.00	13.33	533.20	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF3c	77	49.35	13.80	681.04	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF4	625	16.80	2.75	46.20	0.36	6.05		0.00	0.00	0.00	0.00	0.00
Total	**3004**	**44.41**	**11.97**	**531.56**	**0.09**	**4.00**		**0.07**	**2.50**	**0.17**	**0.00**	**0.00**

a) Calculated using percent cover/browse only where species/browse is present.

Appendix C cont.

Ecosite Phase	n	Willow Spp. (*Salix spp.*)						Tamarack (*Larix laricina*)				
		Frequency %	Mean PC[1]	Importance Value	% Browsed[a]	Importance Value		Frequency %	Mean PC[1]	Importance Value	% Browsed[a]	Importance Value
BP2	347	2.02	2.50	5.04	2.93	5.91		0.00	0.00	0.00	0.00	0.00
BP3	233	3.00	2.50	7.51	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP4	18	27.78	7.70	213.89	6.70	186.11		0.00	0.00	0.00	0.00	0.00
BP11	9	22.22	15.50	344.44	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP12	116	6.90	2.50	17.24	1.94	13.38		0.00	0.00	0.00	0.00	0.00
BP14	94	31.91	7.38	235.53	1.33	42.45		1.06	2.50	2.66	0.00	0.00
BP18	3	33.33	37.50	1250.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP19	45	11.11	10.30	114.44	3.60	40.00		8.89	2.50	22.22	0.00	0.00
BP20	93	8.60	9.00	77.42	2.88	24.77		16.13	3.37	54.35	0.00	0.00
BP21	4	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP22	2	0.00	0.00	0.00	0.00	0.00		50.00	2.50	125.00	0.00	0.00
BP23	34	85.29	26.28	2241.53	7.60	648.24		47.06	6.31	296.94	0.00	0.00
BP24	5	0.00	0.00	0.00	0.00	0.00		80.00	5.75	460.00	0.00	0.00
BP25	1	100.00	37.50	3750.00	15.50	1550.00		0.00	0.00	0.00	0.00	0.00
BP26	1	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
DL1	1	100.00	2.50	250.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
DL2	9	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF1c	46	13.04	2.50	32.61	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF1d	6	33.33	6.00	200.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF2c	1202	4.83	3.62	17.47	3.75	18.09		0.00	0.00	0.00	0.00	0.00
RF2d	18	33.33	12.67	422.33	15.08	502.67		0.00	0.00	0.00	0.00	0.00
RF2b	15	33.33	7.70	256.67	6.20	206.67		0.00	0.00	0.00	0.00	0.00
RF3c	77	7.79	4.67	36.39	2.58	20.10		0.00	0.00	0.00	0.00	0.00
RF4	625	1.92	2.50	4.80	6.88	13.21		0.32	2.50	0.80	0.00	0.00
Total	**3004**	**6.62**	**8.67**	**57.43**	**4.14**	**27.43**		**1.43**	**4.52**	**6.47**	**0.00**	**0.00**

a) Calculated using percent cover/browse only where species/browse is present.

Appendix C cont.

Ecosite Phase	n	Trembling Aspen (*Populus tremuloides*)						Paper Birch (*Betula papyrifer)*				
		Frequency %	Mean PC[1]	Importance Value	% Browsed[a]	Importance Value		Frequency %	Mean PC[1]	Importance Value	% Browsed[a]	Importance Value
BP2	347	0.86	2.50	2.16	0.00	0.00		10.37	3.58	37.14	0.14	1.45
BP3	233	1.72	2.50	4.29	0.00	0.00		11.16	4.85	54.12	0.19	2.12
BP4	18	5.56	2.50	13.89	0.00	0.00		72.22	24.54	1772.33	0.00	0.00
BP11	9	0.00	0.00	0.00	0.00	0.00		88.89	19.69	1750.22	0.00	0.00
BP12	116	0.00	0.00	0.00	0.00	0.00		31.90	4.50	143.53	0.07	2.23
BP14	94	0.00	0.00	0.00	0.00	0.00		67.02	3.33	223.18	0.00	0.00
BP18	3	0.00	0.00	0.00	0.00	0.00		66.67	9.00	600.00	0.00	0.00
BP19	45	0.00	0.00	0.00	0.00	0.00		8.89	5.75	51.11	0.63	5.60
BP20	93	0.00	0.00	0.00	0.00	0.00		10.75	7.70	82.80	0.25	2.69
BP21	4	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP22	2	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP23	34	0.00	0.00	0.00	0.00	0.00		20.59	8.07	166.15	0.36	7.41
BP24	5	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP25	1	0.00	0.00	0.00	0.00	0.00		100.00	2.50	250.00	0.00	0.00
BP26	1	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
DL1	1	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
DL2	9	0.00	0.00	0.00	0.00	0.00		11.11	2.50	27.78	0.00	0.00
RF1c	46	2.17	2.50	5.43	0.00	0.00		36.96	2.50	92.39	0.15	5.54
RF1d	6	0.00	0.00	0.00	0.00	0.00		100.00	20.42	2042.00	3.00	300.00
RF2c	1202	0.58	2.50	1.46	0.00	0.00		5.91	6.91	40.82	2.14	12.64
RF2d	18	0.00	0.00	0.00	0.00	0.00		94.44	44.65	4216.94	3.62	341.89
RF2b	15	0.00	0.00	0.00	0.00	0.00		40.00	10.50	420.00	3.00	120.00
RF3c	77	5.19	2.50	12.99	0.00	0.00		6.49	2.50	16.23	0.00	0.00
RF4	625	0.00	0.00	0.00	0.00	0.00		2.88	3.94	11.35	2.97	8.55
Total	**3004**	**0.67**	**2.50**	**1.66**	**0.00**	**0.00**		**11.58**	**8.18**	**94.76**	**0.94**	**10.89**

a) = Calculated using percent cover/browse only where species/browse is present.

Appendix C cont.

Ecosite Phase	n	Wild Red Raspberry (*Rubus idaeus*)						Birch Spp. (*Betula spp.*)				
		Frequency %	Mean PC[1]	Importance Value	% Browsed[a]	Importance Value		Frequency %	Mean PC[1]	Importance Value	% Browsed[a]	Importance Value
BP2	347	0.00	0.00	0.00	0.00	0.00		1.44	2.50	3.60	0.00	0.00
BP3	233	0.00	0.00	0.00	0.00	0.00		0.43	2.50	1.07	0.00	0.00
BP4	18	0.00	0.00	0.00	0.00	0.00		5.56	15.50	86.11	0.00	0.00
BP11	9	22.22	2.50	55.56	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP12	116	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP14	94	0.00	0.00	0.00	0.00	0.00		1.06	2.50	2.66	0.00	0.00
BP18	3	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP19	45	0.00	0.00	0.00	0.00	0.00		15.56	8.07	125.53	0.36	5.60
BP20	93	0.00	0.00	0.00	0.00	0.00		6.45	4.67	30.13	0.00	0.00
BP21	4	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP22	2	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP23	34	0.00	0.00	0.00	0.00	0.00		64.71	27.18	1758.71	0.00	0.00
BP24	5	0.00	0.00	0.00	0.00	0.00		60.00	2.50	150.00	0.00	0.00
BP25	1	0.00	0.00	0.00	0.00	0.00		100.00	37.50	3750.00	15.50	1550.00
BP26	1	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
DL1	1	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
DL2	9	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF1c	46	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF1d	6	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF2c	1202	0.00	0.00	0.00	0.00	0.00		0.17	2.50	0.42	1.25	0.21
RF2d	18	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF2b	15	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF3c	77	0.00	0.00	0.00	0.00	0.00		6.49	5.10	33.12	0.00	0.00
RF4	625	0.00	0.00	0.00	0.00	0.00		2.88	3.22	9.27	0.42	1.21
Total	**3004**	**0.07**	**2.50**	**0.17**	**0.00**	**0.00**		**2.40**	**11.79**	**28.26**	**0.39**	**0.93**

a) Calculated using percent cover/browse only where species/browse is present.

Appendix C cont.

Ecosite Phase	n	Currant Spp. (*Ribes spp.*)						Sweet Gale (*Myrica gale)*				
		Frequency %	Mean PC[1]	Importance Value	% Browsed[a]	Importance Value		Frequency %	Mean PC[1]	Importance Value	% Browsed[a]	Importance Value
BP2	347	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP3	233	0.00	0.00	0.00	0.00	0.00		0.43	2.50	1.07	0.00	0.00
BP4	18	0.00	0.00	0.00	0.00	0.00		11.11	15.50	172.22	0.00	0.00
BP11	9	0.00	0.00	0.00	0.00	0.00		11.11	15.50	172.22	0.00	0.00
BP12	116	0.00	0.00	0.00	0.00	0.00		3.45	5.75	19.83	0.00	0.00
BP14	94	0.00	0.00	0.00	0.00	0.00		26.60	4.58	121.81	0.00	0.00
BP18	3	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP19	45	0.00	0.00	0.00	0.00	0.00		35.56	7.13	253.51	0.00	0.00
BP20	93	0.00	0.00	0.00	0.00	0.00		3.23	2.50	8.06	0.00	0.00
BP21	4	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP22	2	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP23	34	2.94	2.50	7.35	0.00	0.00		70.59	6.29	444.00	0.00	0.00
BP24	5	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP25	1	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
BP26	1	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
DL1	1	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
DL2	9	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF1c	46	0.00	0.00	0.00	0.00	0.00		2.17	2.50	5.43	0.00	0.00
RF1d	6	0.00	0.00	0.00	0.00	0.00		16.67	15.50	258.33	0.00	0.00
RF2c	1202	0.00	0.00	0.00	0.00	0.00		0.33	2.50	0.83	0.00	0.00
RF2d	18	0.00	0.00	0.00	0.00	0.00		22.22	2.50	55.56	0.00	0.00
RF2b	15	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF3c	77	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
RF4	625	0.00	0.00	0.00	0.00	0.00		3.20	3.80	12.16	0.38	1.22
Total	**3004**	**0.03**	**2.50**	**0.08**	**0.00**	**0.00**		**3.53**	**5.41**	**19.09**	**0.07**	**0.25**

a) = Calculated using percent cover/browse only where species/browse is present.

Appendix D.

Appendix D. Sample of Game Camera Wildlife Photo Captures in the Area of the Project.

Camera 6 (All-season Road) – Black Bear with cubs

Appendix D cont.

Camera 12 (Trail) White-tailed Deer

Appendix D cont.

Camera 15 (Reference) - Moose

Appendix D cont.

Camera 7 (Reference) - Marten

Appendix D cont.

Camera 15 (Reference) - Red Squirrel

Appendix D cont.

Camera 15 (Reference) - Snowshoe Hare

Appendix D cont.

Camera 19 (Trail) - Grey Wolf

Appendix D cont.

Camera 17 (Conventional Cutline) – Moose

Appendix D cont.

Camera 21 (Hand-cut Line) – Woodland Caribou

Appendix D cont.

Camera 16 (Trail) - Red Fox

Appendix D cont.

Camera 12 (Trail) - Canada Lynx

Rook I Project

Environmental Impact Statement

Annex VIII.2: Wildlife Baseline Report 2 (Amphibians, Birds, and Bats)

WILDLIFE BASELINE REPORT 2 (AMPHIBIANS, BIRDS, AND BATS) FOR THE ROOK I PROJECT

Final Report

Prepared by:

Canada North Environmental Services
Saskatoon, Saskatchewan

Prepared for:

NexGen Energy Ltd.
Saskatoon, Saskatchewan

Project No. 3008

June 2024

EXECUTIVE SUMMARY

The Rook I Project (Project) is a proposed new uranium mining and milling operation that is 100% owned by NexGen Energy Ltd. (NexGen). The Project would be located in northwestern Saskatchewan, approximately 40 kilometres (km) east of the Alberta-Saskatchewan border, 130 km north of the town of La Loche, and 640 km northwest of the city of Saskatoon. The wildlife baseline program is a component of a comprehensive baseline program that documents the natural and socio-economic environments in the anticipated area of the Project. Information obtained through database searches and field surveys will be used alongside Indigenous knowledge in the Environmental Assessment and cumulative effects assessment, to inform Project planning, and for developing future monitoring programs and reclamation plans.

The program was designed to obtain comprehensive information characterizing wildlife, including species of conservation concern, and their habitats within near vicinity to the Project (Site Study Area [SSA] and a broader Local Study Area [LSA]). The SSA consisted of an area 25 square kilometres (km^2) in size that encompasses the Project footprint, and the LSA consisted of an area 225 km^2 in size that surrounds the SSA. To meet study objectives, species of conservation concern database searches, amphibian auditory surveys, breeding bird surveys, common nighthawk (*Chordeiles minor*) surveys, yellow rail (*Coturnicops noveboracensis*) surveys, and acoustic bat detection surveys were completed. Wildlife surveys were completed using a combination of in-situ and Autonomous Recording Units (ARU) methods.

A list of 15 species with conservation concern was compiled from database searches and by assessing biogeographical range for species potentially occurring in the region. The HABISask database search identified 11 wildlife species previously recorded within 30 km of the centre of the SSA, including 10 bird species and one mammal. A further two mammal species and two amphibian species were added to database search results based on biogeographical range and habitat potential within the LSA.

Two species of amphibians were detected in the study area, including Canadian toads (*Anaxyrus hemiophrys*) and wood frogs (*Lithobates sylvaticus*). Canadian toads were the only species of conservation concern detected, and the total number of detection locations, including survey results and incidental observations, included two sites in the SSA and five sites in the LSA.

During the breeding bird surveys, 100 point count locations were surveyed, including 53 in the SSA and 47 in the LSA using a mix of in-situ and ARU surveys. A total of 95 bird species were recorded, including 11 species of conservation concern. These included four species listed under the *Species at Risk Act* (SARA): common nighthawk, olive-sided flycatcher (*Contopus cooperi*), rusty blackbird (*Euphagus carolinus*), and barn swallow (*Hirundo rustica*). An additional 7 species with provincial activity restriction guidelines were observed, including Bonaparte's gull (*Chroicocephalus piladelphia*), common loon (*Gavia immer*), bald eagle (*Haliaeetus leucocephalus*), herring gull (*Larus argentatus*), osprey (*Pandion haliaetus*), American white pelican (*Pelicanus erythrorhyncos*), and great gray owl (*Strix nebulosa*).

A total of 27 locations were surveyed for common nighthawks and 15 wetlands for yellow rail using in-situ field surveys and ARU recordings. Detection rates per survey for common nighthawks ranged from zero to six individuals, and numerous incidental observations of common nighthawks were also recorded during other survey types completed in the SSA and LSA. No yellow rails were recorded during the surveys or incidentally, and the study area was determined to have minimal habitat suitable for this species.

Five bat detectors were installed in the SSA, and were designed to detect bats in three frequency groups: high frequency, low frequency, and myotis species. A total of 4,312 bat passes were recorded, including 4,206 in the high frequency and myotis groups, and 106 in the low-frequency group. Based on biogeographical range, abundance, call characteristics, and habitat suitability, bat passes categorized into either the high frequency or the Myotis groups are expected to be primarily composed of little brown myotis (*Myotis lucifugus*), and those individuals in the low frequency group are expected to be primarily composed of silver-haired (*Lasionycteris noctivagans*) or hoary bats (*Lasiurus cinereus*).

Overall, 19 sensitive species were detected during targeted field surveys and incidentally, including six species listed under SARA: common nighthawk, olive-sided flycatcher, rusty blackbird, barn swallow, boreal woodland caribou (*Rangifer tarandus caribou*), and bat species (potentially two species listed as endangered). An additional 12 species with provincial activity restriction guidelines were detected including Canadian toad, Bonaparte's gull, common loon, bald eagle, herring gull, osprey, American white pelican, great gray owl, and four bat species in the Family *Vespertilionidae*. One additional provincially rare insect species, luna moth (*Actias luna*), was also observed.

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Abbreviations	Definition
ARU	Autonomous recording unit
BCR	Bird Conservation Region
CanNorth	Canada North Environmental Services
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
EA	Environmental Assessment
EIS	Environmental Impact Statement
HABISask	Hunting, Angling and Biodiversity Information of Saskatchewan
LSA	Local Study Area
NexGen	NexGen Energy Ltd.
Project	Rook I Project
RSA	Regional Study Area
SARA	*Species at Risk Act*
SC	Study components
SCDC	Saskatchewan Conservation Data Centre
SOCC	Species of conservation concern
SSA	Site Study Area
TLU	Traditional Land Use
VC	Valued component

Units	Definition
cm	centimetres
dB	decibels
kHz	kilohertz
km	kilometres
km²	square kilometres
km/h	kilometres per hour
m	metres
ms	milliseconds
%	percent

1.0 INTRODUCTION

The Rook I Project (Project) is a proposed new uranium mining and milling operation that is 100% owned by NexGen Energy Ltd. (NexGen). The Project would be located in northwestern Saskatchewan, approximately 40 kilometres (km) east of the Alberta-Saskatchewan border, 130 km north of the town of La Loche, and 640 km northwest of the city of Saskatoon (Figure 1.0-1). The Project would reside within Treaty 8 territory and within the Métis Homeland. At a regional scale, the Project would be situated within the southern Athabasca Basin adjacent to Patterson Lake, and along the upper Clearwater River system (Figure 1.0-2). Access to the Project would be from an existing road off Highway 955. The Project would include underground and surface facilities to support the extraction and processing of uranium ore from the Arrow deposit, a land-based, basement-hosted, high-grade uranium deposit.

The wildlife baseline report represents a component of a comprehensive baseline program that documents the natural and socio-economic environments in the anticipated area of the Project. The wildlife baseline program was undertaken to provide context from which Project wildlife effects could be assessed in the Environmental Impact Statement (EIS).

Since exploration at the Project commenced in 2013, NexGen has engaged regularly and established relationships with local First Nations and Métis Groups (collectively referred to as Indigenous Groups) and northern communities, specifically those closest and with greatest access to the proposed Project. NexGen respects the rights of Indigenous Peoples and the unique relationship Indigenous Peoples have with the environment, and recognizes the importance of full and open discussion with interested or potentially affected Indigenous communities regarding the development, operation, and decommissioning of the proposed Project. Engagement activities to date, as well as future planned engagement activities, reflect the value NexGen places on meaningful engagement with Indigenous and northern communities who could be potentially affected by the proposed Project. Engagement mechanisms have included, but are not limited to: meetings with leadership, workshops and community information sessions, Project site tours, establishing Joint Working Groups to support the gathering and incorporation of Indigenous and Métis Knowledge throughout the Environmental Assessment (EA) process, and providing funding for Traditional Land Use (TLU) Studies[1] to understand how the proposed Project may interact with the Indigenous communities' traditional use of the anticipated area of the Project.

Feedback received during engagement activities was documented for contribution to the EIS for the Project; examples of feedback received include discussion of concerns, interests, potential adverse effects, mitigation, and design alternatives. Many baseline studies were initiated in advance of formal engagement on the EA for the Project; however, engagement during the execution of baseline studies has helped inform the understanding of baseline conditions and confirmed components of the natural and socio-economic environments that required study. A summary of feedback related to the terrestrial baseline program is presented in Appendix A of the Wildlife Baseline Road Map (Annex VIII).

[1] Traditional Land Use (TLU) Studies include all land use studies developed by the Project's affected Indigenous Groups, including Traditional Land Use and Occupancy studies, Traditional Knowledge and Use studies, and Indigenous Rights and Knowledge studies, henceforth referred collectively as TLU Studies.

Canada North Environmental Services (CanNorth) was retained to complete baseline investigations for select study components (SCs) for the Project. The details of studies conducted in 2018 to characterize aspects of the terrestrial environment, specifically amphibians, birds, and bats, are presented herein.

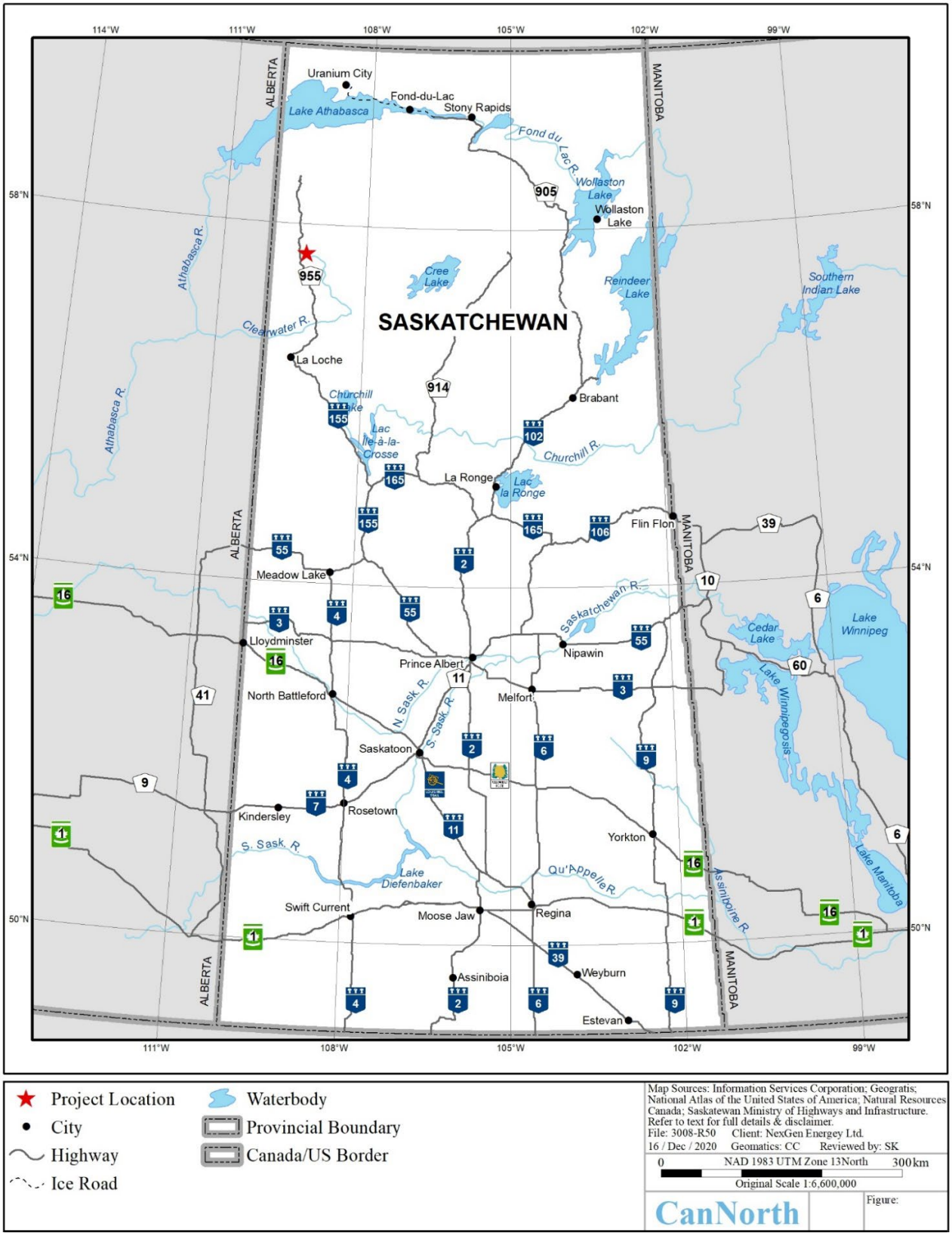

Figure 1.0-1: Location of the Rook I Project Within Saskatchewan

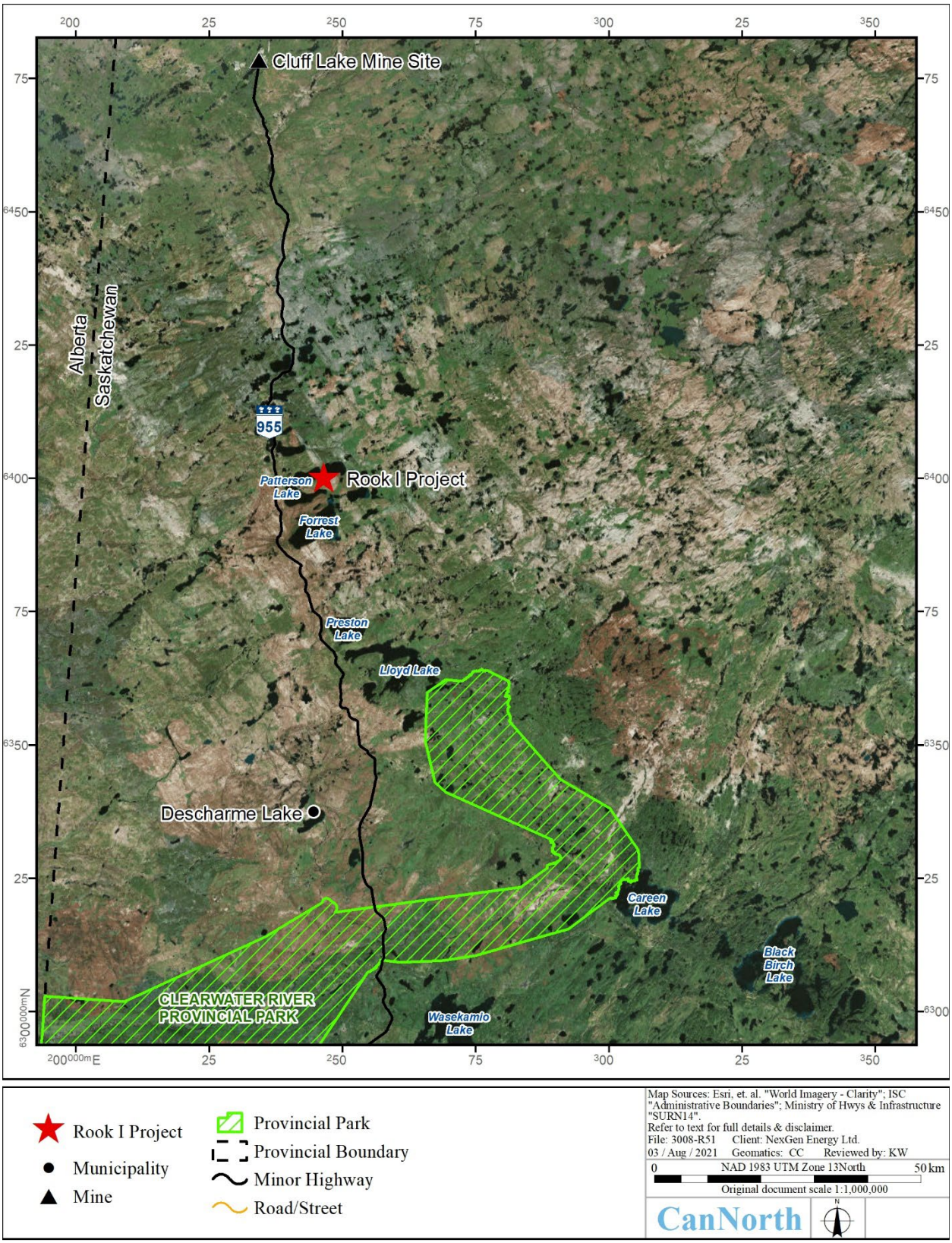

Figure 1.0-2: Location of the Rook I Project Within the Region

1.1 Study Objectives

The objective of the wildlife baseline program was to obtain comprehensive information to characterize wildlife, including species of conservation concern (SOCC) and the associated habitats within the area of the Project. Study components were chosen for the potential to be selected as a valued component (VC) during the EA process, based on best practices for baseline characterization (ENV 2014a; IAAC 2019; CNSC 2020). Valued components are those attributes that are scientifically, ecologically, historically, economically, socially, and culturally important to the government, Indigenous Groups, the public, the proponent, and other stakeholders (BC EAO 2013; ENV 2014a). Additionally, "the applicant or licensee should identify all biological species at risk (i.e., endangered, threatened, special concern, extirpated at a federal, provincial, or municipal level) known to occur in the area or where the site is within the range of the species" (CNSC 2020).

Collecting comprehensive baseline information on wildlife and wildlife habitat in the vicinity of the Project will provide valuable information for the EA, and planning mitigation measures, which aligns with items identified as important to Indigenous and Métis peoples in the region (Firelight Research Inc. 2019 a,b; WD Lewis & Associates Ltd. 2019; YNLR 2020; Origins Heritage Consulting Inc. 2020). Documenting wildlife species presence, as well as providing abundance estimates, will aid in determining which species to use as VCs for the EA, alongside Indigenous Knowledge gained through TLU studies and joint working group meetings held between NexGen and local community members.

A lifecycle approach was undertaken for the development and implementation of the Project baseline program that factored in data needs in the short and long term. The studies were designed to thoroughly prepare the Project for an EA, risk assessment and pathways modelling, as well as to establish long-term stations that can be sampled throughout the life of the mine. Studies completed provide quantitative data collected using accepted standards of good scientific practice and up-to-date sampling procedures and equipment. The study design involved sampling site, local, and regional study areas that included areas that can be used as reference sites during the operational phase of the Project.

To meet study objectives, the following desktop and field studies were completed as part of the wildlife baseline investigations for the Project:

- species of conservation concern database searches;
- autonomous recording units for detection of amphibians, birds, and bats;
- amphibian auditory surveys;
- breeding bird surveys;
- common nighthawk (*Chordeiles minor*) surveys;
- yellow rail (*Coturnicops noveboracensis*) surveys; and
- bat detection surveys.

The study design and objectives, methods, and results of each component of the wildlife baseline program conducted by CanNorth in 2018 are detailed in each section. Species nomenclature and common names used in this report follow the Saskatchewan Conservation Data Centre (SKCDC) taxa lists for vertebrates and invertebrates (SKCDC 2018a,b).

1.2 Study Area

1.2.1 Ecoregion Description

The Project footprint lies in the Boreal Plain Ecozone, with some portions of LSA (described below) extending into the Boreal Shield Ecozone. The Project footprint is within the Firebag Hills landscape area of the Mid-boreal Uplands Ecoregion, whereas the LSA is encompassed by two Ecoregions; the Mid-boreal Uplands Ecoregion plus the McTaggart Plain landscape area of the Athabasca Plain Ecoregion.

The Firebag Hills landscape area of the Mid-Boreal Upland Ecoregion is characterized by variable elevational gradients, ranging from 480 metres (m) to 580 m, with both strong and gentle rolling morainic hills (Acton et al. 1998). All water in this landscape area drains westward through the Clearwater River and associated watercourses. Regosolic soils are found predominantly on the eroding slopes of watercourses, whereas Dystric Brunisolic soils are found on more stable slopes and in the upland sections on top of sandy glacial till and glaciofluvial deposits. The vegetation on the northern part of this area is characterized by shrubby jack pine (*Pinus banksiana*) forests that possess lichen understoreys, a consequence of frequent forest fires and the sandy soils that lie beneath (Acton et al. 1998). Conversely, the poorly drained depression areas consist of tamarack (*Larix laricina*) and black spruce (*Picea mariana*) peatlands.

The McTaggart Plain landscape area of the Athabasca Plain Ecoregion has northward sloping hills from the southern point of this area, ranging from 540 m to 450 m (Acton et al. 1998). Sandy glaciofluvial deposits and eskers are abundant in the area, where Brunisolic soils can be found on these well-drained slopes and overtop the glacial till plains. Organic soils, Gleysolic soils, and Cryosolic soils dominate the poorly drained depression areas as well as large flat bogs, with permanently frozen Cryosols occasionally present. Jack pine and black spruce stands dominate the slopes of many eskers whereas open jack pine forests are exclusive to sandy glaciofluvial areas. The depression/boggy flat areas are covered in dense black spruce forests with stunted trees (Acton et al. 1998).

1.2.2 Wildlife Study Area

Study areas established for the wildlife baseline studies conducted by CanNorth in 2018 were determined based the deposit location, the preliminary site layout, regulatory requirements (provincial [GS 2014] and federal [IAAC 2019]), and study area sizes for other baseline investigations completed for similar northern mining developments (e.g., CanNorth 2010; 2013 a,b; AREVA 2016). Wildlife investigations were focused in a Site Study Area (SSA), as well as a broader Local Study Area (LSA), which are centred on the Arrow deposit (Figure 1.2-1).

The SSA included the area where the deposit and ultimately the construction and mine operations would occur. The SSA is where effects (i.e., total area subject to vegetation and soil disturbance which may have direct and indirect effects on wildlife) are expected to occur on the terrestrial environment (GS 2014) and consisted of an area 25 square kilometres (km^2)(5 km x 5 km) that encompasses the entire Project footprint (Figure 1.2-1). The LSA included the area outside the SSA where there is reasonable potential of direct and/or indirect effects on the terrestrial environment from project activities (GS 2014). The LSA was centered on the SSA and consisted of an area 225 km^2 (15 km x 15 km). The SSA and LSA boundaries are of an appropriate scale and location for assessment of effects on potential VCs resulting from existing and planned activities (CanNorth 2010; 2013 a,b; GS 2014; IAAC 2019).

Due to the focus of these wildlife baseline investigations on select SCs, a regional study area (RSA) was not identified as such areas are generally used for assessing the potential for direct/indirect and/or cumulative effects on wildlife that have large home ranges or spatial movements, such as woodland caribou (*Rangifer tarandus caribou*) (McLoughlin et al. 2016).

Note that these baseline study boundaries were defined at the beginning of the baseline field studies to inform the field study designs; however, the SSA and LSA vary from those chosen for the effects assessment conducted when the Project design was finalized.

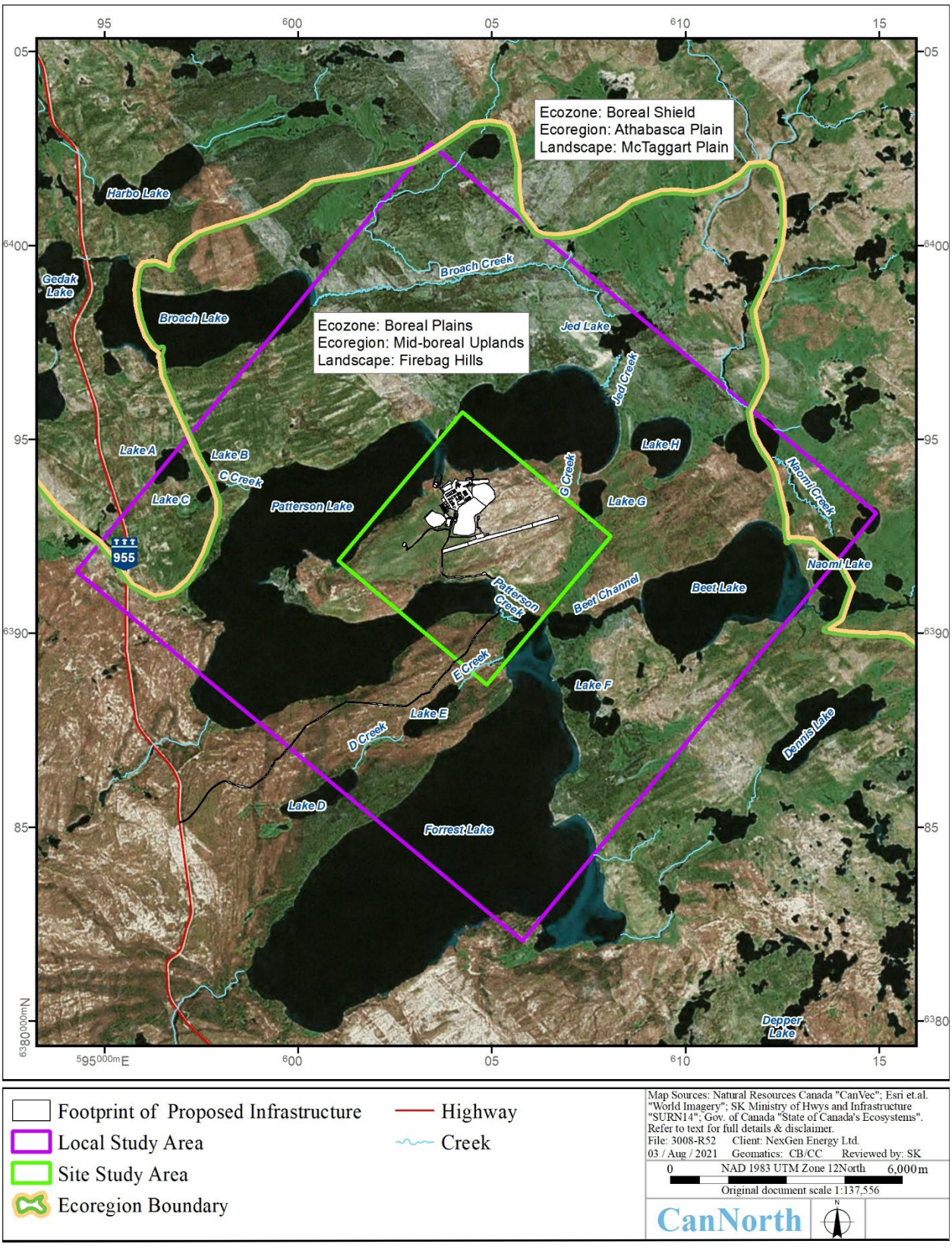

Figure 1.2-1: Overview of the Site Study Area and Local Study Area Sampled for Wildlife Baseline Studies, 2018

2.0 CONSERVATION DATABASE SEARCH AND EXISTING INFORMATION

2.1 Study Objectives

To meet regulatory guidance and scientific best practices, desktop database and information searches were completed prior to field baseline studies to aid in describing conditions in the terrestrial environment (ENV 2014a; IAAC 2019; CNSC 2020). The objective of the database searches was to summarize historical and geographical data on wildlife SOCC previously recorded or potentially found in the SSA and LSA. Species of conservation concern are likely to be considered VCs, as SOCC are scientifically, ecologically, historically, economically, and culturally important to the government, Indigenous groups, the public, the proponent, and other stakeholders (BC EAO 2013; GS 2014; IAAC 2019). Data provided by the database search results were used to plan in-field wildlife surveys, as well as inform field biologists of habitats which are likely to contain SOCC within the SSA and LSA.

2.2 Methods

Prior to field surveys, a list of wildlife SOCC was compiled. To identify habitats and SOCC that may occur within the SSA and LSA, provincial and federal databases were searched (IAAC 2019). Database searches were completed using the Hunting, Angling and Biodiversity Information of Saskatchewan (HABISask) mapping application (ENV 2018a) and the Species at Risk Public Registry (SARPR 2018). Search areas used for the HABISask database results encompassed a 30-km radius from the centre of the SSA. The Important Bird Areas (IBAs) of Canada Database (BSC 2015) was also accessed to determine if the LSA overlapped with any IBAs.

Search results for SOCC included federally listed species at risk and species considered provincially rare or sensitive that are expected to occur in the SSA and LSA, as well as previously recorded occurrences of rare, at-risk, and protected species in the vicinity of the LSA. Federally listed species at risk include species given a designation by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and/or by the Species at Risk Act (SARA; SARA 2002; SARPR 2018). Provincially rare or sensitive species are designated S1 (critically imperiled/extremely rare), S2 (imperiled/very rare), S3 (vulnerable/rare to uncommon), SH (historically present without recent verification), SNR (species not yet provincially ranked), or SU (provincial status uncertain due to insufficient information) by SKCDC (2018a,b).

2.3 Results

No amphibian SOCC were found in the HABISask database search results; however, the range of northern leopard frog (*Lithobates pipiens*) and Canadian toad (*Anaxyrus hemiophrys*) overlap the SSA and LSA (Hamilton et al. 1998; SARPR 2018). Northern leopard frog is listed as a species of special concern under SARA and COSEWIC and is provincially-ranked S3 (Table 2.3-1). Canadian toad is not federally listed as a species at risk and is provincially ranked S4 (apparently secure), but does have a provincially-recommended setback distance associated with breeding and overwintering habitats.

Ten avian SOCC have been previously documented in HABISask within the 30-km radius search area (Table 2.3-1). Common nighthawk, olive-sided flycatcher (*Contopus cooperi*), and barn swallow (*Hirundo rustica*) are all listed as threatened by COSEWIC and SARA (SARPR 2018). Seven additional bird species, including common goldeneye (*Bucephala clangula*), Bonaparte's gull (*Chroicocephalus piladelphia*), common loon (*Gavia immer*), bald eagle (*Haliaeetus leucocephalus*), herring gull (*Larus argentatus*), American white pelican (*Pelicanus erythrorhyncos*), and common tern (*Sterna hirundo*) are not listed

federally but have provincially-recommended setbacks and/or are ranked S3M (vulnerable/rare to uncommon and transient) by SKCDC (ENV 2017; SKCDC 2018a).

Two bat species at risk were identified by the HABISask database search to have ranges that are within 30 km of the Project (Table 2.3-1). Little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*), have breeding ranges overlapping the SSA and LSA (SARPR 2018). These species are listed as endangered by COSEWIC and SARA and are provincially-ranked S4 and S3, respectively (Table 2.3-1) (SARPR 2018; SKCDC 2018a). In addition, all bat species have an activity restriction setback for medium and high disturbance activities from their roost/foraging sites of 500 m year-round under the Saskatchewan Ministry of Environment's Activity Restriction Guidelines for Sensitive Species (ENV 2017).

The boreal population of woodland caribou is designated as threatened by COSEWIC and SARA and is provincially-ranked S3 (Table 2.3-1)(SARPR 2018; SKCDC 2018a). Habitat potential for this species is classified as medium to high throughout the majority of the SSA and LSA (ENV 2018a).

2.4 Existing Information

There is a paucity of existing information concerning amphibians, bats, and breeding birds in the area of the Project and in the region of northwest Saskatchewan. The HABISask mapping application (ENV 2018a) contains data on wildlife species submitted to the province as part of industrial and research activities. The HABISask application is the best place to look for existing wildlife information in the province (Dr. R. Fisher, Royal Saskatchewan Museum, pers. comm.).

No known amphibian surveys have occurred in the area of the Project due to its remote location in the northwest corner of the province (A. Didiuk, Canadian Wildlife Service, pers. comm.). Additionally, bats remain one of the least studied groups in Saskatchewan and to our knowledge, no studies have been completed within the area of the Project (Dr. M. Brigham, University of Regina, pers. comm.). A bat research project has just been initiated in the vicinity of Uranium City, Saskatchewan which is approximately 200 km north of the area of the Project (Dr. J. Lane, University of Saskatchewan, pers. comm.). Breeding bird surveys have increasingly been completed in the northwest part of the province as part of the ongoing Saskatchewan breeding bird atlas (SBBA 2021). In addition, the Canadian Wildlife Service has been completing aerial waterfowl surveys along pre-determined transects in strata 21 in northwest Saskatchewan since 1955 (USFWS 2021) focused on select species of diving and dabbling ducks. However, currently, no breeding bird surveys or aerial waterfowl surveys occur in the area of the Project (USFWS 2021; NABBS 2021; SBBA 2021).

To provide existing information on these three groups, a review of general species accounts or regional group summaries was completed below, along with descriptions of habitat types preferred by the species known to occur in the region.

Amphibians

There is the potential for four amphibian species to occur within the area of the Project; boreal chorus frog (*Pseudacris maculate*), wood frog (*Lithobates sylvaticus*), Canadian toad, and northern leopard frog. Canadian toads and northern leopard frogs are both sensitive species that have been observed as far north as Lake Athabasca in Saskatchewan, and both species have undergone population declines across their range (Browne 2009; Wagner 1997). Boreal chorus frogs and wood frogs are secure within the province.

Northern leopard frogs generally require three habitat types during their yearly cycle, including breeding wetlands, wintering habitat, and vegetated uplands used primarily for feeding during the late summer period in-between breeding and overwintering (COSEWIC 2009). Overall, in order to support northern leopard frogs, these habitat types must be spaced reasonably close together on the landscape. Their overwintering habitat is typically cold, well oxygenated waterbodies that do not freeze solid. After emergence from overwintering habitat, frogs begin their migration to breeding habitats in the spring between April and June. Adult frogs can travel up to 1.6 km to breed in shallow, warm waters of wetlands, margins of lakes, marshes, dugouts, springs, beaver ponds, flooded ditches, borrow pits, and slow moving waters of streams and rivers; in general suitable wetland habitat is signified by emergent and submergent vegetation where they can deposit eggs.

Canadian toads are most active at night hunting for food from May to October. They rest during the day and hide underneath leaves, rocks, logs or in patches of tall grass. In late fall they dig into soft ground by digging their back feet and burying down deep past the frost line where they spend the winter hibernating. Their breeding habitat consists of shallow lakes, ponds, or temporary bodies of water (Nature North 2021).

Boreal chorus frogs prefer forest openings surrounding woodland ponds for their preferred habitat. They will breed in fishless ponds with at least 10 cm of water, including shallow lakes, swamps, marshes, beaver ponds, roadside ditches, and flooded areas (Nature Watch 2021). Their overwintering strategy is hibernation and adults are freeze tolerant. They overwinter in underground rodent burrows, underneath vegetation or debris, and in crevices of rocks and logs (Government of Montana 2021).

Finally, wood frogs inhabit moist woodlands and vernal woodland pools for breeding. They are the early breeders and can begin calling when there is still ice present on the ponds in the spring. They are also freeze tolerant and hibernate underneath logs or leaf litter on the forest floor (Nature Watch 2021).

Bats

There is the potential for six bat species to occur within the area of the Project; big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), little brown bat, and northern myotis.

Big brown bat, little brown bat, and northern myotis all have an overwinter strategy of hibernating and their preferred habitats include caves and abandoned mines (AFWD 2006; Nature Serve 2009). These species tend to overwinter in caves and abandoned mines with densities up to 300,000 individuals in a single cave; they prefer large cavities a few degrees above freezing with a humidity level close to 80 %. All three species tend to return to the same overwintering site year after year. Little to no research has been completed on hibernating bats in caves in Saskatchewan. Dr. Mark Brigham, a Professor of Biology at the University of Regina who is an expert bat researcher, is unaware of any active hibernaculum in caves in Saskatchewan (Brigham pers. comm.). During the spring, females move to daytime roosts or maternity colonies to give birth; these may be areas such as the attics of buildings (Forsyth 1999; COSEWIC 2013). On the other hand, males are typically solitary and spread out from overwintering sites using temporary roosts in cavities near foraging areas (Forsyth 1999; COSEWIC 2013). Summer roosting habitat includes tree cavities, beneath exfoliating bark on trees, tree cavities and branches, and rock crevices (AFWD 2006). Mating occurs in the late summer and early fall, with males often perching in caves to produce echolocation calls

to court females. Old mines have also been known to be used as temporary roosts for courtship and mating or to raise their young (Tuttle et al. 1998).

Hoary bats are solitary, migratory, and overwinter in southern California, southeastern United States, Mexico, and Guatemala, although some have been known to overwinter in their northern range. They migrate and raise their young throughout Canada and the northern United States. Usually, only females and their young inhabit Canada while the males typically spend their summer in the western United States. They inhabit treed areas, including edges of clearings, heavy forests, open wooded areas, and shade trees along urban streets and in city parks. Hoary bats roost three to five metres above the ground during the day, usually in the foliage of trees, preferring dense leaf coverage. They may also be found roosting in tree cavities, under driftwood planks, overhangs of buildings and in caves (Anderson 2002; AEP 2009).

Silver-haired bats are colonial, migratory and overwinter in the southern United States. They migrate and raise their young throughout Canada and the United States. They inhabit coniferous or mixed coniferous and deciduous forest and summer roost in near the tops of trees, under tree bark or in tree cavities. Silver-haired bats feed in disturbed areas, tree-top level, small clearings and along roadways or watercourses. (BCI 2021a).

Eastern red bats are solitary, migratory and overwinter in the eastern part of North America. They inhabit foliage of deciduous or evergreen trees and tend to feed around forest edges, in clearings or around street lights (BCI 2021b).

Breeding Birds

The area of the Project spans two large bird conservation regions consisting of Boreal Taiga Plains (Boreal Plains) and Boreal Softwood Shield (Prairie Northern Region). Numerous bird species breed in these areas of the boreal forest. In Bird Conservation Region (BCR) 8 (boreal soft shield), there are approximately 215 bird species (upland breeding landbirds, shorebirds, waterbirds, and waterfowl) known to occur with 67 species that have been identified as priority species based on their distribution and abundance, their threats, their federal and provincial status, their inclusion in regional and continental conservation/stewardship plans, or based on expert opinion (EC 2014). Landbirds are the most represented species out of the 215 known bird species, representing approximately 152 species. Wetlands are some of the most important habitat features for birds in this region, with one third of the priority species using this cover type. Additionally, forests and shrub/early successional habitat are also used widely by priority species in this region. In BCR 6 (boreal plains), there are approximately 288 bird species known to occur, with 120 species that have been identified as priority species based on their distribution and abundance, their threats, their federal and provincial status, their inclusion in regional and continental conservation/stewardship plans, or based on expert opinion. Landbirds are the most represented species out of the 288 known bird species, representing approximately 150 species. The majority of the priority species (66%) prefer wetland habitat, with the second favored habitat being shrub/early successional forest (EC 2013).

Table 2.3-1: Database Search Results for Wildlife Species of Conservation Concern Potentially Occurring in the Local Study Area

Scientific Name	Common Name	Federal Rank and Activity Restriction Guidelines					Provincial Rank and Activity Restriction Guidelines				Habitat
		COSEWIC Status	SARA Status	Protected Aspect	Restricted Activity Dates	Setback Distance (m)	SKCDC Rank	Protected Aspect	Restricted Activity Dates	Setback Distance (m)	
Amphibians											
Anaxyrus hemiophrys	Canadian toad	-	-	-	-	-	S4	Breeding and overwintering habitat	Year round	90	Breeds in shallow areas of ponds, lakes and marshes. Winters in uplands in areas with sandy soil (NatureServe 2018).
Lithobates pipiens	Northern leopard frog	Special Concern	Special Concern	Breeding pond, wintering site	Year round	400	S3	Breeding and overwintering habitat	Year round	500	Breeds in pools, ponds, marshes, lakes, and slow-moving streams and creeks. Overwinters in large, well oxygenated waterbodies that do not freeze to the bottom (SARPR 2018).
Birds											
Bucephala clangula	Common goldeneye	-	-	Nest	During nesting period	10-30 up to 50+	S5B,S3M	-	-	-	Nests in tree cavities or infrequently, rock crevices, near wetlands, lakes, and rivers (Rodewald 2018).
Chordeiles minor	Common nighthawk	Threatened	Threatened	Nest	May 1 to August 31	200	S4B,S4M	Breeding bird	May 1 to August 31	200	Nests in a wide variety of open habitats including dunes, beaches, burns, logged areas, rocky outcrops, clearings, grasslands, and open forests (Rodewald 2018).
Chroicocephalus piladelphia	Bonaparte's gull	-	-	-	-	-	S4B,S4M	Nesting colony	May 1 to July 15	400	Nests in openings or edges of boreal forests, typically in coniferous trees adjacent to lakes, marshes, or muskegs (Rodewald 2018).
Contopus cooperi	Olive-sided flycatcher	Threatened	Threatened	Nest	May 1 to August 31	300	S4B,S4M	Breeding bird	May 1 to August 31	300	Nests in montane and northern open coniferous forests, typically preferring forest edges and riparian areas (Rodewald 2018).
Euphagus carolinus	Rusty Blackbird	Special concern	Special concern	Nest	May 1 to July 31	300	S3B,SUN,S3M	Breeding bird	May 1 to July 31	300	Nests close to water in wet coniferous and mixed-wood forests, fens, bogs, muskegs, and forest openings (Rodewald 2020).
Gavia immer	Common loon	Not at Risk	-	-	-	-	S5B,S5M	Breeding bird	May 15 to July 15	200	Nests on islands and in sheltered coves of large, clear lakes (Rodewald 2018).
Haliaeetus leucocephalus	Bald eagle	-	-	-	-	-	S5B,S4M	Nest site	March 15 to July 15	1000	Nests in forested areas or cliff faces adjacent to waterbodies supporting large-bodied fish (Rodewald 2018).
Hirundo rustica	Barn swallow	Threatened	Threatened	Active nest	May 1 to August 31	100	S5B,S5M	-	-	-	Nests almost exclusively on human-made structures such as barns, houses, or bridges, with a sheltering overhang and nearby open areas for foraging (Rodewald 2018).
Larus argentatus	Herring gull	-	-	-	-	-	S5B,S5M	Nesting colony	May 1 to July 15	400	Nests on dry, well-drained islands or other sites inaccessible to predators, often with some vegetative cover (Rodewald 2018).
Pandion haliaetus	Osprey	-	-	-	-	-	S2B,S2M	Nest site	May 1 to August 15	1000	Nests in trees or elevated structures near shallow, fish-bearing waters (Rodewald 2020).
Pelicanus erythrorhynchos	American white pelican	Not at Risk	-	-	-	-	S5B,S5M	Nesting colony	April 1 to July 31	1000	Nests colonially on isolated islands in freshwater lakes and rivers. Feeds in shallow lakes, rivers, and marshes (Rodewald 2018).
Sterna hirundo	Common tern	Not at Risk	-	-	-	-	S5B,S5M	Nesting colony	May 1 to July 15	400	Nests on treeless islands with rocky or gravelly substrate (Rodewald 2018).

Scientific Name	Common Name	Federal Rank and Activity Restriction Guidelines					Provincial Rank and Activity Restriction Guidelines				Habitat
		COSEWIC Status	SARA Status	Protected Aspect	Restricted Activity Dates	Setback Distance (m)	SKCDC Rank	Protected Aspect	Restricted Activity Dates	Setback Distance (m)	
Strix nebulosa	Great Grey Owl	-	-	-	-	-	S3	Nest site	March 1 to July 15	400	Nests in mixed-wood to coniferous forests and treed bogs (Rodewald 2020).
Mammals											
Eptesicus fuscus	Big Brown Bat	-	-	-	-	-	S5	Roost/Foraging Site	Year round	500	Forages in tree foliage, over water, or in urban areas. Roosts in buildings, structures, tree hollows or crevices, and rock crevices (NatureServe 2020).
Gulo gulo	Wolverine	Special concern	Special concern	Den	Year round	500	S2	Protected Vertebrata	-	-	Dens in caves, rock crevices, fallen trees, and thickets in boreal, arctic, and montane coniferous forests and tundra (NatureServe 2020).
Lasiurus borealis	Eastern Red Bat	-	-	-	-	-	S4B	Roost/Foraging Site	Year round	500	Forages in woodlands, in pastures, in urban parks, and over water. Roosts in foliage or bark of hardwood trees (NatureServe 2020).
Lasiurus cinereus	Hoary Bat	-	-	-	-	-	S5B	Roost/Foraging Site	Year round	500	Forages over water and along riparian corridors. Roosts in deciduous or coniferous trees (NatureServe 2020).
Lasionycteris noctivagans	Silver-haired Bat	-	-	-	-	-	S5B	Roost/Foraging Site	Year round	500	Forages over small waterbodies or within forested areas. Roosts in snags, tree foliage, tree cavities, and sometimes buildings (NatureServe 2020).
Lontra canadensis	River Otter	-	-	-	-	-	S3	Protected Vertebrata	-	-	Dens in hollow logs, burrows, or shrubby thickets along streams, lakes, ponds, marshes, estuaries, and coasts (NatureServe 2020).
Myotis lucifugus	Little brown myotis	Endangered	Endangered	-	-	-	S4	Roost and foraging site	Year round	500	Forages in lake and stream margins and in woodlands near water. Uses caves, hollow trees, and anthropogenic structures for roosting and raising young (NatureServe 2018).
Myotis septentrionalis	Northern myotis	Endangered	Endangered	-	-	-	S3	Roost and foraging site	Year round	500	Forages in forests, forest edges, and clearings, and occasionally over ponds. Roosts in dead or dying trees, crevices, and caves (NatureServe 2018).
Rangifer tarandus caribou	Woodland caribou	Threatened	Threatened	-	-	-	S3	-	-	-	Mature coniferous forests and forested peatlands rich in lichens (NatureServe 2018).
Insects											
Actias luna	Luna Moth	-	-	-	-	-	S2	-	-	-	Mixedwood and hardwood forests, usually containing its preferred host, white birch (*Betula papyrifera*) (UofA 2018).

3.0 AUTONOMOUS RECORDING UNITS

3.1 Study Objectives

To meet regulatory guidance and scientific best practices, field surveys were completed to assist in describing terrestrial environmental conditions (ENV 2014a; IAAC 2019; CNSC 2020). The objective of the field surveys was to summarize wildlife species distribution, habitat preferences, and identification of wildlife SOCC in the SSA and LSA. Objectives of specific field surveys are described in more detail in relevant sections below, with the value of acoustic surveys highlighted in this section. Acoustic surveys can be used to sample a large variety of taxa, including breeding birds, amphibians, and bats. This survey type can be conducted passively by listening for species-specific vocalizations during a set time interval, or these surveys may be supplemented with the use of a call broadcast (i.e., playing vocalizations of target species through speakers to elicit a behavioural response).

Another option for acoustic surveys is autonomous recording units (ARUs), which can be used as a cost-effective method for increasing sampling intensity for a variety of acoustic wildlife surveys especially in remote areas. Using ARUs can increase temporal sampling effort in areas with poor accessibility and may provide multiple improvements to sampling techniques, especially nocturnal surveys. In general, benefits of ARUs include increased observer safety, reduced human disturbance during sampling, the ability to sample multiple time intervals at each location to encompass temporal variation in peak detection periods, and detecting species that vocalize infrequently or inhabit remote areas (Goyette et al. 2011; Digby et al. 2013; Sidie-Slettedahl et al. 2015). Overall, ARUs are comparable to acoustic surveys with human observers in terms of target species detection probability (Shonfield et al. 2017; Van Wilgenburg et al. 2017). However, ARUs generate permanent records of acoustic surveys, which can be used to confirm identification of rare or sensitive species (Jones et al. 2007; Swiston and Mennill 2009) and the ARU recordings generate large volumes of baseline data, which can be stored digitally and used for future monitoring programs. ARUs are considered an acceptable alternative to a variety of in-situ surveys by ENV (2014b,c,d; 2015). Here, ARUs were used during field surveys for birds and amphibians to supplement in-situ human observer survey effort for several survey types throughout the SSA and LSA.

3.2 Methods

Fifteen ARUs (Wildlife Acoustics Model SM4) were deployed within the SSA (5 units) and LSA (10 units) in May 2018. Deployment sites were selected to ensure adequate coverage of various habitat types within the SSA and LSA, and consisted of areas with high habitat potential for multiple taxa (i.e., sensitive nocturnal bird species and amphibians; Figure 3.2-1; Table 3.2-1). Additionally, ARUs were primarily deployed in locations difficult or unsafe to access under nocturnal conditions, or prohibitively time-consuming to access within required survey timing intervals. To ensure consistency across sampling stations, ARUs were mounted at a height of 1.5 m (i.e., approximately head height) on the north side of trees such that microphones would have an east/west orientation. The diameter of selected trees did not exceed a width of 13 centimetres (cm) to reduce microphone obstruction (Appendix A, Photo 1).

Prior to deployment, all ARUs were programmed to facilitate auditory detection of multiple taxa. A dawn schedule was programmed to supplement breeding bird survey data and a dusk schedule was programmed to optimize detection of amphibians, and nocturnal birds (common nighthawks, yellow rails, and owl species). Schedules were programmed as follows:

- Dawn schedule: 30 minutes before sunrise – 4 hours after sunrise. Recording for 10 minutes every hour (i.e., on for 10 minutes, off for 50 minutes).
- Dusk chorus: 30 minutes before sunset – 5 hours after sunset. Recording for 10 minutes every hour (i.e., on for 10 minutes, off for 50 minutes).

ARUs were programmed to record to two 32 GB secure digital (SD) cards in uncompressed stereo WAV format with a sample rate of 44100 hertz (Hz) and microphone acoustic gain was set at 16.00 decibels (dB) with a preamplifier setting of 26 dB. Recordings were scheduled to start on 23 May 2018 and to run on the programmed schedule until the ARUs were retrieved in mid-July. ARU status was checked on subsequent visits to ensure proper function and to download data as required.

3.3 Results

All ARU's were functional throughout the survey periods for amphibians, breeding birds, and nocturnal birds (deployed 21 May and retrieved 10 July 2018) with no damage or malfunctions recorded. The total number of files successfully recorded was 8,932 ranging from 519 to 674 files per ARU, with a mean of 595 files per ARU. Total recorded data amounted to 1,488 hours.

Results specific to each survey are presented in detail in the following sections:

- Amphibian – Section 4.3
- Common nighthawk – Section 5.3
- Yellow rail – Section 6.3
- Breeding bird – Section 7.4

Figure 3.2-1: Autonomous Recording Unit Locations, May to July 2018

Table 3.2-1: Autonomous Recording Unit Locations, May to July 2018

ARU ID	UTM Location[a]		Project Study Area[b]	Habitat Description
	Easting	Northing		
ARU 01	601313	6398648	LSA	Mature jack pine adjacent burned forest and young conifer.
ARU 02	605792	6398598	LSA	Young and mature jack pine.
ARU 03	609906	6395870	LSA	Burned forest and bog, and mature conifer.
ARU 04	608183	6396958	LSA	Mature jack pine and creek with bridge.
ARU 05	603794	6394437	SSA	Mature jack pine adjacent to Patterson Lake shoreline.
ARU 06	599235	6391405	LSA	Mature jack pine adjacent to Patterson Lake shoreline.
ARU 07	606541	6385407	LSA	Mature jack pine and birch adjacent to Forest Lake shoreline.
ARU 08	603388	6391742	SSA	Black spruce bog adjacent to temporary drill trail.
ARU 09	605602	6393303	SSA	Young jack pine.
ARU 10	607388	6394103	LSA	Mature jack pine adjacent to Patterson Lake shoreline.
ARU 11	605113	6390534	SSA	Mature jack pine and birch adjacent to Patterson Lake and Patterson Creek opening.
ARU 12	602685	6387383	LSA	Mature jack pine and birch adjacent to small lake.
ARU 13	606593	6388821	LSA	Mature jack pine adjacent to bog and Forest Lake.
ARU 14	608124	6390784	LSA	Burned forest and bog adjacent to Beet Lake Channel.
ARU 15	601850	6391262	SSA	Black spruce bog adjacent to mature jack pine.

a) UTM = NAD 83 Zone 12U.

b) LSA = Local Study Area; SSA = Site Study Area.

4.0 AMPHIBIAN ACOUSTIC SURVEYS

4.1 Study Objectives

To meet regulatory guidance and scientific best practices, amphibian acoustic surveys were completed in the summer of 2018 to assist in describing terrestrial environmental conditions (ENV 2014a; IAAC 2019; CNSC 2020). The objectives of the amphibian acoustic surveys were to document distribution, abundance, and species composition of amphibians potentially occurring within the SSA and LSA, including SOCC. As amphibian SOCC are a potential VC, resulting data will assist in identifying amphibian populations and habitat features that may be protected under provincial or federal legislation, including activity restriction guidelines and/or SARA (EC 2009; ENV 2017; SARA 2002). Habitat features that support breeding or over-wintering amphibian SOCC, such as wetlands used as breeding and over-wintering sites, may also be considered as VCs.

4.2 Methods

Amphibian acoustic surveys were completed to determine the presence and distribution of amphibian species in the area of the Project. Two sensitive species (i.e., Canadian toad and northern leopard frog) have biogeographical ranges that are known to overlap the area of the Project, and both species have been observed as far north as Lake Athabasca in Saskatchewan. Population declines have been observed across the respective habitat ranges of both the Canadian toad and northern leopard frog (Browne 2009; Wagner 1997). Survey timing was designed to maximize detection of these species.

A total of sixteen survey sites in the SSA (6 sites) and LSA (10 sites) were surveyed using either in-situ observers (7 instances) or ARUs (9 instances). Survey locations were situated in areas with high habitat potential for breeding amphibians, such as slow-moving shallow streams, semi-permanent wetlands, marshes, and shallow lake margins with emergent vegetation. Wetlands at which amphibian surveys were completed were classified during daylight hours using habitat field guides by McLaughlan et al. (2010) and Smith et al. (2007) (see Annex VII.2 Vegetation Baseline Report 2).

Amphibian surveys were conducted in accordance with the CanNorth Standard Operating Procedure (SOP) for amphibian acoustic surveys, which was adapted from Kendell's methods for surveying northern leopard frogs (Kendell 2002) and ENV's species detection survey protocol for amphibian auditory surveys (ENV 2014b). This SOP conforms to ENV guidelines, accounts for potential VCs, and meets Canadian Nuclear Safety Commission (CNSC) standards for characterizing baseline environments (ENV 2014a,b; CNSC 2020). A Species Detection Research Permit (#18SD005) was obtained from ENV, Fish and Wildlife Branch.

At each location, in-situ surveys consisted of a one-minute acclimation period to allow for amphibians to resume normal activities after being potentially disturbed by the observers' arrival, followed by a five-minute listening period, during which all amphibians heard were recorded. Amphibian acoustic observations were categorized utilizing a call intensity index on a four-point scale (below):

- 0: No amphibians of a given species calling;
- 1: Individuals counted - no overlapping calls (1-5 individuals calling);
- 2: Calls overlapping, but distinguishable (6-10 individuals calling); and
- 3: Full continuous chorus - calls not distinguishable (>10 individuals calling).

Surveys were completed within the nightly peak calling period for most amphibian species (i.e., between 30 minutes before sunset and 1:00 a.m.) and were only completed under suitable weather conditions as outlined by ENV protocols (i.e., suitable water temperatures, no or minimal precipitation, and wind speeds below 20 kilometres per hour [km/h]). Habitat details, UTM coordinates, survey time, and ambient weather conditions were additionally recorded. Surveys were repeated three times and were performed from 21 May 2018 to 24 May 2018, 10 June 2018, and from 19 June 2018 to 21 June 2018, to encompass seasonal variation among species. ARU recordings were analyzed in the office, after unit retrieval, using the same listening intervals (i.e., 5 minutes per site) and the same sampling effort per site (i.e., 3 recordings spaced from 21 May 2018 to 21 June 2018).

To supplement survey efforts, automated recognition of northern leopard frog and Canadian toad calls were also completed on the entirety of audio recordings from ARUs that fell within protocol conditions (e.g., date, time of day). Species specific recognizers were built using known amphibian calls and were analyzed against all requisite ARU recordings using Kaleidoscope Pro (Ver. 5.1.4). Results were reviewed manually to remove false positives.

4.3 Results

Sixteen nocturnal acoustic surveys, including field visits and ARU data recordings, were completed for amphibian species with three surveys being completed at each location (Figure 4.3-1; Appendix A, Photo 2; Appendix B, Table 1).

Two species of amphibians were detected in the area of the Project, including Canadian toads and wood frogs (*Lithobates sylvaticus*). Canadian toads were the most commonly detected amphibians heard during the in-situ and ARU surveys and were found at four of the survey locations (Figure 4.3-2; Appendix B, Table 1). Detection was highest during the first round of surveys (at 4 locations), and dropped to one and two locations in the subsequent two surveys, respectively.

Canadian toads were found incidentally in three additional locations during other surveys completed in the area of the Project. Two Canadian toads were observed in amplexus (i.e., mating posture) during aquatic field surveys at Naomi Lake in May 2018 (Figure 4.3-2; Appendix A, Photo 3; Appendix B, Table 2). Another two individual Canadian toads were detected during yellow rail surveys completed at two separate wetlands in late July 2018 (one field survey and one ARU survey; Figure 4.3-2; Appendix B, Table 2). Additionally, Canadian toads were detected within recordings analyzed for yellow rails and common nighthawks at two of the ARU stations where Canadian toads had been previously recorded during the targeted amphibian surveys. All observations from in-situ and ARU recordings were categorized with a calling index of 1 (i.e., a single individual heard) (Figure 4.3-2; Appendix B, Tables 1 and 2). Finally, Canadian toads were detected within automated recognition of ARU data at two stations where the species had been previously recorded during targeted surveys and at a third station that had no previous detections (Figure 4.3-2; Appendix B, Table 2). The total number of detection locations for Canadian toads, including survey results and incidental observations, included two sites in the SSA and six sites in the LSA. Canadian toads are listed as apparently secure (S4) by the SKCDC, but have a provincial activity restriction guideline recommending a 90-m setback from breeding and overwintering habitat for medium or high disturbance activities year-round (ENV 2017; SKCDC 2018a). Canadian toads are not listed under SARA (SARPR 2018).

Wood frogs were detected during the 24 May 2018 surveys at 2 (at AMPA02 and AMPA04) of the 16 survey sites. An individual wood frog was also detected incidentally in the LSA (at Survey Location YERA_01) during yellow rail surveys. The timing of wood frog observations in the area of the Project (i.e., during the first survey only) reflects the natural phenology of these species, with a significant reduction in breeding activity towards the end of the season (ENV 2014b). Wood frogs are ranked as secure/common (S5) in Saskatchewan (SKCDC 2018a) and are not listed under SARA or COSEWIC (SARPR 2018). No provincial or federal activity restriction guidelines pertain to wood frogs in Saskatchewan.

Northern leopard frogs were not detected during the amphibian auditory surveys nor incidentally during the 2018 field season. Additionally, there was no indication of northern leopard frogs from the automated recognition of data from ARU recordings. No amphibian acoustic surveys were conducted in 2020.

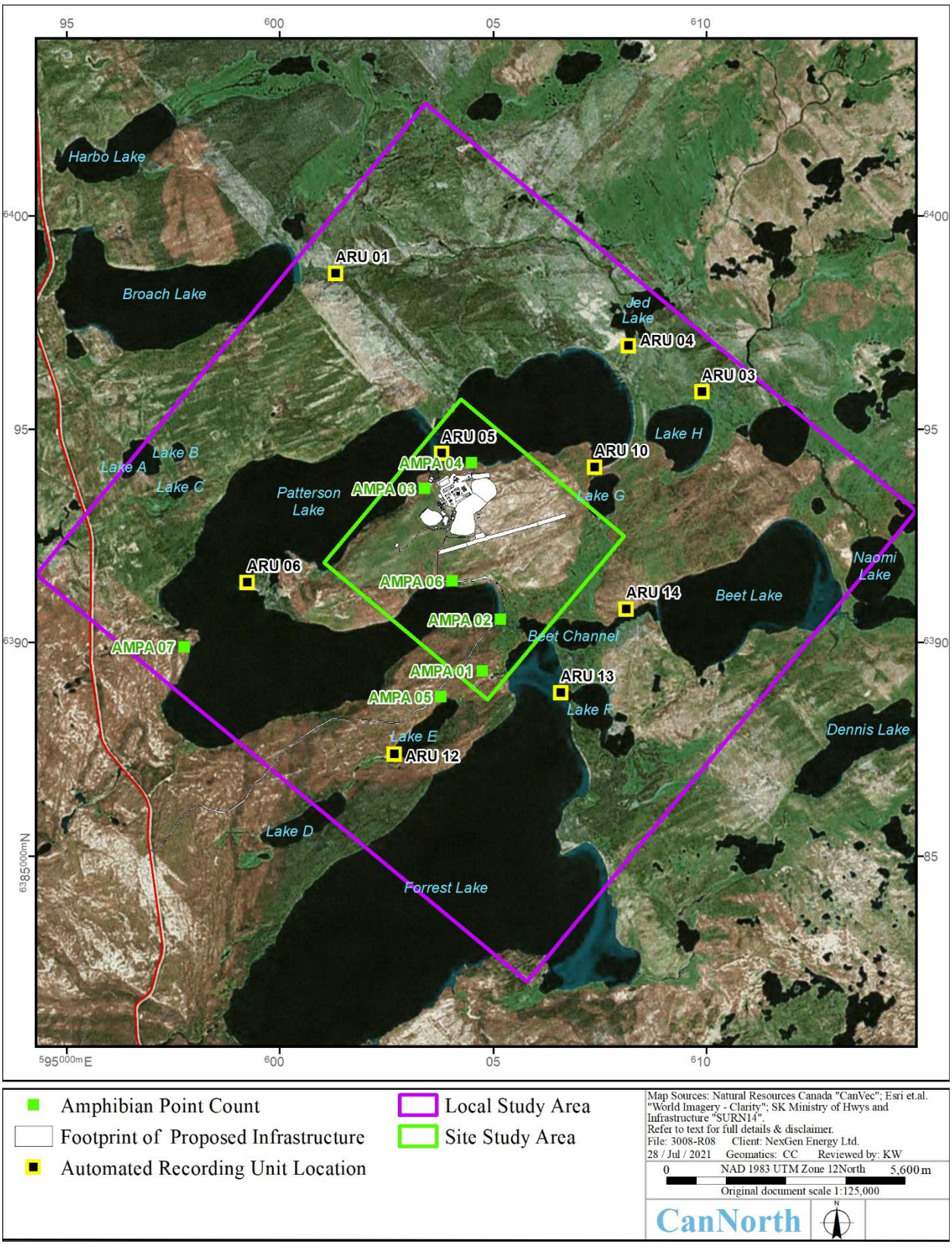

Figure 4.3-1: Amphibian Acoustic Survey Locations, May and June 2018

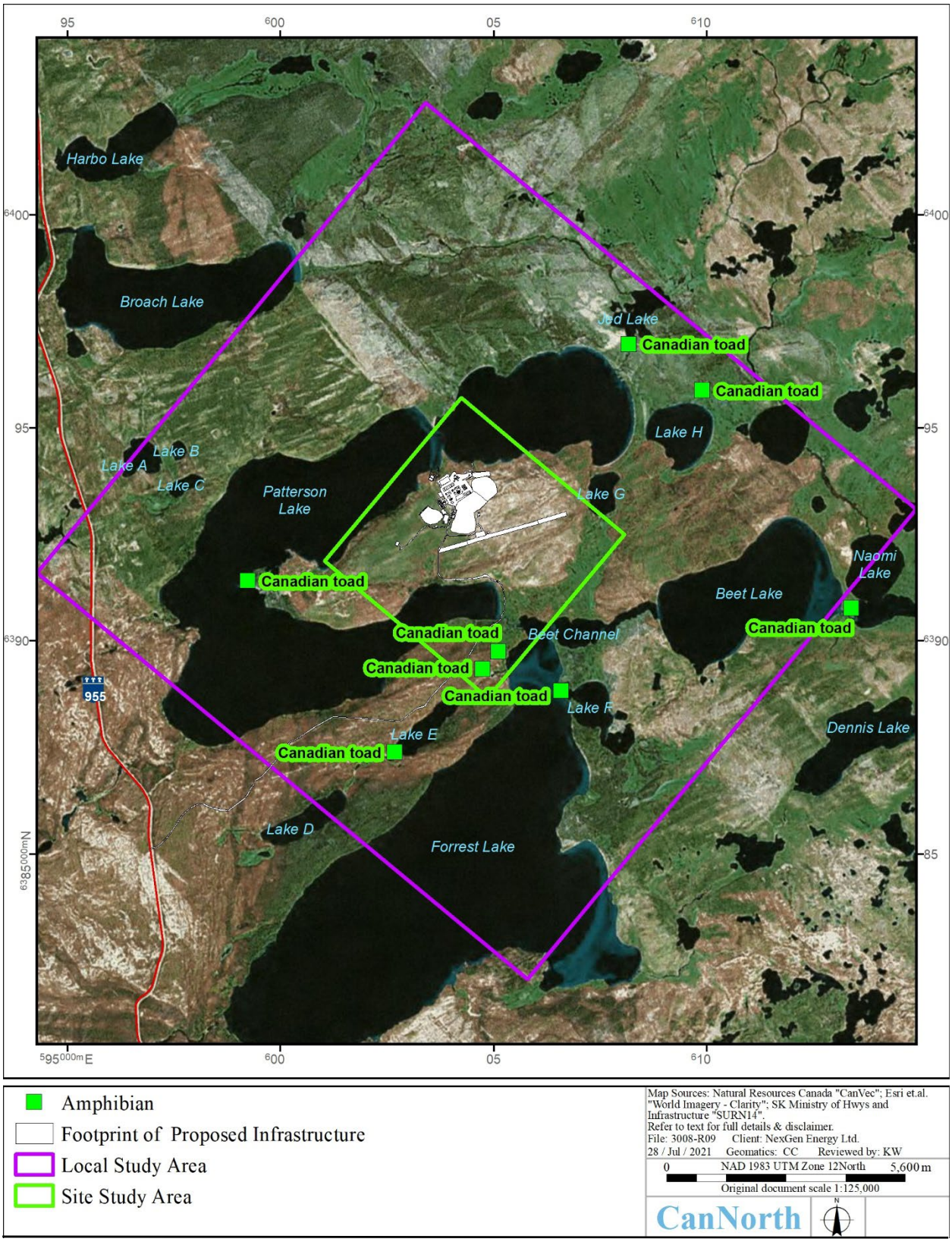

Figure 4.3-2: Locations of Amphibian Species of Conservation Concern Detected During Amphibian Acoustic Surveys and Incidentally, 2018

5.0 COMMON NIGHTHAWK SURVEYS

5.1 Study Objectives

To meet regulatory guidance and scientific best practices, common nighthawk surveys were completed in the summer of 2018 to support description of the terrestrial environmental conditions (ENV 2014a; IAAC 2019; CNSC 2020).

The objectives of the surveys were to document distribution, abundance, and habitat potential for common nighthawks within the SSA and LSA. As SOCC, common nighthawks are a potential VC. Survey data were used to assist in identifying common nighthawk breeding status and habitat features that may support breeding birds, which are protected under provincial and federal legislation including SARA, provincial activity restriction guidelines, and the *Migratory Birds Convention Act* (MBCA 1994; SARA 2002; ENV 2017).

5.2 Methods

Common nighthawk surveys were completed to determine presence and distribution in the area of the Project. A total of 27 locations were surveyed in the SSA (17 locations) and LSA (10 locations) including both in-situ type (12 surveys) and ARU type (15 surveys). Surveys were conducted in accordance with the CanNorth SOP for common nighthawk surveys, which conforms to ENV guidelines and meets CNSC standards for characterizing baseline environments (ENV 2015, CNSC 2020). A Species Detection Research Permit (#18SD005) was obtained from the ENV, Fish and Wildlife Branch.

Survey locations were situated near suitable habitat for foraging or breeding (e.g., open areas, bogs, shorelines, rocky outcrops, and open mixed-wood and coniferous forest; Rodewald 2018). Two rounds of surveys were completed in accordance with ENV's species detection survey protocol for common nighthawk surveys (ENV 2015); surveys were conducted from 19 June 2018 to 20 June 2018 and from 26 June 2018 to 27 June 2018. Based on protocols established by ENV, subsequent survey visits were not required if common nighthawks were detected in the first round of surveys (ENV 2015); however, two rounds of surveys were analyzed for all ARU data to provide additional documentation regarding common nighthawk abundance.

Surveys were completed within optimal detection windows for common nighthawks as outlined by ENV 2015 (i.e., between one hour before sunset and 30 minutes after sunset) and under suitable weather conditions (i.e., winds speeds below 20 km/h, temperatures above 7^{o}C, and no precipitation). Survey locations were spaced a minimum of 800 m apart. At each location, surveys consisted of a 3-minute passive observation period, followed by a 3-minute call-broadcast period. The call broadcast period consisted of alternating 30 second broadcasts of common nighthawk "peent" calls interspersed with 30 seconds of silence (i.e., three repetitions over three minutes) for a total survey period of 6 minutes per site. Any common nighthawks observed or heard throughout the survey were recorded. ARU recordings were analyzed in the office after unit retrieval using the same listening intervals (i.e., 6 minutes per site) and sampling effort per site (2 recordings spaced from within early and late detection periods from 19 June 2018 to 27 June 2018); however, use of ARUs precluded the use of the call broadcast method (ENV 2015).

5.3 Results

A total of 27 common nighthawk locations were surveyed in the area of the Project (Figure 5.3-1; Table 5.3-1; Appendix A, Photo 4). Survey results indicated that common nighthawks are common and widespread as the species was detected at every survey location. In-situ and ARU surveys resulted in detection at 70% of survey locations during the first survey round. All survey locations sampled during the second round of surveys resulted in detection of common nighthawks except for one ARU location where a common nighthawk had been recorded during the first survey interval (Table 5.3-1). In most cases, more than a single individual was detected per survey location. Detection rates per survey ranged from zero to six individuals, with detection of two individuals per site being the most common result (i.e., 30% of surveys) (Table 5.3-1).

Numerous incidental observations of common nighthawks were also recorded during breeding bird surveys or incidentally during other surveys in the area of the Project. Common nighthawks were heard at eight different breeding bird point count stations, and were observed incidentally at nine different locations during amphibian acoustic surveys and yellow rail surveys (Table 5.3-1). These observations consisted of a single individual with the exception of one instance where two individuals were detected. Common nighthawks were additionally detected in ARU recordings during analysis for amphibians and yellow rails; however, all of these ARU stations had previous positive detections during the common nighthawk species targeted survey (Table 5.3-1; Appendix B, Table 2).

Common nighthawks are listed as threatened under Schedule 1 of SARA, and federal and provincial activity restriction guidelines recommend a 200-m setback from breeding birds from 1 May to 31 August (ENV 2017; SARPR 2018; P. Gregoire pers. comm.). The SKCDC ranks common nighthawks as apparently secure breeders (S4B) in Saskatchewan (SKCDC 2018a).

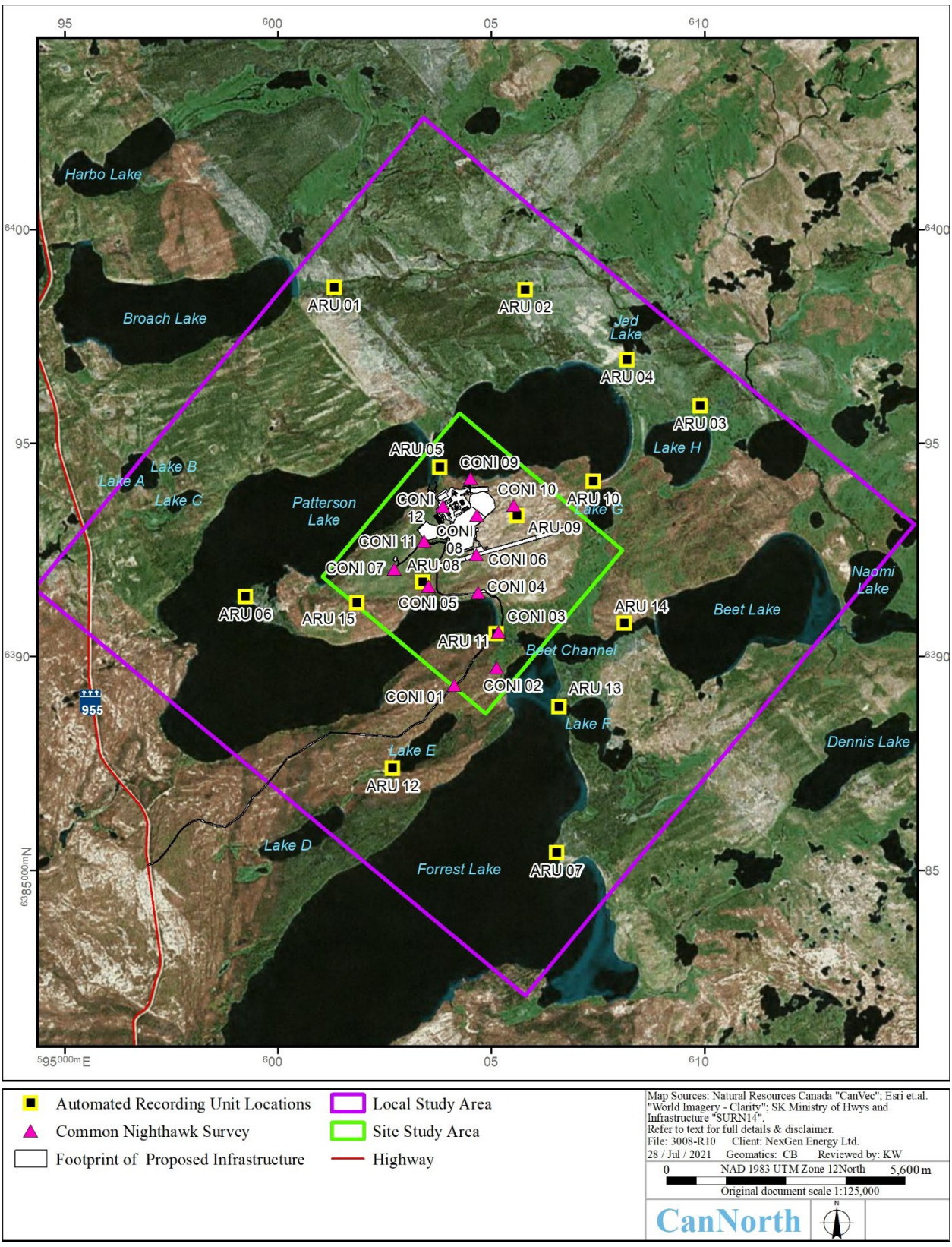

Figure 5.3-1: Common Nighthawk Survey Locations, June 2018

Table 5.3-1: Results of the Common Nighthawk Surveys, June 2018

Survey Location	UTM Coordinates[a]		Project Study Area[b]	Survey Number	Survey Date	Common Nighthawks Detected
	Easting	Northing				
CONI 01	604138	6389331	SSA	1	20-Jun-2018	3
CONI 02	605124	6389747	SSA	1	20-Jun-2018	0
				2	26-Jun-2018	3
CONI 03	605174	6390583	SSA	1	20-Jun-2018	0
				2	26-Jun-2018	2
CONI 04	604697	6391500	SSA	1	20-Jun-2018	2
CONI 05	603527	6391653	SSA	1	20-Jun-2018	0
				2	26-Jun-2018	1
CONI 06	604647	6392394	SSA	1	20-Jun-2018	1
CONI 07	602723	6392051	SSA	1	19-Jun-2018	0
				2	26-Jun-2018	2
CONI 08	604664	6393314	SSA	1	19-Jun-2018	3
CONI 09	604512	6394176	SSA	1	19-Jun-2018	1
				2	26-Jun-2018	1
CONI 10	605532	6393542	SSA	1	19-Jun-2018	3
				2	27-Jun-2018	4
CONI 11	603423	6392705	SSA	1	19-Jun-2018	2
CONI 12	603866	6393520	SSA	1	19-Jun-2018	4
ARU 01	601313	6398648	LSA	1	20-Jun-2018	5
				2	27-Jun-2018	6
ARU 02	605792	6398598	LSA	1	20-Jun-2018	3
				2	29-Jun-2018	2
ARU 03	609906	6395870	LSA	1	19-Jun-2018	6
				2	28-Jun-2018	3
ARU 04	608183	6396958	LSA	1	19-Jun-2018	1
				2	27-Jun-2018	4
ARU 05	603794	6394437	SSA	1	20-Jun-2018	0
				2	27-Jun-2018	1
ARU 06	599235	6391405	LSA	1	20-Jun-2018	1
				2	28-Jun-2018	1
ARU 07	606541	6385407	LSA	1	19-Jun-2018	1
				2	27-Jun-2018	2
ARU 08	603388	6391742	SSA	1	20-Jun-2018	0
				2	27-Jun-2018	2
ARU 09	605602	6393303	SSA	1	19-Jun-2018	3
				2	28-Jun-2018	2
ARU 10	607388	6394103	LSA	1	19-Jun-2018	2
				2	29-Jun-2018	3
ARU 11	605113	6390534	SSA	1	20-Jun-2018	1
				2	30-Jun-2018	1
ARU 12	602685	6387383	LSA	1	20-Jun-2018	1
				2	29-Jun-2018	2
ARU 13	606593	6388821	LSA	1	20-Jun-2018	2
				2	29-Jun-2018	2
ARU 14	608124	6390784	LSA	1	19-Jun-2018	5
				2	29-Jun-2018	3
ARU 15	601850	6391262	SSA	1	20-Jun-2018	1
				2	28-Jun-2018	0

a) UTM = NAD 83 Zone 12U.

b) LSA = Local Study Area; SSA = Site Study Area.

6.0 YELLOW RAIL SURVEYS

6.1 Study Objectives

To meet regulatory guidance and scientific best practices, yellow rail surveys were completed in the summer of 2018 to support the description terrestrial environmental conditions (ENV 2014a; IAAC 2019; CNSC 2020). The objectives of the surveys were to document distribution, abundance, and habitat potential for yellow rails within the SSA and LSA. As SOCC, yellow rails are a potential VC. Survey data were used to assist in identifying yellow rail breeding status and habitat features that may support breeding birds, which are protected under provincial and federal legislation including SARA, provincial activity restriction guidelines, and the *MBCA* (MBCA 1994; SARA 2002; ENV 2017).

6.2 Methods

Sixteen locations were surveyed for yellow rail to document presence and distribution in the area of the Project. Surveys consisted of both in-situ field surveys (7 locations) and ARU surveys (9 locations) in the SSA (6 in-situ survey locations) and LSA (1 in-situ survey location). Surveys were conducted in accordance with the CanNorth SOP for yellow rail surveys, which conforms to ENV guidelines and meets CNSC standards for characterizing baseline environments (ENV 2014a,c, CNSC 2020). A Species Detection Research Permit (#18SD005) was obtained from the ENV Fish and Wildlife Branch.

Two rounds of surveys were completed from 19 June 2018 to 21 June 2018 and from 26 June 2018 to 27 June 2018, as per ENV's species detection survey protocol for yellow rail (ENV 2014c). Survey rounds were separated by a time interval of at least four days between surveys (ENV 2014c). Survey locations focused on waterbodies with suitable yellow rail habitat, particularly shallow marshes or bogs dominated by sedges or grasses (Rodewald 2018). All surveys were completed within the peak nightly calling periods for yellow rail to maximize detection (i.e., between one hour after sunset to 02:00 a.m.) and during suitable weather conditions (i.e., wind speeds less than 20 km/h, temperatures above 0ºC, no precipitation). Survey locations were spaced a minimum of 350 m apart.

At each location, in-situ surveys consisted of a mix of call broadcast and passive listening periods. The call broadcaster was placed approximately 1 m above the ground or water, and was pointed toward the centre of the wetland. Surveys were initiated with a 5-minute passive listening period, followed by a 3-minute call broadcast of the yellow rail recording, consisting of 5 seconds of calls followed by 5 seconds of silence. After the 3-minute call broadcast period, surveys were ended with a 2-minute passive listening period for a total survey time of 10 minutes. All yellow rails observed or heard during the survey were recorded along with habitat details, UTM coordinates, survey times, and ambient weather conditions. ARU recordings were analyzed in the office using the same listening intervals, but without the passive listening period (i.e., 5 minutes per site) and without use of call broadcast methodology. Additionally, ARU recordings were analyzed using the same sampling effort per site (i.e., 2 recordings spaced within early and late detection periods from 19 June 2018 to 27 June 2018).

To supplement survey effort, automated recognition of yellow rail calls was completed on the entirety of ARU recordings that fell within protocol conditions (e.g., date, time of day). Species specific recognizers were built using known yellow rail calls and analyzed against all requisite ARU recordings. Results were reviewed manually to remove false positives.

6.3 Results

A total of 15 wetlands were surveyed for yellow rail using in-situ field surveys and ARU recording analysis (Figure 6.3-1; Table 6.3-1). No yellow rails were heard at any of the target wetlands during surveys. Further, none were detected using automated recognition for yellow rail from suitable ARU recordings or incidentally observed during any of the 2018 field surveys.

Yellow rail prefer to breed in marshes featuring large expanses of grasses and sedges (*Carex* sp.) with minimal shrub cover (Rodewald 2018). The area of the Project was found to contain limited suitable habitat for yellow rail. Survey results and habitat observations in the area of the Project indicated that there is low potential to support breeding yellow rail.

Yellow rail are listed as special concern under Schedule 1 of SARA, and provincial activity restriction guidelines recommend a 350-m setback from breeding birds for high disturbance activities from 1 May to 15 July (ENV 2017; SARPR 2018). Yellow rail are ranked as vulnerable/rare to uncommon breeders (S3) in Saskatchewan by the SKCDC (2018a).

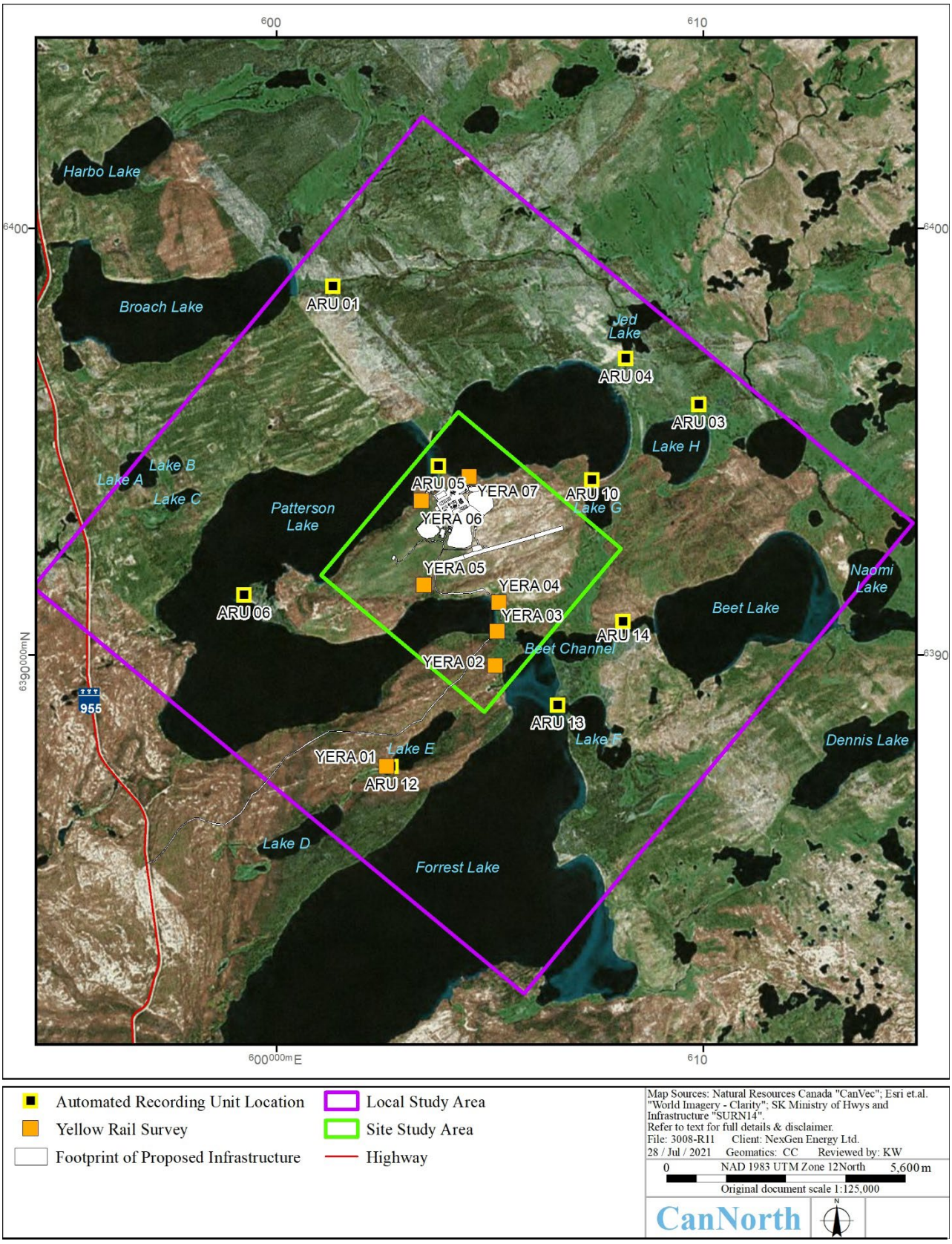

Figure 6.3-1: Yellow Rail Survey Locations, June 2018

Table 6.3-1: Results of the Yellow Rail Surveys, June 2018

Survey Location	UTM Coordinates[1]		Project Study Area[2]	Survey Number	Survey Date	Yellow Rails Detected
	Easting	Northing				
YERA 01	602582	6387381	LSA	1	20-Jun-2018	0
				2	26-Jun-2018	0
YERA 02	605124	6389747	SSA	1	21-Jun-2018	0
				2	26-Jun-2018	0
YERA 03	605173	6390546	SSA	1	21-Jun-2018	0
				2	26-Jun-2018	0
YERA 04	605214	6391227	SSA	1	21-Jun-2018	0
				2	26-Jun-2018	0
YERA 05	603457	6391645	SSA	1	21-Jun-2018	0
				2	26-Jun-2018	0
YERA 06	603390	6393612	SSA	1	19-Jun-2018	0
				2	27-Jun-2018	0
YERA 07	604512	6394176	SSA	1	19-Jun-2018	0
				2	26-Jun-2018	0
ARU 01	601313	6398648	LSA	1	21-Jun-2018	0
				2	27-Jun-2018	0
				3	1-Jul-2018	0
ARU 03	609906	6395870	LSA	1	22-Jun-2018	0
				2	28-Jun-2018	0
				3	3-Jul-2018	0
ARU 04	608183	6396958	LSA	1	19-Jun-2018	0
				2	25-Jun-2018	0
				3	30-Jun-2018	0
ARU 05	603794	6394437	SSA	1	19-Jun-2018	0
				2	26-Jun-2018	0
				3	1-Jul-2018	0
ARU 06	599235	6391405	LSA	1	19-Jun-2018	0
				2	26-Jun-2018	0
				3	1-Jul-2018	0
ARU 10	607388	6394103	LSA	1	19-Jun-2018	0
				2	27-Jun-2018	0
				3	2-Jul-2018	0
ARU 12	602685	6387383	LSA	1	19-Jun-2018	0
				2	27-Jun-2018	0
				3	2-Jul-2018	0
ARU 13	606593	6388821	LSA	1	19-Jun-2018	0
				2	28-Jun-2018	0
				3	2-Jul-2018	0
ARU 14	608124	6390784	LSA	1	19-Jun-2018	0
				2	25-Jun-2018	0
				3	30-Jun-2018	0

a) UTM = NAD 83 Zone 12U.

b) LSA = Local Study Area; SSA = Site Study Area.

7.0 BREEDING BIRD SURVEYS

7.1 Study Objectives

To meet regulatory guidance and scientific best practices, breeding bird surveys were completed in the summer of 2018 to assist in describing terrestrial environmental conditions (ENV 2014a; IAAC 2019; CNSC 2020). The objectives of the surveys were to document distribution, abundance, and species composition of birds potentially occurring within the SSA and LSA, including SOCC. As avian SOCC are potential VCs, resulting data will assist in identifying populations and habitat features that may be protected under provincial or federal legislation, including activity restriction guidelines, SARA, and/or the *MBCA* (MBCA 1994; EC 2009; ENV 2017; SARA 2002).

7.2 Methods

Breeding bird point count surveys using variable radius point counts were completed in the SSA and LSA to document species richness and distribution in the area of the Project. Surveys were conducted in accordance with the CanNorth SOP for breeding bird surveys, which is based on methodology provided by ENV (2014d, 2018b), Bibby et al. (2000), Hamel et al. (1996), and Ralph et al. (1993). This protocol conforms to ENV guidelines, accounts for potential VCs, and meets CNSC standards for characterizing baseline environments (ENV 2014a,d, 2018b; CNSC 2020). A Species Detection Research Permit (#18SD005) was obtained from ENV, Fish and Wildlife Branch.

Two rounds of in-situ field surveys were completed from 5 June 2018 to 12 June 2018 and from 22 June 2018 to 27 June 2018. All accessible habitat types in the SSA and LSA were sampled. Survey timing was consistent with the ENV species detection survey protocol for forest bird surveys (ENV 2014d) and ARU recording data was analyzed in the office using the same daily and seasonal time windows as the in-situ surveys, and 10-minute listening intervals (i.e., similar to in-situ surveys minus the acclimation period). However, for the ARU data, three rounds of surveys were analyzed as per guidance from ENV species detection survey protocol for forest bird surveys (ENV 2014d).

At each point count location, data collection consisted of a 2-minute acclimation period followed by a 10-minute observation period, during which all birds detected were recorded. Detected birds were recorded into 1 of 5 categories: within a 50 m radius of the observer, 50 to 100 m from the observer, >100 m from the observer (unlimited distance), flying overhead, or as an incidental observation (e.g., detected before or after the survey but not during the survey). Habitat details, UTM coordinates, survey time, and ambient weather conditions were additionally recorded. Point counts were completed between sunrise (i.e., ~03:30 a.m.) and four hours after sunrise (i.e., ~07:30 am) to capture the peak activity period for the majority of avian species. Point counts were only completed during acceptable weather conditions (e.g., wind speeds less than 20 km/h, no precipitation). Surveys were spaced at a distance of approximately 400 m or more to avoid re-sampling of previously detected birds.

7.3 Data Analysis

For each habitat type, breeding bird population data were summarized using four measures: abundance (number of birds observed), species richness, diversity, and equitability. A diversity index such as “Shannon’s H” is a mathematical measure of species diversity in a community. The Shannon-Weiner index of diversity (H) was calculated for each point count location to allow diversity comparisons between habitats found in the LSA. Shannon’s H index of diversity was calculated using the equation:

$$H' = \sum_{i=1}^{s} \frac{n_i}{N} \ln \frac{n_i}{N}$$

Where S is the total number of species in a community (species richness) calculated as the proportion of individuals of a given species (n_i) to the total number of individuals in the community (N). This diversity index provides information about bird community composition because it takes the relative abundance of different species into account, along with the number of species observed (Magurran 1988; Rosenzweig 1995). As such, diversity indices provide important information about rarity or ubiquity of species in a community. Following the calculation of H, Shannon's equitability (E_H) was calculated using the following equation:

$$E_H = H / H_{\max} = H / \ln S$$

Equitability assumes a value between 0 and 1, with 1 being complete evenness (i.e., roughly equivalent numbers of birds belonging to each species recorded). Equitability is defined as the degree to which species are equally abundant (Reitz and Wing 1999) and also provides information about bird community composition within the LSA. Areas with an even distribution of abundance between taxa have a higher diversity than samples with the same number of taxa, but with disproportionately high abundance of a few taxa. More taxonomic categories lead to greater diversity values when samples show the same degree of equitability in abundance (Reitz and Wing 1999). For all the above analyses, only observations of birds within a 100 m of the observer during point count surveys were used; flyovers detected during point counts, incidental observations, and ARU data were excluded.

Finally, a species richness curve (i.e., rarefaction curve) was generated to ascertain if sampling was adequate to estimate species richness within the LSA. In general, rarefaction curves flatten as they move to the right (of the graph) given fewer new species are detected per number of individuals observed and indicates that additional sampling would only identify a few new species.

7.4 Results

A total of 100 point count locations were assessed in the SSA (53 locations) and the LSA (47 locations) and this included both in-situ surveys (85 locations) and ARU surveys (15 locations; Figure 7.4-1; Appendix B, Table 3). Overall, the species accumulation curve, for all birds detected in the LSA, indicated a reasonable number of surveys were conducted to detect the majority of species using the LSA because the curve trajectory reached an asymptote indicating that adequate sampling was achieved (Figure 7.4-2).

A total of 3,213 individuals comprised of 95 bird species were detected across the survey period within the LSA (Appendix B, Table 4). Detailed results of the breeding bird surveys are presented in Appendix B, Table 5. The most commonly detected bird species across the survey period was the Canada goose (*Branta canadensis*; 516 detections at 19 locations) followed by dark-eyed junco (*Junco hyemalis*; 313 detections at 92 locations), yellow-rumped warbler (*Setophaga coronate*; 263 detections at 90 locations), and white-throated sparrow (*Zonotrichia albicollis*; 237 detections at 67 locations). Most of the species detected during the 2018 surveys (98%) are protected under the *MBCA* (1994) and/or the provincial *Wildlife Act* (GS 1998), and several SOCC were identified. These included four species listed under SARA: common nighthawk; olive-sided flycatcher; rusty blackbird (*Euphagus carolinus*); and barn swallow. Common nighthawks, olive-sided flycatchers, and barn swallows are all listed as threatened under SARA, whereas rusty

blackbirds are listed as special concern (SARPR 2018). Abundance estimates for SOCC are based on location specific data only and duplicate counts across survey periods were not included. Common nighthawks were detected at 11 locations during breeding bird surveys, with at least a single individual observed at each site (Appendix B, Table 4). There were a total of 44 detections of common nighthawks throughout the SSA and LSA during targeted surveys or incidentally, as previously discussed in Section 5.3 (Figure 7.4-3; Appendix B, Table 2). Thirteen olive-sided flycatchers were detected, including six in the SSA and seven in the LSA (Figure 7.4-4; Appendix B, Table 4). Three rusty blackbirds were detected during ARU data analysis, all of which were located in the LSA (Figure 7.4-4; Appendix B, Table 4). Barn swallows were detected at nine locations with a total of 16 individuals detected in the SSA and six in the LSA. An additional barn swallow was heard incidentally during a common nighthawk survey in the LSA (Figure 7.4-4; Appendix B, Table 4).

Seven additional species with provincial activity restriction guidelines (ENV 2017) were observed during the breeding bird surveys, including Bonaparte's gull, common loon, bald eagle, herring gull, osprey (*Pandion haliaetus*), American white pelican, and great gray owl (*Strix nebulosa*) (Figure 7.4-4; Appendix B, Table 4). Bonaparte's gulls (1 individual) and a pair of bald eagles were observed at Beet Lake, and also at Patterson Lake. Multiple Bonaparte's gulls and five bald eagles were observed in both the LSA and SSA. Three herring gulls, one American white pelican, and four osprey were also observed singly at Patterson Lake. The American white pelican was observed in the SSA, and herring gulls and osprey were observed in both the SSA and LSA. Common loons were detected frequently throughout the survey and were observed in numbers from one to three individuals at lakes located in the SSA and LSA including Patterson Lake, Forrest Lake, Lake G, Lake H, Beet Lake, and Broach Lake. One great gray owl was detected in the LSA, and two additional incidental observations of single great gray owls were documented in the SSA. Species at risk and sensitive species detected in both the SSA and LSA, and the habitats that support these species are discussed further in Section 10.0.

Habitat in the area of the Project is fairly homogeneous and most boreal birds do not respond to fine-scale habitat features (Bayne et al. 2010); therefore, habitats surveyed for breeding birds were grouped into four general habitat types for breeding bird data analysis based on field-level coarse habitat data (i.e., dominant habitat in point count; mature conifer, regeneration conifer, mixedwood/deciduous, and treed wetland) (Table 7.4-1). Bird species richness, abundance, diversity and equitability were tallied for each habitat group.

Abundance was highest in mature conifer forest (361), followed by treed wetland (279) and regeneration forest (271), and mixedwood/deciduous forest (69). Mature conifer forests also had the highest species richness (53), followed by treed wetland (42); whereas richness was lowest in regeneration forests (33) and mixedwood/deciduous forest (33). Diversity indices (H) were highest in mixedwood (4.13) followed by regeneration forests (3.62), treed wetland (3.06), and lowest in mature conifer (2.90). Finally, equitability (E_H) indices were highest in mixedwood (0.91) followed by treed wetland (0.82), and were lowest in mature conifer (0.73) and regeneration forests (0.72). Caution should be used in interpreting these results as fewer surveys were performed in mixedwood/deciduous (n=4) versus the other habitats. Avian species diversity, richness, and abundance is generally highest within the mixedwood portions of the boreal region relative to other habitats (Cumming et al. 2014).

Table 7.4-1: Breeding Bird Diversity Indices by Habitat Type from Point Count Locations in the LSA, May to July 2018

Habitat Type[a]	General Description	Species Richness (Number of Species)	Shannon-Weiner Diversity Index (H)	Equitability (E_H)	Total Abundance of Individuals	Point Counts Completed (n)
Mature conifer	Conifer forest >40 years old (jack pine, black spruce)	53	2.90	0.73	361	37
Mixed wood	Mixed wood/deciduous forest ~10 - 40 and/or >40 years old (paper birch, jack pine, black spruce)	23	4.13	0.91	69	4
Regeneration forest	Recently burned and up to 40 years) conifer forest (snags, young jack pine)	33	3.62	0.72	270	24
Treed wetland	Treed fen, bog, or swamp; shoreline/lakeshore forest (jackpine, black spruce, tamarack, paper birch)	42	3.06	0.82	279	21

a) Dominant habitat type recorded in point count survey location; does not account for fine-scale changes in habitat within point count and is considered a coarse scale classification.

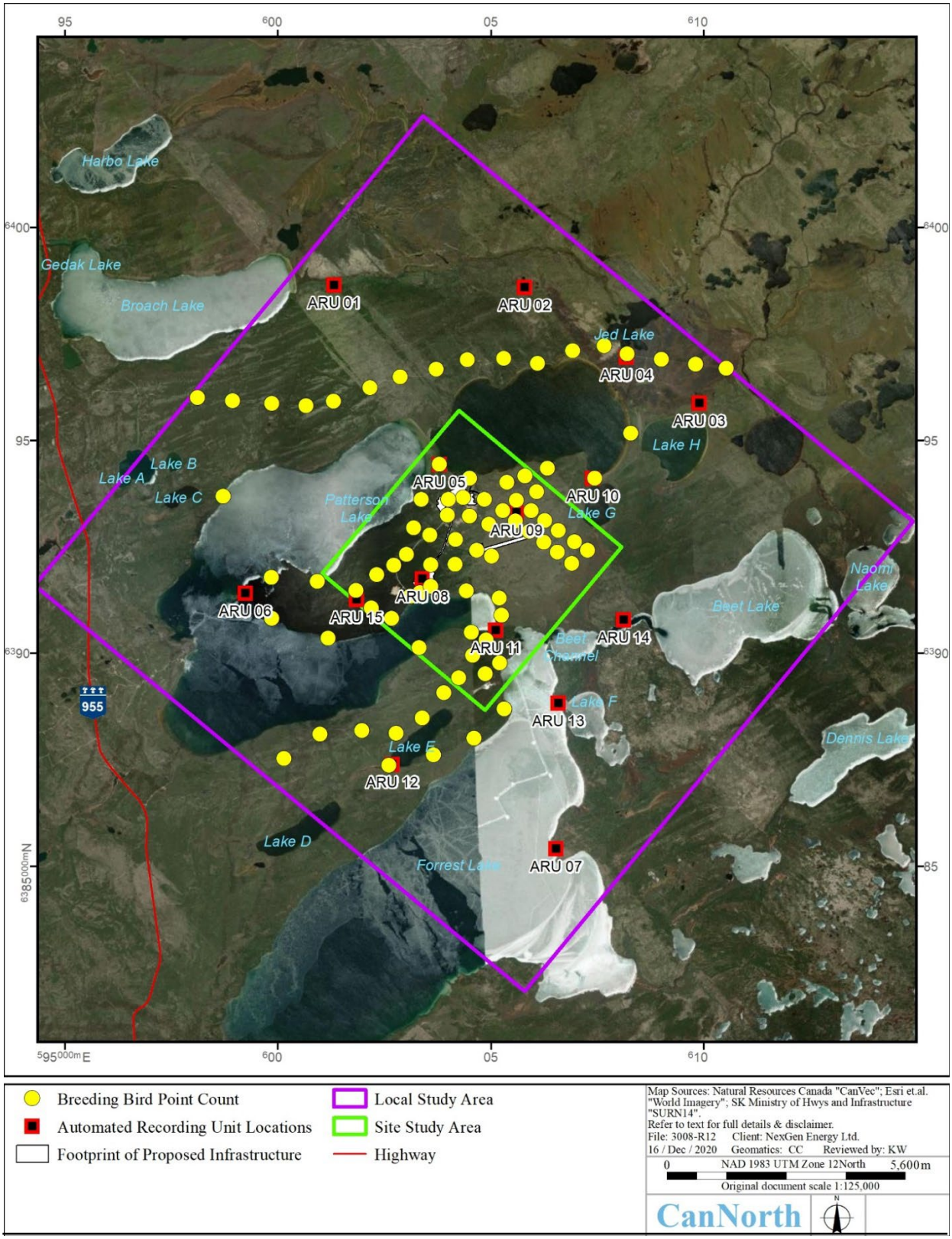

Figure 7.4-1: Breeding Bird Survey Locations, May to July 2018

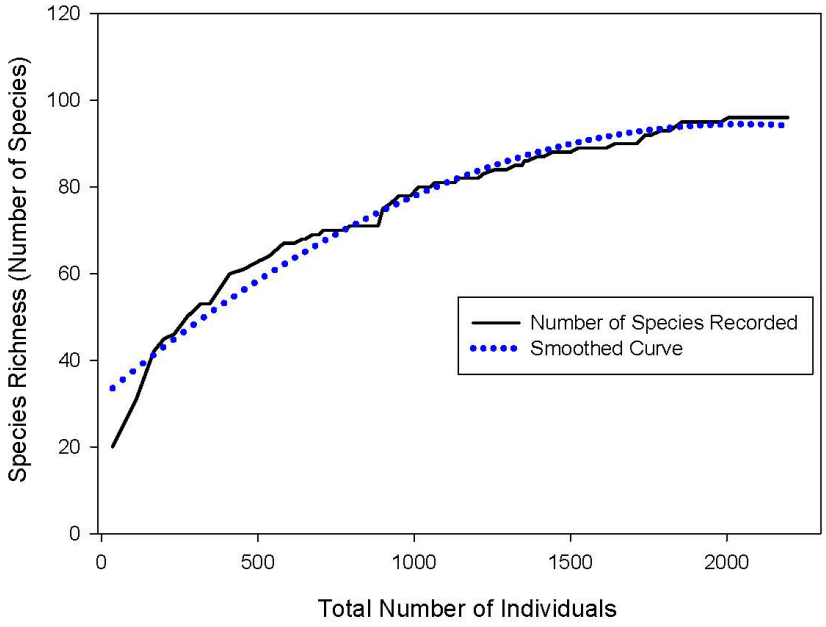

Figure 7.4-2: Species Accumulation Curve for all Breeding Bird Surveys Completed in the LSA, May to July 2018

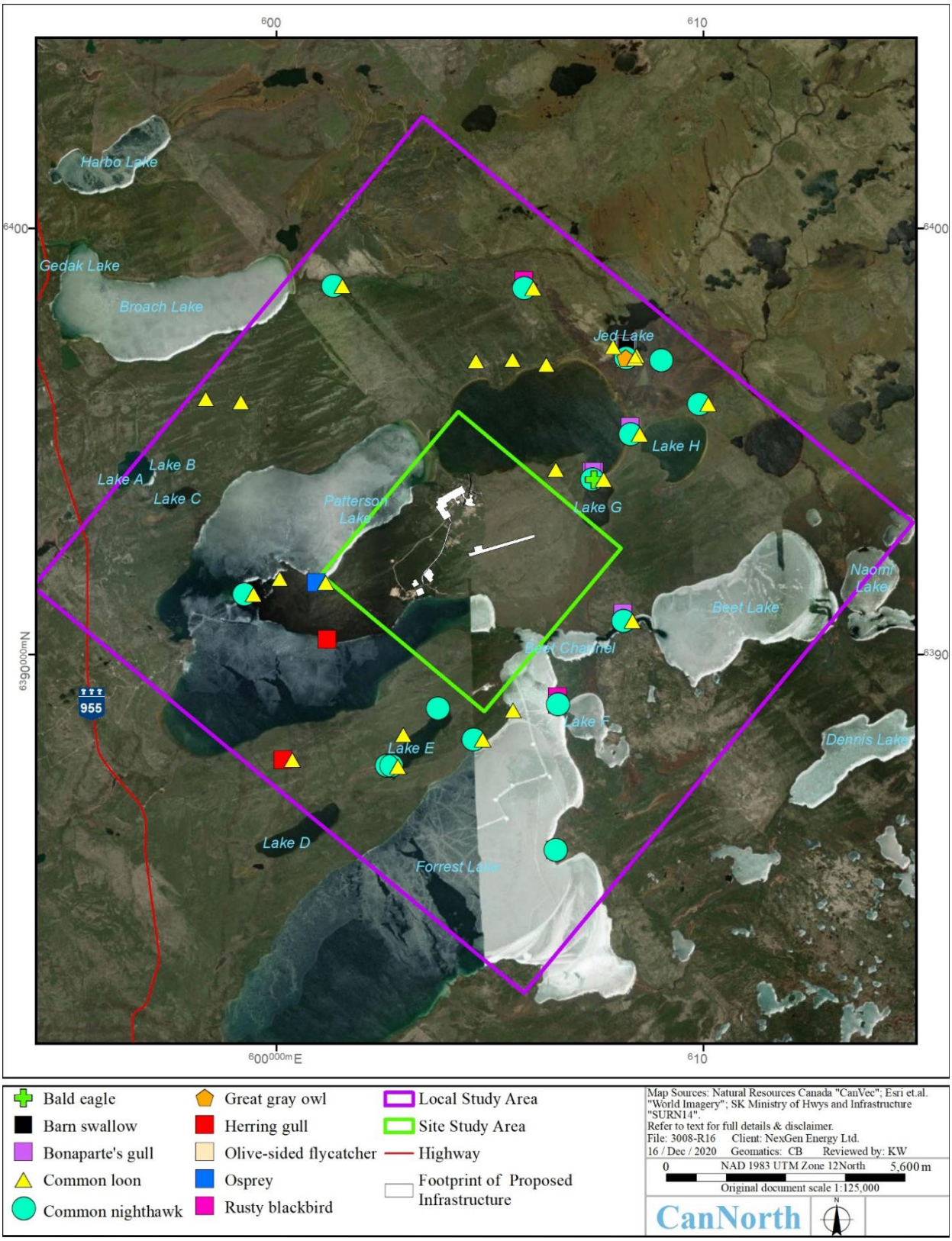

Figure 7.4-3: Locations of Breeding Bird Species of Conservation Concern Detected During Targeted Bird Surveys and Incidentally – LSA, May to July 2018

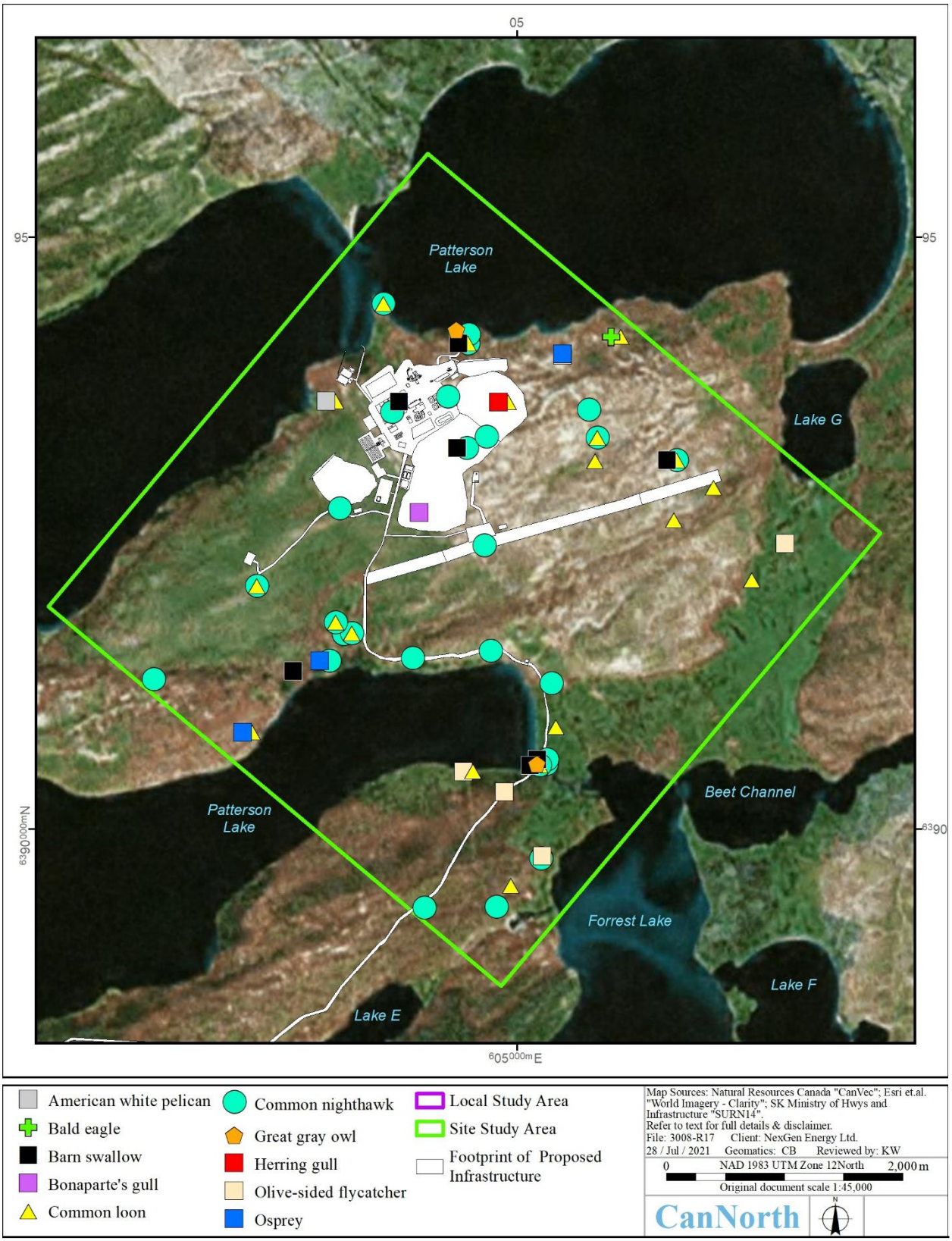

Figure 7.4-4: Locations of Breeding Bird Species of Conservation Concern Detected During Targeted Bird Surveys and Incidentally – SSA, May to July 2018

8.0 BAT SURVEYS

8.1 Study Objectives

To meet regulatory guidance and scientific best practices, bat surveys were completed in the summer of 2018 to support the description of terrestrial environmental conditions (ENV 2014a; IAAC 2019; CNSC 2020). The objectives of the surveys were to document distribution and abundance of bats present in the SSA and LSA, and to provide information on potential species composition. As bat species are a potential VC, resulting data will assist in identifying populations and habitat features that may be protected under provincial or federal legislation, including activity restriction guidelines and/or SARA (MBCA 1994; ENV 2017; SARA 2002).

8.2 Methods

Five bat detectors (i.e., Wildlife Acoustics SM4BAT Full Spectrum bioacoustic recorders) were installed in late May 2018; these installations were within the SSA in areas with high habitat potential for breeding or foraging bats (i.e., mature and regenerating forest, lake shorelines, wetlands, and stream systems; Figure 8.2-1; Table 8.2-1). Sound categories created to identify bats in the area of the Project were based on specific audio signatures as typically calls cannot be conclusively identified to species. Uncertainty exists in differentiating calls of big brown bat (*Eptesicus fuscus*) and silver-haired bat (*Lasionycteris noctivagans*); eastern red bat (*Lasiurus borealis*) and little brown myotis; and species in the Myotis genus. Note that two bat species, little brown myotis and northern myotis, were listed in two species groups. While it can be difficult to distinguish between both species in the Myotis genus, call features can exist that enable observers to rule out the eastern red bat when considering all species in the high frequency group. In consideration of all the above variables, vocalizations of bat species were grouped into the following three categories following Vonhof (2017):

- **High frequency bats**: Eastern red bat, northern myotis, and little brown myotis
- **Low frequency bats**: Big brown, silver-haired, and hoary bat (*Lasiurus cinereus*)
- **Myotis species**: Northern myotis and little brown myotis

Collection and analysis of recordings was conducted in accordance with the CanNorth SOP for bat surveys, which adheres to the Wildlife Siting Guidelines for Saskatchewan Wind Energy Projects (ENV 2016), the Plant and Wildlife Pre-Constructions Surveys for Renewable Energy Projects (ENV 2018c), the Wildlife Directive for Alberta Wind Energy Projects (GA 2018), and the Bat Mitigation Framework for Wind Power Development (GA 2013). Methods used accounted for potential VCs, and met CNSC standards for characterizing baseline environments (ENV 2014a; CNSC 2020).

Bat detectors were programmed prior to deployment and set to record ultrasonic sound at 10-minute intervals (i.e., 10 minutes on, 10 minutes off) beginning 30 minutes after sunset and continuing until 30 minutes before sunrise. To increase data collection quality and reduce extraneous noise files, the detectors were programmed with a minimum recording duration of 1.5 milliseconds (ms) with trigger frequency of 16 kilohertz (kHz), and a trigger level of 12 dB. All detectors were equipped with two 32 GB SD memory cards. Ultrasonic microphones were mounted to 5 cm x 5 cm x 243 cm wooden posts and secured to trees at a height of 2 m using cable ties and screws, resulting in a microphone deployment height of approximately 5 m (Appendix A, Photo 5). One detector (i.e., BAT 03) was mounted to a meteorological (MET) tower at a height of approximately 7 m (Appendix A, Photo 6).

In the analysis, the standard units of measure used were bat call sequences (i.e., bat passes) and the primary measurement for reporting activity rates were bat passes per detector night (i.e., at one detector over a one-night period). This reporting measurement was used as a relative measure of bat activity in the vicinity of any given bat detector. Echolocation analysis was conducted using Kaleidoscope Pro (Version 5.1.4) to determine the number of bat passes per night and to correlate the bat call sequences to species group. Files were analyzed based on parameters such as call frequency, shape, slope, and duration, and were broadly matched to the calls of species with biogeographical ranges overlapping the area of the Project (Table 8.2-2). Manual vetting of results was completed to remove false positives.

Table 8.2-1: Bat Detector Locations, May to October 2018

Detector ID	UTM Location[a]		Deployment Description	Habitat Description
	Easting	Northing		
BAT 01	605211.53	6389780.89	Mounted to a black spruce at a height of approximately 5 m	Bog
BAT 02	605164.26	6390519.56	Mounted to a jack pine at a height of approximately 5 m	Creek
BAT 03	604498.04	6393439.26	Mounted to MET tower at a height of approximately 7 m	Conifer regeneration
BAT 04	604060.77	6391419.04	Mounted to a jack pine at a height of approximately 5 m	Mature pine near Patterson Lake
BAT 05	601850.21	6391261.99	Mounted to a jack pine at a height of approximately 5 m	Mature pine adjacent to conifer regeneration

a) UTM = NAD 83 Zone 12U.

Table 8.2-2: Bat Species Known to Occur in the Biogeographical Region of the Project

Scientific Name	Common Name	SKCDC Rank	COSEWIC	SARA Status	Schedule
Eptesicus fuscus	Big brown bat	S5	-	-	-
Lasionycteris noctivagans	Silver-haired bat	S5B	-	-	-
Lasiurus borealis	Eastern red bat	S4B	-	-	-
Lasiurus cinereus	Hoary bat	S5B	-	-	-
Myotis lucifugus	Little brown myotis	S4	Endangered	Endangered	Schedule 1
Myotis septentrionalis	**Northern myotis**	**S3**	**Endangered**	**Endangered**	**Schedule 1**

Source: All scientific and common names from SKCDC (2018a); Federal rank as per SARPR (2018).

SKCDC = Saskatchewan Conservation Data Centre; S1 = critically imperiled/extremely rare, S2 = imperiled/very rare, S3 = vulnerable/rare to uncommon, S4 = apparently secure, S5 = secure/common, B = breeders

Bold text indicates rare (S1 to S3) species.

Figure 8.2-1: Bat Detector Locations, May to October 2018

8.3 Results

Detectors deployed in the SSA recorded a total of 4,312 bat passes from May 24 to October 15 2018 (Appendix B, Table 6). Bat activity rates for all detectors ranged from 2.49 (324 recordings) to 17.81 (2,315 recordings) bat passes per detector night with a combined average of 7.66 bat passes per detector night (4,312 recordings). Detector BAT 02 recorded significantly more bat passes relative to other detectors, and accounted for approximately 53% of the total recorded files from all detectors (2,315 recordings). Detector BAT 04 malfunctioned in early July with the last recording made on 4 July 2018. Despite the malfunction, Detector BAT 04 recorded the second highest number of bat passes per detector night (i.e., 10.02), with more than 431 recorded passes in 43 detector nights. While the interaction of habitat variables (i.e., prey or roost availability, foraging conditions, and predator avoidance) is difficult to quantify, bats (*Myotis* especially) tend to forage over still water, rivers, forest edges/trails, and generally select larger diameter trees for roosting (COSEWIC 2013). Detectors BAT 02 and BAT 04 were located in stands of mature jack pine dominated habitats, in proximity to water (Patterson Creek and Patterson Lake), and were within 30 m of access roads.

All three bat groups were detected at bat detector stations. Bats in the high frequency group (i.e., eastern red bats, little brown myotis, and northern myotis) and the myotis subset group (i.e., little brown myotis and northern myotis) accounted for the vast majority of recorded bat passes (4,206 recordings; 97.5%). Bats in the low-frequency group (i.e., big brown, silver-haired, and hoary bats) were recorded much less frequently than the other groups (106 recordings; 2.5%). In consideration of known species ranges and abundance, call characteristics, and habitat suitability, bat passes categorized into either the high frequency or the *Myotis* groups were expected to be primarily composed of little brown myotis; likewise, those individuals in the low frequency group were expected to be primarily composed of silver-haired or hoary bats (M. Brigham, University of Regina, pers. comm.).

Bat activity in the SSA increased in the second week of June 2018 and this likely coincided with the establishment of foraging areas or hatches of aerial insects in the vicinity of bat detectors (Figure 8.3-1). Near the end of the season, bat activity levels decreased around 12 August 2018, which may have resulted from individuals initiating migration (COSEWIC 2013). Both little brown myotis and northern myotis mate during a late summer or autumn “swarming period” prior to hibernation (COSEWIC 2013). None of the detectors recorded a spike indicative of swarming activity; however, detection ranges of recorders vary based on a number of factors and, under optimal conditions, a detection range of only 25 m is expected (Agranat 2014).

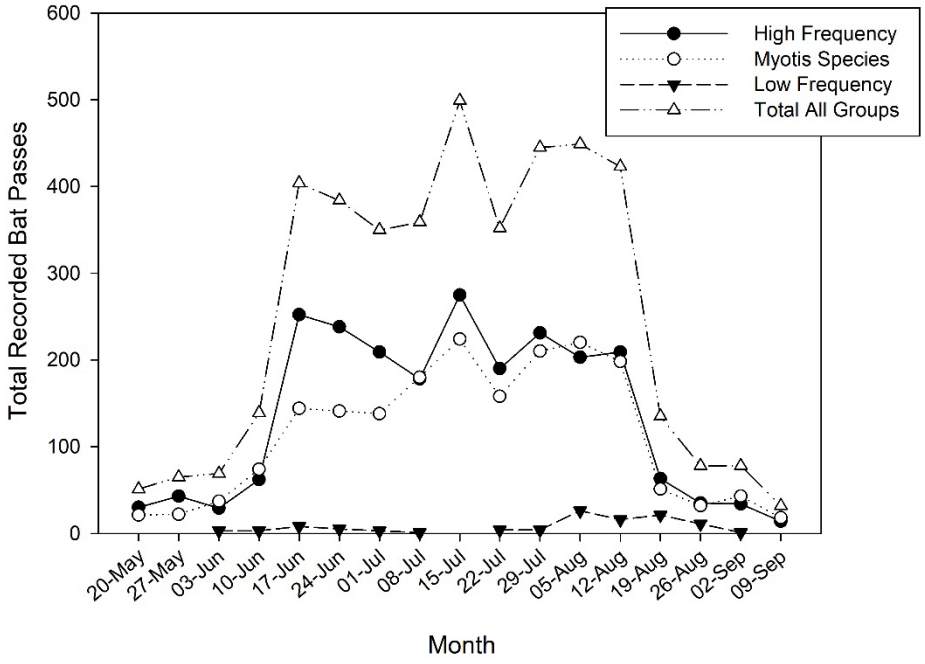

Figure 8.3-1: Total Number of Bat Passes per Month, May to October 2018

9.0 INCIDENTAL WILDLIFE OBSERVATIONS

During the 2018 field program, incidental wildlife observations were recorded for SOCC, species not detected during surveys in the area of the Project, and for non-target species (e.g., mammals). Information related to incidental bird, amphibian, and bat observations are discussed in the respective sections above. The information presented in this section is focused on species lacking targeted field surveys during the 2018 field program.

Mammalian species recorded incidentally in the area of the Project included moose (*Alces americanus*), black bear (*Ursus americanus*), northern grey wolf (*Canis lupus occidentalis*), beaver (*Castor Canadensis*), American mink (*Neovison vison*), muskrat (*Ondatra zibethicus*), snowshoe hare (*Lepus americanus*), least chipmunk (*Tamias minimus*), red squirrel (*Tamiasciurus hudsonicus*), and woodland caribou. All of these species, with the exception of woodland caribou, are ranked as apparently secure (S4) to secure/common (S5) by the SKCDC, and all of these species are not listed under SARA (SARPR 2018; SKCDC 2018a). There are no provincial activity restriction guidelines applicable to any of these species, but all are protected provincially under *the Wildlife Act* (GS 1998; ENV 2017).

Woodland caribou are the only mammalian SOCC observed in the LSA and are listed as threatened under Schedule 1 of SARA (SARPR 2018). The SKCDC ranks woodland caribou as vulnerable/rare to uncommon (S3) in Saskatchewan. Two observations of woodland caribou were recorded in the area of the Project. One individual caribou was observed on the shore of Lake H in August 2018 during aquatic field surveys (Figure 9.0-1; Appendix B, Table 2). Vocalizations of a second individual were detected at ARU 11 in the SSA during breeding bird surveys (Figure 7.4-4; Appendix B, Table 2).

One rare insect species, luna moth (*Actias luna*), was also observed in the area of the Project during 2018 field surveys. Luna moths are ranked as imperiled/very rare (S2) by the SKCDC; however, the luna moth is not listed under SARA or COSEWIC and have no applicable activity restriction guidelines (ENV 2017; SARPR 2018; SKCDC 2018b).

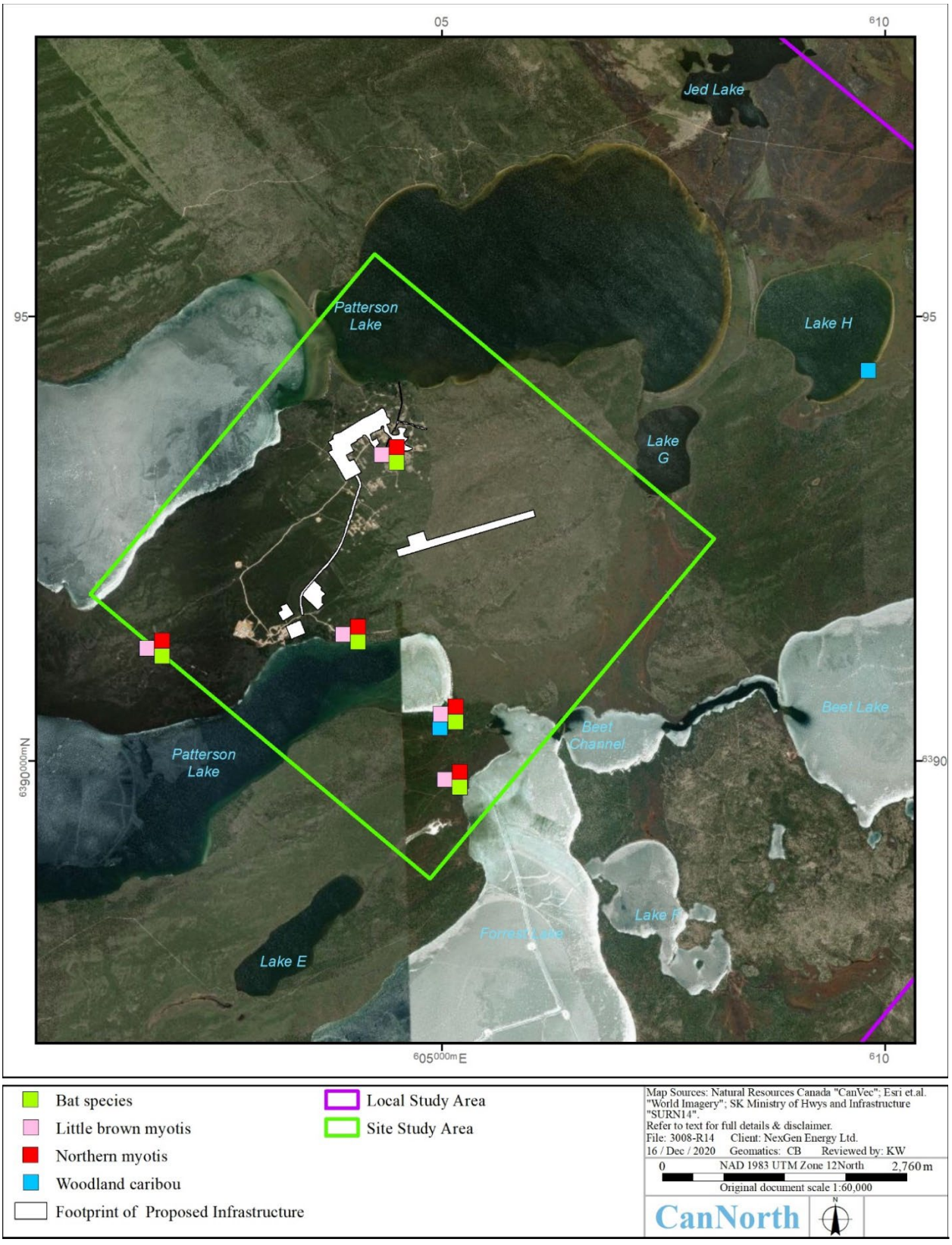

Figure 9.0-1: Locations of Mammal Species of Conservation Concern Detected During Bat Surveys and Incidentally, 2018

10.0 SPECIES OF CONSERVATION CONCERN (SOCC)

The 2018 field surveys resulted in detection of several SOCC. As wildlife species often have specific habitat requirements, some habitat types in the SSA and LSA had a higher probability of providing habitat for rare or sensitive species than others. The following section provides a summary of typical habitat requirements for all SOCC documented during the 2018 field surveys. These include species listed under SARA or COSEWIC, species with provincial or federal setback guidelines, or species ranked as rare or uncommon by the SKCDC (S1 to S3).

A total of 19 sensitive species were detected during targeted field surveys and incidentally (Figure 4.3-2, Figure 7.4-3, and Figure 9.0-1). Six of these species are listed federally under SARA including: common nighthawk (threatened), olive-sided flycatcher (threatened), rusty blackbird (special concern), barn swallow (threatened), boreal woodland caribou (threatened), and bat species (potentially two species listed as endangered; confirmation is not possible without capture) (SARPR 2018). An additional 12 species were observed that are not listed under SARA or COSEWIC, but have provincial activity restriction guidelines. These include Canadian toad, Bonaparte's gull, common loon, bald eagle, herring gull, osprey, American white pelican, great gray owl, and four bat species in the Family *Vespertilionidae* (ENV 2017; SKCDC 2018a). One additional provincially rare insect species, luna moth, was also observed. Information on special management guidelines relating to activity restrictions near habitat features (e.g., nests) of these species is provided in Table 2.3-1.

Details regarding each SOCC listed by order of highest conservation rank discussed below.

10.1 Listed Species under the Species at Risk Act

Common Nighthawk

During the 2018 field program, common nighthawks were documented at a total of 44 locations in the SSA (30 locations) and LSA (14 locations). Common nighthawks breed in a variety of open, sparsely vegetated habitats, including sand dunes and beaches, recently cut or burned forests (i.e., both mixed-wood and coniferous), outcrops of rock or gravel, grasslands, and low vegetation adjacent to wetlands and other water features (Rodewald 2018). The distribution and frequency of common nighthawk observations recorded during targeted and non-targeted surveys suggests that high quality breeding habitat occurs throughout the area of the Project, and that this species is widespread and locally abundant within the SSA and LSA.

Federal and provincial legislation pertinent to common nighthawks is discussed in Section 5.3.

Olive-sided Flycatcher

Olive-sided Flycatchers were identified in 12 locations in the SSA (6 locations) and LSA (6 locations). Olive-sided flycatchers defend relatively large territories and prefer to nest along the edges of open habitats with tall snags or trees, including bogs and riparian zones, burned areas, clear cuts, and open canopy forests (COSEWIC 2007; Rodewald 2018). Both early and late successional stage forests may be used by this species; however, patchy mature forest that has been modified by natural disturbance or with natural openings is generally preferred (Rodewald 2018). The majority (83%) of observations of olive-sided flycatcher within the area of the Project were noted near large waterbodies (i.e., Patterson Lake and Forrest Lake) or along creeks and bogs with sparse vegetation in the adjacent uplands. Habitat types that meet

this description and have the potential to support olive-sided flycatchers were fairly common and widespread in the SSA and LSA.

Olive-sided flycatchers are listed as threatened under SARA (SARPR 2018) and are provincially ranked as S4B (apparently secure breeding population) in Saskatchewan by the SKCDC (2018a). Saskatchewan Activity Restrictions Guidelines and federal guidelines recommend a setback of 300 m from birds exhibiting breeding behaviour from 1 May to 31 August for high-disturbance activities (ENV 2017; P. Gregoire pers. comm.).

Rusty Blackbird

Rusty Blackbirds were identified at three locations in the LSA. This species breeds almost exclusively in the Canadian boreal forest, with preferred habitat including bogs, fens, marshes, and swamps within wet coniferous and mixed forest stands, often near open water (COSEWIC 2006; Rodewald 2018). Suitable habitat for nesting rusty blackbirds was fairly common and widespread in the SSA and LSA.

Rusty Blackbirds are listed as a species of special concern under SARA (SARPR 2018) and are provincially ranked as S3B (rare to uncommon breeding populations) by the SKCDC (2018a). Saskatchewan Activity Restrictions Guidelines and federal guidelines recommend a setback of 300 m from birds exhibiting breeding behaviour from 1 May to 31 July for high-disturbance activities (ENV 2017; P. Gregoire pers. comm.).

Barn Swallow

Barn swallows were identified at a total of 10 locations in the SSA (7 locations) and LSA (3 locations). Prior to European settlement, barn swallows predominantly nested in caves and on cliff faces; however, post-colonial populations nest almost exclusively on anthropogenic structures including barns, out-buildings, bridges, and industrial equipment (SARPR 2018). Foraging occurs in open areas with an abundance of aerial insects, as well as over lakes, pastures, cropland, suburban parks, riparian edges, or disturbed areas (SARPR 2018). In the SSA and LSA, barn swallows were identified at ARU stations near bridge crossings. Breeding habitat within the area of the Project was likely limited to areas with existing infrastructure, such as bridges and construction camps, although this species may be observed elsewhere during foraging or migration.

Barn swallows are designated as Threatened under SARA (SARPR 2018) and are provincially ranked as S5B (secure/common breeding population) in Saskatchewan by the SKCDC (2018a). Federal guidelines recommend a setback of 100 m from active nest sites from 1 May to 31 August for high disturbance activities (P. Gregoire pers. comm.). There are no pertinent provincial activity restriction guidelines relevant to barn swallows in Saskatchewan (ENV 2017).

Myotis Bat Species

Bat species identified in the area of the Project are described in Section 8.3. The majority of recordings were attributed to little brown myotis due to biogeographical range and habitat characteristics of the area of the Project (M. Brigham, University of Regina, pers. comm.). Both the little brown myotis and northern myotis are federally listed as endangered under SARA (SARPR 2018), and the roosts and foraging sites for all bat species (*Vespertilionidae*) are listed under the Saskatchewan Activity Restriction Guidelines,

recommending a 500-m setback from high disturbance activities year-round. While there is some uncertainty in species identification in recordings, there is near certainty that little brown myotis occurs in the area of the Project, and a reasonable likelihood that northern myotis occurs as well (M. Brigham, University of Regina, pers. comm.). Little brown myotis is provincially ranked as S4 (apparently secure), while northern myotis is ranked as S3 (rare to uncommon) in Saskatchewan. The remaining four species of bats potentially detected are ranked as either apparently secure (S4) or secure/common (S5) by the SKCDC.

Considerable range overlap exists between little brown myotis and northern myotis, with northern myotis being less widely distributed and generally less abundant (COSEWIC 2013). The habitat used by myotis species in temperate regions varies seasonally and is limited by the presence of suitable hibernacula (i.e., locations where bats hibernate over the winter) (COSEWIC 2013). Movements of little brown myotis and northern myotis are poorly understood; however, neither species is believed to partake in large migrations away from wintering hibernacula (Havens 2006). Myotis species typically select caves or abandoned mines for hibernacula and look for caverns having a stable ambient temperature, typically between 2°C and 10°C, and a humidity level of >80% (COSEWIC 2013). Specific hibernacula requirements can vary by species and region, with observed hibernacula temperatures as low as -4°C being documented for little brown myotis (COSEWIC 2013). Additional factors including running water features, cave size, number of cave openings, and the availability of adjacent fall foraging habitat are often important in hibernacula selection. Abandoned buildings and man-made structures are not known to be used as hibernacula by either species (COSEWIC 2013). Hibernacula mapping is deficient in Canada, particularly in the western provinces. No historic wintering locations have been previously identified in the area of the Project and the likelihood of hibernacula existing within this area is estimated to be low as discussed in Section 8.3.

Summer habitat selection is likely determined as a function of the availability of roosting structures in relation to accessible foraging grounds; however, current habitat models are incomplete (COSEWIC 2013). Individual bats may utilize a wide variety of physical structures for summer roosting including deeply furrowed tree bark, tree cavities, moderately decomposed snags, rock crevices, buildings, bridges, and other man-made structures (COSEWIC 2013). Myotis species form maternal colonies in the spring with little brown myotis prioritizing warm man-made environments (e.g., attics and bridges) while northern myotis selecting large-diameter trees and snags associated with mature forests (COSEWIC 2013). Northern myotis are far less social than little brown myotis and often roost alone or in smaller maternal colonies (Havens 2006). Myotis species typically return to historic maternal roosts each year (Havens 2006). Finally, both species of myotis are known to forage over water features and along forest edges, but avoid large clearings including large burn overs and clear cuts (COSEWIC 2013).

The most productive bat detector installation was ARU station 02, which was situated adjacent to the Patterson Creek Bridge. This infrastructure could serve to provide habitat for both maternal colonies and/ or mixed sex groups that often congregate at night when cool temperatures persist (Havens 2006). An incidental observation of an individual bat foraging over Patterson Creek was noted near this location in early October. Bats also frequented an area adjacent the NexGen Road directly east of the NexGen camp at ARU station 04. This area is characterized by mature mixed wood forest and proximity to Patterson Lake; features that likely provide natural roosting opportunities near suitable foraging habitat.

Boreal Woodland Caribou

Woodland caribou were recorded incidentally on two occasions in the SSA (1 location) and LSA (1 locations). Woodland caribou occur at low densities in the Canadian boreal forest, with a national average of 2 – 3 animals per 100 km^2 (ECCC 2012). Preferred habitat includes large expanses of intact mature to old-growth coniferous forests (e.g., black spruce and jack pine) interspersed with conifer-dominated peatlands or muskegs (Rettie and Messier 2000; COSEWIC 2012; ECCC 2009; SARPR 2011). Mature and old growth forests provide both terrestrial and arboreal lichens, the primary food source for woodland caribou (Rettie and Messier 2000; ECCC 2009; SARPR 2011; COSEWIC 2012). Early seral stage forests, or recent burns and cuts are avoided, due to the lack of forage (Rettie and Messier 2000; COSEWIC 2012). Disturbed areas may also be more attractive to predators as a result of other ungulates (including deer and moose) being present in these habitat types (COSEWIC 2012). During calving season, habitat with reduced predation risk, such as islands within waterbodies, complex lake shorelines, and peatlands are preferred (SARPR 2011). The area of the Project is estimated to contain a moderate amount of highly suitable habitat for boreal woodland caribou, particularly in treed wetlands, and mature jack pine stands.

Woodland Caribou are listed as threatened under SARA (SARPR 2018) and are provincially ranked as S4 (apparently secure) in Saskatchewan by the SKCDC (2018a). There are no provincial or federal activity restriction guidelines relevant to woodland caribou in Saskatchewan.

10.2 Species with Provincial Activity Restriction Guidelines

Canadian Toad

Canadian toads were documented in a total of seven locations in the SSA (2 locations) and LSA (5 locations). All detections were auditory with the exception of a single incidental observation at Naomi Lake, where two breeding individuals were confirmed. Canadian toads breed in wetlands within a variety of habitat types, including grassland, aspen parkland, and boreal forest, with a range extending as far north as Fort Smith, NWT (GNWT 2018). Canadian toads are often found in association with large bodies of water or river valleys. Adult toads are primarily a terrestrial amphibian species that only spend a few weeks, at most, associated with their aquatic breeding site and can travel into upland areas to elevations of 1200 m above sea level; however, as they are not tolerant of dry conditions as other toad species they generally remain in areas close to water or moist environments (ACA 2002). For the duration of the fall and winter, Canadian toads burrow in the earth so they typically depend on areas with sandy soils that allow ease of burrowing. Thus, preference may be given to sandy upland habitats adjacent to large waterbodies as they are likely to provide important wintering grounds (ACA 2002). Canadian toads are found in highest densities during the breeding between May and July near shallow riparian areas of lakes and slow moving rivers, as well as small seasonal and temporary wetlands (ACA 2002). The numerous wetlands, creeks, and lakes shouldered by sandy, wooded upland habitats noted within the area of the Project provide suitable habitat for all life stages of this species.

Federal and provincial legislation pertinent to Canadian toads is discussed in Section 4.3.

Bonaparte's Gull

Bonaparte's gulls were identified at a total of seven locations in the SSA (3 locations) and LSA (4 locations). This small species of gull prefers nesting in trees or riparian vegetation along the edges of lakes and

marshes in the boreal forest (Rodewald 2018). Nests are typically situated near water to best facilitate foraging for insects, crustaceans, and small fish (Rodewald 2018). Almost all observations of Bonaparte's gulls were noted as being adjacent to the shore of large waterbodies (e.g., Patterson Lake) except for individuals observed in flight. The habitat potential for this species throughout the area of the Project is estimated to be high due to the prevalence of lakes and wetlands with wooded riparian margins.

Bonaparte's gulls are not protected under SARA or COSEWIC (SARPR 2018) and are listed provincially as an S4B (apparently secure breeding population) by the SKCDC (2018a). Saskatchewan Activity Restrictions Guidelines recommend a 400-m setback from gull colonies for high disturbance activities from May 1st to July 15th (ENV 2017).

Common Loon

Common loons were documented in a total of 42 locations in the SSA (18 locations) and LSA (24 locations). Common loons are aquatic birds requiring large permanent water bodies that are fish-bearing, including lakes and slow-moving rivers in forested areas (Rodewald 2018). Preferred nesting habitat is typically along the shore of lakes with coves and islands with steep drop-offs that provide areas of refuge from predators. Nests are constructed of aquatic plants and are always adjacent to water as loons cannot traverse long distances over land (Rodewald 2018). Common loons were found to be fairly abundant throughout the area of the Project, which is estimated to contain a moderate amount of highly suitable lakeshore habitat.

Common loons are not protected under SARA or COSEWIC and are listed provincially as S5B (secure/common breeding population) by the SKCDC (2018a). Saskatchewan Activity Restrictions Guidelines recommend a 200-m setback from nesting loons for high disturbance activities from 1 May to 15 July (ENV 2017).

Bald Eagle

Bald eagles were documented at a total of five locations in the SSA (3 locations) and LSA (2 locations). Preferred breeding habitat for bald eagles typically consists of forested areas adjacent (i.e., within 2 km) to permanent fish-bearing waterbodies that provide adequate foraging opportunities and tall trees for perching and nesting (Rodewald 2018). Nest sites are often situated beneath the crown of the tallest available old-growth conifers, often overlooking water within tracts of forest isolated from human development (Rodewald 2018).

Early seral stage forest and regenerating burnt forest accounted for large portions in the area of the Project. These habitats are not generally preferred by nesting bald eagles, although bald eagles may occasionally use marginal-quality nesting sites such as rocky islands. High quality habitat in the area of the Project was confined to unburned areas of mature spruce and pine that remain near the lake shores. A potential breeding pair of bald eagles was observed at Beet Lake within the LSA, but no active nest site was found.

Bald eagles are not protected under SARA or COSEWIC and are ranked as S5B (secure/common breeding population) by the SKCDC (2018a). Saskatchewan Activity Restrictions Guidelines recommend a 1,000-m setback from bald eagle nests for high disturbance activities from 15 March to 15 July (ENV 2017).

Herring Gulls and Other Large Gull Species

Herring gulls were documented at a total of three locations in the SSA (1 location) and LSA (2 locations). There were several additional observations of large gulls (*Larus spp.*) in the LSA; however, these were not identified to species. Herring gulls typically nest on sparsely-vegetated islands with gravelly substrate (Rodewald 2018), form colonies during the breeding season, and are frequently found in the company of other gull and waterbird species (Rodewald 2018). Herring gulls, along with many other gull species, often utilize a diverse range of habitats during foraging and are opportunistic foragers. It is estimated that the area of the Project provides moderate habitat potential for herring gull colonies, although this species is often noisy and conspicuous and none were observed during the 2018 field program.

Herring gulls are not protected under SARA or COSEWIC (SARPR 2018); however the colonies of herring gulls and other gull species (except for ring-billed and California gulls) have a 400-m setback recommended by Saskatchewan Activity Restriction Guidelines for high disturbance activities (ENV 2017).

Osprey

Osprey were documented at a total of four locations in the SSA (3 locations) and LSA (1 location) and no active nest sites were found during the 2018 field program. Osprey breed in a variety of forested habitats and generally select sites relatively close to fish-bearing waterbodies; however, travel up to 20 km from nests may occur while foraging (Rodewald 2018). Preferred nesting sites typically have open surroundings and often include tall snags, exposed cliff faces, man-made structures, and mature trees (Rodewald 2018). As much of the area of the Project is comprised of burned and regenerating forest, availability of sufficient nest platforms was somewhat limited; suggesting that high quality habitat for osprey in the area of the Project is primarily located in areas with mature trees or other structures capable of supporting nests. Overall, breeding habitat potential in the area of the Project is considered to be moderate.

Osprey are not protected under SARA or COSEWIC and are ranked as S2B (imperiled/very rare breeding population) by the SKCDC (2018a). Saskatchewan Activity Restrictions Guidelines recommend a 1,000-m setback from osprey nests for high disturbance activities from 1 May to 15 August (ENV 2017).

American White Pelican

One American white pelican was identified in the SSA and no evidence of breeding colonies were observed during the 2018 field program. American white pelicans nest colonially, preferring sparsely-vegetated islands with level ground and sand or gravel substrate (Rodewald 2018). The American white pelican will typically form large and conspicuous breeding colonies, often mixing with other colonial species such as double crested cormorants and gulls (Rodewald 2018). During the nesting season, American white pelicans may fly up to 50 km from nesting grounds while foraging for fish, often travelling in groups; therefore, sightings of individuals do not necessarily indicate the presence of a colony nearby (Rodewald 2018). Large lakes including Patterson Lake and Forest Lake have potential to provide seasonal foraging areas; however, the availability of nesting habitat for American white pelicans in the area of the Project is estimated to be low.

American white pelicans are not protected under SARA or COSEWIC and are ranked as S5B (secure/common breeding population) by the SKCDC (2018a). Saskatchewan Activity Restrictions

Guidelines recommend a 1,000-m setback from pelican colonies for high disturbance activities from 1 April to 31 July (ENV 2017).

Great Gray Owl

Great gray owls were detected in three locations in the SSA (2 locations) and LSA (1 location) during the 2018 field program. Great gray owls typically inhabit mature stands of coniferous trees with adjacent meadows, burn-overs, fields, or bogs (Rodewald 2018). Nest sites typically include the abandoned stick nests of ravens or raptors, or the broken tops of snags (Rodewald 2018). Open bogs, fens, burned areas, and meadows shouldered by mature jack pine and black spruce were widely distributed throughout the area of the Project and likely provide sufficient structures to support nesting. Therefore, habitat potential for great gray owls in the area of the Project is fairly high. Density of great gray owl on the landscape is highly variable among years and often fluctuates markedly in response to prey availability (Rodewald 2018); thus, the presence and distribution of great gray owls in the area of the Project may vary significantly among years, despite the availability of suitable habitat.

Great gray owls are not protected under SARA or COSEWIC and are ranked as S3B (vulnerable/rare to uncommon) by the SKCDC (2018a). Saskatchewan Activity Restrictions Guidelines recommend a 400-m setback from great gray owl nest sites for high disturbance activities from 1 May to 15 August (ENV 2017).

11.0 SUMMARY

The wildlife baseline program was designed to obtain comprehensive information to characterize wildlife, to include species of conservation concern (SOCC), and the associated habitats in near vicinity to the Project (Site Study Area [SSA]) and a broader Local Study Area [LSA]). Information obtained through database searches and field surveys was used alongside Indigenous Knowledge in the Environmental Impact Statement (EIS) and cumulative effects assessment, to inform Project planning, and support development of future monitoring programs and reclamation plans. To meet study objectives, the following studies were completed as part of the terrestrial wildlife baseline environment investigations for the Project:

- species of conservation concern database searches;
- autonomous recording units for detection of amphibians, birds, and bats;
- amphibian auditory surveys;
- breeding bird surveys;
- common nighthawk surveys;
- yellow rail surveys; and
- bat detection surveys.

A list of 15 species with conservation concern was compiled from database searches and by assessing biogeographical range for species potentially occurring in the region. The Hunting, Angling and Biodiversity Information of Saskatchewan (HABISask) database search identified 11 wildlife species previously recorded within 30 km of the centre of the SSA, including 10 bird species and one mammal. A further two mammal species and two amphibian species were added to database search results based on biogeographical range and habitat potential within the LSA.

Wildlife surveys were completed in the LSA and SSA for amphibians, common nighthawks, yellow rails, breeding birds, and bats. These surveys were completed by a combination of in-situ and ARU surveys. Sixteen nocturnal amphibian acoustic surveys were completed using a combination of ARU and in-situ surveys. Two species of amphibians were detected in the SSA, including Canadian toads and wood frogs. Canadian toads were the only SOCC detected, and the total number of detection locations, including survey results and incidental observations, included two sites in the SSA and six sites in the LSA.

During the breeding bird surveys, 100 point count locations were surveyed, including 53 in the SSA and 47 in the LSA using a mix of in-situ and ARU surveys. A total of 95 bird species were recorded, including 11 SOCC. These included four species listed under SARA: common nighthawk, olive-sided flycatcher, rusty blackbird, and barn swallow. An additional 7 species with provincial activity restriction guidelines (ENV 2017) were observed, including Bonaparte's gull, common loon, bald eagle, herring gull, osprey, American white pelican, and great gray owl.

A total of 27 locations were surveyed for common nighthawks and 15 wetlands for yellow rail using in-situ field surveys and ARU recordings. Detection rates per survey for common nighthawks ranged from zero to six individuals, and numerous incidental observations of common nighthawks were also recorded during other survey types completed in the SSA and LSA. No yellow rails were recorded during the surveys or incidentally, and the SSA was determined to have minimal habitat suitable for this species.

Five bat detectors were installed in the SSA and were designed to detect bats in three frequency groups: high frequency, low frequency, and myotis species. A total of 4,312 bat passes were recorded, including 4,206 in the high frequency and myotis groups, and 106 in the low-frequency group. Based on biogeographical range, abundance, call characteristics, and habitat suitability, bat passes categorized into either the high frequency or the *Myotis* groups are expected to be primarily composed of little brown myotis and those individuals in the low frequency group are expected to be primarily composed of silver-haired or hoary bats (M. Brigham University of Regina, pers. comm.).

Overall, a total of 19 sensitive species were detected during targeted field surveys and incidentally, including six species listed under SARA with restriction guidelines including: common nighthawk (200 m, 1 May to 31 August), olive-sided flycatcher (300 m, 1 May to 31 August), rusty blackbird (300 m, 1 May to 31 July), barn swallow (100 m, 1 May to 31 August), boreal woodland caribou, and bat species (potentially two species listed as endangered). An additional 12 species with provincial activity restriction guidelines were detected including Canadian toad (90 m year round), Bonaparte's gull (400 m, 1 May to 15 July), common loon (200 m, 15 May to 15 July), bald eagle (1000 m, 15 March to15 July), herring gull (400 m, 1 May to 15 July), osprey (1000 m, 1 May to 15 August), American white pelican (1000 m, 1 April to 31 July, great gray owl (400 m, 1 May to 15 August), and four bat species in the Family *Vespertilionidae* (500 m year round). One additional provincially rare insect species, luna moth, was also observed.

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APPENDICES

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APPENDIX A

WILDLIFE TERRESTRIAL ENVIRONMENT PHOTOGRAPHS

APPENDIX A – WILDLIFE TERRESTRIAL ENVIRONMENT PHOTOGRAPHS
LIST OF PHOTOGRAPHS

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Photo 2. Representative wetland habitat for amphibian acoustic surveys, May 2018

Photo 3. Canadian toads (*Anaxyrus hemiophrys)* mating pair at Naomi Lake, May 2018

Photo 4. Representative in burned forest/bog habitat for common nighthawk surveys, June 2018

Photo 5. Bat detector mounted on tree in mature jack pine stand, May 2018

Photo 6. Bat detector mounted to a meteorological (MET) tower, May 2018

APPENDIX B

DETAILED DATA TABLES

APPENDIX B: DETAILED DATA TABLES
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Appendix B, Table 1

Results of the Amphibian Auditory Survey, May and June 2018

Survey Location	UTM Coordinates[a]		Project Study Area[b]	Survey Number	Survey Date	Scientific Name	Common Name	Call Index[c]
	Easting	Northing						
AMPA 01	604750	6389338	SSA	1	24-May-2018	*Anaxyrus hemiophrys*	Canadian toad	1
				2	10-Jun-2018	-	-	-
				3	20-Jun-2018	-	-	-
AMPA 02	605174	6390544	SSA	1	24-May-2018	*Lithobates sylvaticus*	Wood frog	1
				2	10-Jun-2018	-	-	-
				3	20-Jun-2018	-	-	-
AMPA 03	603393	6393612	SSA	1	24-May-2018	-	-	-
				2	10-Jun-2018	-	-	-
				3	19-Jun-2018	-	-	-
AMPA 04	604491	6394217	SSA	1	24-May-2018	*Lithobates sylvaticus*	Wood frog	1
				2	10-Jun-2018	-	-	-
				3	19-Jun-2018	-	-	-
AMPA 05	603778	6388734	LSA	1	25-May-2018	-	-	-
				2	10-Jun-2018	-	-	-
				3	20-Jun-2018	-	-	-
AMPA 06	604039	6391441	SSA	1	24-May-2018	-	-	-
				2	10-Jun-2018	-	-	-
				3	20-Jun-2018	-	-	-
AMPA 07	597754	6389900	LSA	1	21-May-2018	-	-	-
				2	10-Jun-2018	-	-	-
				3	21-Jun-2018	-	-	-
ARU 01	601313	6398648	LSA	1	23-May-2018	-	-	-
				2	3-Jun-2018	-	-	-
				3	19-Jun-2018	-	-	-
ARU 03	609906	6395870	LSA	1	25-May-2018	*Anaxyrus hemiophrys*	Canadian toad	1
				2	4-Jun-2018	-	-	-
				3	17-Jun-2018	*Anaxyrus hemiophrys*	Canadian toad	1
ARU 04	608183	6396958	LSA	1	28-May-2018	*Anaxyrus hemiophrys*	Canadian toad	1
				2	5-Jun-2018	-	-	-
				3	18-Jun-2018	*Anaxyrus hemiophrys*	Canadian toad	1

Appendix B, Table 1

Results of the Amphibian Auditory Survey, May and June 2018

Survey Location	UTM Coordinates[a]		Project Study Area[b]	Survey Number	Survey Date	Scientific Name	Common Name	Call Index[c]
	Easting	Northing						
ARU 05	603794	6394437	SSA	1	27-May-2018	-	-	-
				2	7-Jun-2018	-	-	-
				3	15-Jun-2018	-	-	-
ARU 06	599235	6391405	LSA	1	25-May-2018	-	-	-
				2	9-Jun-2018	-	-	-
				3	20-Jun-2018	-	-	-
ARU 10	607388	6394103	LSA	1	28-May-2018	-	-	-
				2	7-Jun-2018	-	-	-
				3	14-Jun-2018	-	-	-
ARU 12	602685	6387383	LSA	1	30-May-2018	-	-	-
				2	8-Jun-2018	-	-	-
				3	16-Jun-2018	-	-	-
ARU 13	606593	6388821	LSA	1	27-May-2018	*Anaxyrus hemiophrys*	Canadian toad	1
				2	6-Jun-2018	*Anaxyrus hemiophrys*	Canadian toad	1
				3	17-Jun-2018	-	-	-
ARU 14	608124	6390784	LSA	1	27-Jun-2018	-	-	-
				2	9-Jun-2018	-	-	-
				3	18-Jun-2018	-	-	-

a) UTM = NAD83 Zone 13V.

b) LSA = Local Study Area; SSA = Site Study Area.

c) Auditory surveys used a call intensity index based on the following:

0: No calls heard.

1: Individual calls, not overlapping (1 to 5 individuals calling simultaneously).

2: Calls overlapping, but individuals distinguishable (6 to 10 individuals calling simultaneously).

3: Chorus consistent and overlapping (more than 10 individuals).

Appendix B, Table 2

Species of Conservation Concern Observations and Locations, 2018

Scientific Name	Common Name	SARA Status	SARA Schedule	COSEWIC Status	SKCDC Rank	Survey Location	Survey Type	Observation Type	Project Study Area[a]	Date of Observation	Highest Abundance Detected	UTM Coordinates[b]	
												Easting	Northing
Amphibians													
Anaxyrus hemiophrys	Canadian toad	-	-	Not at risk	S4	AMPH 01	Auditory amphibian	Auditory	SSA	May, 2018	1	604750	6389338
						ARU 03	ARU amphibian, ARU yellow rail (Inc), ARU Common nighthawk (Inc)	Auditory	LSA	May/June, 2018	1	609906	6395870
						ARU 04	ARU amphibian	Auditory, Automated recognition	LSA	May/June, 2018	1	608183	6396958
						ARU 06	ARU Yellow rail (Inc)	Auditory	LSA	July, 2018	1	599235	6391405
						ARU 12	ARU Amphibian	Automated recognition	LSA	June, 2018	1	602685	6387383
						ARU 13	ARU Amphibian, ARU Yellow rail (Inc), ARU Common nighthawk (Inc)	Auditory, Automated recognition	LSA	May/June, 2018	1	606593	6388821
						YERA 02	Yellow rail (Inc)	Auditory	SSA	June, 2018	1	605124	6389747
						Naomi Lake	Incidental	Visual	LSA	May, 2018	2	613406	6390768
Birds													
Chordeiles minor	Common nighthawk	Threatened	Schedule 1	Special concern	S4B, S4M	AMPH 05	Auditory amphibian (Inc)	Auditory	SSA	May/June, 2018	1	603778	6388734
						AMPH 01	Auditory amphibian (Inc)	Auditory	LSA	June, 2018	1	604750	6389338
						AMPH 06	Auditory amphibian (Inc)	Auditory	SSA	June, 2018	1	604039	6391441
						YERA 01	Yellow rail (Inc)	Auditory	SSA	June, 2018	1	602582	6387381
						YERA 02	Yellow rail (Inc)	Auditory	SSA	June, 2018	1	605124	6389747
						YERA 03	Yellow rail (Inc)	Auditory	SSA	June, 2018	1	605173	6390546
						YERA 04	Yellow rail (Inc)	Auditory	SSA	June, 2018	1	605214	6391227
						YERA 05	Yellow rail (Inc)	Auditory	SSA	June, 2018	1	603457	6391645
						YERA 07	Yellow rail (Inc)	Auditory	SSA	June, 2018	2	604512	6394176
						BBS 04	Breeding bird	Auditory	SSA	June, 2018	1	606274	6393113
						BBS 13	Breeding bird	Auditory	LSA	June, 2018	1	608291	6395164
						BBS 17	Breeding bird	Auditory	LSA	June, 2018	1	604615	6388003
						BBS 19	Breeding bird	Auditory	LSA	June, 2018	1	609013	6396900
						BBS 57	Breeding bird	Auditory	SSA	June, 2018	1	604335	6393652
						BBS 66	Breeding bird	Auditory	SSA	June, 2018	1	603336	6391420
						BBS 71	Breeding bird	Auditory	SSA	June, 2018	1	604508	6394101
						BBS 72	Breeding bird	Auditory	SSA	June, 2018	1	604497	6393215
						CONI 01	Common nighthawk	Auditory	SSA	June, 2018	3	604138	6389331
						CONI 02	Common nighthawk	Auditory	SSA	June, 2018	3	605124	6389747
						CONI 03	Common nighthawk	Auditory	SSA	June, 2018	2	605174	6390583
						CONI 04	Common nighthawk	Auditory	SSA	June, 2018	2	604697	6391500
						CONI 05	Common nighthawk	Auditory	SSA	June, 2018	1	603526	6391652
						CONI 06	Common nighthawk	Auditory	SSA	June, 2018	1	604647	6392394
						CONI 07	Common nighthawk	Auditory	SSA	June, 2018	2	602723	6392051
						CONI 08	Common nighthawk	Auditory	SSA	June, 2018	3	604664	6393314
						CONI 09	Common nighthawk	Auditory	SSA	June, 2018	1	604512	6394176
						CONI 10	Common nighthawk	Auditory	SSA	June, 2018	4	605531	6393542
						CONI 11	Common nighthawk	Auditory	SSA	June, 2018	2	603423	6392705
						CONI 12	Common nighthawk	Auditory/Nest	SSA	June, 2018	4	603866	6393520

Appendix B, Table 2

Species of Conservation Concern Observations and Locations, 2018

Scientific Name	Common Name	SARA Status	SARA Schedule	COSEWIC Status	SKCDC Rank	Survey Location	Survey Type	Observation Type	Project Study Area[a]	Date of Observation	Highest Abundance Detected	UTM Coordinates[b]	
												Easting	Northing
Chordeiles minor	Common nighthawk	Threatened	Schedule 1	Special concern	S4B, S4M	ARU 01	ARU Common nighthawk, ARU Amphibian (Inc), ARU Yellow rail (Inc)	Auditory	LSA	June/July, 2018	6	601313	6398648
						ARU 02	ARU Common nighthawk	Auditory	LSA	June, 2018	3	605792	6398598
						ARU 03	ARU Common nighthawk, ARU Breeding bird, ARU Amphibian (Inc), ARU Yellow rail (Inc)	Auditory	LSA	June/July, 2018	6	609906	6395870
						ARU 04	ARU Common nighthawk, ARU Amphibian (Inc)	Auditory	LSA	June, 2018	4	608183	6396958
						ARU 05	ARU Common nighthawk, ARU Breeding bird, ARU Yellow rail (Inc)	Auditory	SSA	June, 2018	1	603794	6394437
						ARU 06	ARU Common nighthawk	Auditory	LSA	June, 2018	1	599235	6391405
						ARU 07	ARU Common nighthawk	Auditory	LSA	June, 2018	2	606541	6385407
						ARU 08	ARU Common nighthawk	Auditory	SSA	June, 2018	2	603388	6391742
						ARU 09	ARU Common nighthawk, ARU Breeding bird	Auditory	SSA	June/July, 2018	3	605602	6393303
						ARU 10	ARU Common nighthawk, ARU Amphibian (Inc), ARU Yellow rail (Inc)	Auditory	LSA	June/July, 2018	4	607388	6394103
						ARU 11	ARU Common nighthawk	Auditory	SSA	June, 2018	1	605113	6390534
						ARU 12	ARU Common nighthawk, ARU Yellow rail (Inc)	Auditory	LSA	June/July, 2018	3	602685	6387383
						ARU 13	ARU Common nighthawk, ARU Yellow rail (Inc)	Auditory	LSA	June/July, 2018	2	606593	6388821
						ARU 14	ARU Common nighthawk, ARU Amphibian (Inc), ARU Yellow rail (Inc)	Auditory	LSA	June, 2018	5	608124	6390784
						ARU 15	ARU Common nighthawk	Auditory	SSA	June, 2018	1	601850	6391262
Chroicocephalus philadelphia	Bonaparte's gull	-	-	-	S4B,S4M	BBS 12	Breeding bird	Auditory	LSA	June, 2018	1	607446	6394107
						BBS 13	Breeding bird	Auditory	LSA	June, 2018	1	608291	6395164
						BBS 58	Breeding bird	Visual	SSA	June, 2018	5	605216	6389768
						BBS 77	Breeding bird	Visual	SSA	June, 2018	8	604178	6392670
						ARU 10	ARU Breeding bird	Auditory	LSA	June, 2018	1	607388	6394103
						ARU 11	ARU Breeding bird	Auditory	SSA	June, 2018	3	605113	6390534
						ARU 14	ARU Breeding bird	Auditory	LSA	June, 2018	1	608124	6390784
Contopus cooperi	Olive-sided flycatcher	Threatened	Schedule 1	Threatened	S4B, S4M	BBS 20	Breeding bird	Auditory	LSA	June, 2018	1	608210	6397027
						BBS 51	Breeding bird	Auditory	SSA	June, 2018	1	604896	6390311
						BBS 53	Breeding bird	Auditory	SSA	June, 2018	1	605389	6394000
						BBS 58	Breeding bird	Auditory	SSA	June, 2018	1	605216	6389768
						BBS 61	Breeding bird	Auditory	SSA	June, 2018	1	607272	6392410
						BBS 67	Breeding bird	Visual	SSA	June, 2018	1	604549	6390482
						BBS 80	Breeding bird	Auditory	SSA	June, 2018	1	603110	6391329
						ARU 01	ARU Breeding bird	Auditory	LSA	June, 2018	1	601313	6398648
						ARU 03	ARU Breeding bird	Auditory	LSA	May, 2018	2	609906	6395870
						ARU 04	ARU Breeding bird	Auditory	LSA	July, 2018	1	608183	6396958

Appendix B, Table 2

Species of Conservation Concern Observations and Locations, 2018

Scientific Name	Common Name	SARA Status	SARA Schedule	COSEWIC Status	SKCDC Rank	Survey Location	Survey Type	Observation Type	Project Study Area[a]	Date of Observation	Highest Abundance Detected	UTM Coordinates[b]	
												Easting	Northing
Contopus cooperi	Olive-sided flycatcher	Threatened	Schedule 1	Threatened	S4B, S4M	ARU 07	ARU Breeding bird	Auditory	LSA	June, 2018	1	606541	6385407
						ARU 13	ARU Breeding bird	Auditory	LSA	July, 2018	1	606593	6388821
Euphagus carolinus	Rusty blackbird	Special concern	Schedule 1	Special concern	S3B, SUN, S3M	ARU 02	ARU Breeding bird	Auditory	LSA	June, 2018	1	605792	6398598
						ARU 10	ARU Breeding bird	Auditory	LSA	June, 2018	1	607388	6394103
						ARU 13	ARU Breeding bird	Auditory	LSA	June, 2018	1	606593	6388821
Gavia immer	Common loon	-	-	Not at risk	S5B,SUN,S5M	BBS 01	Breeding bird	Auditory	SSA	June, 2018	2	606250	6392607
						BBS 04	Breeding bird	Auditory	SSA	June, 2018	1	606274	6393113
						BBW 09	Breeding bird	Auditory	SSA	June, 2018	1	605582	6393105
						BBS 11	Breeding bird	Auditory	LSA	June, 2018	1	606327	6394341
						BBS 12	Breeding bird	Auditory	LSA	June, 2018	1	607446	6394107
						BBS 13	Breeding bird	Auditory	LSA	June, 2018	1	608291	6395164
						BBS 17	Breeding bird	Auditory	LSA	June, 2018	1	604615	6388003
						BBS 18	Breeding bird	Auditory	LSA	June, 2018	1	605321	6388688
						BBS 20	Breeding bird	Auditory	LSA	June, 2018	1	608223	6397016
						BBS 21	Breeding bird	Auditory	LSA	June, 2018	1	607663	6397223
						BBS 23	Breeding bird	Auditory	LSA	June, 2018	1	606100	6396806
						BBS 24	Breeding bird	Auditory	LSA	June, 2018	1	605304	6396921
						BBS 25	Breeding bird	Auditory	LSA	June, 2018	1	604450	6396895
						BBS 32	Breeding bird	Visual	LSA	June, 2018	2	602746	6388110
						BBS 35	Breeding bird	Auditory	LSA	June, 2018	1	602615	6387362
						BBS 38	Breeding bird	Auditory	LSA	June, 2018	1	600138	6387519
						BBS 39	Breeding bird	Auditory	LSA	June, 2018	1	598106	6395998
						BBS 40	Breeding bird	Auditory	LSA	June, 2018	1	598933	6395930
						BBS 43	Breeding bird	Auditory	LSA	June, 2018	1	599842	6391779
						BBS 45	Breeding bird	Flyover	LSA	June, 2018	3	600925	6391681
						BBS 47	Breeding bird	Auditory	SSA	June, 2018	2	605253	6390857
						BBS49	Breeding bird	Auditory	SSA	June, 2018	1	604872	6389516
						BBS 54	Breeding bird	Auditory	SSA	June, 2018	1	605801	6394159
						BBS 55	Breeding bird	Auditory	SSA	June, 2018	1	606910	6392102
						BBS 63	Breeding bird	Auditory	SSA	June, 2018	2	606585	6392882
						BBS 67	Breeding bird	Visual	SSA	June, 2018	1	604551	6390484
						BBS 70	Breeding bird	Flyover	SSA	June, 2018	1	602723	6392053
						BBS 71	Breeding bird	Auditory	SSA	June, 2018	1	604508	6394101
						BBS 74	Breeding bird	Auditory	SSA	June, 2018	1	603387	6393613
						BBS 76	Breeding bird	Auditory	SSA	June, 2018	1	604849	6393604
						BBS 81	Breeding bird	Auditory	SSA	June, 2018	1	602683	6390813
						CONI 05	Common nighthawk (Inc)	Auditory	LSA	June, 2018	1	603526	6391652
						ARU 01	ARU Breeding bird	Auditory	LSA	June, 2018	1	601313	6398648
Gavia immer	Common loon	-	-	Not at risk	S5B,SUN,S5M	ARU 02	ARU Breeding bird	Auditory	LSA	May/July, 2018	1	605792	6398598
						ARU 03	ARU Breeding bird	Auditory	LSA	May/June/July, 2018	2	609906	6395870
						ARU 04	ARU Breeding bird	Auditory	LSA	July, 2018	1	608183	6396958
						ARU 05	ARU Breeding bird	Auditory	SSA	June, 2018	1	603794	6394437

Appendix B, Table 2

Species of Conservation Concern Observations and Locations, 2018

Scientific Name	Common Name	SARA Status	SARA Schedule	COSEWIC Status	SKCDC Rank	Survey Location	Survey Type	Observation Type	Project Study Area[a]	Date of Observation	Highest Abundance Detected	UTM Coordinates[b]	
												Easting	Northing
Gavia immer	Common loon	-	-	Not at risk	S5B,SUN,S5M	ARU 06	ARU Breeding bird	Auditory	LSA	May, 2018	1	599235	6391405
						ARU 08	ARU Breeding bird	Auditory	SSA	June, 2018	1	603388	6391742
						ARU 09	ARU Breeding bird	Auditory	SSA	June, 2018	1	605602	6393303
						ARU 11	ARU Breeding bird	Auditory	SSA	June, 2018	2	605113	6390534
						ARU 14	ARU Breeding bird	Auditory	LSA	June/July, 2018	1	608124	6390784
Haliaeetus leucocephalus	Bald eagle	-	-	Not at risk	S5B, S5N, S4M	BBS 12	Breeding bird	Visual	LSA	June, 2018	2	607446	6394107
						BBS 54	Breeding bird	Visual	SSA	June, 2018	1	605801	6394159
						BBS 66	Breeding bird	Visual breeding pair	SSA	June, 2018	2	603336	6391420
						ARU 11	ARU Breeding bird	Auditory	SSA	June, 2018	1	605113	6390534
						Beet Lake	Incidental	Visual	LSA	May/Aug./Sept., 2018	2	6391114	608938
Hirundo rustica	Barn swallow	Threatened	Schedule 1	Threatened	S5B,S5M	BBS 04	Breeding bird	Auditory	SSA	June, 2018	2	606274	6393113
						BBS 20	Breeding bird	Auditory	LSA	June, 2018	4	608223	6397016
						BBS 66	Breeding bird	Visual/nest	SSA	June, 2018	6	603336	6391420
						BBS 71	Breeding bird	Auditory	SSA	June, 2018	1	604508	6394101
						BBS 72	Breeding bird	Visual	SSA	June, 2018	2	604497	6393215
						BBS 73	Breeding bird	Visual	SSA	June, 2018	2	604005	6393610
						BBS 80	Breeding bird	Visual	SSA	June, 2018	1	603110	6391329
						CONI 03	Common nighthawk (Inc)	Visual	LSA	June, 2018	1	605174	6390583
						ARU 04	ARU Breeding bird	Auditory	LSA	June, 2018	1	608183	6396958
						ARU 11	ARU Breeding bird	Auditory	SSA	June, 2018	2	605113	6390534
Hirundo rustica	Herring gull	-	-	-	S5B,S5M	BBS 34	Breeding bird	Auditory	LSA	June, 2018	1	601177	6390348
						BBS 38	Breeding bird	Auditory	LSA	June, 2018	1	600138	6387519
						BBS 76	Breeding bird	Auditory	SSA	June, 2018	1	604849	6393604
Pandion haliaetus	Osprey	-	-	-	S2B,S2M	BBS 45	Breeding bird	Visual	LSA	June, 2018	1	600925	6391681
						BBS 53	Breeding bird	Visual	SSA	June, 2018	1	605387	6394012
						BBS 66	Breeding bird	Visual/Flyover	SSA	June, 2018	1	603336	6391420
						BBS 81	Breeding bird	Visual	SSA	June, 2018	1	602683	6390813
Pelecanus erythrorhynchos	American white pelican	-	-	Not at risk	S5B,S5M	BBS 74	Breeding bird	Visual	SSA	June, 2018	1	603387	6393613
Strix nebulosa	Great grey owl	-	-	Not at risk	S3	AMPH 04	Auditory amphibian (Inc)	Auditory	SSA	May, 2018	1	604491	6394217
						YERA 04	Yellow rail (Inc)	Flyover	SSA	June, 2018	1	605173	6390546
						ARU 04	ARU Breeding bird	Auditory	LSA	June, 2018	1	608183	6396958
Mammals													
Rangifer tarandus caribou	Woodland caribou	Threatened	Schedule 1	Threatened	S3	Lake H	Incidental	Visual	RSA	August, 2018	1	609943	6394558
						ARU 11	ARU Breeding bird (Inc)	Auditory	SSA	June, 2018	1	605113	6390534
Myotis lucifugus	Little brown myotis	Endangered	Schedule 1	Endangered	S4	BAT 01	ARU Bat	Auditory	SSA	May - Oct., 2018	-	605212	6389781
						BAT 02	ARU Bat	Auditory	SSA	May - Oct., 2018	-	605164	6390520
						BAT 03	ARU Bat	Auditory	SSA	May - Oct., 2018	-	604498	6393439
Myotis lucifugus	Little brown myotis	Endangered	Schedule 1	Endangered	S4	BAT 04	ARU Bat	Auditory	SSA	May - Oct., 2018	-	604061	6391419
						BAT 05	ARU Bat	Auditory	SSA	May - Oct., 2018	-	601850	6391262
Myotis septentrionalis	Northern myotis	Endangered	Schedule 1	Endangered	S3	BAT 01	ARU Bat	Auditory	SSA	May - Oct., 2018	-	605212	6389781
						BAT 02	ARU Bat	Auditory	SSA	May - Oct., 2018	-	605164	6390520
						BAT 03	ARU Bat	Auditory	SSA	May - Oct., 2018	-	604498	6393439
						BAT 04	ARU Bat	Auditory	SSA	May - Oct., 2018	-	604061	6391419

Appendix B, Table 2

Species of Conservation Concern Observations and Locations, 2018

Scientific Name	Common Name	SARA Status	SARA Schedule	COSEWIC Status	SKCDC Rank	Survey Location	Survey Type	Observation Type	Project Study Area[a]	Date of Observation	Highest Abundance Detected	UTM Coordinates[b]	
												Easting	Northing
Myotis septentrionalis	Northern myotis	Endangered	Schedule 1	Endangered	S3	BAT 05	ARU Bat	Auditory	SSA	May - Oct., 2018	-	601850	6391262
Genus *Vespertilionidae*[c]	Bat species	-	-	-	S4B - S5B	BAT 01	ARU Bat	Auditory	SSA	May - Oct., 2018	-	605212	6389781
						BAT 02	ARU Bat	Auditory	SSA	May - Oct., 2018	-	605164	6390520
						BAT 03	ARU Bat	Auditory	SSA	May - Oct., 2018	-	604498	6393439
						BAT 04	ARU Bat	Auditory	SSA	May - Oct., 2018	-	604061	6391419
						BAT 05	ARU Bat	Auditory	SSA	May - Oct., 2018	-	601850	6391262

a) LSA = Local Study Area; SSA = Site Study Area.

b) UTM = NAD83 Zone 13V.

c) Genus Vespertilionidae includes big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasirurus borealis*), and hoary bat (*Lasirurus cinereus*).

Inc = Incidental observation of non-targeted species.

Appendix B, Table 3

Breeding Bird Point Count Locations, May to June 2018

Survey Location	UTM Coordinates[a]		Project Study Area[b]	Habitat	Survey Dates		
	Easting	Northing			Round 1	Round 2	Round 3
BBS 01	606250	6392607	SSA	Mature conifer	07-Jun-18	23-Jun-18	-
BBS 02	609820	6396787	LSA	Mature conifer	08-Jun-18	24-Jun-18	-
BBS 03	606566	6392365	SSA	Mature conifer	07-Jun-18	23-Jun-18	-
BBS 04	606274	6393113	SSA	Mature conifer	07-Jun-18	23-Jun-18	-
BBS 05	605954	6393341	SSA	Young conifer	07-Jun-18	23-Jun-18	-
BBS 06	605602	6393590	SSA	Mature conifer	06-Jun-18	23-Jun-18	-
BBS 07	606080	6393794	SSA	Young conifer	06-Jun-18	23-Jun-18	-
BBS 08	605292	6393339	SSA	Mature conifer	06-Jun-18	23-Jun-18	-
BBS 09	605588	6393102	SSA	Young conifer	07-Jun-18	23-Jun-18	-
BBS 10	605915	6392855	SSA	Young conifer	07-Jun-18	22-Jun-18	-
BBS 11	606336	6394338	LSA	Young conifer/lakeshore	06-Jun-18	22-Jun-18	-
BBS 12	607446	6394107	LSA	Mature conifer/deciduous/lakeshore	10-Jun-18	22-Jun-18	-
BBS 13	608291	6395164	LSA	Burned forest/lakeshore	10-Jun-18	22-Jun-18	-
BBS 14	603319	6390132	LSA	Mature mixed wood/lakeshore	11-Jun-18	22-Jun-18	-
BBS 15	610535	6396688	LSA	Mature conifer	08-Jun-18	24-Jun-18	-
BBS 16	603654	6387610	LSA	Mature mixed wood	06-Jun-18	25-Jun-18	-
BBS 17	604609	6388003	LSA	Mature conifer	08-Jun-18	25-Jun-18	-
BBS 18	605321	6388688	LSA	Young conifer	08-Jun-18	25-Jun-18	-
BBS 19	609013	6396900	LSA	Burned forest	08-Jun-18	24-Jun-18	-
BBS 20	608210	6397027	LSA	Young conifer/creek	08-Jun-18	24-Jun-18	-
BBS 21	607663	6397223	LSA	Mature conifer	08-Jun-18	24-Jun-18	-
BBS 22	606927	6397104	LSA	Young conifer/burned forest	08-Jun-18	24-Jun-18	-
BBS 23	606100	6396806	LSA	Mature conifer/lakeshore	08-Jun-18	24-Jun-18	-
BBS 24	605304	6396921	LSA	Mature conifer/lakeshore	08-Jun-18	24-Jun-18	-
BBS 25	604450	6396895	LSA	Mature conifer/lakeshore	08-Jun-18	24-Jun-18	-
BBS 26	603715	6396664	LSA	Mature conifer	08-Jun-18	24-Jun-18	-
BBS 27	602869	6396490	LSA	Mature conifer	08-Jun-18	24-Jun-18	-
BBS 28	602159	6396237	LSA	Mature conifer	08-Jun-18	24-Jun-18	-
BBS 29	603901	6389071	LSA	Mature conifer	05-Jun-18	24-Jun-18	-
BBS 30	603396	6388471	LSA	Mature conifer	05-Jun-18	24-Jun-18	-
BBS 31	603596	6392075	LSA	Mature conifer/bog	09-Jun-18	24-Jun-18	-
BBS 32	602780	6388111	LSA	Young conifer/burned forest	05-Jun-18	24-Jun-18	-
BBS 33	599858	6390817	LSA	Mature conifer/lakeshore	10-Jun-18	22-Jun-18	-
BBS 34	601177	6390348	LSA	Mature conifer	10-Jun-18	27-Jun-18	-

Appendix B, Table 3

Breeding Bird Point Count Locations, May to June 2018

Survey Location	UTM Coordinates[a]		Project Study Area[b]	Habitat	Survey Dates		
	Easting	Northing			Round 1	Round 2	Round 3
BBS 35	602607	6387362	LSA	Mature mixed wood	07-Jun-18	25-Jun-18	-
BBS 36	601971	6388176	LSA	Young conifer	07-Jun-18	24-Jun-18	-
BBS 37	600991	6388098	LSA	Mature conifer	07-Jun-18	24-Jun-18	-
BBS 38	600138	6387519	LSA	Young conifer	07-Jun-18	24-Jun-18	-
BBS 39	598106	6395998	LSA	Mature conifer	08-Jun-18	24-Jun-18	-
BBS 40	598933	6395930	LSA	Mature conifer	08-Jun-18	24-Jun-18	-
BBS 41	599860	6395861	LSA	Mature conifer	08-Jun-18	24-Jun-18	-
BBS 42	600665	6395809	LSA	Mature conifer	08-Jun-18	24-Jun-18	-
BBS 43	599842	6391779	LSA	Young conifer/lakeshore	10-Jun-18	22-Jun-18	-
BBS 44	598711	6393679	LSA	Mixed wood/lakeshore	10-Jun-18	22-Jun-18	-
BBS 45	600925	6391681	LSA	Lakeshore	10-Jun-18	22-Jun-18	-
BBS 46	601307	6395914	LSA	Mature conifer	08-Jun-18	24-Jun-18	-
BBS 47	605260	6390887	SSA	Mature conifer/bog	05-Jun-18	24-Jun-18	-
BBS 48	604254	6389420	SSA	Mature conifer	05-Jun-18	24-Jun-18	-
BBS 49	604872	6389516	SSA	Mature conifer	05-Jun-18	24-Jun-18	-
BBS 50	604582	6389943	SSA	Mature conifer	10-Jun-18	24-Jun-18	-
BBS 51	604896	6390311	SSA	Mature conifer/deciduous	05-Jun-18	24-Jun-18	-
BBS 52	603981	6393233	SSA	Conifer/industrial site	09-Jun-18	24-Jun-18	-
BBS 53	605387	6394012	SSA	Conifer/lakeshore	06-Jun-18	23-Jun-18	-
BBS 54	605801	6394159	SSA	Young conifer	09-Jun-18	23-Jun-18	-
BBS 55	606910	6392102	SSA	Treed wetland	07-Jun-18	23-Jun-18	-
BBS 56	603795	6394434	SSA	Conifer/deciduous/ lakeshore	10-Jun-18	22-Jun-18	-
BBS 57	604351	6393648	SSA	Conifer/industrial site	09-Jun-18	23-Jun-18	-
BBS 58	605216	6389768	SSA	Mixed wood/lakeshore	12-Jun-18	24-Jun-18	-
BBS 59	604673	6392416	SSA	Young conifer	06-Jun-18	23-Jun-18	-
BBS 60	605020	6392275	SSA	Young conifer	06-Jun-18	23-Jun-18	-
BBS 61	607277	6392411	SSA	Treed wetland	07-Jun-18	23-Jun-18	-
BBS 62	606967	6392619	SSA	Mature conifer	07-Jun-18	23-Jun-18	-
BBS 63	606585	6392882	SSA	Mature conifer	07-Jun-18	23-Jun-18	-
BBS 64	604960	6393029	SSA	Young conifer	06-Jun-18	23-Jun-18	-
BBS 65	604164	6392081	SSA	Young conifer	06-Jun-18	23-Jun-18	-
BBS 66	603336	6391420	SSA	Conifer/industrial site	08-Jun-18	23-Jun-18	-
BBS 67	604549	6390482	SSA	Mixed wood/lakeshore	05-Jun-18	24-Jun-18	-
BBS 68	602328	6391846	SSA	Young conifer	06-Jun-18	24-Jun-18	-

Appendix B, Table 3

Breeding Bird Point Count Locations, May to June 2018

Survey Location	UTM Coordinates[a]		Project Study Area[b]	Habitat	Survey Dates		
	Easting	Northing			Round 1	Round 2	Round 3
BBS 69	601838	6391472	SSA	Young conifer/burned forest	06-Jun-18	24-Jun-18	-
BBS 70	602727	6392060	SSA	Young conifer	06-Jun-18	24-Jun-18	-
BBS 71	604508	6394101	SSA	Mixed wood/lakeshore	06-Jun-18	22-Jun-18	-
BBS 72	604503	6393217	SSA	Mature conifer	06-Jun-18	23-Jun-18	-
BBS 73	604005	6393610	SSA	Mature conifer/industrial site	06-Jun-18	24-Jun-18	-
BBS 74	603373	6393607	SSA	Treed wetland/lakeshore	06-Jun-18	24-Jun-18	-
BBS 75	603195	6392942	SSA	Conifer/Industrial site	06-Jun-18	24-Jun-18	-
BBS 76	604849	6393604	SSA	Young conifer	07-Jun-18	23-Jun-18	-
BBS 77	604178	6392670	SSA	Conifer/industrial site	06-Jun-18	23-Jun-18	-
BBS 78	603574	6392770	SSA	Young conifer	06-Jun-18	24-Jun-18	-
BBS 79	603023	6392321	SSA	Young conifer	06-Jun-18	24-Jun-18	-
BBS 80	603110	6391329	SSA	Mixed wood/lakeshore	06-Jun-18	23-Jun-18	-
BBS 81	602675	6390818	SSA	Mixed wood/industrial site	06-Jun-18	22-Jun-18	-
BBS 82	602198	6391056	SSA	Young conifer	06-Jun-18	24-Jun-18	-
BBS 83	604431	6391459	SSA	Mature conifer	05-Jun-18	24-Jun-18	-
BBS 84	605199	6391291	SSA	Mature conifer	05-Jun-18	24-Jun-18	-
BBS 85	603594	6391571	SSA	Mature conifer	05-Jun-18	23-Jun-18	-
ARU 01	601313	6398648	LSA	Mature conifer/burned forest	31-May-18	17-Jun-18	07-Jul-18
ARU 02	605792	6398598	LSA	Young and mature conifer	31-May-18	18-Jun-18	06-Jul-18
ARU 03	609906	6395870	LSA	Mature conifer/burned forest and bog	31-May-18	19-Jun-18	09-Jul-18
ARU 04	608183	6396958	LSA	Mature conifer/creek	10-Jun-18	22-Jun-18	08-Jul-18
ARU 05	603794	6394437	SSA	Mature conifer/lakeshore	01-Jun-18	15-Jun-18	12-Jul-18
ARU 06	599235	6391405	LSA	Mature conifer/lakeshore	30-May-18	13-Jun-18	07-Jul-18
ARU 07	606541	6385407	LSA	Mature Conifer/deciduous/ lakeshore	09-Jun-18	19-Jun-18	01-Jul-18
ARU 08	603388	6391742	SSA	Mature conifer/bog	10-Jun-18	20-Jun-18	09-Jul-18
ARU 09	605602	6393303	SSA	Young conifer	08-Jun-18	16-Jun-18	04-Jul-18
ARU 10	607388	6394103	LSA	Mature conifer/lakeshore	03-Jun-18	13-Jun-18	27-Jun-18
ARU 11	605113	6390534	SSA	Mature conifer/lakeshore/creek	06-Jun-18	15-Jun-18	30-Jun-18
ARU 12	602685	6387383	LSA	Mature deciduous/conifer/lakeshore	10-Jun-18	17-Jun-18	25-Jun-18
ARU 13	606593	6388821	LSA	Mature conifer/bog/lakeshore	03-Jun-18	15-Jun-18	12-Jul-18
ARU 14	608124	6390784	LSA	Burned forest and bog/creek	06-Jun-18	25-Jun-18	08-Jul-18
ARU 15	601850	6391262	SSA	Mature conifer/bog	08-Jun-18	23-Jun-18	07-Jul-18

a) All UTM coordinates are in NAD 83 Zone 12V.

b) LSA = Local Study Area; SSA = Site Study Area.

Appendix B, Table 4

Results of the Breeding Bird Surveys, May to July 2018

Scientific Name	Common Name	SKCDC Rank	COSEWIC status	SARA status	Abundance[a]	Detection Locations[b]
Actitis macularius	Spotted sandpiper	S4B,S4M	-	-	6	6
Agelaius phoeniceus	Red-winged blackbird	S5B,SUN,S5M	-	-	1	1
Ammodramus leconteii	LeConte's sparrow	S5B,S5M	-	-	5	2
Anas acuta	Northern pintail	S5B,S4N,S5M	-	-	1	1
Anas americana	American wigeon	S5B,S2N,S5M	-	-	1	1
Anas platyrhynchos	Mallard	S5B,S5M	-	-	1	1
Aythya affinis	Lesser scaup	S5B,S3N,S5M	-	-	1	1
aythya americana	Redhead	S5B,S2N,S5M	-	-	4	1
Bartramia longicauda	Upland sandpiper	S5B,S5M	-	-	43	3
Bombycilla cedrorum	Cedar waxwing	S5B,S5M	-	-	3	3
Branta canadensis	Canada goose	S5B,S2N,S5M	-	-	516	19
Buteo jamaicensis	Red-tailed hawk	S5B,S1N,S5M	Not at Risk	-	1	1
Cardellina pusilla	Wilson's warbler	S5B,SUM			18	11
Catharus guttatus	Hermit thrush	S5B,S5M	-	-	118	54
Catharus ustulatus	Swainson's thrush	S5B,S5M			78	36
Charadrius vociferus	Killdeer	S5B,S5M	-	-	1	1
Chordeiles minor [c]	**Common nighthawk**	S4B,S4M	Threatened	Threatened	18	18
Chroicocephalus philadelphia [c]	**Bonaparte's gull**	S4B,S4M	-	-	24	7
Cistothorus palustris	Marsh wren	S4B,S4M	-	-	1	1
Colaptes auratus	Northern flicker	S5B,SUN,S5M	-	-	6	4
Contopus cooperi [c]	**Olive-sided flycatcher**	S4B,S4M	Special Concern	Threatened	16	12
Contopus sordidulus	Western wood-pewee	S4B,S4M	-	-	3	2
Corvus brachyrhynchos	American crow	S5B,S4N,S5M	-	-	21	15
Corvus corax	Common raven	S5	-	-	19	13
Dumetella carolinensis	Gray catbird	S5B,S5M	-	-	1	1
Empidonax alnorum	Alder flycatcher	S5B,S5M	-	-	38	22
Empidonax alnorum	Yellow-bellied flycatcher	S5B,S5M	-	-	14	10
Empidonax minimus	Least flycatcher	S5B,S5M	-	-	2	4
Empidonax traillii	Willow flycatcher	S4B,S4M	-	-	1	1
Euphagus carolinus [c]	**Rusty blackbird**	S3B,SUN,S3M	Special Concern	Special Concern	4	3
Falcipennis canadensis	Spruce grouse	S5	-	-	4	4
Gallinago delicata	Wilson's snipe	S5B,S5M	-	-	20	17
Gavia immer [c]	**Common loon**	S5B,SUN,S5M	Not at Risk	-	62	41
Geothlypis philadelphia	Mourning warbler	S5B,S5M	-	-	3	3
Grus canadensis	Sandhill crane	S5B,S5M	-	-	9	6
Haliaeetus leucocephalus [c]	**Bald eagle**	S5B,S5N,S4M	-	-	6	4

Appendix B, Table 4

Results of the Breeding Bird Surveys, May to July 2018

Scientific Name	Common Name	SKCDC Rank	COSEWIC status	SARA status	Abundance[a]	Detection Locations[b]
Hirundo rustica	**Barn swallow**	S5B,S5M	Threatened	Threatened	29	9
Junco hyemalis	Dark-eyed junco	S5B,S4N,S5M	-	-	313	92
Larus argentatus [c]	**Herring gull**	S5B,S5M	-	-	3	3
Larus californicus	California gull	S4B,S4M	-	-	21	9
Larus delawarensis	Ring-billed gull	S5B,S5M	-	-	44	21
Larus sp. [c]	**Gull sp.**	-	-	-	8	3
Loxia curvirostra	Red crossbill	S4B,S5N	-	-	64	16
Loxia leucoptera	White-winged crossbill	S4B,S3N	-	-	43	13
Megaceryle alcyon	Belted kingfisher	S4B,S4M	-	-	5	4
Melospiza georgiana	Swamp sparrow	S5B,S5M	-	-	20	14
Melospiza lincolnii	Lincoln's sparrow	S5B,S5M	-	-	26	14
Melospiza melodia	Song sparrow	S5B,S5M	-	-	66	21
Mergus merganser	Common merganser	S5B,S2N,S4M	-	-	37	9
Mniotilta varia	Black-and-white warbler	S5B,S5M	-	-	3	3
Oreothlypis celata	Orange-crowned warbler	S5B,S5M	-	-	50	28
Oreothlypis peregrina	Tennessee warbler	S5B,S5M	-	-	40	27
Oreothlypis ruficapilla	Nashville warbler	S5B,S5M	-	-	3	3
Pandion haliaetus [c]	**Osprey**	S2B,S2M	-	-	4	4
Parkesia noveboracensis	Northern waterthrush	S5B,S5M	-	-	5	5
Passerella iliaca	Red fox sparrow	S5B,SUM	-	-	71	39
Pelecanus erythrorhynchos [c]	**American white pelican**	S5B,S5M	-	-	1	1
Perisoreus canadensis	Gray jay	S5	-	-	66	43
Petrochelidon pyrrhonota	Cliff swallow	S5B,S5M	-	-	6	2
Pheucticus ludovicianus	Rose-breasted grosbeak	S5B,S5M	-	-	1	1
Piciformes	Woodpeckers	-	-	-	11	8
Picoides arcticus	Black-backed woodpecker	S4	-	-	12	9
Picoides dorsalis	American three-toed woodpecker	S4	-	-	1	1
Picoides villosus	Hairy woodpecker	S5	-	-	2	2
Pinicola enucleator	Pine grosbeak	S2B,S4N	-	-	6	1
Plectrophenax nivalis	Snow bunting	S5N,S5M	-	-	1	1
Podiceps grisegena	Red-necked grebe	S5B,S5M	Not at Risk	-	3	2
Poecile atricapillus	Black-capped chickadee	S5	-	-	1	1

Appendix B, Table 4

Results of the Breeding Bird Surveys, May to July 2018

Scientific Name	Common Name	SKCDC Rank	COSEWIC status	SARA status	Abundance[a]	Detection Locations[b]
Poecile hudsonicus	Boreal chickadee	S4	-	-	2	2
Regulus calendula	Ruby-crowned kinglet	S5B,S5M	-	-	60	36
Regulus satrapa	Golden-crowned kinglet	S5B,S4N,S5M	-	-	3	3
Seiurus aurocapilla	Ovenbird	S5B,S5M	-	-	2	2
Setophaga castanea	Bay-breasted warbler	S5B,S5M	-	-	3	1
Setophaga coronata	Yellow-rumped warbler	S5B,S5M	-	-	263	90
Setophaga magnolia	Magnolia warbler	S5B,S5M	-	-	21	16
Setophaga palmarum	Palm warbler	S5B,S5M	-	-	219	69
Setophaga petechia	Yellow warbler	S5B,S5M	-	-	15	12
Setophaga striata	Blackpoll warbler	S5B,S4M	-	-	2	2
Sitta canadensis	Red-breasted nuthatch	S5B,S5N,S5M	-	-	1	1
Spinus pinus	Pine siskin	S5	-	-	19	6
Spizella pallida	Clay-coloured sparrow	S5B,S5M	-	-	11	7
Spizella passerina	Chipping sparrow	S5B,S5M	-	-	188	71
Strix nebulosa [c]	**Great gray owl**	S3	Not at Risk	-	1	1
Tachycineta bicolor	Tree swallow	S5B,S5M	-	-	7	5
Tringa flavipes	Lesser yellowlegs	S4B,S4M	-	-	5	5
Tringa melanoleuca	Greater yellowlegs	S5B,S5M	-	-	9	8
Tringa semipalmata	Willet	S4B,S4M	-	-	1	1
Tringa solitaria	Solitary sandpiper	S5B,S4M	-	-	3	2
Troglodytes hiemalis	Winter wren	S5B,S5M	-	-	2	2
Turdus migratorius	American robin	S5B,SUN,S5M	-	-	98	43
Vireo olivaceus	Red-eyed vireo	S5B,S5M	-	-	13	10
Vireo philadelphicus	Philadelphia vireo	S5B,S5M	-	-	4	4
Vireo solitarius	Blue-headed vireo	S5B,S5M	-	-	10	10
Zenaida macroura	Mourning dove	S5B,S5M	-	-	1	1
Zonotrichia albicollis	White-throated sparrow	S5B,S5M	-	-	237	67
Zonotrichia leucophrys	White-crowned sparrow	S4B,S4M	-	-	14	10

Provincially rare or sensitive breeding species denoted in bold text.

Source: Scientific and common names and SKCDC rank from SKCDC (2018a).

S3 = vulnerable/rare to uncommon; S4 = apparently secure; S5 = secure/common; B = breeding population; M = migratory population.

SKCDC = Saskatchewan Conservation Data Centre; COSEWIC = Committee on the Status of Endangered Wildlife in Canada; S2 = imperiled/very rare;

a) Abundance = total abundance summed across all survey periods.

b) Detection locations indicate the total number of point count locations each species was detected.

c) Species with provincial activity restriction guidelines (MOE 2017a).

Appendix B, Table 5

Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 01	2018-06-07	606249.761	6392607.116	*Turdus migratorius*	American robin	1
BBS 01	2018-06-07	606249.761	6392607.116	*Poecile hudsonicus*	Boreal chickadee	1
BBS 01	2018-06-07	606249.761	6392607.116	*Branta canadensis*	Canada goose	80
BBS 01	2018-06-07	606249.761	6392607.116	*Spizella passerina*	Chipping sparrow	1
BBS 01	2018-06-07	606249.761	6392607.116	*Junco hyemalis*	Dark-eyed junco	1
BBS 01	2018-06-07	606249.761	6392607.116	*Gavia immer*	Common loon	2
BBS 01	2018-06-07	606249.761	6392607.116	*Gavia immer*	Common loon	1
BBS 01	2018-06-07	606249.761	6392607.116	*Catharus guttatus*	Hermit thrush	1
BBS 01	2018-06-07	606249.761	6392607.116	*Corvus corax*	Northern raven	1
BBS 01	2018-06-07	606249.761	6392607.116	*Gallinago delicata*	Wilson's snipe	1
BBS 01	2018-06-07	606249.761	6392607.116	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 01	2018-06-07	606249.761	6392607.116	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 01	2018-06-23	606245.576	6392611.907	*Turdus migratorius*	American robin	1
BBS 01	2018-06-23	606245.576	6392611.907	*Spizella passerina*	Chipping sparrow	1
BBS 01	2018-06-23	606245.576	6392611.907	*Junco hyemalis*	Dark-eyed junco	1
BBS 01	2018-06-23	606245.576	6392611.907	*Junco hyemalis*	Dark-eyed junco	1
BBS 01	2018-06-23	606245.576	6392611.907	*Junco hyemalis*	Dark-eyed junco	1
BBS 01	2018-06-23	606245.576	6392611.907	*Junco hyemalis*	Dark-eyed junco	1
BBS 01	2018-06-23	606245.576	6392611.907	*Junco hyemalis*	Dark-eyed junco	1
BBS 01	2018-06-23	606245.576	6392611.907	*Gavia immer*	Common loon	1
BBS 01	2018-06-23	606245.576	6392611.907	*Perisoreus canadensis*	Gray jay	1
BBS 01	2018-06-23	606245.576	6392611.907	*Catharus guttatus*	Hermit thrush	1
BBS 01	2018-06-23	606245.576	6392611.907	*Spinus pinus*	Pine siskin	1
BBS 01	2018-06-23	606245.576	6392611.907	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 01	2018-06-23	606245.576	6392611.907	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 02	2018-06-08	609819.527	6396786.965	*Branta canadensis*	Canada goose	160
BBS 02	2018-06-08	609819.527	6396786.965	*Junco hyemalis*	Dark-eyed junco	1
BBS 02	2018-06-08	609819.527	6396786.965	*Junco hyemalis*	Dark-eyed junco	1
BBS 02	2018-06-08	609819.527	6396786.965	*Perisoreus canadensis*	Gray jay	1
BBS 02	2018-06-08	609819.527	6396786.965	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 02	2018-06-24	609823.205	6396789.85	*Picoides arcticus*	Black-backed woodpecker	1
BBS 02	2018-06-24	609823.205	6396789.85	*Spizella passerina*	Chipping sparrow	1
BBS 02	2018-06-24	609823.205	6396789.85	*Junco hyemalis*	Dark-eyed junco	2

Appendix B, Table 5

Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 02	2018-06-24	609823.205	6396789.85	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 02	2018-06-24	609823.205	6396789.85	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 03	2018-06-07	606566.052	6392365.387	*Junco hyemalis*	Dark-eyed junco	1
BBS 03	2018-06-07	606566.052	6392365.387	*Catharus guttatus*	Hermit thrush	1
BBS 03	2018-06-07	606566.052	6392365.387	*Catharus guttatus*	Hermit thrush	2
BBS 03	2018-06-07	606566.052	6392365.387	*Anas platyrhynchos*	Mallard	1
BBS 03	2018-06-07	606566.052	6392365.387	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 03	2018-06-07	606566.052	6392365.387	*Setophaga palmarum*	Palm warbler	1
BBS 03	2018-06-07	606566.052	6392365.387	*Setophaga palmarum*	Palm warbler	1
BBS 03	2018-06-07	606566.052	6392365.387	*Grus canadensis*	Sandhill crane	1
BBS 03	2018-06-07	606566.052	6392365.387	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 03	2018-06-07	606566.052	6392365.387	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 03	2018-06-23	606560.35	6392366.573	*Corvus brachyrhynchos*	American crow	2
BBS 03	2018-06-23	606560.35	6392366.573	*Turdus migratorius*	American robin	1
BBS 03	2018-06-23	606560.35	6392366.573	*Spizella passerina*	Chipping sparrow	1
BBS 03	2018-06-23	606560.35	6392366.573	*Junco hyemalis*	Dark-eyed junco	2
BBS 03	2018-06-23	606560.35	6392366.573	*Junco hyemalis*	Dark-eyed junco	1
BBS 03	2018-06-23	606560.35	6392366.573	*Junco hyemalis*	Dark-eyed junco	1
BBS 03	2018-06-23	606560.35	6392366.573	*Catharus guttatus*	Hermit thrush	1
BBS 03	2018-06-23	606560.35	6392366.573	*Setophaga palmarum*	Palm warbler	1
BBS 03	2018-06-23	606560.35	6392366.573	*Setophaga palmarum*	Palm warbler	1
BBS 03	2018-06-23	606560.35	6392366.573	*Loxia curvirostra*	Red crossbill	1
BBS 03	2018-06-23	606560.35	6392366.573	*Gallinago delicata*	Wilson's snipe	1
BBS 03	2018-06-23	606560.35	6392366.573	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 03	2018-06-23	606560.35	6392366.573	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 04	2018-06-07	606273.527	6393113.299	*Spizella passerina*	Chipping sparrow	1
BBS 04	2018-06-07	606273.527	6393113.299	*Mergus merganser*	Common merganser	3
BBS 04	2018-06-07	606273.527	6393113.299	*Chordeiles minor*	Common nighthawk	1
BBS 04	2018-06-07	606273.527	6393113.299	*Junco hyemalis*	Dark-eyed junco	1
BBS 04	2018-06-07	606273.527	6393113.299	*Junco hyemalis*	Dark-eyed junco	1
BBS 04	2018-06-07	606273.527	6393113.299	*Gavia immer*	Common loon	1
BBS 04	2018-06-07	606273.527	6393113.299	*Catharus guttatus*	Hermit thrush	1
BBS 04	2018-06-07	606273.527	6393113.299	*Catharus guttatus*	Hermit thrush	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 04	2018-06-07	606273.527	6393113.299	*Setophaga palmarum*	Palm warbler	2
BBS 04	2018-06-23	606275.689	6393108.233	*Turdus migratorius*	American robin	1
BBS 04	2018-06-23	606275.689	6393108.233	*Hirundo rustica*	Barn swallow	2
BBS 04	2018-06-23	606275.689	6393108.233	*Chordeiles minor*	Common nighthawk	1
BBS 04	2018-06-23	606275.689	6393108.233	*Junco hyemalis*	Dark-eyed junco	1
BBS 04	2018-06-23	606275.689	6393108.233	*Junco hyemalis*	Dark-eyed junco	1
BBS 04	2018-06-23	606275.689	6393108.233	*Gavia immer*	Common loon	1
BBS 04	2018-06-23	606275.689	6393108.233	*Catharus guttatus*	Hermit thrush	1
BBS 04	2018-06-23	606275.689	6393108.233	*Setophaga palmarum*	Palm warbler	1
BBS 04	2018-06-23	606275.689	6393108.233	*Setophaga palmarum*	Palm warbler	1
BBS 04	2018-06-23	606275.689	6393108.233	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 04	2018-06-23	606275.689	6393108.233	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 05	2018-06-07	605954.096	6393341.044	*Junco hyemalis*	Dark-eyed junco	1
BBS 05	2018-06-07	605954.096	6393341.044	*Junco hyemalis*	Dark-eyed junco	1
BBS 05	2018-06-07	605954.096	6393341.044	*Setophaga palmarum*	Palm warbler	1
BBS 05	2018-06-07	605954.096	6393341.044	*Setophaga palmarum*	Palm warbler	2
BBS 05	2018-06-07	605954.096	6393341.044	*Loxia curvirostra*	Red crossbill	11
BBS 05	2018-06-07	605954.096	6393341.044	*Catharus ustulatus*	Swainson's thrush	1
BBS 05	2018-06-07	605954.096	6393341.044	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 05	2018-06-23	605950.816	6393340.958	*Junco hyemalis*	Dark-eyed junco	1
BBS 05	2018-06-23	605950.816	6393340.958	*Junco hyemalis*	Dark-eyed junco	1
BBS 05	2018-06-23	605950.816	6393340.958	*Junco hyemalis*	Dark-eyed junco	1
BBS 05	2018-06-23	605950.816	6393340.958	*Dumetella carolinensis*	Gray catbird	1
BBS 05	2018-06-23	605950.816	6393340.958	*Setophaga palmarum*	Palm warbler	1
BBS 05	2018-06-23	605950.816	6393340.958	*Setophaga palmarum*	Palm warbler	1
BBS 05	2018-06-23	605950.816	6393340.958	*Spinus pinus*	Pine siskin	1
BBS 06	2018-06-06	605602.151	6393590.351	*Junco hyemalis*	Dark-eyed junco	1
BBS 06	2018-06-06	605602.151	6393590.351	*Perisoreus canadensis*	Gray jay	1
BBS 06	2018-06-06	605602.151	6393590.351	*Setophaga palmarum*	Palm warbler	2
BBS 06	2018-06-06	605602.151	6393590.351	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 06	2018-06-06	605602.151	6393590.351	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 06	2018-06-23	605605.691	6393594.23	*Junco hyemalis*	Dark-eyed junco	1
BBS 06	2018-06-23	605605.691	6393594.23	*Junco hyemalis*	Dark-eyed junco	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 06	2018-06-23	605605.691	6393594.23	*Setophaga palmarum*	Palm warbler	1
BBS 06	2018-06-23	605605.691	6393594.23	*Setophaga palmarum*	Palm warbler	1
BBS 06	2018-06-23	605605.691	6393594.23	*Catharus ustulatus*	Swainson's thrush	1
BBS 07	2018-06-06	606079.722	6393793.76	*Turdus migratorius*	American robin	1
BBS 07	2018-06-06	606079.722	6393793.76	*Junco hyemalis*	Dark-eyed junco	1
BBS 07	2018-06-06	606079.722	6393793.76	*Junco hyemalis*	Dark-eyed junco	1
BBS 07	2018-06-06	606079.722	6393793.76	*Corvus corax*	Northern raven	1
BBS 07	2018-06-06	606079.722	6393793.76	*Setophaga palmarum*	Palm warbler	2
BBS 07	2018-06-06	606079.722	6393793.76	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 07	2018-06-06	606079.722	6393793.76	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 07	2018-06-23	606062.819	6393803.452	*Junco hyemalis*	Dark-eyed junco	1
BBS 07	2018-06-23	606062.819	6393803.452	*Catharus guttatus*	Hermit thrush	1
BBS 07	2018-06-23	606062.819	6393803.452	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 07	2018-06-23	606062.819	6393803.452	*Passerella iliaca*	Red fox sparrow	1
BBS 07	2018-06-23	606062.819	6393803.452	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 07	2018-06-23	606062.819	6393803.452	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 08	2018-06-06	605291.813	6393339.002	*Turdus migratorius*	American robin	1
BBS 08	2018-06-06	605291.813	6393339.002	*Spizella passerina*	Chipping sparrow	1
BBS 08	2018-06-06	605291.813	6393339.002	*Junco hyemalis*	Dark-eyed junco	2
BBS 08	2018-06-06	605291.813	6393339.002	*Catharus guttatus*	Hermit thrush	2
BBS 08	2018-06-06	605291.813	6393339.002	*Catharus guttatus*	Hermit thrush	1
BBS 08	2018-06-06	605291.813	6393339.002	*Setophaga palmarum*	Palm warbler	1
BBS 08	2018-06-06	605291.813	6393339.002	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 08	2018-06-23	605288.16	6393334.897	*Junco hyemalis*	Dark-eyed junco	1
BBS 08	2018-06-23	605288.16	6393334.897	*Junco hyemalis*	Dark-eyed junco	1
BBS 08	2018-06-23	605288.16	6393334.897	*Perisoreus canadensis*	Gray jay	1
BBS 08	2018-06-23	605288.16	6393334.897	*Setophaga palmarum*	Palm warbler	1
BBS 08	2018-06-23	605288.16	6393334.897	*Passerella iliaca*	Red fox sparrow	1
BBS 09	2018-06-07	605587.997	6393101.689	*Turdus migratorius*	American robin	1
BBS 09	2018-06-07	605587.997	6393101.689	*Junco hyemalis*	Dark-eyed junco	1
BBS 09	2018-06-07	605587.997	6393101.689	*Catharus guttatus*	Hermit thrush	1
BBS 09	2018-06-07	605587.997	6393101.689	*Setophaga palmarum*	Palm warbler	1
BBS 09	2018-06-07	605587.997	6393101.689	*Setophaga coronata*	Yellow-rumped warbler	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 09	2018-06-07	605587.997	6393101.689	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 09	2018-06-23	605582.236	6393105.214	*Spizella passerina*	Chipping sparrow	1
BBS 09	2018-06-23	605582.236	6393105.214	*Junco hyemalis*	Dark-eyed junco	1
BBS 09	2018-06-23	605582.236	6393105.214	*Junco hyemalis*	Dark-eyed junco	2
BBS 09	2018-06-23	605582.236	6393105.214	*Junco hyemalis*	Dark-eyed junco	1
BBS 09	2018-06-23	605582.236	6393105.214	*Junco hyemalis*	Dark-eyed junco	1
BBS 09	2018-06-23	605582.236	6393105.214	*Gavia immer*	Common loon	1
BBS 09	2018-06-23	605582.236	6393105.214	*Catharus guttatus*	Hermit thrush	1
BBS 09	2018-06-23	605582.236	6393105.214	*Setophaga palmarum*	Palm warbler	1
BBS 09	2018-06-23	605582.236	6393105.214	*Setophaga palmarum*	Palm warbler	1
BBS 09	2018-06-23	605582.236	6393105.214	*Setophaga palmarum*	Palm warbler	1
BBS 09	2018-06-23	605582.236	6393105.214	*Loxia leucoptera*	Two-barred crossbill	2
BBS 10	2018-06-07	605915.194	6392855.296	*Junco hyemalis*	Dark-eyed junco	1
BBS 10	2018-06-07	605915.194	6392855.296	*Perisoreus canadensis*	Gray jay	1
BBS 10	2018-06-07	605915.194	6392855.296	*Catharus guttatus*	Hermit thrush	1
BBS 10	2018-06-07	605915.194	6392855.296	*Setophaga palmarum*	Palm warbler	1
BBS 10	2018-06-07	605915.194	6392855.296	*Setophaga palmarum*	Palm warbler	2
BBS 10	2018-06-07	605915.194	6392855.296	*Cardellina pusilla*	Wilson's warbler	1
BBS 10	2018-06-07	605915.194	6392855.296	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 10	2018-06-07	605915.194	6392855.296	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 10	2018-06-22	605908.299	6392854.224	*Spizella passerina*	Chipping sparrow	1
BBS 10	2018-06-22	605908.299	6392854.224	*Junco hyemalis*	Dark-eyed junco	1
BBS 10	2018-06-22	605908.299	6392854.224	*Junco hyemalis*	Dark-eyed junco	1
BBS 10	2018-06-22	605908.299	6392854.224	*Catharus guttatus*	Hermit thrush	1
BBS 10	2018-06-22	605908.299	6392854.224	*Setophaga palmarum*	Palm warbler	2
BBS 10	2018-06-22	605908.299	6392854.224	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 10	2018-06-22	605908.299	6392854.224	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 11	2018-06-06	606336.022	6394338.243	*Junco hyemalis*	Dark-eyed junco	1
BBS 11	2018-06-06	606336.022	6394338.243	*Aythya affinis*	Lesser scaup	1
BBS 11	2018-06-06	606336.022	6394338.243	*Corvus corax*	Northern raven	1
BBS 11	2018-06-06	606336.022	6394338.243	*Setophaga palmarum*	Palm warbler	1
BBS 11	2018-06-06	606336.022	6394338.243	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 11	2018-06-06	606336.022	6394338.243	*Setophaga coronata*	Yellow-rumped warbler	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 11	2018-06-22	606326.814	6394341.231	*Spizella passerina*	Chipping sparrow	1
BBS 11	2018-06-22	606326.814	6394341.231	*Junco hyemalis*	Dark-eyed junco	1
BBS 11	2018-06-22	606326.814	6394341.231	*Gavia immer*	Common loon	1
BBS 11	2018-06-22	606326.814	6394341.231	*Perisoreus canadensis*	Gray jay	1
BBS 11	2018-06-22	606326.814	6394341.231	*Setophaga palmarum*	Palm warbler	1
BBS 11	2018-06-22	606326.814	6394341.231	*Setophaga palmarum*	Palm warbler	1
BBS 11	2018-06-22	606326.814	6394341.231	*Passerella iliaca*	Red fox sparrow	1
BBS 11	2018-06-22	606326.814	6394341.231	*Vireo solitarius*	Solitary vireo	1
BBS 11	2018-06-22	606326.814	6394341.231	*Catharus ustulatus*	Swainson's thrush	1
BBS 11	2018-06-22	606326.814	6394341.231	*Catharus ustulatus*	Swainson's thrush	1
BBS 11	2018-06-22	606326.814	6394341.231	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 11	2018-06-22	606326.814	6394341.231	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 11	2018-06-22	606326.814	6394341.231	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 12	2018-06-10	607446.486	6394107.086	*Empidonax alnorum*	Alder flycatcher	1
BBS 12	2018-06-10	607446.486	6394107.086	*Haliaeetus leucocephalus*	Bald eagle	1
BBS 12	2018-06-10	607446.486	6394107.086	*Chroicocephalus philadelphia*	Bonaparte's gull	1
BBS 12	2018-06-10	607446.486	6394107.086	*Spizella passerina*	Chipping sparrow	1
BBS 12	2018-06-10	607446.486	6394107.086	*Spizella pallida*	Clay-colored sparrow	1
BBS 12	2018-06-10	607446.486	6394107.086	*Gavia immer*	Common loon	1
BBS 12	2018-06-10	607446.486	6394107.086	*Melospiza lincolnii*	Lincoln's sparrow	1
BBS 12	2018-06-10	607446.486	6394107.086	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 12	2018-06-10	607446.486	6394107.086	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 12	2018-06-10	607446.486	6394107.086	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 12	2018-06-10	607446.486	6394107.086	*Melospiza melodia*	Song sparrow	1
BBS 12	2018-06-10	607446.486	6394107.086	*Melospiza melodia*	Song sparrow	1
BBS 12	2018-06-10	607446.486	6394107.086	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 12	2018-06-10	607446.486	6394107.086	*Setophaga petechia*	Yellow warbler	1
BBS 12	2018-06-10	607446.486	6394107.086	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 12	2018-06-10	607446.486	6394107.086	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 12	2018-06-22	607443.607	6394109.906	*Empidonax alnorum*	Alder flycatcher	1
BBS 12	2018-06-22	607443.607	6394109.906	*Corvus brachyrhynchos*	American crow	1
BBS 12	2018-06-22	607443.607	6394109.906	*Turdus migratorius*	American robin	1
BBS 12	2018-06-22	607443.607	6394109.906	*Turdus migratorius*	American robin	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 12	2018-06-22	607443.607	6394109.906	*Turdus migratorius*	American robin	1
BBS 12	2018-06-22	607443.607	6394109.906	*Haliaeetus leucocephalus*	Bald eagle	2
BBS 12	2018-06-22	607443.607	6394109.906	*Chroicocephalus philadelphia*	Bonaparte's gull	1
BBS 12	2018-06-22	607443.607	6394109.906	*Spizella passerina*	Chipping sparrow	2
BBS 12	2018-06-22	607443.607	6394109.906	*Spizella passerina*	Chipping sparrow	1
BBS 12	2018-06-22	607443.607	6394109.906	*Spizella pallida*	Clay-colored sparrow	1
BBS 12	2018-06-22	607443.607	6394109.906	*Gavia immer*	Common loon	1
BBS 12	2018-06-22	607443.607	6394109.906	*Melospiza lincolnii*	Lincoln's sparrow	1
BBS 12	2018-06-22	607443.607	6394109.906	*Melospiza lincolnii*	Lincoln's sparrow	1
BBS 12	2018-06-22	607443.607	6394109.906	*Passerella iliaca*	Red fox sparrow	1
BBS 12	2018-06-22	607443.607	6394109.906	*Melospiza melodia*	Song sparrow	1
BBS 12	2018-06-22	607443.607	6394109.906	*Melospiza melodia*	Song sparrow	1
BBS 12	2018-06-22	607443.607	6394109.906	*Melospiza melodia*	Song sparrow	1
BBS 12	2018-06-22	607443.607	6394109.906	*Actitis macularius*	Spotted sandpiper	1
BBS 12	2018-06-22	607443.607	6394109.906	*Zonotrichia leucophrys*	White-crowned sparrow	1
BBS 12	2018-06-22	607443.607	6394109.906	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 12	2018-06-22	607443.607	6394109.906	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 12	2018-06-22	607443.607	6394109.906	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 12	2018-06-22	607443.607	6394109.906	*Setophaga petechia*	Yellow warbler	1
BBS 12	2018-06-22	607443.607	6394109.906	*Setophaga petechia*	Yellow warbler	1
BBS 13	2018-06-10	608290.669	6395164.366	*Corvus brachyrhynchos*	American crow	1
BBS 13	2018-06-10	608290.669	6395164.366	*Turdus migratorius*	American robin	1
BBS 13	2018-06-10	608290.669	6395164.366	*Turdus migratorius*	American robin	1
BBS 13	2018-06-10	608290.669	6395164.366	*Chordeiles minor*	Common nighthawk	1
BBS 13	2018-06-10	608290.669	6395164.366	*Junco hyemalis*	Dark-eyed junco	1
BBS 13	2018-06-10	608290.669	6395164.366	*Gavia immer*	Common loon	1
BBS 13	2018-06-10	608290.669	6395164.366	*Tringa solitaria*	Solitary sandpiper	2
BBS 13	2018-06-10	608290.669	6395164.366	*Melospiza melodia*	Song sparrow	1
BBS 13	2018-06-22	608285.966	6395159.562	*Turdus migratorius*	American robin	2
BBS 13	2018-06-22	608285.966	6395159.562	*Chroicocephalus philadelphia*	Bonaparte's gull	1
BBS 13	2018-06-22	608285.966	6395159.562	*Branta canadensis*	Canada goose	55
BBS 13	2018-06-22	608285.966	6395159.562	*Spizella passerina*	Chipping sparrow	1
BBS 13	2018-06-22	608285.966	6395159.562	*Spizella passerina*	Chipping sparrow	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 13	2018-06-22	608285.966	6395159.562	*Perisoreus canadensis*	Gray jay	1
BBS 13	2018-06-22	608285.966	6395159.562	*Melospiza lincolnii*	Lincoln's sparrow	1
BBS 13	2018-06-22	608285.966	6395159.562	*Setophaga palmarum*	Palm warbler	1
BBS 13	2018-06-22	608285.966	6395159.562	*Setophaga palmarum*	Palm warbler	1
BBS 13	2018-06-22	608285.966	6395159.562	*Larus delawarensis*	Ring-billed gull	1
BBS 13	2018-06-22	608285.966	6395159.562	*Melospiza melodia*	Song sparrow	1
BBS 13	2018-06-22	608285.966	6395159.562	*Melospiza melodia*	Song sparrow	1
BBS 13	2018-06-22	608285.966	6395159.562	*Melospiza melodia*	Song sparrow	1
BBS 13	2018-06-22	608285.966	6395159.562	*Zonotrichia leucophrys*	White-crowned sparrow	1
BBS 13	2018-06-22	608285.966	6395159.562	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 14	2018-06-11	603318.572	6390131.649	*Junco hyemalis*	Dark-eyed junco	1
BBS 14	2018-06-11	603318.572	6390131.649	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 14	2018-06-11	603318.572	6390131.649	*Vireo olivaceus*	Red-eyed vireo	1
BBS 14	2018-06-11	603318.572	6390131.649	*Catharus ustulatus*	Swainson's thrush	1
BBS 14	2018-06-11	603318.572	6390131.649	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 14	2018-06-11	603318.572	6390131.649	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 14	2018-06-11	603318.572	6390131.649	*Empidonax flaviventris*	Yellow-bellied flycatcher	1
BBS 14	2018-06-11	603318.572	6390131.649	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 14	2018-06-11	603318.572	6390131.649	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 14	2018-06-22	603326.576	6390133.969	*Spizella passerina*	Chipping sparrow	1
BBS 14	2018-06-22	603326.576	6390133.969	*Spizella passerina*	Chipping sparrow	1
BBS 14	2018-06-22	603326.576	6390133.969	*Parkesia noveboracensis*	Northern waterthrush	1
BBS 14	2018-06-22	603326.576	6390133.969	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 14	2018-06-22	603326.576	6390133.969	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 14	2018-06-22	603326.576	6390133.969	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 14	2018-06-22	603326.576	6390133.969	*Vireo olivaceus*	Red-eyed vireo	1
BBS 14	2018-06-22	603326.576	6390133.969	*Catharus ustulatus*	Swainson's thrush	1
BBS 14	2018-06-22	603326.576	6390133.969	*Catharus ustulatus*	Swainson's thrush	1
BBS 14	2018-06-22	603326.576	6390133.969	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 14	2018-06-22	603326.576	6390133.969	*Tachycineta bicolor*	Tree swallow	1
BBS 14	2018-06-22	603326.576	6390133.969	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 14	2018-06-22	603326.576	6390133.969	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 14	2018-06-22	603326.576	6390133.969	*Zonotrichia albicollis*	White-throated sparrow	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 14	2018-06-22	603326.576	6390133.969	*Empidonax flaviventris*	Yellow-bellied flycatcher	1
BBS 14	2018-06-22	603326.576	6390133.969	*Empidonax flaviventris*	Yellow-bellied flycatcher	1
BBS 14	2018-06-22	603326.576	6390133.969	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 14	2018-06-22	603326.576	6390133.969	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 15	2018-06-08	610535.291	6396687.644	*Empidonax alnorum*	Alder flycatcher	1
BBS 15	2018-06-08	610535.291	6396687.644	*Branta canadensis*	Canada goose	1
BBS 15	2018-06-08	610535.291	6396687.644	*Junco hyemalis*	Dark-eyed junco	1
BBS 15	2018-06-08	610535.291	6396687.644	*Picoides villosus*	Hairy woodpecker	1
BBS 15	2018-06-08	610535.291	6396687.644	*Anas acuta*	Northern pintail	1
BBS 15	2018-06-08	610535.291	6396687.644	*Contopus sordidulus*	Western wood pewee	1
BBS 15	2018-06-08	610535.291	6396687.644	*Zonotrichia albicollis*	White-throated sparrow	2
BBS 15	2018-06-08	610535.291	6396687.644	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 15	2018-06-08	610535.291	6396687.644	*Gallinago delicata*	Wilson's snipe	1
BBS 15	2018-06-24	610536.373	6396687.339	*Junco hyemalis*	Dark-eyed junco	1
BBS 15	2018-06-24	610536.373	6396687.339	*Catharus guttatus*	Hermit thrush	1
BBS 15	2018-06-24	610536.373	6396687.339	*Pheucticus ludovicianus*	Rose-breasted grosbeak	1
BBS 15	2018-06-24	610536.373	6396687.339	*Zonotrichia albicollis*	White-throated sparrow	2
BBS 15	2018-06-24	610536.373	6396687.339	*Gallinago delicata*	Wilson's snipe	1
BBS 15	2018-06-24	610536.373	6396687.339	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 16	2018-06-06	603653.6	6387609.824	*Spizella passerina*	Chipping sparrow	1
BBS 16	2018-06-06	603653.6	6387609.824	*Junco hyemalis*	Dark-eyed junco	1
BBS 16	2018-06-06	603653.6	6387609.824	*Perisoreus canadensis*	Gray jay	1
BBS 16	2018-06-06	603653.6	6387609.824	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 16	2018-06-06	603653.6	6387609.824	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 16	2018-06-06	603653.6	6387609.824	*Plectrophenax nivalis*	Snow bunting	1
BBS 16	2018-06-06	603653.6	6387609.824	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 16	2018-06-06	603653.6	6387609.824	*Cardellina pusilla*	Wilson's warbler	1
BBS 16	2018-06-25	603652.088	6387612.904	*Larus californicus*	California gull	1
BBS 16	2018-06-25	603652.088	6387612.904	*Spizella passerina*	Chipping sparrow	1
BBS 16	2018-06-25	603652.088	6387612.904	*Perisoreus canadensis*	Gray jay	1
BBS 16	2018-06-25	603652.088	6387612.904	*Catharus guttatus*	Hermit thrush	1
BBS 16	2018-06-25	603652.088	6387612.904	*Passerella iliaca*	Red fox sparrow	1
BBS 16	2018-06-25	603652.088	6387612.904	*Catharus ustulatus*	Swainson's thrush	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 16	2018-06-25	603652.088	6387612.904	*Catharus ustulatus*	Swainson's thrush	1
BBS 16	2018-06-25	603652.088	6387612.904	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 16	2018-06-25	603652.088	6387612.904	*Loxia leucoptera*	Two-barred crossbill	1
BBS 16	2018-06-25	603652.088	6387612.904	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 16	2018-06-25	603652.088	6387612.904	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 16	2018-06-25	603652.088	6387612.904	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 16	2018-06-25	603652.088	6387612.904	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 17	2018-06-08	604609.284	6388003.163	*Chordeiles minor*	Common nighthawk	1
BBS 17	2018-06-08	604609.284	6388003.163	*Chordeiles minor*	Common nighthawk	1
BBS 17	2018-06-08	604609.284	6388003.163	*Junco hyemalis*	Dark-eyed junco	1
BBS 17	2018-06-08	604609.284	6388003.163	*Regulus satrapa*	Golden-crowned kinglet	1
BBS 17	2018-06-08	604609.284	6388003.163	*Catharus guttatus*	Hermit thrush	1
BBS 17	2018-06-08	604609.284	6388003.163	*Catharus guttatus*	Hermit thrush	1
BBS 17	2018-06-08	604609.284	6388003.163	*Catharus guttatus*	Hermit thrush	1
BBS 17	2018-06-08	604609.284	6388003.163	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 17	2018-06-08	604609.284	6388003.163	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 17	2018-06-08	604609.284	6388003.163	*Larus*	-	1
BBS 17	2018-06-08	604609.284	6388003.163	*Catharus ustulatus*	Swainson's thrush	1
BBS 17	2018-06-08	604609.284	6388003.163	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 17	2018-06-25	604614.608	6388002.966	*Spizella passerina*	Chipping sparrow	1
BBS 17	2018-06-25	604614.608	6388002.966	*Spizella passerina*	Chipping sparrow	1
BBS 17	2018-06-25	604614.608	6388002.966	*Spizella passerina*	Chipping sparrow	1
BBS 17	2018-06-25	604614.608	6388002.966	*Chordeiles minor*	Common nighthawk	1
BBS 17	2018-06-25	604614.608	6388002.966	*Junco hyemalis*	Dark-eyed junco	1
BBS 17	2018-06-25	604614.608	6388002.966	*Junco hyemalis*	Dark-eyed junco	1
BBS 17	2018-06-25	604614.608	6388002.966	*Gavia immer*	Common loon	1
BBS 17	2018-06-25	604614.608	6388002.966	*Catharus guttatus*	Hermit thrush	1
BBS 17	2018-06-25	604614.608	6388002.966	*Setophaga magnolia*	Magnolia warbler	1
BBS 17	2018-06-25	604614.608	6388002.966	*Zenaida macroura*	Mourning dove	1
BBS 17	2018-06-25	604614.608	6388002.966	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 17	2018-06-25	604614.608	6388002.966	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 17	2018-06-25	604614.608	6388002.966	*Passerella iliaca*	Red fox sparrow	1
BBS 17	2018-06-25	604614.608	6388002.966	*Catharus ustulatus*	Swainson's thrush	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 17	2018-06-25	604614.608	6388002.966	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 17	2018-06-25	604614.608	6388002.966	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 17	2018-06-25	604614.608	6388002.966	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 17	2018-06-25	604614.608	6388002.966	*Empidonax flaviventris*	Yellow-bellied flycatcher	1
BBS 17	2018-06-25	604614.608	6388002.966	*Empidonax flaviventris*	Yellow-bellied flycatcher	1
BBS 17	2018-06-25	604614.608	6388002.966	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 18	2018-06-08	605320.952	6388687.874	*Branta canadensis*	Canada goose	1
BBS 18	2018-06-08	605320.952	6388687.874	*Gavia immer*	Common loon	1
BBS 18	2018-06-08	605320.952	6388687.874	*Gavia immer*	Common loon	1
BBS 18	2018-06-08	605320.952	6388687.874	*Corvus corax*	Northern raven	1
BBS 18	2018-06-08	605320.952	6388687.874	*Corvus corax*	Northern raven	1
BBS 18	2018-06-08	605320.952	6388687.874	*Setophaga palmarum*	Palm warbler	1
BBS 18	2018-06-08	605320.952	6388687.874	*Vireo philadelphicus*	Philadelphia vireo	1
BBS 18	2018-06-08	605320.952	6388687.874	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 18	2018-06-08	605320.952	6388687.874	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 18	2018-06-08	605320.952	6388687.874	*Catharus ustulatus*	Swainson's thrush	1
BBS 18	2018-06-08	605320.952	6388687.874	*Melospiza georgiana*	Swamp sparrow	1
BBS 18	2018-06-08	605320.952	6388687.874	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 18	2018-06-25	605328.376	6388689.627	*Turdus migratorius*	American robin	1
BBS 18	2018-06-25	605328.376	6388689.627	*Turdus migratorius*	American robin	1
BBS 18	2018-06-25	605328.376	6388689.627	*Spizella passerina*	Chipping sparrow	1
BBS 18	2018-06-25	605328.376	6388689.627	*Spizella passerina*	Chipping sparrow	1
BBS 18	2018-06-25	605328.376	6388689.627	*Tringa melanoleuca*	Greater yellowlegs	1
BBS 18	2018-06-25	605328.376	6388689.627	*Vireo olivaceus*	Red-eyed vireo	1
BBS 18	2018-06-25	605328.376	6388689.627	*Larus delawarensis*	Ring-billed gull	1
BBS 18	2018-06-25	605328.376	6388689.627	*Grus canadensis*	Sandhill crane	1
BBS 18	2018-06-25	605328.376	6388689.627	*Melospiza melodia*	Song sparrow	1
BBS 18	2018-06-25	605328.376	6388689.627	*Falcipennis canadensis*	Spruce grouse	1
BBS 18	2018-06-25	605328.376	6388689.627	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 18	2018-06-25	605328.376	6388689.627	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 18	2018-06-25	605328.376	6388689.627	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 18	2018-06-25	605328.376	6388689.627	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 19	2018-06-08	609013.26	6396900.453	*Spizella passerina*	Chipping sparrow	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 19	2018-06-08	609013.26	6396900.453	*Chordeiles minor*	Common nighthawk	1
BBS 19	2018-06-08	609013.26	6396900.453	*Setophaga palmarum*	Palm warbler	1
BBS 19	2018-06-08	609013.26	6396900.453	*Zonotrichia albicollis*	White-throated sparrow	2
BBS 19	2018-06-24	609013.031	6396900.113	*Spizella passerina*	Chipping sparrow	1
BBS 19	2018-06-24	609013.031	6396900.113	*Chordeiles minor*	Common nighthawk	1
BBS 19	2018-06-24	609013.031	6396900.113	*Junco hyemalis*	Dark-eyed junco	1
BBS 19	2018-06-24	609013.031	6396900.113	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 19	2018-06-24	609013.031	6396900.113	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 19	2018-06-24	609013.031	6396900.113	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 19	2018-06-24	609013.031	6396900.113	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 20	2018-06-08	608209.868	6397026.652	*Empidonax alnorum*	Alder flycatcher	1
BBS 20	2018-06-08	608209.868	6397026.652	*Hirundo rustica*	Barn swallow	4
BBS 20	2018-06-08	608209.868	6397026.652	*Mniotilta varia*	Black-and-white warbler	1
BBS 20	2018-06-08	608209.868	6397026.652	*Picoides arcticus*	Black-backed woodpecker	1
BBS 20	2018-06-08	608209.868	6397026.652	*Contopus cooperi*	Olive-sided flycatcher	1
BBS 20	2018-06-08	608209.868	6397026.652	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 20	2018-06-08	608209.868	6397026.652	*Setophaga palmarum*	Palm warbler	1
BBS 20	2018-06-08	608209.868	6397026.652	*Melospiza melodia*	Song sparrow	1
BBS 20	2018-06-08	608209.868	6397026.652	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 20	2018-06-08	608209.868	6397026.652	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 20	2018-06-08	608209.868	6397026.652	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 20	2018-06-08	608209.868	6397026.652	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 20	2018-06-24	608223.457	6397015.766	*Turdus migratorius*	American robin	1
BBS 20	2018-06-24	608223.457	6397015.766	*Anas americana*	American wigeon	1
BBS 20	2018-06-24	608223.457	6397015.766	*Hirundo rustica*	Barn swallow	1
BBS 20	2018-06-24	608223.457	6397015.766	*Megaceryle alcyon*	Belted kingfisher	1
BBS 20	2018-06-24	608223.457	6397015.766	*Larus californicus*	California gull	1
BBS 20	2018-06-24	608223.457	6397015.766	*Spizella passerina*	Chipping sparrow	1
BBS 20	2018-06-24	608223.457	6397015.766	*Gavia immer*	Common loon	1
BBS 20	2018-06-24	608223.457	6397015.766	*Melospiza lincolnii*	Lincoln's sparrow	1
BBS 20	2018-06-24	608223.457	6397015.766	*Cistothorus palustris*	Marsh wren	1
BBS 20	2018-06-24	608223.457	6397015.766	*Setophaga palmarum*	Palm warbler	1
BBS 20	2018-06-24	608223.457	6397015.766	*Melospiza melodia*	Song sparrow	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 20	2018-06-24	608223.457	6397015.766	*Zonotrichia leucophrys*	White-crowned sparrow	1
BBS 20	2018-06-24	608223.457	6397015.766	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 21	2018-06-08	607663.391	6397222.782	*Branta canadensis*	Canada goose	150
BBS 21	2018-06-08	607663.391	6397222.782	*Junco hyemalis*	Dark-eyed junco	1
BBS 21	2018-06-08	607663.391	6397222.782	*Gavia immer*	Common loon	1
BBS 21	2018-06-08	607663.391	6397222.782	*Tringa melanoleuca*	Greater yellowlegs	1
BBS 21	2018-06-08	607663.391	6397222.782	*Setophaga palmarum*	Palm warbler	1
BBS 21	2018-06-08	607663.391	6397222.782	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 21	2018-06-08	607663.391	6397222.782	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 21	2018-06-08	607663.391	6397222.782	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 21	2018-06-24	607661.603	6397222.734	*Turdus migratorius*	American robin	1
BBS 21	2018-06-24	607661.603	6397222.734	*Junco hyemalis*	Dark-eyed junco	2
BBS 21	2018-06-24	607661.603	6397222.734	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 22	2018-06-08	606927.437	6397103.539	*Turdus migratorius*	American robin	1
BBS 22	2018-06-08	606927.437	6397103.539	*Picoides arcticus*	Black-backed woodpecker	1
BBS 22	2018-06-08	606927.437	6397103.539	*Picoides arcticus*	Black-backed woodpecker	1
BBS 22	2018-06-08	606927.437	6397103.539	*Branta canadensis*	Canada goose	1
BBS 22	2018-06-08	606927.437	6397103.539	*Spizella passerina*	Chipping sparrow	1
BBS 22	2018-06-08	606927.437	6397103.539	*Spizella passerina*	Chipping sparrow	1
BBS 22	2018-06-08	606927.437	6397103.539	*Perisoreus canadensis*	Gray jay	1
BBS 22	2018-06-08	606927.437	6397103.539	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 22	2018-06-24	606934.574	6397099.718	*Turdus migratorius*	American robin	1
BBS 22	2018-06-24	606934.574	6397099.718	*Spizella passerina*	Chipping sparrow	1
BBS 22	2018-06-24	606934.574	6397099.718	*Perisoreus canadensis*	Gray jay	1
BBS 22	2018-06-24	606934.574	6397099.718	*Perisoreus canadensis*	Gray jay	1
BBS 22	2018-06-24	606934.574	6397099.718	*Picoides villosus*	Hairy woodpecker	1
BBS 22	2018-06-24	606934.574	6397099.718	*Corvus corax*	Northern raven	1
BBS 22	2018-06-24	606934.574	6397099.718	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 23	2018-06-08	606099.835	6396805.928	*Junco hyemalis*	Dark-eyed junco	1
BBS 23	2018-06-08	606099.835	6396805.928	*Gavia immer*	Common loon	1
BBS 23	2018-06-08	606099.835	6396805.928	*Passerella iliaca*	Red fox sparrow	1
BBS 23	2018-06-08	606099.835	6396805.928	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 23	2018-06-08	606099.835	6396805.928	*Setophaga coronata*	Yellow-rumped warbler	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 23	2018-06-24	606129.184	6396821.401	*Spizella passerina*	Chipping sparrow	1
BBS 23	2018-06-24	606129.184	6396821.401	*Junco hyemalis*	Dark-eyed junco	2
BBS 23	2018-06-24	606129.184	6396821.401	*Corvus corax*	Northern raven	1
BBS 23	2018-06-24	606129.184	6396821.401	*Larus delawarensis*	Ring-billed gull	1
BBS 23	2018-06-24	606129.184	6396821.401	*Laridae*	-	6
BBS 23	2018-06-24	606129.184	6396821.401	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 23	2018-06-24	606129.184	6396821.401	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 24	2018-06-08	605304.056	6396921.095	*Spizella passerina*	Chipping sparrow	1
BBS 24	2018-06-08	605304.056	6396921.095	*Spizella passerina*	Chipping sparrow	1
BBS 24	2018-06-08	605304.056	6396921.095	*Gavia immer*	Common loon	1
BBS 24	2018-06-08	605304.056	6396921.095	*Perisoreus canadensis*	Gray jay	1
BBS 24	2018-06-08	605304.056	6396921.095	*Podiceps grisegena*	Red-necked grebe	2
BBS 24	2018-06-08	605304.056	6396921.095	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 24	2018-06-24	605303.989	6396919.088	*Turdus migratorius*	American robin	1
BBS 24	2018-06-24	605303.989	6396919.088	*Larus californicus*	California gull	1
BBS 24	2018-06-24	605303.989	6396919.088	*Spizella passerina*	Chipping sparrow	1
BBS 24	2018-06-24	605303.989	6396919.088	*Junco hyemalis*	Dark-eyed junco	1
BBS 24	2018-06-24	605303.989	6396919.088	*Junco hyemalis*	Dark-eyed junco	1
BBS 24	2018-06-24	605303.989	6396919.088	*Passerella iliaca*	Red fox sparrow	1
BBS 24	2018-06-24	605303.989	6396919.088	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 24	2018-06-24	605303.989	6396919.088	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 25	2018-06-08	604450.209	6396895.133	*Empidonax alnorum*	Alder flycatcher	1
BBS 25	2018-06-08	604450.209	6396895.133	*Junco hyemalis*	Dark-eyed junco	1
BBS 25	2018-06-08	604450.209	6396895.133	*Gavia immer*	Common loon	1
BBS 25	2018-06-08	604450.209	6396895.133	*Corvus corax*	Northern raven	1
BBS 25	2018-06-08	604450.209	6396895.133	*Vireo olivaceus*	Red-eyed vireo	1
BBS 25	2018-06-08	604450.209	6396895.133	*Podiceps grisegena*	Red-necked grebe	1
BBS 25	2018-06-08	604450.209	6396895.133	*Larus delawarensis*	Ring-billed gull	2
BBS 25	2018-06-08	604450.209	6396895.133	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 25	2018-06-08	604450.209	6396895.133	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 25	2018-06-24	604449.141	6396899.561	*Spizella passerina*	Chipping sparrow	1
BBS 25	2018-06-24	604449.141	6396899.561	*Catharus guttatus*	Hermit thrush	1
BBS 25	2018-06-24	604449.141	6396899.561	*Catharus guttatus*	Hermit thrush	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 25	2018-06-24	604449.141	6396899.561	*Setophaga palmarum*	Palm warbler	1
BBS 25	2018-06-24	604449.141	6396899.561	*Vireo olivaceus*	Red-eyed vireo	1
BBS 25	2018-06-24	604449.141	6396899.561	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 25	2018-06-24	604449.141	6396899.561	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 26	2018-06-08	603715.15	6396664.456	*Perisoreus canadensis*	Gray jay	1
BBS 26	2018-06-08	603715.15	6396664.456	*Catharus guttatus*	Hermit thrush	1
BBS 26	2018-06-08	603715.15	6396664.456	*Falcipennis canadensis*	Spruce grouse	1
BBS 26	2018-06-08	603715.15	6396664.456	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 26	2018-06-24	603724.118	6396658.894	*Junco hyemalis*	Dark-eyed junco	1
BBS 26	2018-06-24	603724.118	6396658.894	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 26	2018-06-24	603724.118	6396658.894	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 27	2018-06-08	602869.029	6396490.338	*Empidonax alnorum*	Alder flycatcher	1
BBS 27	2018-06-08	602869.029	6396490.338	*Junco hyemalis*	Dark-eyed junco	1
BBS 27	2018-06-08	602869.029	6396490.338	*Junco hyemalis*	Dark-eyed junco	1
BBS 27	2018-06-08	602869.029	6396490.338	*Junco hyemalis*	Dark-eyed junco	1
BBS 27	2018-06-08	602869.029	6396490.338	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 27	2018-06-08	602869.029	6396490.338	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 27	2018-06-24	602911.102	6396498.427	*Picoides arcticus*	Black-backed woodpecker	1
BBS 27	2018-06-24	602911.102	6396498.427	*Spizella passerina*	Chipping sparrow	1
BBS 27	2018-06-24	602911.102	6396498.427	*Junco hyemalis*	Dark-eyed junco	1
BBS 27	2018-06-24	602911.102	6396498.427	*Junco hyemalis*	Dark-eyed junco	1
BBS 27	2018-06-24	602911.102	6396498.427	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 28	2018-06-08	602159.434	6396237.321	*Spizella passerina*	Chipping sparrow	1
BBS 28	2018-06-08	602159.434	6396237.321	*Junco hyemalis*	Dark-eyed junco	1
BBS 28	2018-06-08	602159.434	6396237.321	*Perisoreus canadensis*	Gray jay	4
BBS 28	2018-06-08	602159.434	6396237.321	*Catharus guttatus*	Hermit thrush	1
BBS 28	2018-06-08	602159.434	6396237.321	*Loxia curvirostra*	Red crossbill	1
BBS 28	2018-06-08	602159.434	6396237.321	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 28	2018-06-24	602171.25	6396232.273	*Junco hyemalis*	Dark-eyed junco	1
BBS 28	2018-06-24	602171.25	6396232.273	*Junco hyemalis*	Dark-eyed junco	2
BBS 28	2018-06-24	602171.25	6396232.273	*Catharus guttatus*	Hermit thrush	1
BBS 28	2018-06-24	602171.25	6396232.273	*Catharus guttatus*	Hermit thrush	1
BBS 28	2018-06-24	602171.25	6396232.273	*Setophaga coronata*	Yellow-rumped warbler	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 29	2018-06-05	603900.818	6389071.197	*Junco hyemalis*	Dark-eyed junco	2
BBS 29	2018-06-05	603900.818	6389071.197	*Catharus guttatus*	Hermit thrush	2
BBS 29	2018-06-05	603900.818	6389071.197	*Vireo philadelphicus*	Philadelphia vireo	1
BBS 29	2018-06-05	603900.818	6389071.197	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 29	2018-06-05	603900.818	6389071.197	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 29	2018-06-05	603900.818	6389071.197	*Gallinago delicata*	Wilson's snipe	1
BBS 29	2018-06-05	603900.818	6389071.197	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 29	2018-06-24	603871.251	6389047.718	*Catharus guttatus*	Hermit thrush	1
BBS 29	2018-06-24	603871.251	6389047.718	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 29	2018-06-24	603871.251	6389047.718	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 29	2018-06-24	603871.251	6389047.718	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 29	2018-06-24	603871.251	6389047.718	*Setophaga palmarum*	Palm warbler	1
BBS 29	2018-06-24	603871.251	6389047.718	*Setophaga palmarum*	Palm warbler	1
BBS 29	2018-06-24	603871.251	6389047.718	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 29	2018-06-24	603871.251	6389047.718	*Cardellina pusilla*	Wilson's warbler	1
BBS 29	2018-06-24	603871.251	6389047.718	*Empidonax flaviventris*	Yellow-bellied flycatcher	1
BBS 29	2018-06-24	603871.251	6389047.718	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 29	2018-06-24	603871.251	6389047.718	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 30	2018-06-05	603395.684	6388470.529	*Spizella pallida*	Clay-colored sparrow	1
BBS 30	2018-06-05	603395.684	6388470.529	*Junco hyemalis*	Dark-eyed junco	1
BBS 30	2018-06-05	603395.684	6388470.529	*Empidonax minimus*	Least flycatcher	1
BBS 30	2018-06-05	603395.684	6388470.529	*Setophaga palmarum*	Palm warbler	1
BBS 30	2018-06-05	603395.684	6388470.529	*Setophaga palmarum*	Palm warbler	1
BBS 30	2018-06-05	603395.684	6388470.529	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 30	2018-06-05	603395.684	6388470.529	*Empidonax flaviventris*	Yellow-bellied flycatcher	1
BBS 30	2018-06-05	603395.684	6388470.529	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 30	2018-06-24	603387.264	6388467.975	*Spizella passerina*	Chipping sparrow	1
BBS 30	2018-06-24	603387.264	6388467.975	*Spizella passerina*	Chipping sparrow	1
BBS 30	2018-06-24	603387.264	6388467.975	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 30	2018-06-24	603387.264	6388467.975	*Catharus ustulatus*	Swainson's thrush	1
BBS 30	2018-06-24	603387.264	6388467.975	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 30	2018-06-24	603387.264	6388467.975	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 30	2018-06-24	603387.264	6388467.975	*Empidonax flaviventris*	Yellow-bellied flycatcher	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 31	2018-06-09	603595.618	6392075.372	*Spizella passerina*	Chipping sparrow	1
BBS 31	2018-06-09	603595.618	6392075.372	*Junco hyemalis*	Dark-eyed junco	1
BBS 31	2018-06-09	603595.618	6392075.372	*Catharus guttatus*	Hermit thrush	2
BBS 31	2018-06-09	603595.618	6392075.372	*Setophaga palmarum*	Palm warbler	2
BBS 31	2018-06-09	603595.618	6392075.372	*Setophaga palmarum*	Palm warbler	1
BBS 31	2018-06-09	603595.618	6392075.372	*Passerella iliaca*	Red fox sparrow	1
BBS 31	2018-06-09	603595.618	6392075.372	*Falcipennis canadensis*	Spruce grouse	1
BBS 31	2018-06-09	603595.618	6392075.372	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 31	2018-06-09	603595.618	6392075.372	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 31	2018-06-24	603594.351	6392075.896	*Turdus migratorius*	American robin	1
BBS 31	2018-06-24	603594.351	6392075.896	*Spizella passerina*	Chipping sparrow	1
BBS 31	2018-06-24	603594.351	6392075.896	*Mergus merganser*	Common merganser	1
BBS 31	2018-06-24	603594.351	6392075.896	*Junco hyemalis*	Dark-eyed junco	1
BBS 31	2018-06-24	603594.351	6392075.896	*Catharus guttatus*	Hermit thrush	2
BBS 31	2018-06-24	603594.351	6392075.896	*Setophaga palmarum*	Palm warbler	1
BBS 31	2018-06-24	603594.351	6392075.896	*Setophaga palmarum*	Palm warbler	1
BBS 31	2018-06-24	603594.351	6392075.896	*Passerella iliaca*	Red fox sparrow	1
BBS 31	2018-06-24	603594.351	6392075.896	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 32	2018-06-05	602780.118	6388111.041	*Branta canadensis*	Canada goose	1
BBS 32	2018-06-05	602780.118	6388111.041	*Junco hyemalis*	Dark-eyed junco	1
BBS 32	2018-06-05	602780.118	6388111.041	*Junco hyemalis*	Dark-eyed junco	1
BBS 32	2018-06-05	602780.118	6388111.041	*Empidonax minimus*	Least flycatcher	1
BBS 32	2018-06-05	602780.118	6388111.041	*Setophaga palmarum*	Palm warbler	1
BBS 32	2018-06-05	602780.118	6388111.041	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 32	2018-06-05	602780.118	6388111.041	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 32	2018-06-05	602780.118	6388111.041	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 32	2018-06-05	602780.118	6388111.041	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 32	2018-06-05	602780.118	6388111.041	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 32	2018-06-24	602745.534	6388110.497	*Empidonax alnorum*	Alder flycatcher	1
BBS 32	2018-06-24	602745.534	6388110.497	*Branta canadensis*	Canada goose	3
BBS 32	2018-06-24	602745.534	6388110.497	*Junco hyemalis*	Dark-eyed junco	1
BBS 32	2018-06-24	602745.534	6388110.497	*Junco hyemalis*	Dark-eyed junco	1
BBS 32	2018-06-24	602745.534	6388110.497	*Junco hyemalis*	Dark-eyed junco	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 32	2018-06-24	602745.534	6388110.497	*Gavia immer*	Common loon	2
BBS 32	2018-06-24	602745.534	6388110.497	*Setophaga palmarum*	Palm warbler	1
BBS 32	2018-06-24	602745.534	6388110.497	*Setophaga palmarum*	Palm warbler	1
BBS 32	2018-06-24	602745.534	6388110.497	*Setophaga palmarum*	Palm warbler	1
BBS 32	2018-06-24	602745.534	6388110.497	*Passerella iliaca*	Red fox sparrow	1
BBS 32	2018-06-24	602745.534	6388110.497	*Passerella iliaca*	Red fox sparrow	1
BBS 32	2018-06-24	602745.534	6388110.497	*Larus delawarensis*	Ring-billed gull	1
BBS 32	2018-06-24	602745.534	6388110.497	*Catharus ustulatus*	Swainson's thrush	1
BBS 32	2018-06-24	602745.534	6388110.497	*Zonotrichia albicollis*	White-throated sparrow	4
BBS 32	2018-06-24	602745.534	6388110.497	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 32	2018-06-24	602745.534	6388110.497	*Cardellina pusilla*	Wilson's warbler	1
BBS 32	2018-06-24	602745.534	6388110.497	*Empidonax flaviventris*	Yellow-bellied flycatcher	1
BBS 32	2018-06-24	602745.534	6388110.497	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 33	2018-06-10	599857.607	6390816.724	*Empidonax alnorum*	Alder flycatcher	1
BBS 33	2018-06-10	599857.607	6390816.724	*Spizella passerina*	Chipping sparrow	1
BBS 33	2018-06-10	599857.607	6390816.724	*Junco hyemalis*	Dark-eyed junco	1
BBS 33	2018-06-10	599857.607	6390816.724	*Perisoreus canadensis*	Gray jay	1
BBS 33	2018-06-10	599857.607	6390816.724	*Laridae*	-	1
BBS 33	2018-06-10	599857.607	6390816.724	*Catharus ustulatus*	Swainson's thrush	1
BBS 33	2018-06-10	599857.607	6390816.724	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 33	2018-06-10	599857.607	6390816.724	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 33	2018-06-22	599860.4	6390809.999	*Larus californicus*	California gull	2
BBS 33	2018-06-22	599860.4	6390809.999	*Spizella passerina*	Chipping sparrow	1
BBS 33	2018-06-22	599860.4	6390809.999	*Spizella passerina*	Chipping sparrow	1
BBS 33	2018-06-22	599860.4	6390809.999	*Catharus guttatus*	Hermit thrush	1
BBS 33	2018-06-22	599860.4	6390809.999	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 33	2018-06-22	599860.4	6390809.999	*Catharus ustulatus*	Swainson's thrush	1
BBS 33	2018-06-22	599860.4	6390809.999	*Catharus ustulatus*	Swainson's thrush	1
BBS 33	2018-06-22	599860.4	6390809.999	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 33	2018-06-22	599860.4	6390809.999	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 34	2018-06-10	601176.735	6390348.411	*Empidonax alnorum*	Alder flycatcher	1
BBS 34	2018-06-10	601176.735	6390348.411	*Spizella pallida*	Clay-colored sparrow	1
BBS 34	2018-06-10	601176.735	6390348.411	*Larus argentatus*	Herring gull	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 34	2018-06-10	601176.735	6390348.411	*Setophaga palmarum*	Palm warbler	2
BBS 34	2018-06-10	601176.735	6390348.411	*Catharus ustulatus*	Swainson's thrush	2
BBS 34	2018-06-10	601176.735	6390348.411	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 34	2018-06-27	601174.151	6390341.887	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 34	2018-06-27	601174.151	6390341.887	*Vireo olivaceus*	Red-eyed vireo	1
BBS 34	2018-06-27	601174.151	6390341.887	*Vireo olivaceus*	Red-eyed vireo	1
BBS 34	2018-06-27	601174.151	6390341.887	*Catharus ustulatus*	Swainson's thrush	1
BBS 34	2018-06-27	601174.151	6390341.887	*Catharus ustulatus*	Swainson's thrush	1
BBS 34	2018-06-27	601174.151	6390341.887	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 34	2018-06-27	601174.151	6390341.887	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 34	2018-06-27	601174.151	6390341.887	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 34	2018-06-27	601174.151	6390341.887	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 34	2018-06-27	601174.151	6390341.887	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 35	2018-06-07	602607.221	6387361.771	*Empidonax alnorum*	Alder flycatcher	2
BBS 35	2018-06-07	602607.221	6387361.771	*Empidonax alnorum*	Alder flycatcher	1
BBS 35	2018-06-07	602607.221	6387361.771	*Branta canadensis*	Canada goose	11
BBS 35	2018-06-07	602607.221	6387361.771	*Junco hyemalis*	Dark-eyed junco	1
BBS 35	2018-06-07	602607.221	6387361.771	*Melospiza lincolnii*	Lincoln's sparrow	1
BBS 35	2018-06-07	602607.221	6387361.771	*Parkesia noveboracensis*	Northern waterthrush	1
BBS 35	2018-06-07	602607.221	6387361.771	*Setophaga palmarum*	Palm warbler	1
BBS 35	2018-06-07	602607.221	6387361.771	*Melospiza melodia*	Song sparrow	1
BBS 35	2018-06-07	602607.221	6387361.771	*Catharus ustulatus*	Swainson's thrush	1
BBS 35	2018-06-07	602607.221	6387361.771	*Zonotrichia albicollis*	White-throated sparrow	2
BBS 35	2018-06-07	602607.221	6387361.771	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 35	2018-06-07	602607.221	6387361.771	*Cardellina pusilla*	Wilson's warbler	2
BBS 35	2018-06-07	602607.221	6387361.771	*Setophaga petechia*	Yellow warbler	1
BBS 35	2018-06-25	602615.474	6387361.535	*Empidonax alnorum*	Alder flycatcher	1
BBS 35	2018-06-25	602615.474	6387361.535	*Empidonax alnorum*	Alder flycatcher	1
BBS 35	2018-06-25	602615.474	6387361.535	*Empidonax alnorum*	Alder flycatcher	1
BBS 35	2018-06-25	602615.474	6387361.535	*Spizella passerina*	Chipping sparrow	1
BBS 35	2018-06-25	602615.474	6387361.535	*Spizella passerina*	Chipping sparrow	1
BBS 35	2018-06-25	602615.474	6387361.535	*Spizella passerina*	Chipping sparrow	1
BBS 35	2018-06-25	602615.474	6387361.535	*Spizella passerina*	Chipping sparrow	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 35	2018-06-25	602615.474	6387361.535	*Spizella pallida*	Clay-colored sparrow	1
BBS 35	2018-06-25	602615.474	6387361.535	*Junco hyemalis*	Dark-eyed junco	1
BBS 35	2018-06-25	602615.474	6387361.535	*Gavia immer*	Common loon	1
BBS 35	2018-06-25	602615.474	6387361.535	*Catharus guttatus*	Hermit thrush	1
BBS 35	2018-06-25	602615.474	6387361.535	*Oreothlypis ruficapilla*	Nashville warbler	1
BBS 35	2018-06-25	602615.474	6387361.535	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 35	2018-06-25	602615.474	6387361.535	*Setophaga palmarum*	Palm warbler	1
BBS 35	2018-06-25	602615.474	6387361.535	*Setophaga palmarum*	Palm warbler	1
BBS 35	2018-06-25	602615.474	6387361.535	*Passerella iliaca*	Red fox sparrow	1
BBS 35	2018-06-25	602615.474	6387361.535	*Catharus ustulatus*	Swainson's thrush	1
BBS 35	2018-06-25	602615.474	6387361.535	*Catharus ustulatus*	Swainson's thrush	1
BBS 35	2018-06-25	602615.474	6387361.535	*Melospiza georgiana*	Swamp sparrow	1
BBS 35	2018-06-25	602615.474	6387361.535	*Melospiza georgiana*	Swamp sparrow	1
BBS 35	2018-06-25	602615.474	6387361.535	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 35	2018-06-25	602615.474	6387361.535	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 35	2018-06-25	602615.474	6387361.535	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 35	2018-06-25	602615.474	6387361.535	*Cardellina pusilla*	Wilson's warbler	1
BBS 35	2018-06-25	602615.474	6387361.535	*Empidonax flaviventris*	Yellow-bellied flycatcher	1
BBS 36	2018-06-07	601970.544	6388175.782	*Junco hyemalis*	Dark-eyed junco	1
BBS 36	2018-06-07	601970.544	6388175.782	*Junco hyemalis*	Dark-eyed junco	1
BBS 36	2018-06-07	601970.544	6388175.782	*Catharus guttatus*	Hermit thrush	1
BBS 36	2018-06-07	601970.544	6388175.782	*Setophaga palmarum*	Palm warbler	1
BBS 36	2018-06-07	601970.544	6388175.782	*Passerella iliaca*	Red fox sparrow	1
BBS 36	2018-06-07	601970.544	6388175.782	*Passerella iliaca*	Red fox sparrow	1
BBS 36	2018-06-07	601970.544	6388175.782	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 36	2018-06-07	601970.544	6388175.782	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 36	2018-06-07	601970.544	6388175.782	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 36	2018-06-07	601970.544	6388175.782	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 36	2018-06-24	601964.338	6388177.853	*Empidonax alnorum*	Alder flycatcher	1
BBS 36	2018-06-24	601964.338	6388177.853	*Perisoreus canadensis*	Gray jay	1
BBS 36	2018-06-24	601964.338	6388177.853	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 36	2018-06-24	601964.338	6388177.853	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 36	2018-06-24	601964.338	6388177.853	*Setophaga palmarum*	Palm warbler	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 36	2018-06-24	601964.338	6388177.853	*Setophaga palmarum*	Palm warbler	1
BBS 36	2018-06-24	601964.338	6388177.853	*Zonotrichia albicollis*	White-throated sparrow	2
BBS 36	2018-06-24	601964.338	6388177.853	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 36	2018-06-24	601964.338	6388177.853	*Cardellina pusilla*	Wilson's warbler	1
BBS 36	2018-06-24	601964.338	6388177.853	*Empidonax flaviventris*	Yellow-bellied flycatcher	1
BBS 36	2018-06-24	601964.338	6388177.853	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 36	2018-06-24	601964.338	6388177.853	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 36	2018-06-24	601964.338	6388177.853	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 37	2018-06-07	600990.557	6388098.215	*Branta canadensis*	Canada goose	1
BBS 37	2018-06-07	600990.557	6388098.215	*Mergus merganser*	Common merganser	1
BBS 37	2018-06-07	600990.557	6388098.215	*Junco hyemalis*	Dark-eyed junco	1
BBS 37	2018-06-07	600990.557	6388098.215	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 37	2018-06-07	600990.557	6388098.215	*Vireo solitarius*	Solitary vireo	1
BBS 37	2018-06-07	600990.557	6388098.215	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 37	2018-06-07	600990.557	6388098.215	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 37	2018-06-24	600992.674	6388094.815	*Spizella passerina*	Chipping sparrow	2
BBS 37	2018-06-24	600992.674	6388094.815	*Spinus pinus*	Pine siskin	1
BBS 37	2018-06-24	600992.674	6388094.815	*Passerella iliaca*	Red fox sparrow	1
BBS 37	2018-06-24	600992.674	6388094.815	*Zonotrichia albicollis*	White-throated sparrow	2
BBS 37	2018-06-24	600992.674	6388094.815	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 37	2018-06-24	600992.674	6388094.815	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 37	2018-06-24	600992.674	6388094.815	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 38	2018-06-07	600137.971	6387519.064	*Spizella passerina*	Chipping sparrow	1
BBS 38	2018-06-07	600137.971	6387519.064	*Junco hyemalis*	Dark-eyed junco	1
BBS 38	2018-06-07	600137.971	6387519.064	*Junco hyemalis*	Dark-eyed junco	1
BBS 38	2018-06-07	600137.971	6387519.064	*Junco hyemalis*	Dark-eyed junco	1
BBS 38	2018-06-07	600137.971	6387519.064	*Larus argentatus*	Herring gull	1
BBS 38	2018-06-07	600137.971	6387519.064	*Gavia immer*	Common loon	1
BBS 38	2018-06-07	600137.971	6387519.064	*Setophaga magnolia*	Magnolia warbler	1
BBS 38	2018-06-07	600137.971	6387519.064	*Setophaga palmarum*	Palm warbler	1
BBS 38	2018-06-07	600137.971	6387519.064	*Setophaga palmarum*	Palm warbler	1
BBS 38	2018-06-07	600137.971	6387519.064	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 38	2018-06-07	600137.971	6387519.064	*Zonotrichia albicollis*	White-throated sparrow	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 38	2018-06-07	600137.971	6387519.064	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 38	2018-06-07	600137.971	6387519.064	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 38	2018-06-24	600114.609	6387497.102	*Poecile atricapillus*	Black-capped chickadee	1
BBS 38	2018-06-24	600114.609	6387497.102	*Spizella passerina*	Chipping sparrow	1
BBS 38	2018-06-24	600114.609	6387497.102	*Spizella passerina*	Chipping sparrow	2
BBS 38	2018-06-24	600114.609	6387497.102	*Junco hyemalis*	Dark-eyed junco	1
BBS 38	2018-06-24	600114.609	6387497.102	*Perisoreus canadensis*	Gray jay	1
BBS 38	2018-06-24	600114.609	6387497.102	*Catharus guttatus*	Hermit thrush	1
BBS 38	2018-06-24	600114.609	6387497.102	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 38	2018-06-24	600114.609	6387497.102	*Setophaga palmarum*	Palm warbler	1
BBS 38	2018-06-24	600114.609	6387497.102	*Setophaga palmarum*	Palm warbler	1
BBS 38	2018-06-24	600114.609	6387497.102	*Passerella iliaca*	Red fox sparrow	1
BBS 38	2018-06-24	600114.609	6387497.102	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 38	2018-06-24	600114.609	6387497.102	*Zonotrichia albicollis*	White-throated sparrow	2
BBS 38	2018-06-24	600114.609	6387497.102	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 38	2018-06-24	600114.609	6387497.102	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 38	2018-06-24	600114.609	6387497.102	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 39	2018-06-08	598106.26	6395998.182	*Junco hyemalis*	Dark-eyed junco	1
BBS 39	2018-06-08	598106.26	6395998.182	*Gavia immer*	Common loon	1
BBS 39	2018-06-08	598106.26	6395998.182	*Vireo solitarius*	Solitary vireo	1
BBS 39	2018-06-08	598106.26	6395998.182	*Setophaga petechia*	Yellow warbler	1
BBS 39	2018-06-08	598106.26	6395998.182	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 39	2018-06-24	598101.09	6395992.488	*Empidonax alnorum*	Alder flycatcher	1
BBS 39	2018-06-24	598101.09	6395992.488	*Colaptes auratus*	Northern flicker	1
BBS 39	2018-06-24	598101.09	6395992.488	*Passerella iliaca*	Red fox sparrow	1
BBS 39	2018-06-24	598101.09	6395992.488	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 40	2018-06-08	598933.106	6395929.806	*Gavia immer*	Common loon	1
BBS 40	2018-06-08	598933.106	6395929.806	*Catharus guttatus*	Hermit thrush	1
BBS 40	2018-06-08	598933.106	6395929.806	*Catharus guttatus*	Hermit thrush	1
BBS 40	2018-06-08	598933.106	6395929.806	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 40	2018-06-24	598935.57	6395921.736	*Spizella passerina*	Chipping sparrow	1
BBS 40	2018-06-24	598935.57	6395921.736	*Junco hyemalis*	Dark-eyed junco	1
BBS 40	2018-06-24	598935.57	6395921.736	*Perisoreus canadensis*	Gray jay	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 40	2018-06-24	598935.57	6395921.736	*Catharus guttatus*	Hermit thrush	1
BBS 40	2018-06-24	598935.57	6395921.736	*Passerella iliaca*	Red fox sparrow	1
BBS 40	2018-06-24	598935.57	6395921.736	*Catharus ustulatus*	Swainson's thrush	1
BBS 40	2018-06-24	598935.57	6395921.736	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 40	2018-06-24	598935.57	6395921.736	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 41	2018-06-08	599859.595	6395861.052	*Junco hyemalis*	Dark-eyed junco	1
BBS 41	2018-06-08	599859.595	6395861.052	*Seiurus aurocapilla*	Ovenbird	1
BBS 41	2018-06-08	599859.595	6395861.052	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 41	2018-06-08	599859.595	6395861.052	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 41	2018-06-08	599859.595	6395861.052	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 41	2018-06-24	599867.377	6395864.697	*Spizella passerina*	Chipping sparrow	1
BBS 41	2018-06-24	599867.377	6395864.697	*Junco hyemalis*	Dark-eyed junco	1
BBS 41	2018-06-24	599867.377	6395864.697	*Vireo solitarius*	Solitary vireo	1
BBS 41	2018-06-24	599867.377	6395864.697	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 42	2018-06-08	600664.811	6395809.422	*Spizella passerina*	Chipping sparrow	1
BBS 42	2018-06-08	600664.811	6395809.422	*Spizella passerina*	Chipping sparrow	1
BBS 42	2018-06-08	600664.811	6395809.422	*Junco hyemalis*	Dark-eyed junco	1
BBS 42	2018-06-08	600664.811	6395809.422	*Catharus guttatus*	Hermit thrush	1
BBS 42	2018-06-08	600664.811	6395809.422	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 42	2018-06-24	600663.851	6395807.282	*Junco hyemalis*	Dark-eyed junco	1
BBS 42	2018-06-24	600663.851	6395807.282	*Junco hyemalis*	Dark-eyed junco	1
BBS 42	2018-06-24	600663.851	6395807.282	*Catharus guttatus*	Hermit thrush	2
BBS 43	2018-06-10	599842.287	6391778.622	*Setophaga striata*	Blackpoll warbler	1
BBS 43	2018-06-10	599842.287	6391778.622	*Branta canadensis*	Canada goose	1
BBS 43	2018-06-10	599842.287	6391778.622	*Junco hyemalis*	Dark-eyed junco	1
BBS 43	2018-06-10	599842.287	6391778.622	*Gavia immer*	Common loon	1
BBS 43	2018-06-10	599842.287	6391778.622	*Geothlypis philadelphia*	Mourning warbler	1
BBS 43	2018-06-10	599842.287	6391778.622	*Larus delawarensis*	Ring-billed gull	1
BBS 43	2018-06-10	599842.287	6391778.622	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 43	2018-06-10	599842.287	6391778.622	*Melospiza melodia*	Song sparrow	1
BBS 43	2018-06-10	599842.287	6391778.622	*Melospiza melodia*	Song sparrow	1
BBS 43	2018-06-10	599842.287	6391778.622	*Melospiza georgiana*	Swamp sparrow	1
BBS 43	2018-06-10	599842.287	6391778.622	*Zonotrichia leucophrys*	White-crowned sparrow	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 43	2018-06-10	599842.287	6391778.622	*Zonotrichia leucophrys*	White-crowned sparrow	1
BBS 43	2018-06-10	599842.287	6391778.622	*Setophaga petechia*	Yellow warbler	1
BBS 43	2018-06-10	599842.287	6391778.622	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 43	2018-06-10	599842.287	6391778.622	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 43	2018-06-22	599836.716	6391774.586	*Larus californicus*	California gull	3
BBS 43	2018-06-22	599836.716	6391774.586	*Spizella passerina*	Chipping sparrow	1
BBS 43	2018-06-22	599836.716	6391774.586	*Spizella passerina*	Chipping sparrow	1
BBS 43	2018-06-22	599836.716	6391774.586	*Spizella passerina*	Chipping sparrow	1
BBS 43	2018-06-22	599836.716	6391774.586	*Spizella passerina*	Chipping sparrow	1
BBS 43	2018-06-22	599836.716	6391774.586	*Junco hyemalis*	Dark-eyed junco	1
BBS 43	2018-06-22	599836.716	6391774.586	*Junco hyemalis*	Dark-eyed junco	1
BBS 43	2018-06-22	599836.716	6391774.586	*Perisoreus canadensis*	Gray jay	1
BBS 43	2018-06-22	599836.716	6391774.586	*Catharus guttatus*	Hermit thrush	1
BBS 43	2018-06-22	599836.716	6391774.586	*Setophaga palmarum*	Palm warbler	1
BBS 43	2018-06-22	599836.716	6391774.586	*Melospiza melodia*	Song sparrow	1
BBS 43	2018-06-22	599836.716	6391774.586	*Melospiza melodia*	Song sparrow	1
BBS 43	2018-06-22	599836.716	6391774.586	*Catharus ustulatus*	Swainson's thrush	1
BBS 43	2018-06-22	599836.716	6391774.586	*Catharus ustulatus*	Swainson's thrush	1
BBS 43	2018-06-22	599836.716	6391774.586	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 43	2018-06-22	599836.716	6391774.586	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 43	2018-06-22	599836.716	6391774.586	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 44	2018-06-10	598711	6393678.96	*Catharus guttatus*	Hermit thrush	1
BBS 44	2018-06-10	598711	6393678.96	*Setophaga magnolia*	Magnolia warbler	1
BBS 44	2018-06-10	598711	6393678.96	*Larus delawarensis*	Ring-billed gull	6
BBS 44	2018-06-10	598711	6393678.96	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 44	2018-06-10	598711	6393678.96	*Catharus ustulatus*	Swainson's thrush	1
BBS 44	2018-06-10	598711	6393678.96	*Catharus ustulatus*	Swainson's thrush	1
BBS 44	2018-06-10	598711	6393678.96	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 44	2018-06-10	598711	6393678.96	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 44	2018-06-10	598711	6393678.96	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 44	2018-06-10	598711	6393678.96	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 44	2018-06-22	598700.599	6393682.159	*Spizella passerina*	Chipping sparrow	1
BBS 44	2018-06-22	598700.599	6393682.159	*Empidonax minimus*	Least flycatcher	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 44	2018-06-22	598700.599	6393682.159	*Empidonax minimus*	Least flycatcher	1
BBS 44	2018-06-22	598700.599	6393682.159	*Setophaga magnolia*	Magnolia warbler	1
BBS 44	2018-06-22	598700.599	6393682.159	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 44	2018-06-22	598700.599	6393682.159	*Catharus ustulatus*	Swainson's thrush	1
BBS 44	2018-06-22	598700.599	6393682.159	*Catharus ustulatus*	Swainson's thrush	1
BBS 44	2018-06-22	598700.599	6393682.159	*Catharus ustulatus*	Swainson's thrush	1
BBS 44	2018-06-22	598700.599	6393682.159	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 44	2018-06-22	598700.599	6393682.159	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 45	2018-06-10	600925.047	6391680.526	*Empidonax alnorum*	Alder flycatcher	1
BBS 45	2018-06-10	600925.047	6391680.526	*Empidonax alnorum*	Alder flycatcher	1
BBS 45	2018-06-10	600925.047	6391680.526	*Spizella passerina*	Chipping sparrow	1
BBS 45	2018-06-10	600925.047	6391680.526	*Spizella passerina*	Chipping sparrow	1
BBS 45	2018-06-10	600925.047	6391680.526	*Mergus merganser*	Common merganser	20
BBS 45	2018-06-10	600925.047	6391680.526	*Gavia immer*	Common loon	3
BBS 45	2018-06-10	600925.047	6391680.526	*Setophaga magnolia*	Magnolia warbler	1
BBS 45	2018-06-10	600925.047	6391680.526	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 45	2018-06-10	600925.047	6391680.526	*Setophaga palmarum*	Palm warbler	1
BBS 45	2018-06-10	600925.047	6391680.526	*Catharus ustulatus*	Swainson's thrush	1
BBS 45	2018-06-10	600925.047	6391680.526	*Pandion haliaetus*	Western osprey	1
BBS 45	2018-06-10	600925.047	6391680.526	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 45	2018-06-10	600925.047	6391680.526	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 45	2018-06-22	600923.773	6391683.724	*Spizella passerina*	Chipping sparrow	1
BBS 45	2018-06-22	600923.773	6391683.724	*Mergus merganser*	Common merganser	1
BBS 45	2018-06-22	600923.773	6391683.724	*Junco hyemalis*	Dark-eyed junco	1
BBS 45	2018-06-22	600923.773	6391683.724	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 45	2018-06-22	600923.773	6391683.724	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 45	2018-06-22	600923.773	6391683.724	*Setophaga palmarum*	Palm warbler	1
BBS 45	2018-06-22	600923.773	6391683.724	*Setophaga palmarum*	Palm warbler	1
BBS 45	2018-06-22	600923.773	6391683.724	*Setophaga palmarum*	Palm warbler	1
BBS 45	2018-06-22	600923.773	6391683.724	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 45	2018-06-22	600923.773	6391683.724	*Catharus ustulatus*	Swainson's thrush	1
BBS 45	2018-06-22	600923.773	6391683.724	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 45	2018-06-22	600923.773	6391683.724	*Zonotrichia albicollis*	White-throated sparrow	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 45	2018-06-22	600923.773	6391683.724	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 45	2018-06-22	600923.773	6391683.724	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 45	2018-06-22	600923.773	6391683.724	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 46	2018-06-08	601307.131	6395914.246	*Junco hyemalis*	Dark-eyed junco	2
BBS 46	2018-06-08	601307.131	6395914.246	*Spinus pinus*	Pine siskin	6
BBS 46	2018-06-08	601307.131	6395914.246	*Catharus ustulatus*	Swainson's thrush	2
BBS 46	2018-06-08	601307.131	6395914.246	*Catharus ustulatus*	Swainson's thrush	1
BBS 46	2018-06-08	601307.131	6395914.246	*Catharus ustulatus*	Swainson's thrush	1
BBS 46	2018-06-24	601306.943	6395914.575	*Junco hyemalis*	Dark-eyed junco	1
BBS 46	2018-06-24	601306.943	6395914.575	*Empidonax flaviventris*	Yellow-bellied flycatcher	1
BBS 46	2018-06-24	601306.943	6395914.575	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 46	2018-06-24	601306.943	6395914.575	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 47	2018-06-05	605259.98	6390887.482	*Turdus migratorius*	American robin	1
BBS 47	2018-06-05	605259.98	6390887.482	*Regulus satrapa*	Golden-crowned kinglet	1
BBS 47	2018-06-05	605259.98	6390887.482	*Perisoreus canadensis*	Gray jay	1
BBS 47	2018-06-05	605259.98	6390887.482	*Setophaga magnolia*	Magnolia warbler	1
BBS 47	2018-06-05	605259.98	6390887.482	*Setophaga palmarum*	Palm warbler	2
BBS 47	2018-06-05	605259.98	6390887.482	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 47	2018-06-05	605259.98	6390887.482	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 47	2018-06-05	605259.98	6390887.482	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 47	2018-06-24	605253.476	6390857.463	*Turdus migratorius*	American robin	1
BBS 47	2018-06-24	605253.476	6390857.463	*Turdus migratorius*	American robin	2
BBS 47	2018-06-24	605253.476	6390857.463	*Turdus migratorius*	American robin	1
BBS 47	2018-06-24	605253.476	6390857.463	*Spizella passerina*	Chipping sparrow	1
BBS 47	2018-06-24	605253.476	6390857.463	*Junco hyemalis*	Dark-eyed junco	1
BBS 47	2018-06-24	605253.476	6390857.463	*Junco hyemalis*	Dark-eyed junco	1
BBS 47	2018-06-24	605253.476	6390857.463	*Junco hyemalis*	Dark-eyed junco	1
BBS 47	2018-06-24	605253.476	6390857.463	*Junco hyemalis*	Dark-eyed junco	1
BBS 47	2018-06-24	605253.476	6390857.463	*Gavia immer*	Common loon	2
BBS 47	2018-06-24	605253.476	6390857.463	*Melospiza lincolnii*	Lincoln's sparrow	1
BBS 47	2018-06-24	605253.476	6390857.463	*Setophaga palmarum*	Palm warbler	1
BBS 47	2018-06-24	605253.476	6390857.463	*Larus delawarensis*	Ring-billed gull	1
BBS 47	2018-06-24	605253.476	6390857.463	*Melospiza melodia*	Song sparrow	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 47	2018-06-24	605253.476	6390857.463	*Actitis macularius*	Spotted sandpiper	1
BBS 47	2018-06-24	605253.476	6390857.463	*Melospiza georgiana*	Swamp sparrow	1
BBS 47	2018-06-24	605253.476	6390857.463	*Loxia leucoptera*	Two-barred crossbill	1
BBS 47	2018-06-24	605253.476	6390857.463	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 47	2018-06-24	605253.476	6390857.463	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 48	2018-06-05	604253.585	6389419.634	*Junco hyemalis*	Dark-eyed junco	1
BBS 48	2018-06-05	604253.585	6389419.634	*Catharus guttatus*	Hermit thrush	1
BBS 48	2018-06-05	604253.585	6389419.634	*Setophaga palmarum*	Palm warbler	1
BBS 48	2018-06-05	604253.585	6389419.634	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 48	2018-06-05	604253.585	6389419.634	*Catharus ustulatus*	Swainson's thrush	1
BBS 48	2018-06-05	604253.585	6389419.634	*Zonotrichia albicollis*	White-throated sparrow	2
BBS 48	2018-06-24	604237.904	6389411.545	*Empidonax alnorum*	Alder flycatcher	1
BBS 48	2018-06-24	604237.904	6389411.545	*Catharus guttatus*	Hermit thrush	1
BBS 48	2018-06-24	604237.904	6389411.545	*Catharus guttatus*	Hermit thrush	1
BBS 48	2018-06-24	604237.904	6389411.545	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 48	2018-06-24	604237.904	6389411.545	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 48	2018-06-24	604237.904	6389411.545	*Setophaga palmarum*	Palm warbler	1
BBS 48	2018-06-24	604237.904	6389411.545	*Setophaga palmarum*	Palm warbler	1
BBS 48	2018-06-24	604237.904	6389411.545	*Setophaga palmarum*	Palm warbler	1
BBS 48	2018-06-24	604237.904	6389411.545	*Loxia curvirostra*	Red crossbill	1
BBS 48	2018-06-24	604237.904	6389411.545	*Passerella iliaca*	Red fox sparrow	1
BBS 48	2018-06-24	604237.904	6389411.545	*Vireo olivaceus*	Red-eyed vireo	1
BBS 48	2018-06-24	604237.904	6389411.545	*Loxia leucoptera*	Two-barred crossbill	13
BBS 48	2018-06-24	604237.904	6389411.545	*Loxia leucoptera*	Two-barred crossbill	1
BBS 48	2018-06-24	604237.904	6389411.545	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 48	2018-06-24	604237.904	6389411.545	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 48	2018-06-24	604237.904	6389411.545	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 48	2018-06-24	604237.904	6389411.545	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 49	2018-06-05	604872.173	6389516.248	*Empidonax alnorum*	Alder flycatcher	1
BBS 49	2018-06-05	604872.173	6389516.248	*Empidonax alnorum*	Alder flycatcher	1
BBS 49	2018-06-05	604872.173	6389516.248	*Megaceryle alcyon*	Belted kingfisher	1
BBS 49	2018-06-05	604872.173	6389516.248	*Spizella passerina*	Chipping sparrow	1
BBS 49	2018-06-05	604872.173	6389516.248	*Junco hyemalis*	Dark-eyed junco	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 49	2018-06-05	604872.173	6389516.248	*Gavia immer*	Common loon	1
BBS 49	2018-06-05	604872.173	6389516.248	*Setophaga palmarum*	Palm warbler	2
BBS 49	2018-06-05	604872.173	6389516.248	*Agelaius phoeniceus*	Red-winged blackbird	1
BBS 49	2018-06-05	604872.173	6389516.248	*Catharus ustulatus*	Swainson's thrush	1
BBS 49	2018-06-05	604872.173	6389516.248	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 49	2018-06-05	604872.173	6389516.248	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 49	2018-06-05	604872.173	6389516.248	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 49	2018-06-05	604872.173	6389516.248	*Setophaga petechia*	Yellow warbler	1
BBS 49	2018-06-05	604872.173	6389516.248	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 49	2018-06-24	604874.319	6389516.415	*Empidonax alnorum*	Alder flycatcher	1
BBS 49	2018-06-24	604874.319	6389516.415	*Junco hyemalis*	Dark-eyed junco	1
BBS 49	2018-06-24	604874.319	6389516.415	*Perisoreus canadensis*	Gray jay	1
BBS 49	2018-06-24	604874.319	6389516.415	*Setophaga palmarum*	Palm warbler	1
BBS 49	2018-06-24	604874.319	6389516.415	*Setophaga palmarum*	Palm warbler	1
BBS 49	2018-06-24	604874.319	6389516.415	*Catharus ustulatus*	Swainson's thrush	1
BBS 49	2018-06-24	604874.319	6389516.415	*Catharus ustulatus*	Swainson's thrush	1
BBS 49	2018-06-24	604874.319	6389516.415	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 49	2018-06-24	604874.319	6389516.415	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 49	2018-06-24	604874.319	6389516.415	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 49	2018-06-24	604874.319	6389516.415	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 50	2018-06-10	604582.12	6389943.011	*Junco hyemalis*	Dark-eyed junco	1
BBS 50	2018-06-10	604582.12	6389943.011	*Catharus guttatus*	Hermit thrush	1
BBS 50	2018-06-10	604582.12	6389943.011	*Setophaga palmarum*	Palm warbler	1
BBS 50	2018-06-10	604582.12	6389943.011	*Loxia curvirostra*	Red crossbill	8
BBS 50	2018-06-10	604582.12	6389943.011	*Passerella iliaca*	Red fox sparrow	1
BBS 50	2018-06-10	604582.12	6389943.011	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 50	2018-06-10	604582.12	6389943.011	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 50	2018-06-24	604577.846	6389939.671	*Junco hyemalis*	Dark-eyed junco	1
BBS 50	2018-06-24	604577.846	6389939.671	*Catharus guttatus*	Hermit thrush	1
BBS 50	2018-06-24	604577.846	6389939.671	*Catharus guttatus*	Hermit thrush	1
BBS 50	2018-06-24	604577.846	6389939.671	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 50	2018-06-24	604577.846	6389939.671	*Passerella iliaca*	Red fox sparrow	1
BBS 50	2018-06-24	604577.846	6389939.671	*Vireo olivaceus*	Red-eyed vireo	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 50	2018-06-24	604577.846	6389939.671	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 50	2018-06-24	604577.846	6389939.671	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 50	2018-06-24	604577.846	6389939.671	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 50	2018-06-24	604577.846	6389939.671	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 50	2018-06-24	604577.846	6389939.671	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 51	2018-06-05	604895.913	6390310.551	*Spizella passerina*	Chipping sparrow	1
BBS 51	2018-06-05	604895.913	6390310.551	*Tringa melanoleuca*	Greater yellowlegs	1
BBS 51	2018-06-05	604895.913	6390310.551	*Contopus cooperi*	Olive-sided flycatcher	1
BBS 51	2018-06-05	604895.913	6390310.551	*Setophaga palmarum*	Palm warbler	1
BBS 51	2018-06-05	604895.913	6390310.551	*Zonotrichia albicollis*	White-throated sparrow	2
BBS 51	2018-06-05	604895.913	6390310.551	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 51	2018-06-05	604895.913	6390310.551	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 51	2018-06-24	604874.703	6390292.403	*Junco hyemalis*	Dark-eyed junco	1
BBS 51	2018-06-24	604874.703	6390292.403	*Tringa melanoleuca*	Greater yellowlegs	1
BBS 51	2018-06-24	604874.703	6390292.403	*Perisoreus canadensis*	Gray jay	1
BBS 51	2018-06-24	604874.703	6390292.403	*Catharus guttatus*	Hermit thrush	1
BBS 51	2018-06-24	604874.703	6390292.403	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 51	2018-06-24	604874.703	6390292.403	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 51	2018-06-24	604874.703	6390292.403	*Larus delawarensis*	Ring-billed gull	1
BBS 51	2018-06-24	604874.703	6390292.403	*Loxia leucoptera*	Two-barred crossbill	1
BBS 51	2018-06-24	604874.703	6390292.403	*Loxia leucoptera*	Two-barred crossbill	1
BBS 51	2018-06-24	604874.703	6390292.403	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 51	2018-06-24	604874.703	6390292.403	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 51	2018-06-24	604874.703	6390292.403	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 51	2018-06-24	604874.703	6390292.403	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 52	2018-06-09	603981.461	6393233.141	*Catharus guttatus*	Hermit thrush	2
BBS 52	2018-06-09	603981.461	6393233.141	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 52	2018-06-09	603981.461	6393233.141	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 52	2018-06-09	603981.461	6393233.141	*Gallinago delicata*	Wilson's snipe	1
BBS 52	2018-06-09	603981.461	6393233.141	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 52	2018-06-24	603983.136	6393237.639	*Junco hyemalis*	Dark-eyed junco	2
BBS 52	2018-06-24	603983.136	6393237.639	*Setophaga palmarum*	Palm warbler	1
BBS 52	2018-06-24	603983.136	6393237.639	*Passerella iliaca*	Red fox sparrow	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 52	2018-06-24	603983.136	6393237.639	*Passerella iliaca*	Red fox sparrow	1
BBS 52	2018-06-24	603983.136	6393237.639	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 52	2018-06-24	603983.136	6393237.639	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 52	2018-06-24	603983.136	6393237.639	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 53	2018-06-06	605387.473	6394012.338	*Junco hyemalis*	Dark-eyed junco	1
BBS 53	2018-06-06	605387.473	6394012.338	*Geothlypis philadelphia*	Mourning warbler	1
BBS 53	2018-06-06	605387.473	6394012.338	*Parkesia noveboracensis*	Northern waterthrush	1
BBS 53	2018-06-06	605387.473	6394012.338	*Setophaga palmarum*	Palm warbler	1
BBS 53	2018-06-06	605387.473	6394012.338	*Setophaga palmarum*	Palm warbler	1
BBS 53	2018-06-06	605387.473	6394012.338	*Pandion haliaetus*	Western osprey	1
BBS 53	2018-06-06	605387.473	6394012.338	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 53	2018-06-06	605387.473	6394012.338	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 53	2018-06-06	605387.473	6394012.338	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 53	2018-06-06	605387.473	6394012.338	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 53	2018-06-23	605389.292	6393999.799	*Junco hyemalis*	Dark-eyed junco	1
BBS 53	2018-06-23	605389.292	6393999.799	*Junco hyemalis*	Dark-eyed junco	1
BBS 53	2018-06-23	605389.292	6393999.799	*Catharus guttatus*	Hermit thrush	1
BBS 53	2018-06-23	605389.292	6393999.799	*Contopus cooperi*	Olive-sided flycatcher	1
BBS 53	2018-06-23	605389.292	6393999.799	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 53	2018-06-23	605389.292	6393999.799	*Setophaga palmarum*	Palm warbler	1
BBS 53	2018-06-23	605389.292	6393999.799	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 53	2018-06-23	605389.292	6393999.799	*Loxia leucoptera*	Two-barred crossbill	5
BBS 53	2018-06-23	605389.292	6393999.799	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 53	2018-06-23	605389.292	6393999.799	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 54	2018-06-09	605800.559	6394158.79	*Spizella passerina*	Chipping sparrow	1
BBS 54	2018-06-09	605800.559	6394158.79	*Setophaga palmarum*	Palm warbler	1
BBS 54	2018-06-09	605800.559	6394158.79	*Setophaga palmarum*	Palm warbler	1
BBS 54	2018-06-09	605800.559	6394158.79	*Melospiza georgiana*	Swamp sparrow	1
BBS 54	2018-06-09	605800.559	6394158.79	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 54	2018-06-09	605800.559	6394158.79	*Gallinago delicata*	Wilson's snipe	1
BBS 54	2018-06-09	605800.559	6394158.79	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 54	2018-06-23	605799.93	6394157.772	*Haliaeetus leucocephalus*	Bald eagle	1
BBS 54	2018-06-23	605799.93	6394157.772	*Spizella passerina*	Chipping sparrow	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 54	2018-06-23	605799.93	6394157.772	*Junco hyemalis*	Dark-eyed junco	1
BBS 54	2018-06-23	605799.93	6394157.772	*Junco hyemalis*	Dark-eyed junco	2
BBS 54	2018-06-23	605799.93	6394157.772	*Junco hyemalis*	Dark-eyed junco	1
BBS 54	2018-06-23	605799.93	6394157.772	*Gavia immer*	Common loon	1
BBS 54	2018-06-23	605799.93	6394157.772	*Catharus guttatus*	Hermit thrush	1
BBS 54	2018-06-23	605799.93	6394157.772	*Melospiza lincolnii*	Lincoln's sparrow	1
BBS 54	2018-06-23	605799.93	6394157.772	*Setophaga palmarum*	Palm warbler	1
BBS 54	2018-06-23	605799.93	6394157.772	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 54	2018-06-23	605799.93	6394157.772	*Setophaga petechia*	Yellow warbler	1
BBS 54	2018-06-23	605799.93	6394157.772	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 55	2018-06-07	606910.421	6392101.813	*Turdus migratorius*	American robin	1
BBS 55	2018-06-07	606910.421	6392101.813	*Spizella passerina*	Chipping sparrow	1
BBS 55	2018-06-07	606910.421	6392101.813	*Junco hyemalis*	Dark-eyed junco	1
BBS 55	2018-06-07	606910.421	6392101.813	*Junco hyemalis*	Dark-eyed junco	1
BBS 55	2018-06-07	606910.421	6392101.813	*Gavia immer*	Common loon	1
BBS 55	2018-06-07	606910.421	6392101.813	*Perisoreus canadensis*	Gray jay	1
BBS 55	2018-06-07	606910.421	6392101.813	*Corvus corax*	Northern raven	1
BBS 55	2018-06-07	606910.421	6392101.813	*Setophaga palmarum*	Palm warbler	2
BBS 55	2018-06-07	606910.421	6392101.813	*Setophaga palmarum*	Palm warbler	1
BBS 55	2018-06-07	606910.421	6392101.813	*Melospiza melodia*	Song sparrow	1
BBS 55	2018-06-07	606910.421	6392101.813	*Gallinago delicata*	Wilson's snipe	1
BBS 55	2018-06-07	606910.421	6392101.813	*Gallinago delicata*	Wilson's snipe	1
BBS 55	2018-06-07	606910.421	6392101.813	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 55	2018-06-23	606906.145	6392105.487	*Corvus brachyrhynchos*	American crow	1
BBS 55	2018-06-23	606906.145	6392105.487	*Turdus migratorius*	American robin	1
BBS 55	2018-06-23	606906.145	6392105.487	*Turdus migratorius*	American robin	1
BBS 55	2018-06-23	606906.145	6392105.487	*Junco hyemalis*	Dark-eyed junco	1
BBS 55	2018-06-23	606906.145	6392105.487	*Junco hyemalis*	Dark-eyed junco	1
BBS 55	2018-06-23	606906.145	6392105.487	*Junco hyemalis*	Dark-eyed junco	2
BBS 55	2018-06-23	606906.145	6392105.487	*Catharus guttatus*	Hermit thrush	1
BBS 55	2018-06-23	606906.145	6392105.487	*Catharus guttatus*	Hermit thrush	1
BBS 55	2018-06-23	606906.145	6392105.487	*Melospiza lincolnii*	Lincoln's sparrow	1
BBS 55	2018-06-23	606906.145	6392105.487	*Melospiza lincolnii*	Lincoln's sparrow	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 55	2018-06-23	606906.145	6392105.487	*Setophaga palmarum*	Palm warbler	1
BBS 55	2018-06-23	606906.145	6392105.487	*Setophaga palmarum*	Palm warbler	1
BBS 55	2018-06-23	606906.145	6392105.487	*Setophaga palmarum*	Palm warbler	1
BBS 55	2018-06-23	606906.145	6392105.487	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 55	2018-06-23	606906.145	6392105.487	*Tringa semipalmata*	Willet	1
BBS 55	2018-06-23	606906.145	6392105.487	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 56	2018-06-10	603794.803	6394433.797	*Spizella passerina*	Chipping sparrow	1
BBS 56	2018-06-10	603794.803	6394433.797	*Spizella passerina*	Chipping sparrow	1
BBS 56	2018-06-10	603794.803	6394433.797	*Perisoreus canadensis*	Gray jay	1
BBS 56	2018-06-10	603794.803	6394433.797	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 56	2018-06-10	603794.803	6394433.797	*Larus delawarensis*	Ring-billed gull	1
BBS 56	2018-06-10	603794.803	6394433.797	*Melospiza melodia*	Song sparrow	1
BBS 56	2018-06-10	603794.803	6394433.797	*Melospiza melodia*	Song sparrow	2
BBS 56	2018-06-10	603794.803	6394433.797	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 56	2018-06-10	603794.803	6394433.797	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 56	2018-06-10	603794.803	6394433.797	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 56	2018-06-22	603798.824	6394428.22	*Larus delawarensis*	Ring-billed gull	6
BBS 56	2018-06-22	603798.824	6394428.22	*Melospiza melodia*	Song sparrow	1
BBS 56	2018-06-22	603798.824	6394428.22	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 56	2018-06-22	603798.824	6394428.22	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 57	2018-06-09	604351.109	6393647.639	*Junco hyemalis*	Dark-eyed junco	1
BBS 57	2018-06-09	604351.109	6393647.639	*Catharus guttatus*	Hermit thrush	1
BBS 57	2018-06-09	604351.109	6393647.639	*Setophaga palmarum*	Palm warbler	2
BBS 57	2018-06-09	604351.109	6393647.639	*Setophaga palmarum*	Palm warbler	2
BBS 57	2018-06-23	604335.304	6393651.909	*Chordeiles minor*	Common nighthawk	1
BBS 57	2018-06-23	604335.304	6393651.909	*Junco hyemalis*	Dark-eyed junco	1
BBS 57	2018-06-23	604335.304	6393651.909	*Setophaga palmarum*	Palm warbler	1
BBS 57	2018-06-23	604335.304	6393651.909	*Setophaga palmarum*	Palm warbler	1
BBS 57	2018-06-23	604335.304	6393651.909	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 57	2018-06-23	604335.304	6393651.909	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 58	2018-06-12	605215.872	6389767.75	*Empidonax alnorum*	Alder flycatcher	1
BBS 58	2018-06-12	605215.872	6389767.75	*Chroicocephalus philadelphia*	Bonaparte's gull	5
BBS 58	2018-06-12	605215.872	6389767.75	*Junco hyemalis*	Dark-eyed junco	2

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 58	2018-06-12	605215.872	6389767.75	*Contopus cooperi*	Olive-sided flycatcher	1
BBS 58	2018-06-12	605215.872	6389767.75	*Setophaga palmarum*	Palm warbler	1
BBS 58	2018-06-12	605215.872	6389767.75	*Melospiza melodia*	Song sparrow	1
BBS 58	2018-06-12	605215.872	6389767.75	*Gallinago delicata*	Wilson's snipe	1
BBS 58	2018-06-24	605213.627	6389771.367	*Empidonax alnorum*	Alder flycatcher	1
BBS 58	2018-06-24	605213.627	6389771.367	*Junco hyemalis*	Dark-eyed junco	1
BBS 58	2018-06-24	605213.627	6389771.367	*Junco hyemalis*	Dark-eyed junco	1
BBS 58	2018-06-24	605213.627	6389771.367	*Contopus cooperi*	Olive-sided flycatcher	1
BBS 58	2018-06-24	605213.627	6389771.367	*Melospiza melodia*	Song sparrow	1
BBS 58	2018-06-24	605213.627	6389771.367	*Melospiza georgiana*	Swamp sparrow	1
BBS 58	2018-06-24	605213.627	6389771.367	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 58	2018-06-24	605213.627	6389771.367	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 59	2018-06-06	604673.195	6392415.643	*Junco hyemalis*	Dark-eyed junco	1
BBS 59	2018-06-06	604673.195	6392415.643	*Catharus guttatus*	Hermit thrush	1
BBS 59	2018-06-06	604673.195	6392415.643	*Setophaga palmarum*	Palm warbler	3
BBS 59	2018-06-06	604673.195	6392415.643	*Setophaga palmarum*	Palm warbler	3
BBS 59	2018-06-06	604673.195	6392415.643	*Zonotrichia leucophrys*	White-crowned sparrow	1
BBS 59	2018-06-06	604673.195	6392415.643	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 59	2018-06-23	597121.683	6382421.587	*Spizella passerina*	Chipping sparrow	1
BBS 59	2018-06-23	597121.683	6382421.587	*Junco hyemalis*	Dark-eyed junco	1
BBS 59	2018-06-23	597121.683	6382421.587	*Junco hyemalis*	Dark-eyed junco	2
BBS 59	2018-06-23	597121.683	6382421.587	*Junco hyemalis*	Dark-eyed junco	1
BBS 59	2018-06-23	597121.683	6382421.587	*Setophaga palmarum*	Palm warbler	2
BBS 59	2018-06-23	597121.683	6382421.587	*Passerella iliaca*	Red fox sparrow	1
BBS 59	2018-06-23	597121.683	6382421.587	*Passerella iliaca*	Red fox sparrow	1
BBS 59	2018-06-23	597121.683	6382421.587	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 59	2018-06-23	597121.683	6382421.587	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 60	2018-06-06	605020.018	6392275.273	*Empidonax minimus*	Least flycatcher	1
BBS 60	2018-06-06	605020.018	6392275.273	*Setophaga palmarum*	Palm warbler	1
BBS 60	2018-06-06	605020.018	6392275.273	*Setophaga palmarum*	Palm warbler	1
BBS 60	2018-06-06	605020.018	6392275.273	*Gallinago delicata*	Wilson's snipe	1
BBS 60	2018-06-06	605020.018	6392275.273	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 60	2018-06-06	605020.018	6392275.273	*Setophaga coronata*	Yellow-rumped warbler	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 60	2018-06-23	605023.073	6392279.474	*Spizella passerina*	Chipping sparrow	1
BBS 60	2018-06-23	605023.073	6392279.474	*Junco hyemalis*	Dark-eyed junco	1
BBS 60	2018-06-23	605023.073	6392279.474	*Junco hyemalis*	Dark-eyed junco	1
BBS 60	2018-06-23	605023.073	6392279.474	*Junco hyemalis*	Dark-eyed junco	1
BBS 60	2018-06-23	605023.073	6392279.474	*Perisoreus canadensis*	Gray jay	1
BBS 60	2018-06-23	605023.073	6392279.474	*Catharus guttatus*	Hermit thrush	1
BBS 60	2018-06-23	605023.073	6392279.474	*Setophaga palmarum*	Palm warbler	1
BBS 60	2018-06-23	605023.073	6392279.474	*Vireo solitarius*	Solitary vireo	1
BBS 60	2018-06-23	605023.073	6392279.474	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 61	2018-06-07	607276.899	6392411.022	*Picoides arcticus*	Black-backed woodpecker	1
BBS 61	2018-06-07	607276.899	6392411.022	*Setophaga striata*	Blackpoll warbler	1
BBS 61	2018-06-07	607276.899	6392411.022	*Spizella passerina*	Chipping sparrow	1
BBS 61	2018-06-07	607276.899	6392411.022	*Setophaga palmarum*	Palm warbler	1
BBS 61	2018-06-07	607276.899	6392411.022	*Setophaga palmarum*	Palm warbler	1
BBS 61	2018-06-07	607276.899	6392411.022	*Empidonax traillii*	Willow flycatcher	1
BBS 61	2018-06-07	607276.899	6392411.022	*Gallinago delicata*	Wilson's snipe	1
BBS 61	2018-06-07	607276.899	6392411.022	*Setophaga petechia*	Yellow warbler	1
BBS 61	2018-06-23	607272.329	6392410.009	*Turdus migratorius*	American robin	1
BBS 61	2018-06-23	607272.329	6392410.009	*Turdus migratorius*	American robin	1
BBS 61	2018-06-23	607272.329	6392410.009	*Spizella passerina*	Chipping sparrow	1
BBS 61	2018-06-23	607272.329	6392410.009	*Spizella passerina*	Chipping sparrow	1
BBS 61	2018-06-23	607272.329	6392410.009	*Spizella passerina*	Chipping sparrow	1
BBS 61	2018-06-23	607272.329	6392410.009	*Spizella passerina*	Chipping sparrow	1
BBS 61	2018-06-23	607272.329	6392410.009	*Junco hyemalis*	Dark-eyed junco	1
BBS 61	2018-06-23	607272.329	6392410.009	*Perisoreus canadensis*	Gray jay	1
BBS 61	2018-06-23	607272.329	6392410.009	*Melospiza lincolnii*	Lincoln's sparrow	1
BBS 61	2018-06-23	607272.329	6392410.009	*Melospiza lincolnii*	Lincoln's sparrow	1
BBS 61	2018-06-23	607272.329	6392410.009	*Contopus cooperi*	Olive-sided flycatcher	1
BBS 61	2018-06-23	607272.329	6392410.009	*Setophaga palmarum*	Palm warbler	1
BBS 61	2018-06-23	607272.329	6392410.009	*Setophaga palmarum*	Palm warbler	1
BBS 61	2018-06-23	607272.329	6392410.009	*Loxia curvirostra*	Red crossbill	1
BBS 61	2018-06-23	607272.329	6392410.009	*Buteo jamaicensis*	Red-tailed hawk	1
BBS 61	2018-06-23	607272.329	6392410.009	*Contopus sordidulus*	Western wood pewee	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 61	2018-06-23	607272.329	6392410.009	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 61	2018-06-23	607272.329	6392410.009	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 61	2018-06-23	607272.329	6392410.009	*Gallinago delicata*	Wilson's snipe	1
BBS 62	2018-06-07	606967.367	6392619.015	*Spizella passerina*	Chipping sparrow	1
BBS 62	2018-06-07	606967.367	6392619.015	*Junco hyemalis*	Dark-eyed junco	2
BBS 62	2018-06-07	606967.367	6392619.015	*Junco hyemalis*	Dark-eyed junco	1
BBS 62	2018-06-07	606967.367	6392619.015	*Catharus guttatus*	Hermit thrush	2
BBS 62	2018-06-07	606967.367	6392619.015	*Setophaga palmarum*	Palm warbler	1
BBS 62	2018-06-07	606967.367	6392619.015	*Setophaga palmarum*	Palm warbler	1
BBS 62	2018-06-07	606967.367	6392619.015	*Grus canadensis*	Sandhill crane	2
BBS 62	2018-06-23	606959.987	6392615.924	*Empidonax alnorum*	Alder flycatcher	1
BBS 62	2018-06-23	606959.987	6392615.924	*Turdus migratorius*	American robin	1
BBS 62	2018-06-23	606959.987	6392615.924	*Turdus migratorius*	American robin	1
BBS 62	2018-06-23	606959.987	6392615.924	*Junco hyemalis*	Dark-eyed junco	1
BBS 62	2018-06-23	606959.987	6392615.924	*Junco hyemalis*	Dark-eyed junco	1
BBS 62	2018-06-23	606959.987	6392615.924	*Perisoreus canadensis*	Gray jay	1
BBS 62	2018-06-23	606959.987	6392615.924	*Melospiza lincolnii*	Lincoln's sparrow	1
BBS 62	2018-06-23	606959.987	6392615.924	*Setophaga palmarum*	Palm warbler	3
BBS 62	2018-06-23	606959.987	6392615.924	*Passerella iliaca*	Red fox sparrow	1
BBS 62	2018-06-23	606959.987	6392615.924	*Passerella iliaca*	Red fox sparrow	1
BBS 62	2018-06-23	606959.987	6392615.924	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 62	2018-06-23	606959.987	6392615.924	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 62	2018-06-23	606959.987	6392615.924	*Gallinago delicata*	Wilson's snipe	1
BBS 62	2018-06-23	606959.987	6392615.924	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 63	2018-06-07	606585.101	6392881.585	*Branta canadensis*	Canada goose	23
BBS 63	2018-06-07	606585.101	6392881.585	*Spizella passerina*	Chipping sparrow	1
BBS 63	2018-06-07	606585.101	6392881.585	*Spizella passerina*	Chipping sparrow	1
BBS 63	2018-06-07	606585.101	6392881.585	*Junco hyemalis*	Dark-eyed junco	1
BBS 63	2018-06-07	606585.101	6392881.585	*Junco hyemalis*	Dark-eyed junco	1
BBS 63	2018-06-07	606585.101	6392881.585	*Gavia immer*	Common loon	2
BBS 63	2018-06-07	606585.101	6392881.585	*Setophaga magnolia*	Magnolia warbler	1
BBS 63	2018-06-07	606585.101	6392881.585	*Corvus corax*	Northern raven	2
BBS 63	2018-06-07	606585.101	6392881.585	*Setophaga palmarum*	Palm warbler	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 63	2018-06-07	606585.101	6392881.585	*Setophaga palmarum*	Palm warbler	1
BBS 63	2018-06-07	606585.101	6392881.585	*Pinicola enucleator*	Pine grosbeak	6
BBS 63	2018-06-07	606585.101	6392881.585	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 63	2018-06-07	606585.101	6392881.585	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 63	2018-06-23	606587.057	6392873.06	*Turdus migratorius*	American robin	1
BBS 63	2018-06-23	606587.057	6392873.06	*Spizella passerina*	Chipping sparrow	1
BBS 63	2018-06-23	606587.057	6392873.06	*Junco hyemalis*	Dark-eyed junco	1
BBS 63	2018-06-23	606587.057	6392873.06	*Junco hyemalis*	Dark-eyed junco	1
BBS 63	2018-06-23	606587.057	6392873.06	*Junco hyemalis*	Dark-eyed junco	1
BBS 63	2018-06-23	606587.057	6392873.06	*Junco hyemalis*	Dark-eyed junco	1
BBS 63	2018-06-23	606587.057	6392873.06	*Perisoreus canadensis*	Gray jay	1
BBS 63	2018-06-23	606587.057	6392873.06	*Catharus guttatus*	Hermit thrush	1
BBS 63	2018-06-23	606587.057	6392873.06	*Catharus guttatus*	Hermit thrush	1
BBS 63	2018-06-23	606587.057	6392873.06	*Setophaga palmarum*	Palm warbler	1
BBS 63	2018-06-23	606587.057	6392873.06	*Setophaga palmarum*	Palm warbler	1
BBS 63	2018-06-23	606587.057	6392873.06	*Vireo solitarius*	Solitary vireo	1
BBS 63	2018-06-23	606587.057	6392873.06	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 63	2018-06-23	606587.057	6392873.06	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 63	2018-06-23	606587.057	6392873.06	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 64	2018-06-06	604959.919	6393029.091	*Junco hyemalis*	Dark-eyed junco	1
BBS 64	2018-06-06	604959.919	6393029.091	*Junco hyemalis*	Dark-eyed junco	1
BBS 64	2018-06-06	604959.919	6393029.091	*Junco hyemalis*	Dark-eyed junco	1
BBS 64	2018-06-06	604959.919	6393029.091	*Junco hyemalis*	Dark-eyed junco	1
BBS 64	2018-06-06	604959.919	6393029.091	*Catharus guttatus*	Hermit thrush	2
BBS 64	2018-06-06	604959.919	6393029.091	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 64	2018-06-06	604959.919	6393029.091	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 64	2018-06-23	604958.979	6393028.509	*Junco hyemalis*	Dark-eyed junco	2
BBS 64	2018-06-23	604958.979	6393028.509	*Setophaga palmarum*	Palm warbler	1
BBS 64	2018-06-23	604958.979	6393028.509	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 65	2018-06-06	604164.381	6392081.402	*Turdus migratorius*	American robin	1
BBS 65	2018-06-06	604164.381	6392081.402	*Turdus migratorius*	American robin	1
BBS 65	2018-06-06	604164.381	6392081.402	*Junco hyemalis*	Dark-eyed junco	1
BBS 65	2018-06-06	604164.381	6392081.402	*Catharus guttatus*	Hermit thrush	2

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 65	2018-06-06	604164.381	6392081.402	*Catharus guttatus*	Hermit thrush	1
BBS 65	2018-06-06	604164.381	6392081.402	*Setophaga palmarum*	Palm warbler	1
BBS 65	2018-06-06	604164.381	6392081.402	*Setophaga palmarum*	Palm warbler	1
BBS 65	2018-06-06	604164.381	6392081.402	*Setophaga palmarum*	Palm warbler	1
BBS 65	2018-06-06	604164.381	6392081.402	*Zonotrichia leucophrys*	White-crowned sparrow	1
BBS 65	2018-06-23	604165.31	6392082.428	*Junco hyemalis*	Dark-eyed junco	1
BBS 65	2018-06-23	604165.31	6392082.428	*Junco hyemalis*	Dark-eyed junco	1
BBS 65	2018-06-23	604165.31	6392082.428	*Setophaga palmarum*	Palm warbler	1
BBS 65	2018-06-23	604165.31	6392082.428	*Setophaga palmarum*	Palm warbler	1
BBS 65	2018-06-23	604165.31	6392082.428	*Setophaga palmarum*	Palm warbler	1
BBS 65	2018-06-23	604165.31	6392082.428	*Passerella iliaca*	Red fox sparrow	1
BBS 65	2018-06-23	604165.31	6392082.428	*Passerella iliaca*	Red fox sparrow	2
BBS 65	2018-06-23	604165.31	6392082.428	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 65	2018-06-23	604165.31	6392082.428	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 65	2018-06-23	604165.31	6392082.428	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 65	2018-06-23	604165.31	6392082.428	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 66	2018-06-08	603336.084	6391419.734	*Haliaeetus leucocephalus*	Bald eagle	1
BBS 66	2018-06-08	603336.084	6391419.734	*Hirundo rustica*	Barn swallow	6
BBS 66	2018-06-08	603336.084	6391419.734	*Spizella passerina*	Chipping sparrow	1
BBS 66	2018-06-08	603336.084	6391419.734	*Chordeiles minor*	Common nighthawk	1
BBS 66	2018-06-08	603336.084	6391419.734	*Junco hyemalis*	Dark-eyed junco	1
BBS 66	2018-06-08	603336.084	6391419.734	*Corvus corax*	Northern raven	1
BBS 66	2018-06-08	603336.084	6391419.734	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 66	2018-06-08	603336.084	6391419.734	*Setophaga palmarum*	Palm warbler	1
BBS 66	2018-06-08	603336.084	6391419.734	*Larus delawarensis*	Ring-billed gull	3
BBS 66	2018-06-08	603336.084	6391419.734	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 66	2018-06-08	603336.084	6391419.734	*Catharus ustulatus*	Swainson's thrush	1
BBS 66	2018-06-08	603336.084	6391419.734	*Pandion haliaetus*	Western osprey	1
BBS 66	2018-06-08	603336.084	6391419.734	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 66	2018-06-08	603336.084	6391419.734	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 66	2018-06-08	603336.084	6391419.734	*Cardellina pusilla*	Wilson's warbler	1
BBS 66	2018-06-08	603336.084	6391419.734	*Troglodytes hiemalis*	Winter wren	1
BBS 66	2018-06-08	603336.084	6391419.734	*Setophaga coronata*	Yellow-rumped warbler	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 66	2018-06-08	603336.084	6391419.734	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 66	2018-06-23	603331.413	6391420.283	*Turdus migratorius*	American robin	1
BBS 66	2018-06-23	603331.413	6391420.283	*Hirundo rustica*	Barn swallow	4
BBS 66	2018-06-23	603331.413	6391420.283	*Spizella passerina*	Chipping sparrow	1
BBS 66	2018-06-23	603331.413	6391420.283	*Spizella passerina*	Chipping sparrow	1
BBS 66	2018-06-23	603331.413	6391420.283	*Petrochelidon pyrrhonota*	Cliff swallow	2
BBS 66	2018-06-23	603331.413	6391420.283	*Junco hyemalis*	Dark-eyed junco	1
BBS 66	2018-06-23	603331.413	6391420.283	*Junco hyemalis*	Dark-eyed junco	1
BBS 66	2018-06-23	603331.413	6391420.283	*Junco hyemalis*	Dark-eyed junco	1
BBS 66	2018-06-23	603331.413	6391420.283	*Oreothlypis ruficapilla*	Nashville warbler	1
BBS 66	2018-06-23	603331.413	6391420.283	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 66	2018-06-23	603331.413	6391420.283	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 66	2018-06-23	603331.413	6391420.283	*Melospiza melodia*	Song sparrow	1
BBS 66	2018-06-23	603331.413	6391420.283	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 66	2018-06-23	603331.413	6391420.283	*Loxia leucoptera*	Two-barred crossbill	1
BBS 66	2018-06-23	603331.413	6391420.283	*Pandion haliaetus*	Western osprey	1
BBS 66	2018-06-23	603331.413	6391420.283	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 66	2018-06-23	603331.413	6391420.283	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 66	2018-06-23	603331.413	6391420.283	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 66	2018-06-23	603331.413	6391420.283	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 66	2018-06-23	603331.413	6391420.283	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 67	2018-06-05	604548.893	6390482.452	*Spizella passerina*	Chipping sparrow	1
BBS 67	2018-06-05	604548.893	6390482.452	*Junco hyemalis*	Dark-eyed junco	1
BBS 67	2018-06-05	604548.893	6390482.452	*Perisoreus canadensis*	Gray jay	1
BBS 67	2018-06-05	604548.893	6390482.452	*Contopus cooperi*	Olive-sided flycatcher	1
BBS 67	2018-06-05	604548.893	6390482.452	*Setophaga palmarum*	Palm warbler	1
BBS 67	2018-06-05	604548.893	6390482.452	*Setophaga palmarum*	Palm warbler	1
BBS 67	2018-06-05	604548.893	6390482.452	*Larus delawarensis*	Ring-billed gull	1
BBS 67	2018-06-05	604548.893	6390482.452	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 67	2018-06-05	604548.893	6390482.452	*Zonotrichia leucophrys*	White-crowned sparrow	1
BBS 67	2018-06-05	604548.893	6390482.452	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 67	2018-06-24	604550.578	6390484.277	*Spizella passerina*	Chipping sparrow	1
BBS 67	2018-06-24	604550.578	6390484.277	*Junco hyemalis*	Dark-eyed junco	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 67	2018-06-24	604550.578	6390484.277	*Junco hyemalis*	Dark-eyed junco	1
BBS 67	2018-06-24	604550.578	6390484.277	*Gavia immer*	Common loon	1
BBS 67	2018-06-24	604550.578	6390484.277	*Parkesia noveboracensis*	Northern waterthrush	1
BBS 67	2018-06-24	604550.578	6390484.277	*Contopus cooperi*	Olive-sided flycatcher	1
BBS 67	2018-06-24	604550.578	6390484.277	*Setophaga palmarum*	Palm warbler	1
BBS 67	2018-06-24	604550.578	6390484.277	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 67	2018-06-24	604550.578	6390484.277	*Setophaga petechia*	Yellow warbler	1
BBS 67	2018-06-24	604550.578	6390484.277	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 68	2018-06-06	602327.799	6391845.518	*Junco hyemalis*	Dark-eyed junco	1
BBS 68	2018-06-06	602327.799	6391845.518	*Junco hyemalis*	Dark-eyed junco	1
BBS 68	2018-06-06	602327.799	6391845.518	*Setophaga palmarum*	Palm warbler	2
BBS 68	2018-06-06	602327.799	6391845.518	*Loxia curvirostra*	Red crossbill	2
BBS 68	2018-06-06	602327.799	6391845.518	*Loxia curvirostra*	Red crossbill	4
BBS 68	2018-06-06	602327.799	6391845.518	*Loxia curvirostra*	Red crossbill	2
BBS 68	2018-06-06	602327.799	6391845.518	*Passerella iliaca*	Red fox sparrow	1
BBS 68	2018-06-06	602327.799	6391845.518	*Passerella iliaca*	Red fox sparrow	1
BBS 68	2018-06-06	602327.799	6391845.518	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 68	2018-06-06	602327.799	6391845.518	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 68	2018-06-24	602324.622	6391841.317	*Junco hyemalis*	Dark-eyed junco	2
BBS 68	2018-06-24	602324.622	6391841.317	*Setophaga palmarum*	Palm warbler	2
BBS 68	2018-06-24	602324.622	6391841.317	*Passerella iliaca*	Red fox sparrow	1
BBS 68	2018-06-24	602324.622	6391841.317	*Passerella iliaca*	Red fox sparrow	1
BBS 68	2018-06-24	602324.622	6391841.317	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 68	2018-06-24	602324.622	6391841.317	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 68	2018-06-24	602324.622	6391841.317	*Zonotrichia albicollis*	White-throated sparrow	2
BBS 69	2018-06-06	601837.631	6391472.178	*Spizella passerina*	Chipping sparrow	1
BBS 69	2018-06-06	601837.631	6391472.178	*Junco hyemalis*	Dark-eyed junco	2
BBS 69	2018-06-06	601837.631	6391472.178	*Setophaga palmarum*	Palm warbler	1
BBS 69	2018-06-06	601837.631	6391472.178	*Setophaga palmarum*	Palm warbler	1
BBS 69	2018-06-06	601837.631	6391472.178	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 69	2018-06-06	601837.631	6391472.178	*Catharus ustulatus*	Swainson's thrush	1
BBS 69	2018-06-06	601837.631	6391472.178	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 69	2018-06-24	601837.715	6391468.839	*Spizella passerina*	Chipping sparrow	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 69	2018-06-24	601837.715	6391468.839	*Junco hyemalis*	Dark-eyed junco	2
BBS 69	2018-06-24	601837.715	6391468.839	*Setophaga magnolia*	Magnolia warbler	1
BBS 69	2018-06-24	601837.715	6391468.839	*Setophaga palmarum*	Palm warbler	2
BBS 69	2018-06-24	601837.715	6391468.839	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 69	2018-06-24	601837.715	6391468.839	*Zonotrichia albicollis*	White-throated sparrow	2
BBS 69	2018-06-24	601837.715	6391468.839	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 70	2018-06-06	602727.054	6392060.126	*Junco hyemalis*	Dark-eyed junco	1
BBS 70	2018-06-06	602727.054	6392060.126	*Junco hyemalis*	Dark-eyed junco	1
BBS 70	2018-06-06	602727.054	6392060.126	*Setophaga palmarum*	Palm warbler	1
BBS 70	2018-06-06	602727.054	6392060.126	*Setophaga palmarum*	Palm warbler	1
BBS 70	2018-06-06	602727.054	6392060.126	*Passerella iliaca*	Red fox sparrow	1
BBS 70	2018-06-06	602727.054	6392060.126	*Passerella iliaca*	Red fox sparrow	1
BBS 70	2018-06-06	602727.054	6392060.126	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 70	2018-06-06	602727.054	6392060.126	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 70	2018-06-24	602722.948	6392052.559	*Junco hyemalis*	Dark-eyed junco	1
BBS 70	2018-06-24	602722.948	6392052.559	*Gavia immer*	Common loon	1
BBS 70	2018-06-24	602722.948	6392052.559	*Setophaga palmarum*	Palm warbler	1
BBS 70	2018-06-24	602722.948	6392052.559	*Setophaga palmarum*	Palm warbler	2
BBS 70	2018-06-24	602722.948	6392052.559	*Passerella iliaca*	Red fox sparrow	1
BBS 70	2018-06-24	602722.948	6392052.559	*Passerella iliaca*	Red fox sparrow	1
BBS 70	2018-06-24	602722.948	6392052.559	*Passerella iliaca*	Red fox sparrow	1
BBS 70	2018-06-24	602722.948	6392052.559	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 70	2018-06-24	602722.948	6392052.559	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 71	2018-06-06	604508.143	6394101.222	*Turdus migratorius*	American robin	1
BBS 71	2018-06-06	604508.143	6394101.222	*Spizella passerina*	Chipping sparrow	1
BBS 71	2018-06-06	604508.143	6394101.222	*Junco hyemalis*	Dark-eyed junco	1
BBS 71	2018-06-06	604508.143	6394101.222	*Regulus satrapa*	Golden-crowned kinglet	1
BBS 71	2018-06-06	604508.143	6394101.222	*Gavia immer*	Common loon	1
BBS 71	2018-06-06	604508.143	6394101.222	*Perisoreus canadensis*	Gray jay	1
BBS 71	2018-06-06	604508.143	6394101.222	*Vireo olivaceus*	Red-eyed vireo	1
BBS 71	2018-06-06	604508.143	6394101.222	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 71	2018-06-06	604508.143	6394101.222	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 71	2018-06-06	604508.143	6394101.222	*Setophaga petechia*	Yellow warbler	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 71	2018-06-06	604508.143	6394101.222	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 71	2018-06-22	604505.22	6394105.825	*Turdus migratorius*	American robin	1
BBS 71	2018-06-22	604505.22	6394105.825	*Hirundo rustica*	Barn swallow	1
BBS 71	2018-06-22	604505.22	6394105.825	*Mergus merganser*	Common merganser	1
BBS 71	2018-06-22	604505.22	6394105.825	*Chordeiles minor*	Common nighthawk	1
BBS 71	2018-06-22	604505.22	6394105.825	*Junco hyemalis*	Dark-eyed junco	1
BBS 71	2018-06-22	604505.22	6394105.825	*Junco hyemalis*	Dark-eyed junco	3
BBS 71	2018-06-22	604505.22	6394105.825	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 71	2018-06-22	604505.22	6394105.825	*Zonotrichia albicollis*	White-throated sparrow	2
BBS 71	2018-06-22	604505.22	6394105.825	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 72	2018-06-06	604503.244	6393217.3	*Spizella passerina*	Chipping sparrow	1
BBS 72	2018-06-06	604503.244	6393217.3	*Spizella passerina*	Chipping sparrow	1
BBS 72	2018-06-06	604503.244	6393217.3	*Spizella passerina*	Chipping sparrow	1
BBS 72	2018-06-06	604503.244	6393217.3	*Spizella passerina*	Chipping sparrow	1
BBS 72	2018-06-06	604503.244	6393217.3	*Junco hyemalis*	Dark-eyed junco	1
BBS 72	2018-06-06	604503.244	6393217.3	*Passerella iliaca*	Red fox sparrow	1
BBS 72	2018-06-23	604497.084	6393215.47	*Turdus migratorius*	American robin	1
BBS 72	2018-06-23	604497.084	6393215.47	*Hirundo rustica*	Barn swallow	2
BBS 72	2018-06-23	604497.084	6393215.47	*Spizella passerina*	Chipping sparrow	2
BBS 72	2018-06-23	604497.084	6393215.47	*Spizella passerina*	Chipping sparrow	1
BBS 72	2018-06-23	604497.084	6393215.47	*Chordeiles minor*	Common nighthawk	1
BBS 72	2018-06-23	604497.084	6393215.47	*Junco hyemalis*	Dark-eyed junco	1
BBS 72	2018-06-23	604497.084	6393215.47	*Junco hyemalis*	Dark-eyed junco	1
BBS 72	2018-06-23	604497.084	6393215.47	*Tringa flavipes*	Lesser yellowlegs	1
BBS 72	2018-06-23	604497.084	6393215.47	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 72	2018-06-23	604497.084	6393215.47	*Passerella iliaca*	Red fox sparrow	1
BBS 72	2018-06-23	604497.084	6393215.47	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 72	2018-06-23	604497.084	6393215.47	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 73	2018-06-06	604005.316	6393609.658	*Hirundo rustica*	Barn swallow	2
BBS 73	2018-06-06	604005.316	6393609.658	*Spizella passerina*	Chipping sparrow	1
BBS 73	2018-06-06	604005.316	6393609.658	*Spizella passerina*	Chipping sparrow	1
BBS 73	2018-06-06	604005.316	6393609.658	*Junco hyemalis*	Dark-eyed junco	1
BBS 73	2018-06-06	604005.316	6393609.658	*Seiurus aurocapilla*	Ovenbird	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 73	2018-06-06	604005.316	6393609.658	*Setophaga palmarum*	Palm warbler	1
BBS 73	2018-06-06	604005.316	6393609.658	*Setophaga palmarum*	Palm warbler	1
BBS 73	2018-06-06	604005.316	6393609.658	*Catharus ustulatus*	Swainson's thrush	1
BBS 73	2018-06-06	604005.316	6393609.658	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 73	2018-06-06	604005.316	6393609.658	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 73	2018-06-24	603983.136	6393237.639	*Spizella passerina*	Chipping sparrow	1
BBS 73	2018-06-24	603983.136	6393237.639	*Junco hyemalis*	Dark-eyed junco	1
BBS 73	2018-06-24	603983.136	6393237.639	*Junco hyemalis*	Dark-eyed junco	1
BBS 73	2018-06-24	603983.136	6393237.639	*Setophaga palmarum*	Palm warbler	1
BBS 73	2018-06-24	603983.136	6393237.639	*Setophaga palmarum*	Palm warbler	1
BBS 73	2018-06-24	603983.136	6393237.639	*Passerella iliaca*	Red fox sparrow	1
BBS 73	2018-06-24	603983.136	6393237.639	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 73	2018-06-24	603983.136	6393237.639	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 74	2018-06-06	603372.837	6393606.691	*Spizella passerina*	Chipping sparrow	1
BBS 74	2018-06-06	603372.837	6393606.691	*Junco hyemalis*	Dark-eyed junco	1
BBS 74	2018-06-06	603372.837	6393606.691	*Gavia immer*	Common loon	1
BBS 74	2018-06-06	603372.837	6393606.691	*Perisoreus canadensis*	Gray jay	1
BBS 74	2018-06-06	603372.837	6393606.691	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 74	2018-06-06	603372.837	6393606.691	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 74	2018-06-06	603372.837	6393606.691	*Vireo solitarius*	Solitary vireo	1
BBS 74	2018-06-06	603372.837	6393606.691	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 74	2018-06-06	603372.837	6393606.691	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 74	2018-06-06	603372.837	6393606.691	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 74	2018-06-24	603387.229	6393613.296	*Empidonax alnorum*	Alder flycatcher	1
BBS 74	2018-06-24	603387.229	6393613.296	*Pelecanus erythrorhynchos*	American white pelican	1
BBS 74	2018-06-24	603387.229	6393613.296	*Spizella pallida*	Clay-colored sparrow	1
BBS 74	2018-06-24	603387.229	6393613.296	*Junco hyemalis*	Dark-eyed junco	1
BBS 74	2018-06-24	603387.229	6393613.296	*Junco hyemalis*	Dark-eyed junco	1
BBS 74	2018-06-24	603387.229	6393613.296	*Catharus guttatus*	Hermit thrush	1
BBS 74	2018-06-24	603387.229	6393613.296	*Catharus guttatus*	Hermit thrush	1
BBS 74	2018-06-24	603387.229	6393613.296	*Oreothlypis ruficapilla*	Nashville warbler	1
BBS 74	2018-06-24	603387.229	6393613.296	*Spinus pinus*	Pine siskin	7
BBS 74	2018-06-24	603387.229	6393613.296	*Passerella iliaca*	Red fox sparrow	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 74	2018-06-24	603387.229	6393613.296	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 74	2018-06-24	603387.229	6393613.296	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 74	2018-06-24	603387.229	6393613.296	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 74	2018-06-24	603387.229	6393613.296	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 74	2018-06-24	603387.229	6393613.296	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 74	2018-06-24	603387.229	6393613.296	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 75	2018-06-06	603195.317	6392942.129	*Junco hyemalis*	Dark-eyed junco	1
BBS 75	2018-06-06	603195.317	6392942.129	*Setophaga magnolia*	Magnolia warbler	1
BBS 75	2018-06-06	603195.317	6392942.129	*Setophaga palmarum*	Palm warbler	1
BBS 75	2018-06-06	603195.317	6392942.129	*Setophaga palmarum*	Palm warbler	1
BBS 75	2018-06-06	603195.317	6392942.129	*Passerella iliaca*	Red fox sparrow	1
BBS 75	2018-06-06	603195.317	6392942.129	*Catharus ustulatus*	Swainson's thrush	1
BBS 75	2018-06-06	603195.317	6392942.129	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 75	2018-06-24	603190.98	6392946.028	*Junco hyemalis*	Dark-eyed junco	1
BBS 75	2018-06-24	603190.98	6392946.028	*Perisoreus canadensis*	Gray jay	1
BBS 75	2018-06-24	603190.98	6392946.028	*Setophaga palmarum*	Palm warbler	2
BBS 75	2018-06-24	603190.98	6392946.028	*Passerella iliaca*	Red fox sparrow	2
BBS 75	2018-06-24	603190.98	6392946.028	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 75	2018-06-24	603190.98	6392946.028	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 75	2018-06-24	603190.98	6392946.028	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 76	2018-06-07	604849.342	6393603.726	*Empidonax alnorum*	Alder flycatcher	1
BBS 76	2018-06-07	604849.342	6393603.726	*Spizella passerina*	Chipping sparrow	1
BBS 76	2018-06-07	604849.342	6393603.726	*Junco hyemalis*	Dark-eyed junco	1
BBS 76	2018-06-07	604849.342	6393603.726	*Larus argentatus*	Herring gull	1
BBS 76	2018-06-07	604849.342	6393603.726	*Gavia immer*	Common loon	1
BBS 76	2018-06-07	604849.342	6393603.726	*Setophaga palmarum*	Palm warbler	2
BBS 76	2018-06-07	604849.342	6393603.726	*Setophaga palmarum*	Palm warbler	1
BBS 76	2018-06-07	604849.342	6393603.726	*Setophaga palmarum*	Palm warbler	1
BBS 76	2018-06-07	604849.342	6393603.726	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 76	2018-06-23	604851.956	6393608.806	*Turdus migratorius*	American robin	1
BBS 76	2018-06-23	604851.956	6393608.806	*Junco hyemalis*	Dark-eyed junco	1
BBS 76	2018-06-23	604851.956	6393608.806	*Junco hyemalis*	Dark-eyed junco	2
BBS 76	2018-06-23	604851.956	6393608.806	*Setophaga magnolia*	Magnolia warbler	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 76	2018-06-23	604851.956	6393608.806	*Setophaga palmarum*	Palm warbler	2
BBS 76	2018-06-23	604851.956	6393608.806	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 76	2018-06-23	604851.956	6393608.806	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 77	2018-06-06	604178.402	6392670.4	*Junco hyemalis*	Dark-eyed junco	1
BBS 77	2018-06-06	604178.402	6392670.4	*Junco hyemalis*	Dark-eyed junco	3
BBS 77	2018-06-06	604178.402	6392670.4	*Catharus guttatus*	Hermit thrush	1
BBS 77	2018-06-06	604178.402	6392670.4	*Setophaga palmarum*	Palm warbler	2
BBS 77	2018-06-06	604178.402	6392670.4	*Setophaga palmarum*	Palm warbler	1
BBS 77	2018-06-06	604178.402	6392670.4	*Passerella iliaca*	Red fox sparrow	1
BBS 77	2018-06-06	604178.402	6392670.4	*Passerella iliaca*	Red fox sparrow	1
BBS 77	2018-06-23	604179.108	6392673.091	*Chroicocephalus philadelphia*	Bonaparte's gull	8
BBS 77	2018-06-23	604179.108	6392673.091	*Larus californicus*	California gull	3
BBS 77	2018-06-23	604179.108	6392673.091	*Junco hyemalis*	Dark-eyed junco	1
BBS 77	2018-06-23	604179.108	6392673.091	*Junco hyemalis*	Dark-eyed junco	1
BBS 77	2018-06-23	604179.108	6392673.091	*Setophaga palmarum*	Palm warbler	3
BBS 77	2018-06-23	604179.108	6392673.091	*Passerella iliaca*	Red fox sparrow	1
BBS 77	2018-06-23	604179.108	6392673.091	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 78	2018-06-06	603573.717	6392769.7	*Junco hyemalis*	Dark-eyed junco	1
BBS 78	2018-06-06	603573.717	6392769.7	*Junco hyemalis*	Dark-eyed junco	2
BBS 78	2018-06-06	603573.717	6392769.7	*Catharus guttatus*	Hermit thrush	1
BBS 78	2018-06-06	603573.717	6392769.7	*Setophaga magnolia*	Magnolia warbler	1
BBS 78	2018-06-06	603573.717	6392769.7	*Corvus corax*	Northern raven	1
BBS 78	2018-06-06	603573.717	6392769.7	*Setophaga palmarum*	Palm warbler	2
BBS 78	2018-06-06	603573.717	6392769.7	*Setophaga palmarum*	Palm warbler	1
BBS 78	2018-06-06	603573.717	6392769.7	*Passerella iliaca*	Red fox sparrow	1
BBS 78	2018-06-06	603573.717	6392769.7	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 78	2018-06-06	603573.717	6392769.7	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 78	2018-06-06	603573.717	6392769.7	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 78	2018-06-24	603568.522	6392769.79	*Junco hyemalis*	Dark-eyed junco	1
BBS 78	2018-06-24	603568.522	6392769.79	*Junco hyemalis*	Dark-eyed junco	1
BBS 78	2018-06-24	603568.522	6392769.79	*Junco hyemalis*	Dark-eyed junco	1
BBS 78	2018-06-24	603568.522	6392769.79	*Setophaga palmarum*	Palm warbler	1
BBS 78	2018-06-24	603568.522	6392769.79	*Setophaga palmarum*	Palm warbler	2

Appendix B, Table 5

Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 78	2018-06-24	603568.522	6392769.79	*Setophaga palmarum*	Palm warbler	1
BBS 78	2018-06-24	603568.522	6392769.79	*Passerella iliaca*	Red fox sparrow	1
BBS 78	2018-06-24	603568.522	6392769.79	*Passerella iliaca*	Red fox sparrow	1
BBS 78	2018-06-24	603568.522	6392769.79	*Passerella iliaca*	Red fox sparrow	1
BBS 78	2018-06-24	603568.522	6392769.79	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 78	2018-06-24	603568.522	6392769.79	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 78	2018-06-24	603568.522	6392769.79	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 78	2018-06-24	603568.522	6392769.79	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 79	2018-06-06	603022.965	6392320.59	*Junco hyemalis*	Dark-eyed junco	1
BBS 79	2018-06-06	603022.965	6392320.59	*Catharus guttatus*	Hermit thrush	1
BBS 79	2018-06-06	603022.965	6392320.59	*Setophaga magnolia*	Magnolia warbler	1
BBS 79	2018-06-06	603022.965	6392320.59	*Setophaga palmarum*	Palm warbler	1
BBS 79	2018-06-06	603022.965	6392320.59	*Setophaga palmarum*	Palm warbler	1
BBS 79	2018-06-06	603022.965	6392320.59	*Passerella iliaca*	Red fox sparrow	1
BBS 79	2018-06-06	603022.965	6392320.59	*Catharus ustulatus*	Swainson's thrush	1
BBS 79	2018-06-06	603022.965	6392320.59	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 79	2018-06-06	603022.965	6392320.59	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 79	2018-06-06	603022.965	6392320.59	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 79	2018-06-24	603022.709	6392318.913	*Turdus migratorius*	American robin	1
BBS 79	2018-06-24	603022.709	6392318.913	*Branta canadensis*	Canada goose	7
BBS 79	2018-06-24	603022.709	6392318.913	*Junco hyemalis*	Dark-eyed junco	1
BBS 79	2018-06-24	603022.709	6392318.913	*Catharus guttatus*	Hermit thrush	1
BBS 79	2018-06-24	603022.709	6392318.913	*Setophaga palmarum*	Palm warbler	2
BBS 79	2018-06-24	603022.709	6392318.913	*Passerella iliaca*	Red fox sparrow	2
BBS 79	2018-06-24	603022.709	6392318.913	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 79	2018-06-24	603022.709	6392318.913	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 80	2018-06-06	603110.314	6391329.104	*Empidonax alnorum*	Alder flycatcher	1
BBS 80	2018-06-06	603110.314	6391329.104	*Hirundo rustica*	Barn swallow	1
BBS 80	2018-06-06	603110.314	6391329.104	*Hirundo rustica*	Barn swallow	1
BBS 80	2018-06-06	603110.314	6391329.104	*Junco hyemalis*	Dark-eyed junco	1
BBS 80	2018-06-06	603110.314	6391329.104	*Contopus cooperi*	Olive-sided flycatcher	1
BBS 80	2018-06-06	603110.314	6391329.104	*Setophaga palmarum*	Palm warbler	1
BBS 80	2018-06-06	603110.314	6391329.104	*Regulus calendula*	Ruby-crowned kinglet	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 80	2018-06-06	603110.314	6391329.104	*Melospiza georgiana*	Swamp sparrow	1
BBS 80	2018-06-23	603115.576	6391324.115	*Turdus migratorius*	American robin	1
BBS 80	2018-06-23	603115.576	6391324.115	*Turdus migratorius*	American robin	1
BBS 80	2018-06-23	603115.576	6391324.115	*Spizella passerina*	Chipping sparrow	1
BBS 80	2018-06-23	603115.576	6391324.115	*Petrochelidon pyrrhonota*	Cliff swallow	4
BBS 80	2018-06-23	603115.576	6391324.115	*Junco hyemalis*	Dark-eyed junco	2
BBS 80	2018-06-23	603115.576	6391324.115	*Junco hyemalis*	Dark-eyed junco	1
BBS 80	2018-06-23	603115.576	6391324.115	*Setophaga palmarum*	Palm warbler	1
BBS 80	2018-06-23	603115.576	6391324.115	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 80	2018-06-23	603115.576	6391324.115	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 80	2018-06-23	603115.576	6391324.115	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 81	2018-06-06	602674.821	6390817.835	*Junco hyemalis*	Dark-eyed junco	1
BBS 81	2018-06-06	602674.821	6390817.835	*Junco hyemalis*	Dark-eyed junco	1
BBS 81	2018-06-06	602674.821	6390817.835	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 81	2018-06-06	602674.821	6390817.835	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 81	2018-06-06	602674.821	6390817.835	*Setophaga petechia*	Yellow warbler	1
BBS 81	2018-06-06	602674.821	6390817.835	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 81	2018-06-22	602683.013	6390812.697	*Turdus migratorius*	American robin	1
BBS 81	2018-06-22	602683.013	6390812.697	*Larus californicus*	California gull	8
BBS 81	2018-06-22	602683.013	6390812.697	*Junco hyemalis*	Dark-eyed junco	1
BBS 81	2018-06-22	602683.013	6390812.697	*Gavia immer*	Common loon	1
BBS 81	2018-06-22	602683.013	6390812.697	*Setophaga magnolia*	Magnolia warbler	1
BBS 81	2018-06-22	602683.013	6390812.697	*Setophaga magnolia*	Magnolia warbler	1
BBS 81	2018-06-22	602683.013	6390812.697	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 81	2018-06-22	602683.013	6390812.697	*Melospiza melodia*	Song sparrow	1
BBS 81	2018-06-22	602683.013	6390812.697	*Catharus ustulatus*	Swainson's thrush	1
BBS 81	2018-06-22	602683.013	6390812.697	*Catharus ustulatus*	Swainson's thrush	1
BBS 81	2018-06-22	602683.013	6390812.697	*Oreothlypis peregrina*	Tennessee warbler	1
BBS 81	2018-06-22	602683.013	6390812.697	*Tachycineta bicolor*	Tree swallow	1
BBS 81	2018-06-22	602683.013	6390812.697	*Pandion haliaetus*	Western osprey	1
BBS 81	2018-06-22	602683.013	6390812.697	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 81	2018-06-22	602683.013	6390812.697	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 81	2018-06-22	602683.013	6390812.697	*Troglodytes hiemalis*	Winter wren	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 81	2018-06-22	602683.013	6390812.697	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 81	2018-06-22	602683.013	6390812.697	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 82	2018-06-06	602197.606	6391055.573	*Poecile hudsonicus*	Boreal chickadee	1
BBS 82	2018-06-06	602197.606	6391055.573	*Junco hyemalis*	Dark-eyed junco	1
BBS 82	2018-06-06	602197.606	6391055.573	*Passerella iliaca*	Red fox sparrow	1
BBS 82	2018-06-06	602197.606	6391055.573	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 82	2018-06-06	602197.606	6391055.573	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 82	2018-06-24	602193.235	6391051.342	*Junco hyemalis*	Dark-eyed junco	1
BBS 82	2018-06-24	602193.235	6391051.342	*Junco hyemalis*	Dark-eyed junco	1
BBS 82	2018-06-24	602193.235	6391051.342	*Catharus guttatus*	Hermit thrush	1
BBS 82	2018-06-24	602193.235	6391051.342	*Catharus guttatus*	Hermit thrush	1
BBS 82	2018-06-24	602193.235	6391051.342	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 82	2018-06-24	602193.235	6391051.342	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 83	2018-06-05	604431	6391458.985	*Junco hyemalis*	Dark-eyed junco	1
BBS 83	2018-06-05	604431	6391458.985	*Junco hyemalis*	Dark-eyed junco	1
BBS 83	2018-06-05	604431	6391458.985	*Setophaga palmarum*	Palm warbler	1
BBS 83	2018-06-05	604431	6391458.985	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 83	2018-06-05	604431	6391458.985	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 83	2018-06-05	604431	6391458.985	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 83	2018-06-24	604452.898	6391459.55	*Turdus migratorius*	American robin	1
BBS 83	2018-06-24	604452.898	6391459.55	*Junco hyemalis*	Dark-eyed junco	1
BBS 83	2018-06-24	604452.898	6391459.55	*Oreothlypis celata*	Orange-crowned warbler	2
BBS 83	2018-06-24	604452.898	6391459.55	*Catharus ustulatus*	Swainson's thrush	1
BBS 83	2018-06-24	604452.898	6391459.55	*Setophaga coronata*	Yellow-rumped warbler	2
BBS 84	2018-06-05	605198.904	6391291.204	*Turdus migratorius*	American robin	1
BBS 84	2018-06-05	605198.904	6391291.204	*Mniotilta varia*	Black-and-white warbler	1
BBS 84	2018-06-05	605198.904	6391291.204	*Junco hyemalis*	Dark-eyed junco	1
BBS 84	2018-06-05	605198.904	6391291.204	*Perisoreus canadensis*	Gray jay	1
BBS 84	2018-06-05	605198.904	6391291.204	*Perisoreus canadensis*	Gray jay	1
BBS 84	2018-06-05	605198.904	6391291.204	*Setophaga palmarum*	Palm warbler	2
BBS 84	2018-06-05	605198.904	6391291.204	*Gallinago delicata*	Wilson's snipe	1
BBS 84	2018-06-05	605198.904	6391291.204	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 84	2018-06-24	605195.153	6391286.206	*Turdus migratorius*	American robin	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
BBS 84	2018-06-24	605195.153	6391286.206	*Turdus migratorius*	American robin	1
BBS 84	2018-06-24	605195.153	6391286.206	*Turdus migratorius*	American robin	1
BBS 84	2018-06-24	605195.153	6391286.206	*Spizella passerina*	Chipping sparrow	1
BBS 84	2018-06-24	605195.153	6391286.206	*Spizella passerina*	Chipping sparrow	1
BBS 84	2018-06-24	605195.153	6391286.206	*Spizella passerina*	Chipping sparrow	1
BBS 84	2018-06-24	605195.153	6391286.206	*Junco hyemalis*	Dark-eyed junco	1
BBS 84	2018-06-24	605195.153	6391286.206	*Junco hyemalis*	Dark-eyed junco	1
BBS 84	2018-06-24	605195.153	6391286.206	*Perisoreus canadensis*	Gray jay	1
BBS 84	2018-06-24	605195.153	6391286.206	*Setophaga palmarum*	Palm warbler	1
BBS 84	2018-06-24	605195.153	6391286.206	*Setophaga palmarum*	Palm warbler	1
BBS 84	2018-06-24	605195.153	6391286.206	*Larus delawarensis*	Ring-billed gull	2
BBS 84	2018-06-24	605195.153	6391286.206	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 85	2018-06-05	603594.097	6391570.567	*Spizella passerina*	Chipping sparrow	1
BBS 85	2018-06-05	603594.097	6391570.567	*Junco hyemalis*	Dark-eyed junco	1
BBS 85	2018-06-05	603594.097	6391570.567	*Junco hyemalis*	Dark-eyed junco	1
BBS 85	2018-06-05	603594.097	6391570.567	*Catharus guttatus*	Hermit thrush	1
BBS 85	2018-06-05	603594.097	6391570.567	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 85	2018-06-05	603594.097	6391570.567	*Vireo philadelphicus*	Philadelphia vireo	1
BBS 85	2018-06-05	603594.097	6391570.567	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 85	2018-06-05	603594.097	6391570.567	*Catharus ustulatus*	Swainson's thrush	1
BBS 85	2018-06-05	603594.097	6391570.567	*Setophaga coronata*	Yellow-rumped warbler	1
BBS 85	2018-06-23	603594.643	6391570.247	*Junco hyemalis*	Dark-eyed junco	1
BBS 85	2018-06-23	603594.643	6391570.247	*Junco hyemalis*	Dark-eyed junco	1
BBS 85	2018-06-23	603594.643	6391570.247	*Perisoreus canadensis*	Gray jay	1
BBS 85	2018-06-23	603594.643	6391570.247	*Setophaga magnolia*	Magnolia warbler	1
BBS 85	2018-06-23	603594.643	6391570.247	*Oreothlypis celata*	Orange-crowned warbler	1
BBS 85	2018-06-23	603594.643	6391570.247	*Setophaga palmarum*	Palm warbler	1
BBS 85	2018-06-23	603594.643	6391570.247	*Regulus calendula*	Ruby-crowned kinglet	1
BBS 85	2018-06-23	603594.643	6391570.247	*Catharus ustulatus*	Swainson's thrush	1
BBS 85	2018-06-23	603594.643	6391570.247	*Zonotrichia albicollis*	White-throated sparrow	1
BBS 85	2018-06-23	603594.643	6391570.247	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 01	2018-05-31	601312.893	6398647.581	*Turdus migratorius*	American robin	2
ARU 01	2018-05-31	601312.893	6398647.581	*Spizella passerina*	Chipping sparrow	2

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 01	2018-05-31	601312.893	6398647.581	*Spizella passerina*	Chipping sparrow	1
ARU 01	2018-05-31	601312.893	6398647.581	*Junco hyemalis*	Dark-eyed junco	3
ARU 01	2018-05-31	601312.893	6398647.581	*Perisoreus canadensis*	Gray jay	1
ARU 01	2018-05-31	601312.893	6398647.581	*Loxia curvirostra*	Red crossbill	3
ARU 01	2018-05-31	601312.893	6398647.581	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 01	2018-05-31	601312.893	6398647.581	*Tringa solitaria*	Solitary sandpiper	1
ARU 01	2018-05-31	601312.893	6398647.581	*Melospiza georgiana*	Swamp sparrow	1
ARU 01	2018-05-31	601312.893	6398647.581	*Gallinago delicata*	Wilson's snipe	1
ARU 01	2018-05-31	601312.893	6398647.581	*Piciformes*	Woodpeckers	1
ARU 01	2018-05-31	601312.893	6398647.581	*Piciformes*	Woodpeckers	1
ARU 01	2018-06-17	601312.893	6398647.581	*Corvus brachyrhynchos*	American crow	1
ARU 01	2018-06-17	601312.893	6398647.581	*Turdus migratorius*	American robin	2
ARU 01	2018-06-17	601312.893	6398647.581	*Branta canadensis*	Canada goose	2
ARU 01	2018-06-17	601312.893	6398647.581	*Spizella passerina*	Chipping sparrow	1
ARU 01	2018-06-17	601312.893	6398647.581	*Junco hyemalis*	Dark-eyed junco	4
ARU 01	2018-06-17	601312.893	6398647.581	*Gavia immer*	Common loon	1
ARU 01	2018-06-17	601312.893	6398647.581	*Perisoreus canadensis*	Gray jay	1
ARU 01	2018-06-17	601312.893	6398647.581	*Melospiza lincolnii*	Lincoln's sparrow	1
ARU 01	2018-06-17	601312.893	6398647.581	*Contopus cooperi*	Olive-sided flycatcher	1
ARU 01	2018-06-17	601312.893	6398647.581	*Setophaga palmarum*	Palm warbler	1
ARU 01	2018-06-17	601312.893	6398647.581	*Loxia curvirostra*	Red crossbill	3
ARU 01	2018-06-17	601312.893	6398647.581	*Passerella iliaca*	Red fox sparrow	1
ARU 01	2018-06-17	601312.893	6398647.581	*Larus delawarensis*	Ring-billed gull	1
ARU 01	2018-06-17	601312.893	6398647.581	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 01	2018-06-17	601312.893	6398647.581	*Loxia leucoptera*	Two-barred crossbill	1
ARU 01	2018-07-07	601312.893	6398647.581	*Turdus migratorius*	American robin	1
ARU 01	2018-07-07	601312.893	6398647.581	*Turdus migratorius*	American robin	1
ARU 01	2018-07-07	601312.893	6398647.581	*Spizella passerina*	Chipping sparrow	1
ARU 01	2018-07-07	601312.893	6398647.581	*Junco hyemalis*	Dark-eyed junco	1
ARU 01	2018-07-07	601312.893	6398647.581	*Junco hyemalis*	Dark-eyed junco	2
ARU 01	2018-07-07	601312.893	6398647.581	*Perisoreus canadensis*	Gray jay	1
ARU 01	2018-07-07	601312.893	6398647.581	*Setophaga palmarum*	Palm warbler	1
ARU 01	2018-07-07	601312.893	6398647.581	*Tachycineta bicolor*	Tree swallow	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 01	2018-07-07	601312.893	6398647.581	*Loxia leucoptera*	Two-barred crossbill	1
ARU 02	2018-05-31	605791.912	6398598.442	*Turdus migratorius*	American robin	1
ARU 02	2018-05-31	605791.912	6398598.442	*Branta canadensis*	Canada goose	3
ARU 02	2018-05-31	605791.912	6398598.442	*Spizella passerina*	Chipping sparrow	1
ARU 02	2018-05-31	605791.912	6398598.442	*Junco hyemalis*	Dark-eyed junco	2
ARU 02	2018-05-31	605791.912	6398598.442	*Gavia immer*	Common loon	1
ARU 02	2018-05-31	605791.912	6398598.442	*Perisoreus canadensis*	Gray jay	1
ARU 02	2018-05-31	605791.912	6398598.442	*Catharus guttatus*	Hermit thrush	1
ARU 02	2018-05-31	605791.912	6398598.442	*Catharus guttatus*	Hermit thrush	1
ARU 02	2018-05-31	605791.912	6398598.442	*Setophaga palmarum*	Palm warbler	1
ARU 02	2018-05-31	605791.912	6398598.442	*Setophaga palmarum*	Palm warbler	1
ARU 02	2018-05-31	605791.912	6398598.442	*Loxia curvirostra*	Red crossbill	2
ARU 02	2018-05-31	605791.912	6398598.442	*Passerella iliaca*	Red fox sparrow	1
ARU 02	2018-05-31	605791.912	6398598.442	*Piciformes*	Woodpeckers	1
ARU 02	2018-05-31	605791.912	6398598.442	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 02	2018-06-18	605791.912	6398598.442	*Corvus brachyrhynchos*	American crow	1
ARU 02	2018-06-18	605791.912	6398598.442	*Junco hyemalis*	Dark-eyed junco	2
ARU 02	2018-06-18	605791.912	6398598.442	*Junco hyemalis*	Dark-eyed junco	1
ARU 02	2018-06-18	605791.912	6398598.442	*Perisoreus canadensis*	Gray jay	2
ARU 02	2018-06-18	605791.912	6398598.442	*Catharus guttatus*	Hermit thrush	2
ARU 02	2018-06-18	605791.912	6398598.442	*Setophaga palmarum*	Palm warbler	2
ARU 02	2018-06-18	605791.912	6398598.442	*Passerella iliaca*	Red fox sparrow	2
ARU 02	2018-06-18	605791.912	6398598.442	*Euphagus carolinus*	Rusty blackbird	1
ARU 02	2018-06-18	605791.912	6398598.442	*Setophaga coronata*	Yellow-rumped warbler	3
ARU 02	2018-07-06	605791.912	6398598.442	*Picoides dorsalis*	American three-toed woodpecker	1
ARU 02	2018-07-06	605791.912	6398598.442	*Junco hyemalis*	Dark-eyed junco	2
ARU 02	2018-07-06	605791.912	6398598.442	*Junco hyemalis*	Dark-eyed junco	1
ARU 02	2018-07-06	605791.912	6398598.442	*Gavia immer*	Common loon	1
ARU 02	2018-07-06	605791.912	6398598.442	*Perisoreus canadensis*	Gray jay	1
ARU 02	2018-07-06	605791.912	6398598.442	*Catharus guttatus*	Hermit thrush	1
ARU 02	2018-07-06	605791.912	6398598.442	*Catharus guttatus*	Hermit thrush	2
ARU 02	2018-07-06	605791.912	6398598.442	*Setophaga palmarum*	Palm warbler	3
ARU 02	2018-07-06	605791.912	6398598.442	*Passerella iliaca*	Red fox sparrow	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 02	2018-07-06	605791.912	6398598.442	*Catharus ustulatus*	Swainson's thrush	1
ARU 02	2018-07-06	605791.912	6398598.442	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 03	2018-05-31	609905.884	6395870.496	*Turdus migratorius*	American robin	1
ARU 03	2018-05-31	609905.884	6395870.496	*Turdus migratorius*	American robin	1
ARU 03	2018-05-31	609905.884	6395870.496	*Branta canadensis*	Canada goose	2
ARU 03	2018-05-31	609905.884	6395870.496	*Spizella passerina*	Chipping sparrow	2
ARU 03	2018-05-31	609905.884	6395870.496	*Chordeiles minor*	Common nighthawk	1
ARU 03	2018-05-31	609905.884	6395870.496	*Junco hyemalis*	Dark-eyed junco	3
ARU 03	2018-05-31	609905.884	6395870.496	*Gavia immer*	Common loon	1
ARU 03	2018-05-31	609905.884	6395870.496	*Perisoreus canadensis*	Gray jay	1
ARU 03	2018-05-31	609905.884	6395870.496	*Catharus guttatus*	Hermit thrush	1
ARU 03	2018-05-31	609905.884	6395870.496	*Contopus cooperi*	Olive-sided flycatcher	2
ARU 03	2018-05-31	609905.884	6395870.496	*Setophaga palmarum*	Palm warbler	2
ARU 03	2018-05-31	609905.884	6395870.496	*Grus canadensis*	Sandhill crane	1
ARU 03	2018-05-31	609905.884	6395870.496	*Loxia leucoptera*	Two-barred crossbill	2
ARU 03	2018-05-31	609905.884	6395870.496	*Zonotrichia albicollis*	White-throated sparrow	3
ARU 03	2018-05-31	609905.884	6395870.496	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 03	2018-05-31	609905.884	6395870.496	*Piciformes*	Woodpeckers	1
ARU 03	2018-05-31	609905.884	6395870.496	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 03	2018-06-19	609905.884	6395870.496	*Corvus brachyrhynchos*	American crow	2
ARU 03	2018-06-19	609905.884	6395870.496	*Turdus migratorius*	American robin	2
ARU 03	2018-06-19	609905.884	6395870.496	*Setophaga castanea*	Bay-breasted warbler	3
ARU 03	2018-06-19	609905.884	6395870.496	*Spizella passerina*	Chipping sparrow	1
ARU 03	2018-06-19	609905.884	6395870.496	*Junco hyemalis*	Dark-eyed junco	2
ARU 03	2018-06-19	609905.884	6395870.496	*Gavia immer*	Common loon	2
ARU 03	2018-06-19	609905.884	6395870.496	*Tringa melanoleuca*	Greater yellowlegs	1
ARU 03	2018-06-19	609905.884	6395870.496	*Perisoreus canadensis*	Gray jay	1
ARU 03	2018-06-19	609905.884	6395870.496	*Catharus guttatus*	Hermit thrush	2
ARU 03	2018-06-19	609905.884	6395870.496	*Melospiza melodia*	Song sparrow	1
ARU 03	2018-06-19	609905.884	6395870.496	*Melospiza georgiana*	Swamp sparrow	1
ARU 03	2018-06-19	609905.884	6395870.496	*Tachycineta bicolor*	Tree swallow	1
ARU 03	2018-06-19	609905.884	6395870.496	*Loxia leucoptera*	Two-barred crossbill	3
ARU 03	2018-06-19	609905.884	6395870.496	*Zonotrichia albicollis*	White-throated sparrow	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 03	2018-06-19	609905.884	6395870.496	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 03	2018-07-09	609905.884	6395870.496	*Turdus migratorius*	American robin	1
ARU 03	2018-07-09	609905.884	6395870.496	*Spizella passerina*	Chipping sparrow	1
ARU 03	2018-07-09	609905.884	6395870.496	*Junco hyemalis*	Dark-eyed junco	4
ARU 03	2018-07-09	609905.884	6395870.496	*Gavia immer*	Common loon	1
ARU 03	2018-07-09	609905.884	6395870.496	*Gavia immer*	Common loon	1
ARU 03	2018-07-09	609905.884	6395870.496	*Catharus guttatus*	Hermit thrush	1
ARU 03	2018-07-09	609905.884	6395870.496	*Catharus guttatus*	Hermit thrush	1
ARU 03	2018-07-09	609905.884	6395870.496	*Melospiza melodia*	Song sparrow	1
ARU 03	2018-07-09	609905.884	6395870.496	*Zonotrichia albicollis*	White-throated sparrow	3
ARU 03	2018-07-09	609905.884	6395870.496	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 04	2018-06-10	608183.077	6396958.324	*Turdus migratorius*	American robin	1
ARU 04	2018-06-10	608183.077	6396958.324	*Hirundo rustica*	Barn swallow	1
ARU 04	2018-06-10	608183.077	6396958.324	*Picoides arcticus*	Black-backed woodpecker	1
ARU 04	2018-06-10	608183.077	6396958.324	*Branta canadensis*	Canada goose	1
ARU 04	2018-06-10	608183.077	6396958.324	*Spizella passerina*	Chipping sparrow	2
ARU 04	2018-06-10	608183.077	6396958.324	*Junco hyemalis*	Dark-eyed junco	2
ARU 04	2018-06-10	608183.077	6396958.324	*Strix nebulosa*	Great gray owl	1
ARU 04	2018-06-10	608183.077	6396958.324	*Tringa melanoleuca*	Greater yellowlegs	1
ARU 04	2018-06-10	608183.077	6396958.324	*Catharus guttatus*	Hermit thrush	2
ARU 04	2018-06-10	608183.077	6396958.324	*Melospiza lincolnii*	Lincoln's sparrow	2
ARU 04	2018-06-10	608183.077	6396958.324	*Colaptes auratus*	Northern flicker	2
ARU 04	2018-06-10	608183.077	6396958.324	*Corvus corax*	Northern raven	1
ARU 04	2018-06-10	608183.077	6396958.324	*Setophaga palmarum*	Palm warbler	1
ARU 04	2018-06-10	608183.077	6396958.324	*Loxia curvirostra*	Red crossbill	1
ARU 04	2018-06-10	608183.077	6396958.324	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 04	2018-06-10	608183.077	6396958.324	*Melospiza melodia*	Song sparrow	3
ARU 04	2018-06-10	608183.077	6396958.324	*Bartramia longicauda*	Upland sandpiper	1
ARU 04	2018-06-10	608183.077	6396958.324	*Zonotrichia albicollis*	White-throated sparrow	2
ARU 04	2018-06-10	608183.077	6396958.324	*Piciformes*	Woodpeckers	1
ARU 04	2018-06-22	608183.077	6396958.324	*Corvus brachyrhynchos*	American crow	1
ARU 04	2018-06-22	608183.077	6396958.324	*Turdus migratorius*	American robin	3
ARU 04	2018-06-22	608183.077	6396958.324	*Hirundo rustica*	Barn swallow	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 04	2018-06-22	608183.077	6396958.324	*Spizella passerina*	Chipping sparrow	2
ARU 04	2018-06-22	608183.077	6396958.324	*Mergus merganser*	Common merganser	1
ARU 04	2018-06-22	608183.077	6396958.324	*Junco hyemalis*	Dark-eyed junco	2
ARU 04	2018-06-22	608183.077	6396958.324	*Catharus guttatus*	Hermit thrush	1
ARU 04	2018-06-22	608183.077	6396958.324	*Charadrius vociferus*	Killdeer	1
ARU 04	2018-06-22	608183.077	6396958.324	*Tringa flavipes*	Lesser yellowlegs	1
ARU 04	2018-06-22	608183.077	6396958.324	*Melospiza lincolnii*	Lincoln's sparrow	2
ARU 04	2018-06-22	608183.077	6396958.324	*Colaptes auratus*	Northern flicker	1
ARU 04	2018-06-22	608183.077	6396958.324	*Corvus corax*	Northern raven	1
ARU 04	2018-06-22	608183.077	6396958.324	*Setophaga palmarum*	Palm warbler	1
ARU 04	2018-06-22	608183.077	6396958.324	*Loxia curvirostra*	Red crossbill	2
ARU 04	2018-06-22	608183.077	6396958.324	*Grus canadensis*	Sandhill crane	2
ARU 04	2018-06-22	608183.077	6396958.324	*Melospiza melodia*	Song sparrow	1
ARU 04	2018-06-22	608183.077	6396958.324	*Actitis macularius*	Spotted sandpiper	1
ARU 04	2018-06-22	608183.077	6396958.324	*Melospiza georgiana*	Swamp sparrow	1
ARU 04	2018-06-22	608183.077	6396958.324	*Zonotrichia leucophrys*	White-crowned sparrow	2
ARU 04	2018-06-22	608183.077	6396958.324	*Zonotrichia albicollis*	White-throated sparrow	3
ARU 04	2018-06-22	608183.077	6396958.324	*Gallinago delicata*	Wilson's snipe	1
ARU 04	2018-06-22	608183.077	6396958.324	*Piciformes*	Woodpeckers	1
ARU 04	2018-06-22	608183.077	6396958.324	*Piciformes*	Woodpeckers	1
ARU 04	2018-06-22	608183.077	6396958.324	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 04	2018-07-08	608183.077	6396958.324	*Branta canadensis*	Canada goose	1
ARU 04	2018-07-08	608183.077	6396958.324	*Spizella passerina*	Chipping sparrow	3
ARU 04	2018-07-08	608183.077	6396958.324	*Mergus merganser*	Common merganser	1
ARU 04	2018-07-08	608183.077	6396958.324	*Junco hyemalis*	Dark-eyed junco	2
ARU 04	2018-07-08	608183.077	6396958.324	*Gavia immer*	Common loon	1
ARU 04	2018-07-08	608183.077	6396958.324	*Catharus guttatus*	Hermit thrush	1
ARU 04	2018-07-08	608183.077	6396958.324	*Melospiza lincolnii*	Lincoln's sparrow	3
ARU 04	2018-07-08	608183.077	6396958.324	*Contopus cooperi*	Olive-sided flycatcher	1
ARU 04	2018-07-08	608183.077	6396958.324	*Melospiza melodia*	Song sparrow	1
ARU 04	2018-07-08	608183.077	6396958.324	*Melospiza melodia*	Song sparrow	1
ARU 04	2018-07-08	608183.077	6396958.324	*Zonotrichia leucophrys*	White-crowned sparrow	1
ARU 04	2018-07-08	608183.077	6396958.324	*Zonotrichia albicollis*	White-throated sparrow	5

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 05	2018-06-01	603793.641	6394437.22	*Spizella passerina*	Chipping sparrow	1
ARU 05	2018-06-01	603793.641	6394437.22	*Spizella passerina*	Chipping sparrow	1
ARU 05	2018-06-01	603793.641	6394437.22	*Mergus merganser*	Common merganser	3
ARU 05	2018-06-01	603793.641	6394437.22	*Chordeiles minor*	Common nighthawk	1
ARU 05	2018-06-01	603793.641	6394437.22	*Junco hyemalis*	Dark-eyed junco	1
ARU 05	2018-06-01	603793.641	6394437.22	*Gavia immer*	Common loon	1
ARU 05	2018-06-01	603793.641	6394437.22	*Catharus guttatus*	Hermit thrush	1
ARU 05	2018-06-01	603793.641	6394437.22	*Tringa flavipes*	Lesser yellowlegs	1
ARU 05	2018-06-01	603793.641	6394437.22	*Melospiza lincolnii*	Lincoln's sparrow	2
ARU 05	2018-06-01	603793.641	6394437.22	*Aythya americana*	Redhead	4
ARU 05	2018-06-01	603793.641	6394437.22	*Larus delawarensis*	Ring-billed gull	1
ARU 05	2018-06-01	603793.641	6394437.22	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 05	2018-06-01	603793.641	6394437.22	*Melospiza melodia*	Song sparrow	2
ARU 05	2018-06-01	603793.641	6394437.22	*Catharus ustulatus*	Swainson's thrush	1
ARU 05	2018-06-01	603793.641	6394437.22	*Zonotrichia albicollis*	White-throated sparrow	3
ARU 05	2018-06-01	603793.641	6394437.22	*Piciformes*	Woodpeckers	1
ARU 05	2018-06-15	603793.641	6394437.22	*Larus californicus*	California gull	1
ARU 05	2018-06-15	603793.641	6394437.22	*Spizella passerina*	Chipping sparrow	1
ARU 05	2018-06-15	603793.641	6394437.22	*Gavia immer*	Common loon	1
ARU 05	2018-06-15	603793.641	6394437.22	*Perisoreus canadensis*	Gray jay	1
ARU 05	2018-06-15	603793.641	6394437.22	*Melospiza melodia*	Song sparrow	2
ARU 05	2018-06-15	603793.641	6394437.22	*Zonotrichia albicollis*	White-throated sparrow	2
ARU 05	2018-06-15	603793.641	6394437.22	*Zonotrichia albicollis*	White-throated sparrow	2
ARU 05	2018-06-15	603793.641	6394437.22	*Setophaga coronata*	Yellow-rumped warbler	3
ARU 05	2018-07-12	603793.641	6394437.22	*Turdus migratorius*	American robin	1
ARU 05	2018-07-12	603793.641	6394437.22	*Spizella passerina*	Chipping sparrow	1
ARU 05	2018-07-12	603793.641	6394437.22	*Spizella passerina*	Chipping sparrow	1
ARU 05	2018-07-12	603793.641	6394437.22	*Junco hyemalis*	Dark-eyed junco	2
ARU 05	2018-07-12	603793.641	6394437.22	*Ammodramus leconteii*	LeConte's sparrow	1
ARU 05	2018-07-12	603793.641	6394437.22	*Melospiza lincolnii*	Lincoln's sparrow	1
ARU 05	2018-07-12	603793.641	6394437.22	*Melospiza melodia*	Song sparrow	4
ARU 05	2018-07-12	603793.641	6394437.22	*Actitis macularius*	Spotted sandpiper	1
ARU 05	2018-07-12	603793.641	6394437.22	*Zonotrichia albicollis*	White-throated sparrow	2

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 05	2018-07-12	603793.641	6394437.22	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 06	2018-05-30	599234.54	6391404.598	*Turdus migratorius*	American robin	2
ARU 06	2018-05-30	599234.54	6391404.598	*Picoides arcticus*	Black-backed woodpecker	1
ARU 06	2018-05-30	599234.54	6391404.598	*Spizella passerina*	Chipping sparrow	2
ARU 06	2018-05-30	599234.54	6391404.598	*Junco hyemalis*	Dark-eyed junco	2
ARU 06	2018-05-30	599234.54	6391404.598	*Gavia immer*	Common loon	1
ARU 06	2018-05-30	599234.54	6391404.598	*Perisoreus canadensis*	Gray jay	1
ARU 06	2018-05-30	599234.54	6391404.598	*Setophaga palmarum*	Palm warbler	1
ARU 06	2018-05-30	599234.54	6391404.598	*Loxia curvirostra*	Red crossbill	3
ARU 06	2018-05-30	599234.54	6391404.598	*Larus delawarensis*	Ring-billed gull	2
ARU 06	2018-05-30	599234.54	6391404.598	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 06	2018-05-30	599234.54	6391404.598	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 06	2018-05-30	599234.54	6391404.598	*Grus canadensis*	Sandhill crane	2
ARU 06	2018-05-30	599234.54	6391404.598	*Melospiza georgiana*	Swamp sparrow	1
ARU 06	2018-05-30	599234.54	6391404.598	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 06	2018-05-30	599234.54	6391404.598	*Cardellina pusilla*	Wilson's warbler	1
ARU 06	2018-05-30	599234.54	6391404.598	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 06	2018-06-13	599234.54	6391404.598	*Corvus brachyrhynchos*	American crow	1
ARU 06	2018-06-13	599234.54	6391404.598	*Spizella passerina*	Chipping sparrow	3
ARU 06	2018-06-13	599234.54	6391404.598	*Melospiza melodia*	Song sparrow	1
ARU 06	2018-06-13	599234.54	6391404.598	*Melospiza melodia*	Song sparrow	1
ARU 06	2018-06-13	599234.54	6391404.598	*Catharus ustulatus*	Swainson's thrush	2
ARU 06	2018-06-13	599234.54	6391404.598	*Zonotrichia albicollis*	White-throated sparrow	2
ARU 06	2018-06-13	599234.54	6391404.598	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 06	2018-07-07	599234.54	6391404.598	*Spizella passerina*	Chipping sparrow	1
ARU 06	2018-07-07	599234.54	6391404.598	*Junco hyemalis*	Dark-eyed junco	2
ARU 06	2018-07-07	599234.54	6391404.598	*Perisoreus canadensis*	Gray jay	1
ARU 06	2018-07-07	599234.54	6391404.598	*Catharus guttatus*	Hermit thrush	1
ARU 06	2018-07-07	599234.54	6391404.598	*Ammodramus leconteii*	LeConte's sparrow	1
ARU 06	2018-07-07	599234.54	6391404.598	*Setophaga palmarum*	Palm warbler	1
ARU 06	2018-07-07	599234.54	6391404.598	*Loxia curvirostra*	Red crossbill	2
ARU 06	2018-07-07	599234.54	6391404.598	*Passerella iliaca*	Red fox sparrow	1
ARU 06	2018-07-07	599234.54	6391404.598	*Melospiza georgiana*	Swamp sparrow	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 07	2018-06-09	606540.753	6385406.776	*Corvus brachyrhynchos*	American crow	1
ARU 07	2018-06-09	606540.753	6385406.776	*Turdus migratorius*	American robin	1
ARU 07	2018-06-09	606540.753	6385406.776	*Megaceryle alcyon*	Belted kingfisher	1
ARU 07	2018-06-09	606540.753	6385406.776	*Picoides arcticus*	Black-backed woodpecker	1
ARU 07	2018-06-09	606540.753	6385406.776	*Spizella passerina*	Chipping sparrow	3
ARU 07	2018-06-09	606540.753	6385406.776	*Junco hyemalis*	Dark-eyed junco	2
ARU 07	2018-06-09	606540.753	6385406.776	*Tringa melanoleuca*	Greater yellowlegs	1
ARU 07	2018-06-09	606540.753	6385406.776	*Contopus cooperi*	Olive-sided flycatcher	1
ARU 07	2018-06-09	606540.753	6385406.776	*Oreothlypis celata*	Orange-crowned warbler	1
ARU 07	2018-06-09	606540.753	6385406.776	*Larus delawarensis*	Ring-billed gull	2
ARU 07	2018-06-09	606540.753	6385406.776	*Larus delawarensis*	Ring-billed gull	2
ARU 07	2018-06-09	606540.753	6385406.776	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 07	2018-06-09	606540.753	6385406.776	*Vireo solitarius*	Solitary vireo	1
ARU 07	2018-06-09	606540.753	6385406.776	*Catharus ustulatus*	Swainson's thrush	1
ARU 07	2018-06-09	606540.753	6385406.776	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 07	2018-06-09	606540.753	6385406.776	*Gallinago delicata*	Wilson's snipe	1
ARU 07	2018-06-09	606540.753	6385406.776	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 07	2018-06-19	606540.753	6385406.776	*Turdus migratorius*	American robin	1
ARU 07	2018-06-19	606540.753	6385406.776	*Turdus migratorius*	American robin	1
ARU 07	2018-06-19	606540.753	6385406.776	*Picoides arcticus*	Black-backed woodpecker	1
ARU 07	2018-06-19	606540.753	6385406.776	*Branta canadensis*	Canada goose	3
ARU 07	2018-06-19	606540.753	6385406.776	*Branta canadensis*	Canada goose	1
ARU 07	2018-06-19	606540.753	6385406.776	*Bombycilla cedrorum*	Cedar waxwing	1
ARU 07	2018-06-19	606540.753	6385406.776	*Spizella passerina*	Chipping sparrow	1
ARU 07	2018-06-19	606540.753	6385406.776	*Spizella passerina*	Chipping sparrow	4
ARU 07	2018-06-19	606540.753	6385406.776	*Junco hyemalis*	Dark-eyed junco	1
ARU 07	2018-06-19	606540.753	6385406.776	*Contopus cooperi*	Olive-sided flycatcher	1
ARU 07	2018-06-19	606540.753	6385406.776	*Larus delawarensis*	Ring-billed gull	3
ARU 07	2018-06-19	606540.753	6385406.776	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 07	2018-06-19	606540.753	6385406.776	*Catharus ustulatus*	Swainson's thrush	2
ARU 07	2018-06-19	606540.753	6385406.776	*Loxia leucoptera*	Two-barred crossbill	2
ARU 07	2018-06-19	606540.753	6385406.776	*Bartramia longicauda*	Upland sandpiper	1
ARU 07	2018-06-19	606540.753	6385406.776	*Zonotrichia albicollis*	White-throated sparrow	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 07	2018-06-19	606540.753	6385406.776	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 07	2018-06-19	606540.753	6385406.776	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 07	2018-06-19	606540.753	6385406.776	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 07	2018-07-01	606540.753	6385406.776	*Turdus migratorius*	American robin	1
ARU 07	2018-07-01	606540.753	6385406.776	*Turdus migratorius*	American robin	1
ARU 07	2018-07-01	606540.753	6385406.776	*Spizella passerina*	Chipping sparrow	2
ARU 07	2018-07-01	606540.753	6385406.776	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 07	2018-07-01	606540.753	6385406.776	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 08	2018-06-10	603388.452	6391741.952	*Bombycilla cedrorum*	Cedar waxwing	1
ARU 08	2018-06-10	603388.452	6391741.952	*Spizella passerina*	Chipping sparrow	3
ARU 08	2018-06-10	603388.452	6391741.952	*Gavia immer*	Common loon	1
ARU 08	2018-06-10	603388.452	6391741.952	*Tringa melanoleuca*	Greater yellowlegs	1
ARU 08	2018-06-10	603388.452	6391741.952	*Setophaga palmarum*	Palm warbler	1
ARU 08	2018-06-10	603388.452	6391741.952	*Loxia curvirostra*	Red crossbill	2
ARU 08	2018-06-10	603388.452	6391741.952	*Passerella iliaca*	Red fox sparrow	1
ARU 08	2018-06-10	603388.452	6391741.952	*Larus delawarensis*	Ring-billed gull	1
ARU 08	2018-06-10	603388.452	6391741.952	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 08	2018-06-10	603388.452	6391741.952	*Vireo solitarius*	Solitary vireo	1
ARU 08	2018-06-10	603388.452	6391741.952	*Catharus ustulatus*	Swainson's thrush	3
ARU 08	2018-06-10	603388.452	6391741.952	*Oreothlypis peregrina*	Tennessee warbler	1
ARU 08	2018-06-10	603388.452	6391741.952	*Zonotrichia albicollis*	White-throated sparrow	2
ARU 08	2018-06-10	603388.452	6391741.952	*Empidonax flaviventris*	Yellow-bellied flycatcher	1
ARU 08	2018-06-10	603388.452	6391741.952	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 08	2018-06-10	603388.452	6391741.952	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 08	2018-06-20	603388.452	6391741.952	*Turdus migratorius*	American robin	2
ARU 08	2018-06-20	603388.452	6391741.952	*Megaceryle alcyon*	Belted kingfisher	1
ARU 08	2018-06-20	603388.452	6391741.952	*Spizella passerina*	Chipping sparrow	1
ARU 08	2018-06-20	603388.452	6391741.952	*Spizella passerina*	Chipping sparrow	3
ARU 08	2018-06-20	603388.452	6391741.952	*Junco hyemalis*	Dark-eyed junco	2
ARU 08	2018-06-20	603388.452	6391741.952	*Oreothlypis celata*	Orange-crowned warbler	1
ARU 08	2018-06-20	603388.452	6391741.952	*Setophaga palmarum*	Palm warbler	1
ARU 08	2018-06-20	603388.452	6391741.952	*Setophaga palmarum*	Palm warbler	1
ARU 08	2018-06-20	603388.452	6391741.952	*Passerella iliaca*	Red fox sparrow	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 08	2018-06-20	603388.452	6391741.952	*Larus delawarensis*	Ring-billed gull	1
ARU 08	2018-06-20	603388.452	6391741.952	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 08	2018-06-20	603388.452	6391741.952	*Catharus ustulatus*	Swainson's thrush	1
ARU 08	2018-06-20	603388.452	6391741.952	*Oreothlypis peregrina*	Tennessee warbler	1
ARU 08	2018-06-20	603388.452	6391741.952	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 08	2018-06-20	603388.452	6391741.952	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 08	2018-06-20	603388.452	6391741.952	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 08	2018-07-09	603388.452	6391741.952	*Turdus migratorius*	American robin	1
ARU 08	2018-07-09	603388.452	6391741.952	*Megaceryle alcyon*	Belted kingfisher	1
ARU 08	2018-07-09	603388.452	6391741.952	*Spizella passerina*	Chipping sparrow	1
ARU 08	2018-07-09	603388.452	6391741.952	*Junco hyemalis*	Dark-eyed junco	2
ARU 08	2018-07-09	603388.452	6391741.952	*Catharus guttatus*	Hermit thrush	1
ARU 08	2018-07-09	603388.452	6391741.952	*Catharus guttatus*	Hermit thrush	1
ARU 08	2018-07-09	603388.452	6391741.952	*Geothlypis philadelphia*	Mourning warbler	1
ARU 08	2018-07-09	603388.452	6391741.952	*Oreothlypis celata*	Orange-crowned warbler	2
ARU 08	2018-07-09	603388.452	6391741.952	*Passerella iliaca*	Red fox sparrow	1
ARU 08	2018-07-09	603388.452	6391741.952	*Catharus ustulatus*	Swainson's thrush	1
ARU 08	2018-07-09	603388.452	6391741.952	*Zonotrichia albicollis*	White-throated sparrow	3
ARU 09	2018-06-08	605602.388	6393302.55	*Corvus brachyrhynchos*	American crow	1
ARU 09	2018-06-08	605602.388	6393302.55	*Branta canadensis*	Canada goose	1
ARU 09	2018-06-08	605602.388	6393302.55	*Branta canadensis*	Canada goose	7
ARU 09	2018-06-08	605602.388	6393302.55	*Spizella passerina*	Chipping sparrow	1
ARU 09	2018-06-08	605602.388	6393302.55	*Gavia immer*	Common loon	1
ARU 09	2018-06-08	605602.388	6393302.55	*Gavia immer*	Common loon	1
ARU 09	2018-06-08	605602.388	6393302.55	*Perisoreus canadensis*	Gray jay	1
ARU 09	2018-06-08	605602.388	6393302.55	*Catharus guttatus*	Hermit thrush	2
ARU 09	2018-06-08	605602.388	6393302.55	*Setophaga palmarum*	Palm warbler	1
ARU 09	2018-06-08	605602.388	6393302.55	*Loxia curvirostra*	Red crossbill	2
ARU 09	2018-06-08	605602.388	6393302.55	*Setophaga coronata*	Yellow-rumped warbler	3
ARU 09	2018-06-08	605602.388	6393302.55	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 09	2018-06-16	605602.388	6393302.55	*Turdus migratorius*	American robin	2
ARU 09	2018-06-16	605602.388	6393302.55	*Spizella passerina*	Chipping sparrow	2
ARU 09	2018-06-16	605602.388	6393302.55	*Spizella passerina*	Chipping sparrow	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 09	2018-06-16	605602.388	6393302.55	*Junco hyemalis*	Dark-eyed junco	2
ARU 09	2018-06-16	605602.388	6393302.55	*Perisoreus canadensis*	Gray jay	1
ARU 09	2018-06-16	605602.388	6393302.55	*Catharus guttatus*	Hermit thrush	1
ARU 09	2018-06-16	605602.388	6393302.55	*Setophaga palmarum*	Palm warbler	1
ARU 09	2018-06-16	605602.388	6393302.55	*Loxia curvirostra*	Red crossbill	2
ARU 09	2018-06-16	605602.388	6393302.55	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 09	2018-07-04	605602.388	6393302.55	*Spizella passerina*	Chipping sparrow	1
ARU 09	2018-07-04	605602.388	6393302.55	*Chordeiles minor*	Common nighthawk	4
ARU 09	2018-07-04	605602.388	6393302.55	*Junco hyemalis*	Dark-eyed junco	3
ARU 09	2018-07-04	605602.388	6393302.55	*Perisoreus canadensis*	Gray jay	2
ARU 09	2018-07-04	605602.388	6393302.55	*Catharus guttatus*	Hermit thrush	3
ARU 09	2018-07-04	605602.388	6393302.55	*Setophaga palmarum*	Palm warbler	1
ARU 09	2018-07-04	605602.388	6393302.55	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 09	2018-07-04	605602.388	6393302.55	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 10	2018-06-03	607388.365	6394102.646	*Empidonax alnorum*	Alder flycatcher	1
ARU 10	2018-06-03	607388.365	6394102.646	*Corvus brachyrhynchos*	American crow	1
ARU 10	2018-06-03	607388.365	6394102.646	*Turdus migratorius*	American robin	1
ARU 10	2018-06-03	607388.365	6394102.646	*Chroicocephalus philadelphia*	Bonaparte's gull	1
ARU 10	2018-06-03	607388.365	6394102.646	*Chroicocephalus philadelphia*	Bonaparte's gull	1
ARU 10	2018-06-03	607388.365	6394102.646	*Spizella passerina*	Chipping sparrow	1
ARU 10	2018-06-03	607388.365	6394102.646	*Spizella pallida*	Clay-colored sparrow	1
ARU 10	2018-06-03	607388.365	6394102.646	*Junco hyemalis*	Dark-eyed junco	4
ARU 10	2018-06-03	607388.365	6394102.646	*Setophaga magnolia*	Magnolia warbler	1
ARU 10	2018-06-03	607388.365	6394102.646	*Setophaga palmarum*	Palm warbler	1
ARU 10	2018-06-03	607388.365	6394102.646	*Euphagus carolinus*	Rusty blackbird	1
ARU 10	2018-06-03	607388.365	6394102.646	*Melospiza melodia*	Song sparrow	1
ARU 10	2018-06-03	607388.365	6394102.646	*Melospiza melodia*	Song sparrow	2
ARU 10	2018-06-03	607388.365	6394102.646	*Zonotrichia albicollis*	White-throated sparrow	2
ARU 10	2018-06-03	607388.365	6394102.646	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 10	2018-06-03	607388.365	6394102.646	*Piciformes*	Woodpeckers	1
ARU 10	2018-06-13	607388.365	6394102.646	*Empidonax alnorum*	Alder flycatcher	1
ARU 10	2018-06-13	607388.365	6394102.646	*Empidonax alnorum*	Alder flycatcher	1
ARU 10	2018-06-13	607388.365	6394102.646	*Turdus migratorius*	American robin	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 10	2018-06-13	607388.365	6394102.646	*Turdus migratorius*	American robin	1
ARU 10	2018-06-13	607388.365	6394102.646	*Spizella passerina*	Chipping sparrow	1
ARU 10	2018-06-13	607388.365	6394102.646	*Junco hyemalis*	Dark-eyed junco	1
ARU 10	2018-06-13	607388.365	6394102.646	*Setophaga magnolia*	Magnolia warbler	1
ARU 10	2018-06-13	607388.365	6394102.646	*Parkesia noveboracensis*	Northern waterthrush	1
ARU 10	2018-06-13	607388.365	6394102.646	*Passerella iliaca*	Red fox sparrow	1
ARU 10	2018-06-13	607388.365	6394102.646	*Vireo olivaceus*	Red-eyed vireo	1
ARU 10	2018-06-13	607388.365	6394102.646	*Larus delawarensis*	Ring-billed gull	1
ARU 10	2018-06-13	607388.365	6394102.646	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 10	2018-06-13	607388.365	6394102.646	*Euphagus carolinus*	Rusty blackbird	1
ARU 10	2018-06-13	607388.365	6394102.646	*Melospiza melodia*	Song sparrow	1
ARU 10	2018-06-13	607388.365	6394102.646	*Melospiza melodia*	Song sparrow	1
ARU 10	2018-06-13	607388.365	6394102.646	*Actitis macularius*	Spotted sandpiper	1
ARU 10	2018-06-13	607388.365	6394102.646	*Catharus ustulatus*	Swainson's thrush	1
ARU 10	2018-06-13	607388.365	6394102.646	*Oreothlypis peregrina*	Tennessee warbler	1
ARU 10	2018-06-13	607388.365	6394102.646	*Tachycineta bicolor*	Tree swallow	3
ARU 10	2018-06-13	607388.365	6394102.646	*Zonotrichia albicollis*	White-throated sparrow	3
ARU 10	2018-06-13	607388.365	6394102.646	*Gallinago delicata*	Wilson's snipe	1
ARU 10	2018-06-13	607388.365	6394102.646	*Cardellina pusilla*	Wilson's warbler	1
ARU 10	2018-06-13	607388.365	6394102.646	*Setophaga petechia*	Yellow warbler	2
ARU 10	2018-06-13	607388.365	6394102.646	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 10	2018-06-13	607388.365	6394102.646	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 10	2018-06-27	607388.365	6394102.646	*Empidonax alnorum*	Alder flycatcher	1
ARU 10	2018-06-27	607388.365	6394102.646	*Corvus brachyrhynchos*	American crow	1
ARU 10	2018-06-27	607388.365	6394102.646	*Turdus migratorius*	American robin	2
ARU 10	2018-06-27	607388.365	6394102.646	*Chroicocephalus philadelphia*	Bonaparte's gull	1
ARU 10	2018-06-27	607388.365	6394102.646	*Chroicocephalus philadelphia*	Bonaparte's gull	1
ARU 10	2018-06-27	607388.365	6394102.646	*Spizella passerina*	Chipping sparrow	1
ARU 10	2018-06-27	607388.365	6394102.646	*Spizella passerina*	Chipping sparrow	1
ARU 10	2018-06-27	607388.365	6394102.646	*Spizella pallida*	Clay-colored sparrow	1
ARU 10	2018-06-27	607388.365	6394102.646	*Junco hyemalis*	Dark-eyed junco	1
ARU 10	2018-06-27	607388.365	6394102.646	*Melospiza lincolnii*	Lincoln's sparrow	1
ARU 10	2018-06-27	607388.365	6394102.646	*Setophaga magnolia*	Magnolia warbler	1

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Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 10	2018-06-27	607388.365	6394102.646	*Colaptes auratus*	Northern flicker	1
ARU 10	2018-06-27	607388.365	6394102.646	*Setophaga palmarum*	Palm warbler	1
ARU 10	2018-06-27	607388.365	6394102.646	*Passerella iliaca*	Red fox sparrow	1
ARU 10	2018-06-27	607388.365	6394102.646	*Melospiza melodia*	Song sparrow	2
ARU 10	2018-06-27	607388.365	6394102.646	*Catharus ustulatus*	Swainson's thrush	1
ARU 10	2018-06-27	607388.365	6394102.646	*Catharus ustulatus*	Swainson's thrush	1
ARU 10	2018-06-27	607388.365	6394102.646	*Melospiza georgiana*	Swamp sparrow	1
ARU 10	2018-06-27	607388.365	6394102.646	*Bartramia longicauda*	Upland sandpiper	1
ARU 10	2018-06-27	607388.365	6394102.646	*Zonotrichia leucophrys*	White-crowned sparrow	2
ARU 10	2018-06-27	607388.365	6394102.646	*Zonotrichia albicollis*	White-throated sparrow	4
ARU 10	2018-06-27	607388.365	6394102.646	*Cardellina pusilla*	Wilson's warbler	1
ARU 10	2018-06-27	607388.365	6394102.646	*Cardellina pusilla*	Wilson's warbler	1
ARU 10	2018-06-27	607388.365	6394102.646	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 11	2018-06-06	605112.635	6390534.366	*Turdus migratorius*	American robin	1
ARU 11	2018-06-06	605112.635	6390534.366	*Hirundo rustica*	Barn swallow	1
ARU 11	2018-06-06	605112.635	6390534.366	*Chroicocephalus philadelphia*	Bonaparte's gull	1
ARU 11	2018-06-06	605112.635	6390534.366	*Spizella passerina*	Chipping sparrow	1
ARU 11	2018-06-06	605112.635	6390534.366	*Mergus merganser*	Common merganser	2
ARU 11	2018-06-06	605112.635	6390534.366	*Tringa melanoleuca*	Greater yellowlegs	1
ARU 11	2018-06-06	605112.635	6390534.366	*Perisoreus canadensis*	Gray jay	2
ARU 11	2018-06-06	605112.635	6390534.366	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 11	2018-06-06	605112.635	6390534.366	*Zonotrichia albicollis*	White-throated sparrow	2
ARU 11	2018-06-06	605112.635	6390534.366	*Gallinago delicata*	Wilson's snipe	1
ARU 11	2018-06-06	605112.635	6390534.366	*Cardellina pusilla*	Wilson's warbler	1
ARU 11	2018-06-06	605112.635	6390534.366	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 11	2018-06-15	605112.635	6390534.366	*Corvus brachyrhynchos*	American crow	1
ARU 11	2018-06-15	605112.635	6390534.366	*Turdus migratorius*	American robin	1
ARU 11	2018-06-15	605112.635	6390534.366	*Haliaeetus leucocephalus*	Bald eagle	1
ARU 11	2018-06-15	605112.635	6390534.366	*Hirundo rustica*	Barn swallow	1
ARU 11	2018-06-15	605112.635	6390534.366	*Spizella passerina*	Chipping sparrow	2
ARU 11	2018-06-15	605112.635	6390534.366	*Gavia immer*	Common loon	2
ARU 11	2018-06-15	605112.635	6390534.366	*Perisoreus canadensis*	Gray jay	1
ARU 11	2018-06-15	605112.635	6390534.366	*Melospiza lincolnii*	Lincoln's sparrow	1

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Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 11	2018-06-15	605112.635	6390534.366	*Setophaga palmarum*	Palm warbler	1
ARU 11	2018-06-15	605112.635	6390534.366	*Loxia curvirostra*	Red crossbill	1
ARU 11	2018-06-15	605112.635	6390534.366	*Vireo solitarius*	Solitary vireo	1
ARU 11	2018-06-15	605112.635	6390534.366	*Melospiza melodia*	Song sparrow	1
ARU 11	2018-06-15	605112.635	6390534.366	*Actitis macularius*	Spotted sandpiper	1
ARU 11	2018-06-15	605112.635	6390534.366	*Catharus ustulatus*	Swainson's thrush	1
ARU 11	2018-06-15	605112.635	6390534.366	*Melospiza georgiana*	Swamp sparrow	1
ARU 11	2018-06-15	605112.635	6390534.366	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 11	2018-06-15	605112.635	6390534.366	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 11	2018-06-15	605112.635	6390534.366	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 11	2018-06-30	605112.635	6390534.366	*Turdus migratorius*	American robin	1
ARU 11	2018-06-30	605112.635	6390534.366	*Hirundo rustica*	Barn swallow	1
ARU 11	2018-06-30	605112.635	6390534.366	*Chroicocephalus philadelphia*	Bonaparte's gull	2
ARU 11	2018-06-30	605112.635	6390534.366	*Spizella passerina*	Chipping sparrow	2
ARU 11	2018-06-30	605112.635	6390534.366	*Catharus guttatus*	Hermit thrush	1
ARU 11	2018-06-30	605112.635	6390534.366	*Colaptes auratus*	Northern flicker	1
ARU 11	2018-06-30	605112.635	6390534.366	*Oreothlypis celata*	Orange-crowned warbler	1
ARU 11	2018-06-30	605112.635	6390534.366	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 11	2018-06-30	605112.635	6390534.366	*Catharus ustulatus*	Swainson's thrush	1
ARU 11	2018-06-30	605112.635	6390534.366	*Melospiza georgiana*	Swamp sparrow	1
ARU 11	2018-06-30	605112.635	6390534.366	*Oreothlypis peregrina*	Tennessee warbler	1
ARU 11	2018-06-30	605112.635	6390534.366	*Loxia leucoptera*	Two-barred crossbill	2
ARU 11	2018-06-30	605112.635	6390534.366	*Zonotrichia albicollis*	White-throated sparrow	2
ARU 11	2018-06-30	605112.635	6390534.366	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 12	2018-06-10	602685.101	6387382.79	*Empidonax alnorum*	Alder flycatcher	1
ARU 12	2018-06-10	602685.101	6387382.79	*Turdus migratorius*	American robin	1
ARU 12	2018-06-10	602685.101	6387382.79	*Larus californicus*	California gull	1
ARU 12	2018-06-10	602685.101	6387382.79	*Spizella pallida*	Clay-colored sparrow	1
ARU 12	2018-06-10	602685.101	6387382.79	*Catharus guttatus*	Hermit thrush	1
ARU 12	2018-06-10	602685.101	6387382.79	*Tringa flavipes*	Lesser yellowlegs	1
ARU 12	2018-06-10	602685.101	6387382.79	*Setophaga magnolia*	Magnolia warbler	1
ARU 12	2018-06-10	602685.101	6387382.79	*Oreothlypis celata*	Orange-crowned warbler	1
ARU 12	2018-06-10	602685.101	6387382.79	*Setophaga palmarum*	Palm warbler	1

Appendix B, Table 5

Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 12	2018-06-10	602685.101	6387382.79	*Catharus ustulatus*	Swainson's thrush	2
ARU 12	2018-06-10	602685.101	6387382.79	*Melospiza georgiana*	Swamp sparrow	1
ARU 12	2018-06-10	602685.101	6387382.79	*Oreothlypis peregrina*	Tennessee warbler	2
ARU 12	2018-06-10	602685.101	6387382.79	*Oreothlypis peregrina*	Tennessee warbler	1
ARU 12	2018-06-10	602685.101	6387382.79	*Loxia leucoptera*	Two-barred crossbill	1
ARU 12	2018-06-10	602685.101	6387382.79	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 12	2018-06-10	602685.101	6387382.79	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 12	2018-06-10	602685.101	6387382.79	*Cardellina pusilla*	Wilson's warbler	2
ARU 12	2018-06-10	602685.101	6387382.79	*Piciformes*	Woodpeckers	1
ARU 12	2018-06-10	602685.101	6387382.79	*Setophaga petechia*	Yellow warbler	1
ARU 12	2018-06-17	602685.101	6387382.79	*Empidonax alnorum*	Alder flycatcher	2
ARU 12	2018-06-17	602685.101	6387382.79	*Mniotilta varia*	Black-and-white warbler	1
ARU 12	2018-06-17	602685.101	6387382.79	*Spizella passerina*	Chipping sparrow	1
ARU 12	2018-06-17	602685.101	6387382.79	*Junco hyemalis*	Dark-eyed junco	2
ARU 12	2018-06-17	602685.101	6387382.79	*Perisoreus canadensis*	Gray jay	1
ARU 12	2018-06-17	602685.101	6387382.79	*Setophaga magnolia*	Magnolia warbler	1
ARU 12	2018-06-17	602685.101	6387382.79	*Oreothlypis celata*	Orange-crowned warbler	1
ARU 12	2018-06-17	602685.101	6387382.79	*Setophaga palmarum*	Palm warbler	1
ARU 12	2018-06-17	602685.101	6387382.79	*Larus delawarensis*	Ring-billed gull	1
ARU 12	2018-06-17	602685.101	6387382.79	*Catharus ustulatus*	Swainson's thrush	3
ARU 12	2018-06-17	602685.101	6387382.79	*Melospiza georgiana*	Swamp sparrow	1
ARU 12	2018-06-17	602685.101	6387382.79	*Oreothlypis peregrina*	Tennessee warbler	3
ARU 12	2018-06-17	602685.101	6387382.79	*Zonotrichia albicollis*	White-throated sparrow	2
ARU 12	2018-06-17	602685.101	6387382.79	*Cardellina pusilla*	Wilson's warbler	2
ARU 12	2018-06-17	602685.101	6387382.79	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 12	2018-06-25	602685.101	6387382.79	*Empidonax alnorum*	Alder flycatcher	1
ARU 12	2018-06-25	602685.101	6387382.79	*Turdus migratorius*	American robin	1
ARU 12	2018-06-25	602685.101	6387382.79	*Spizella passerina*	Chipping sparrow	1
ARU 12	2018-06-25	602685.101	6387382.79	*Spizella pallida*	Clay-colored sparrow	2
ARU 12	2018-06-25	602685.101	6387382.79	*Perisoreus canadensis*	Gray jay	1
ARU 12	2018-06-25	602685.101	6387382.79	*Catharus guttatus*	Hermit thrush	1
ARU 12	2018-06-25	602685.101	6387382.79	*Oreothlypis celata*	Orange-crowned warbler	2
ARU 12	2018-06-25	602685.101	6387382.79	*Spinus pinus*	Pine siskin	3

Appendix B, Table 5

Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 12	2018-06-25	602685.101	6387382.79	*Passerella iliaca*	Red fox sparrow	1
ARU 12	2018-06-25	602685.101	6387382.79	*Melospiza melodia*	Song sparrow	1
ARU 12	2018-06-25	602685.101	6387382.79	*Catharus ustulatus*	Swainson's thrush	2
ARU 12	2018-06-25	602685.101	6387382.79	*Melospiza georgiana*	Swamp sparrow	1
ARU 12	2018-06-25	602685.101	6387382.79	*Melospiza georgiana*	Swamp sparrow	1
ARU 12	2018-06-25	602685.101	6387382.79	*Loxia leucoptera*	Two-barred crossbill	3
ARU 12	2018-06-25	602685.101	6387382.79	*Zonotrichia albicollis*	White-throated sparrow	4
ARU 12	2018-06-25	602685.101	6387382.79	*Empidonax flaviventris*	Yellow-bellied flycatcher	1
ARU 12	2018-06-25	602685.101	6387382.79	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 13	2018-06-03	606592.508	6388820.829	*Turdus migratorius*	American robin	1
ARU 13	2018-06-03	606592.508	6388820.829	*Spizella passerina*	Chipping sparrow	3
ARU 13	2018-06-03	606592.508	6388820.829	*Mergus merganser*	Common merganser	1
ARU 13	2018-06-03	606592.508	6388820.829	*Junco hyemalis*	Dark-eyed junco	1
ARU 13	2018-06-03	606592.508	6388820.829	*Tringa flavipes*	Lesser yellowlegs	1
ARU 13	2018-06-03	606592.508	6388820.829	*Vireo olivaceus*	Red-eyed vireo	1
ARU 13	2018-06-03	606592.508	6388820.829	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 13	2018-06-03	606592.508	6388820.829	*Melospiza melodia*	Song sparrow	1
ARU 13	2018-06-03	606592.508	6388820.829	*Falcipennis canadensis*	Spruce grouse	1
ARU 13	2018-06-03	606592.508	6388820.829	*Catharus ustulatus*	Swainson's thrush	2
ARU 13	2018-06-03	606592.508	6388820.829	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 13	2018-06-03	606592.508	6388820.829	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 13	2018-06-15	606592.508	6388820.829	*Corvus brachyrhynchos*	American crow	1
ARU 13	2018-06-15	606592.508	6388820.829	*Turdus migratorius*	American robin	1
ARU 13	2018-06-15	606592.508	6388820.829	*Spizella passerina*	Chipping sparrow	1
ARU 13	2018-06-15	606592.508	6388820.829	*Perisoreus canadensis*	Gray jay	1
ARU 13	2018-06-15	606592.508	6388820.829	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 13	2018-06-15	606592.508	6388820.829	*Euphagus carolinus*	Rusty blackbird	1
ARU 13	2018-06-15	606592.508	6388820.829	*Melospiza melodia*	Song sparrow	2
ARU 13	2018-06-15	606592.508	6388820.829	*Loxia leucoptera*	Two-barred crossbill	2
ARU 13	2018-06-15	606592.508	6388820.829	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 13	2018-06-15	606592.508	6388820.829	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 13	2018-07-12	606592.508	6388820.829	*Turdus migratorius*	American robin	1
ARU 13	2018-07-12	606592.508	6388820.829	*Mergus merganser*	Common merganser	2

Appendix B, Table 5

Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 13	2018-07-12	606592.508	6388820.829	*Contopus cooperi*	Olive-sided flycatcher	1
ARU 13	2018-07-12	606592.508	6388820.829	*Loxia curvirostra*	Red crossbill	5
ARU 13	2018-07-12	606592.508	6388820.829	*Melospiza melodia*	Song sparrow	1
ARU 13	2018-07-12	606592.508	6388820.829	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 13	2018-07-12	606592.508	6388820.829	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 14	2018-06-06	608124.41	6390784.457	*Euphagus*	American blackbirds	1
ARU 14	2018-06-06	608124.41	6390784.457	*Turdus migratorius*	American robin	1
ARU 14	2018-06-06	608124.41	6390784.457	*Turdus migratorius*	American robin	1
ARU 14	2018-06-06	608124.41	6390784.457	*Picoides arcticus*	Black-backed woodpecker	1
ARU 14	2018-06-06	608124.41	6390784.457	*Spizella passerina*	Chipping sparrow	2
ARU 14	2018-06-06	608124.41	6390784.457	*Junco hyemalis*	Dark-eyed junco	1
ARU 14	2018-06-06	608124.41	6390784.457	*Gavia immer*	Common loon	1
ARU 14	2018-06-06	608124.41	6390784.457	*Catharus guttatus*	Hermit thrush	2
ARU 14	2018-06-06	608124.41	6390784.457	*Corvus corax*	Northern raven	1
ARU 14	2018-06-06	608124.41	6390784.457	*Vireo philadelphicus*	Philadelphia vireo	1
ARU 14	2018-06-06	608124.41	6390784.457	*Loxia curvirostra*	Red crossbill	5
ARU 14	2018-06-06	608124.41	6390784.457	*Vireo olivaceus*	Red-eyed vireo	1
ARU 14	2018-06-06	608124.41	6390784.457	*Regulus calendula*	Ruby-crowned kinglet	2
ARU 14	2018-06-06	608124.41	6390784.457	*Melospiza melodia*	Song sparrow	1
ARU 14	2018-06-06	608124.41	6390784.457	*Melospiza melodia*	Song sparrow	2
ARU 14	2018-06-06	608124.41	6390784.457	*Zonotrichia albicollis*	White-throated sparrow	2
ARU 14	2018-06-06	608124.41	6390784.457	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 14	2018-06-06	608124.41	6390784.457	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 14	2018-06-25	608124.41	6390784.457	*Corvus brachyrhynchos*	American crow	2
ARU 14	2018-06-25	608124.41	6390784.457	*Turdus migratorius*	American robin	1
ARU 14	2018-06-25	608124.41	6390784.457	*Turdus migratorius*	American robin	1
ARU 14	2018-06-25	608124.41	6390784.457	*Chroicocephalus philadelphia*	Bonaparte's gull	1
ARU 14	2018-06-25	608124.41	6390784.457	*Spizella passerina*	Chipping sparrow	3
ARU 14	2018-06-25	608124.41	6390784.457	*Junco hyemalis*	Dark-eyed junco	2
ARU 14	2018-06-25	608124.41	6390784.457	*Junco hyemalis*	Dark-eyed junco	1
ARU 14	2018-06-25	608124.41	6390784.457	*Gavia immer*	Common loon	1
ARU 14	2018-06-25	608124.41	6390784.457	*Catharus guttatus*	Hermit thrush	1
ARU 14	2018-06-25	608124.41	6390784.457	*Corvus corax*	Northern raven	3

Appendix B, Table 5

Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 14	2018-06-25	608124.41	6390784.457	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 14	2018-06-25	608124.41	6390784.457	*Melospiza melodia*	Song sparrow	2
ARU 14	2018-06-25	608124.41	6390784.457	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 14	2018-06-25	608124.41	6390784.457	*Zonotrichia albicollis*	White-throated sparrow	2
ARU 14	2018-06-25	608124.41	6390784.457	*Piciformes*	Woodpeckers	1
ARU 14	2018-06-25	608124.41	6390784.457	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 14	2018-07-08	608124.41	6390784.457	*Corvus brachyrhynchos*	American crow	1
ARU 14	2018-07-08	608124.41	6390784.457	*Corvus brachyrhynchos*	American crow	1
ARU 14	2018-07-08	608124.41	6390784.457	*Turdus migratorius*	American robin	1
ARU 14	2018-07-08	608124.41	6390784.457	*Picoides arcticus*	Black-backed woodpecker	1
ARU 14	2018-07-08	608124.41	6390784.457	*Spizella passerina*	Chipping sparrow	1
ARU 14	2018-07-08	608124.41	6390784.457	*Junco hyemalis*	Dark-eyed junco	2
ARU 14	2018-07-08	608124.41	6390784.457	*Junco hyemalis*	Dark-eyed junco	1
ARU 14	2018-07-08	608124.41	6390784.457	*Gavia immer*	Common loon	1
ARU 14	2018-07-08	608124.41	6390784.457	*Perisoreus canadensis*	Gray jay	1
ARU 14	2018-07-08	608124.41	6390784.457	*Sitta canadensis*	Red-breasted nuthatch	1
ARU 14	2018-07-08	608124.41	6390784.457	*Melospiza melodia*	Song sparrow	3
ARU 14	2018-07-08	608124.41	6390784.457	*Zonotrichia leucophrys*	White-crowned sparrow	1
ARU 14	2018-07-08	608124.41	6390784.457	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 14	2018-07-08	608124.41	6390784.457	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 15	2018-06-08	601850.206	6391261.993	*Empidonax alnorum*	Alder flycatcher	1
ARU 15	2018-06-08	601850.206	6391261.993	*Spizella passerina*	Chipping sparrow	3
ARU 15	2018-06-08	601850.206	6391261.993	*Junco hyemalis*	Dark-eyed junco	1
ARU 15	2018-06-08	601850.206	6391261.993	*Junco hyemalis*	Dark-eyed junco	1
ARU 15	2018-06-08	601850.206	6391261.993	*Perisoreus canadensis*	Gray jay	1
ARU 15	2018-06-08	601850.206	6391261.993	*Catharus guttatus*	Hermit thrush	2
ARU 15	2018-06-08	601850.206	6391261.993	*Passerella iliaca*	Red fox sparrow	1
ARU 15	2018-06-08	601850.206	6391261.993	*Larus delawarensis*	Ring-billed gull	1
ARU 15	2018-06-08	601850.206	6391261.993	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 15	2018-06-08	601850.206	6391261.993	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 15	2018-06-08	601850.206	6391261.993	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 15	2018-06-08	601850.206	6391261.993	*Setophaga coronata*	Yellow-rumped warbler	2
ARU 15	2018-07-07	601850.206	6391261.993	*Spizella passerina*	Chipping sparrow	1

Appendix B, Table 5

Detailed Breeding Bird Results, 2018

Site ID	Date	UTM Coordinates[1]		Scientific Name	Common Name	Abundance
		Easting	Northing			
ARU 15	2018-07-07	601850.206	6391261.993	*Junco hyemalis*	Dark-eyed junco	2
ARU 15	2018-07-07	601850.206	6391261.993	*Perisoreus canadensis*	Gray jay	1
ARU 15	2018-07-07	601850.206	6391261.993	*Catharus guttatus*	Hermit thrush	1
ARU 15	2018-07-07	601850.206	6391261.993	*Oreothlypis celata*	Orange-crowned warbler	1
ARU 15	2018-07-07	601850.206	6391261.993	*Oreothlypis celata*	Orange-crowned warbler	1
ARU 15	2018-07-07	601850.206	6391261.993	*Setophaga palmarum*	Palm warbler	1
ARU 15	2018-07-07	601850.206	6391261.993	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 15	2018-07-07	601850.206	6391261.993	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 15	2018-07-07	601850.206	6391261.993	*Setophaga coronata*	Yellow-rumped warbler	1
ARU 15	2018-07-23	601850.206	6391261.993	*Bombycilla cedrorum*	Cedar waxwing	1
ARU 15	2018-07-23	601850.206	6391261.993	*Spizella passerina*	Chipping sparrow	2
ARU 15	2018-07-23	601850.206	6391261.993	*Junco hyemalis*	Dark-eyed junco	2
ARU 15	2018-07-23	601850.206	6391261.993	*Perisoreus canadensis*	Gray jay	1
ARU 15	2018-07-23	601850.206	6391261.993	*Catharus guttatus*	Hermit thrush	1
ARU 15	2018-07-23	601850.206	6391261.993	*Setophaga magnolia*	Magnolia warbler	1
ARU 15	2018-07-23	601850.206	6391261.993	*Oreothlypis celata*	Orange-crowned warbler	2
ARU 15	2018-07-23	601850.206	6391261.993	*Setophaga palmarum*	Palm warbler	1
ARU 15	2018-07-23	601850.206	6391261.993	*Regulus calendula*	Ruby-crowned kinglet	1
ARU 15	2018-07-23	601850.206	6391261.993	*Oreothlypis peregrina*	Tennessee warbler	1
ARU 15	2018-07-23	601850.206	6391261.993	*Zonotrichia albicollis*	White-throated sparrow	1
ARU 15	2018-07-23	601850.206	6391261.993	*Setophaga coronata*	Yellow-rumped warbler	1

a) UTM = NAD83 Zone 13V.

Appendix B, Table 6

Total Bat Detections, May to October 2018

Detected ID	Number of Nights in Operation	Recorded Bat Passes			Total Recorded Bat Passes	Total Bat Passes Per Detector Night
		High Frequency[a]	*Myotis* spp.[b]	Low Frequency[c]		
BAT 01	130	377	272	11	660	5.08
BAT 02	130	1166	1138	11	2315	17.81
BAT 03	130	320	195	67	582	4.48
BAT 04	43[d]	300	128	3	431	10.02
BAT 05	130	132	178	14	324	2.49
COMBINED	**563**	**2295**	**1911**	**106**	**4312**	**7.66**

a) Including *Myotis lucifugus, Myotis septentrionalis, and Lasirurus borealis.*

b) Including *Myotis lucifugus, and Myotis septentrionalis.*

c) Including *Eptesicus fuscus, Lasionycteris noctivagans, and Lasirurus cinereus.*

d) Detector Malfunction on 4 July 2018.

Rook I Project

Environmental Impact Statement

Annex VIII.3: Wildlife Baseline Report 3 (Bird Migration and Bats)

WILDLIFE BASELINE REPORT 3
(BIRD MIGRATION AND BATS)
FOR THE ROOK I PROJECT

Final Report

Prepared by:

Canada North Environmental Services
Saskatoon, Saskatchewan

Prepared for:

NexGen Energy Ltd.
Saskatoon, Saskatchewan

Project No. 3008

June 2024

EXECUTIVE SUMMARY

The Rook I Project (Project) is a proposed new uranium mining and milling operation that is 100% owned by NexGen Energy Ltd. (NexGen). The Project would be located in northwestern Saskatchewan, approximately 40 kilometres (km) east of the Alberta-Saskatchewan border, 130 km north of the town of La Loche, and 640 km northwest of the city of Saskatoon. The wildlife baseline program is a component of a comprehensive baseline program that documents the natural and socio-economic environments in the anticipated area of the Project. Information obtained through database searches and field surveys will be used alongside Indigenous and Local Knowledge in the Environmental Assessment (EA) and cumulative effects assessment, to inform Project planning, and for developing future monitoring programs and reclamation plans.

The program was designed to obtain comprehensive information characterizing wildlife, including species of conservation concern (SOCC), and their habitats within near vicinity to the Project (Site Study Area [SSA]) and a broader Local Study Area (LSA). The SSA consisted of an area 25 km^2 in size that encompasses the Project footprint, and the LSA consisted of an area 225 km^2 in size that surrounds the SSA. NexGen was evaluating the feasibility of installing four wind turbines as part of the development of the Project. To supplement baseline survey efforts from 2018, Canada North Environmental Services (CanNorth) was retained to complete avian migration surveys and acoustic bat surveys with a focus on the previously contemplated locations for proposed wind turbines. Avian and acoustic bat surveys were completed as part of the 2018 wildlife baseline investigations (CanNorth 2021), with the exception of avian migration surveys which were not part of the scope of work in 2018.

The program was designed to supplement baseline data, following recommendations in the Wildlife Siting Guidelines for Saskatchewan Wind Energy Projects (ENV 2016), the Plant and Wildlife Pre-Construction Surveys for Renewable Energy Projects (ENV 2018), the Wildlife Guidelines for Alberta Wind Energy Projects (GA 2011), and the Wildlife Directive for Alberta Wind and Energy Projects (GA 2018). As some avian and bat species are potential valued components (VCs) in the EA, resulting data will assist in identifying potential risks to species that that may be protected under provincial or federal legislation, including activity restriction guidelines and/or the *Species at Risk Act* (SARA) (GC 1994; ENV 2017; SARPR 2020).

During the avian migration surveys, four point count locations were surveyed during the spring and fall survey periods in the SSA. A total of 502 birds were recorded during avian migration surveys including 344 during the spring surveys and 158 during the fall surveys. A total of 47 bird species were recorded, including five species of conservation concern. These included two species listed under the SARA: common nighthawk (*Chordeiles minor*) and barn swallow (*Hirundo rustica*). An additional three species with provincial activity restriction guidelines were observed including Bonaparte's gull (*Chroicocephalus Philadelphia*), common loon (*Gavia immer*), and bald eagle (*Haliaeetus leucocephalus*).

Three bat detectors were installed in the SSA, and were designed to detect bats in three frequency groups: high frequency, low frequency, and myotis species. A total of 320 bat passes were recorded, including 311 in the high frequency and myotis groups, and nine in the low-frequency group. Based on biogeographical range, abundance, call characteristics, and habitat suitability, bat passes categorized into either the high frequency or the Myotis groups are expected to be primarily composed of little brown myotis (*Myotis lucifugus*) (note this does not discount the presence of northern Myotis [*Myotis septentrionalis*] in the area of the Project), and those individuals in the low frequency group are expected to be primarily

composed of silver-haired (*Lasionycteris noctivagans*) or hoary bats (*Lasiurus cinereus*). Both the little brown myotis and northern myotis are federally listed as endangered under SARA (SARPR 2020), and the roosts and foraging sites for all bat species (*Vespertilionidae*) are listed under the Saskatchewan Activity Restriction Guidelines (ENV 2017), recommending a 500-m setback from high disturbance activities year-round.

Overall, nine sensitive species were detected, including four species listed under SARA: common nighthawk, barn swallow, and bat species (potentially two species listed as endangered – little brown Myotis and northern myotis). An additional five species with provincial activity restriction guidelines were detected including Bonaparte's gull, common loon, bald eagle, and four bat species in the Family *Vespertilionidae*.

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Abbreviations	Definition
CanNorth	Canada North Environmental Services
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
EA	Environmental Assessment
EIS	Environmental Impact Statement
LSA	Local Study Area
NexGen	NexGen Energy Ltd.
Project	Rook I Project
SARA	*Species at Risk Act*
SC	Study components
SOCC	Species of conservation concern
SSA	Site Study Area
TLU	Traditional Land Use
VC	Valued component

Units	Definition
bpm	birds per minute
cm	centimetre
dB	decibels
kHz	kilohertz
km	kilometre
m	metre
ms	millisecond
%	percent

1.0 INTRODUCTION

The Rook I Project (Project) is a proposed new uranium mining and milling operation that is 100% owned by NexGen Energy Ltd. (NexGen). The Project would be located in northwestern Saskatchewan, approximately 40 kilometres (km) east of the Alberta-Saskatchewan border, 130 km north of the town of La Loche, and 640 km northwest of the city of Saskatoon (Figure 1.0-1). The Project would reside within Treaty 8 territory and within the Métis Homeland. At a regional scale, the Project would be situated within the southern Athabasca Basin adjacent to Patterson Lake, and along the upper Clearwater River system (Figure 1.0-2). Access to the Project would be from an existing road off Highway 955. The Project would include underground and surface facilities to support the extraction and processing of uranium ore from the Arrow deposit, a land-based, basement-hosted, high-grade uranium deposit.

The wildlife baseline report represents a component of a comprehensive baseline program that documents the natural and socio-economic environments in the anticipated area of the Project. The wildlife baseline program was undertaken to provide context from which Project wildlife effects could be assessed in the Environmental Impact Statement (EIS).

Since exploration at the Project commenced in 2013, NexGen has engaged regularly and established relationships with local First Nations and Métis Groups (collectively referred to as Indigenous Groups) and northern communities, specifically those closest and with greatest access to the proposed Project. NexGen respects the rights of Indigenous Peoples and the unique relationship Indigenous Peoples have with the environment, and recognizes the importance of full and open discussion with interested or potentially affected Indigenous communities regarding the development, operation, and decommissioning of the proposed Project. Engagement activities to date, as well as future planned engagement activities, reflect the value NexGen places on meaningful engagement with Indigenous and northern communities who could be potentially affected by the proposed Project. Engagement mechanisms have included, but are not limited to: meetings with leadership, workshops and community information sessions, Project site tours, establishing Joint Working Groups to support the gathering and incorporation of Indigenous and Métis Knowledge throughout the Environmental Assessment (EA) process, and providing funding for Traditional Land Use (TLU) Studies[1] to understand how the proposed Project may interact with the Indigenous communities' traditional use of the anticipated area of the Project.

Feedback received during engagement activities was documented for contribution to the EIS for the Project; examples of feedback received include discussion of concerns, interests, potential adverse effects, mitigation, and design alternatives. Many baseline studies were initiated in advance of formal engagement on the EA for the Project; however, engagement during the execution of baseline studies has helped inform the understanding of baseline conditions and confirmed components of the natural and socio-economic environments that required study. A summary of feedback related to the terrestrial baseline program is presented in Appendix A of the Wildlife Baseline Road Map (Annex VIII).

Canada North Environmental Services (CanNorth) was retained to complete baseline investigations for select study components (SCs) for the Project. The details of studies conducted in 2020 to characterize avian migration patterns and use, as well as supplementary acoustic bat information are presented herein.

[1] Traditional Land Use (TLU) Studies include all land use studies developed by the Project's affected Indigenous Groups, including Traditional Land Use and Occupancy studies, Traditional Knowledge and Use studies, and Indigenous Rights and Knowledge studies, henceforth referred collectively as TLU Studies.

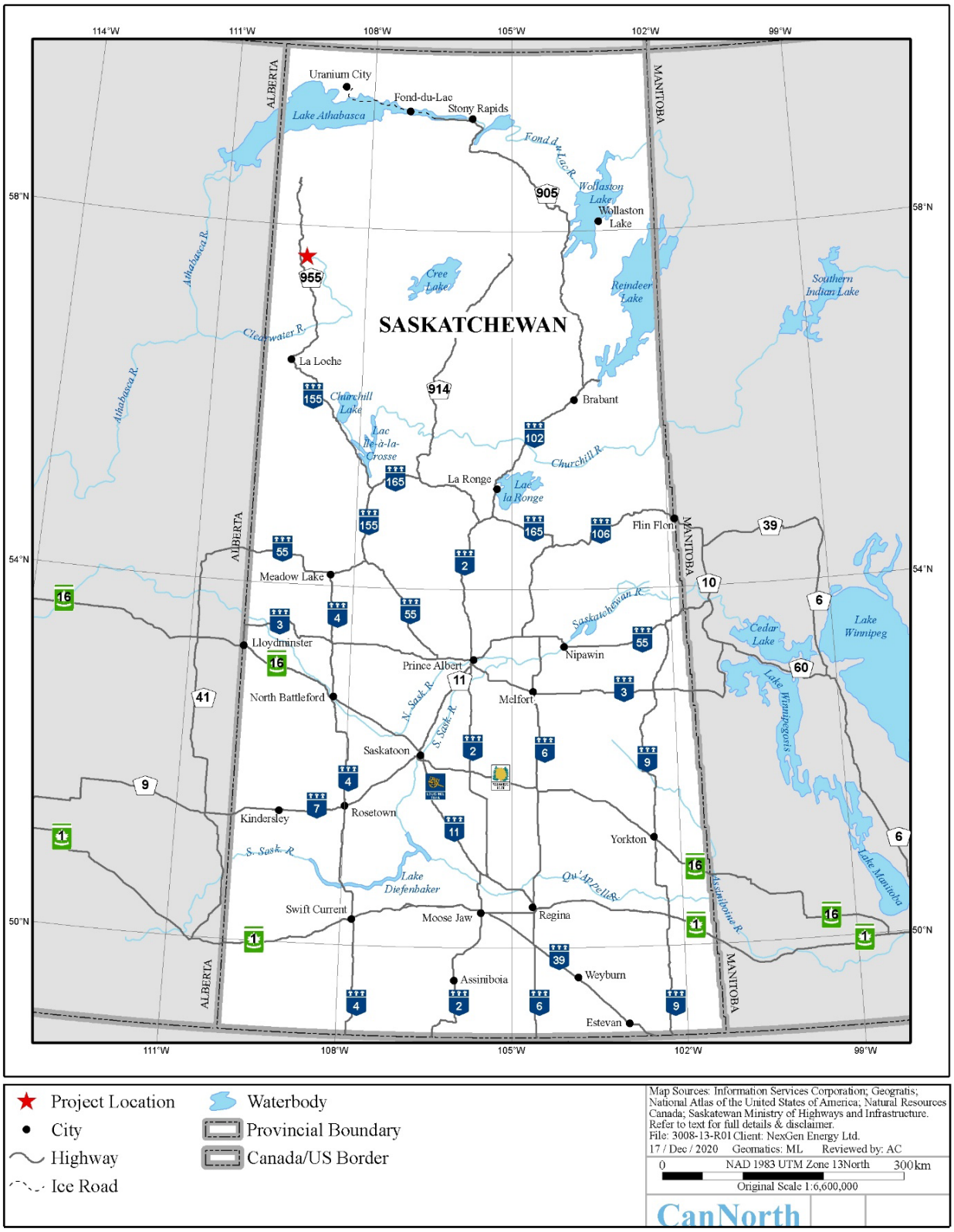

Figure 1.0-1: Location of the Rook I Project within Saskatchewan

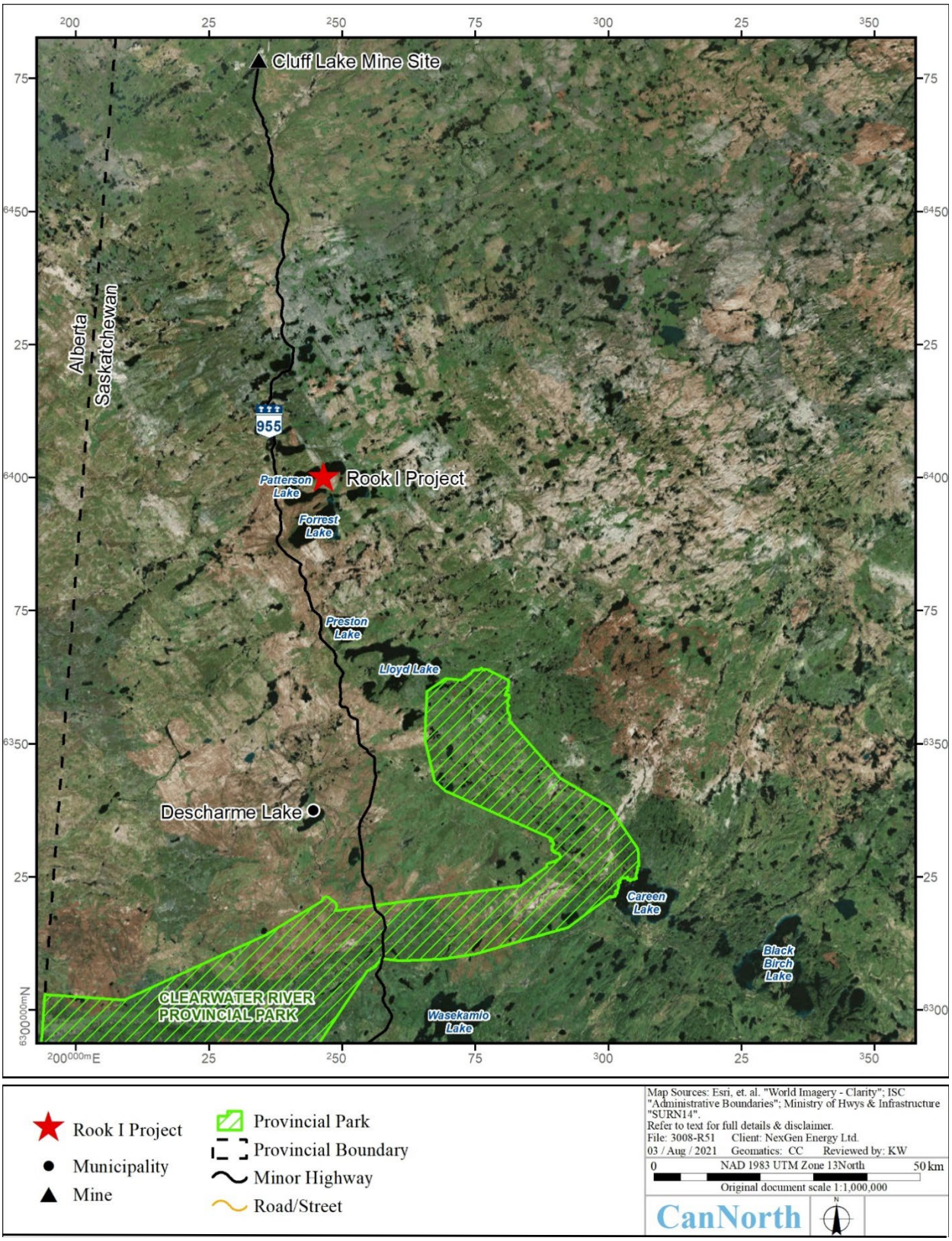

Figure 1.0-2: Location of the Rook I Project Within the Region

1.1 Study Objectives

NexGen was evaluating the feasibility of installing four wind turbines as part of the development of the Project. To supplement baseline survey efforts from 2018, CanNorth was retained to complete avian migration surveys and acoustic bat surveys with a focus on the previously contemplated locations for proposed wind turbines. Avian and acoustic bat surveys were completed as part of the 2018 wildlife baseline investigations (CanNorth 2021), with the exception of avian migration surveys which were not part of the scope of work in 2018.

The objective of the 2020 surveys was to supplement baseline data, following recommendations in the Wildlife Siting Guidelines for Saskatchewan Wind Energy Projects (ENV 2016), the Plant and Wildlife Pre-Construction Surveys for Renewable Energy Projects (ENV 2018), the Wildlife Guidelines for Alberta Wind Energy Projects (GA 2011), and the Wildlife Directive for Alberta Wind and Energy Projects (GA 2018). As some avian and bat species are potential valued components (VCs) in the EA, resulting data will assist in identifying potential risks to species that that may be protected under provincial or federal legislation, including activity restriction guidelines and/or the *Species at Risk Act* (SARA) (GC 1994; ENV 2017; SARPR 2020).

1.2 Study Area

The study area established for the 2020 avian migration and acoustic bat surveys was focused on the avian Site Study Area (SSA) established in 2018 for the Project wildlife environmental baseline investigations (CanNorth 2021). The SSA included the area where the deposit and ultimately the construction and mine operations would occur. The SSA is where effects (total area subject to vegetation and soil disturbance, which may have direct and indirect effects on wildlife) are expected to occur on terrestrial environment (GS 2014) and consisted of an area 25 square kilometres (km^2) (5 km x 5 km) that encompasses the entire Project footprint (Figure 1.2-1). The SSA is of an appropriate scale and location for assessment of effects on potential VCs resulting from existing and planned activities (CanNorth 2010, 2013a,b; GS 2014; IAAC 2019). Specific survey locations for the 2020 avian migration and bat acoustic surveys were situated near to the proposed turbine locations (Figure 1.2-1); details are provided in Section 2 below.

The SSA lies in the Boreal Plain Ecozone, within the Firebag Hills landscape area of the Mid-boreal Uplands Ecoregion. This area is characterized by variable elevational gradients, ranging from 480 m to 580 m, with both strong and gentle rolling morainic hills (Acton et al. 1998). All water in this landscape area drains westward through the Clearwater River and associated watercourses. Regosolic soils are found predominantly on the eroding slopes of watercourses, whereas Dystric Brunisolic soils are found on more stable slopes and in the upland sections on top of sandy glacial till and glaciofluvial deposits. The vegetation on the northern part of this area is characterized by shrubby jack pine (*Pinus banksiana*) forests that possess lichen understoreys, a consequence of frequent forest fires and the sandy soils that lie beneath (Acton et al. 1998). Conversely, the poorly drained depression areas consist of tamarack (*Larix laricina*) and black spruce (*Picea mariana*) peatlands.

Note that the baseline study boundaries were defined at the beginning of the baseline field studies to inform the field study designs; however, the SSA and Local Study Area (LSA) vary from those chosen for the effects assessment conducted when the Project design was finalized.

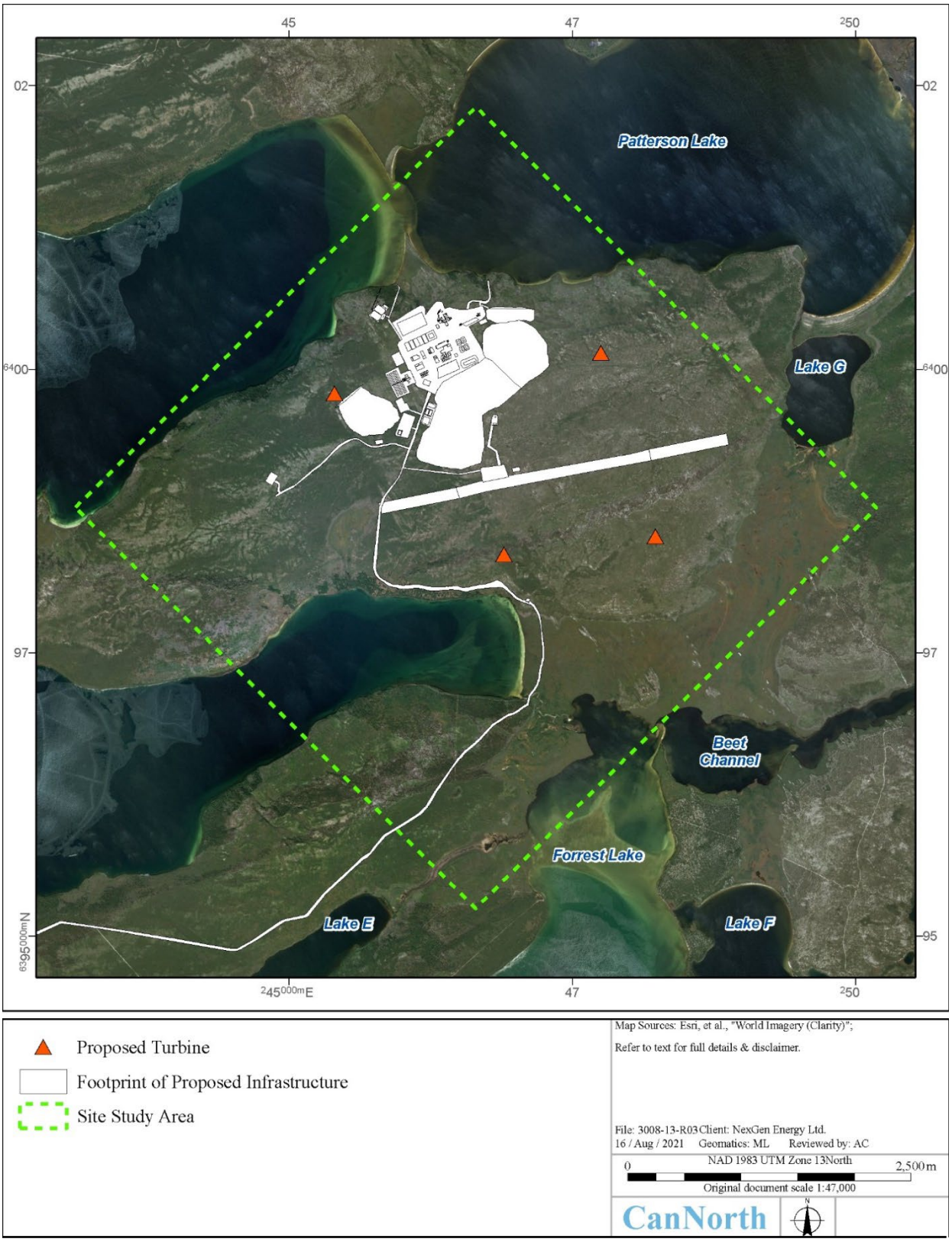

Figure 1.2-1: Locations of Project Infrastructure and Previously Proposed Wind Turbines

2.0 AVIAN MIGRATION SURVEYS

2.1 Study Objectives

A study of avian migration activity was conducted following recommendations in the Wildlife Siting Guidelines for Saskatchewan Wind Energy Projects (ENV 2016), the Plant and Wildlife Pre-Construction Surveys for Renewable Energy Projects (ENV 2018), and the Wildlife Guidelines for Alberta Wind Energy Projects (GA 2011). The study objective was to characterize avian migration, abundance, and diversity in the areas targeted for construction of four proposed wind turbines to provide information for determining risks to migrating birds, in line with the Wildlife Directive for Alberta Wind Energy Projects (GA 2018).

2.2 Methods

To document avian migration in relative proximity to proposed wind turbine locations, spring and fall passage migration surveys were completed at four survey points in the SSA (Table 2.2-1; Figure 2.2-1; Appendix A, Photos 1 to 4). Survey locations were chosen in areas with suitable vantage points (i.e., clear sightlines where feasible) within the SSA. Data were recorded over three site visits for spring, and three site visits for fall, to capture early, mid, and late season migrants. Spring surveys were completed from 2 May 2020 to 1 June 2020, and fall surveys from 10 August 2020 to 20 September 2020.

Table 2.2-1: Locations of Avian Migration Surveys, Spring and Fall 2020

Site ID	UTM Coordinates[a]		Site Description
	Easting	Northing	
AVM 01	605253	6391035	Along access road through bog. Excellent sight lines in all directions.
AVM 02	603392	6391763	Trail through bog. Excellent sight lines to north, south, and east. Good sight line to west.
AVM 03	604488	6393418	Cleared area at high vantage point. Excellent sight lines in all directions.
AVM 04	606006	6391822	At cleared drill pad. Good sight lines to east, south, and west. North view somewhat impaired by topography.

a) UTM = NAD83, Zone 12.

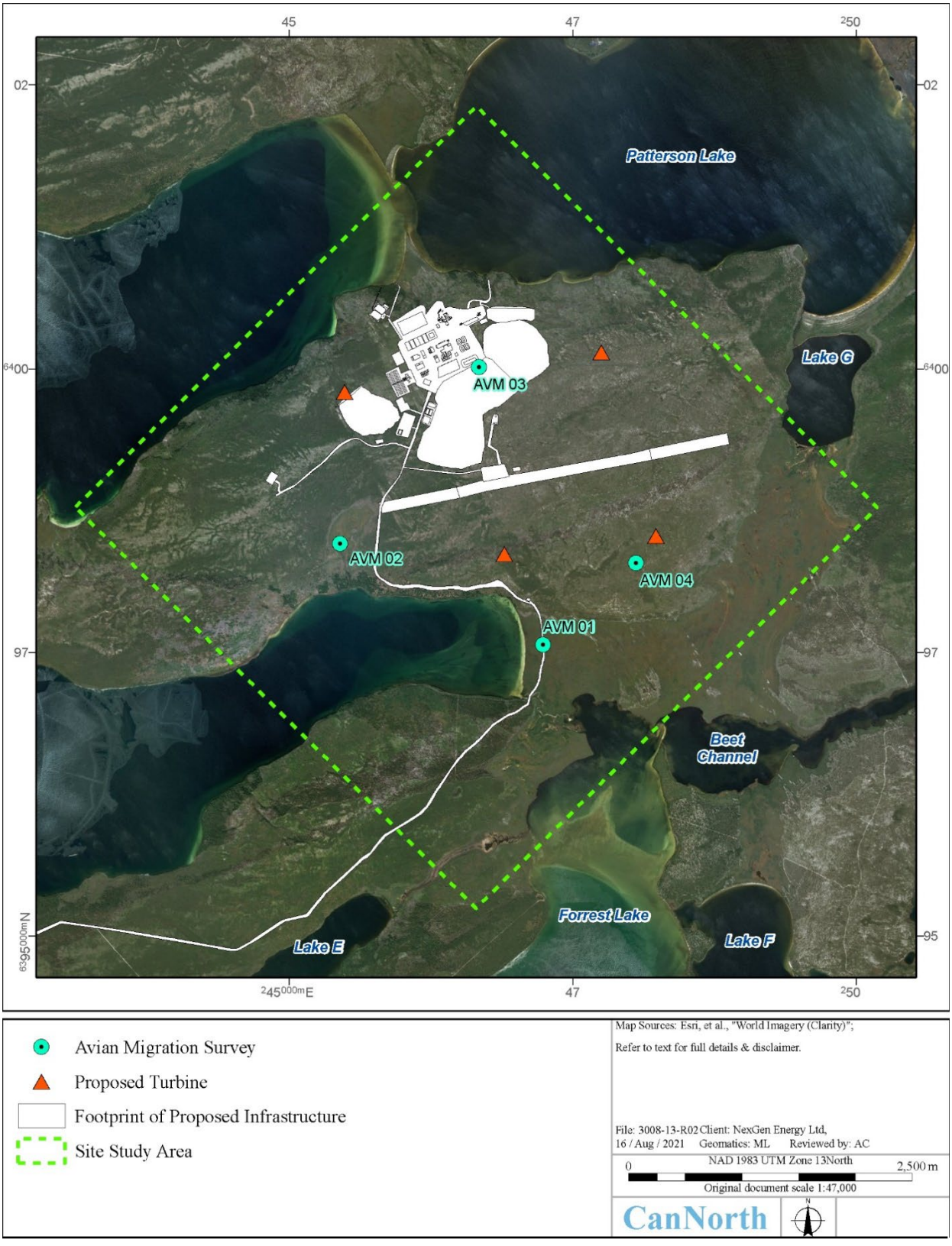

Figure 2.2-1: Locations of Avian Migration Surveys, Spring and Fall 2020

Passage migration surveys followed standard guidance and methods for migration surveys for renewable wind energy projects (AESRD 2013; GA 2011, 2018) and were completed at stationary points. Surveys consisted of 20-minute observation periods completed in both the morning and evening to capture peak movement of migratory birds during daylight hours. Morning surveys were completed starting 30 minutes before sunrise to 3.5 hours after sunrise, and evening surveys from four hours before sunset until sunset. All surveys were completed under suitable weather conditions (i.e., wind speeds below 20 km/h; no or minimal precipitation).

All birds observed were recorded. In cases where birds were observed at too great a distance to identify to species, these observations were grouped under a higher level of taxonomy (e.g., duck species, gull species) for inclusion with specified guilds under published protocols (AEP 2020), as follows:

A) Passerines (sparrow, warbler, blackbird, jay, lark, longspur, pipit, hummingbird, nighthawk, woodpecker)
B) Birds of prey (owl, hawk, falcon, eagle, vulture)
C) Grouse and allies (grouse, partridge, pheasant, turkey, ptarmigan)
D) Waterfowl (swan, goose, duck, grebe, loon, diving duck)
E) Shorebirds/waterbirds (sandpiper, heron, crane, egret, coot, rail, gull, phalarope)
F) Others (crow, raven, magpie, dove, pigeon)

Where large flocks of birds were observed, counting individual birds was not feasible and block-counting was used to estimate overall flock size. For a single species flock, 10 individual birds were counted, and then the remaining birds in the flock were estimated in blocks of 10 (or another suitable integer which was dependent upon flock size [e.g., 50 birds or 100 birds]). If there were a number of species within the flock of birds then observers scanned the flock, recorded percentages of specific species (e.g., 10% Canada goose, 25% Ross's goose, 65% snow goose), then counted 100 individual birds, and extrapolated this number of birds to the remainder of the flock to get total flock size. The species composition percentages were multiplied by the flock size to get species-specific totals. Finally, for each observation, the species, quantity, and flight path (i.e., height) of individuals or flocks were recorded. All bird observations during survey times were reported as the number of birds observed per minute (bpm), as per guidance and existing protocols (AEP 2020).

2.3 Results

Spring avian migration field surveys were conducted between 02 May 2020 and 01 June 2020, while the fall avian migration surveys were completed from 10 August 2020 to 20 September 2020. A total of 502 birds were recorded during avian migration surveys in the spring and fall of 2020, including 344 during the spring surveys and 158 during the fall surveys (Table 2.3-1). Overall species richness throughout the SSA encompassed 47 species of birds in 6 guilds (Appendix B, Table 1). Five species of conservation concern (SOCC) were observed during surveys. Two of these species are listed federally as Threatened under SARA including: common nighthawk (*Chordeiles minor*) and barn swallow (*Hirundo rustica*) (SARPR 2020). An additional three species were observed that are not listed under SARA or Committee on the Status of Endangered Wildlife in Canada (COSEWIC) but have provincial activity restriction guidelines. These include Bonaparte's gull (*Chroicocephalus Philadelphia*), common loon (*Gavia immer*), and bald eagle (*Haliaeetus leucocephalus*) (ENV 2017; SKCDC 2020). Additional details on those SOCC identified in the spring and fall of 2020 can be found in Section 2.9 of the Rook I Project Wildlife Environment

Baseline Report (CanNorth 2021). Detailed results of the avian migration surveys are presented in Appendix B, Table 1.

The most abundant migrants observed during both the spring and fall surveys were snow geese (*Anser caerulescens*). A total of 120 birds were counted, all of which counted during the spring surveys; these accounted for approximately 23.9% of the total number of birds counted during the migration surveys. Canada geese (*Branta canadensis*) were also abundant migrants, with a total of 58 individuals counted; of these, 14 were recorded in the spring and 44 in the fall. Snow geese and Canada geese together comprise approximately 35.4% of total observations. No large kettles of raptors were observed during surveys; in all cases, raptors were observed singly or in pairs.

The most abundant birds were categorized into the waterfowl and passerine guilds (239 observances and 204 observances, respectively). Seven species of waterbirds were observed during spring and fall surveys, with 22 species of passerines observed across the survey periods. The station that recorded the highest diversity and abundance was at survey location AVM 01, with 259 individuals from 30 different species. It should be noted that across all guilds, survey locations, and seasons, observed birds per minute (bpm) were consistently low, averaging 0.53 bpm across the survey duration. While no significant numbers of migrating birds were observed (i.e., large flocks of foraging waterfowl or passerines), habitat usage can be highly variable among years. The numbers of migratory birds recorded at these locations are reflective of conditions that may be observed anywhere within area of the Project. As food and open water availability may vary either annually or seasonally, movement of migratory birds throughout the Project vicinity are expected to change with surrounding conditions.

Table 2.3-1: Results of Avian Migration Surveys, Spring and Fall 2020

Site ID	Guild[a]	Abundance	Total Survey Time (mins)	Birds per minute	Proportion	Loafing	Aerial Flight Height		
						0m	1-30m	31-60m	61+ m
AVM 01	**SPRING 2020 (02 May 2020 to 01 June 2020)**								
	A	50	120	**0.42**	25%	45	4	1	0
	B	6	120	**0.05**	3%	0	5	0	1
	C	0	120	**0.00**	0%	0	0	0	0
	D	139	120	**1.16**	68%	21	4	22	92
	E	8	120	**0.07**	4%	6	1	0	1
	F	0	120	**0.00**	0%	0	0	0	0
	TOTAL	**203**	**120**	**1.69**	**100%**	**72**	**14**	**23**	**94**
	FALL 2020 (10 August 2020 to 20 September 2020)								
	A	10	120	**0.08**	18%	10	0	0	0
	B	0	120	**0.00**	0%	0	0	0	0
	C	0	120	**0.00**	0%	0	0	0	0
	D	42	120	**0.35**	75%	1	30	11	0
	E	1	120	**0.01**	2%	1	0	0	0
	F	3	120	**0.03**	5%	1	2	0	0
	TOTAL	**56**	**120**	**0.47**	**100%**	**12**	**30**	**11**	**0**
AVM 02	**SPRING 2020 (02 May 2020 to 01 June 2020)**								
	A	12	120	**0.10**	24%	8	3	1	0
	B	3	120	**0.03**	6%	0	1	2	0
	C	1	120	**0.01**	2%	1	0	0	0
	D	30	120	**0.25**	59%	10	0	0	20
	E	2	120	**0.02**	4%	1	0	1	0
	F	3	120	**0.03**	6%	1	2	0	0
	TOTAL	**51**	**120**	**0.43**	**100%**	**21**	**6**	**4**	**20**
	FALL 2020 (10 August 2020 to 20 September 2020)								
	A	16	120	**0.13**	80%	14	0	2	0
	B	1	120	**0.01**	5%	0	0	1	0
	C	0	120	**0.00**	0%	0	0	0	0
	D	1	120	**0.01**	5%	0	0	1	0
	E	1	120	**0.01**	5%	1	0	0	0
	F	1	120	**0.01**	5%	1	0	0	0
	TOTAL	**20**	**120**	**0.17**	**100%**	**15**	**0**	**4**	**0**
AVM 03	**SPRING 2020 (03 May 2020 to 01 June 2020)**								
	A	26	120	**0.22**	74%	9	6	8	3
	B	0	120	**0.00**	0%	0	0	0	0
	C	0	120	**0.00**	0%	0	0	0	0
	D	5	120	**0.04**	14%	2	0	2	1
	E	3	120	**0.03**	9%	2	0	0	1
	F	1	120	**0.01**	3%	1	0	0	0
	TOTAL	**35**	**120**	**0.29**	**100%**	**14**	**6**	**10**	**5**
	FALL 2020 (10 August 2020 to 20 September 2020)								
	A	36	120	**0.30**	61%	18	3	2	13

Site ID	Guild[a]	Abundance	Total Survey Time (mins)	Birds per minute	Proportion	Loafing	Aerial Flight Height		
						0m	1-30m	31-60m	61+ m
	B	0	120	**0.00**	0%	0	0	0	0
	C	0	120	**0.00**	0%	0	0	0	0
	D	17	120	**0.14**	29%	17	0	0	0
	E	4	120	**0.03**	7%	0	3	1	0
	F	2	120	**0.02**	3%	1	1	0	0
	TOTAL	**59**	**120**	**0.49**	**100%**	**35**	**6**	**3**	**13**
AVM 04	**SPRING 2020 (02 May 2020 to 01 June 2020)**								
	A	36	120	**0.30**	65%	25	11	0	0
	B	0	120	**0.00**	0%	0	0	0	0
	C	0	120	**0.00**	0%	0	0	0	0
	D	4	120	**0.03**	7%	4	0	0	0
	E	14	120	**0.12**	25%	7	0	7	0
	F	1	120	**0.01**	2%	1	0	0	0
	TOTAL	**55**	**120**	**0.46**	**100%**	**37**	**11**	**7**	**0**
	FALL 2020 (28 August 2020 to 20 September 2020)								
	A	18	120	**0.15**	78%	5	11	2	0
	B	0	120	**0.00**	0%	0	0	0	0
	C	0	120	**0.00**	0%	0	0	0	0
	D	1	120	**0.01**	4%	1	0	0	0
	E	4	120	**0.03**	17%	3	1	0	0
	F	0	120	**0.00**	0%	0	0	0	0
	TOTAL	**23**	**120**	**0.19**	**100%**	**9**	**12**	**2**	**0**

Source: Guild categories from AEP (2020).

a) Guild Categories are defined as:

A: Passerines (sparrow, warbler, blackbird, jay, lark, longspur, pipit, hummingbird, nighthawk, woodpecker).

B: Birds of prey (owl, hawk, falcon, eagle, vulture).

C: Grouse and allies (grouse, partridge, pheasant, turkey, ptarmigan).

D: Waterfowl (swan, goose, duck, grebe, loon, diving duck).

E: Shorebirds/waterbirds (sandpiper, heron, crane, egret, coot, rail, gull, phalarope).

F: Others (crow, raven, magpie, dove, pigeon).

3.0 BAT SURVEYS

3.1 Study Objectives

Bat surveys were conducted for the proposed Project in summer 2020 to supplement the 2018 acoustic bat surveys that were conducted as a component of comprehensive wildlife baseline studies completed to describe existing conditions in the terrestrial environment for the Project (CanNorth 2021). A study of bat activity was conducted following recommendations in the Wildlife Siting Guidelines for Saskatchewan Wind Energy Projects (ENV 2016), the Plant and Wildlife Pre-Construction Surveys for Renewable Energy Projects (ENV 2018), the Wildlife Guidelines for Alberta Wind Energy Projects (GA 2011), and the Bat Mitigation Framework for Wind Power Development (GA 2013). The study objective was to characterize seasonal bat activity in the areas targeted for construction of four proposed wind turbines to provide information for determining the risk to bat species, in line with the Wildlife Directive for Alberta Wind Energy Projects (GA 2018).

3.2 Methods

Acoustic bat surveys were conducted from 2 May 2020 to 24 September 2020 at three monitoring stations (Table 3.2-1; Figure 3.2-1), following protocols established by Vonhof (2017). Full spectrum Wildlife Acoustics SM4BAT detectors paired with ultrasonic U2 microphones were installed adjacent to proposed locations for the proposed wind turbines. Bat detectors were programmed prior to deployment and set to record ultrasonic sound at 10 minute intervals (i.e., 10 minutes on, 10 minutes off) beginning 30 minutes after sunset and continuing until 30 minutes before sunrise. To increase data collection quality and reduce extraneous noise files, the detectors were programmed with a minimum recording duration of 1.5 milliseconds (ms) with trigger frequency of 16 kilohertz (kHz), and a trigger level of 12 decibels (dB). All detectors were equipped with two 32 GB SD memory cards. Ultrasonic microphones were mounted to 5 centimetres (cm) x 5 cm x 244 cm wooden posts and secured to trees at a height of 2 metres (m) using cable ties and screws, resulting in a microphone deployment height of approximately 4.5 m. Detectors were retrieved in late September 2020.

Table 3.2-1: Locations of Bat Detectors, May To September 2020

Detector ID	UTM Coordinates[a]		Site Description	Deployment Description	Habitat Description
	Easting	Northing			
BAT 06	605103	6393820	North slope	Jack pine (*Pinus banksiana*) at a height of approximately 4.5 meters	Coniferous forest
BAT 07	603306	6393125	~10 m from well head	Jack pine (*Pinus banksiana*) at a height of approximately 4.5 meters	Coniferous forest
BAT 08	605999	6391861	Adjacent to drill pad	Jack pine (*Pinus banksiana*) at a height of approximately 4.5 meters	Coniferous forest

a) UTM = NAD83, Zone 12.

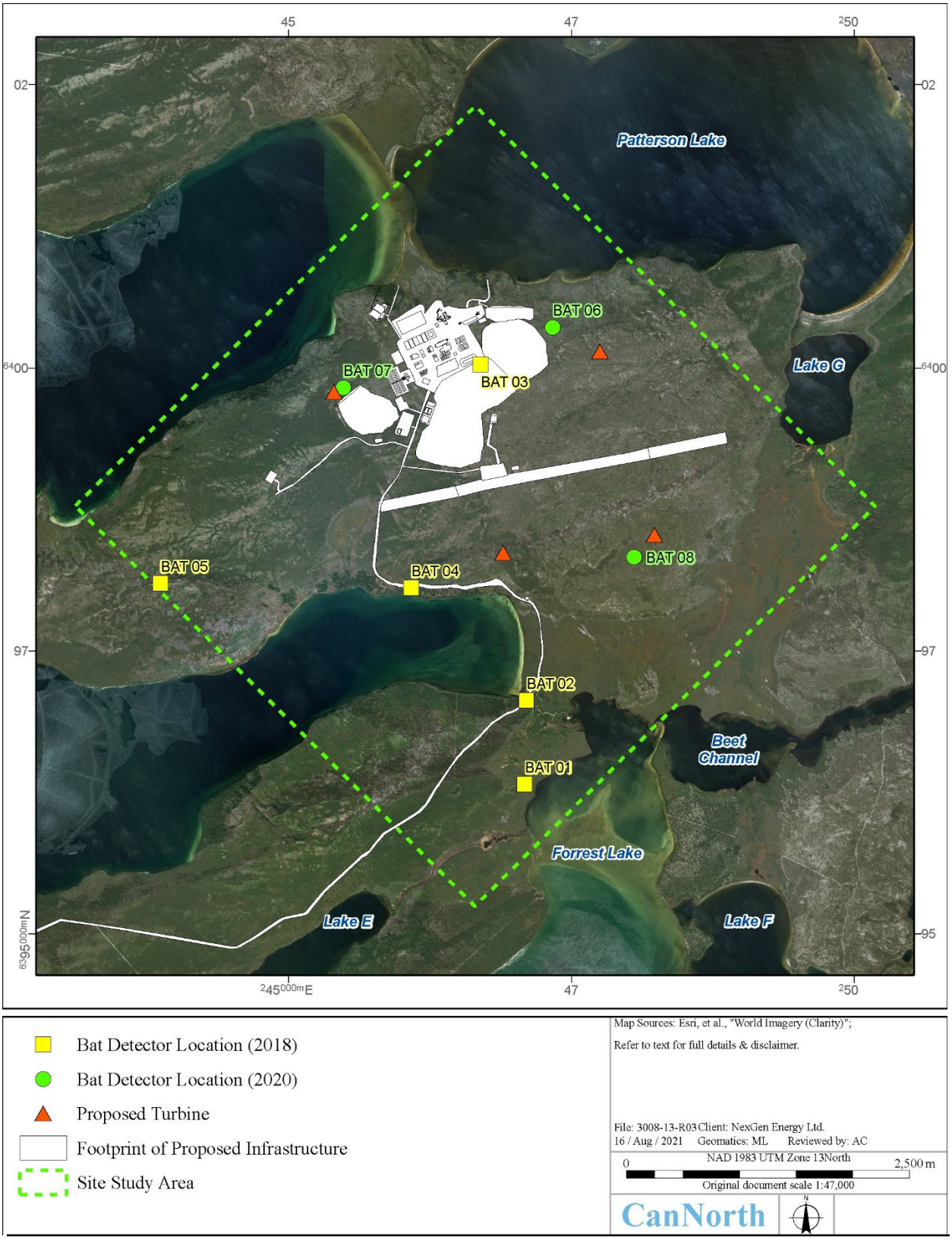

Figure 3.2-1: Location of Bat Detectors

In the analysis, the standard units of measure used were bat call sequences (i.e., bat passes) and the primary measurement for reporting activity rates were bat passes per detector night (i.e., at one detector over a one-night period). This information was used as a relative measure of bat activity in the vicinity of any given bat detector. Echolocation analysis was conducted using Kaleidoscope Pro (Version 5.1.4) to determine the number of bat passes per night and to identify the bat call sequences to species group. Files were analyzed based on parameters such as call frequency, shape, slope, and duration, and were broadly matched to the calls of species with biogeographical ranges overlapping the Project area (Table 3.2-2).

Table 3.2-2: Bat Species with Biogeographical Ranges Overlapping the Project Area

Scientific Name	Common Name	SKCDC Rank	COSEWIC	SARA Status	Schedule
Eptesicus fuscus	Big brown bat	S5	-	-	-
Lasionycteris noctivagans	Silver-haired bat	S5B	-	-	-
Lasiurus borealis	Eastern red bat	S4B	-	-	-
Lasiurus cinereus	Hoary bat	S5B	-	-	-
Myotis lucifugus	**Little brown myotis**	**S4B,S4N**	**Endangered**	**Endangered**	**Schedule 1**
Myotis septentrionalis	**Northern myotis**	**S3**	**Endangered**	**Endangered**	**Schedule 1**

Source: All scientific, common names, and provincial ranks from SKCDC (2020); federal ranks from SARPR (2020).
SKCDC = Saskatchewan Conservation Data Centre; S3 = vulnerable/rare to uncommon, S4 = apparently secure, S5 = secure/common.
B = Breeding populations of migratory species in the province, N = Non-breeding populations of migratory species in the province.
Bold text indicates species of conservation concern.
COSEWIC = Committee on the Status of Endangered Wildlife In Canada.
SARA = *Species at Risk Act*.

Manual vetting of results was completed to remove false positives. Sound categories created to identify bats in the area of the Project were based on specific audio signatures as typically calls cannot be conclusively identified to species. Uncertainty exists in differentiating calls of big brown bat (*Eptesicus fuscus*) and silver-haired bat (*Lasionycteris noctivagans*); eastern red bat (*Lasiurus borealis*) and little brown myotis; and species in the Myotis genus. Note that two bat species, little brown myotis and northern myotis, were listed in two species groups. While it can be difficult to distinguish between both species in the Myotis genus, call features can exist that enable observers to rule out the eastern red bat when considering all species in the high frequency group. In consideration of all the above variables, vocalizations of bat species were grouped into the following three categories following Vonhof (2017):

- High frequency bats: Eastern red bat, northern myotis and little brown myotis
- Low frequency bats: Big brown, silver-haired, and hoary bat (*Lasiurus cinereus*)
- *Myotis* species: Northern myotis and little brown myotis

3.3 Results

Detectors recorded a total of 320 bat passes from 2 May 2020 until 24 September 2020. Bat activity rates for all detectors ranged from 0.25 (36 recordings) to 1.46 (211 recordings) bat passes per detector night with a combined average of 0.74 bat passes per detector night (320 recordings). While the interaction of habitat variables (i.e., prey or roost availability, foraging conditions, and predator avoidance) is difficult to quantify, bats (*Myotis* especially) tend to forage over still water, rivers, forest edges/trails, and generally select larger diameter trees for roosting (COSEWIC 2013). Results are presented in Table 3.3-1, with detailed results in Appendix B, Table 2.

Table 3.3-1: Results of Acoustic Bat Surveys, May to September 2020

Detector ID	Number of Nights in Operation	Recorded Bat Passes			Total Recorded Bat Passes	Total Bat Passes Per Detector Night
		High Frequency[a]	*Myotis* spp.[b]	Low Frequency[c]		
BAT_06	145	34	34	5	73	0.50
BAT_07	145	29	7	0	36	0.25
BAT_08	145	115	92	4	211	1.46
COMBINED	**435**	**178**	**133**	**9**	**320**	**0.74**

a) Including *Myotis lucifugus, Myotis septentrionalis,* and *Lasirurus borealis.*

b) Including *Myotis lucifugus,* and *Myotis septentrionalis.*

c) Including *Eptesicus fuscus, Lasionycteris noctivagans,* and *Lasirurus cinereus.*

All three bat groups were detected at bat detector stations. Bats in the high frequency group (i.e., eastern red bats, little brown myotis, and northern myotis) and the myotis group (i.e., little brown myotis and northern myotis) accounted for the vast majority of recorded bat passes (311 recordings; 97.2%). Bats in the low-frequency group (i.e., big brown, silver-haired, and hoary bats) were recorded much less frequently than the other groups (9 recordings; 3.8%). In consideration of known species ranges and abundance, call characteristics, and habitat suitability, bat passes categorized into either the high frequency or the *Myotis* groups are expected to be primarily composed of little brown myotis. Likewise, those individuals in the low frequency group are expected to be primarily composed of silver-haired or hoary bats (M. Brigham, University of Regina, pers. comm.).

Bat activity in the area of the Project was fairly consistent from May to August with two spikes in total bat passes on 30 July and 7 August (Figure 3.3-1). Both little brown myotis and northern myotis mate during a late summer or autumn “swarming period” prior to hibernation (COSEWIC 2013). None of the detectors recorded a spike indicative of swarming activity which could indicate presence of nearby hibernacula. However, detection ranges of recorders vary based on a number of factors and under optimal conditions a detection range of only 25 m is expected (Agranat 2014).

Both the little brown myotis and northern myotis are federally listed as endangered under SARA (SARPR 2020), and the roosts and foraging sites for all bat species (*Vespertilionidae*) are listed under the Saskatchewan Activity Restriction Guidelines (ENV 2017), recommending a 500-m setback from high disturbance activities year-round. While there is some uncertainty in species identification in recordings, there is near certainty that little brown myotis occurs in the area of the Project, and a reasonable likelihood that northern myotis occurs as well (M. Brigham, University of Regina, pers. comm.). Little brown myotis is provincially ranked as S4 (apparently secure), while northern myotis is ranked as S3 (rare to

uncommon) in Saskatchewan. The remaining four species of bats potentially detected are ranked as either apparently secure (S4) or secure/common (S5) by the SKCDC.

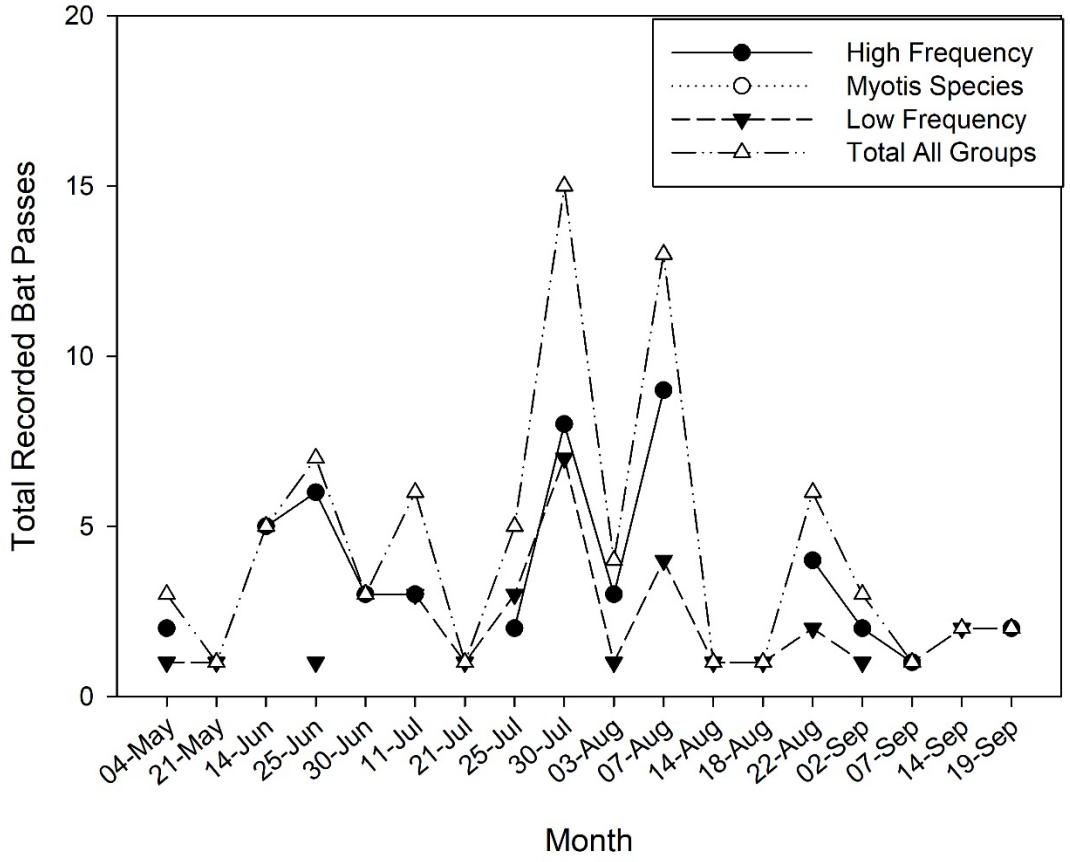

Figure 3.3-1: Total Number of Bat Passes per Month, May to September 2020

4.0 SUMMARY

The wildlife baseline program was designed to obtain comprehensive information to characterize wildlife, to include SOCC, and the associated habitats in near vicinity to the Project (SSA) and a broader LSA). Information obtained through database searches and field surveys was used alongside Indigenous and Local Knowledge in the EIS and cumulative effects assessment, to inform Project planning, and support development of future monitoring programs and reclamation plans.

NexGen was contemplating the feasibility of installing four wind turbines as part of their efforts to develop the Project. To supplement baseline survey efforts from 2018, CanNorth was retained to complete avian migration surveys and acoustic bat surveys with a focus on the locations for proposed wind turbines. Three rounds each of spring and fall avian migration surveys were completed at four survey locations in areas with suitable vantage points (i.e., clear sightlines where feasible) within the avian site study area. Bat detectors were deployed in accessible areas of habitat consistent with the proposed locations of wind turbines. It is highlighted that the turbines are not included as part of EIS for the Project.

Avian migration surveys in spring and fall totaled 920 minutes of observation time across four survey stations, with 502 birds observed. Overall species richness throughout the area of the Project encompassed 47 species of birds in 6 guilds. Five species of SOCC were observed during surveys. Two of these are listed federally as threatened under SARA including: common nighthawk and barn swallow (SARPR 2020). An additional three species have provincial activity restriction guidelines, including Bonaparte's gull (400 m, 1 May to 15 July), common loon (200 m, 15 May to 15 July), and bald eagle (1,000 m, 15 March to 15 July).

Between May and October 2020, three bat detectors were deployed to detect bats in three vocalization categories: high frequency, low frequency, and myotis. A total of 320 bat passes were recorded, including 178 high frequency, 133 myotis, and 9 low-frequency vocalization categories. Based on biogeographical range, abundance, call characteristics, and habitat suitability, bat passes categorized into either the high frequency or the *Myotis* groups are expected to be primarily composed of little brown myotis, and those individuals in the low frequency group are expected to be primarily composed of silver-haired or hoary bats. Both the little brown myotis and northern myotis are federally listed as endangered under SARA (SARPR 2020), and the roosts and foraging sites for all bat species (*Vespertilionidae*) are listed under the Saskatchewan Activity Restriction Guidelines, recommending a 500-m setback from high disturbance activities year-round.

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APPENDICES

LIST OF APPENDICES

APPENDIX A

WILDLIFE TERRESTRIAL ENVIRONMENT PHOTOGRAPHS

APPENDIX A – WILDLIFE TERRESTRIAL ENVIRONMENT PHOTOGRAPHS
LIST OF PHOTOGRAPHS

Photo 1. Avian migration survey point AVM 01, North view, Spring 2020

Photo 2. Avian migration survey point AVM 02, North view, Spring 2020

Photo 3. Avian migration survey point AVM 03, North view, Spring 2020

Photo 4. Avian migration survey point AVM 04, North view, Spring 2020

APPENDIX B

DETAILED DATA TABLES

APPENDIX B: DETAILED DATA TABLES
LIST OF TABLES

Appendix B, Table 1

Detailed Results From The Avian Migration Surveys Conducted For The Project, Spring and Fall 2020

Site ID	Season	Survey Round	Date	UTM Coordinates[a]		Scientific Name	Common Name	Species Guild[b]	Quantity	Flight Height Grouping (m)
				Easting	Northing					
AVM 01	**Spring**	**1**	**02-May-2020**	**605253**	**6391035**	***Haliaeetus leucocephalus***	**Bald Eagle**	**B**	**3**	**1-30**
AVM 01	Spring	1	02-May-2020	605253	6391035	*Branta canadensis*	Canada Goose	D	2	loafing/foraging
AVM 01	Spring	1	03-May-2020	605253	6391035	*Perisoreus canadensis*	Canada Jay	A	1	1-30
AVM 01	**Spring**	**1**	**02-May-2020**	**605253**	**6391035**	***Gavia immer***	**Common Loon**	**D**	**2**	**loafing/foraging**
AVM 01	Spring	1	03-May-2020	605253	6391035	*Junco hyemalis*	Dark-eyed Junco	A	3	1-30
AVM 01	Spring	1	02-May-2020	605253	6391035	*Anas platyrhynchos*	Mallard	D	1	1-30
AVM 01	Spring	1	02-May-2020	605253	6391035	*Anas platyrhynchos*	Mallard	D	2	1-30
AVM 01	Spring	1	03-May-2020	605253	6391035	*Accipiter gentilis atricapillus*	Northern Goshawk	B	1	1-30
AVM 01	Spring	1	03-May-2020	605253	6391035	*Circus hudsonius*	Northern Harrier	B	1	1-30
AVM 01	Spring	1	03-May-2020	605253	6391035	*Antigone canadensis*	Sandhill Crane	E	3	loafing/foraging
AVM 01	**Spring**	**2**	**14-May-2020**	**605253**	**6391035**	***Gavia immer***	**Common Loon**	**D**	**1**	**61+**
AVM 01	**Spring**	**2**	**15-May-2020**	**605253**	**6391035**	***Gavia immer***	**Common Loon**	**D**	**1**	**loafing/foraging**
AVM 01	Spring	2	15-May-2020	605253	6391035	*Plectrophenax nivalis*	Snow Bunting	A	30	loafing/foraging
AVM 01	Spring	2	14-May-2020	605253	6391035	*Anser caerulescens*	Snow Goose	D	35	61+
AVM 01	Spring	2	15-May-2020	605253	6391035	*Anser caerulescens*	Snow Goose	D	9	31-60
AVM 01	Spring	2	15-May-2020	605253	6391035	*Anser caerulescens*	Snow Goose	D	44	61+
AVM 01	Spring	2	15-May-2020	605253	6391035	*Anser caerulescens*	Snow Goose	D	12	61+
AVM 01	Spring	2	15-May-2020	605253	6391035	*Cygnus columbianus*	Tundra Swan	D	13	31-60
AVM 01	Spring	3	31-May-2020	605253	6391035	*Turdus migratorius*	American Robin	A	1	31-60
AVM 01	Spring	3	31-May-2020	605253	6391035	*Turdus migratorius*	American Robin	A	1	loafing/foraging
AVM 01	Spring	3	31-May-2020	605253	6391035	*Turdus migratorius*	American Robin	A	1	loafing/foraging
AVM 01	Spring	3	01-Jun-2020	605253	6391035	*Turdus migratorius*	American Robin	A	1	loafing/foraging
AVM 01	Spring	3	01-Jun-2020	605253	6391035	*Turdus migratorius*	American Robin	A	3	loafing/foraging
AVM 01	Spring	3	01-Jun-2020	605253	6391035	*Turdus migratorius*	American Robin	A	1	loafing/foraging
AVM 01	**Spring**	**3**	**31-May-2020**	**605253**	**6391035**	***Haliaeetus leucocephalus***	**Bald Eagle**	**B**	**1**	**61+**
AVM 01	**Spring**	**3**	**31-May-2020**	**605253**	**6391035**	***Chroicocephalus philadelphia***	**Bonaparte's Gull**	**E**	**1**	**1-30**
AVM 01	**Spring**	**3**	**01-Jun-2020**	**605253**	**6391035**	***Chroicocephalus philadelphia***	**Bonaparte's Gull**	**E**	**1**	**loafing/foraging**
AVM 01	Spring	3	31-May-2020	605253	6391035	*Larus californicus*	California Gull	E	1	61+
AVM 01	Spring	3	01-Jun-2020	605253	6391035	*Perisoreus canadensis*	Canada Jay	A	1	loafing/foraging
AVM 01	Spring	3	01-Jun-2020	605253	6391035	*Bucephala clangula*	Common Goldeneye	D	15	loafing/foraging
AVM 01	Spring	3	01-Jun-2020	605253	6391035	*Bucephala clangula*	Common Goldeneye	D	1	loafing/foraging
AVM 01	**Spring**	**3**	**31-May-2020**	**605253**	**6391035**	***Gavia immer***	**Common Loon**	**D**	**1**	**1-30**
AVM 01	**Spring**	**3**	**31-May-2020**	**605253**	**6391035**	***Chordeiles minor***	**Common Nighthawk**	**A**	**1**	**loafing/foraging**
AVM 01	Spring	3	01-Jun-2020	605253	6391035	*Tringa flavipes*	Lesser Yellowlegs	E	1	loafing/foraging
AVM 01	Spring	3	01-Jun-2020	605253	6391035	*Melospiza lincolnii*	Lincoln's Sparrow	A	1	loafing/foraging
AVM 01	Spring	3	01-Jun-2020	605253	6391035	*Leiothlypis celata*	Orange-crowned Warbler	A	1	loafing/foraging
AVM 01	Spring	3	01-Jun-2020	605253	6391035	*Setophaga palmarum*	Palm Warbler	A	2	loafing/foraging
AVM 01	Spring	3	31-May-2020	605253	6391035	*Regulus calendula*	Ruby-crowned Kinglet	A	1	loafing/foraging
AVM 01	Spring	3	01-Jun-2020	605253	6391035	*Catharus ustulatus*	Swainson's Thrush	A	1	loafing/foraging
AVM 01	Spring	3	01-Jun-2020	605253	6391035	*Zonotrichia albicollis*	White-throated Sparrow	A	1	loafing/foraging
AVM 01	Spring	3	01-Jun-2020	605253	6391035	*Setophaga coronata*	Yellow-rumped Warbler	E	1	loafing/foraging
AVM 01	Fall	1	10-Aug-2020	605253	6391035	*Perisoreus canadensis*	Canada Jay	A	1	loafing/foraging
AVM 01	Fall	2	29-Aug-2020	605253	6391035	*Branta canadensis*	Canada Goose	D	30	1-30
AVM 01	Fall	2	28-Aug-2020	605253	6391035	*Larus delawarensis*	Ring-billed Gull	E	1	loafing/foraging
AVM 01	Fall	3	20-Sep-2020	605253	6391035	*Turdus migratorius*	American Robin	A	1	loafing/foraging
AVM 01	Fall	3	20-Sep-2020	605253	6391035	*Turdus migratorius*	American Robin	A	1	loafing/foraging
AVM 01	Fall	3	20-Sep-2020	605253	6391035	*Turdus migratorius*	American Robin	A	1	loafing/foraging
AVM 01	Fall	3	20-Sep-2020	605253	6391035	*Cyanocitta cristata*	Blue Jay	A	1	loafing/foraging

Appendix B, Table 1

Detailed Results From The Avian Migration Surveys Conducted For The Project, Spring and Fall 2020

Site ID	Season	Survey Round	Date	UTM Coordinates[a]		Scientific Name	Common Name	Species Guild[b]	Quantity	Flight Height Grouping (m)
				Easting	Northing					
AVM 01	Fall	3	20-Sep-2020	605253	6391035	*Branta canadensis*	Canada Goose	D	11	31-60
AVM 01	Fall	3	20-Sep-2020	605253	6391035	*Perisoreus canadensis*	Canada Jay	A	1	loafing/foraging
AVM 01	**Fall**	**3**	**20-Sep-2020**	**605253**	**6391035**	***Gavia immer***	**Common Loon**	**D**	**1**	**loafing/foraging**
AVM 01	Fall	3	20-Sep-2020	605253	6391035	*Corvus corax*	Common Raven	F	2	1-30
AVM 01	Fall	3	20-Sep-2020	605253	6391035	*Corvus corax*	Common Raven	F	1	loafing/foraging
AVM 01	Fall	3	20-Sep-2020	605253	6391035	*Junco hyemalis*	Dark-eyed Junco	A	1	loafing/foraging
AVM 01	Fall	3	20-Sep-2020	605253	6391035	*Dryobates pubescens*	Downy Woodpecker	A	1	loafing/foraging
AVM 01	Fall	3	20-Sep-2020	605253	6391035	*Spinus pinus*	Pine Siskin	A	2	loafing/foraging
AVM 02	Spring	1	02-May-2020	603392	6391763	*Corvus brachyrhynchos*	American Crow	F	1	1-30
AVM 02	Spring	1	03-May-2020	603392	6391763	*Turdus migratorius*	American Robin	A	2	1-30
AVM 02	Spring	1	03-May-2020	603392	6391763	*Perisoreus canadensis*	Canada Jay	A	1	loafing/foraging
AVM 02	Spring	1	02-May-2020	603392	6391763	*Corvus corax*	Common Raven	F	1	loafing/foraging
AVM 02	Spring	1	03-May-2020	603392	6391763	*Junco hyemalis*	Dark-eyed Junco	A	1	loafing/foraging
AVM 02	Spring	1	03-May-2020	603392	6391763	*Laridae*	Gulls, Terns, and Skimmers*	E	1	61+
AVM 02	Spring	2	15-May-2020	603392	6391763	*Falco sparverius*	American Kestrel	B	1	1-30
AVM 02	Spring	2	14-May-2020	603392	6391763	*Branta canadensis*	Canada Goose	D	10	loafing/foraging
AVM 02	Spring	2	14-May-2020	603392	6391763	*Junco hyemalis*	Dark-eyed Junco	A	1	loafing/foraging
AVM 02	Spring	2	15-May-2020	603392	6391763	*Junco hyemalis*	Dark-eyed Junco	A	2	loafing/foraging
AVM 02	Spring	2	15-May-2020	603392	6391763	*Regulus calendula*	Ruby-crowned Kinglet	A	1	loafing/foraging
AVM 02	Spring	2	15-May-2020	603392	6391763	*Anser caerulescens*	Snow Goose	D	20	
AVM 02	Spring	3	01-Jun-2020	603392	6391763	*Corvus brachyrhynchos*	American Crow	F	1	1-30
AVM 02	Spring	3	01-Jun-2020	603392	6391763	*Turdus migratorius*	American Robin	A	1	1-30
AVM 02	**Spring**	**3**	**31-May-2020**	**603392**	**6391763**	***Haliaeetus leucocephalus***	**Bald Eagle**	**B**	**2**	**61+**
AVM 02	**Spring**	**3**	**31-May-2020**	**603392**	**6391763**	***Chordeiles minor***	**Common Nighthawk**	**A**	**1**	**61+**
AVM 02	Spring	3	31-May-2020	603392	6391763	*Regulus calendula*	Ruby-crowned Kinglet	A	1	loafing/foraging
AVM 02	Spring	3	01-Jun-2020	603392	6391763	*Falcipennis canadensis*	Spruce Grouse	C	1	loafing/foraging
AVM 02	Spring	3	01-Jun-2020	603392	6391763	*Cardellina pusilla*	Wilson's Warbler	A	1	loafing/foraging
AVM 02	Spring	3	31-May-2020	603392	6391763	*Setophaga coronata*	Yellow-rumped Warbler	E	1	loafing/foraging
AVM 02	**Fall**	**1**	**10-Aug-2020**	**603392**	**6391763**	***Chordeiles minor***	**Common Nighthawk**	**A**	**1**	**31-60**
AVM 02	Fall	2	29-Aug-2020	603392	6391763	*Perisoreus canadensis*	Canada Jay	A	1	loafing/foraging
AVM 02	Fall	2	29-Aug-2020	603392	6391763	*Corvus corax*	Common Raven	F	1	loafing/foraging
AVM 02	Fall	2	29-Aug-2020	603392	6391763	*Anatidae*	Ducks, Geese, Swans*	D	1	31-60
AVM 02	Fall	2	29-Aug-2020	603392	6391763	*Spinus pinus*	Pine Siskin	A	1	31-60
AVM 02	Fall	3	20-Sep-2020	603392	6391763	*Turdus migratorius*	American Robin	A	1	loafing/foraging
AVM 02	**Fall**	**3**	**20-Sep-2020**	**603392**	**6391763**	***Haliaeetus leucocephalus***	**Bald Eagle**	**B**	**1**	**31-60**
AVM 02	Fall	3	20-Sep-2020	603392	6391763	*Perisoreus canadensis*	Canada Jay	A	2	loafing/foraging
AVM 02	Fall	3	20-Sep-2020	603392	6391763	*Perisoreus canadensis*	Canada Jay	A	1	loafing/foraging
AVM 02	Fall	3	20-Sep-2020	603392	6391763	*Passerella iliaca*	Fox Sparrow	A	1	loafing/foraging
AVM 02	Fall	3	20-Sep-2020	603392	6391763	*Junco hyemalis hyemalis*	Slate-coloured Junco	A	8	loafing/foraging
AVM 02	Fall	3	20-Sep-2020	603392	6391763	*Setophaga coronata*	Yellow-rumped Warbler	E	1	loafing/foraging
AVM 03	Spring	1	03-May-2020	604488	6393418	*Corvus corax*	Common Raven	F	1	loafing/foraging
AVM 03	Spring	1	03-May-2020	604488	6393418	*Junco hyemalis*	Dark-eyed Junco	A	2	loafing/foraging
AVM 03	**Spring**	**2**	**14-May-2020**	**604488**	**6393418**	***Gavia immer***	**Common Loon**	**D**	**2**	**31-60**
AVM 03	Spring	2	15-May-2020	604488	6393418	*Mergus merganser*	Common Merganser	D	1	61+
AVM 03	Spring	2	15-May-2020	604488	6393418	*Anatidae*	Ducks, Geese, Swans*	D	1	loafing/foraging
AVM 03	Spring	2	15-May-2020	604488	6393418	*Laridae*	Gulls, Terns, and Skimmers*	E	1	61+
AVM 03	Spring	2	15-May-2020	604488	6393418	*Plectrophenax nivalis*	Snow Bunting	A	2	31-60

Appendix B, Table 1

Detailed Results From The Avian Migration Surveys Conducted For The Project, Spring and Fall 2020

Site ID	Season	Survey Round	Date	UTM Coordinates[a]		Scientific Name	Common Name	Species Guild[b]	Quantity	Flight Height Grouping (m)
				Easting	Northing					
AVM 03	Spring	3	01-Jun-2020	604488	6393418	*Turdus migratorius*	American Robin	A	1	loafing/foraging
AVM 03	**Spring**	**3**	**31-May-2020**	**604488**	**6393418**	***Hirundo rustica***	**Barn Swallow**	**A**	**4**	**1-30**
AVM 03	**Spring**	**3**	**01-Jun-2020**	**604488**	**6393418**	***Hirundo rustica***	**Barn Swallow**	**A**	**2**	**31-60**
AVM 03	**Spring**	**3**	**01-Jun-2020**	**604488**	**6393418**	***Chroicocephalus philadelphia***	**Bonaparte's Gull**	**E**	**1**	**loafing/foraging**
AVM 03	**Spring**	**3**	**01-Jun-2020**	**604488**	**6393418**	***Gavia immer***	**Common Loon**	**D**	**1**	**loafing/foraging**
AVM 03	**Spring**	**3**	**31-May-2020**	**604488**	**6393418**	***Chordeiles minor***	**Common Nighthawk**	**A**	**1**	**61+**
AVM 03	**Spring**	**3**	**31-May-2020**	**604488**	**6393418**	***Chordeiles minor***	**Common Nighthawk**	**A**	**2**	**61+**
AVM 03	Spring	3	31-May-2020	604488	6393418	*Junco hyemalis*	Dark-eyed Junco	A	1	loafing/foraging
AVM 03	Spring	3	01-Jun-2020	604488	6393418	*Junco hyemalis*	Dark-eyed Junco	A	1	loafing/foraging
AVM 03	Spring	3	01-Jun-2020	604488	6393418	*Eremophila alpestris*	Horned Lark	A	4	31-60
AVM 03	Spring	3	01-Jun-2020	604488	6393418	*Setophaga palmarum*	Palm Warbler	A	1	loafing/foraging
AVM 03	Spring	3	01-Jun-2020	604488	6393418	*Regulus calendula*	Ruby-crowned Kinglet	A	1	loafing/foraging
AVM 03	Spring	3	01-Jun-2020	604488	6393418	*Catharus ustulatus*	Swainson's Thrush	A	1	loafing/foraging
AVM 03	Spring	3	31-May-2020	604488	6393418	*Tachycineta bicolor*	Tree Swallow	A	2	1-30
AVM 03	Spring	3	01-Jun-2020	604488	6393418	*Zonotrichia albicollis*	White-throated Sparrow	A	1	loafing/foraging
AVM 03	Spring	3	01-Jun-2020	604488	6393418	*Setophaga coronata*	Yellow-rumped Warbler	E	1	loafing/foraging
AVM 03	**Fall**	**1**	**10-Aug-2020**	**604488**	**6393418**	***Hirundo rustica***	**Barn Swallow**	**A**	**1**	**1-30**
AVM 03	**Fall**	**1**	**10-Aug-2020**	**604488**	**6393418**	***Chordeiles minor***	**Common Nighthawk**	**A**	**5**	**61+**
AVM 03	Fall	1	10-Aug-2020	604488	6393418	*Junco hyemalis*	Dark-eyed Junco	A	2	1-30
AVM 03	Fall	1	10-Aug-2020	604488	6393418	*Tringa melanoleuca*	Greater Yellowlegs	E	1	1-30
AVM 03	Fall	1	10-Sep-2020	604488	6393418	*Setophaga coronata*	Yellow-rumped Warbler	E	2	1-30
AVM 03	Fall	2	29-Aug-2020	604488	6393418	*Charadriiformes*	Auks*	E	1	31-60
AVM 03	**Fall**	**2**	**29-Aug-2020**	**604488**	**6393418**	***Hirundo rustica***	**Barn Swallow**	**A**	**2**	**31-60**
AVM 03	**Fall**	**2**	**28-Aug-2020**	**604488**	**6393418**	***Gavia immer***	**Common Loon**	**D**	**1**	**loafing/foraging**
AVM 03	**Fall**	**2**	**28-Aug-2020**	**604488**	**6393418**	***Chordeiles minor***	**Common Nighthawk**	**A**	**8**	**61+**
AVM 03	Fall	2	28-Aug-2020	604488	6393418	*Anatidae*	Ducks, Geese, Swans*	D	11	loafing/foraging
AVM 03	Fall	3	20-Sep-2020	604488	6393418	*Anthus rubescens*	American Pipit	A	1	loafing/foraging
AVM 03	Fall	3	20-Sep-2020	604488	6393418	*Turdus migratorius*	American Robin	A	2	loafing/foraging
AVM 03	Fall	3	20-Sep-2020	604488	6393418	*Branta canadensis*	Canada Goose	D	3	loafing/foraging
AVM 03	Fall	3	20-Sep-2020	604488	6393418	*Perisoreus canadensis*	Canada Jay	A	2	loafing/foraging
AVM 03	**Fall**	**3**	**20-Sep-2020**	**604488**	**6393418**	***Gavia immer***	**Common Loon**	**D**	**1**	**loafing/foraging**
AVM 03	**Fall**	**3**	**20-Sep-2020**	**604488**	**6393418**	***Gavia immer***	**Common Loon**	**D**	**1**	**loafing/foraging**
AVM 03	Fall	3	20-Sep-2020	604488	6393418	*Corvus corax*	Common Raven	F	1	loafing/foraging
AVM 03	Fall	3	20-Sep-2020	604488	6393418	*Corvus corax*	Common Raven	F	1	1-30
AVM 03	Fall	3	20-Sep-2020	604488	6393418	*Junco hyemalis*	Dark-eyed Junco	A	8	loafing/foraging
AVM 03	Fall	3	20-Sep-2020	604488	6393418	*Junco hyemalis*	Dark-eyed Junco	A	1	loafing/foraging
AVM 03	Fall	3	20-Sep-2020	604488	6393418	*Spinus pinus*	Pine Siskin	A	4	loafing/foraging
AVM 04	Spring	1	03-May-2020	606006	6391822	*Corvus brachyrhynchos*	American Crow	F	1	loafing/foraging
AVM 04	Spring	1	03-May-2020	606006	6391822	*Turdus migratorius*	American Robin	A	4	1-30
AVM 04	Spring	1	03-May-2020	606006	6391822	*Turdus migratorius*	American Robin	A	1	1-30
AVM 04	Spring	1	02-May-2020	606006	6391822	*Branta canadensis*	Canada Goose	D	2	loafing/foraging
AVM 04	**Spring**	**1**	**02-May-2020**	**606006**	**6391822**	***Gavia immer***	**Common Loon**	**D**	**1**	**loafing/foraging**
AVM 04	Spring	1	02-May-2020	606006	6391822	*Junco hyemalis*	Dark-eyed Junco	A	1	loafing/foraging
AVM 04	Spring	1	02-May-2020	606006	6391822	*Tringa melanoleuca*	Greater Yellowlegs	E	2	loafing/foraging
AVM 04	Spring	2	14-May-2020	606006	6391822	*Junco hyemalis*	Dark-eyed Junco	A	6	loafing/foraging
AVM 04	Spring	2	14-May-2020	606006	6391822	*Junco hyemalis*	Dark-eyed Junco	A	5	1-30
AVM 04	Spring	2	15-May-2020	606006	6391822	*Junco hyemalis*	Dark-eyed Junco	A	1	1-30

Appendix B, Table 1

Detailed Results From The Avian Migration Surveys Conducted For The Project, Spring and Fall 2020

Site ID	Season	Survey Round	Date	UTM Coordinates[a]		Scientific Name	Common Name	Species Guild[b]	Quantity	Flight Height Grouping (m)
				Easting	Northing					
AVM 04	Spring	2	14-May-2020	606006	6391822	*Passerella iliaca*	Fox Sparrow	A	1	loafing/foraging
AVM 04	Spring	3	01-Jun-2020	606006	6391822	*Turdus migratorius*	American Robin	A	1	loafing/foraging
AVM 04	**Spring**	**3**	**31-May-2020**	**606006**	**6391822**	***Gavia immer***	**Common Loon**	**D**	**1**	**loafing/foraging**
AVM 04	**Spring**	**3**	**31-May-2020**	**606006**	**6391822**	***Chordeiles minor***	**Common Nighthawk**	**A**	**1**	**loafing/foraging**
AVM 04	Spring	3	31-May-2020	606006	6391822	*Junco hyemalis*	Dark-eyed Junco	A	2	loafing/foraging
AVM 04	Spring	3	01-Jun-2020	606006	6391822	*Junco hyemalis*	Dark-eyed Junco	A	3	loafing/foraging
AVM 04	Spring	3	31-May-2020	606006	6391822	*Catharus guttatus*	Hermit Thrush	A	2	loafing/foraging
AVM 04	Spring	3	01-Jun-2020	606006	6391822	*Catharus guttatus*	Hermit Thrush	A	1	loafing/foraging
AVM 04	Spring	3	01-Jun-2020	606006	6391822	*Leiothlypis celata*	Orange-crowned Warbler	A	2	loafing/foraging
AVM 04	Spring	3	31-May-2020	606006	6391822	*Setophaga palmarum*	Palm Warbler	A	3	loafing/foraging
AVM 04	Spring	3	01-Jun-2020	606006	6391822	*Setophaga palmarum*	Palm Warbler	A	2	loafing/foraging
AVM 04	Spring	3	31-May-2020	606006	6391822	*Gallinago delicata*	Wilson's Snipe	E	7	31-60
AVM 04	Spring	3	01-Jun-2020	606006	6391822	*Gallinago delicata*	Wilson's Snipe	E	1	loafing/foraging
AVM 04	Spring	3	31-May-2020	606006	6391822	*Setophaga coronata*	Yellow-rumped Warbler	E	3	loafing/foraging
AVM 04	Spring	3	01-Jun-2020	606006	6391822	*Setophaga coronata*	Yellow-rumped Warbler	E	1	loafing/foraging
AVM 04	**Fall**	**2**	**29-Aug-2020**	**606006**	**6391822**	***Gavia immer***	**Common Loon**	**D**	**1**	**loafing/foraging**
AVM 04	Fall	2	28-Aug-2020	606006	6391822	*Antigone canadensis*	Sandhill Crane	E	2	loafing/foraging
AVM 04	Fall	2	28-Aug-2020	606006	6391822	*Setophaga coronata*	Yellow-rumped Warbler	E	1	loafing/foraging
AVM 04	Fall	2	29-Aug-2020	606006	6391822	*Setophaga coronata*	Yellow-rumped Warbler	E	1	1-30
AVM 04	Fall	3	20-Sep-2020	606006	6391822	*Anthus rubescens*	American Pipit	A	2	1-30
AVM 04	Fall	2	29-Aug-2020	606006	6391822	*Setophaga coronata*	Yellow-rumped Warbler	E	1	1-30
AVM 04	Fall	3	20-Sep-2020	606006	6391822	*Anthus rubescens*	American Pipit	A	2	1-30
AVM 04	Fall	3	20-Sep-2020	606006	6391822	*Anthus rubescens*	American Pipit	A	3	1-30
AVM 04	Fall	3	20-Sep-2020	606006	6391822	*Anthus rubescens*	American Pipit	A	1	loafing/foraging
AVM 04	Fall	3	20-Sep-2020	606006	6391822	*Turdus migratorius*	American Robin	A	2	31-60
AVM 04	Fall	3	20-Sep-2020	606006	6391822	*Perisoreus canadensis*	Canada Jay	A	2	loafing/foraging
AVM 04	Fall	3	20-Sep-2020	606006	6391822	*Junco hyemalis*	Dark-eyed Junco	A	1	loafing/foraging
AVM 04	Fall	3	20-Sep-2020	606006	6391822	*Setophaga palmarum*	Palm Warbler	A	1	loafing/foraging
AVM 04	Fall	3	20-Sep-2020	606006	6391822	*Spinus pinus*	Pine Siskin	A	6	1-30

Source: All scientific names and common names from SKCDC (2020); Guild categories from AEB (2020).

Bold observations denote Species of Conservation Concern (SOCC).

a) UTM = NAD83, Zone 12.

b) Guild Categories are defined as:

A: Passerines (sparrow, warbler, blackbird, jay, lark, longspur, pipit, hummingbird, nighthawk, woodpecker.

B: Birds of prey (owl, hawk, falcon, eagle, vulture).

C: Grouse and allies (grouse, partridge, pheasant, turkey, ptarmigan).

D: Waterfowl (swan, goose, duck, grebe, loon, diving duck).

E: Shorebirds/waterbirds (sandpiper, heron, crane, egret, coot, rail, gull, phalarope).

F: Others (crow, raven, magpie, dove, pigeon).

Appendix B, Table 2

Detailed Results From Acoustic Bat Surveys, May to September 2020

Site ID	Fmin (kHz)	Fmean (kHz)	Fmax (kHz)	Date	Time	Vocalization Category[a]
BAT 06	37563.867	39730.48	44092.641	2020-05-04	2:40:17	High Frequency
BAT 06	38728.68	42811.832	51789.559	2020-05-04	2:40:17	High Frequency
BAT 06	37075.727	43442.48	57679.195	2020-05-04	2:40:17	Myotis
BAT 06	37836.555	44908.922	62255.145	2020-05-07	0:50:55	Myotis
BAT 06	38575.512	47802.91	65998.227	2020-05-21	1:15:24	Myotis
BAT 06	36282.48	41459.598	56186.848	2020-06-03	1:39:02	High Frequency
BAT 06	36691.746	42163.832	51171.188	2020-06-14	0:49:16	High Frequency
BAT 06	37007.141	41277.953	47444.535	2020-06-14	0:49:16	High Frequency
BAT 06	39734.602	45625.039	58743.141	2020-06-22	0:52:32	Myotis
BAT 06	40576.25	48063.473	61698.125	2020-06-24	23:53:21	Myotis
BAT 06	38161.395	42739.387	50822.375	2020-06-28	1:54:18	High Frequency
BAT 06	37523.012	41701.422	47440.754	2020-06-28	1:57:47	Myotis
BAT 06	39316.887	45616.934	56123.902	2020-06-28	1:57:47	Myotis
BAT 06	37468.258	47394.953	63347.867	2020-07-04	1:52:21	Myotis
BAT 06	36810.172	42001.223	51098.668	2020-07-05	1:48:22	High Frequency
BAT 06	34893.355	37416.938	41959.457	2020-07-05	1:52:46	High Frequency
BAT 06	33156.832	38055.766	45411.789	2020-07-20	3:30:04	High Frequency
BAT 06	35632.008	45043.727	62162.332	2020-07-22	23:23:47	Myotis
BAT 06	17609.66	18516.039	20505.398	2020-07-22	23:25:32	Low Frequency
BAT 06	33801.621	37453.586	43278.516	2020-07-24	23:19:45	High Frequency
BAT 06	36727.105	41776.598	51616.188	2020-07-25	1:23:19	High Frequency
BAT 06	38821.551	45576.637	59390.785	2020-07-25	2:22:22	Myotis
BAT 06	37229.227	40962.148	46844.25	2020-07-27	1:18:50	High Frequency
BAT 06	36734.121	40678.844	46907	2020-07-29	2:12:08	Myotis
BAT 06	35343.598	38477.926	45249.883	2020-07-29	3:11:05	High Frequency
BAT 06	36068.773	46340.949	66204.359	2020-07-29	23:11:13	Myotis
BAT 06	38174.09	42452.613	48447.82	2020-07-30	2:12:38	Myotis
BAT 06	38065.563	41612.668	46369.82	2020-07-30	2:12:46	Myotis
BAT 06	37455.934	42456.211	49251.273	2020-07-30	2:12:46	Myotis
BAT 06	36196.238	40838.426	48667.23	2020-07-30	23:08:09	High Frequency
BAT 06	38575.508	45857.688	60967.344	2020-07-30	23:11:58	Myotis
BAT 06	39076.035	43605.324	49430.344	2020-07-31	0:07:50	Myotis
BAT 06	36732.691	40374.945	45987.023	2020-08-01	0:11:37	High Frequency
BAT 06	37009.18	40737.301	46433.551	2020-08-01	0:11:37	High Frequency
BAT 06	36073.398	47125.453	70765.906	2020-08-01	1:12:20	Myotis
BAT 06	37884.676	43609.316	53950.434	2020-08-02	0:04:31	Myotis
BAT 06	36783.961	42629.898	52257.824	2020-08-02	0:06:43	High Frequency
BAT 06	32688.461	34717.055	39518.563	2020-08-02	2:08:57	High Frequency
BAT 06	36949.773	39168.902	43298.746	2020-08-02	2:08:57	High Frequency
BAT 06	35957.063	37806.66	40921.523	2020-08-02	3:04:22	High Frequency
BAT 06	37975.887	46703.406	61211.406	2020-08-03	1:00:13	Myotis
BAT 06	37719.781	42576.5	50441.938	2020-08-07	1:52:49	High Frequency
BAT 06	36688.848	44690.926	60704.219	2020-08-07	1:52:49	Myotis
BAT 06	42078.285	46076.172	55495.129	2020-08-07	2:57:02	Myotis
BAT 06	35036.891	37264.582	40784.082	2020-08-07	2:58:32	High Frequency
BAT 06	34787.871	37366.227	40677.273	2020-08-07	2:58:32	High Frequency
BAT 06	35718.156	38950.18	44280.875	2020-08-07	2:58:32	High Frequency
BAT 06	35079.262	39013.137	47533.223	2020-08-07	2:58:32	High Frequency
BAT 06	38004.273	44305.711	57123.25	2020-08-12	1:44:49	Myotis
BAT 06	37749.793	45284.906	58236.539	2020-08-12	3:42:49	Myotis
BAT 06	36603.477	39336.957	45088.746	2020-08-15	2:34:30	High Frequency

Appendix B, Table 2

Detailed Results From Acoustic Bat Surveys, May to September 2020

Site ID	Fmin (kHz)	Fmean (kHz)	Fmax (kHz)	Date	Time	Vocalization Category[a]
BAT 06	35876.625	38082.734	42133.883	2020-08-15	2:34:30	High Frequency
BAT 06	37304.902	46441.41	64916.504	2020-08-15	22:33:18	Myotis
BAT 06	38477.023	43944.711	50990.18	2020-08-16	0:29:29	High Frequency
BAT 06	37649.359	43241.328	50519.207	2020-08-16	0:29:29	Myotis
BAT 06	38413.746	44054.012	53533.75	2020-08-17	22:28:50	Myotis
BAT 06	38683.285	46913.707	64416.785	2020-08-18	1:26:15	Myotis
BAT 06	36244.832	38235.316	41704.316	2020-08-19	2:24:49	High Frequency
BAT 06	38077.199	46016.672	59190.797	2020-08-19	2:28:08	Myotis
BAT 06	38099.816	41238.516	46652.145	2020-08-22	2:14:13	High Frequency
BAT 06	36999.59	41883.215	51609.34	2020-08-22	2:14:13	Myotis
BAT 06	37210.297	45528.691	64354.535	2020-08-22	2:14:13	Myotis
BAT 06	33789.195	35745.688	38059.023	2020-08-24	21:10:45	High Frequency
BAT 06	33226.328	38202.867	47052.883	2020-08-24	21:10:45	High Frequency
BAT 06	36237.004	40864.824	50372.363	2020-08-29	0:59:48	High Frequency
BAT 06	36708.813	42748.84	56047.055	2020-09-02	21:47:36	Myotis
BAT 06	38754.441	47046.563	62371.254	2020-09-04	2:43:47	Myotis
BAT 06	37091.883	41485.785	51102.668	2020-09-05	1:40:47	High Frequency
BAT 06	36601.543	43824.109	57313.738	2020-09-14	5:12:40	Myotis
BAT 06	32588.041	36768.234	41904.344	2020-09-20	2:57:11	High Frequency
BAT 06	34160.469	36274.336	38706.277	2020-09-20	2:57:11	High Frequency
BAT 06	32722.422	35423.094	37301.586	2020-09-20	2:57:11	High Frequency
BAT 06	33375.883	36801.719	42697.977	2020-09-22	19:48:33	High Frequency
BAT 07	37924.633	41716.672	47824.121	2020-05-09	23:55:03	Myotis
BAT 07	37840.387	43881.469	55428.5	2020-05-09	23:55:03	Myotis
BAT 07	36419.508	39542.453	44888.602	2020-06-14	1:49:15	High Frequency
BAT 07	38911.934	47352.98	63799.93	2020-06-22	0:55:35	Myotis
BAT 07	36338.73	41189.172	51670.461	2020-07-19	23:30:17	High Frequency
BAT 07	39343.426	43273.086	51212.566	2020-07-23	0:23:24	Myotis
BAT 07	37217.578	38829.598	41705.82	2020-07-26	0:19:42	High Frequency
BAT 07	36538.785	38519.012	41177.5	2020-07-26	0:19:42	High Frequency
BAT 07	37350.563	39138.113	42526.773	2020-07-26	0:19:42	High Frequency
BAT 07	37228.855	41134.902	46958.766	2020-07-30	0:11:33	High Frequency
BAT 07	40468.176	42603.277	48732.988	2020-07-30	3:09:29	High Frequency
BAT 07	33916.734	35133.227	37296.234	2020-07-30	3:09:29	High Frequency
BAT 07	37664.164	38794.008	41032.184	2020-07-30	3:09:29	High Frequency
BAT 07	36921.934	44367.828	60328.336	2020-07-30	4:09:18	Myotis
BAT 07	35937.52	38181.285	41618.758	2020-08-01	1:11:21	High Frequency
BAT 07	35204.828	38421.586	43577.363	2020-08-01	1:11:21	High Frequency
BAT 07	36869.293	39069.59	45163.574	2020-08-02	2:08:14	High Frequency
BAT 07	39429.766	42186.227	47955.195	2020-08-03	3:02:52	High Frequency
BAT 07	37604.809	40976.16	46922.098	2020-08-11	22:43:35	High Frequency
BAT 07	36842.898	39870.348	46823.496	2020-08-11	23:40:59	High Frequency
BAT 07	37266.68	42077.875	50453.742	2020-08-12	2:45:21	High Frequency
BAT 07	45208.488	48390.715	56196.625	2020-08-16	22:28:12	Myotis
BAT 07	37121.664	42713.695	55155.793	2020-08-19	1:22:00	High Frequency
BAT 07	35052.027	39267.598	45285.832	2020-08-19	23:20:23	High Frequency
BAT 07	36065.195	39506.902	46467.906	2020-08-20	0:21:47	High Frequency
BAT 07	36450.086	37714.102	39413.648	2020-09-02	23:43:53	High Frequency
BAT 07	34868.23	38440.629	46978.32	2020-09-05	2:36:21	High Frequency
BAT 07	36486.008	41918.938	56964.824	2020-09-07	3:32:59	High Frequency
BAT 07	37046.395	40050.125	45023.418	2020-09-08	23:25:03	High Frequency

Appendix B, Table 2

Detailed Results From Acoustic Bat Surveys, May to September 2020

Site ID	Fmin (kHz)	Fmean (kHz)	Fmax (kHz)	Date	Time	Vocalization Category[a]
BAT 07	37115.848	40264.402	45658.098	2020-09-08	23:25:03	High Frequency
BAT 07	34983.406	39829.539	50863.754	2020-09-10	0:24:14	High Frequency
BAT 07	34735.727	37520.789	42769.113	2020-09-15	20:05:15	High Frequency
BAT 07	35468.879	39703.707	50483.898	2020-09-15	20:05:15	High Frequency
BAT 07	35075.715	44976.516	63065.668	2020-09-16	23:02:38	Myotis
BAT 07	34411.609	38388.266	43800.875	2020-09-19	23:54:15	High Frequency
BAT 07	34992.785	41274.602	53149.621	2020-09-19	23:54:15	High Frequency
BAT 08	34784.375	38717.832	45189.82	2020-05-16	23:09:58	High Frequency
BAT 08	34340.391	36642.516	40395.383	2020-05-30	2:33:32	High Frequency
BAT 08	34901.508	38826.465	48121.207	2020-05-30	2:33:32	High Frequency
BAT 08	37003.238	40840.398	47644.652	2020-06-10	23:47:43	High Frequency
BAT 08	37569.953	41739.449	53734.684	2020-06-14	1:50:22	High Frequency
BAT 08	35542.82	39263.926	45004.023	2020-06-14	2:48:31	High Frequency
BAT 08	25683.531	26311.684	27690.721	2020-06-23	1:53:20	Low Frequency
BAT 08	25509.473	26085.395	27377.943	2020-06-23	1:53:20	Low Frequency
BAT 08	25643.66	26185.934	27043.785	2020-06-23	1:53:20	Low Frequency
BAT 08	25602.305	25967.285	26756.744	2020-06-23	1:53:20	Low Frequency
BAT 08	34886.297	40451.52	52026.953	2020-06-24	1:56:07	High Frequency
BAT 08	40201.965	42935.172	47852.789	2020-06-25	0:51:00	High Frequency
BAT 08	38551.246	42208.523	50161.086	2020-06-25	0:51:00	Myotis
BAT 08	37192.832	41158.645	48947.707	2020-06-25	23:54:55	High Frequency
BAT 08	36704.719	41223.543	51102.605	2020-06-25	23:57:35	High Frequency
BAT 08	36659.695	43027.902	59007.375	2020-06-25	23:58:51	High Frequency
BAT 08	36793.344	40815.465	48812.566	2020-06-25	23:59:11	High Frequency
BAT 08	37425.973	40730.957	46290.215	2020-06-25	23:59:18	High Frequency
BAT 08	37131.477	39678.688	45234.047	2020-06-26	0:52:56	High Frequency
BAT 08	37166.836	39872.047	45920.82	2020-06-26	0:52:56	High Frequency
BAT 08	37954.73	39986.023	44164.5	2020-06-26	0:52:56	High Frequency
BAT 08	39805.922	42327.41	47228.871	2020-06-27	0:53:32	High Frequency
BAT 08	37533.965	39386.41	42655.035	2020-06-27	0:54:24	High Frequency
BAT 08	39763.883	43645.727	50725.145	2020-06-27	0:54:24	High Frequency
BAT 08	34668.074	37278.32	44614.039	2020-06-27	1:57:54	High Frequency
BAT 08	36423.641	40177.289	46851.41	2020-06-30	1:50:35	High Frequency
BAT 08	36454.719	38327.727	40822.77	2020-06-30	1:50:35	High Frequency
BAT 08	35245.883	40915.66	52591.344	2020-06-30	1:53:48	High Frequency
BAT 08	39613.141	43329.813	49731.195	2020-07-08	2:51:29	High Frequency
BAT 08	36682.387	43019.691	54442.117	2020-07-11	1:45:27	Myotis
BAT 08	37037.656	42728.242	54008.461	2020-07-11	1:45:27	Myotis
BAT 08	40880.805	48180.762	61920.629	2020-07-11	1:45:27	Myotis
BAT 08	38354.48	42322.234	48061.039	2020-07-11	23:43:22	High Frequency
BAT 08	37041.363	40792.961	47481.906	2020-07-11	23:43:22	High Frequency
BAT 08	38071.555	42573.629	51353.93	2020-07-11	23:43:22	High Frequency
BAT 08	36395.605	38069.195	41118.359	2020-07-12	0:42:18	High Frequency
BAT 08	36963.078	38988.723	42625.16	2020-07-12	0:42:18	High Frequency
BAT 08	37125.156	42414.078	49868.984	2020-07-12	0:45:38	Myotis
BAT 08	35225.262	45019.953	60661.602	2020-07-12	0:45:38	Myotis
BAT 08	34099.512	36415.531	40007.082	2020-07-12	0:47:52	High Frequency
BAT 08	34524.402	36489.563	39575.352	2020-07-12	0:47:52	High Frequency
BAT 08	36095.926	37513.781	39478.445	2020-07-19	23:29:03	High Frequency
BAT 08	35784.27	38225.902	41708.781	2020-07-20	0:31:11	High Frequency
BAT 08	35218.828	41817.367	52080.711	2020-07-21	23:27:10	Myotis

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Detailed Results From Acoustic Bat Surveys, May to September 2020

Site ID	Fmin (kHz)	Fmean (kHz)	Fmax (kHz)	Date	Time	Vocalization Category[a]
BAT 08	37746.488	40122.379	44432.574	2020-07-22	23:25:01	High Frequency
BAT 08	37283.262	39454.93	42964.633	2020-07-22	23:25:01	High Frequency
BAT 08	37298.273	42069.039	49966.742	2020-07-23	2:23:12	High Frequency
BAT 08	37562.824	40479.016	44471.906	2020-07-23	2:23:12	High Frequency
BAT 08	36213.367	42041.09	56822.207	2020-07-24	23:19:25	High Frequency
BAT 08	37507.918	40283.379	45247.746	2020-07-24	23:20:08	High Frequency
BAT 08	36533.488	41215.836	48640.684	2020-07-25	23:19:26	High Frequency
BAT 08	36275.836	43672.703	58857.633	2020-07-25	23:19:26	Myotis
BAT 08	35663.848	44068.371	59066.977	2020-07-25	23:19:26	Myotis
BAT 08	37709.926	42370.234	51041.52	2020-07-26	1:17:01	High Frequency
BAT 08	37335.227	40900.559	46482.449	2020-07-27	3:18:51	Myotis
BAT 08	37926.777	40768.605	44879.645	2020-07-27	3:19:39	High Frequency
BAT 08	37890.523	42694.57	52276.254	2020-07-27	23:22:04	High Frequency
BAT 08	40305.094	43366.574	47991.543	2020-07-27	23:22:04	Myotis
BAT 08	39817.625	42898.242	48056.211	2020-07-29	2:13:22	Myotis
BAT 08	38466.613	40721.945	45047.953	2020-07-29	3:18:46	High Frequency
BAT 08	38837.395	40682.902	43629.664	2020-07-29	3:18:46	High Frequency
BAT 08	38704.43	41967.699	47805.707	2020-07-29	23:10:11	High Frequency
BAT 08	37456.141	42045.082	48111.43	2020-07-29	23:12:50	High Frequency
BAT 08	38730.375	41305.68	46268.207	2020-07-29	23:14:57	High Frequency
BAT 08	38929.57	41198.652	45523.578	2020-07-29	23:14:57	High Frequency
BAT 08	38558.5	40340.664	42714.59	2020-07-29	23:14:57	High Frequency
BAT 08	39417.367	42205.383	46554.109	2020-07-29	23:14:57	Myotis
BAT 08	35661.148	39860.809	51398.457	2020-07-30	0:09:09	High Frequency
BAT 08	38891.371	41436.887	45186.91	2020-07-30	0:10:37	High Frequency
BAT 08	35938.883	39214.652	46975.68	2020-07-30	1:10:44	High Frequency
BAT 08	37727.398	44109.508	55412.234	2020-07-30	1:13:26	Myotis
BAT 08	41216.645	49046.473	64016.293	2020-07-30	4:10:54	Myotis
BAT 08	39498.719	42832.359	47749.301	2020-07-31	0:08:52	High Frequency
BAT 08	38191.184	41417.402	46870.719	2020-07-31	2:10:21	High Frequency
BAT 08	37134.824	41062.563	47922.914	2020-07-31	2:10:21	Myotis
BAT 08	39798.02	43320.461	49257.898	2020-08-01	0:07:10	Myotis
BAT 08	39190.207	42914.848	49672.859	2020-08-01	0:09:27	Myotis
BAT 08	37695.898	40685.512	45115.965	2020-08-01	1:05:59	High Frequency
BAT 08	37619.41	40115.52	44588.992	2020-08-01	1:05:59	High Frequency
BAT 08	38876.348	43270.914	50424.773	2020-08-01	3:06:11	High Frequency
BAT 08	37394.23	40587.785	45374.234	2020-08-01	3:09:21	High Frequency
BAT 08	37667.473	41317.523	46860.234	2020-08-01	4:06:07	High Frequency
BAT 08	38585.617	42556.84	49096.043	2020-08-01	4:07:32	High Frequency
BAT 08	38468.656	42376.266	49243.313	2020-08-01	4:08:48	Myotis
BAT 08	37922.453	40779.258	44270.547	2020-08-01	4:08:48	Myotis
BAT 08	38026.738	42872.969	52007.516	2020-08-01	4:09:33	Myotis
BAT 08	37454.676	42929.09	54169.629	2020-08-01	23:05:09	High Frequency
BAT 08	36794.773	41351.328	49790.32	2020-08-02	0:07:39	High Frequency
BAT 08	43431.453	47574.348	55778.418	2020-08-02	1:03:46	Myotis
BAT 08	39040.926	41124.922	44971.688	2020-08-02	1:06:15	High Frequency
BAT 08	36755.965	41222.816	47675.066	2020-08-02	1:10:46	High Frequency
BAT 08	36372.492	39933.25	45419.797	2020-08-02	1:10:46	High Frequency
BAT 08	34883.891	38247.098	43983.305	2020-08-02	2:05:56	High Frequency
BAT 08	37485.965	41930.473	48669.117	2020-08-02	23:00:42	High Frequency
BAT 08	34551.199	38764.125	45360.719	2020-08-03	23:07:40	High Frequency

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Detailed Results From Acoustic Bat Surveys, May to September 2020

Site ID	Fmin (kHz)	Fmean (kHz)	Fmax (kHz)	Date	Time	Vocalization Category[a]
BAT 08	38107.191	39136.137	41044.398	2020-08-03	23:59:56	High Frequency
BAT 08	36956.957	41427.73	48768.023	2020-08-04	0:02:50	High Frequency
BAT 08	36896.043	41270.926	50522.094	2020-08-04	4:02:29	High Frequency
BAT 08	35493.633	41265.707	55477.922	2020-08-04	22:56:17	High Frequency
BAT 08	36334.652	39175.707	43115.688	2020-08-04	23:58:02	High Frequency
BAT 08	37051.328	39926.965	44414.078	2020-08-04	23:58:02	High Frequency
BAT 08	33777.879	35472.813	39613.535	2020-08-05	1:00:29	High Frequency
BAT 08	35937.34	39211.879	48229.859	2020-08-05	1:00:29	High Frequency
BAT 08	39156.66	43491.734	50058.605	2020-08-06	23:57:23	Myotis
BAT 08	38614.82	47709.109	68609.852	2020-08-06	23:57:23	Myotis
BAT 08	38489.242	44041.109	51158.652	2020-08-06	23:57:23	Myotis
BAT 08	39059.828	43175.848	52049.281	2020-08-07	0:51:12	Myotis
BAT 08	34030.719	36198.484	38746.992	2020-08-07	0:58:34	High Frequency
BAT 08	34191.996	36314.621	39256.191	2020-08-07	0:58:34	High Frequency
BAT 08	34200.785	36737.57	40746.914	2020-08-07	0:58:34	High Frequency
BAT 08	37761.301	40264.355	43961.68	2020-08-07	2:52:50	High Frequency
BAT 08	37965.73	43345.324	55623.453	2020-08-07	2:52:50	Myotis
BAT 08	44607.148	49761.969	62435.176	2020-08-08	21:51:23	Myotis
BAT 08	37752.816	40550.266	45269.387	2020-08-12	4:41:53	High Frequency
BAT 08	37596.094	42103.582	50158.246	2020-08-12	4:44:53	High Frequency
BAT 08	36210.113	41380.539	50264.711	2020-08-14	22:32:07	Myotis
BAT 08	37674.715	42784.098	50990.141	2020-08-16	2:29:55	High Frequency
BAT 08	37514.715	40616.984	44959.414	2020-08-16	2:29:55	Myotis
BAT 08	38567.984	43325.914	52022.105	2020-08-16	4:29:03	Myotis
BAT 08	40967.102	45021.617	51523.395	2020-08-16	4:29:26	Myotis
BAT 08	39813.867	45459.336	57050.262	2020-08-16	4:29:26	Myotis
BAT 08	38546.637	42561.91	50102.824	2020-08-16	4:29:47	High Frequency
BAT 08	37979.457	41597.016	47986.141	2020-08-16	4:29:47	High Frequency
BAT 08	37592.773	42445.703	52407.188	2020-08-16	4:30:51	High Frequency
BAT 08	38859.047	43120.762	51041.734	2020-08-16	4:30:51	Myotis
BAT 08	38225.359	42080.727	48836.168	2020-08-16	4:30:51	Myotis
BAT 08	38586.215	42993.371	50627.277	2020-08-16	4:30:51	Myotis
BAT 08	38840.391	44378.996	54515.125	2020-08-16	4:30:51	Myotis
BAT 08	37923.922	41613.086	47543.988	2020-08-16	4:31:17	Myotis
BAT 08	38256.32	42926.215	51904.672	2020-08-16	4:31:17	Myotis
BAT 08	39484.742	44815.262	54709.082	2020-08-16	4:31:17	Myotis
BAT 08	38236.012	42407.848	49809.883	2020-08-16	4:31:50	Myotis
BAT 08	37869.051	40817.879	45510.109	2020-08-16	4:32:14	High Frequency
BAT 08	38495.488	42818.926	50591.66	2020-08-16	4:32:14	Myotis
BAT 08	37406.887	43327.957	55494.066	2020-08-16	4:32:14	Myotis
BAT 08	38412.195	45528.148	57947.633	2020-08-16	4:32:14	Myotis
BAT 08	38351.234	44002.137	55616.969	2020-08-16	4:33:14	Myotis
BAT 08	38357.059	43479.598	52484.84	2020-08-16	4:33:14	Myotis
BAT 08	38875.207	43674.684	53650.285	2020-08-16	4:33:14	Myotis
BAT 08	39427.383	43330.594	49646.27	2020-08-16	4:33:35	Myotis
BAT 08	39467.227	44183.676	53269.277	2020-08-16	4:34:00	Myotis
BAT 08	38883.434	43867.746	53728.355	2020-08-16	4:34:00	Myotis
BAT 08	39275.563	43786.602	52050.492	2020-08-16	4:34:00	Myotis
BAT 08	37501.82	39751.324	43543.152	2020-08-16	4:34:34	High Frequency
BAT 08	39293.887	42989.953	49239.324	2020-08-16	4:34:34	Myotis
BAT 08	39282.949	43564.508	50714.273	2020-08-16	4:34:34	Myotis

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Detailed Results From Acoustic Bat Surveys, May to September 2020

Site ID	Fmin (kHz)	Fmean (kHz)	Fmax (kHz)	Date	Time	Vocalization Category[a]
BAT 08	38105.063	42482.324	51142.246	2020-08-16	4:34:53	Myotis
BAT 08	38761.82	43676.609	53349.969	2020-08-16	4:36:12	Myotis
BAT 08	38153.266	42194.285	49672.055	2020-08-16	4:36:55	High Frequency
BAT 08	38183.121	41933.559	47670.645	2020-08-17	0:29:02	High Frequency
BAT 08	39131.652	44219.914	52504.742	2020-08-17	0:29:02	Myotis
BAT 08	38719.355	43817.469	53031.25	2020-08-17	0:29:29	Myotis
BAT 08	38593.031	43196.348	50478.336	2020-08-17	0:30:12	Myotis
BAT 08	37777.934	42005.117	48327.203	2020-08-17	0:30:59	Myotis
BAT 08	40740.98	47719.086	60421.875	2020-08-17	0:31:18	Myotis
BAT 08	38382.266	43342.211	50528.453	2020-08-17	0:32:39	Myotis
BAT 08	38943.117	42015.988	46468.281	2020-08-17	0:33:13	High Frequency
BAT 08	38911.945	42682.977	47953.715	2020-08-17	0:33:13	Myotis
BAT 08	39459.324	44307.352	53162.414	2020-08-17	0:33:13	Myotis
BAT 08	38070.383	41528.695	46502.68	2020-08-17	0:34:23	Myotis
BAT 08	35715.363	39310.949	46053.957	2020-08-17	3:31:05	High Frequency
BAT 08	38771.258	43171.105	51038.563	2020-08-17	3:35:57	Myotis
BAT 08	38892.965	43434.238	50196.297	2020-08-17	3:36:36	Myotis
BAT 08	39322.094	41676.195	46184.48	2020-08-19	22:20:52	Myotis
BAT 08	37897.777	43475.375	53962.848	2020-08-19	22:20:52	Myotis
BAT 08	38242.414	44227.074	56939.785	2020-08-19	23:19:58	Myotis
BAT 08	38278.391	42167.039	48784.117	2020-08-20	2:20:12	Myotis
BAT 08	38526.145	42914.098	48980.188	2020-08-20	2:21:18	Myotis
BAT 08	39878.605	44817.609	51919.18	2020-08-20	3:23:15	Myotis
BAT 08	39864.203	46871.574	60292.043	2020-08-21	1:17:00	Myotis
BAT 08	38995.195	43561.949	53296.375	2020-08-21	3:19:50	High Frequency
BAT 08	38612.844	40741.117	42998.133	2020-08-21	4:21:57	High Frequency
BAT 08	38345.082	43339.098	51678.398	2020-08-21	4:21:57	Myotis
BAT 08	34943.773	39742.309	51697.117	2020-08-22	0:16:45	High Frequency
BAT 08	34670.75	36360.473	38294.406	2020-08-22	4:17:29	High Frequency
BAT 08	34011.043	38241.582	46310.34	2020-08-22	4:17:29	High Frequency
BAT 08	35667.41	40240.152	46887.211	2020-08-24	22:10:50	High Frequency
BAT 08	35386.359	39220.113	44833.387	2020-08-24	22:10:50	High Frequency
BAT 08	36475.016	39876.492	45292.977	2020-08-29	2:57:31	High Frequency
BAT 08	35347.18	38785.445	48361.07	2020-08-29	3:01:20	High Frequency
BAT 08	37619.164	40590.02	44979.461	2020-09-01	0:48:39	High Frequency
BAT 08	34957.34	39389.531	46294.184	2020-09-01	0:48:39	High Frequency
BAT 08	40003.426	44747.254	54237.871	2020-09-01	0:48:39	Myotis
BAT 08	39132.926	42029.441	46339.969	2020-09-01	0:48:39	Myotis
BAT 08	44152.203	45853.664	50686.301	2020-09-01	1:51:57	High Frequency
BAT 08	37972.414	41700.789	47364.242	2020-09-01	3:55:56	Myotis
BAT 08	37147.453	42942.387	58903.602	2020-09-02	0:50:46	High Frequency
BAT 08	39413.648	44051.789	50332.09	2020-09-04	23:38:23	Myotis
BAT 08	39648.238	48361.293	68192.398	2020-09-04	23:38:23	Myotis
BAT 08	39510.719	44342.672	51298.918	2020-09-05	1:36:11	Myotis
BAT 08	37477.176	40093.938	43933.613	2020-09-05	1:39:55	High Frequency
BAT 08	39328.617	45769.246	62095.617	2020-09-05	1:39:55	Myotis
BAT 08	35707.156	38411.012	42877.684	2020-09-05	2:36:46	High Frequency
BAT 08	38503.598	43999.543	53476.023	2020-09-06	0:37:14	Myotis
BAT 08	36701.922	40613.711	47028.297	2020-09-06	0:41:48	High Frequency
BAT 08	37733.859	40025.023	43454.375	2020-09-08	22:27:55	High Frequency
BAT 08	38318.867	45426.781	60366.113	2020-09-09	0:28:47	Myotis

Appendix B, Table 2

Detailed Results From Acoustic Bat Surveys, May to September 2020

Site ID	Fmin (kHz)	Fmean (kHz)	Fmax (kHz)	Date	Time	Vocalization Category[a]
BAT 08	38268.125	43217.004	52633.563	2020-09-09	0:29:09	Myotis
BAT 08	37855.094	42116.555	48979.367	2020-09-09	0:29:23	Myotis
BAT 08	37659.297	40712.254	45670.469	2020-09-09	0:29:46	High Frequency
BAT 08	39040.418	43530.172	52313.684	2020-09-09	0:29:46	Myotis
BAT 08	37215.969	40478.754	49562.656	2020-09-09	1:27:19	High Frequency
BAT 08	39677.836	40830.945	42848.922	2020-09-09	1:29:56	High Frequency
BAT 08	42413.836	44299.793	48306.539	2020-09-09	1:29:56	High Frequency
BAT 08	37384.633	43302.398	58319.98	2020-09-09	1:32:14	Myotis
BAT 08	40111.254	52005.789	73338.688	2020-09-14	1:18:17	Myotis
BAT 08	40068.219	47377.996	61025.441	2020-09-16	22:05:43	Myotis
BAT 08	36917.367	44101.605	62168.273	2020-09-18	0:00:02	Myotis
BAT 08	38760.785	42199.281	48350.82	2020-09-18	2:02:05	High Frequency
BAT 08	37314.328	45204.848	65874.844	2020-09-18	2:02:05	Myotis
BAT 08	39048.121	42354.906	47884.367	2020-09-22	22:46:57	Myotis

a) High Frequency includes: *Myotis lucifugus, Myotis septentrionalis,* and *Lasirurus borealis;*

Myotis includes: *Myotis lucifugus,* and *Myotis septentrionalis.*

Low frequency includes: *Eptesicus fuscus, Lasionycteris noctivagans,* and *Lasirurus cinereus.*

Rook I Project

Environmental Impact Statement

Annex IX: Heritage Resources Impact Assessment and Cover Letter

TECHNICAL MEMORANDUM

Final

Date: **September 1st, 2021**

To: **Frank Halliday**
NexGen Energy Ltd.

From: **Alan Korejbo**
Canada North Environmental Services

Subject: **Heritage Resources Impact Assessment Update: NexGen Energy Ltd. Rook I Project, Patterson Lake**

CanNorth Project No. 3008-20 Rev. 0

Introduction

The purpose of this memorandum is to provide a summary regarding the Heritage Resources Impact Assessment (HRIA) completed for NexGen Energy Ltd.'s (NexGen) proposed Rook I Project (Project) at Patterson Lake, Saskatchewan, in 2018, as well as follow-up activities since then. In Saskatchewan, heritage resources include Precontact period and Historic period archaeological sites, built heritage sites and structures of historical and/or architectural interest, and paleontological sites. Heritage resources are the property of the Provincial Crown and are protected under *The Heritage Property Act* (GS 1980) (Act). The Act is administered by the Saskatchewan Ministry of Parks, Culture and Sport's (PCS) Heritage Conservation Branch (HCB).

Heritage Resources Impact Assessment

The HCB has identified two primary triggers for determining if an HRIA is required for a project (per section 63 of the Act). An area is considered heritage sensitive based on the presence of known heritage resources and/or the potential for new heritage resources to be discovered. The extent of previous land disturbance and nature and scope of the project are also taken into consideration. Additional screening criteria for northern Saskatchewan (northern parklands and boreal forest) to determine heritage potential include areas that are:

- within 500 m of a Site of a Special Nature (SSN) (per. S. 64 of Act) or other previously recorded site(s), unless the site has been determined to have low interpretive value;
- along dry, upland margins of a major bog or fen;

- within 250 m of watercourses or lakes;
- within 50 m of historic trails;
- within 250 m of strandlines; and
- on escarpments (defined by two or more contour intervals within 200 m), prominent uplands, and hills/ridges (including eskers) within 500 m of a water source.

The Project area was submitted to the HCB for review during the HRIA permit application process and the HCB determined that portions of the proposed Rook I Project are located in heritage-sensitive terrain and that an HRIA was required (electronic submission on May 26th, 2018; HCB File No. 18-1009). To allow NexGen flexibility for future development, a larger Heritage Study Area (HSA) was established than what was required for the Project as understood at the time. Three general areas within the HSA required an HRIA: the northern shore of Patterson Lake (Area 1), a large, level upland area (Area 2), and the southern shore of Patterson Lake (Area 3) (Appendix A).

Results

Canada North Environmental Services Limited (CanNorth) completed an HRIA for NexGen's Project from June 19th to June 22nd, 2018, under Archaeological Resource Investigation Permit No. 18-068 issued to Kara Wolfe (CanNorth, archaeologist) (CanNorth 2018).

The Project areas were assessed using a combination of pedestrian reconnaissance and the excavation of 239 subsurface shovel probes (Table 1). No new heritage resources were identified during the HRIA. No further archaeological study was recommended following completion of the investigation. The recommendations of the draft report were accepted by the HCB on October 29th, 2018, and a hardcopy and USB driver of the final report were sent to the HCB (Wade Dargin, HCB, archaeologist, pers. comm., October 29th, 2018; CanNorth 2018).

Table 1: NexGen Rook I Project HRIA (Permit No. 18-068).

Area	Hectares (ha)	Geographic Area of the HSA	Shovel Probes
Area 1	130	Northern shore of Patterson Lake	144
Area 2	17	Upland area	75
Area 3	33	Southern shore of Patterson Lake	20

The HRIA survey design was based on Project plans provided to CanNorth and the HCB by NexGen (Appendix B).

Follow-up Activities after the 2018 HRIA

Airstrip

After completion of the 2018 HRIA, the orientation of the proposed airstrip and site roads (Area 2) were revised (Appendix C). Upon notification of the changes, CanNorth forwarded the revised plans to the HCB to establish if the revisions to the Project's plans warranted further heritage work. The HCB determined that, given the airstrip's distance from the lake (i.e., further than 250 m), and that no new heritage resources were discovered in the area during the HRIA, that they had no concerns or additional heritage requirements regarding the revision to the airstrip (Wade Dargin, HCB, archaeologist, pers. comm., August 29th and 30th, 2018).

Revised Plans in 2021

Following continued advancement of the Project design, in 2021, NexGen proposed several potential changes as compared to the Project that was surveyed and assessed in 2018 under Permit No. 18-068. Although the areas of highest archaeological potential had been assessed within the Project area during the 2018 HRIA, the updated Project design impacted areas of native boreal forest terrain that were not considered at that time, and NexGen requested a Heritage Resource Review (HRR) of the most recent proposed Project plans to determine if there would be any HRIA requirements.

The updated Project design was submitted to the HCB in an email on February 9th, 2021, and then subsequently reviewed by the HCB February 25th, 2021 (HCB File No. 21-144, February 25th, 2021; Appendix D). The HCB determined that no known archaeological sites are located in direct conflict with the proposed development, and the proposed construction would occur in areas where previous archaeological survey work has been undertaken or in areas judged to have a low heritage potential. The HCB determined that there are no further concerns with the development proceeding as planned.

Summary and Conclusion

An HRIA was completed for NexGen's Rook I Project at Patterson Lake, Saskatchewan from June 19th to June 22nd, 2018, under Archaeological Resource Investigation Permit No. 18-068. The Project was assessed using a combination of pedestrian reconnaissance and the excavation of 239 subsurface shovel probes. No new heritage resources were identified during the HRIA, and no further archaeological study was recommended.

Changes to the original potential Project plans in 2021 resulted in the development of certain portions of the potential Project being outside of areas covered during the HRIA. The HCB was informed of the changes and they determined that no additional HRIA requirements were necessary. The revisions to the NexGen Project are in full compliance with HCB requirements (per section 63 of the Act) (GS 1980).

I trust that this memorandum presents the information you require. Should you have any further comments or questions, please contact the undersigned.

Alan Korejbo, M.A.
Canada North Environmental
Heritage Division Manager / Senior Archaeologist
Office: (306) 652-4432
Mobile: (306) 227-8182
Email: alan.korejbo@cannorth.com

Literature Cited

Canada North Environmental Services (CanNorth). 2018. NexGen Energy Ltd. Rook I Heritage Resources Impact Assessment Permit No. 18-068. Report on file with the Heritage Conservation Branch, Regina, Saskatchewan.

Government of Saskatchewan (GS). 1980. The Heritage Property Act, being Chapter H-2.2 of the Statutes of Saskatchewan, 1979-80 (effective November 28, 1980) as amended by the Statutes of Saskatchewan, 1980-81, c.76 and 83; 1982-83, c.35; 1983, c.77; 1983-84, c.39 and 49; 1988-89, c.55; 1989-90, c.15 and 54; 1993, c.26; 1996, c.32; 1998, c.P-42.1; 2000, c.L-5.1; 2001, c.20; 2002, c.C-11.1; 2005, c.M-36.1; 2007, c.P-13.2; 2010, c.N-5.2 and c.21; 2013, c.27; 2014, c.E-13.1; and 2018, c.12 and 42. The Queen's Printer. Regina, Saskatchewan. Website: www.qp.gov.sk.ca/documents/English/Statutes/Statutes/H2-2.pdf. Accessed June 25th, 2019.

LIST OF APPENDICES

APPENDIX A. NEXGEN ENERGY LTD.'S ROOK I OPERATION PHASE I HERITAGE RESOURCES IMPACT ASSESSMENT.

APPENDIX B. ROOK I PROPERTY – DETAILED SITE PLAN; SEPTEMBER 2017.

APPENDIX C. ROOK I PROJECT – PROPOSED PROJECT INFRASTRUCTURE REV A

APPENDIX D. HERITAGE RESOURCE REVIEW

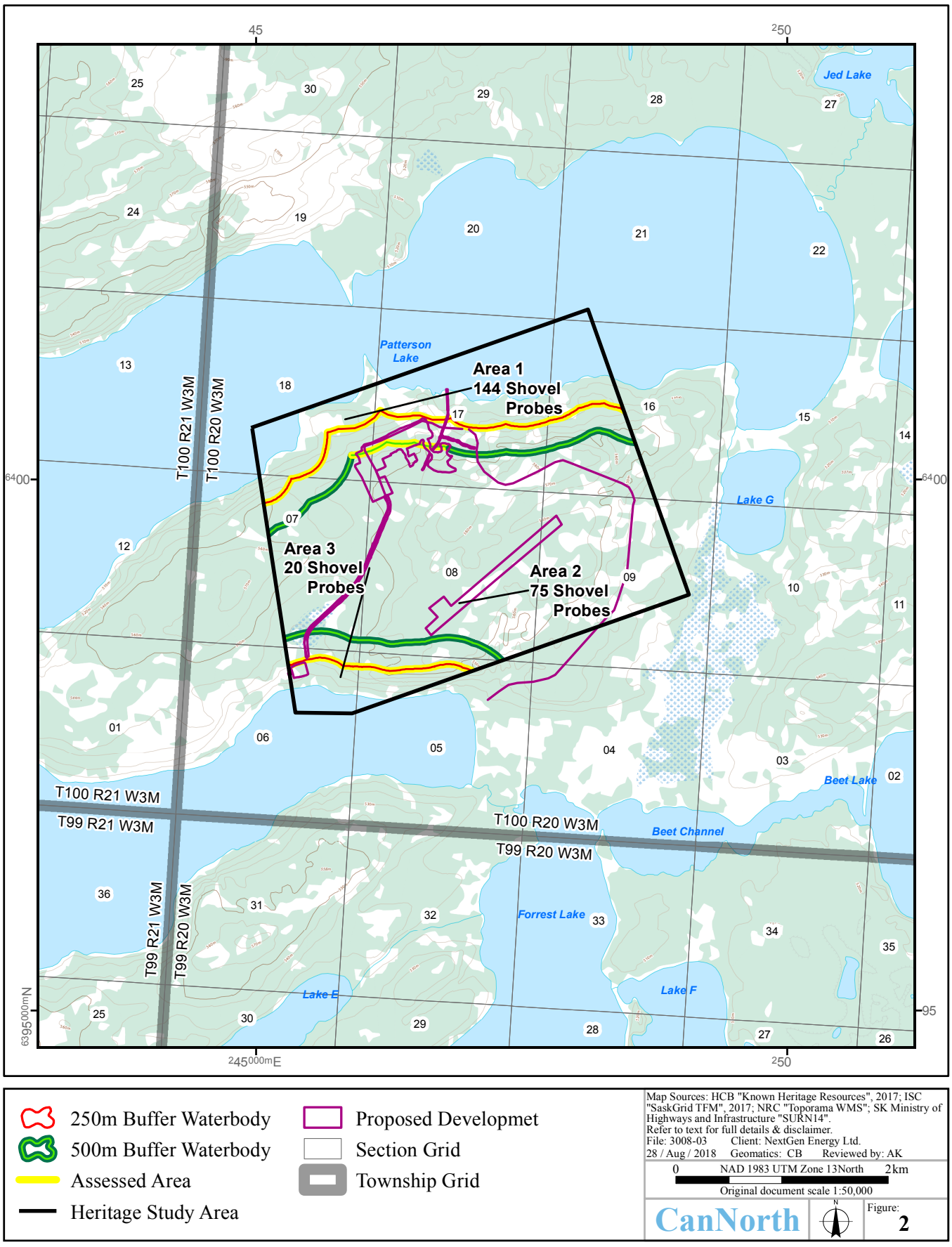


Figure 2. NexGen Energy Ltd.'s Rook I Operation Phase I Heritage Resources Impact Assessment.

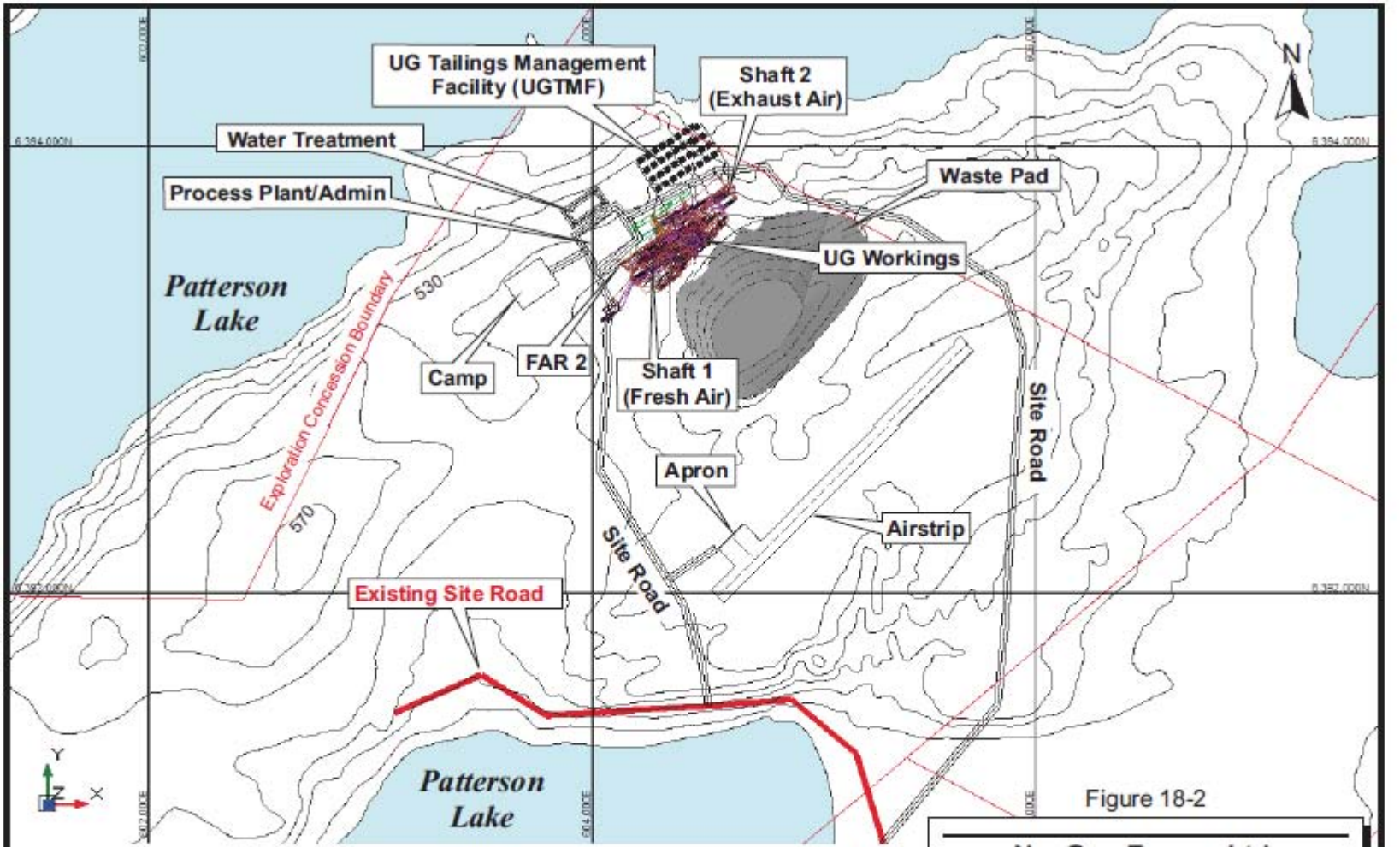


Figure 18-2

NexGen Energy Ltd.

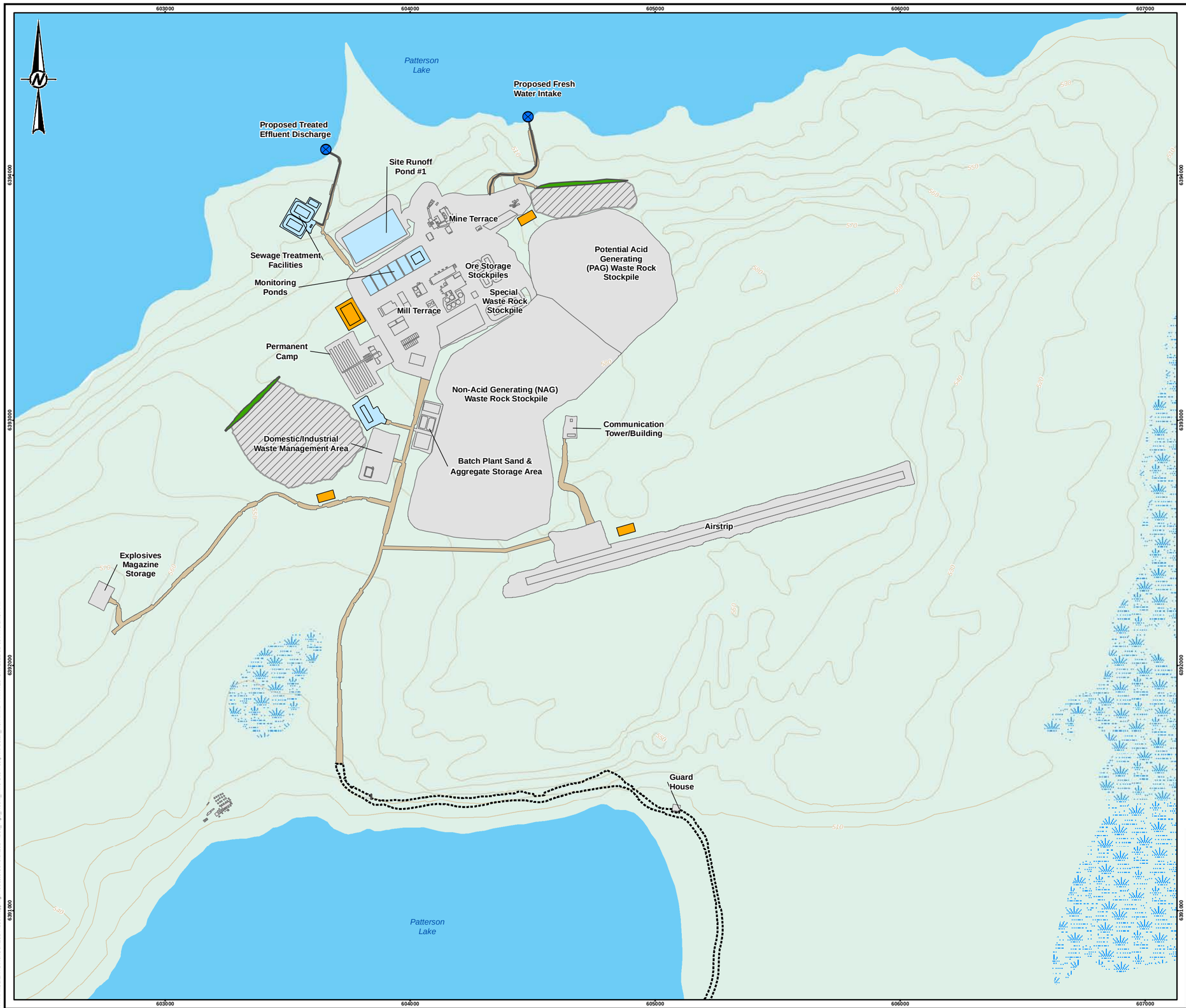
Rook I Property

Northern Saskatchewan, Canada

Detailed Site Plan

September 2017

Source: RPA, 2017.



LEGEND

- ELEVATION CONTOUR (10 m INTERVAL)
- WATERBODY
- WATERBODY
- WETLAND
- FOREST
- POTENTIAL INTAKE AND DISCHARGE LOCATIONS
- INTAKE OR DISCHARGE PIPE

PROPOSED PROJECT INFRASTRUCTURE

- SITE ACCESS ROAD
- SITE ROAD
- TOPSOIL AND UNSUITABLE MATERIAL STOCKPILE
- SITE WATER CONTACT CONTAINMENT BERM
- SITE WATER CONTACT CONTAINMENT AREA
- PROJECT INFRASTRUCTURE

DRAFT

0 500 1,000

1:15,500 METRES

REFERENCE(S)

1. PROJECT FEATURES OBTAINED FROM NEXGEN, JANUARY 20, 2021.
2. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT

NexGen Energy Ltd.

ROOK I PROJECT

TITLE

Proposed Project Infrastructure

GOLDER

PROJECT		20144150	PHASE	3314 - 06
DESIGN	MM	2020-12-23	SCALE AS SHOWN	REV. A
GIS	NO	2021-02-08		
CHECK	XXX		**FIGURE: 3**	
REVIEW	XXX			

PATH: I:\CLIENT\SNexGen\20144150\Mapping\Products\General\20144150_Fig3_RookI_Mine-Site-Footprint-Detail_RevA.mxd PRINTED ON: 2021-02-08 AT: 5:17:37 PM

Ministry of Parks, Culture and Sport
Heritage Conservation Branch
2nd Floor, 3211 Albert Street
Regina, Canada S4S 5W6

Phone: 306.787.5753
Fax: 306.787.0069

Email: wade.dargin@gov.sk.ca

February 25, 2021

Our file: 21-144

Alan Korejbo
Canada North Environmental Services
Agent For: **NexGen Energy Ltd.**
211 Wheeler Street
SASKATOON SK S7P 0A4

Dear Alan Korejbo:

RE: NexGen Energy Ltd., Rook I Mine Site, Patterson Lake – Updated Project Footprint
HERITAGE RESOURCE REVIEW

Thank you for referring this project for heritage resource review.

In determining the need for, and scope of, Heritage Resource Impact Assessment (HRIA) pursuant to s.63 of *The Heritage Property Act*, the following factors were considered: the presence of previously recorded heritage sites, the area's overall heritage resource potential, the extent of previous land disturbance, and the scope of new proposed land development.

No known archaeological sites are located in direct conflict with the proposed development. Construction will occur in areas where previous archaeological survey work has been undertaken or in areas judged to have a low heritage potential. Therefore, our office has no further concerns with the development proceeding as planned.

If you have any questions regarding these heritage regulatory requirements, please feel free to contact me. Thank you again for referring this proposed development and for your cooperation in protecting the province's cultural heritage.

Sincerely,

Wade Dargin
Archaeologist

Government of Saskatchewan

Heritage Conservation Branch
2nd Floor, 3211 Albert Street
Regina, Canada S4S 5W6

Phone: 306-787-5774
Tom.Richards@gov.sk.ca

November 26, 2018

Our File: 18-1009

Ms. Kara Wolfe
CanNorth
Agent For: **NexGen Energy Ltd.**
211 Wheeler Street
SASKATOON SK S7P 0A4

Dear Ms. Wolfe:

RE: NexGen – Rook I Project
RESULTS LETTER

Please be advised we received (October 31, 2018) your final report on the heritage resource impact assessment (HRIA) for this project completed under Investigation Permit #18-068.

No new or previously recorded heritage sites were observed in the course of pedestrian survey and subsurface testing of the developments, despite the high potential of the area. As all HRIA regulatory requirements have now been satisfactorily completed, this office has no concern with this project proceeding as planned.

On behalf of the Heritage Conservation Branch, please convey our appreciation to NexGen for having commissioned this investigation, and for their continuing assistance and support in preserving Saskatchewan's archaeological heritage.

Sincerely,

Dr. Thomas Richards
Senior Archaeologist

CanNorth
Canada North Environmental Services Limited Partnership
A First Nation Environmental Services Company

NexGen Energy Ltd.
Rook I
Heritage Resources Impact Assessment
Permit No. 18-068

Final Report

HCB File No. 18-1009

Prepared by:

Canada North Environmental Services
Saskatoon, Saskatchewan

Prepared for:
NexGen Energy Ltd.
Vancouver, British Columbia

Project No. 3008-1

October 2018

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF PHOTOGRAPHS

PROJECT CREDITS

Project Manager.....Alan Korejbo, M.A.

Permit Holder.....Kara Wolfe, M.A.

Field Assistant.....Julie Mushynsky, Ph.D.

Report Author.....Kara Wolfe, M.A.

Report Maps….....Chad Coziahr, B.A.

EXECUTIVE SUMMARY

A Heritage Resources Impact Assessment (HRIA) was completed for NexGen Energy Ltd.'s (NexGen) Rook I project. Canada North Environmental Services (CanNorth) submitted the project to the Heritage Conservation Branch (HCB) on behalf of NexGen. The HCB determined that portions of the Rook I project are located within heritage sensitive terrain. The HCB agreed that, since the project was located near the shore of Patterson Lake, there was moderate to high potential of heritage resources, and an HRIA was required (HCB File No. 18-1009).

Canada North Environmental Services (CanNorth) completed the field assessment from June 19th to June 22nd, 2018, under Archaeological Resource Investigation Permit No. 18-068 issued to Kara Wolfe (CanNorth, archaeologist). The Heritage Study Area (HSA) is composed of three areas: the northern shore of Patterson Lake (Area 1), a large, level upland area (Area 2), and the southern shore of Patterson Lake (Area 3). The project areas were assessed using a combination of pedestrian reconnaissance and the excavation of 239 subsurface shovel probes. No heritage resources were identified.

It is recommended that NexGen be provided with regulatory approval as per Section 63 of The Heritage Property Act (GS 1980) for their proposed Rook I project should the project proceed as planned. This report fulfills the permitting requirements necessary for the completion of this HRIA.

1.0 INTRODUCTION

A Heritage Resources Impact Assessment (HRIA) was completed for NexGen Energy Ltd.'s proposed Rook I project. Canada North Environmental Services (CanNorth) completed the field assessment from June 19th, 2018, to June 22nd, 2018 under Archaeological Resource Investigation Permit No. 18-068 issued to Kara Wolfe (CanNorth, archaeologist).

The following sections discuss the results of the HRIA. A description of the project is included in Section 2, while Section 3 discusses previous archaeology. Methodology is discussed in Section 4, fieldwork results are presented in Section 5, and recommendations are discussed in Section 6. Shovel probe locations are documented in Appendix A, and survey plans are provided in Appendix B.

1.1 Heritage Conservation Branch Screening Criteria

In Saskatchewan, heritage resources include Precontact Period and Historic Period archaeological sites, built heritage sites and structures of historical and/or architectural interest, and paleontological sites. Heritage resources are the property of the Provincial Crown and are protected under *The Heritage Property Act* (GS 1980).

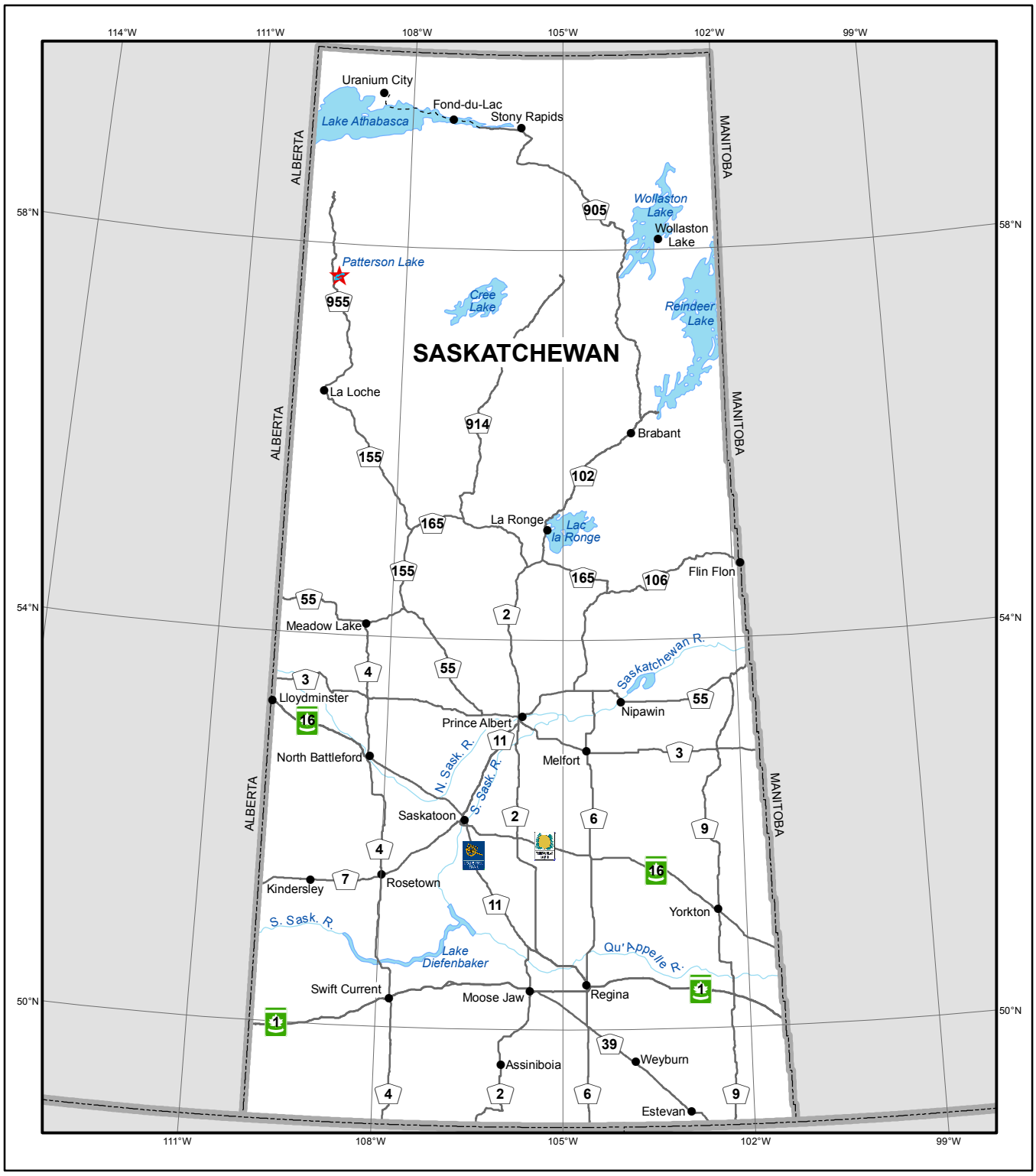
The Heritage Conservation Branch (HCB) has identified two primary triggers for determining if an HRIA is required for a project (per section 63 of *The Heritage Property Act*) (GS 1980). An area is considered heritage sensitive based on the presence of known heritage resources and the potential for new heritage resources to be discovered. The extent of previous land disturbance and nature and scope of the project are also taken into consideration. Additional screening criteria for northern Saskatchewan (northern parklands and boreal forest) to determine heritage potential, include:

- within 500 m of a Site of a Special Nature (SSN) (per. S. 64 of *The Heritage Property Act*), or other previously recorded site(s), unless the site has been determined to have low interpretive value;
- along dry, upland margins of a major bog or fen;
- within 250 m of watercourses or lakes;
- within 50 m of historic trails;
- within 250 m of strandlines; and

- on escarpments (defined by two or more contour intervals within 200 m), prominent uplands, and hills/ridges (including eskers) within 500 m of a water source.

CanNorth submitted the project area to the HCB on behalf of NexGen (Figure 1; Figure 2; Appendix B). It was determined that portions of the Rook I project are located in heritage sensitive terrain and that an HRIA was required (HCB File No. 18-1009). In order to allow NexGen flexibility for future development, a larger Heritage Study Area (HSA) was established. Three general areas within the HSA required an HRIA and are summarized in the table below.

NexGen Rook I project.		
Area	**Hectares (ha)**	**Geographic Area of the HSA**
Area 1	130	Northern shore of Patterson Lake
Area 2	17	Upland area
Area 3	33	Southern shore of Patterson Lake



Project Location
Cities
Highway
Ice Road
Waterbody
Canada/US Border
Provincial Boundary

Map Sources: ISC, used with permission, NAUSA; NRC 1:10M; SURN14.
Refer to text for full details & disclaimer.

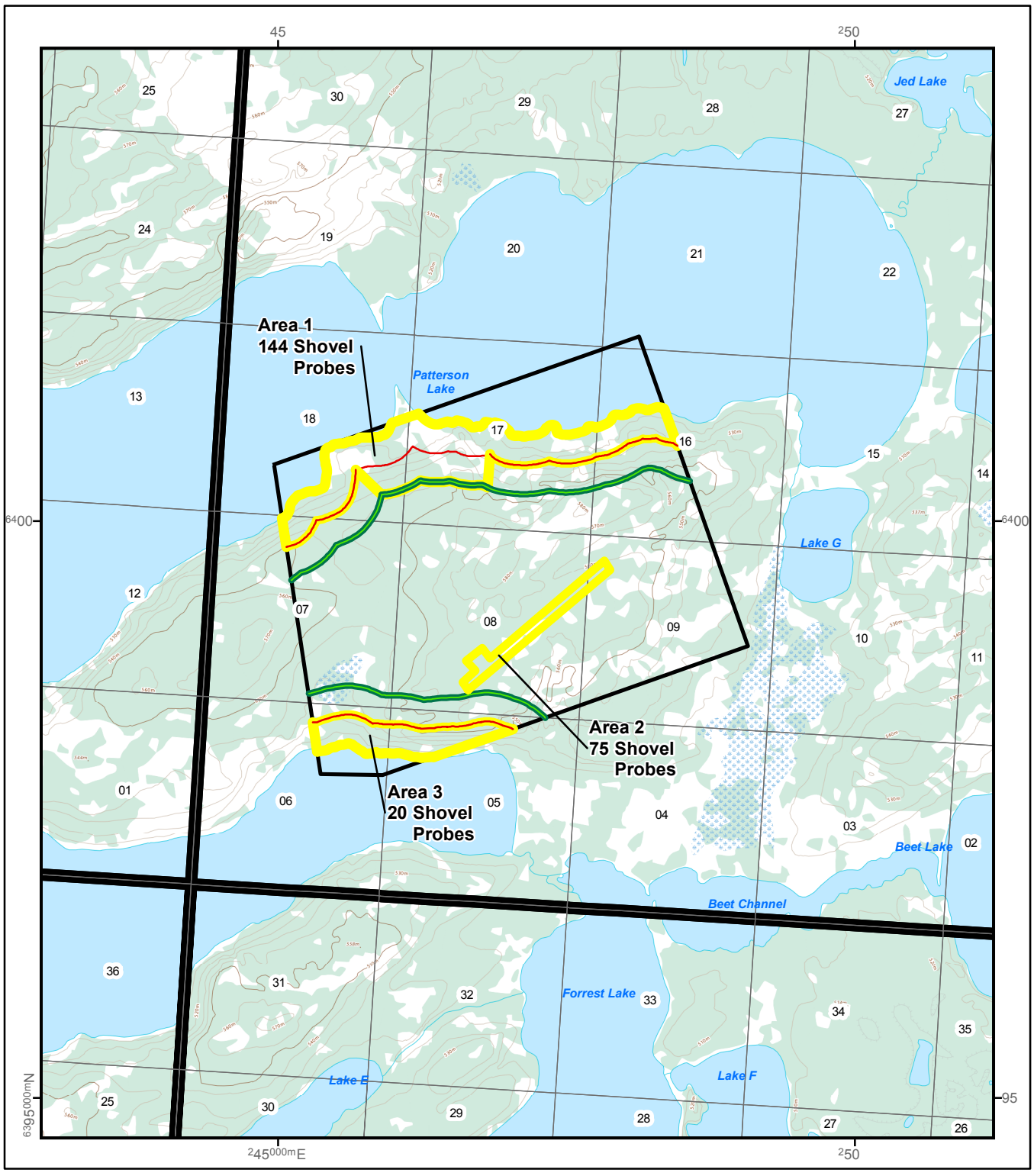
File: 3008-21 / Aug / 2018
Client: NextGen Energy Ltd.
Geomatics: CB
Reviewed by: AK

0 NAD 1983 UTM Zone 13North 300 km
Original Scale 1:6,600,000

CanNorth

Figure: 1

Figure 1. Project location.



250m Buffer Waterbody
500m Buffer Waterbody
Assessed Area
Heritage Study Area
Section Grid
Township Grid

Map Sources: HCB "Known Heritage Resources", 2017; ISC "SaskGrid TFM", 2017; NRC "Toporama WMS"; SK Ministry of Highways and Infrastructure "SURN14".
Refer to text for full details & disclaimer.
File: 3008- Client: NextGen Energy Ltd.
26 / Oct / 2018 Geomatics: CB Reviewed by: AK
0 NAD 1983 UTM Zone 13North 2km
Original document scale 1:50,000
CanNorth
Figure: 2

Figure 2. NexGen Energy Ltd.'s Rook I Operation Heritage Resources Impact Assessment.

2.0 PROJECT DESCRIPTION

2.1 Project Area and Local Environment

The Rook I project is located in northwest Saskatchewan in an area known as the Athabasca Basin. Geographically, the project area is located in the Firebag Hills Landscape Area of the Mid-Boreal Plain Ecoregion (Acton et al. 1998). Patterson Lake is located approximately 1.7 km east of Highway No. 955. There are no communities located in the vicinity of the project. The village of La Loche, Saskatchewan is located 155 km south of the project along Highway 955.

The nearest communities to the project area include the Hamlet of Descharme Lake, Saskatchewan, located approximately 60 km north, and the Village of La Loche, Saskatchewan, approximately 130 km north (Figure 1).

The general landscape consists of rolling upland morainic plain influenced by the Wisconsonian Glaciation Period resulting in the formation of the Cree Lake Moraine (Acton et al. 1998). The Cree Lake Moraine is located west of the Patterson Lake South Project. Dominant glacial features, including end moraines, eskers, kames, and knob and kettle terrain, provide evidence of the latest retreat of the Keewatin Sector of the Laurentide Ice Sheet approximately 10,000 years ago (Dyke 2004). The area west of the Cree Lake Moraine would have been deglaciated by approximately 10,000 years before present (B.P.), and areas east of the moraine would have been deglaciated shortly after, providing a baseline of between 9,000 and 10,000 B.P. for the earliest human habitation of the area (Dyke 2004).

The HSA includes three areas: Area 1 along the north side of Patterson Lake, Area 2 on the highlands, and Area 3 along the southern shore of Patterson Lake. Areas within 250 m of Patterson Lake within the HSA were surveyed along with high potential, level areas. In total, approximately 180 ha of terrain were assessed (Figure 2).

2.2 Potential Impacts to Heritage Resources

Heritage resources are considered a non-renewable resource. Context is important to the archaeologist for proper recording and interpretation. The proposed Rook I project has the potential to negatively impact heritage resources if present within the potential footprint of a future development. Heavy equipment can impact heritage resources in a

variety of ways. Surface features may be crushed and/or displaced by the weight of machinery, while buried cultural materials (e.g., artifacts and features) may be impacted during the development of the Rook I project, if present.

By completing an HRIA prior to any significant development, it allows for any heritage resources identified in the project area to be successfully mitigated. This is achieved by either avoidance of the resource or through further archaeological research if avoiding the archaeological site is not feasible. Further archaeological research can include an intensive shovel testing program, archaeological excavation, and the recording of surface features (e.g., hearth, stone cairn, cellar depression) in detail. If a Site of Special Nature (SSN) (e.g., burial, pictograph, petroglyph) is discovered in the project area, avoidance may be the only option, as SSN are offered explicit protection under Section 64 of *The Heritage Property Act* (GS 1980).

3.0 PREVIOUS ARCHAEOLOGICAL RESEARCH

The HCB's archaeological site database was consulted to determine the type and number of known sites recorded near the proposed project. In addition, the extent of previous archaeological work in the area was reviewed.

3.1 Known Heritage Resources

In total, four archaeological sites have been recorded within the boundaries of NTS Map Sheet 74 F-11 (Figure 3). These sites have been identified as artifact scatters (n=2), artifact finds (n=1), and single feature (n=1). Three of the sites have been dated to the Precontact Period. A diagnostic projectile point was identified at HjOi-2. A Taltheilei projectile point was identified in a tree throw. The Taltheilei culture dates to 2,600 B.P. to historic times and is typically divided into the Early Period (2,600 to 2,100 B.P), Middle Period (2,100 to 1,500 B.P.), and Late Period (1,200 to Historic Period) (Gordon 1996; Meyer 1999).

Known archaeological sites located within NTS Map Sheet 74 F-11.

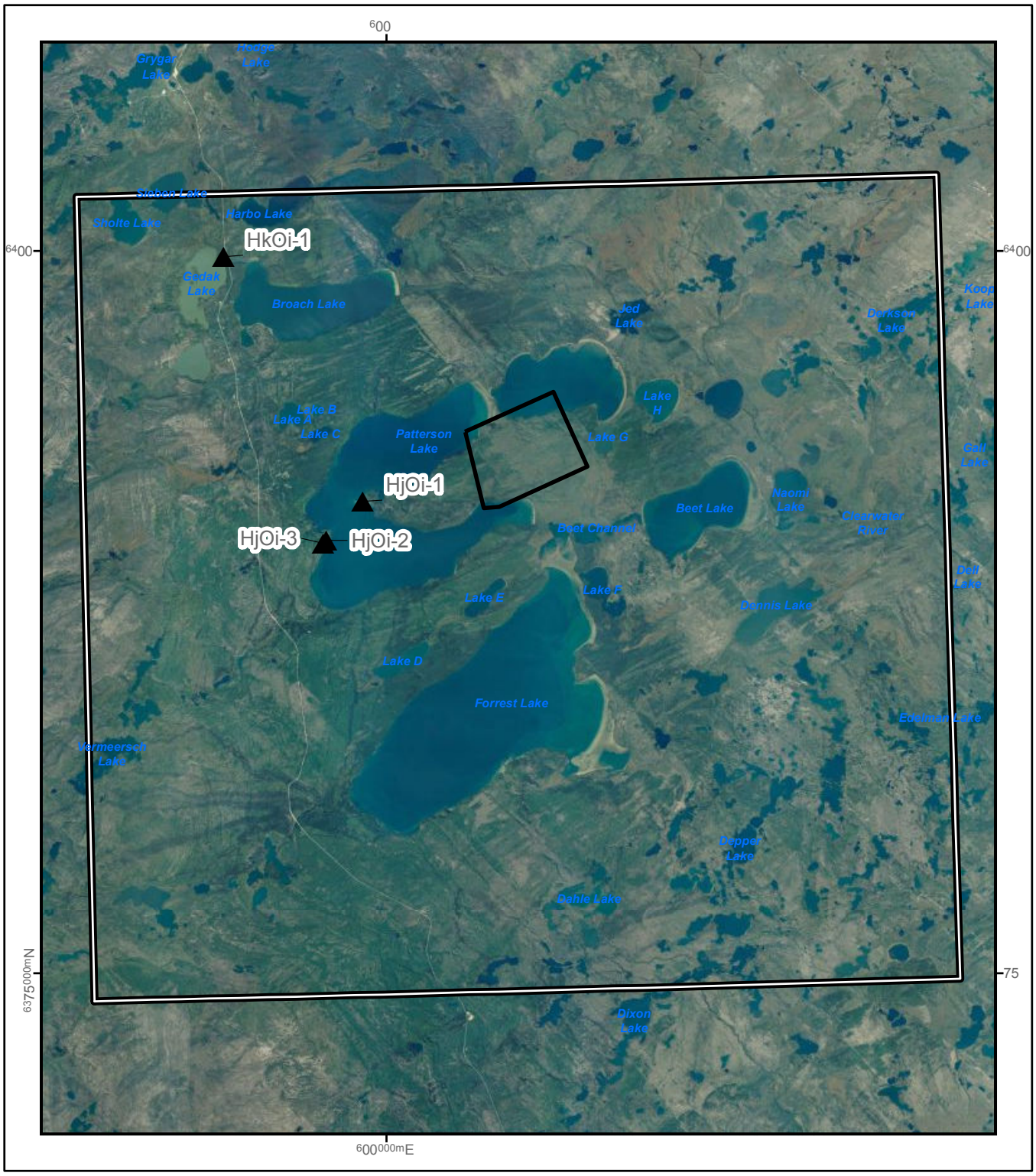
Borden No.	Site Type	Cultural Affiliation	Permit No.
HjOi-1	Artifact Scatter	Unknown Precontact	13-117
HjOi-2	Artifact Scatter	Taltheilei	13-117
HjOi-3	Single Feature	Unknown Precontact	13-117
HkOi-1	Artifact Find	Unknown Precontact	79-000

Archaeological site HjOi-1 is located approximately 4 km west of the project area. An artifact scatter was identified on an exposed cut bank leading down to the shore of Patterson Lake. No artifacts were identified subsurface. A single tool, a broken biface, made from Beaver River Sandstone was identified.

3.2 Previous Archaeological Work

A post-impact HRIA for the NexGen Rook I project was completed under Archaeological Resource Investigation Permit No. 15-148, by Bison Historical Services Ltd. This HRIA focussed on areas that had been impacted during the 2013, 2014, and 2015 exploration programs. Previous activities included drill locations, access roads, storage areas, a camp, a core analysis area, a boat dock, and a helicopter landing pad. As directed by the HCB,

areas with previous disturbances within 250 m of specific water bodies were subject to a post impact pedestrian survey (HCB File Nos.: 13-593, 13-2056, 14-3085, and 15-713). Additionally, subsurface testing was conducted in areas thought to have potential for buried archaeological resources. No heritage sites were identified during the survey.



▲ Known Heritage Site

Heritage Study Area

NTS Map Sheet 74 F-11

Map Sources: HCB "Known Heritage Resources", 2017; ISC "SaskGrid TFM", 2017; SGIC "FlySask"; SK Ministry of Highways and Infrastructure "SURN14".
Refer to text for full details & disclaimer.
File: 3008-R04 Client: NextGen Energy Ltd.
30 / Oct / 2018 Geomatics: CB Reviewed by: AK

0 NAD 1983 UTM Zone 12North 10km

Original document scale 1:200,000

CanNorth

Figure: 3

Figure 3. Known heritage sites on NTS map sheet 74 F-11.

4.0 METHODOLOGY

4.1 Baseline Field Assessment

The goal of the baseline field assessment is to help to determine the nature of archaeological sites, the types of landforms in which sites are located, and the characteristics of artifacts that may be found within the baseline study area (Heizer and Graham 1968; Meyer 1983; McManamon 1984; Renfrew and Bahn 2004). Given the large size of the baseline study area and limited resources for archaeological investigations, baseline field assessment uses extensive survey methods that will produce a large-scale perspective of the study area as opposed to intensive or fine-grained data of specific locations or sites (Meyer 1984; Renfrew and Bahn 2004). Baseline field assessment is especially important in areas where little previous archaeological investigations have been conducted, such as the northern boreal forest region of Saskatchewan. Baseline field assessment should be considered a preliminary investigation within the given baseline study area. Specific areas and known archaeological sites within the project area may require further investigations.

In general, many areas in the northern boreal forest area of Saskatchewan are inaccessible because much of it is covered by wetlands, rivers, and lakes as well as a lack of roads and trails. In order to gain access to areas of high archaeological potential within the baseline study area, the usage of watercraft and all-terrain vehicles is often required. The inaccessibility of some areas may, unfortunately, result in biases within the results, as only areas that can be more easily accessed are assessed (Korejbo 2011). Given the challenges of archaeological investigation in the northern boreal forest area of Saskatchewan, this bias is seen as acceptable in the course of initial baseline investigation.

The most popular and effective method used in baseline field assessment consists of a combination of pedestrian reconnaissance and the excavation of shovel probes (Ruppé 1966; Burke and Smith 2004; TPCS 2008). Pedestrian reconnaissance focusses on the identification of surface features (e.g., stone circles, stone cairns, cellar depressions) and subsurface exposures (e.g., rodent exposures, blowouts, trails, cutbanks) in areas considered to have high heritage potential (e.g., level landforms along rivers and lakes, valley crests). Areas of high potential can generally be detected during a pre-field assessment of the proposed project area utilizing topographic maps, satellite imagery, and aerial photography; however, satellite imagery and aerial photographs can be ambiguous,

and microtopographical features that may be considered areas of high heritage potential are not always visible on topographical maps, leading to the necessity of assessing heritage potential during field assessment.

Although surface visibility for heritage resources may be high in some project areas, artifacts and features may still be concealed by subsurface deposits (Schiffer et al. 1978). For this reason, it is necessary to compliment pedestrian reconnaissance with the excavation of shovel probes within the project area. This is especially vital in areas with poor surface visibility, such as those covered by thick vegetation (e.g., trees, shrubs, tall grasses) (Lovis 1976; Chartkoff 1978; Korejbo 2011). Shovel probes, measuring approximately 40 cm by 40 cm, are judgementally excavated in the project area with the goal of discovering buried artifacts and features (e.g., hearth) that may not be detected during pedestrian reconnaissance. In general, the likelihood of discovering a small site is improved when the frequency of shovel probes is increased (McManamon 1984).

If a site is discovered, the precise location, size, boundaries, function, and significance of the site are determined through the excavation of shovel tests and pedestrian reconnaissance (Fladmark 1978; Burke and Smith 2004). The site's geographical location (UTM coordinates) is based off of a central location (preferably from a known feature) at the site and is recorded by using a hand-held Global Positioning Satellite (GPS) unit. Shovel tests, measuring 50 cm by 50 cm, are systematically excavated throughout the site to determine the extent of the site. All excavated soils are screened through a one quarter-inch (6 mm) wire mesh, increasing the recovery rate of artifacts. Generally, more artifacts can be discovered during sub-surface shovel testing than during surface reconnaissance (Meyer 1983).

All tools (e.g., projectile points, scrapers, bifaces) discovered on the surface and all cultural material (e.g., artifacts, faunal remains, fire-cracked rock) identified during shovel testing are collected and taken to the CanNorth archaeology lab in Saskatoon, Saskatchewan, where they are catalogued and analyzed in detail. Commonly, artifacts found on the surface and not identified as a formal tool during pedestrian reconnaissance (e.g., lithic debitage) are recorded and left in-situ. Immovable cultural features (e.g., historic building, stone circles, stone cairns, cellar depressions) that are identified in conflict with the project may be tested, photographed, and mapped in detail. Artifacts and features observed or collected during field assessment assist in the interpretation of the site. Some local site interpretations may include the age, cultural affiliation, and function.

On a more regional scale, a compilation of site data throughout a region or regions may enable interpretations such as trade routes, migration patterns, seasonal rounds, and interaction spheres.

5.0 FIELDWORK RESULTS

An HRIA for NexGen's proposed Rook I project was completed from June 19th, 2018, to June 22nd, 2018, under Archaeological Resource Investigation Permit No. 18-068. Detailed survey plans and handheld GPS units easily defined the project area. The survey results are described below.

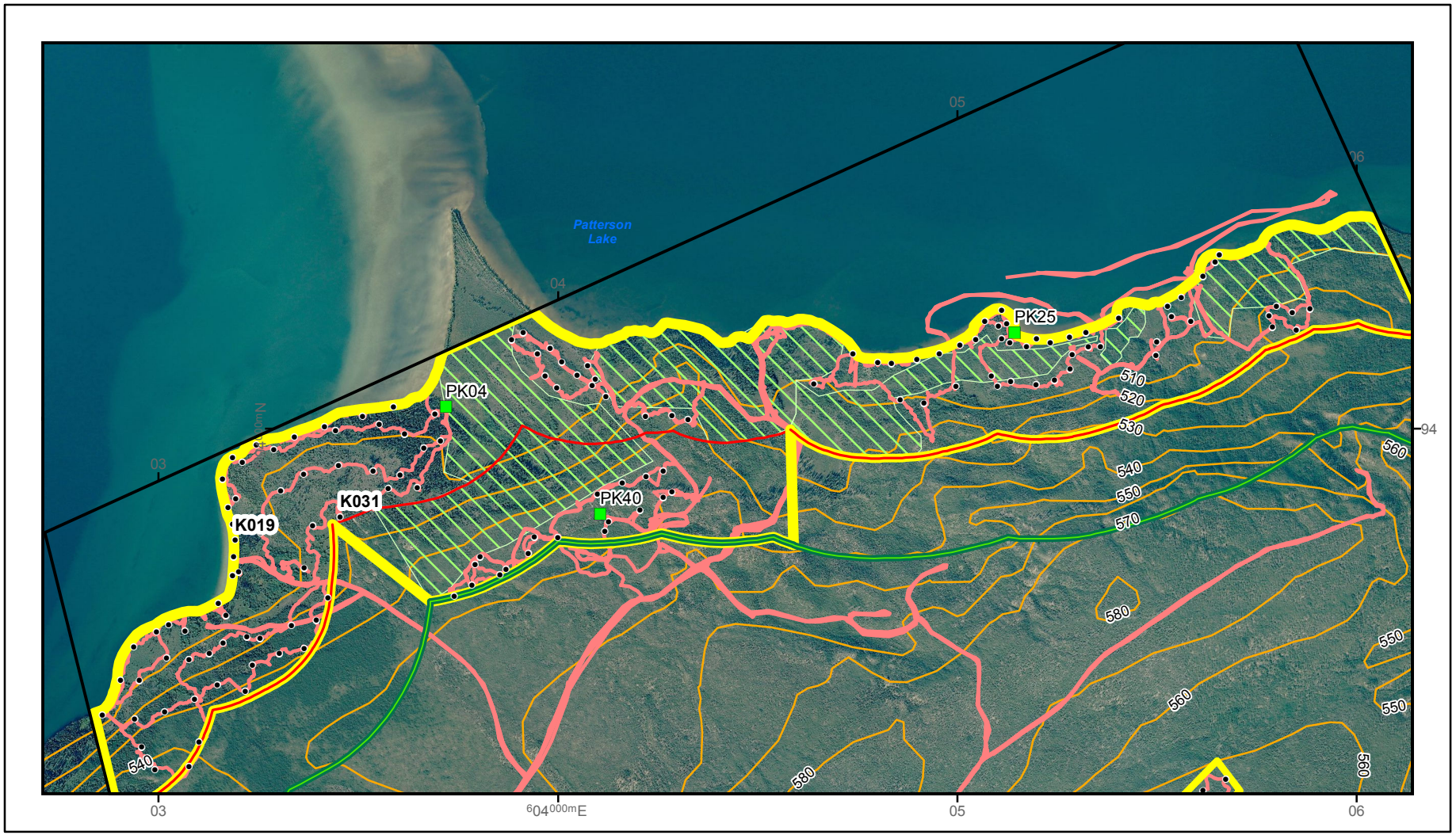
5.1 Area 1

Area 1 is located at the northern portion of the study area along Patterson Lake and covers approximately 130 ha (Figures 2 and 4). In general, the terrain in this area consisted of low-lying, boggy terrain interspersed with small ridges of well-drained terrain that sloped downward towards the lake (north). Vegetation in the low-lying areas was characterized by sphagnum moss (*Sphagnum* sp.), Labrador tea (*Rhododendron* sp.) and black spruce (*Picea mariana*) (Photo 1; Figure 4). Dry, well-drained areas were characterized by regenerating jack pine (*Pinus banksiana*) and reindeer lichen (*Cladonia rangiferina*) (Photo 2 and Photo 3; Figure 4). Recent forest fire activities have removed much of the understory that is usually present in Boreal Forest environments.

Photo 1. View north from PK04 of low-lying boggy terrain (June 19th, 2018)

Photo 2. View west from shovel probe K031 of well-drained, level terrain in Area 1 (June 19th, 2018).

Photo 3. View north from shovel probe K019 along well-drained lake rampart along Patterson Lake (June 19th, 2018).



- Shovel Probes
- Photo Locations
- Assessed Area
- Heritage Study Area
- 250m Buffer Waterbody
- 500m Buffer Waterbody
- Pedestrian Survey
- Low Heritage Potential (eg. Low lying, too sloped, disturbed)
- Contour (m)

Map Sources: HCB "Known Heritage Resources", 2017; ISC "SaskGrid TFM", 2017; SGIC "FlySask"; SK Ministry of Highways and Infrastructure "SURN14".
Refer to text for full details & disclaimer.
File: 3008- Client: NextGen Energy Ltd.
26 / Oct / 2018 Geomatics: CB Reviewed by: AK

0 NAD 1983 UTM Zone 12North 750 M
Original Scale 1:15,000

CanNorth

Figure: 4

Figure 4. NexGen Energy Ltd.'s Rook I Operation Area 1 Heritage Resources Impact Assessment detail.

Portions of Area 1 identified as having high heritage potential were assessed to determine if any heritage resources were in conflict with the project (Figure 2). In total, approximately 130 ha were assessed utilizing a combination of pedestrian reconnaissance, watercraft reconnaissance, post-impact inspections of disturbed areas, and the excavation of 144 shovel probes (Appendix A, Table 1). Testing focussed on areas within 250 m of Patterson Lake and areas of potential disturbance within 500 m from the Patterson Lake shoreline (Figure 4).

Shovel probes were judgmentally excavated in areas considered to have the greatest heritage potential (i.e., well-drained and level areas suitable for a camp site or activity area). Shovel probe stratigraphy was consistent across the area and consisted of a sand matrix as typified by shovel probe K031 (Photo 4; Figure 4):

- 0 cm to 4 cm organic duff;
- 4 cm to 14/30 cm tan sand; and
- 14/30 cm to 50 cm orange sand.

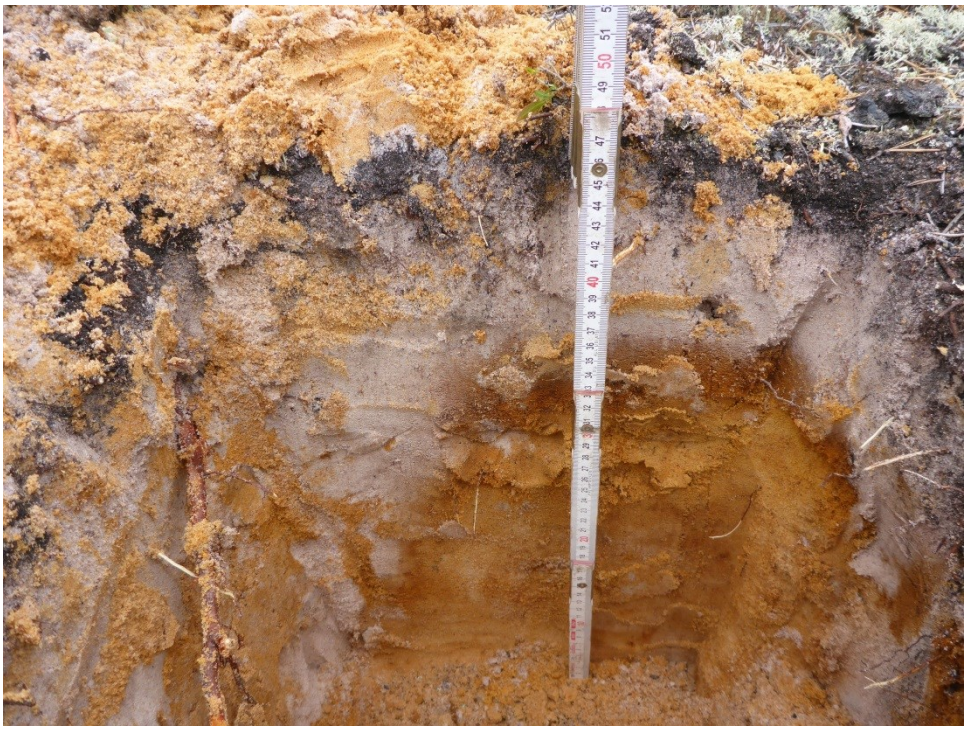


Photo 4. Stratigraphy of shovel probe K031 (July 19th, 2018).

Large portions of the project area were impacted by previous exploration infrastructure, including trails, pump stations, a helicopter pad, wood waste storage, and drill areas. It appeared that levelling activities had occurred and that fill might have been brought in to build up trails through low-lying areas. Many of the areas that contained drilling equipment were located on higher, well-drained areas (Photo 5; Figure 4).

Photo 5. View southwest from PK40 of a high heritage potential area subject to disturbance from drilling and trail developments (June 22nd, 2018).

Surface visibility was good to excellent throughout the project area. Surface surveys were conducted along the beach and cut banks (Photo 6; Figure 4). No surface features or cultural materials were discovered in conflict with Area 1.

Photo 6. View east from PK25 of the beach along Patterson Lake in Area 1 (June 21st, 2018).

5.2 Area 2

Area 2 consists of approximately 17 ha and is located on a high, well-drained area in the central region of land that separates different segments of Patterson Lake. The Patterson Lake shoreline is approximately 550 m south and approximately 1,000 m north of this area. The area was fairly level with gently undulating terrain located at the northern and southern edges (Photo 7; Figure 5). Vegetation in the area consisted of regenerating jack pine and reindeer lichen. Recent forest fire activities have removed much of the understory that is usually present in Boreal Forest environments.

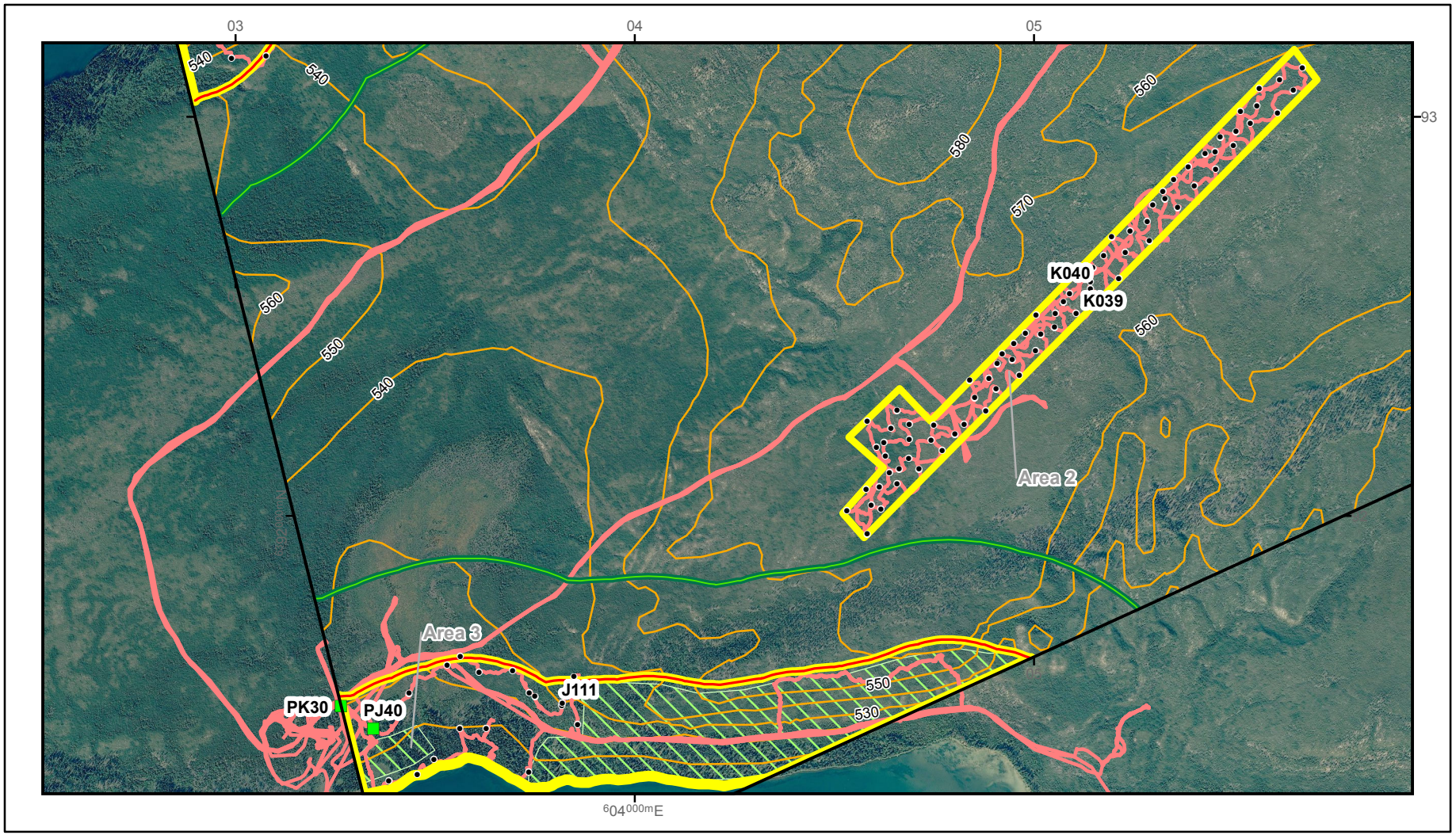


Figure 5. NexGen Energy Ltd.'s Rook I Operation Area 2 and 3 Heritage Resources Impact Assessment detail.

Photo 7. View south from shovel probe K039 of terrain in Area 2 (June 20th, 2018).

Shovel probes were judgmentally excavated in areas considered to have the greatest heritage potential (i.e., well-drained and level areas suitable for a camp site or activity area). In total, 75 shovel probes were excavated in Area 2. Shovel probe stratigraphy was consistent across the area and comprised a sand matrix as typified by shovel probe K040 (Photo 8; Figure 5):

- 0 cm to 15 cm tan sand; and
- 15 cm to 50 cm orange sand with some cobbles at the bottom.

Surface visibility was good to excellent throughout the project area. No surface features or cultural materials were identified in conflict with Area 2.

Photo 8. Stratigraphy of shovel probe K040 (June 20th, 2018).

5.3 Area 3

An HRIA for Area 3 consists of approximately 33 ha along the Patterson Lake shoreline. In general, the terrain in Area 3 consisted of low-lying, boggy terrain or well-drained terrain that sloped steeply down to Patterson Lake with very few level, well-drained areas (Photo 9; Figure 5). Vegetation observed in the area consisted of sphagnum moss, Labrador tea, black spruce, jack pine, and reindeer lichen.

Photo 9. View east from PJ 40 of low-lying, boggy terrain in Area 3 (June 22nd, 2018).

Photo 10. View north from shovel probe J111 along a small drumlin in Area 3 (June 22nd, 2018).

Area 3 was assessed using a combination of pedestrian reconnaissance, post-impact survey, and the excavation of 20 shovel probes. Shovel probes were judgmentally excavated in areas considered to have the greatest heritage potential (i.e., well-drained and level areas suitable for a camp site or activity area). In general, the terrain in Area 3 would be categorized as moderate to poor heritage potential. The highest heritage potential in Area 3 consisted of a small drumlin feature (Photo 10; Figure 5). Shovel probe stratigraphy along the drumlins consisted of a sand matrix and is summarized below:

- 0 cm to 5 cm tan sand; and
- 5 cm to 15 cm tan sand with large cobbles.

Large portions of Area 3 had been cleared, and post-impact surveys were conducted in these areas (Photo 11; Figure 5). Surface visibility was moderate throughout the project area. No surface features or cultural materials were identified in conflict with Area 3.

Photo 11. View east from PK30 of the proposed camp area that has been disturbed by clearing activities (June 22nd, 2018).

6.0 SUMMARY AND RECOMMENDATIONS

An HRIA was completed for NexGen's proposed Rook I project under Archaeological Resource Investigation Permit No. 18-068 from June 19th, 2018, to June 22nd, 2018. Heritage sensitive portions of the project were assessed using a combination of pedestrian and boat-based reconnaissance, post-impact assessment, and the excavation of 239 shovel probes. No new sites were identified in conflict with the project. The results of the HRIA are summarized by quarter-section in the table below.

NexGen Energy Ltd.			
Heritage Resources Impact Assessment results (Permit No. 18-068).			
Project	**Area Assessed (ha)**	**Shovel Probes**	**Recommendation**
Area 1	130	144	No new heritage resources identified.
			No further concerns.
Area 2	17	75	No new heritage resources identified.
			No further concerns.
Area 3	33	20	No new heritage resources identified.
			No further concerns.
Total:	**180**	**239**	

It is recommended that NexGen Energy Ltd. be provided with regulatory approval as per Section 63 of *The Heritage Property Act* for their proposed Rook I project to should the project proceed as planned. In the event that human remains are discovered, please contact the local RCMP detachment and the HCB (306-787-2817).

7.0 CLOSURE

If you have any questions or require additional information regarding this HRIA, please contact the undersigned.

Sincerely,

Kara Wolfe, M.A.

Archaeologist

Canada North Environmental Services

Alan Korejbo, M.A.

Heritage Division Manager

Canada North Environmental Services

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9.0 MAP SOURCES AND DISCLAIMERS

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APPENDICES

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APPENDIX A

SHOVEL PROBES

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APPENDIX A, TABLE 1

Geographical location of shovel probes in
NexGen Energy Ltd.'s Rook I – Area 1.

Shovel Probe	Zone (NAD 83)	UTM Easting	UTM Northing
J001	12V	603185	6393631
J002	12V	603169	6393532
J003	12V	603025	6393508
J004	12V	602938	6393454
J005	12V	602905	6393370
J006	12V	602940	6393273
J007	12V	603015	6393290
J008	12V	603090	6393322
J009	12V	603076	6393421
J010	12V	603127	6393437
J011	12V	603161	6393463
J012	12V	603221	6393478
J013	12V	603254	6393474
J014	12V	603332	6393507
J015	12V	603188	6393679
J016	12V	603185	6393760
J017	12V	603192	6393825
J018	12V	603209	6393916
J019	12V	603288	6393947
J020	12V	603443	6393995
J021	12V	603552	6394010
J022	12V	603615	6393986
J023	12V	603692	6394037
J024	12V	603705	6393969
J025	12V	603664	6393952
J026	12V	603604	6393883
J027	12V	603537	6393893
J028	12V	603451	6393908
J029	12V	603363	6393886
J030	12V	603306	6393843
J031	12V	603255	6393739
J076	12V	605780	6394284
J077	12V	605799	6394306
J078	12V	605838	6394291
J079	12V	605614	6394382
J080	12V	605526	6394307
J081	12V	605499	6394218
J082	12V	605585	6394269
J083	12V	605358	6394206
J084	12V	605328	6394205

APPENDIX A, TABLE 1

Geographical location of shovel probes in
NexGen Energy Ltd.'s Rook I – Area 1.

Shovel Probe	Zone (NAD 83)	UTM Easting	UTM Northing
J085	12V	605287	6394186
J086	12V	605282	6394149
J087	12V	605243	6394121
J088	12V	605197	6394110
J089	12V	605134	6394118
J090	12V	605100	6394108
J091	12V	605086	6394133
J092	12V	605110	6394225
J093	12V	605069	6394270
J094	12V	604996	6394105
J095	12V	604916	6394064
J096	12V	604856	6394072
J097	12V	604641	6394112
J098	12V	604120	6394080
J099	12V	604085	6394108
J100	12V	604047	6394134
J101	12V	603980	6394200
J102	12V	603884	6394222
J103	12V	603996	6394101
J118	12V	603940	6393728
J119	12V	603925	6393687
J120	12V	603854	6393635
J121	12V	603792	6393659
J122	12V	603740	6393582
J123	12V	604127	6393767
J124	12V	604263	6393828
J125	12V	604220	6393880
J126	12V	604099	6393835
J127	12V	605199	6394226
J128	12V	604326	6394023
J130	12V	602858	6393282
K001	12V	603201	6393641
K002	12V	603150	6393562
K003	12V	603065	6393493
K004	12V	602994	6393491
K005	12V	603020	6393426
K006	12V	602952	6393369
K007	12V	602958	6393202
K008	12V	602990	6393146
K009	12V	603076	6393152

APPENDIX A, TABLE 1

Geographical location of shovel probes in
NexGen Energy Ltd.'s Rook I – Area 1.

Shovel Probe	Zone (NAD 83)	UTM Easting	UTM Northing
K010	12V	603101	6393215
K011	12V	603146	6393358
K012	12V	603217	6393342
K013	12V	603235	6393409
K014	12V	603302	6393437
K015	12V	603364	6393450
K016	12V	603395	6393520
K017	12V	603424	6393576
K018	12V	603364	6393651
K019	12V	603191	6393720
K020	12V	603173	6393802
K021	12V	603159	6393873
K022	12V	603185	6393928
K023	12V	603245	6393959
K024	12V	603340	6393980
K025	12V	603415	6394005
K026	12V	603510	6394031
K027	12V	603588	6394054
K028	12V	603648	6393851
K029	12V	603575	6393850
K030	12V	603517	6393804
K031	12V	603454	6393780
K032	12V	603386	6393758
K063	12V	605849	6394247
K064	12V	605883	6394300
K065	12V	605656	6394436
K066	12V	605646	6394417
K067	12V	605560	6394329
K068	12V	605496	6394183
K069	12V	605536	6394281
K070	12V	605404	6394277
K071	12V	605322	6394240
K072	12V	605281	6394229
K073	12V	605233	6394215
K074	12V	605173	6394206
K075	12V	605132	6394215
K076	12V	605124	6394263
K077	12V	605103	6394256
K078	12V	605111	6394297
K079	12V	605046	6394224

APPENDIX A, TABLE 1

Geographical location of shovel probes in
NexGen Energy Ltd.'s Rook I – Area 1.

Shovel Probe	Zone (NAD 83)	UTM Easting	UTM Northing
K080	12V	605006	6394210
K081	12V	604954	6394189
K082	12V	604898	6394173
K083	12V	604835	6394163
K084	12V	604801	6394165
K085	12V	604739	6394189
K086	12V	604285	6394034
K087	12V	604219	6394031
K088	12V	604074	6394157
K089	12V	604093	6394123
K090	12V	604010	6394167
K091	12V	603913	6394240
K092	12V	603948	6394187
K093	12V	603968	6394132
K100	12V	603999	6393727
K101	12V	603869	6393648
K102	12V	603784	6393608
K103	12V	603805	6393679
K104	12V	604117	6393743
K105	12V	604206	6393795
K106	12V	604285	6393841
K107	12V	604264	6393894
K108	12V	604160	6393865
K109	12V	605790	6394254

APPENDIX A, TABLE 2

Geographical location of shovel probes in
NexGen Energy Ltd.'s Rook I – Area 2.

Shovel Probe	Zone (NAD 83)	UTM Easting	UTM Northing
J032	12V	604851	6392296
J033	12V	604838	6392339
J034	12V	604887	6392345
J035	12V	604907	6392382
J036	12V	604920	6392407
J037	12V	604945	6392392
J038	12V	604949	6392433
J039	12V	604978	6392458
J040	12V	605016	6392456
J041	12V	605005	6392503
J042	12V	605054	6392507
J043	12V	605073	6392536
J044	12V	605088	6392557
J045	12V	605099	6392599
J046	12V	605140	6392587
J047	12V	605147	6392621
J048	12V	605174	6392652
J049	12V	605194	6392699
J050	12V	605240	6392715
J051	12V	605283	6392738
J052	12V	605297	6392779
J053	12V	605328	6392794
J054	12V	605322	6392813
J055	12V	605349	6392843
J056	12V	605385	6392874
J057	12V	605428	6392907
J058	12V	605454	6392912
J059	12V	605466	6392949
J060	12V	605505	6392963
J061	12V	605517	6393014
J062	12V	605557	6393028
J063	12V	605564	6393071
J064	12V	604688	6392192
J065	12V	604623	6392183
J066	12V	604627	6392151
J067	12V	604532	6392012
J068	12V	604591	6392026
J069	12V	604580	6392067
J070	12V	604612	6392073
J071	12V	604637	6392109

APPENDIX A, TABLE 2

Geographical location of shovel probes in
NexGen Energy Ltd.'s Rook I – Area 2.

Shovel Probe	Zone (NAD 83)	UTM Easting	UTM Northing
J072	12V	604662	6392117
J073	12V	604686	6392144
J074	12V	604741	6392189
J075	12V	604748	6392227
J129	12V	604687	6392231
K033	12V	604825	6392231
K034	12V	604878	6392263
K035	12V	604904	6392318
K036	12V	604962	6392352
K037	12V	605003	6392414
K038	12V	605050	6392473
K039	12V	605105	6392507
K040	12V	605140	6392569
K041	12V	605211	6392595
K042	12V	605228	6392660
K043	12V	605287	6392689
K044	12V	605359	6392773
K045	12V	605401	6392827
K046	12V	605454	6392869
K047	12V	605499	6392928
K048	12V	605541	6392984
K049	12V	605609	6393010
K050	12V	605649	6393066
K051	12V	605672	6393122
K052	12V	605614	6393093
K053	12V	604657	6392264
K054	12V	604641	6392220
K055	12V	604582	6392238
K056	12V	604604	6392171
K057	12V	604581	6391955
K058	12V	604615	6392017
K059	12V	604657	6392081
K060	12V	604712	6392118
K061	12V	604769	6392164
K062	12V	604801	6392205

APPENDIX A, TABLE 3

Geographical location of shovel probes in
NexGen Energy Ltd.'s Rook I – Area 3.

Shovel Probe	Zone (NAD 83)	UTM Easting	UTM Northing
J104	12V	603435	6391555
J105	12V	603530	6391626
J106	12V	603563	6391649
J107	12V	603610	6391609
J108	12V	603694	6391613
J109	12V	603736	6391557
J110	12V	603750	6391548
J111	12V	603817	6391525
J112	12V	603818	6391532
J113	12V	603828	6391569
J114	12V	603834	6391570
J115	12V	603847	6391597
J116	12V	603827	6391561
J117	12V	603856	6391476
K094	12V	603384	6391336
K095	12V	603455	6391352
K096	12V	603497	6391390
K097	12V	603562	6391467
K098	12V	603628	6391467
K099	12V	603735	6391359

APPENDIX C

SURVEY PLAN

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
A	30JUL18	ISSUED FOR SQUAD CHECK / REVIEW	VC	RY				

Rook I Project

Environmental Impact Statement

Annex X: Socio-economic Baseline Report

SOCIO-ECONOMIC BASELINE REPORT FOR THE ROOK I PROJECT

Prepared for:

NexGen Energy Ltd.

Prepared by:

WSP Canada Inc.

April 2022

Executive Summary

Introduction

NexGen Energy Ltd. (NexGen) is proposing to develop a new uranium mining and milling operation in northwestern Saskatchewan, called the Rook I Project (Project). The Project would be located approximately 40 km east of the Saskatchewan-Alberta border, 130 km north of the town of La Loche, and 640 km northwest of the city of Saskatoon. The Project would reside within Treaty 8 territory and the Métis Homeland. At a regional scale, the Project would be situated within the southern Athabasca Basin adjacent to Patterson Lake, along the upper Clearwater River system. Patterson Lake is at the interface of the Boreal Shield and Boreal Plain ecozones. Access to the Project would be from an existing road off Highway 955, with on-site worker accommodation serviced by fly-in/fly-out access.

An Environmental Assessment (EA) is being conducted as a designated project under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) and in accordance with requirements under *The Environmental Assessment Act* of Saskatchewan. This Technical Support Document provides a description of the existing socio-economic environment within the defined local study area (LSA) and regional study area (RSA). The LSA consists of the local communities closest to the Project that would experience direct and indirect socio-economic effects and which NexGen has prioritized for economic benefits from the Project. The RSA consists of the Northern Saskatchewan Administrative District. This report demonstrates an understanding of the socio-economic context for the Project and is used to support the assessment of the Project's potential socio-economic effects as reported in the Environmental Impact Statement.

Methodology And Approach

The approach to documenting the existing socio-economic environment was designed to confirm that sufficient information was collected to understand and assess potential effects of the Project. The characterization of the existing socio-economic environment included both quantitative (e.g., statistical) and qualitative (e.g., discussions) data collection and analysis in line with Canadian and international best practice for environmental impact studies. Both primary and secondary data sources were used throughout the baseline study.

Primary data collection sources included:

- Indigenous Group Study Agreements;
- Indigenous Knowledge and Traditional Land Use Studies (IKTLU);
- Joint Working Groups (JWGs);
- key person (KP) interviews; and
- community information sessions and workshops.

Secondary data sources included:

- census community profiles (Statistics Canada);
- custom Statistics Canada population projections for Keewatin Yatthé Regional Health Authority;
- Crown-Indigenous Relations and Northern Affairs Canada profiles;
- Saskatchewan Health Authority data;
- community and municipal internet sites;
- statistical reports and secondary documentation from local governments;
- regional and local growth strategy documents, including Official Community Plans and Comprehensive Community Plans;
- Community Vitality Monitoring Partnership Process reports;
- *Economic, Sector, and Demographic Analysis for the La Loche Region and Clearwater First Natio*n (DMCA 2018); and
- local media articles.

Summary of Existing Socio-Economic Environment

Population and Demographics

The RSA is predominantly Indigenous, with 87.4% identifying as such. The RSA population steadily increased between 2006 and 2016, driven largely by growth in the late 2000s. Between 2011 and 2016, the population increased by 1.4% compared to 7.8% growth in the five-year period prior (i.e., 2006 to 2011). Except for the period between 2006 and 2011, the provincial population growth rate has typically exceeded that of the RSA. The RSA has a large youth population, with a considerably higher proportion of the population aged 0 to 19 (youth; 40.2%) than the provincial average (25.8%), and a median age of 25.7, far below the provincial median of 38.7. With a larger youth population, the RSA has a lower proportion of the population who are working age (aged 20 to 64 years) as compared to Saskatchewan as a whole (53.0% and 58.7%, respectively).

Within the LSA 95.2% of residents are Indigenous. Median age within the LSA Indigenous population is 26.4 years which is slightly higher than the Indigenous population of the RSA (23.6) and the province (24.3). The Indigenous population of the LSA is notably younger than the non-Indigenous population (40.1 median).

Clearwater River Dene Nation (CRDN) is the youngest LSA community, with a median age of 23.8. Between 2006 and 2016, the median age of CRDN increased slightly (21.2 to 23.8) but remained lower than the median age of the provincial Indigenous population (24.3) and the RSA (25.7).

Despite a recent population decline, La Loche remains the largest LSA community, with a 2016 population of 2,365.

Buffalo Narrows has the oldest population among the LSA communities. Between 2006 and 2016 the median age of the Buffalo Narrows population increased from 27.3 to 30.8, compared to the 2016 provincial Indigenous median of 24.3 and RSA (25.7).

When looking at migration patterns it was found that a smaller proportion of the LSA population are migrants within the last year (i.e., 2016) and five years (i.e., 2011 through 2016) compared to the RSA and Saskatchewan as a whole. Among the LSA communities, La Loche had the lowest migration rate within 1 year (1.1%) and within 5 years (3.8%). Population projections for the LSA suggests annual population changes ranging from a decrease of 0.34% to an increase of 0.22%.

Economic Profile

The economy of the RSA is notably different than the province overall. Mining, quarrying, and oil and gas extraction, educational services, public administration, and health care and social assistance accounted for a larger proportion of employment in the RSA in 2016 compared to the province.

The LSA is economically supressed by a lack of economic opportunity due to no suitably sized primary industry since the decline of the fur industry in the 1960s. Labour force participation and unemployment rates in communities are low, with employment concentrated primarily in government-funded service sectors and Crown corporations. There are lower employment rates in common rural sectors including agriculture, forestry, fishing and hunting, manufacturing, and retail trade than in the province overall.

There is limited tourism industry or infrastructure in the LSA, and limited manufacturing. Fishing and commercial forestry activities contribute to the LSA economy, though to a limited scale. Mineral exploration and investment activity in the LSA is growing. From 2008 to 2017 there was 328.3 million pounds of measured and indicated uranium resources found in the west side of the province, with more than 70% of the resources located north of La Loche (DMCA 2018). La Loche is the closest urban settlement on Highway 955 to the uranium opportunities in northwestern Saskatchewan; however, the only mineral related activity occurring in this area at present is exploration.

The low population density and remoteness of the communities in the RSA are a challenge to economic development. The RSA has a less diversified economy, a more limited access to services and educational opportunities, and higher transportation costs. In many of the RSA communities, transportation costs are very high and can be logistically challenging (e.g., remote fly-in communities that may only be accessible by winter road).

Community Features and Infrastructure

Within the LSA, homelessness is an issue as well as limited funding and high demand for housing. Housing can be slow to build resulting in out-migration of residents to neighbouring communities. There are long waitlists for band housing in some communities. Many homes require regular maintenance and repairs. Overcrowding is also an issue in on-reserve housing in the LSA.

Recreational facilities are similar among the LSA communities with each having some indoor and outdoor facilities. Each community has some form of organized recreational services that is volunteer or community-run. Information on levels of use, capacity, and program/infrastructure gaps was not available for each LSA community.

Educational facilities within the LSA are generally sufficient for the population; however, post-secondary education required many community members to travel to La Loche, Buffalo Narrows, or to a larger southern population centre.

Healthcare facilities within LSA communities are somewhat limited, with some specialized services requiring residents to travel (e.g., mental health and addiction services). Residents will generally travel to La Loche, Turnor Lake, or Meadow Lake for health care services unavailable at local health care centres.

Labour Force Characteristics

A 2013 review of the socio-economic effects of uranium mining in Northern Saskatchewan noted that the total number of RSA residents participating in the workforce increased from 5,924 in 1976 to 11,272 in 2006. Despite this increase, employment and unemployment rates in the RSA remained relatively stable from 1976 to 2006 due to concurrent population growth (CVMPP 2013). The RSA unemployment rate and percentage of people not in the labour force have also been consistently higher compared to the province during this same period. The RSA participation rate was higher among males (51.9%) than females (45.9%), a trend that is also reflected in the average provincial rates (73.3% and 63.4%, respectively).

In 2016, unemployment was higher in the RSA than the provincial average (23.8% compared to 7.1%), with males having a higher rate than females (28.7% compared to 18.2%, respectively). Unemployment in the overall RSA labour force has risen substantially from 17.9% in 2011 to 23.8% in 2016.

The mining, forestry, and oil and gas industries were once the dominant employers in the LSA communities. Employment in the mining, quarrying, oil and gas extraction peaked in 2011 in the LSA communities (11.2% of total employment) followed by a decline by 2016 (6.9% of total employment); however, it remained higher than the provincial average. Employment in other primary industries such as agriculture, forestry, fishing, and hunting was lower in the LSA and RSA than in all of Saskatchewan. Provincially, construction, retail trade, agriculture, forestry, fishing, and hunting accounted for a larger share of employment than educational services or public administration.

Income

Income within the LSA and RSA come from both the wage or market economy and the traditional economy. Participation in the traditional economy is not captured by Statistics Canada data but forms an important part of the LSA and RSA economies.

Within LSA communities the median income is highest in Buffalo Narrows and lowest in CRDN. All LSA communities have a median income lower than the median for the provincial Indigenous population. With the exception of CRDN, all LSA communities had a lower percentage of their population receiving employment income when compared to the Indigenous provincial population. The number of households receiving government transfer payments within the LSA, and RSA is higher that the rest of Saskatchewan and is also higher amongst the Indigenous population compared to the non-Indigenous population.

The importance of both the traditional and wage economies has been a regular topic of discussion with Indigenous Groups through engagement activities. Feedback from JWGs and LSA community members suggests that jobs such as fishing, logging, gathering wild rice, trapping are the primary source of income for many

individuals, but that they are not captured in census data because these are not part of the wage economy. Sources of income among community members come from many different avenues, with an estimated 80% of community members participating in the traditional economy in some form.

Education and Training

Among LSA communities, the highest proportion of the population aged 15 years old or older with no certificate, diploma, or degree in 2016 was in La Loche (67.2%) and the lowest was in Buffalo Narrows (32.2%). Buffalo Narrows has the highest share of population aged 15 years old or older with a post-secondary non-university certificate or diploma (17.1%), a university certificate or diploma below the bachelor's level (3.9%), and a university degree at bachelor level or above (11.2%) among communities in the LSA. Buffalo Narrows has higher levels of educational attainment than the other LSA communities, possibly influenced by the Northlands College campus location within the community, economic opportunities (as evidenced by its higher participation rates and lower unemployment rates), and more robust business environment. The proportion of the population aged 15 and over with an apprenticeship or trades certificate or diploma in the LSA in 2016 is similar to the proportion for Saskatchewan as a whole. Barriers to educational attainment include lack of childcare, financial challenges and few others within the family achieving educational success.

Community Health

In the RSA, total crude mortality rates are approximately 1.5 to 2 times as high as the province (NSPHU 2017a). Between 2006 to 2016, total mortality in the RSA has decreased slightly, but remains at rates greater than the province overall. Issues such as mental health challenges are common in LSA communities, including suicide and addiction. Support for mental health and addiction is an area many community members felt could be improved.

Across LSA communities similar health concerns were heard including mental health and addiction (drugs and alcohol), respiratory and cardiac illness, sexually transmitted diseases, cancers, and diabetes.

Public Safety

Criminal code violations in the Buffalo Narrows RCMP Detachment area are low compared to the La Loche RCMP Detachment area. However, violations in Buffalo Narrows are increasing each year, with a 55.1% increase in total criminal code violations from 2015 to 2020. The La Loche RCMP Detachment area trends lower, with total criminal code violations decreasing 9.8% from 2015 to 2020. Saskatchewan criminal code violations increased by 2.2% in the same period. Despite the decrease in criminal code violations in the La Loche RCMP Detachment area, interviews indicated that there is a perception that the community is not safe.

Community Well-Being

Community well-being index scores were lowest in CRDN and highest in Buffalo Narrows. Areas for improvement to community well-being in CRDN included income and housing which had low component scores. Social issues such as drug and alcohol abuse were highlighted by many residents as affecting the well-being of the community.

Participants in the KP interviews had similar answers regarding what contributed to their quality of life in their communities. These included;

- Health, societal and cultural, economic, educational, and neighbourhood and physical environment elements.
- A sense of community in their respective communities and liked that their smaller communities were quieter and had slower paces of life.
- The land, clean air, freedom, and the ability to do land-based activities (e.g., camping, snowshoeing, quad rides, hunting, fishing, swimming, berry picking, picnics) and live off the land.
- People and respective communities contribute to the quality of life and the lower cost of living is an advantage.
- Employment also improves quality of life.

Aspirations

Aspirations of Indigenous and non-Indigenous communities within the LSA and RSA range from the expansion of employment, training, and labour markets to increase the development of social, cultural, and tourism programs. Communities within the LSA and RSA expressed an interest in continued engagement and participation opportunities regarding the Project and Project-related activities and noted the need for further relationship-building with NexGen. The preservation of the ecological environment, the health of local people and the integration of community and Indigenous knowledge into the assessment process for the Project was also noted by Indigenous communities as highly important. Project engagement with LSA communities in the form of KP interviews, JWG meetings, and IKTLU Studies identified the following Project specific community aspirations:

- active community participation and engagement;
- commitments related to additional community infrastructure;
- health, safety, and community well-being;
- preservation of historical and cultural heritage;
- protection and conservation of the natural environment; and
- training, education, employment, business and contracting opportunities.

NexGen is committed to ensuring that the Project does not result in disadvantages for community members and helps them to achieve their goals and aspirations. NexGen has already and plans to continue to make investments in LSA communities through various initiatives. Continued engagement with communities will continue throughout the life of the Project.

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FIGURES

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Abbreviations and Units of Measure

Abbreviation	Definition
BNDN	Birch Narrows Dene Nation
BRDN	Buffalo River Dene Nation
COPD	chronic obstructive pulmonary disease
CRDN	Clearwater River Dene Nation
EA	Environmental Assessment
ENV	Saskatchewan Ministry of Environment
FFMC	Freshwater Fish Marketing Corporation
GDI	Gabriel Dumont Institute
GDP	gross domestic product
HIV	human immunodeficiency virus
IKTLU	Indigenous Knowledge and Traditional Land Use
Joint Panel	Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan
JWG	Joint Working Group
KP	key person
KYHR	Keewatin Yatthé Health Region
KYHRA	Keewatin Yatthé Health Region Authority
LPA	local priority area
LSA	local study area
MLTC	Meadow Lake Tribal Council
MN-S	Métis Nation – Saskatchewan
MPTP	Multi-Party Training Plan
MSLA	Mineral Surface Lease Agreement
NCQ	Northern Career Quest Inc.
NDF	Northern Development Fund
NexGen	NexGen Energy Ltd.
NLSD	Northern Lights School Division
NR2	Northern Region 2
NSAD	Northern Saskatchewan Administrative District
PLAWR	Primrose Lake Air Weapons Range
Project	Rook I Project
RCMP	Royal Canadian Mounted Police
RSA	regional study area
SHA	Saskatchewan Health Authority
TSD	Technical Support Document
VC	valued component

Unit	Definition
%	percent
$	Canadian dollars unless otherwise stated
kg	kilogram
km	kilometre
km/h	kilometres per hour
km^2	square kilometre
m	metre
MVkm	million-vehicle-kilometre

1.0 INTRODUCTION

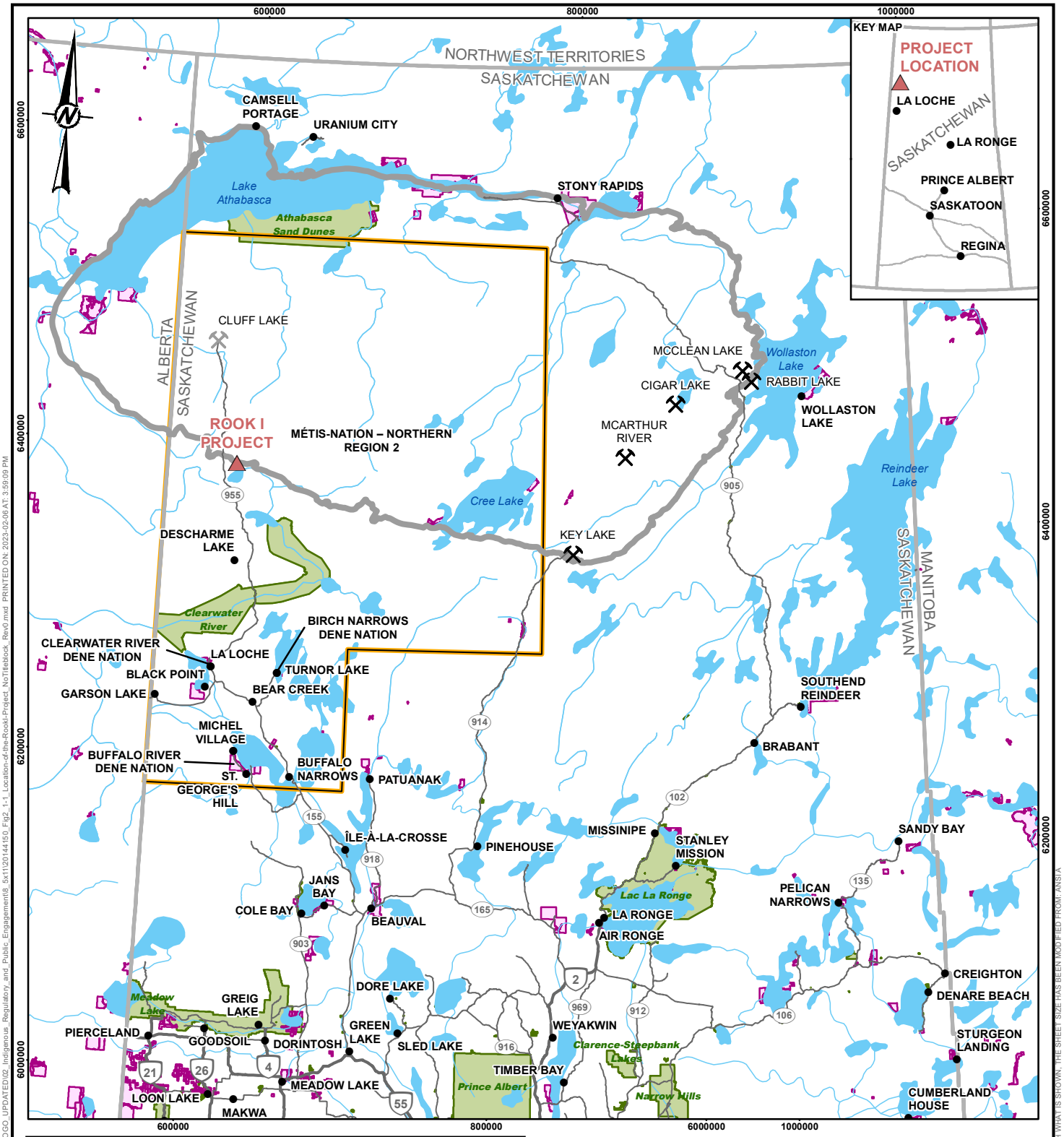
The Rook I Project (Project) is a proposed new uranium mining and milling operation that is 100% owned by NexGen Energy Ltd. (NexGen). The Project would be located in northwestern Saskatchewan, approximately 40 km east of the Saskatchewan-Alberta border, 130 km north of the town of La Loche, and 640 km northwest of the city of Saskatoon (Figure 1). The Project would reside within Treaty 8 territory and within the Métis Homeland, specifically the area referred to as Clearwater Clear Lake (i.e., name for Métis Nation – Saskatchewan [MN-S] Northern Region 2 [NR2]; Figure 2). At a regional scale, the Project would be situated within the southern Athabasca Basin adjacent to Patterson Lake, and along the upper Clearwater River system (Figure 3). Access to the Project would be from an existing road off Highway 955. The Project would include underground and surface facilities to support the extraction and processing of uranium ore from the Arrow deposit, a land-based, basement-hosted, high-grade uranium deposit (Figure 3).

Since exploration at the Project commenced in 2013, NexGen has engaged regularly and established relationships with local First Nation and Métis Groups (collectively referred to as Indigenous Groups), specifically those closest and with greatest access to the Project. NexGen respects the rights of Indigenous Peoples, the unique relationship Indigenous Peoples have with the environment, and recognizes the importance of full and open discussion with interested or potentially affected Indigenous Groups regarding the development, operation, and decommissioning of the proposed Project. Engagement activities to date, as well as future planned engagement activities, reflect the value NexGen places on meaningful engagement with Indigenous Groups who could be potentially affected by the proposed Project. NexGen mechanisms have included, but are not limited to: meetings with leadership, workshops and community information sessions, Project site tours, establishing Joint Working Groups (JWGs; Section 4.3.3) to support the gathering and incorporation of Indigenous Knowledge throughout the Environmental Assessment (EA) process, and providing funding for Indigenous Knowledge and Traditional Land Use (IKTLU) Studies[1] to understand how the Project may interact with the Indigenous Groups' traditional use of the anticipated area of the Project.

Feedback received during engagement activities was documented for contribution to the EIS for the Project; examples of feedback received include discussion of concerns, interests, potential adverse effects, mitigation, and design alternatives. Many baseline studies were initiated in advance of formal engagement on the EA for the Project; however, engagement during the execution of baseline studies has helped inform the understanding of baseline conditions and confirmed components of the natural and socio-economic environments that required study.

This report describes and characterizes the existing socio-economic environment to provide context and a basis for evaluating potential Project-related effects and cumulative effects on economy, community well-being, Indigenous land and resource use, and other land and resource use. This report presents a detailed account of the socio-economic environment present in the potentially affected Denesųłiné (Dene) First Nations and Métis Groups (collectively referred to as Indigenous Groups) and communities.

[1] Indigenous Knowledge and Traditional Land Use (IKTLU) Studies include all land use studies developed by the Project's potentially affected Indigenous Groups, including Traditional Land Use and Occupancy studies, Traditional Knowledge and Use studies, and Indigenous Rights and Knowledge studies, henceforth referred collectively as IKTLU Studies.



LEGEND

- POPULATED PLACE
- URANIUM MINING FACILITY (ACTIVE)
- URANIUM MINING FACILITY (DECOMMISSIONED)
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- ATHABASCA BASIN BOUNDARY
- INDIAN RESERVE
- PROVINCIAL PARKS
- WATERBODY
- PROJECT LOCATION
- MÉTIS NATION-SASKATCHEWAN NORTHERN REGION 2

0 100 200
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REFERENCE(S)

1. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. PARKS OBTAINED FROM IHS MARKIT CANADA ULC.

PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT: NexGen Energy Ltd. — ROOK I PROJECT

TITLE: LOCATION OF THE ROOK I PROJECT

CONSULTANT: wsp

PROJECT 20144150 | SCALE AS SHOWN | REV. 0

FIGURE 1

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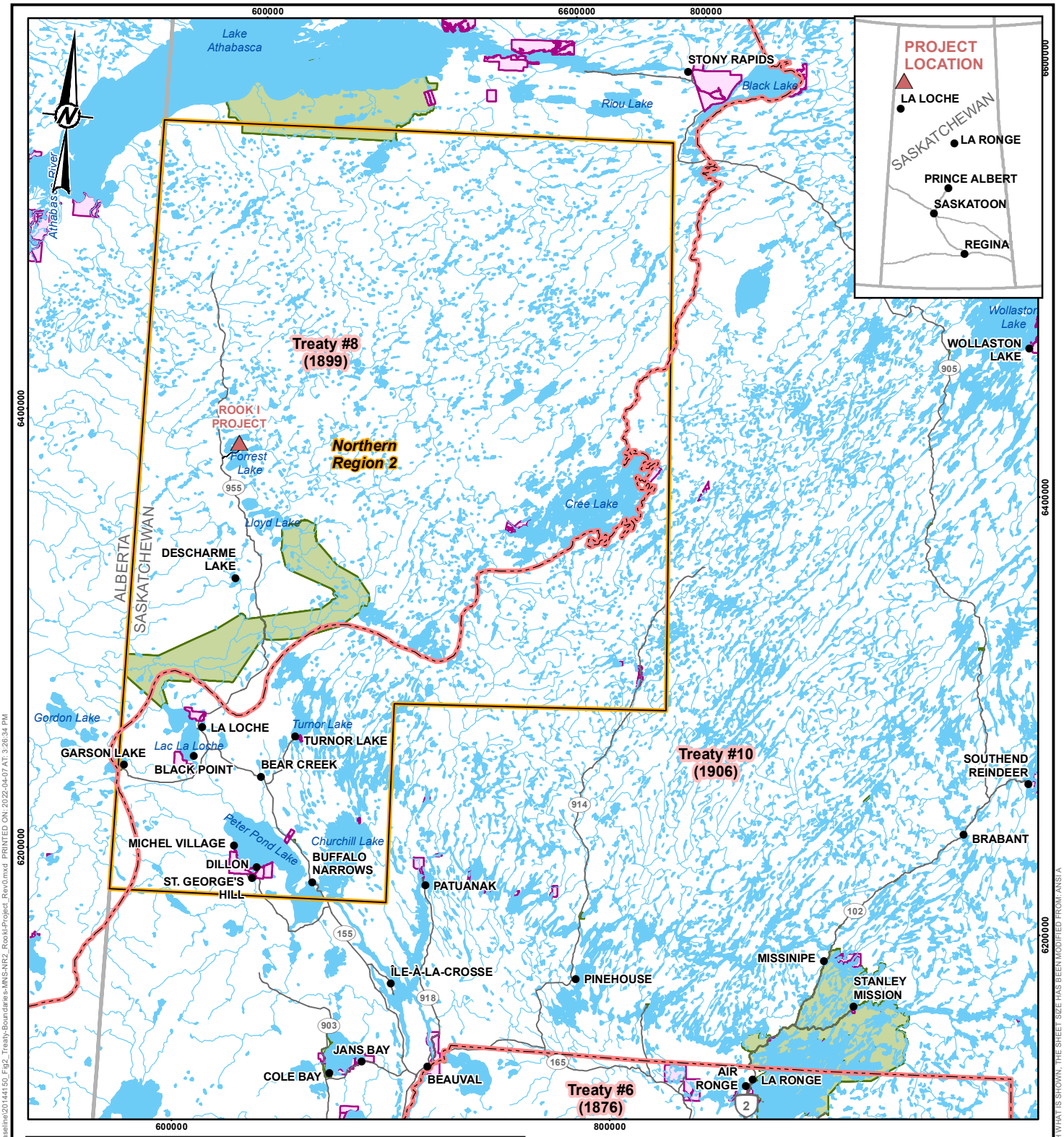

LEGEND

- POPULATED PLACE
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- INDIAN RESERVE
- PROVINCIAL PARK
- WATERBODY
- PROJECT LOCATION
- FIRST NATION TREATY BOUNDARIES
- MÉTIS NATION-SASKATCHEWAN NORTHERN REGION 2

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1:2,500,000 KILOMETRES

REFERENCE(S)

1. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. PARKS OBTAINED FROM IHS MARKIT CANADA ULC.
3. ABORIGINAL AFFAIRS AND NORTHERN DEVELOPMENT CANADA (AANDC) AND MEADOW LAKE TRIBAL COUNCIL, BIRCH NARROWS DENE NATION.
4. COLD LAKE AIR WEAPONS RANGE OBTAINED FROM SASKATCHEWAN MINISTRY OF ENVIRONMENT

PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT: NexGen Energy Ltd. — ROOK I PROJECT

TITLE

TREATY BOUNDARIES AND MÉTIS NATION-SASKATCHEWAN NORTHERN REGION 2

CONSULTANT: wsp

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CHECK	DW	2022-04-07		
REVIEW	KG	2022-04-07		

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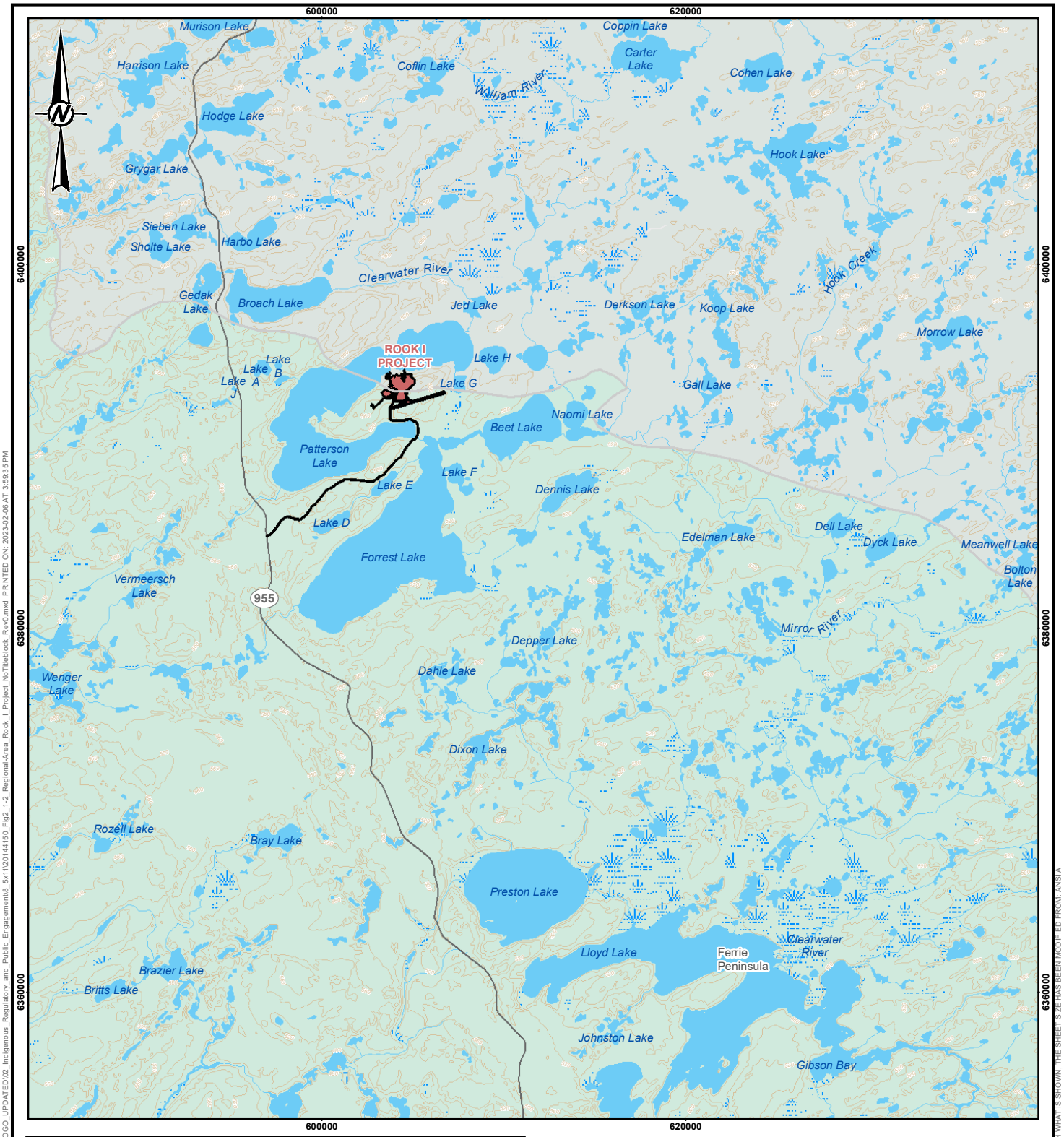

LEGEND

- ELEVATION CONTOUR (20 m INTERVAL)
- SECONDARY HIGHWAY
- WATERCOURSE
- ATHABASCA BASIN
- WATERBODY
- WETLAND
- WOODED AREA
- PROPOSED PROJECT FOOTPRINT

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REFERENCE(S)

1. PROJECT FEATURES OBTAINED FROM NEXGEN, APRIL 6, 2021.
2. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT

NexGen Energy Ltd.

ROOK I PROJECT

TITLE

ROOK I PROJECT TRANSPORTATION AND ACCESS

CONSULTANT

wsp

PROJECT	20144150	SCALE AS SHOWN	REV. 0

FIGURE 3

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2.0 STUDY OBJECTIVE

2.1 Purpose and Objectives

The purpose of this baseline report is to describe socio-economic conditions in the region (Section 3.0, Study Areas) and provide a more detailed description of socio-economic conditions in communities potentially affected by the Project. This information will be used to:

- establish an understanding of current conditions against which potential Project effects can be evaluated;
- identify appropriate measurement indicators and endpoints for consideration in analysis of potential Project effects;
- identify potential effects of Project construction, operations, and eventual closure relative to existing socio-economic conditions;
- determine suitable mitigation and benefit enhancement measures;
- identify residual effects after mitigation;
- evaluate the significance of residual effects once mitigations have been taken into account;
- assist with development of adaptive management to further avoid and minimize adverse Project effects and enhance Project benefits; and
- provide baseline information for subsequent compliance and voluntary environmental, social, and governance monitoring and reporting.

2.2 Scope

The socio-economic baseline describes the current population and demographic, economic, education and training, social, and health and well-being conditions and trends at regional and local levels. This baseline integrates information collected during the socio-economic primary and secondary data gathering processes, and is organized as follows:

- Section 3.0 describes the study areas selected for the baseline;
- Section 4.0 describes the methods used in the baseline study;
- Section 5.0 describes the context of the Project with reference to the regional study area (RSA) and local study area (LSA);
- Section 6.0 describes the existing social baseline conditions in the RSA and LSA; and
- Section 7.0 provides a summary of the RSA and LSA socio-economic baseline.

3.0 STUDY AREAS

The study area boundaries for the socio-economic baseline study are shown in Figure 4, RSA, and Figure 5, LSA. The RSA and LSA were determined using:

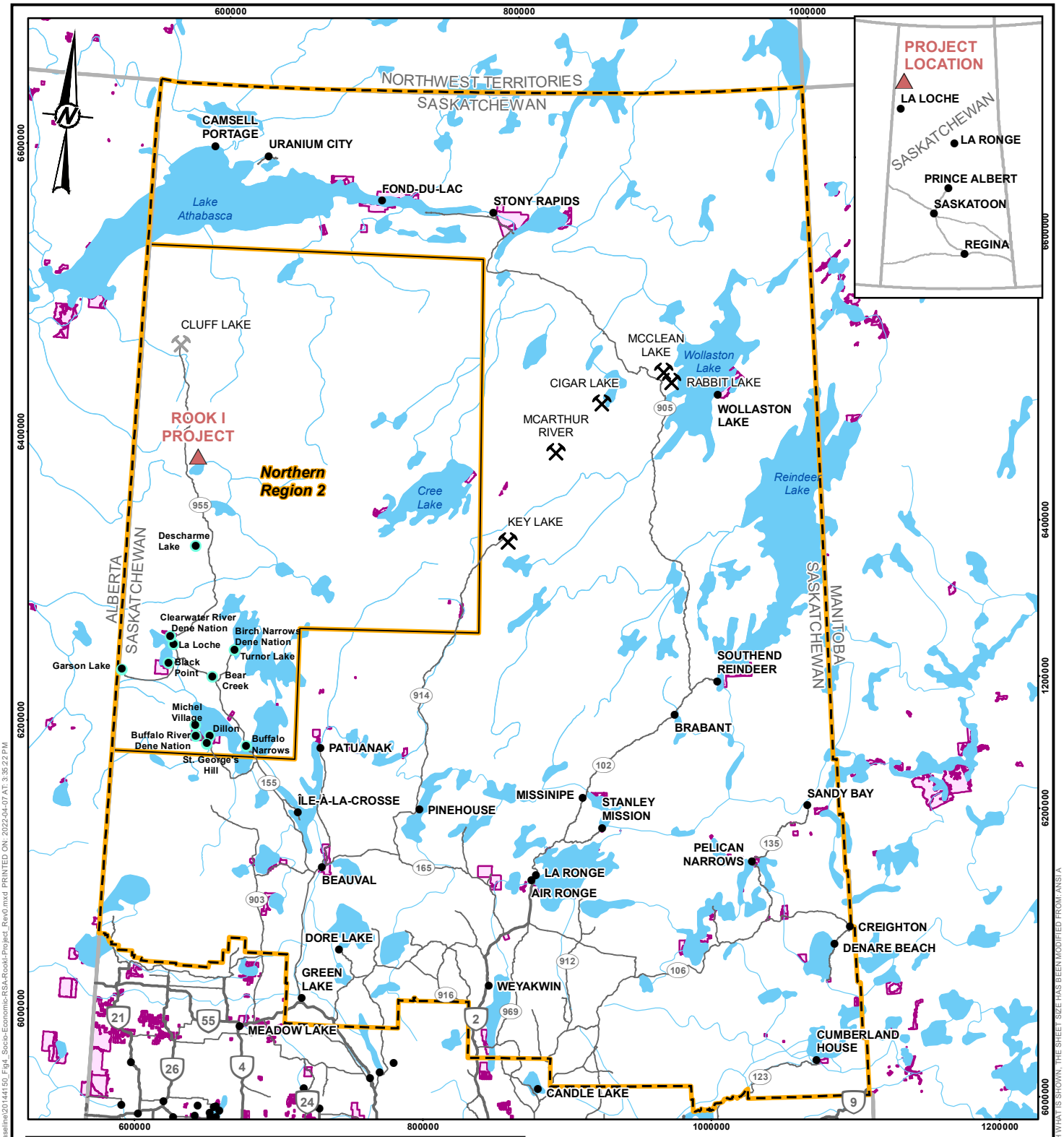
- the description of the Project's works and activities potentially interacting with the socio-economic environment[2];
- an understanding of the local area surrounding the Project;
- a preliminary screening of the extent of potential Project effects (direct and indirect);
- key issues or concerns raised by Indigenous Groups;
- Indigenous and Local Knowledge[3];
- information collected during the engagement process, including key issues or concerns raised by local government, provincial and federal government agencies, stakeholders, and the public; and
- provincial, regional, and local government administrative boundaries.

3.1 Regional Study Area

The RSA, which includes the Project and LSA (Section 3.2), was identified to provide the relevant contextual data and characterization of the regional socio-economic conditions for potential Project-specific socio-economic effects and cumulative effects. The RSA for the socio-economic baseline is aligned with the boundary of the Northern Saskatchewan Administrative District (NSAD; Figure 4). The NSAD as defined in *The Northern Municipalities Act, 2010*, is the regional statistical reporting unit used by Statistics Canada and the Government of Saskatchewan and has the same boundaries as Statistics Canada Census Division No. 18.

The Project is located on Crown Land in the NSAD and requires a Mineral Surface Lease Agreement (MSLA) to operate (Government of Saskatchewan 2021a). Based on other uranium MSLAs issued by the province (Government of Saskatchewan 2018a), it is anticipated that the Project lease would include a range of provisions regarding land tenure, environmental protection measures, occupational health and safety, and reporting on employment, purchases and other socio-economic benefits for all residents of the NSAD, not solely to the communities in the LSA. A portion of the Project's direct and indirect socio-economic effects, including employment, income, supplier revenues, and government revenues (i.e., Project benefits), would extend beyond the LSA to a broader spatial scale within the NSAD and Saskatchewan. Therefore, communities and Indigenous Groups in the RSA are also expected to experience some level of direct and indirect employment, income, and training benefits from the proposed Project, though at a lesser extent than LSA communities.

[2] The socio-economic environment includes aspects of people's way of life, their culture, community, relationships, political systems, environment, health and well-being, personal and property rights, fears, and aspirations.
[3] Local Knowledge is a more general term than Indigenous Knowledge and, for the purposes of the EA, represents information from an LPA citizen or representative, but without Indigenous Group/Elder sanction (i.e., it is not an official position, statement, or document).



LEGEND

- POPULATED PLACE
- URANIUM MINING FACILITY (ACTIVE)
- URANIUM MINING FACILITY (DECOMMISSIONED)
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- INDIAN RESERVE
- WATERBODY
- PROJECT LOCATION
- SOCIO-ECONOMIC LOCAL STUDY AREA COMMUNITIES
- SOCIO-ECONOMIC REGIONAL STUDY AREA (ALSO NSAD BOUNDARY)
- MÉTIS NATION-SASKATCHEWAN NORTHERN REGION 2

REFERENCE(S)

1. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. PARKS OBTAINED FROM IHS MARKIT CANADA ULC.

PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT: NexGen Energy Ltd. — ROOK I PROJECT

TITLE: **SOCIO-ECONOMIC REGIONAL STUDY AREA**

CONSULTANT: wsp

PROJECT		20144150	PHASE	3111 - 6
DESIGN	DW	2022-04-07	SCALE AS SHOWN	REV. 0
GIS	NO	2022-04-07		
CHECK	DW	2022-04-07		
REVIEW	KG	2022-04-07		

FIGURE 4

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3.2 Local Study Area

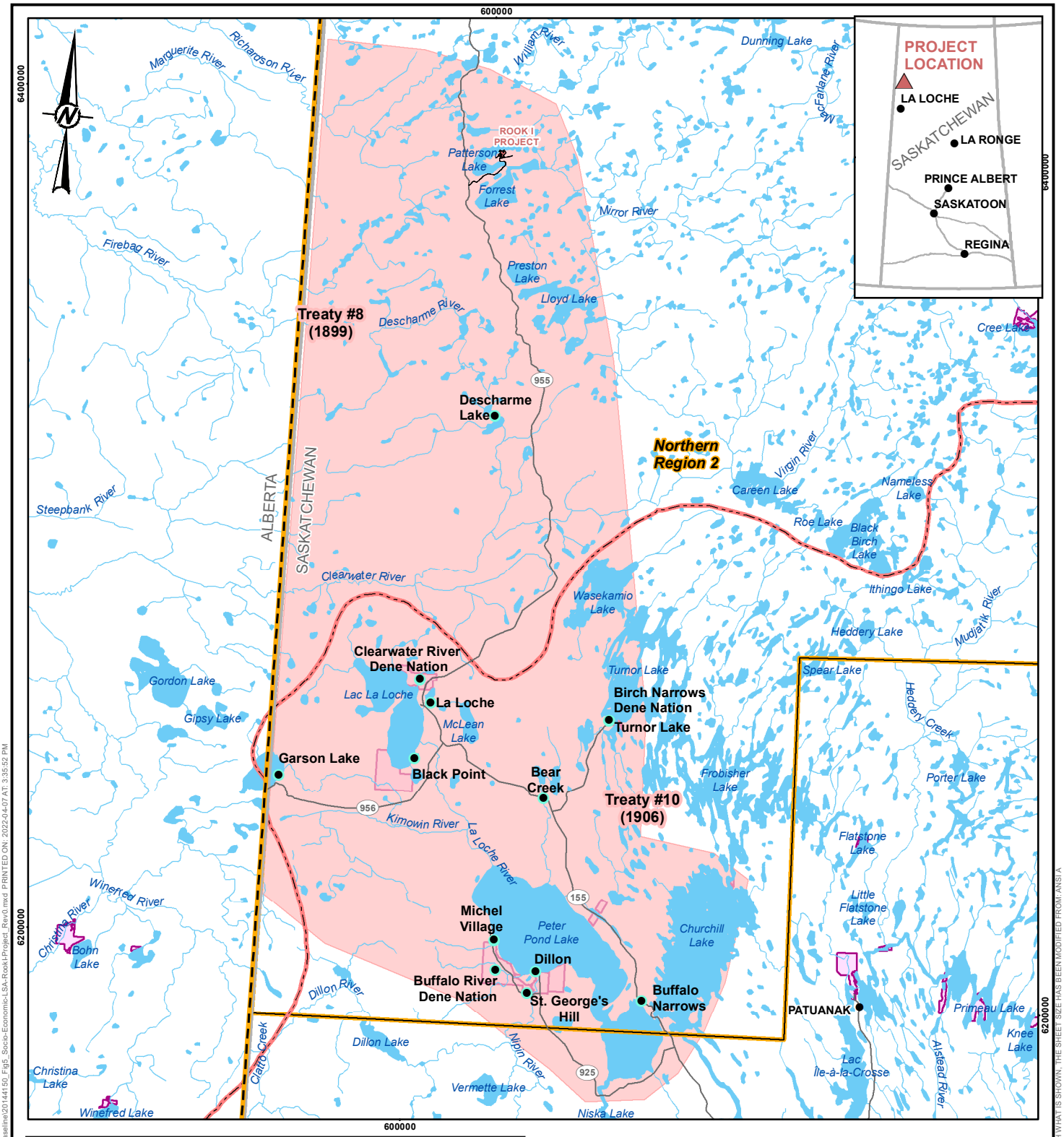
The LSA is the area where the potential direct and indirect effects of the Project on socio-economic conditions are likely to be greatest. The LSA corresponds with NexGen's local priority area (LPA), which consists of the local communities closest to the Project that would experience most of the Project effects and which NexGen has prioritized for economic benefits from the Project. These communities are located along, or accessed via, Highways 155 and 955 north of the intersection of Highways 155 and 925 (Figure 5). The LSA includes communities that:

- could experience changes in employment, income, business opportunities, and government revenues;
- could experience changes in population and demography through changes in migration;
- may provide services and infrastructure to the Project and/or experience demand/supply effects on services, infrastructure, housing, recreation, and/or transportation; or
- could potentially experience changes to community well-being.

In establishing the LSA for the Project, consideration was given to the location of community-specific and regional services, and their respective geographic service areas; services that are anticipated to be provided on site for the Project; and services required from municipal and/or regional sources. Consideration was also given to the location of recreational infrastructure and recreational areas. The LSA also considered key Indigenous and community concerns. The following communities and applicable Métis Locals, and Indigenous Groups are included in the LSA:

- Descharme Lake;
- Clearwater River Dene Nation (CRDN);
- Northern Village of La Loche (Métis Local 39);
- Black Point (Métis Local 162);
- Garson Lake;
- Bear Creek (Métis Local 156);
- Birch Narrows Dene Nation (BNDN);
- Turnor Lake (Métis Local 40);
- Northern Village of Buffalo Narrows (Métis Local 62);
- St. George's Hill (Métis Local 70).
- Buffalo River Dene Nation (BRDN; Dillon); and
- Michel Village (Métis Local 65).

All Indigenous Groups within the LSA are reflected in the above list, including MN-S NR2, which is represented through the communities within the region.



LEGEND

- POPULATED PLACE
- SECONDARY HIGHWAY
- WATERCOURSE
- INDIAN RESERVE
- WATERBODY
- PROJECT LOCATION
- SOCIO-ECONOMIC LOCAL STUDY AREA COMMUNITIES
- SOCIO-ECONOMIC REGIONAL STUDY AREA
- FIRST NATION TREATY BOUNDARIES
- LOCAL PRIORITY AREA
- MÉTIS NATION-SASKATCHEWAN NORTHERN REGION 2

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REFERENCE(S)
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2. PARKS OBTAINED FROM IHS MARKIT CANADA ULC.
PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT
NexGen Energy Ltd.
ROOK I PROJECT

TITLE
SOCIO-ECONOMIC LOCAL STUDY AREA

CONSULTANT
WSP

PROJECT		20144150	PHASE	3111 - 6
DESIGN	DW	2022-04-07	SCALE AS SHOWN	REV. 0
GIS	NO	2022-04-07		
CHECK	DW	2022-04-07	**FIGURE 5**	
REVIEW	KG	2022-04-07		

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4.0 METHODS

The approach to documenting the existing socio-economic environment was designed to confirm that appropriate information was collected to understand and assess potential effects of the Project. The characterization of the existing socio-economic environment included both quantitative (e.g., statistical) and qualitative (e.g., discussions) data collection and analysis in line with Canadian and international best practice for environmental impact studies. Both primary and secondary data sources were used throughout the baseline study.

Data collection began with a review of existing literature and databases from a variety of public sources (e.g., statistical sources, government reports, academic reports), as guided by experience with similar projects in Saskatchewan and throughout Canada. Data was collected for both the RSA and LSA with a focus on current information as well as longitudinal data. Primary data collection was undertaken in the form of key person (KP) interviews[4], a standard practice for socio-economic baselines and effects assessments. Joint Working Group discussions, IKTLU Studies, and workshops also assisted in identifying existing socio-economic conditions and related community interests and concerns. Joint Working Groups, specifically, provided an opportunity for Indigenous Groups to discuss topics of their choice related to the Project, and information shared from these meetings pertinent to potential socio-economic valued components[5] (VCs) were incorporated into this baseline, where appropriate. Existing conditions within the RSA (e.g., population, demography, migration, and educational attainment) were used for certain topics as a point of comparison with the LSA during the data analysis process. Following the collection of primary and secondary data, baseline profiles were developed.

4.1 Standards and Guidelines

Best practices in socio-economic baseline data collection were applied in the development of this report, including development of interview guides and data treatment. Secondary data collection adheres to presentation of publicly available information and does not include confidential sources. Primary data collection was undertaken with informed consent of participants, and permission to use information collected through interviews was obtained.

This report satisfies the requirements of an EA of a designated project under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) and requirements under *The Environmental Assessment Act* of Saskatchewan. In addition, this report meets the Terms of Reference for the Project submitted to the Saskatchewan Ministry of Environment (ENV) and Canadian Nuclear Safety Commission.

[4] Note the CRDN asked to conduct their own KP interviews. NexGen provided the KP interview guide for this purpose; however, these interviews were not yet complete at the drafting of this baseline. The CRDN and NexGen will continue to work together to identify ways to incorporate their information into the Project.
[5] Valued components are aspects of the biophysical, cultural, and socio-economic environments that are considered to have scientific, social, cultural, economic, historical, archaeological, or aesthetic importance (Beanlands and Duinker 1983; CNSC 2021).

4.2 Secondary Data Collection

Baseline information for the RSA and LSA was collected from the following secondary sources:

- census community profiles (Statistics Canada);
- custom[6] Statistics Canada population projections for Keewatin Yatthé Regional Health Authority (KYRHA);
- Crown-Indigenous Relations and Northern Affairs Canada profiles;
- Government of Saskatchewan;
- Saskatchewan Bureau of Statistics;
- Saskatchewan Health Authority (SHA);
- community and municipal internet sites;
- statistical reports and secondary documentation from local governments;
- regional and local growth strategy documents, including Official Community Plans (i.e., La Loche, Buffalo Narrows, Bear Creek) and Comprehensive Community Plans (i.e., BNDN);
- Community Vitality Monitoring Partnership Process reports;
- *Economic, Sector, and Demographic Analysis for the La Loche Region and Clearwater First Natio*n (DMCA 2018); and
- local media articles.

Data from the last three censuses (i.e., 2006, 2011, and 2016), and the 2011 National Household Survey conducted by Statistics Canada were analyzed to illustrate regional and local economic and social trends. For the RSA, some data are presented in different analytical packages based on data availability and boundaries. Data from these sources were used to characterize the existing environment, based on the most recently available data.

For the purposes of this report, information for the smaller LSA communities (i.e., Bear Creek, Descharme Lake, Garson Lake, Black Point, Michel Village, and St. George's Hill), for which community-level information is extremely limited, are presented together as 'Other LSA communities'. For some socio-economic conditions, there is no data available for these communities, in which case, the 'other LSA communities' sub-section was omitted. Where information was made available for these communities it was captured in this baseline. Otherwise, the data from the larger communities in the LSA was considered analogous to the neighbouring smaller communities as they tend to provide social infrastructure and services for these smaller communities as well.

Quantitative information for communities and Indigenous Groups in the LSA is sometimes presented collectively for comparison purposes with regional and provincial indicators, where relevant and comparative information is available. However, it is recognized that these communities and Indigenous Groups each have their own unique characteristics. These differences are described quantitatively and qualitatively throughout this subsection.

[6] Custom means a dataset was made by Statistics Canada at the specific request of NexGen or NexGen's consultants that otherwise did not exist or was not publicly available.

4.3 Primary Data Collection

After compiling publicly available secondary data, opportunities were identified for further investigation to characterise socio-economic baseline conditions in LSA communities and validate secondary information. Primary data collection in the form of Indigenous and Local Knowledge was compiled from IKTLU Studies, JWG meetings, KP interviews and information from several other sources. Other sources included community information sessions and workshops with youth and trappers to provide additional information and confirm the accuracy of secondary data (i.e., verification and triangulation).

The following subsections describe the Indigenous Group Study Agreements and the key sources of Indigenous and Local Knowledge used through the primary data collection process.

4.3.1 Indigenous Group Study Agreements

In 2019, NexGen negotiated and signed individual Study Agreements with the four primary Indigenous Groups within the Project LPA (i.e., CRDN, MN-S [representing NR2], BNDN, and BRDN). Each Study Agreement formalized an engagement process between NexGen and the individual Indigenous Group to, among other things:

- identify and characterize potential impacts (both positive and negative) to Indigenous and Treaty Rights and socio-economic interests resulting from the Project; and
- collaboratively identify potential avoidance, mitigation, and accommodation measures related to identified negative impacts to those Indigenous and Treaty Rights and measures to enhance the positive impacts.

The Study Agreements also acknowledged that, notwithstanding the activities contemplated under the Study Agreement, the responsibility for fulfilling the *Duty to Consult*[7] remains with the Crown.

Each of the Study Agreements also:

- Established individual JWGs composed of representatives chosen by each Indigenous Group to facilitate regular, ongoing engagement during the Project EA, including the sharing of Indigenous and Local Knowledge. The JWGs are fully funded by NexGen.
- Committed NexGen to providing the funds necessary to allow each community to undertake, or cause to be undertaken, a self-directed IKTLU Study.
- Committed NexGen to provide capacity funding to allow for participation by Indigenous Groups in the JWGs, including the retention of technical support.
- Committed NexGen and the Indigenous Group to negotiating in good faith to formalize a Benefit Agreement with each Indigenous Group and to provide funding to assist each in negotiating such an agreement.

A Study Funding Agreement was also signed in 2019 with the Ya'thi Néné Lands and Resources (on behalf of the Black Lake Denesųłiné First Nation and Fond du Lac Denesųłiné First Nation) as the Ya'thi Néné Lands and Resources identified an interest in sharing Indigenous Knowledge through a study. The Study Funding Agreement

[7] The Government of Canada has a duty to consult, and where appropriate, accommodate Indigenous groups when it considers conduct that might adversely impact potential or established Aboriginal or treaty rights (Government of Canada 2019a).

between NexGen and Ya'thi Néné Lands and Resources was strictly for the purposes of funding a study and did not include the establishment of a JWG.

4.3.2 Indigenous Knowledge and Traditional Land Use Studies

Indigenous and Local Knowledge was included in the socio-economic baseline consistent with principles set out in relevant federal and provincial government, including working with the communities and accessing knowledge with community support (Government of Canada 2016a).

A key source of Indigenous and Local Knowledge is the Project-specific studies completed by Indigenous Groups, including Traditional Land Use and Occupancy studies, Traditional Knowledge and Use studies, and Indigenous Rights and Knowledge studies (henceforth referred collectively as Indigenous Knowledge and Traditional Land Use [IKTLU] Studies). The IKTLU Studies that were reviewed in developing the socio-economic baseline are included below:

- TSD II (BNDN), Birch Narrows Dene Nation Traditional Knowledge and Use Study Specific to NexGen Energy Limited's Proposed Rook I Project;
- TSD III (BRDN), Buffalo River Dene Nation Traditional Knowledge and Use Study Specific to NexGen Energy Limited's Proposed Rook I Project;
- TSD IV (MN-S), Métis Nation – Saskatchewan Northern Region 2 Traditional Land Use & Diet Study for the NexGen Rook I Project;
- TSD V.1 (CRDN), Preliminary Identification of Issues and Concerns Related to the Proposed NexGen Energy Ltd. Rook I Project in the Patterson Lake Area; A Review; Clearwater River Dene Nation; Traditional Land Use and Occupancy Mapping Interviews; 2010 – 2016;
- TSD V.2 (CRDN), Clearwater River Dene Nation Indigenous Rights and Knowledge Survey Related to the Proposed NexGen Energy Ltd. Rook 1 Project in the Patterson Lake Area; and
- TSD VI (YNLR), Provision of Athabasca Denesųłiné Traditional Knowledge, Land Use and Occupancy Information for the NexGen Rook I Project Environmental Assessment.

4.3.3 Joint Working Groups

Another key source of Indigenous and Local Knowledge is information shared by Indigenous Group representatives during JWG meetings. The JWGs represent an agreed-upon primary engagement mechanism as outlined in the Study Agreements signed by each Indigenous Group and NexGen. There are four JWGs with the Project's primary Indigenous Groups (as identified by the Canadian Nuclear Safety Commission, the ENV, and NexGen):

- CRDN JWG;
- MN-S JWG representing MN-S NR2;
- BNDN JWG; and
- BRDN JWG.

The leadership of each primary Indigenous Group selected their JWG participants with consideration of group diversity; where possible, members included Elders, youth, different genders, a range of ages, and land users around Patterson Lake.

The JWG meetings were intended to be held monthly with communities where scheduling allowed. Monthly meetings with community members were held with the BNDN and BRDN from October 2019 to July 2021, excluding April to July 2020 and September to November 2020 due to considerations for COVID-19. The CRDN and MN-S participated in JWG meetings from October 2019 to August 2020, excluding April to November 2020. Effective December 2020, meetings with the CRDN and MN-S were suspended at the request of those groups, with a few periodic meetings being held since then. Joint Working Group meetings covered a broad range of Environmental Impact Statement topics, including VCs. For the purposes of this baseline, most JWG meetings also included discussions on socio-economic aspects of the Project, or the interconnectivity of the bio-physical environment and the human environment.

Three JWG sessions in February 2020 were specifically conducted with BNDN, BRDN, and MN-S to discuss community definitions of well-being, including the factors that both contribute to and detract from well-being, and how participants felt the Project might interact with these factors. The CRDN JWG was unable to meet prior to the completion of the socio-economic baseline.

Key topics discussed at the February 2020 JWGs included:

- Gender-Based Analysis Plus;
- IKTLU Studies;
- job, training, and business opportunities; and
- socio-economics.

To better understand the complex relationship between the traditional, wage, and government transfer economies influencing how community members interacted with and used the environment, a specific JWG session was developed in August 2021. The BNDN and the BRDN participated in this JWG session; however, the CRDN, and the MN-S were unable to meet prior to completion of the socio-economic baseline.

Key topics discussed at the August 2021 JWGs included:

- key aspects of the traditional and wage economies;
- changes in community participation in the traditional and wage economies;
- gender differences in participation in the traditional and the wage economies;
- the effects of government transfers and subsidies on participation in the traditional and wage economies; and
- discussions on the challenges and opportunities for future participation in the traditional and wage economies.

This is an example of how multiple JWG discussions with various JWGs over time resulted in the development of a specialized JWG topic. From this JWG special topic session, further sessions were conducted on the BRDN culture and history. Inclusion of cultural/history shares at the start of all JWG sessions was also discussed with JWGs as an opportunity to provide information to NexGen on items important to primary Indigenous Groups.

4.3.4 Key Person Interviews

The KP interviews were undertaken to confirm trends observed in quantitative data, address gaps that could not be readily filled by secondary sources, and provide context and perspectives on community interests and concerns. Key Person interviews were conducted with key information holders within the LSA communities including representatives of organizations with mandates related to socio-economic conditions in both Indigenous and non-Indigenous communities. These discussions also provided the opportunity to identify potential issues of concern for the LSA communities and to obtain greater contextual information regarding variation in conditions within individual communities, including between different subgroups of the community. An objective of the socio-economic baseline was to capture such variation for the purpose of assessing how the proposed Project may affect specific subgroups of the LSA population differently.

A KP interview program is an industry-accepted approach to qualitative data collection and analysis for understanding communities taking part in impact assessment in Saskatchewan, Canada, and globally (IAAC 2020a; IAIA 2015). It is an effective means for obtaining relevant community profile information from service providers, community leaders, and informed members of the community. Information gathered through a KP interview program can help strengthen the understanding of the existing environment when used in combination with other primary and secondary data sources, and can be used in data triangulation to confirm accuracy and applicability. A KP interview program was undertaken between 2019 and 2021 as part of the characterization of the existing economic environment to confirm trends observed in quantitative data, provide information that could not be readily filled by secondary sources, and to provide context and perspectives on community interests and concerns.

The KP interview process was approached collaboratively with communities through the Community Coordinators provided for (i.e., funded by NexGen) through each of the Study Agreements. Community Coordinators were trained to assist in identifying participants in the KP interview program and were primarily responsible for initial outreach and scheduling of interviews. Interview guides were developed to seek additional information and provide local context. Interviews were conducted with community members, including business owners, principals and staff of schools, housing clerks, healthcare directors, band councillors, women with knowledge experience with the worker rotation system, and the Royal Canadian Mounted Police (RCMP). Topics covered during KP interviews included health, education, economic development, social services, and community well-being. Information collected from interviews was categorized based on the topics included in the existing conditions and incorporated where possible to either provide additional detail or validate secondary data. A total of 73 KP interviews were conducted with community members primarily through telephone unless another method was requested.

Interviews were conducted with the consent of individual interview participants and community leadership including La Loche (20 interviews), BNDN / Turnor Lake (9 interviews), BRDN (16 interviews), Buffalo Narrows (24 interviews), and other hamlets and villages (3 interviews) in the LSA, as well as the Meadow Lake Tribal Council (MLTC; 1 interview). The CRDN indicated a desire to undertake interviews independently and NexGen provided the KP interview guide and directions for interviewers. Those interview results had not been provided to NexGen at the time of drafting this report.

4.3.5 Community Information Sessions and Workshops

Community information sessions were held in four locations (i.e., La Loche, Buffalo Narrows, BNDN, and BRDN) in June 2019 and a total of 226 participants attended (NexGen 2019). The objectives of the community information sessions were to inform local communities of the Project and the EA process, answer questions, and receive initial feedback specific to the Project for consideration during the EA (e.g., VCs). The community information sessions were a drop-in format with a series of poster presentations. Each display was attended to by a representative of NexGen (including NexGen consultants) who was able to address and record attendees' questions and comments. Participants were encouraged to ask questions and provide feedback, fill out a general survey about key interests and concerns, and complete a VC survey. The results of the surveys were compiled and used to inform the socio-economic baseline report.

Workshops with specific groups were held in 2020 and 2021. A youth workshop was held in March 2020, which included 44 students and 10 staff from high schools in Buffalo Narrows, Dillon, La Loche, and Turnor Lake. The youth workshop covered a variety of different topics which included Project background information, employment and educational opportunities, mentorship programs and scholarship opportunities. Attendees were given the opportunity to ask questions as well as provide feedback on the effectiveness of the workshops which allowed for open-ended comments and conversation about topics covered within each event.

An N-19 Trappers Association workshop was held in July 2021 with associated members in La Loche. Six trappers who actively harvest within the N-19 block attended the workshop and discussed topics related to land use and participation in trapping, furbearer health, and habitat as well as commercial harvesting.

A workshop with women from the LSA planned for April 2020 was postponed due to the COVID-19 pandemic. The workshop was reorganized into a series of five individual interviews with women identified by each Indigenous Group who had direct or indirect experience with mining employment. These KP interviews were completed as part of the KP interview program which took place between October 2019 and July 2021.

4.3.6 Data Limitations and Challenges

Challenges were faced pertaining to the information collection process; the COVID-19 pandemic and forest fires in the summer of 2021 represented the two most notable challenges. However, care was taken to verify that the socio-economic baseline was robust and presents a sound foundation for the consideration of Project effects (positive and negative) on Indigenous and non-Indigenous communities. This was achieved through the implementation of digital platforms (e.g., Microsoft Teams / Zoom meetings) and telephone interviews. It is important to note that the majority of the KP interviews were completed prior to COVID-19, and access to quantitative data sources were not affected. The following data limitations pertaining to the socio-economic baseline are acknowledged:

- Statistics Canada Census and National Household Survey data are limited for smaller communities due to confidentiality concerns and suppression of data. Population data are suppressed in communities with less than 40 persons, while income data are suppressed in communities with less than 250 persons or 40 households (Statistics Canada 2019). Consequently, census data for several indicators are not available for small communities in the LSA such as Bear Creek, Black Point, Descharme Lake, and Garson Lake. Further, due to data rounding conventions for smaller population centres, some totals do not add up to 100%. Data presented for some indicators (e.g., housing) has been subjected to a confidentiality procedure

known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals in tables therefore may not add-up due to rounding. A data note is included with each data table affected by the rounding convention. Data may also be suppressed when enumeration was incomplete, or data quality was poor.

- Statistics Canada data can contribute to developing an understanding of the local and regional economies and how they have changed over time. Data should be interpreted with caution due to comparability issues across years, confidentiality, and data quality. Information was reviewed for a number of indicators from the Census of Canada over time. In 2011, there was a change in how the census was administered, with a National Household Survey replacing the previous long-form census. One of the key differences was a change from a mandatory to an optional response requirement. In JWG discussions, some individuals noted that Statistics Canada data were not always representative of their communities, due in part to low participation in census surveys; however, they acknowledged the Statistics Canada economic data did seem to accurately represent the community (BRDN-JWG 2021a). It is also noted that Statistics Canada has processes to address low participation rates and would limit the data if they believed it was not an accurate representation, either by not releasing the data or releasing it with strong disclaimers noting the lack of confidence in the accuracy of the information or the limitations in use of the data. No such disclaimers were attached to the data from the LSA communities.
- The most recent census data available are from the 2016 Statistics Canada Census. Where more up to-date data are not available, this report endeavours to qualitatively capture current conditions using historical data as a framing tool to identify trends.
- Information drawn from the 2016 Statistics Canada Census Aboriginal Community Profiles[8] is understood to potentially be dated and not reflective of current community social and economic conditions. Changes in the local, regional, and national economy arising from the COVID-19 pandemic are not captured in the 2016 census data.
- Where NSAD data are not available for an indicator in the RSA, provincial level data are provided.
- The most recent data available for the former KYRHA are for 2011 to 2015. Some health and well-being data are only available from the broader health region and may not be entirely representative of the LSA (Figure 4).
- The data collected from KP interviews may not be representative of the perspectives of all community members. Key persons were selected by the communities based on their knowledge and experience that could be relevant to characterizing the socio-economic baseline of the community, and is consistent with industry good practice. Data presented from the KP interviews are based on the interviewed community members' knowledge and experience, and their willingness to participate and share data openly. Collaboration was sought with Indigenous Groups to assist in identifying KP interviewees. As a result, some participants in the KP interview program were identified with the assistance of Community Coordinators who live in the communities.

[8]Note that Statistics Canada uses the term "Aboriginal" in previous censuses. The term Indigenous has been used throughout this report unless referencing a specific, named document (e.g., Aboriginal population profile, Aboriginal Treaty Rights) for consistency with current nomenclature.

- Due to the COVID-19 pandemic and resulting provincial and local government restrictions on travel of non-residents within communities, in-person engagement was not possible for much of 2020 and 2021. Typically, primary data collection involves engagement regarding the overall scope and methods of the socio-economic baseline and impact assessment in support of identification/coverage of key issues/concerns in the study. Digital engagement endeavoured to capture the concerns of primary data collection participants during this time. There is some concern that, without direct, targeted engagement, this process may be less accessible and may have achieved fewer comprehensive results than an in-person engagement.
- The demographic data used in this report relies upon publicly available data, primarily from government sources. It is acknowledged that some Indigenous Groups caution against the validity and utility of official census data, which do not accurately or wholistically portray economic, social, cultural, and health characteristics of their communities.
- The socio-economic baseline makes best efforts to describe economic, services and infrastructure, and health and well-being conditions as they currently exist in the RSA and LSA, based on available information, and presents some conclusions about historical and future trends to support the assessment of potential effects. The difficulty in projecting economic and social conditions into the future for the LSA communities is a limitation on the presented baseline. To address these limitations, key trends or findings were confirmed where possible through KP interviews or other published reports and data.

4.4 Quality Assurance / Quality Control

Quality assurance and quality control measures were employed throughout the data collection, analysis, and reporting process. The study design was developed to meet standards and best practices used in provincial, Canadian, and international socio-economic assessment practice, including those for the EA of mining projects. During the primary and secondary data collection programs, quality assurance and quality control measures included:

- Informed consent forms were read prior to the commencement of interviews to inform interviewees of the interview process and how interview results would be used in the EA and reported in the Environmental Impact Statement; consent and any conditions imposed by the interviewee to participating in the interview were confirmed. Consent forms were saved for reference.
- Triangulation was used to confirm interview responses received by asking similar questions to more than one respondent to verify information. Interviewees were informed that interviewers may follow up with questions and clarifications should they be needed during data analysis.
- Where there were two interviewers, notes were taken by each interviewer and cross-checked prior to finalization of interview notes.
- Similarly, secondary data was triangulated where applicable to confirm alignment of the information provided on the same topic area from multiple sources, including KP interviews. Where differences were found and could not be reconciled, these differences are noted in the report.
- General limitations of secondary data were considered in the application and interpretation of the information, and key limitations are noted in the report.

5.0 CONTEXT

This section provides high level context to the consideration of baseline conditions in the RSA and LSA. It describes the regional and local setting with reference to geographic location, settlement history and hierarchy, connectivity, governance, and planning. This section highlights key policies and governance arrangements that have shaped the development of the RSA and LSA communities and the provision of services and facilities and influenced land and resource use and resident participation in the traditional and wage economies.

5.1 Regional Study Area Context

5.1.1 Regional Setting

The RSA covers approximately half of Saskatchewan's land area yet is sparsely populated. An estimated 3.4% (36,850 people) of the province's population resides in more than 40 communities in the RSA (Planning for Growth n.d.a). Most of the area within the RSA is Crown Land (Planning for Growth n.d.a). In present day, over 80% of the approximately 40,000 inhabitants of northern Saskatchewan are Indigenous (Statistics Canada 2017e).

5.1.1.1 Regional Communities

The RSA consists of 25 incorporated municipalities and 94 First Nation reserves. The 25 incorporated municipalities consist of two towns, 11 northern villages, 11 northern hamlets, and the district[9] (Figure 4). In 2016, the majority of the RSA population lived in the northern First Nation reserves or the incorporated municipalities (96.5%) (Government of Saskatchewan 2021a; Statistics Canada 2016). The largest population centres in the RSA are the town of La Ronge (i.e., population of 2,688) in the southern part of the RSA and the Northern Village of La Loche (i.e., population of 2,365) in the northeastern part of the RSA (Figure 4). Of the 11 northern villages in the RSA, the largest population centres are La Ronge (i.e., population of 2.688), La Loche, (i.e., population of 2,444) and Île-à-la Crosse (i.e., population of 1,296). The northern hamlets, northern settlements and subdivisions of the RSA have smaller populations than the northern villages.

5.1.1.2 Regional Connectivity

The majority of RSA communities are dispersed on separate trunk roads originating from Prince Albert, Saskatoon, and Battleford. However, a number of more remote northern communities[10] lack road access (University of Saskatchewan 2020) and rely heavily on ice roads in the winter months and barges or air freight in the summer months for personal transportation and for the transport of freight into communities. As such, transportation costs in these communities are much more expensive than for communities with year-round, direct road access.

5.1.1.3 History and Settlement Patterns

Prior to European contact, the northern boreal forest area of Saskatchewan was occupied by Dene peoples (University of Saskatchewan n.d.a) in the north, and by the Atsina, (also known as Gros Ventres), Nakota and Hidatsa and the Shoshone (also known as Snake) in the south. The advent of the fur trade in northern

[9] The district is a single municipality that covers the unorganized area of the NSAD and includes all areas outside of incorporated municipalities and designated park land. The unorganized communities of the district include 11 northern settlements, 14 resort subdivisions and nine cluster subdivisions.
[10] E.g., Hatchet Lake First Nation and Wollaston Lake, Fond du Lac First Nation, Black Lake First Nation (Saskatoon StarPhoenix 2016).

Saskatchewan in the late 1700s brought about substantial change in territorial distributions of First Nation groups who then entered into competition and conflict over fur resources. Based on information from the JWG meetings, the Dene lived in different areas around Patterson Lake. Stories indicate that they were once one tribe that split into three tribes, with one going south (Navajo), one staying central (Dene), and one going north (Dogrib, and Beaver; BRDN-JWG 2021b). The nêhiyawak (Cree) moved onto the prairies with the fur trade in 1740 and were the middlemen in the fur trade, trading with the English, French and other Indigenous groups (University of Saskatchewan n.d.b). The Cree now occupy a large area of Saskatchewan, from the northern woodlands areas to the southern plains and are now the most numerous Indigenous group in Saskatchewan.

In 1871, the Canadian government began negotiating treaties with Indigenous Peoples in northwest Canada to establish title to the land and create reserves for Indigenous settlement (Canadian Encyclopedia 2021a). Indigenous leaders signed treaties to maintain as much of their traditional way of life as possible while also adapting to the challenges of European settler encroachment. Mining spurred the treaty signing process in the north, including the signing of Treaty 8 (University of Saskatchewan n.d.c). Treaty 8 was signed in 1899 and was negotiated with the Cree, Denesųłıné, Beaver, and other inhabitants of the territory (Canadian Encyclopedia 2021a).

Treaty 10 was signed in 1906/1907 after the Dene and Cree in northern Saskatchewan requested a treaty in the late 1800s as they became concerned with the influx of non-Indigenous people and wanted protection for their way of life (Dodson et al. 2006). Treaty 10 was based on the other numbered treaties, including the right of signatories to continue their traditional ways of life of hunting, trapping, and fishing throughout their ceded territory (Canadian Encyclopedia 2021b). The RSA includes a portion of both Treaty 8 and Treaty 10.

The northern part of Saskatchewan is also the traditional homeland of the MN-S (Figure 2). The Métis people are people of mixed European and Indigenous ancestry, who emerged as a distinct people with a unique identity (TSD IV: MN-S). Métis settlement in Saskatchewan predated the development of an agrarian society by over 100 years (University of Saskatchewan n.d.d). After 1821 and the consolidation of the Canadian fur trade, and until the age of the railway, Métis traders travelled to what is now Saskatchewan in large caravans of Red River carts. The spatial distribution of Saskatchewan's Métis peoples is diverse, with Métis living throughout Saskatchewan and particularly in the four urban centres of Regina, Saskatoon, Prince Albert, and North Battleford (University of Saskatchewan n.d.d). Métis also reside in the following northwest towns and villages: Beauval, Buffalo Narrows, Cole Bay, Green Lake, Ile-à-la-Crosse, Jan's Bay, and Turnor Lake. In the northeast, Métis are found within Cumberland House and La Ronge (University of Saskatchewan n.d.d).

5.1.1.4 Key Government Policies

In the early 20th century, Indigenous Peoples continued to practice land-based activities throughout their traditional territories. In northern Saskatchewan, Dene, Cree, and Métis subsistence depended on their ability to access the boreal forest and its resources such as plants, caribou, moose, deer, beaver, snowshoe hare, waterfowl, grouse, and fish (Mackenzie 2004). However, the implementation of numerous federal and provincial government policies over the next several decades would have large implications on how Indigenous Peoples in northern Saskatchewan would be able to access and use the land and resources. While policies were established to meet the Government of Canada's and Government of Saskatchewan's conservation and economic development goals, they slowly eroded the hunting, fishing, and trapping rights of the northern Cree, Dene, and Métis people (Dodson et al. 2006).

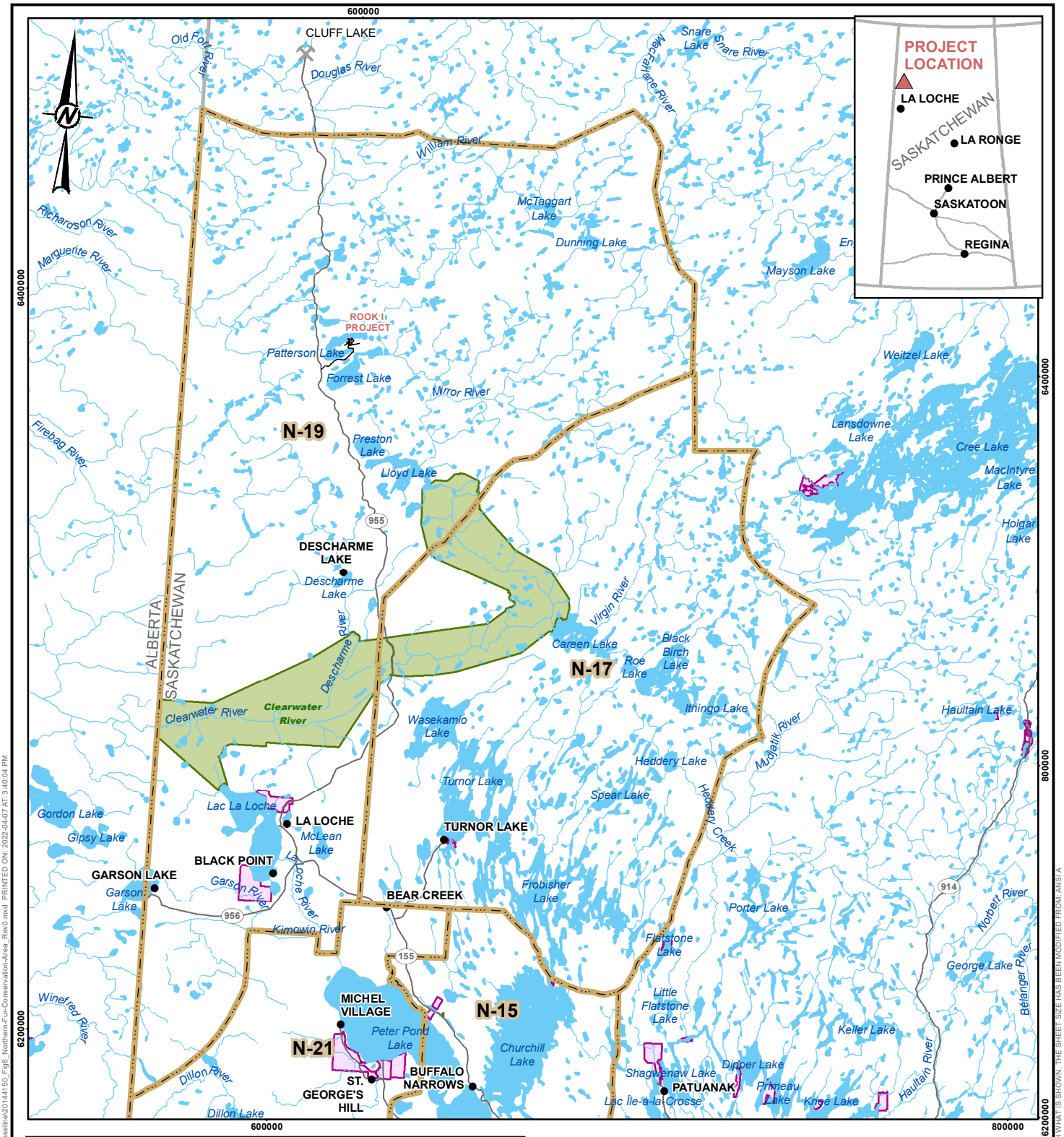
5.1.1.4.1 The Northern Fur Conservation Area and Fur Conservation Block System

By the 20th century, trapping had become an important part of Indigenous livelihoods, and the fur trade provided tools such as steel traps and better access to European goods (Mackenzie 2004). Trapping was practised over large territories based on the annual cycle of resource availability. Trapping areas were rotated to prevent resource depletion, which was self-regulated by local families and bands, and family trapping areas were passed down through the generations (Gulig 1995).

The economic depression during the 1930s resulted in the migration of non-Indigenous trappers to northern Saskatchewan who competed with the Métis and First Nations people for fur (Raymond 2013). In response to declining fur resources, the Government of Saskatchewan introduced a “lease system” during the 1930s that allowed individuals to trap on a piece of land for a 10-year period; as a result, Indigenous trappers lost many of the more productive fur areas in northern Saskatchewan (Gulig 1995). Other trapping regulations imposed by the Government of Saskatchewan, including the banning of beaver trapping and the opening and closing of the trapping season, also affected the traditional trapping practices of Indigenous Peoples (Raymond 2013).

In 1944, the Government of Saskatchewan established a Fur Conservation Block system on all lands in northern Saskatchewan, with the intention that Indigenous communities could sustain themselves through hunting, trapping, and commercial fishing (ENV 2012; Tough and McGregor 2007). In 1946, the Northern Fur Conservation Area in northern Saskatchewan was divided into 88 trapping blocks, and further subdivided into zones or family-allocated traplines, which was managed by restricting the number of trappers and fur harvest in each area (ENV 2012; Figure 6).

This legislation and the introduction of the Fur Conservation Block system had a large effect on northern Indigenous Peoples, including the creation of trapping boundaries that prevented members from using important areas for trapping and other subsistence harvesting activities (TSD II: BNDN; TSD III: BRDN). The Government of Saskatchewan’s views of the modern economy and conservation policies, which was based on a highly regulated trapping system, conflicted with how trapping was traditionally managed by Indigenous Peoples that rotated trapping areas based on resource availability and the cultural practice of familial reciprocity (Gulig 1995; Raymond 2013).



LEGEND

- POPULATED PLACE
- URANIUM MINING FACILITY (DECOMMISSIONED)
- SECONDARY HIGHWAY
- WATERCOURSE
- INDIAN RESERVE
- PROVINCIAL PARKS
- WATERBODY
- PROPOSED PROJECT FOOTPRINT
- FUR BLOCKS

0 40 80
1:1,480,000 KILOMETRES

REFERENCE(S)

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2. PARKS OBTAINED FROM IHS MARKIT CANADA ULC.
3. WILDLIFE MANAGEMENT, GAME BIRD DISTRICTS & GAME BIRD MANAGEMENT UNITS (GBMU), SASKATCHEWAN MINISTRY OF ENVIRONMENT, FISH AND WILDLIFE.

PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT: NexGen Energy Ltd. — ROOK I PROJECT

TITLE: NORTHERN FUR CONSERVATION AREA

CONSULTANT: WSP

PROJECT	20144150		PHASE	3111 - 6
DESIGN	DW	2022-04-07	SCALE AS SHOWN	REV. 0
GIS	NO	2022-04-07		
CHECK	DW	2022-04-07		
REVIEW	KG	2022-04-07		

FIGURE 6

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

PATH: I:\CLIENTS\NexGen\20144150\Mapping\Products\Trad_Land_Use\Socio-Economic\Baseline\20144150_Fig6_Northern_Fur_Conservation_Area_Rev0.mxd PRINTED ON: 2022-04-07 AT: 3:40:04 PM

5.1.1.4.2 The Natural Resource Transfer Agreements

The control of fur-bearing and game animals was transferred to the Government of Saskatchewan from the Government of Canada in 1905. Over the next several decades, the Government of Saskatchewan began to limit Indigenous Peoples access to game as it aimed to capitalize on the fur market and conserve game stocks (i.e., populations) for sports hunting (Gulig 1997; Gulig 2003 *in* Dodson et al. 2006).

The Natural Resource Transfer Agreements of 1930 were passed to formally transfer control and management of natural resources from the Government of Canada to provincial governments in Manitoba, Alberta, and Saskatchewan (Raymond 2013). The Saskatchewan agreement was enacted by the *Saskatchewan Natural Resources Act.* While the Natural Resource Transfer Agreements and treaty agreements protected First Nations' subsistence rights, the Métis were not similarly protected and the agreements facilitated the introduction of new conservation policies that allowed the Province of Saskatchewan to enforce regulations regarding natural resources that would eventually affect the northern subsistence economy (Raymond 2013). The legislation enabled the Government of Saskatchewan to allow the Dene and Cree to hunt, trap, and fish for subsistence purposes only in areas where they had "a right of access" to protect the value of natural resources for commercial and other interests (Gulig 1997; Dodson et al. 2006). The Métis were excluded under this legislation (Raymond 2013).

5.1.1.4.3 Commercial Fisheries Regulations

Interest in the commercial fishery by 1905 had became increasingly focused on northern lakes, where regulation emphasized enhancing commercial access rather than maintaining a sustainable yield, which was incompatible with Indigenous subsistence patterns (Gulig 1997). Hoping to create a commercial fishery during the 1920s and 1930s, the Government of Canada attempted to limit Indigenous fishing in northern Saskatchewan by placing regulations on which lakes Indigenous Peoples were allowed to fish (Gulig 2003 *in* Dodson et al. 2006). Other laws were passed to limit Indigenous access to fish, including restrictions on net and mesh sizes, and fishing for subsistence purposes regardless of what had been established through the treaties (Gulig 1997; Dodson et al. 2006). By the 1930s, commercial and sports fishing had reduced the fish stocks in many northern lakes, including Peter Pond Lake and Churchill Lake, to the detriment of the local Indigenous Peoples (Gulig 2003 in Dodson et al. 2006). Saskatchewan's fishery was regulated and managed by federal interests until the *Saskatchewan Natural Resources Act* was established in 1930.

Between the late 1960s and the mid-1970s, commercial fishers in northern Saskatchewan landed about 11 million pounds (approximately 5 million kg) of fish annually, valued at nearly $2 million, from roughly 170 lakes (Environment Canada 1975). Up to the early 1990s, commercial fishing was an important industry for communities in the RSA. There is anecdotal evidence to suggest that fish harvesters made sufficient income to live off; catches contributed to subsistence diets, and dried fish was sold in southern communities for extra cash income. Commercial fishing is conducted primarily through fishing co-operatives which are established within communities, including local towns and hamlets and Indigenous communities, and their residents can obtain membership. It was reported by the Saskatchewan Commercial Fisherman's Co-operative Federation Ltd that over 700 fish harvesters belonged to local fishing co-operatives (The Encyclopedia of Saskatchewan 2006a).

The ENV is responsible for issuing fishing licences and setting lake quotas, fishing seasons, and allowable fishing gear. Market conditions also influence the commercial fishery (e.g., type and number of fish targeted due to market prices) and, more recently, the COVID-19 pandemic has also affected the fisheries because the Freshwater Fish Marketing Corporation (FFMC) was no longer in a position to purchase product due to over supply and a decrease in orders from restaurants and other purchasers (Gillis 2020). Established in 1969, the

FFMC acted as a single-desk marketer of Canada's inland fish catch under the *Freshwater Fish Marketing Act*. The FFMC's mandate was to purchase all legally caught fish, create an orderly fish market, and increase returns to fish harvesters (Government of Canada 2021a). In 2012, the Government of Saskatchewan no longer subscribed to the *Freshwater Fish Marketing Act*. Commercial fisheries were no longer required to sell to the FFMC and, likewise, the FFMC was no longer obligated to purchase from them as there was now a free market approach (Government of Canada 2021a). Given choice, some fish harvesters continue to sell to the FFMC and others market their catch to small processors and for local consumption.

5.1.1.4.4 The Primrose Lake Air Weapons Range

The Primrose Lake Air Weapons Range (PLAWR), also known as the Cold Lake Air Weapons Range, was established in 1951 on traditional Aboriginal and Treaty lands and has primarily been used for military air weapons testing and operations training (Figure 7). The PLAWR lies approximately 60 km south of the BRDN's IR 193 (Figure 8), straddling the Saskatchewan-Alberta border, and covers an area of 11,754 km^2 (Lackenbauer 2006). In 1953, the federal government signed agreements with the governments of Saskatchewan and Alberta to perpetually lease the range; the agreements have been renewed continuously since 1954. Non-military use of the PLAWR has increased since 2006 and is expected to continue to grow in and around the range for the accommodation of the natural gas, commercial fishing, and logging sectors (Lackenbauer 2006).

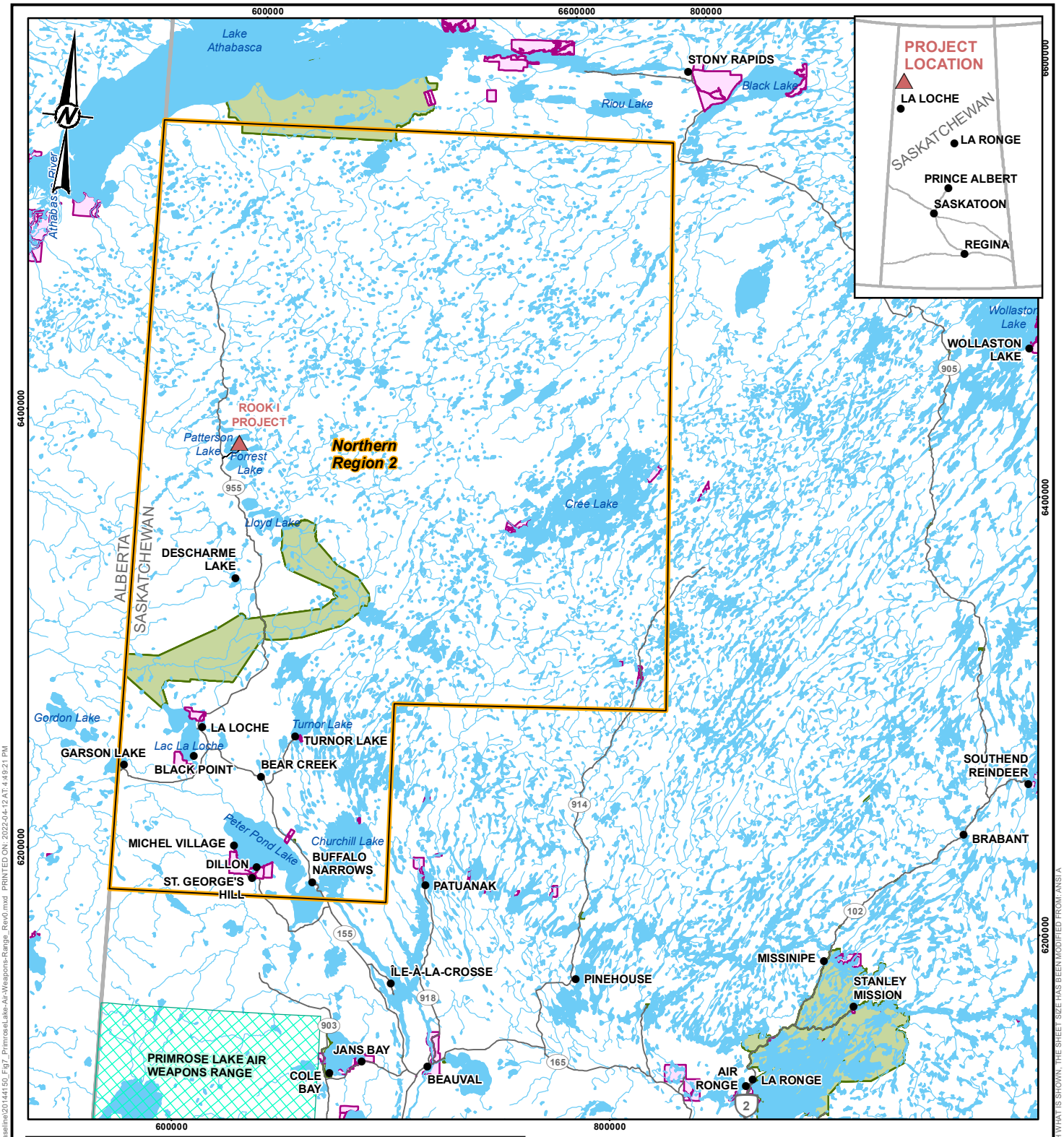
When the PLAWR was established, several First Nation and Métis communities lost access to lands that were part of their traditional hunting and trapping territories. Approximately $700,000 in compensation to the Métis in Northern Saskatchewan was paid out by the Government of Canada between 1954 and 1961 for the loss of ability to access and partake in traditional activities (CBC News 2007). In 2005, the Government of Canada and the Province of Saskatchewan announced a joint investment of $19.5 million to be spread out over a five-year period for the purpose of regional economic development initiatives. The funding was aimed at assisting with compensating communities affected by the establishment of the PLAWR (Government of Canada 2005).

The BNDN noted that they conducted a community vote regarding the distribution of funds from the Cold Lake Air Weapons Range Settlement. The vote demonstrated overwhelmingly support for a division of the funds from the Cold Lake Air Weapons Range Settlement, with a proportion going to current members, and a portion allocated to a BNDN fund designed to enhance their communities. This was based on a recognition that the Cold Lake Air Weapons Range had affected a previous generation, and the settlement should not only benefit the current generation, but future generations as well (BNDN-JWG 2021a).

5.1.1.4.5 Wildfire Management Policies

Wildfires are unplanned fires that burn organic soil, grasses, shrubs, trees, and associated vegetative fuels (Provincial Auditor of Saskatchewan 2017). Wildfires can play a natural and beneficial role on the boreal landscape. When they do occur, wildfires can affect land use patterns for hunting, fishing, and trapping, and burn cabins. The ENV is responsible for detecting wildfires in Saskatchewan (Provincial Auditor of Saskatchewan 2017). In the event of a wildfire, the ENV assesses how to best manage the situation using a hierarchy of priority for "values-at-risk" including (Dallyn 2012):

- human life;
- communities and major public industry and infrastructure;
- commercial forest; and
- other values.



LEGEND

- POPULATED PLACE
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- INDIAN RESERVE
- PROVINCIAL PARK
- WATERBODY
- PROJECT LOCATION
- MÉTIS NATION-SASKATCHEWAN NORTHERN REGION 2
- PRIMROSE LAKE AIR WEAPONS RANGE

0 60 120
1:2,500,000 KILOMETRES

REFERENCE(S)

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2. PARKS OBTAINED FROM IHS MARKIT CANADA ULC.
3. ABORIGINAL AFFAIRS AND NORTHERN DEVELOPMENT CANADA (AANDC) AND MEADOW LAKE TRIBAL COUNCIL, BIRCH NARROWS DENE NATION.
4. COLD LAKE AIR WEAPONS RANGE OBTAINED FROM SASKATCHEWAN MINISTRY OF ENVIRONMENT

PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT: NexGen Energy Ltd. — ROOK I PROJECT

TITLE: PRIMROSE LAKE AIR WEAPONS RANGE

CONSULTANT: WSP

PROJECT		20144150	PHASE	3111 - 6
DESIGN	DW	2022-04-12	SCALE AS SHOWN	REV. 0
GIS	NO	2022-04-12		
CHECK	DW	2022-04-12		
REVIEW	KG	2022-04-12		

FIGURE 7

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

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Given that there are valuable assets in areas where wildfire may occur, wildfire must be effectively managed to protect life and property. The decision to suppress (i.e., fight) a fire is made by assessing each wildfire and making decisions about how to manage it (Tymstra et al. 2020).

When there are structural values-at-risk that require wildfire protection, several strategies are used. For larger facilities, such as mine sites and similar facilities, facility workers are trained to respond to immediate wildfire threats, and equipment to fight wildfires is be kept on site. Effective March 2016, *The Wildfire Act* (s.20) requires industrial and commercial operators operating during the wildfire season to submit wildfire prevention and preparedness plans.

Based on wildfire prevention and preparedness plans submitted, the ENV stores information about values-at-risk in its Wildfire Management Database. Temporary values-at-risk include forestry, tree planting, and mining exploration work camps. Permanent values-at-risk include the name and location of communities, major public and industrial infrastructure, commercial timber, structures, natural resources, commercial industrial operations, cottages, and cabins (Provincial Auditor of Saskatchewan 2017).

The Saskatchewan Public Safety Agency incorporated the ENV's Wildfire Management Branch and the Ministry of Government Relations' Emergency Management and Fire Safety in January 2019. The Saskatchewan Public Safety Agency has fire bases located in La Loche and Buffalo Narrows, with a Response Centre in Buffalo Narrows that oversees the Buffalo Narrows Protection Area where the proposed Project is located. Emergency Services Officers and Protection Officers are responsible for communicating risk information concerning communities and commercial operators (SPSA n.d.). Wildfire response depends on the values-at-risk and whether an area might benefit ecologically from a fire. In these areas, consideration is given to fighting fires based on a careful assessment of the values present (Dallyn 2012; Rusek and Marshall 2000).

Indigenous Groups have observed that forest fires in northern Saskatchewan have increased in magnitude and frequency over the last decade and are concerned about future effects from wildfires to their traditional lands and cabins (TSD V: CRDN; TSD III: BRDN; TSD IV: MN-S). Indigenous communities in Saskatchewan and in other provinces are calling on their provincial governments to collaborate with them in finding solutions to mitigate, prevent, and fight wildfires, so they can apply their Indigenous Knowledge, traditional laws, and practices of fire management, including the use of controlled burns to manage forests and prevent wildfires (Pearce 2021; ICT 2019; GVS n.d.).

5.1.1.4.6 Agricultural Benefits Agreement (Cows and Plows)

Treaty 8 was signed between the Crown and First Nations in the Athabasca Lake region in 1899. The treaty included an Agricultural Benefits Agreement, better known as 'cows and plows', that promised farming equipment to First Nations that wanted to farm the land. These terms were unfulfilled. Over the last several decades, the Government of Canada has been negotiating settlements with Treaty 8 First Nations to resolve their agricultural benefits claims, which include financial compensation for past damages relating to broken treaty promises. In 2018, the Government of Canada and eighteen First Nations in Treaty 8 (of which none were LSA communities), successfully concluded negotiated settlements to resolve their agricultural benefits claims, and negotiations have been ongoing with several other First Nations (ANA 2018).

5.1.1.4.7 Residential Schools

Residential schools were government-sponsored, church-run schools that were established to assimilate Indigenous children into Euro-Canadian culture. Through the residential school system, the Government of Canada removed Indigenous children from their homes and communities, as an attempt to both educate and convert Indigenous youth and to assimilate them into Canadian society (Canadian Geographic n.d.; Marshall and Gallant 2012). However, the schools disrupted the lives of individuals and communities, causing long term problems among Indigenous Peoples (Marshall and Gallant 2012).

The federally funded, church-run schools operated in Canada for more than 160 years (Canadian Geographic n.d.). In total, there were an estimated 130 residential schools in operation throughout Canada from 1831 to 1996 (Marshall and Gallant 2012). In Saskatchewan, there were 20 residential schools operated by the churches. The most northern of these schools were Lac La Ronge (1907 to 1947), Ile-a-la-cross (1821 to 1976), and Beauval (Lac La Plonge; 1860 to 1995; Niessen 2017).

In the 1950s and 1960s, the Government of Canada began to pursue a policy of integration in southern Canada to facilitate the attendance of First Nation children in the provincial school system, which many Métis students were already attending (Parks Canada 2021). In northern Saskatchewan, federal Indian day schools were located at Peter Pond Lake IR No. 193, Dillon (1955 to 1989), Wapachewunak IR No. 192D, the north end of Ile-a-la-cross, Patuanuk (1972 to 1989), Fond du Lac (1949 to 1968), Chicken IR No. 224, Black Lake (1955 to 1968), and Stony Rapids (1952 to 1961) (IndianDaySchools.Org. n.d.).

The process of integrating students into provincial school systems and closing residential schools took decades, with the last schools in Saskatchewan closing in the late 1990s. Many former students have sought acknowledgement and restitution, resulting in the Indian Residential Schools Settlement Agreement in 2007, followed by a formal public apology by Prime Minister Stephen Harper in 2008 (Government of Canada 2021b). In total, an estimated 150,000 First Nation, Inuit, and Métis children attended residential schools across Canada (Marshall and Gallant 2012). The ramifications of the negative experiences of many residential school survivors, including the intergenerational effects on individuals, families, and communities, is important context for understanding many of the underlying challenges faced by Indigenous communities today, including those in the LSA and RSA

5.1.1.4.8 Northern Development Fund

The Northern Development Fund (NDF), established in 1995, provided financial and business incentives to northern businesses, co-operatives, economic organizations, and entrepreneurs, and supports the Government of Saskatchewan's Northern Strategy goal of creating more jobs and business opportunities for residents in northern Saskatchewan (Government of Saskatchewan 1995). The NDF provides loans to assist northern businesses in several sectors, including construction, mining, forestry, transportation, hospitality, tourism, retail, and other services. The loans help to create new jobs and maintain existing jobs, and have assisted trappers, commercial fishermen, and wild rice growers. The NDF also provides cost-shared funding and professional assistance and training to Community-based Regional Economic Development Organizations, which plan and implement economic development at the regional level (Government of Saskatchewan 1998). Section 6.2.4.1.2, Northern Development Fund, describes additional details pertaining to funds allocated for the purposes of community and business development.

5.1.1.4.9 Planning for Growth North

Northern Saskatchewan's Planning for Growth North program is run by the Northern Planning and Sustainability Unit. The Northern Planning and Sustainability Unit provides professional planning services and support within the NSAD (Planning for Growth North SK. n.d.a). Participating municipalities within the region include La Ronge, Buffalo Narrows, La Loche, Descharme Lake, and Michel Village (Planning for Growth North SK. n.d.b).

Northern Saskatchewan's Planning for Growth North is funded through the Northern Municipal Trust Account, along with additional monetary contributions from participating municipalities (Planning for Growth North SK. n.d.b). The Northern Municipal Trust Account employs Community Planners to assist northern municipalities to create and implement Official Community Plans and Zoning Bylaws, train Development Officers to apply bylaws, and create and improve regional relationships to support long term regional planning activities (Planning for Growth North SK. n.d.b). Official Community Plans are created by incorporating Saskatchewan's 14 Statements of Provincial Interest and outline future aspects of physical development within an outlined geographic area. The Zoning Bylaw provides the regulations and restrictions necessary for the implementation of building and development within the municipal area (Planning for Growth North SK. n.d.b).

In 2004, a committee was formed to develop a land use plan that would guide permitted development in the RSA north of La Loche. Representatives from the CRDN, La Loche, the ENV, and the Ministry of Government Relations formed a committee to develop the land use plan; however, the land use plan was never completed (Happ 2021). A regional planning forum was facilitated by the provincial government in 2018 that was intended for capacity building and to build networks to support land use planning processes (Government of Saskatchewan 2019).

5.1.1.4.10 Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan

The Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan (Joint Panel) was appointed through the governments of Canada and Saskatchewan in August 1991. The purpose of the Joint Panel was to review the impact of proposed uranium mining developments in northern Saskatchewan, as well as review the cumulative impacts of existing operations (Joint Panel 1997). Careful consideration was given to the impact of uranium mining on the people who reside in northern Saskatchewan. Typically, project-specific recommendations were made to limit environmental damage and enhance benefits for northern residents (Joint Panel 1997). There were several general issues reported that impact the potential benefits from uranium mining projects. The Joint Panel approved all five northern Saskatchewan uranium mining projects in the 1990s and no further action or reporting from the panel has been undertaken since 1997 (Frost n.d.; MiningWatch Canada 2006; NWMO 2003).

Another issue identified was ensuring that the protection of northern communities and residents is considered as important as protecting the biological environment; professionals should be monitoring and mitigating any impacts of uranium mines and mining on the quality of life for northern communities. To ensure that all steps are being taken to enhance living in northern Saskatchewan, research on approaches to uranium mining were applied by industry and governments to improve the profitability of the industry and provide greater environmental protection (IAAC 1997). Adequate funding and comprehensive studies were organized by the provincial government to ensure northern roads were prepared for the demands of the industry and maintained at an acceptable standard. Finally, the Joint Panel noted it was essential that legislation and regulations for mine workers adequately protect contract and non-contract workers and ensure safe work practices (IAAC 1997).

5.1.1.5 Uranium Mining Industry

Uranium is the primary commodity in the RSA, and capital investment in the RSA is strongly tied to the activity levels in uranium mining (KCDC 2016). The RSA has the largest high-grade uranium deposits in the world and is the source of almost a quarter of the world's uranium supply for electrical generation (Government of Saskatchewan n.d.a). The uranium industry has been active in the RSA for more than 70 years, and the evolution of industry practices provide important context for understanding the existing economic environment in both the LSA and RSA. Uranium mining and milling in the RSA began in the 1950s with the Gunnar, Lorado, and Beaverlodge mines/mills located near Lake Athabasca and serviced through Uranium City, the majority of which delivered ore to the Beaverlodge mill for processing. Several smaller mine sites also operated in the vicinity of Uranium City. The Gunnar and Lorado mines/mills ceased operations in the 1960s while the Beaverlodge mine continued operating until the 1980s (Clement and Stenson 2002). Since the 1970s, several uranium mining operations have been developed in the RSA, including Cluff Lake, Cigar Lake, Key Lake, McClean Lake, McArthur River, and Rabbit Lake (Figure 1). Apart from Cluff Lake, these uranium projects have been developed in the Athabasca Basin, located in the central and northern portions of the RSA (Figure 1; Table 1).

Cluff Lake was operated by Orano Canada (previously called AREVA Resources Canada and COGEMA Resources Inc.) from 1980 until 2002. The Cluff Lake site is located approximately 235 km north of the town of La Loche on Highway 955 (Figure 1). Decommissioning of the site began in 2004 with most of decommissioning work completed by the end of 2006. The site has been available for public access since 2013. Since decommissioning, the mine has been subject to a comprehensive environmental monitoring program (Orano 2020).

The McClean Lake and Mill project is located approximately 26 km west of the Rabbit Lake mine and is currently in operation (Denison Mines 2022). The mill processes ore from Cigar Lake mine. Rabbit Lake transitioned to care and maintenance in 2016 , and McArthur River mine and Key Lake mill transitioned to care and maintenance in 2018 (Cameco 2021b,c). Cigar Lake mine is still in operation as of December 2021 (Cameco 2021a).

Despite uranium development commencing in the 1950s, it is only since the discovery of new uranium deposits in the RSA in the 1990s that the primary economic focus has been building human resource and business capacity to meet the needs of the mining sector. Since the 1990s, northern Saskatchewan workers have been increasingly successful in securing positions at northern sites and northern-owned businesses provide a measurably larger portion of goods and services to the operations. For example, in terms of north business development, the uranium mining industry contributed substantially to the business capacity of northern Saskatchewan (e.g., growth in contracts from northern suppliers from $23 million in 1989 to $624 million in 2012). However, this success has been to the detriment of development efforts and supports for other sectors such as wild rice and forestry (KCDC 2016). The total value of northern contracts has declined somewhat since 2012, likely resulting from a decline in total uranium production from the various operations, and several transitioning to care and maintenance (Table 1).

Table 1: Uranium Operations in the Regional Study Area

Project	Current Status	Date First in Operation	Total Amount Mined
Cigar Lake (mine only)	In operation	2014	93 million pounds
McClean Lake (mine and mill)	In operation	1999 for mill 1996 for mine	n/a
Rabbit Lake (mine and Mill)	Care and maintenance since 2016	1975	Approximately 203 million pounds
McArthur River (mine only)	Care and maintenance since 2018	1999	535 million pounds
Key Lake (mill only now)	Care and maintenance since 2018	1983	

Source: Cameco 2021a,b,c.
n/a = not available.

5.1.2 Local Study Area Context

5.1.2.1 Local Communities and Connectivity

The LSA is characterized by a dispersed settlement pattern of primarily small and highly remote Indigenous communities (i.e., less than 1,000 people; Table 2; Figure 5). The Northern Villages of Buffalo Narrows (estimated population 1,045 people) and La Loche (estimated population 2,365) are the largest population centres in the LSA. Buffalo Narrows is located on Highway 155, approximately 200 km north of Green Lake and 100 km south of La Loche. La Loche is located at the northern terminus of Highway 155 and the southern terminus of Highway 955, 300 km north of Green Lake (Figure 4).

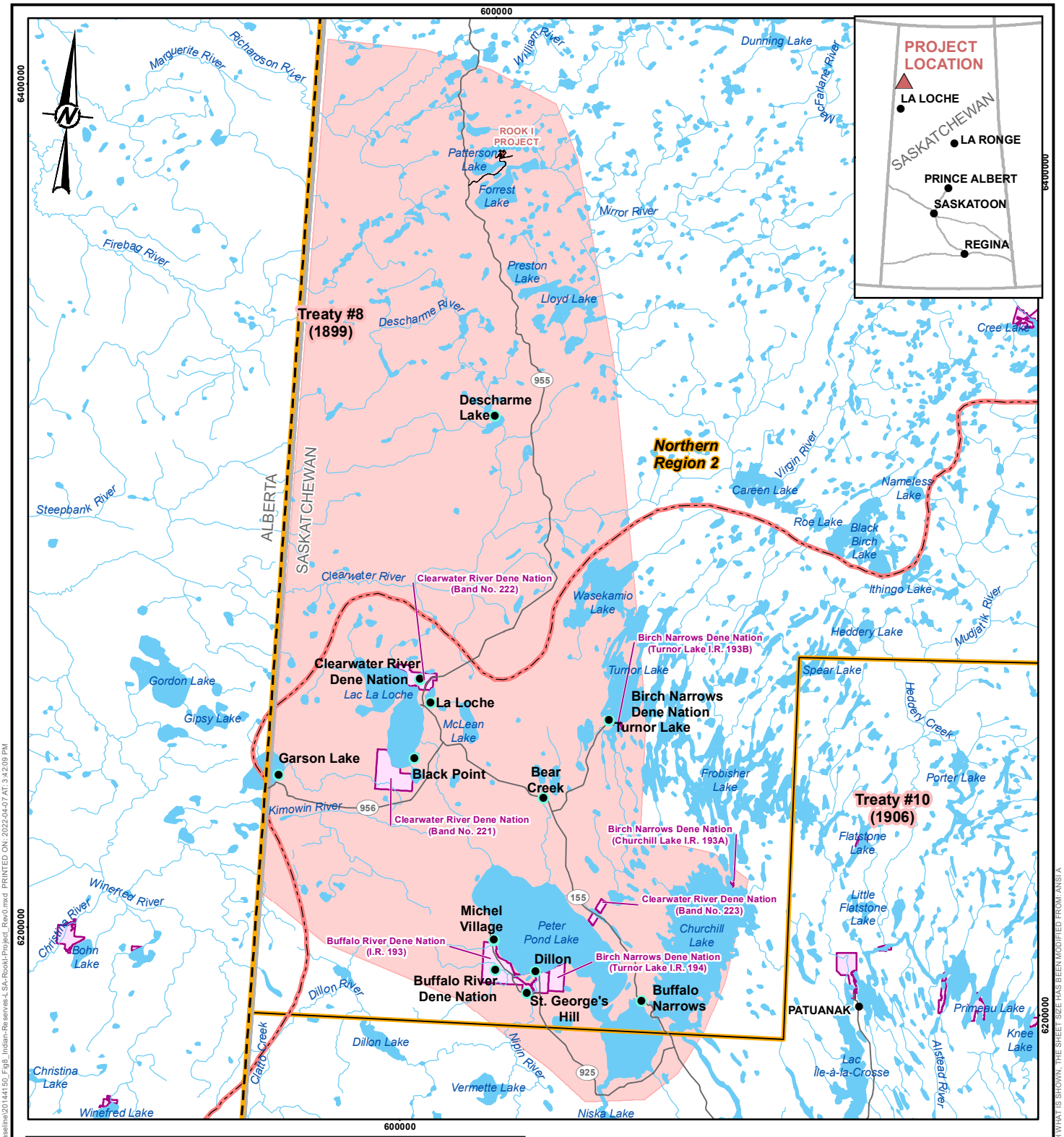
The LSA is remote with limited regional connectivity. Highway 155 is the only surface transport route that connects the LSA communities to the regional centres in southern Saskatchewan, and is the primary means of transport for LSA residents. Highway 955 has been identified by numerous sources as in need of major repair in multiple locations. Highway 955 was built for the Cluff Lake mine and provides access to the northwestern area of the province. It is the only access to the potential uranium developments recently identified in the northwest. Regional commercial airport facilities are located in both Buffalo Narrows and La Loche, with North Country Air operating charter flights out of La Loche and Voyage Air operating charter flights out of Buffalo Narrows.

5.1.2.2 History and Settlement Patterns

5.1.2.2.1 Clearwater River Dene Nation

Clearwater River Dene Nation occupies three reserves (221, 222, 223) and the La Loche Indian Settlement, and controls 9,511 ha of land (INAC 2019a; Figure 8). The most populous reserve is the La Loche Landing reserve (located between La Loche and Buffalo Narrows [Figure 5]), but most of the band members reside in the town of La Loche (University of Saskatchewan n.d.e).

Clearwater River Dene Nation have occupied and used the Clearwater River watershed and Patterson Lake area since beyond living memory (TSD V.1: CRDN). Clearwater River Dene Nation ancestors gathered in Fort McMurray in 1899 for the signing of Treaty 8. The ancestors of the CRDN signed adhesions to Treaty 8 at Fort McMurray in 1899 and 1900. They were included in the Cree-Chipewyan Band of Fort McMurray and the Fort McMurray Stragglers (TSD V.1: CRDN). These ancestors were known as the Portage La Loche Band until they changed their name to the CRDN. The reserve parcels of the CRDN were established in 1970, with many members deciding to remain in La Loche (CRDN 2019).



LEGEND

- POPULATED PLACE
- SECONDARY HIGHWAY
- WATERCOURSE
- INDIAN RESERVE
- WATERBODY
- PROJECT LOCATION
- SOCIO-ECONOMIC LOCAL STUDY AREA COMMUNITIES
- SOCIO-ECONOMIC REGIONAL STUDY AREA
- FIRST NATION TREATY BOUNDARIES
- LOCAL PRIORITY AREA
- MÉTIS NATION-SASKATCHEWAN NORTHERN REGION 2

0 35 70
1:1,300,000 KILOMETRES

REFERENCE(S)

1. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. PARKS OBTAINED FROM IHS MARKIT CANADA ULC.
PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT: NexGen Energy Ltd. — ROOK I PROJECT

TITLE: FIRST NATION RESERVES

CON: wsp

PROJECT		20144150	PHASE	3111 - 6
DESIGN	DW	2022-04-07	SCALE AS SHOWN	REV. 0
GIS	NO	2022-04-07		
CHECK	DW	2022-04-07		
REVIEW	KG	2022-04-07		

FIGURE 8

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

PATH: I:\CLIENTS\NexGen\20144150\Mapping\Products\Trad_Land_Use\SocioEconomic\Baseline\20144150_Fig8_Indian_Reserves_LSA_Rook1_Project_Rev0.mxd PRINTED ON: 2022-04-07 AT 3:42:09 PM

5.1.2.2.2 La Loche

The Northern Village of La Loche was incorporated in 1983, but its history extends back to the fur trade in the late 1770s. At that time, the existing location of La Loche had a post from the North West Company and Hudson's Bay Company and furs and goods were exchanged with the Athabasca and Mackenzie River brigades. Today, La Loche is still largely Métis and Dene, and trapping remains as a local industry (Canadian Encyclopedia 2021b). La Loche is the closest major community on the only access corridor to the recently discovered uranium reserves in the western RSA (DMCA 2018; Figure 5), and has a regional commercial airport facility with North Country Air operating charter flights (North County Air Service n.d.).

5.1.2.2.3 Birch Narrows Dene Nation

Before settling at Buffalo River, the BNDN was thought to have lived at Buffalo Narrows for a period of time in the 1890s (University of Saskatchewan n.d.f). The predecessor to BNDN was the Clear Lake Band (also known as the Peter Pond Band), which formally joined Treaty 10 on 28 August 1906 (The Encyclopedia of Saskatchewan 2006b).

In the 1910s and 1920s, the Clear Lake Band began to petition the Government of Canada for reserves to be surveyed for them within the Treaty 10 area. The surveying of the reserves lands was completed in 1923, with the southern shore of Peter Pond Lake (193), a parcel of land at Churchill Lake (193A), and Turnor Lake (193B) becoming the reserve lands. The Clear Lake Band had also requested Ball Island, which was not included in the survey (Dodson et al. 2006). In 1965, members of the Clear Lake Band were relocated to the Turnor Lake area from Clear Lake (at the northern end of Churchill Lake) while others relocated to Buffalo River and English River (History of La Loche 2012; BNDN 2018). In 1972, the Clear Lake Band would become the BNDN and BRDN (The Encyclopedia of Saskatchewan 2006b). Members moved to the current settlement from Churchill Lake largely due to the presence of Churchill Road access (Figure 5). The BNDN's current reserve parcels are Churchill Lake 193A, Turnor Lake 193B, and Turnor Lake 194 (INAC 2019b; Figure 8).

5.1.2.2.4 Buffalo River Dene Nation

Buffalo River Dene Nation has a reserve approximately 84 km northwest of Ile-à-la-Crosse (Figure 4, Figure 8) and the largest community is in Dillon (University of Saskatchewan n.d.f). The BRDN hunted and trapped around Watapi Lake and became one of the many First Nation bands filing claims for land and economic development losses arising through the creation of the PLAWR in 1954 (University of Saskatchewan n.d.f). In addition to the value of the loss of land for food harvesting, the prohibition of the use of rangelands hindered their ability to travel to meet their relatives at Cold Lake.

Buffalo River Dene Nation joined Treaty 10 on behalf of the Clear Lake Band. The BRDN was part of the Clear Lake Band (also called the Peter Pond Band) until 1972, when it was divided into the BNDN and BRDN (Thompson 2021). The BRDN's current reserve parcel is BRDN 193 (INAC 2019c; Figure 8).

5.1.2.2.5 Buffalo Narrows

Buffalo Narrows (Figure 5) is a village situated on an ancient hunting site that provided a bottleneck into which Indigenous hunters could drive wood bison (University of Saskatchewan n.d.g). Indigenous Peoples came to the narrows to catch and dry fish during the summer months, and the first trading posts were established in the area in the 1790s. Permanent settlement began in 1895.

The economy was previously based on natural resources such as fishing, trapping, logging operations, and mink ranging, which peaked in the 1950s and 1970s. Due to its relation to other communities in the LSA, the infrastructure put into place in the village was intended to position the community to be a regional centre providing government and commercial services to the northwest of Saskatchewan. The village was incorporated as a northern village in 1983. Despite its smaller population, Buffalo Narrows has developed as a regional service centre for Saskatchewan, with services encompassing the LSA communities, and subsequently supporting a considerably stronger economy (measured through income, labour market dynamics, and economic vitality) than La Loche. Buffalo Narrows also supports a regional commercial airport facility, with Voyage Air operating charter flights out of Buffalo Narrows (Voyage Air 2002).

5.1.2.2.6 Other Local Study Area Communities

Bear Creek was established in the 1960s (Figure 5). The highway between Buffalo Narrows and La Loche was completed when families from La Loche began to permanently settle at the site (Figure 3). The construction of Highway 155 provided a convenient way for residents to travel for services in either centre, and divides Bear Creek into north and south areas (Bear Creek 2020). People settled in Bear Creek so they could continue to live off the land while still being close to services in La Loche.

Descharme Lake is a hamlet accessed by road via Highway 955 from La Loche (Figure 5). Until the 1950s, the hamlet of Descharme Lake was accessed via dog team, horses, and walking. The hamlet was originally called Swan Lake and was one of the mission villages of La Loche (Portage La Loche n.d.a).

Garson Lake (Figure 5), once called Whitefish Lake, is a Dene village with roots in the 1880s (Portage La Loche n.d.b).

Michel Village is on the western shores of Peter Pond Lake (Figure 5) and most residents are Dene (Kayas n.d.).

Historical information on St. George’s Hill and Black Point are not available.

5.2 Governance and Planning

5.2.1 Northern Saskatchewan Administration District

The NSAD was created in 1948 by The *Northern Administration Act*, which provided for the administration and development of northern Saskatchewan (Government of Saskatchewan n.d.a) and is currently defined in the province’s *Northern Municipalities Act, 2010*. The Ministry of Government Relations is responsible for the NSAD and, in consultation with elected mayors or chairperson and councillors (depending on total population), acts as its council with funding from the Northern Municipal Trust Account. The Northern Municipal Trust Account Management Board is appointed to make recommendations to the Minister. In the RSA, the political administration is from outside of the RSA in Regina, and for First Nation reserves, in Ottawa.

The Ministry's Northern Municipal Services branch, in consultation with elected mayors or chairpersons and councillors (depending on total population) acts as the NSAD's local government authority (Government of Saskatchewan 2021a). The Northern Municipal Services provides the following services to support the financial and municipal well-being of northern Saskatchewan communities (Planning for Growth n.d.b):

- municipal administration of NSAD communities;
- municipal advisory services for northern municipalities in the NSAD;

- financial administration of the NSAD communities;
- administration of the Northern Municipal Trust Account; and
- management of Northern Grant Programs and other Programs.

The NSAD boundaries are also used by the provincial government and SHA for the delivery of government services that are intended to manage aspects of the socio-economic conditions within communities. The NSAD is the focus of the Community Vitality Monitoring Partnership, the entity initiated based on a recommendation of the Joint Panel. As a result of that recommendation, Saskatchewan amended the uranium MSLAs to require uranium operations to participate in Community Vitality Monitoring (CVMPP 2013).

5.2.2 First Nations

On-Reserve First Nation governance is provided within the RSA by individual Chiefs and Councillors elected for two- or three-year terms. Further information on First Nations governance is provided in Section 5.2.4, Local Governance and Planning.

The MLTC is the tribal council for nine First Nations, including the CRDN, BNDN, and BRDN (MLTC 2020a). The nine MLTC Chiefs-In-Assembly provide strategic direction and leadership to their Tribal Council and meet four or more times per year. Through the MLTC Leadership Office of the Chiefs, the priorities of the MLTC and its member First Nations are lobbied and advocated with other levels of government, industry, and external stakeholders (MLTC 2020b). The MLTC has three elected positions who serve a four-year term; the Tribal Chief, and two Vice Chiefs (one Cree and one Dene). The organization advocates for the nine First Nations to reach their full potential by delivering programs and services relating to business (including economic development), family services (i.e., child and family services, youth development, Elder services, and education), and community (i.e., health and social development, justice, and information technology and tech services; MLTC 2020c).

5.2.3 Métis Nation – Saskatchewan

Métis make up a large proportion of the population in the LSA (Section 6.1.1.2, Local Study Area), with the greatest number living in Buffalo Narrows and La Loche. The MN-S is the government representing Métis citizens in the province, including their rights under Section 35 of the *Constitution Act*, 1982. The MN-S was incorporated in 2000 and operates through an elected representative system at local, regional, and provincial levels (University of Saskatchewan n.d.h). Métis Locals provide representation at the community level. The Métis Nation Legislative Assembly is the governing authority of MN-S, and consists of the presidents of Métis Locals and Provincial Métis Council. The Assembly has the authority to enact legislation, rules, and regulations (MN-S 2008).

The fundamental principles that guide the governance of the MN-S are based on the Constitution of the Métis Nation – Saskatchewan (MN-S 2008), *The Métis Act, The Métis Nation – Saskatchewan Citizenship Act, The Regional Boundaries Act, 1997, The Métis Nation of Saskatchewan Senate Act, 1999, The Métis Nation Legislative Assembly Act, 1999,* and *The Métis Wildlife and Conservation Act, 1994*.

At the provincial level, the MN-S governance structure includes the Provincial Métis Council, which is a four-member executive; Cabinet; and the Métis Nation Legislative Assembly, which is composed of the Local Presidents, the Provincial Métis Council, four representatives of the Métis Women of Saskatchewan, and four

representatives from the Provincial Métis Youth Council. The Métis Nation Legislative Assembly has the authority to enact legislation, rules, and regulations (MN-S 2008).

In 2019, the MN-S concluded the Métis Government Recognition and Self-Government Agreement with the Government of Canada that affirmed the right to self-government, recognized the MN-S's mandate, and established a process to formally recognize the MN-S government as an Indigenous government in Canadian law (CIRNAC 2019a). The agreement requires the MN-S to undertake constitutional reform consultations in 2020 to provide Métis citizens with an update on proposed amendments to the MN-S Constitution and new legislation to meet the Métis Government Recognition and Self-Government Agreement with Canada (MN-S 2021). The agreement also establishes processes for negotiation agreements regarding additional areas of jurisdiction beyond core areas of governance in the future (CIRNAC 2019a). In August 2021, the Government of Canada sent a letter to MN-S, reaffirming their commitment to meaningly advancing Métis self-determination and self-government in Saskatchewan (MN-S 2021).

Northern Region 2

The MN-S is divided into 12 regions. The LSA communities are in NR2 (Figure 2).

The MN-S NR2 represents the following Métis Locals within the LSA for the Project:

- Local 39, La Loche;
- Local 40, Turnor Lake;
- Local 62, Buffalo Narrows;
- Local 65, Michel Village;
- Local 70, St. George's Hill;
- Local 156, Bear Creek; and
- Local 162, Black Point.

Leadership for Locals is elected and defined by the constitution of each Local. Terms for leaders can be between one and three years (MN-S 2008).

At the time of writing of this report, the regional director of MN-S NR2 is Leonard Montgrand. Regional directors are elected officials that are responsible for the day-to-day socio-economic, cultural, and educational interests within their jurisdiction.

5.2.4 Local Governance and Planning

Community decisions in the LSA communities are made by elected officials (2019 to 2021 KP interview program). Table 2 presents the governing members of each LSA community as of 31 January 2022. Data on how Elder leadership roles and responsibilities are delineated are not publicly available.

Table 2: Governance in the Local Study Area Communities, January 2022

Community	Chief	Mayor/Chairman	Councillors/Aldermen	Term	Next Election
BNDN	Chief Jonathan Sylvester	n/a	Kim Sylvester, Jonathon Sylvester, Anna Sylvester, Dorothy Sylvester	Four years	February 2022
BRDN	Chief Elmer Campbell	n/a	Louis Chanalquay, Debbie Billette, Sylvia Bekkatla, LaPlante, Grayson Janvier	Three years	March 2022
Buffalo Narrows	n/a	Mayor Sandra Ericson	Gary Ericson, Tracy Tinker, Shaylee Gardiner, Darrell Robson, Janelle Pedersen, Martin Morin, Patricia Young	Four years	Fall 2024
CRDN	Chief Teddy Clarke	n/a	Peggy Piche, Sandy Herman, Brenda Janvier, Jim Lemaigre, Alvin Piche	Four years	July 2025
Bear Creek	n/a	Chairman Dean Herman	(Members) Sandra Woodward, Holly Janvier, Neil Herman, Jamie Lee Janvier	Four years	Fall 2024
Black Point	n/a	Mayor Fabian Park	Archie Toulejour, George Moise	Four years	Fall 2024
Descharme Lake	n/a	Chairman John Frank Sylvestre	Jonathan Janvier, Donny Piche	Four years	Fall 2024
Garson Lake	n/a	Chairman Dora Laprise	(Members) Casey James Laprise, Donald Laprise	Four years	Fall 2024
La Loche	n/a	Mayor Georgina Jolibois	(Alderman) Kevin Janvier, Leanne Gailey, Melinda Lemaigre, Ida Lemaigre, Justina Lemaigre, Georgina Park-Janvier	Four years	Fall 2024
MN-S NR2	n/a	Locals 39, 40, 62, 65, 70, 127, 130, 156, and 162	n/a	One to three years	n/a
St. George's Hill	n/a	Mayor Donna Janvier	(Alderman) Doris Janvier, Kimberley Cummings, Delphine Banks, Norman Bekkattla	Four years	Fall 2024

Source: MLTC 2020d,e,f; Government of Saskatchewan 2021b,c; INAC 2021a,b,c.
n/a = not applicable; BNDN = Birch Narrows Dene Nation; BRDN = Buffalo River Dene Nation; CRDN = Clearwater River Dene Nation; MN-S = Métis Nation – Saskatchewan; NR2 = Northern Region 2.

Jim Lemaigre, a member of the CRDN, is the Member of Legislative Assembly for Athabasca (provincial electoral district) and was elected in a by-election on February 15, 2022. The Member of Parliament for the Desnethé Missinippi Churchill River is Gary Vidal, the Critic for Indigenous Services for the Conservative Party of Canada.

6.0 EXISTING SOCIO-ECONOMIC CONDITIONS

The existing socio-economic environment is described in the following subsections. Existing conditions for each community asset are generally described according to the RSA and the LSA, and for comparative purposes, LSA communities are compared to the RSA and the Indigenous population of the province of Saskatchewan (where applicable).

6.1 Population and Demographics

The population of a community is one of the most important human assets and a foundation of overall community well-being and growth. Any project that involves a change in workforce has the potential to result in changes in population and the demographic characteristics of communities.

The following subsections provide a detailed description of the population and demographic profile of LSA communities and the RSA. This includes splitting out the population and demographic profile by Indigenous status, age, and sex to note differences by group. Supporting statistical information is presented in Appendix A.

6.1.1 Population By Indigenous Identity, Age, and Sex

6.1.1.1 Regional Study Area

6.1.1.1.1 Indigenous Identity

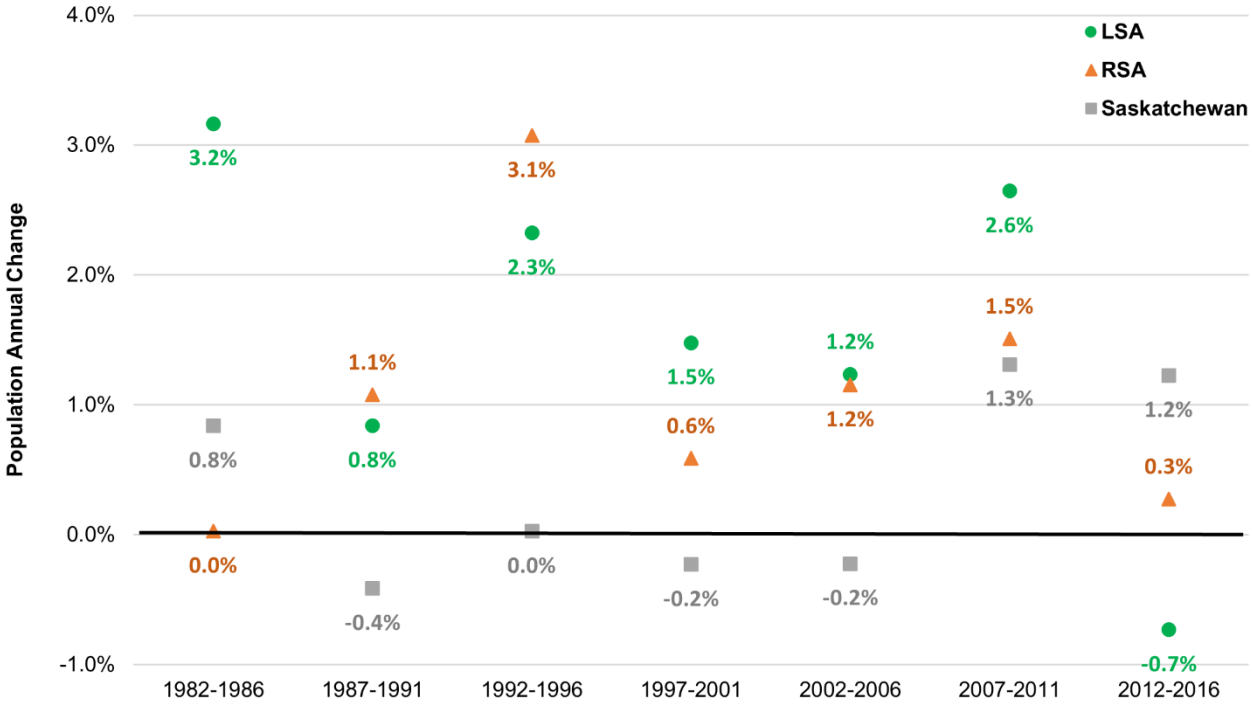
The RSA is predominantly Indigenous, with approximately 87.4% identifying as such (Table 4). Much of the Indigenous population within the RSA identify as having First Nations ancestry (i.e., 80.0%), with a minority identifying as Métis (i.e., 20.1%; Table 5). Between 2006 to 2016, the proportion of people identifying as having First Nations ancestry in the RSA has increased by 21.2% while the proportion claiming Métis ancestry has decreased by 13.7% (Table 4). A very small proportion of the RSA claim multiple Indigenous ancestries (i.e., 0.4%) and even fewer (i.e., less than 0.1%) claimed Inuit ancestry.

6.1.1.1.2 Population Change

The RSA population steadily increased between 2006 and 2016, driven largely by growth in the late 2000s. Between 2011 and 2016, the population increased by 1.4% compared to 7.8% growth in the five-year period prior (2006 to 2011; Table 5). Except for the period between 2006 and 2011, the provincial population growth rate has typically exceeded that of the RSA.

Figure 9 shows the average annual population change for the LSA, the RSA, and Saskatchewan from 1982 to 2016 (Appendix A, Table A-1a). Both the LSA and RSA experienced higher average annual population growth than the province from 1987 to 2011. The higher growth rates in the LSA and RSA may be attributed in part to a younger age structure and higher birth rates, though other factors including in-migration and out-migration can also affect population growth rates and these factors may affect individual communities differently. The LSA and RSA population growth is consistent with a nationally observed trend in higher population growth rates for Indigenous Peoples in Canada due to factors including a younger age structure and higher birth rates (Statistics Canada 2015a).

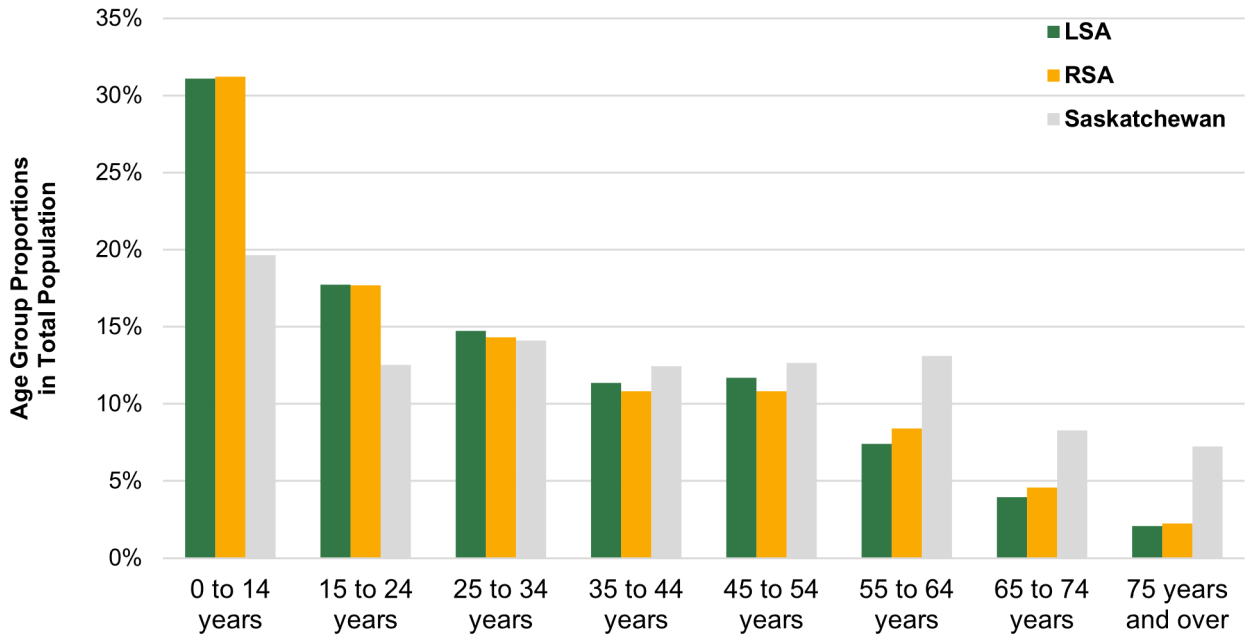
Figure 9: Average Annual Population Change for Local Study Area, Regional Study Area, and Saskatchewan, 1982 to 2016



Source: Statistics Canada 1987, 1992, 1997, 2002, 2007a, 2012a, 2017a.
Average annual percentage population changes calculated by InterGroup Consultants Ltd.
Note: Population numbers for 2011 and 2016 include four northern settlements (i.e., Bear Creek, Black Point, Descharme Lake, and Garson Lake) for which data were not available in previous Census Profiles.
LSA = local study area; RSA = regional study area.

Figure 10 and Table 5 show the distribution of the population by age category for the LSA, the RSA, and Saskatchewan for 2016 (Appendix A, Table A-2a). The pattern of population distribution by age cohort in the RSA shows some deviation from the provincial population distribution pattern. The RSA has a large youth population, with a considerably higher proportion of the population aged 0 to 19 (i.e., youth; 40.2%) than the provincial average (i.e., 25.8%), and a median age of 25.7, far below the provincial median of 37.8 (Table 5). With a larger youth population, the RSA has a lower proportion of the population who are working age (i.e., aged 20 to 64 years) as compared to Saskatchewan as a whole (i.e., 53.0% and 58.7%, respectively). The retirement age population (i.e., aged 65 and older) also makes up a smaller proportion of the overall population in the RSA (i.e., 6.8%) compared to the province (i.e., 15.5%). Overall, this suggests a younger regional population with a greater proportion having yet to reach working age relative to that of the province.

Figure 10: Population Distribution by Age Group for the Local Study Area, Regional Study Area, and Saskatchewan, 2016



Source: Statistics Canada 2017a.
Note: Data were not available for Bear Creek, Descharme Lake, and Garson Lake.
LSA = local study area; RSA = regional study area.

Between 2006 and 2016, the gender ratio in the RSA has become more even, although there is still, overall, more males than females in the RSA (Table 5). During this same period, the opposite is true at the provincial level, where the female population has been higher than the male population. The median age of males is slightly lower than females in the RSA (i.e., 25.1 years compared to 26.2 years, respectively), a trend that is also seen at the provincial level (i.e., 36.9 years compared to 38.7 years, respectively).

Table 3: Demographic Characteristics of Local Study Area Communities, Regional Study Area, Saskatchewan

Metric by Year	CRDN			BNDN			BRDN			Buffalo Narrows			La Loche			LSA Subtotal			Other LSA Communities[a]			Census Division No.18 (RSA)			Saskatchewan		
	I	NI	T	I	NI	T	I	NI	T	I	NI	T	I	NI	T	I	NI	T	I	NI	T	I	NI	T	I	NI	T
Population																											
2016	810	10	825	460	15	480	765	15	785	910	130	1,045	2,275	85	2,365	5,595	265	5,880	375	10	380	32,200	4,650	36,850	175,020	895535	1,070,555
	98.2%	1.2%		95.8%	3.1%		97.5%	1.9%		87.1%	12.4%		96.2%	3.6%		95.2%	4.5%		98.7%	2.6%		87.4%	12.6%		16.3%	83.7%	
2011	770	20	790	c	c	c	750	15	765	1000	155	1,155	2,535	90	2,625	c	c	c	c	c	c	31,960	4,820	36,785	157,740	847,515	1,008,760
	97.5%	2.5%		0.0%	0.0%		98.0%	2.0%		86.6%	13.4%		96.6%	3.4%		c	c		c	c		86.9%	13.1%		15.6%	84.0%	
2006	645	15	658	395	15	413	735	10	741	955	125	1,081	2,225	115	2,348	4,955	280	5,241	c	c	c	29,085	4,815	33,919	141,890	811,955	968,157
	98.0%	2.3%		95.6%	3.6%		99.2%	1.3%		88.3%	11.6%		94.8%	4.9%		94.5%	5.3%		c	c		85.7%	14.2%		14.7%	83.9%	
Population change (%)																											
2011-2016	5.2%	b	4.4%	c	c	c	2.0%	b	2.6%	-9.0%	-16.1%	-9.5%	-10.3%	-5.6%	-9.9%	c	c	c	c	c	c	0.8%	-3.5%	0.2%	11.0%	5.7%	6.1%
2006-2011	19.4%	b	20.1%	c	c	c	2.0%	b	3.2%	4.7%	24.0%	6.8%	13.9%	-21.7%	11.8%	c	c	c	c	c	c	9.9%	0.1%	8.4%	11.2%	4.4%	4.2%
2006-2016	25.6%	b	25.4%	16.5%	b	16.2%	4.1%	b	5.9%	-4.7%	4.0%	-3.3%	2.2%	-26.1%	0.7%	12.9%	-5.4%	12.2%	c	c	c	10.7%	-3.4%	8.6%	23.3%	10.3%	10.6%
Median Age																											
2016	23.5	38.9	23.6	23.8	30.4	24.8	26.5	35.1	26.8	27.9	45.2	30.8	23.3	33.4	23.9	c	c	c	c	c	c	23.6	44.7	25.6	24.3	40.1	37.4
Age of population 2016 (%)																											
0 to 14	30.5%	1.2%	30.5%	33.7%	2.1%	34.7%	29.9%	0.0%	29.9%	26.0%	1.0%	26.9%	32.8%	0.4%	33.0%	c	c	c	c	c	c	29.7%	1.6%	31.4%	5.4%	14.5%	19.9%
15 to 24	22.0%	0.0%	22.0%	16.8%	0.0%	16.8%	15.9%	1.3%	15.9%	12.5%	0.0%	13.0%	18.6%	0.4%	18.8%	c	c	c	c	c	c	16.3%	1.2%	17.5%	3.0%	9.6%	12.6%
25 to 54	36.6%	1.2%	37.8%	35.8%	2.1%	37.9%	39.5%	1.3%	40.8%	32.7%	8.2%	40.4%	35.3%	2.5%	37.6%	c	c	c	c	c	c	30.9%	5.3%	36.2%	6.0%	33.7%	39.6%
55 to 64	5.5%	0.0%	5.5%	5.3%	0.0%	6.3%	7.0%	0.0%	7.6%	6.7%	1.0%	7.7%	5.7%	0.0%	6.1%	c	c	c	c	c	c	5.9%	2.4%	8.3%	1.2%	12.1%	13.3%
65 years and over	4.3%	0.0%	4.3%	5.3%	0.0%	5.3%	5.1%	0.0%	5.7%	10.1%	2.4%	12.5%	4.0%	0.4%	4.4%	c	c	c	c	c	c	4.6%	2.1%	6.7%	0.8%	13.8%	14.6%
15 years and over	68.3%	1.2%	68.9%	63.2%	2.1%	65.3%	68.2%	1.9%	70.1%	61.1%	12.0%	73.6%	63.6%	3.4%	67.0%	c	c	c	c	c	c	57.7%	11.0%	68.6%	11.0%	69.1%	80.1%

Source: Statistics Canada 2007b,c,d,f,g,l,k,m,o; Statistics Canada 2012b,c,d,e,f,g,h,i; Statistics Canada 2017b,c,d,e,f,g.
Note: For confidentiality purposes, values, including totals were randomly rounded either up or down to a multiple of five or 10. The total value may not match the individual values since totals and sub-totals are independently rounded and may not total to 100%.
a = Other LSA Communities: Black Point, Turnor Lake, St. George's Hill, Michel Village. Data was not available for Descharme Lake, Garson Lake, and Bear Creek. As these communities are small, population and demographic information is supressed to maintain confidentiality. Where population profiles are not available for all of the Other LSA communities, no data is presented; b = Estimate not reliable due to small dataset and therefore not presented; c = Data not available, an Aboriginal population profile is not available for this area. Possible reasons include:

- the area does not meet the threshold for 250 or more Indigenous identity population;
- the area has been suppressed for data quality or confidentiality reasons; or
- the area is composed of or contains incompletely enumerated Indian reserves or Indian settlements.

I = Indigenous; NI = non-Indigenous; T = total; CRDN = Clearwater River Dene Nation; BRDN = Buffalo River Dene Nation; BNDN = Birch Narrows Dene Nation; LSA = local study area; RSA = regional study area; n/a= not applicable.

Table 4: Indigenous Identity Characteristics of Local Study Area Communities, Regional Study Area, Saskatchewan

Metric by Year	CRDN				BNDN				BRDN				Buffalo Narrows				La Loche				LSA Subtotal				Other LSA Communities[a]				Census Division No.18 (RSA)				Saskatchewan			
	FN	M	MI	I	FN	M	MI	I	FN	M	MI	I	FN	M	MI	I	FN	M	MI	I	FN	M	MI	I	FN	M	MI	I	FN	M	MI	I	FN	M	MI	I
Indigenous population																																				
2016	780	30	-	810	440	20	-	465	760	10	-	765	180	730	-	905	1,095	1,185	10	2,280	3,255	1,975	10	5,225	c	c	c	c	25,575	6,435	135	32,010	114,570	57,875	1,305	172,810
2011	755	20	-	770	c	c	c	c	710	40	-	750	45	950	-	1,000	740	1,790	10	2,535	c	c	c	c	c	c	c	c	24,700	7,160	35	31,960	103,205	52,450	675	157,740
2006	625	20	-	645	180	10	-	395	700	30	-	735	140	810	-	955	980	1,240	-	2,225	2,625	2,110	-	4,955	c	c	c	c	21,105	7,460	50	29,085	91,400	48,120	625	141,890
Indigenous population change (%)																																				
2011-2016	3.3%	b	n/a	5.2%	c	c	c	c	7.0%	b	n/a	2.0%	b	b	n/a	-9.5%	48.0%	-33.8%	b	-10.1%	c	c	c	c	c	c	c	c	3.5%	-10.1%	285.7%	0.2%	11.0%	10.3%	93.3%	9.6%
2006-2011	20.8%	b	n/a	19.4%	c	c	c	c	1.4%	b	n/a	2.0%	b	b	n/a	4.7%	-24.5%	44.4%	b	13.9%	c	c	c	c	c	c	c	c	17.0%	-4.0%	-30.0%	9.9%	12.9%	9.0%	8.0%	11.2%
2006-2016	24.8%	b	n/a	25.6%	b	b	b	b	8.6%	b	n/a	4.1%	28.6%	-9.9%	n/a	-5.2%	11.7%	-4.4%	b	2.5%	24.0%	-6.4%	c	5.4%	c	c	c	c	21.2%	-13.7%	170.0%	10.1%	25.4%	20.3%	108.8%	21.8%

Source: Statistics Canada 2007b,c,e,f,h,j,l,n,o; Statistics Canada 2013b,d,f,h,j,l; Statistics Canada 2018 a,b,c,d,e,f,g,h.

Note: For confidentiality purposes, values, including totals were randomly rounded either up or down to a multiple of five or 10. The total value may not match the individual values since totals and sub-totals are independently rounded and may not total to 100%.

a = Other LSA Communities: Descharme Lake, Black Point, Garson Lake, Bear Creek, Turnor Lake, St. George's Hill, Michel Village. As these communities are small, population and demographic information is supressed to maintain confidentiality. Where population profiles are not available for all of the Other LSA communities, no data is presented; b = Estimate not reliable due to small dataset and therefore not presented; c = Data not available, an Aboriginal population profile is not available for this area. Possible reasons include:

- the area does not meet the threshold for 250 or more Indigenous identity population; or
- the area has been suppressed for data quality or confidentiality reasons; or
- the area is composed of or contains incompletely enumerated Indian reserves or Indian settlements.

n/a = not applicable; I = single Indigenous ancestry total (consisting of First Nations, Métis, and Inuit); FN = First Nations (North American Indian); M = Métis single ancestry; MI = multiple Indigenous ancestries; CRDN = Clearwater River Dene Nation; BNDN = Birch Narrows Dene Nation; BRDN = Buffalo River Dene Nation; LSA = local study area; RSA = regional study area;

Table 5: Population, Age, and Sex Characteristics of Local Study Area Communities, Regional Study Area, and Saskatchewan[a]

Metric by Year		CRDN			BNDN			BRDN			Buffalo Narrows			La Loche			Census Division No. 18 Indigenous (RSA)			Census Division No.18 (RSA)			Saskatchewan Indigenous			Saskatchewan		
		M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Population																												
2016	#	415	410	820	225	255	475	390	390	785	560	550	1110	1,135	1,235	2370	16035	16165	32205	18,640	18,425	37,065	84,730	90,290	175,020	545,785	552,565	1,098,350
	%	50.6%	50.0%		47.4%	53.7%		49.7%	49.7%		50.5%	49.5%		47.9%	52.1%		49.8%	50.2%		50.3%	49.7%		48.4%	51.6%		49.7%	50.3%	
2011	#	380	395	780	215	205	415	385	380	760	570	585	1155	1,265	1,345	2610	16050	15915	31960	18,375	18,180	36,560	75,845	81,895	157,740	511,555	521,825	1,033,380
	%	48.7%	50.6%		51.8%	49.4%		50.7%	50.0%		49.4%	50.6%		48.5%	51.5%		50.2%	49.8%		50.3%	49.7%		48.1%	51.9%		49.5%	50.5%	
2006	#	330	330	660	215	195	415	375	365	745	515	565	1080	1,170	1,175	2350	14535	14545	29085	17,090	16,830	33,920	69,565	72,325	141,890	475,240	492,915	968,160
	%	50.0%	50.0%		51.8%	47.0%		50.3%	49.0%		47.7%	52.3%		49.8%	50.0%		50.0%	50.0%		50.4%	49.6%		49.0%	51.0%		49.1%	50.9%	
Population change (%)																												
2011-2016		9.2%	3.8%	5.1%	4.7%	24.4%	14.5%	1.3%	2.6%	3.3%	-1.8%	-6.0%	-3.9%	-10.3%	-8.2%	-9.2%	-0.1%	1.6%	0.8%	1.4%	1.3%	1.4%	11.7%	10.3%	11.0%	6.7%	5.9%	6.3%
2006-2011		15.2%	19.7%	18.2%	0.0%	5.1%	0.0%	2.7%	4.1%	2.0%	10.7%	3.5%	6.9%	8.1%	14.5%	11.1%	10.4%	9.4%	9.9%	7.5%	8.0%	7.8%	9.0%	13.2%	11.2%	7.6%	5.9%	6.7%
2006-2016		25.8%	24.2%	24.2%	4.7%	30.8%	14.5%	4.0%	6.8%	5.4%	8.7%	-2.7%	2.8%	-3.0%	5.1%	0.9%	10.3%	11.1%	10.7%	9.1%	9.5%	9.3%	21.8%	24.8%	23.3%	14.8%	12.1%	13.4%
Median age																												
2016		23.1	24.1	23.8	23.4	25.4	24.6	27.6	26.2	26.8	29.4	33.3	30.8	21.8	26.3	24	22.5	24.4	23.6	25.1	26.2	25.7	23.1	25.4	24.3	36.9	38.7	37.8
2011		21.2	23.3	22	19.8	23.1	21.9	26.4	25	25.6	26.1	30.2	27.6	21.6	23.4	22.6	20.7	22.4	21.5	23.2	24.3	23.7	21.3	24	22.6	37	39.2	38.2
2006		21.3	21	21.2	20.9	19.2	20.1	23	22.5	22.8	25.9	28	27.3	19	22.1	20.5	20	21.4	20.7	22.5	23.3	22.9	20.4	22.9	21.7	37.5	39.8	38.7
Age of population 2016 (%)																												
0 to 19		22.0%	19.5%	41.5%	17.9%	21.1%	41.1%	19.7%	19.7%	38.9%	19.8%	15.8%	35.1%	22.4%	20.7%	42.8%	c	c	c	20.6%	19.6%	40.2%	44.5%	40.7%	42.5%	13.2%	12.6%	25.8%
20 to 44		19.5%	21.3%	40.2%	20.0%	20.0%	41.1%	16.6%	17.8%	33.1%	14.0%	15.8%	29.7%	15.8%	19.6%	35.2%	c	c	c	16.6%	17.2%	33.8%	33.3%	35.7%	34.5%	16.6%	16.3%	32.9%
45 to 64		6.7%	7.3%	14.6%	7.4%	7.4%	14.7%	12.1%	10.2%	21.7%	12.6%	12.2%	24.3%	7.4%	9.9%	17.3%	c	c	c	9.5%	9.7%	19.2%	17.5%	18.5%	18.0%	12.8%	12.9%	25.8%
65 years and over		2.4%	1.8%	4.3%	2.1%	3.2%	5.3%	3.2%	2.5%	5.1%	5.0%	5.0%	9.9%	2.5%	1.9%	4.6%	c	c	c	3.6%	3.2%	6.8%	4.8%	5.0%	4.9%	7.0%	8.5%	15.5%
15 years and over		67.5%	70.7%	69.5%	68.9%	60.8%	67.4%	73.1%	71.8%	68.8%	72.3%	74.5%	72.5%	65.2%	69.2%	67.1%	78.6%	78.5%	78.5%	68.3%	69.3%	68.8%	65.7%	68.3%	67.0%	79.8%	80.9%	80.4%
Age of population 2011 (%)																												
0 to 19		21.8%	21.8%	45.5%	25.3%	22.9%	49.4%	18.4%	17.8%	37.5%	20.8%	17.3%	37.7%	23.0%	21.6%	44.1%	48.6%	45.0%	46.8%	22.3%	20.8%	43.1%	47.2%	42.9%	45.0%	13.3%	12.7%	26.1%
20 to 44		17.9%	19.9%	37.2%	16.9%	19.3%	34.9%	18.4%	19.1%	38.8%	12.6%	18.2%	31.6%	17.4%	20.9%	38.5%	32.2%	35.3%	33.8%	16.3%	17.4%	33.6%	31.8%	34.7%	33.3%	16.1%	15.9%	32.0%
45 to 64		6.4%	5.8%	13.5%	7.2%	6.0%	13.3%	9.9%	9.9%	20.4%	12.1%	10.8%	22.9%	6.5%	7.5%	14.2%	15.1%	15.5%	15.3%	9.0%	8.8%	17.8%	16.8%	17.6%	17.2%	13.5%	13.5%	27.0%
65 years and over		2.6%	0.6%	5.1%	2.4%	1.2%	2.4%	2.6%	2.6%	3.9%	3.5%	3.9%	7.4%	1.9%	1.5%	3.1%	4.2%	4.4%	4.3%	2.8%	2.7%	5.4%	4.2%	4.8%	4.5%	6.6%	8.3%	14.9%
15 years and over		65.7%	70.1%	67.0%	68.1%	66.7%	66.6%	72.6%	69.5%	70.5%	67.1%	75.4%	71.3%	65.4%	70.1%	67.8%	62.7	66.4	64.5	66.3%	68.3%	67.3%	64.0	67.7	65.9	80.3%	81.4%	80.9%

Source: Statistics Canada 2007 a,c,d,f,g,l,k,m,o; Statistics Canada 2012a,b,c,d,e,f,g,h; Statistics Canada 2017b,c,d,e,f,g; Statistics Canada 2018a.
Note: For confidentiality purposes, values, including totals were randomly rounded either up or down to a multiple of five or 10. The total value may not match the individual values since totals and sub-totals are independently rounded and may not total to 100%.
a = Data for Other LSA Communities (Descharme Lake, Black Point, Garson Lake, Bear Creek, Turnor Lake, St. George's Hill, Michel Village) is not available and therefore not presented. As these communities are small, population and demographic information is supressed to maintain confidentiality;
b = Estimate not reliable due to small dataset and therefore not presented; c = Data not available, an Aboriginal population profile is not available for this area. Possible reasons include:

- the area does not meet the threshold for 250 or more Aboriginal identity population;
- the area has been suppressed for data quality or confidentiality reasons; or
- the area is composed of or contains incompletely enumerated Indian reserves or Indian settlements.

n/a = not applicable; M = male; F = female; T = total; CRDN = Clearwater River Dene Nation; BNDN = Birch Narrows Dene Nation; BRDN = Buffalo River Dene Nation; LSA = local study area; RSA = regional study area.

6.1.1.2 Local Study Area

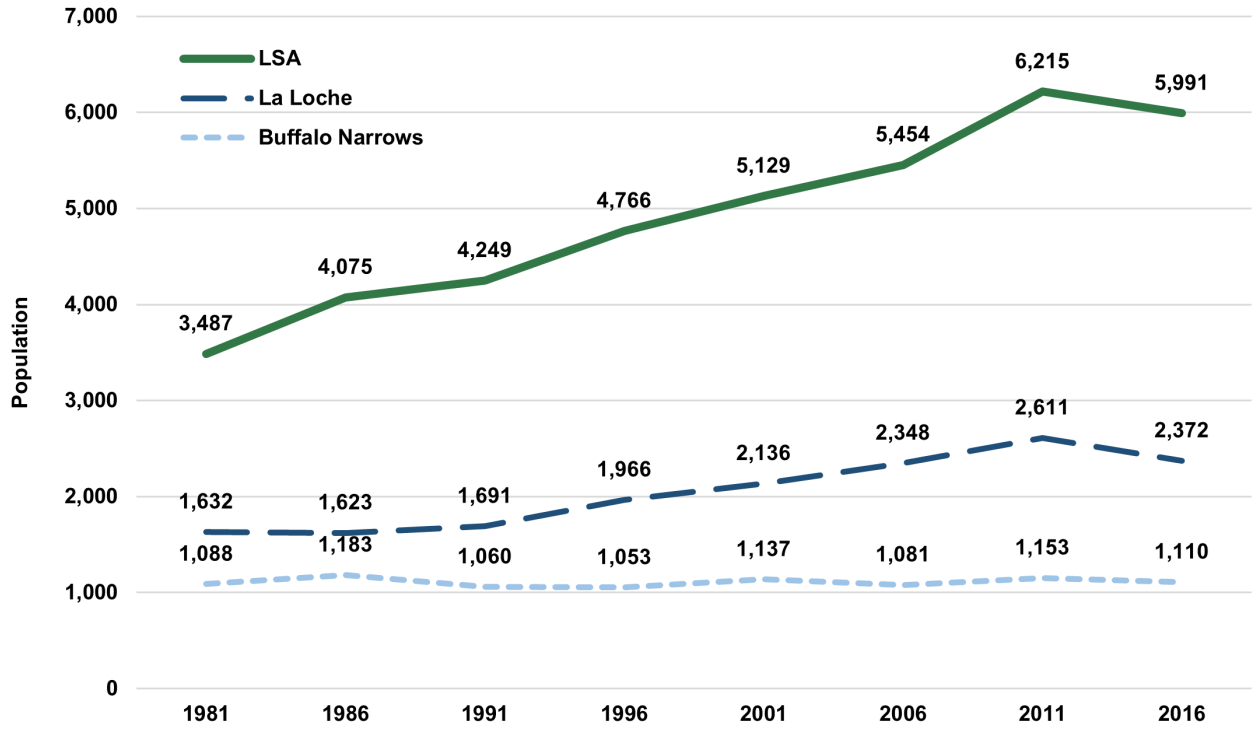
The most recent population statistics for the LSA communities at the time of writing of this report are from the 2016 Statistics Canada census (2021 Statistics Canada census data is not due to be released until late April 2022) (Section 4.2, Secondary Data Collection). To help verify this information, qualitative data from KP interviews was provided for additional context, where available, for a number of communities.

6.1.1.2.1 Local Study Area Population Characteristics

Figure 11 shows the population of the LSA from 1981 to 2016 as reported in the Census of Canada for each five-year census period as well as the populations for the largest communities in the LSA (i.e., La Loche and Buffalo Narrows). The data shows population increases in the LSA from 1981 to 2011 followed by a small decline in 2016. La Loche's population trend was similar to that of the LSA, though not at the same rate, suggesting population growth also occurred in other LSA communities. Buffalo Narrows' population by contrast has remained fairly stagnant, with only minor variations in population growth and contraction over the same period. In 2016, the LSA population was 5,991 persons. The 2016 populations for communities in the LSA range in size from 2,372 people (i.e., La Loche) to 10 or fewer people (i.e., Descharme Lake and Garson Lake, individually) (Appendix A) [11]. The LSA population increased from 3,487 people in 1981 to 6,215 in 2011 and was followed by a decline to 5,991 people in 2016. The LSA population decline from 2011 to 2016 was primarily a result of the population decrease in La Loche (Section 6.1.1.2.2.2, La Loche).

[11] The LSA includes Bear Creek, BNDN (Turnor Lake 193B), Black Point, Buffalo Narrows, BRDN 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data were not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake for 1981 to 2006.

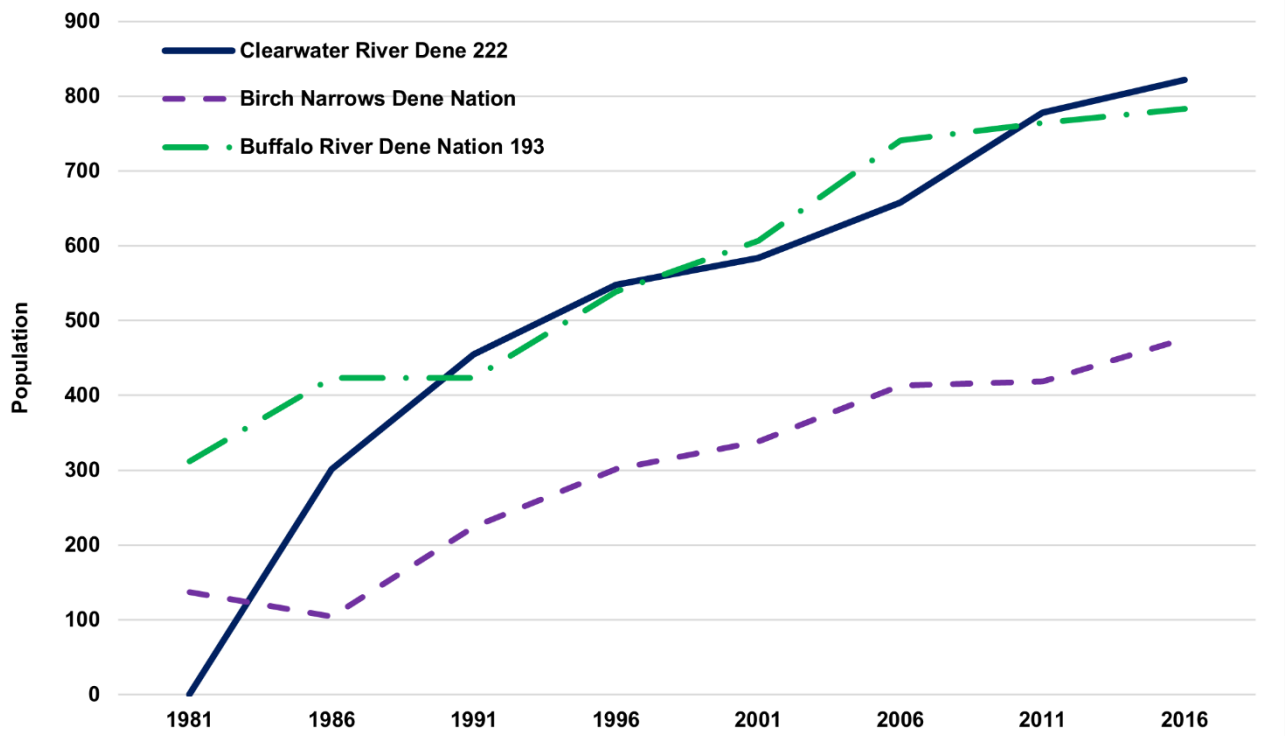
Figure 11: Local Study Area Population, 1981 to 2016



Source: Statistics Canada 1987, 1992, 1997, 2002, 2007a, 2012a, 2017a.
Note: Population numbers for 2011 and 2016 include four northern settlements (i.e., Bear Creek, Black Point, Descharme Lake, and Garson Lake) for which data were not available in previous Census Profiles.
LSA = local study area.

Figure 12 illustrates the population of the Dene Nation communities in the LSA from 1981 to 2016 , where data are available, as reported in the Census of Canada for each five-year census period (Table 5). The data shows substantial population increases in all three communities, which account for the rest of the population growth in the LSA identified in Figure 11. Effectively, on-reserve population growth constituted the bulk of population growth from 1981, with the remainder largely in La Loche.

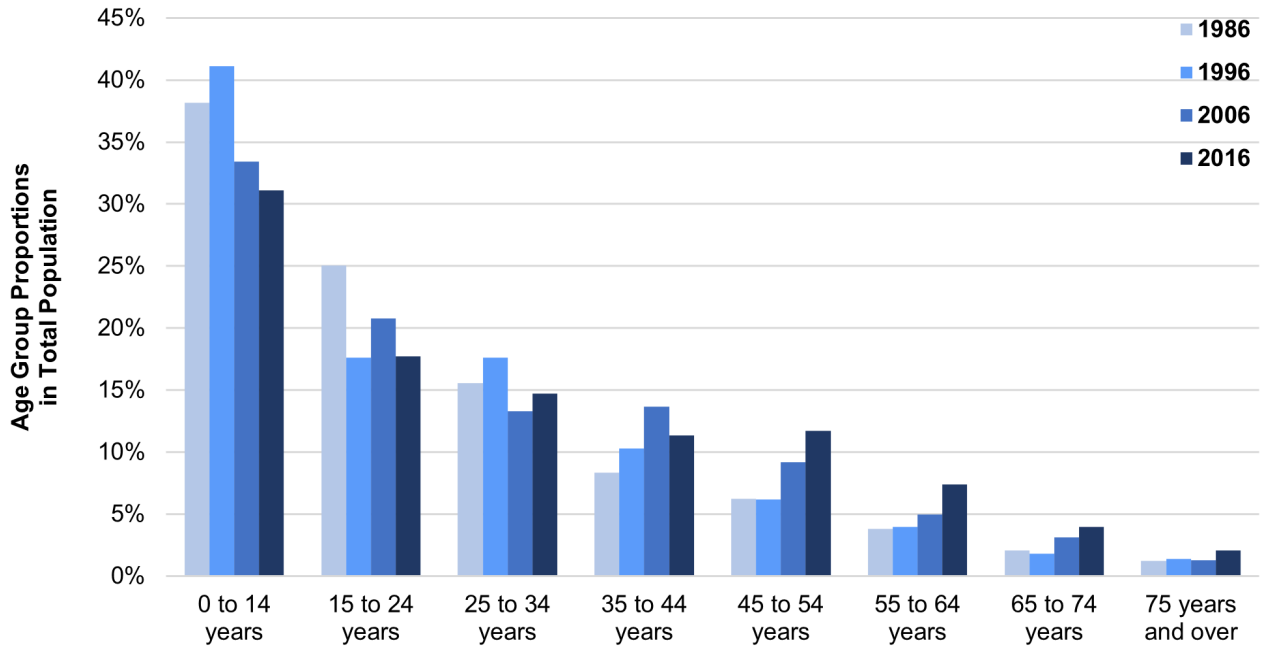
Figure 12: Local Study Area Selected Communities Population, 1981 to 2016



Source: Statistics Canada 1987, 1992, 1997, 2002, 2007a, 2012a, 2017a.
Note: Average annual percentage population changes calculated by InterGroup Consultants Ltd.

Figure 13 shows the change in the age distribution of the LSA population from 1986 to 2016. The proportion of LSA population 24 years of age or younger has steadily decreased between 1986 (i.e., 63.3%) and 2016 (i.e., 48.8%). The proportion of population 45 years or older has steadily increased over the same period (i.e., an increase from 13% to 25%) (Appendix A, Table A-3c).

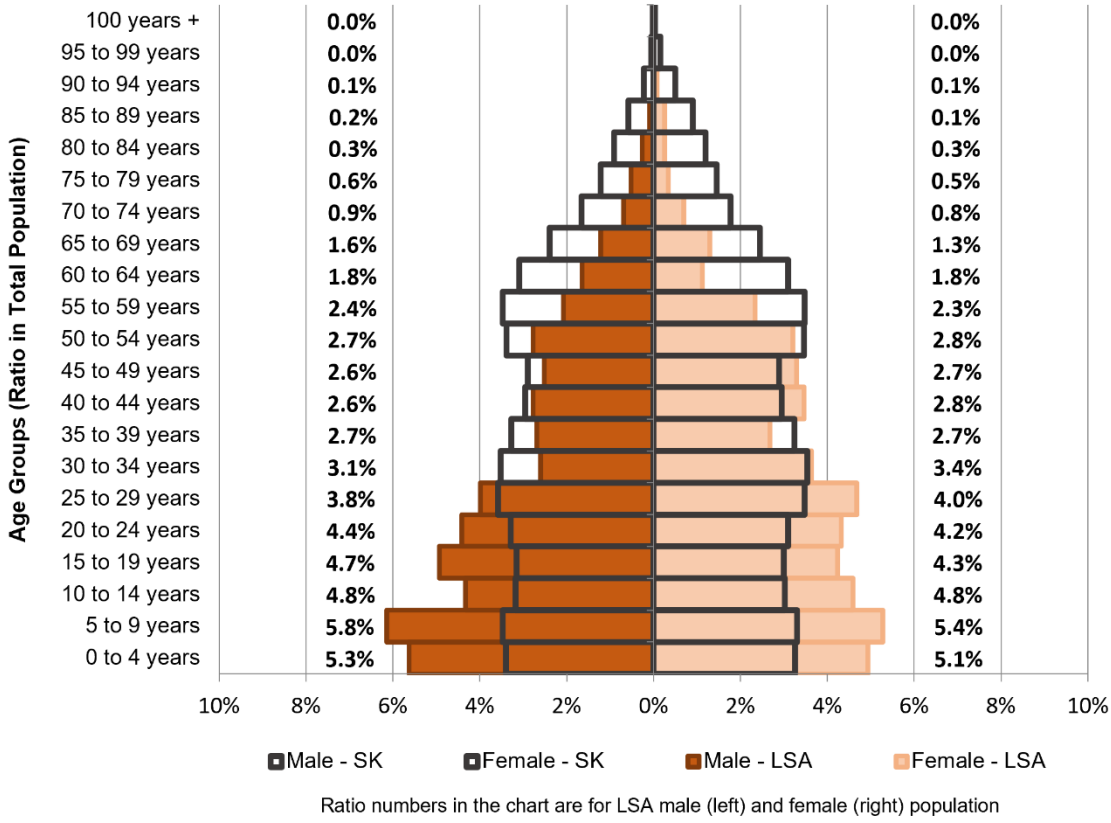
Figure 13: Population Distribution by Age Group for the Local Study Area, 1986 to 2016



Source: Statistics Canada 1987, 1992, 1997, 2002, 2007a, 2012a, 2017a.
Note: Data were not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.

Figure 14 shows the 2016 population for the LSA and Saskatchewan by sex and age cohort. With respect to gender balance in the LSA, females make up a slightly higher proportion (i.e., 51.2%) of the total population than males. By comparison, the populations of the RSA and Saskatchewan are more evenly split between females and males (i.e., 49.7% and 50.3% female portion for the RSA and Saskatchewan, respectively (Appendix A, Table18A-5b); Table 5). The age structure of the LSA population in 2016 was similar to the RSA, and younger than the Saskatchewan population (Appendix A, Table A-5a). Overall, the data reflects the higher proportions of youth, and the contraction of young working-aged cohorts, particularly males over 30. The contraction of male cohorts may be attributed to the lack of economic opportunities (Section 6.2.2, Overview of Local Study Area Economy, and Section 6.4, Labour Force Characteristics). Correspondingly, the data shows higher proportions of working-aged females in the 25 to 34 year old age cohorts. This aligns with labour force analysis (Section 6.4), which notes the main industries in the LSA are traditionally female orientated (e.g., service industries). This analysis was corroborated in discussions with the JWGs in August 2021 (BRDN-JWG 2021a; BNDN-JWG 2021b). The data also shows the proportions of older age cohorts in the LSA is substantially below the comparable Saskatchewan data, which highlights the challenges of northern rural living on aged residents.

Figure 14: Population Age Structure by Sex for the Local Study Area and Saskatchewan, 2016



Source: Statistics Canada 2017a.
Note: Data were not available for Bear Creek, Black Point, Descharme Lake, Garson Lake, and St. George's Hill.
SK = Saskatchewan; LSA = local study area.

6.1.1.2.2 Local Study Area Communities

6.1.1.2.2.1 Clearwater River Dene Nation

Clearwater River Dene Nation is the third largest LSA community, with a population of 820 (Table 5). The CRDN is predominantly First Nation (i.e., 95.1%) with some Métis (i.e., 3.7%; Table 4). Between 2011 and 2016, population growth in CRDN was modest, with a four-year growth rate of 5.1%, which is below the Indigenous provincial average (i.e., 11.0%) but above the RSA average (i.e., 1.4%; Table 4 and Table 5). Clearwater River Dene Nation is the LSA community with the highest growth rate between 2006 and 2016 (i.e., 24.2%).

Clearwater River Dene Nation is the youngest LSA community, with a median age of 23.8. Between 2006 and 2016, the median age of the CRDN increased slightly (i.e., 21.2 to 23.8) but remained lower than the median age of the provincial Indigenous population (i.e., 24.3) and RSA population (i.e., 25.7). The proportion of the working-age population (i.e., 20 to 64 years old) in the CRDN increased between 2011 and 2016 from 50.6% to 54.8%. The proportion of the population that is of working age in CRDN (i.e., 54.8%) is slightly higher than the RSA (i.e., 53.0%), and comparable to the Indigenous provincial average of 52.5%. The increase in the CRDN

working-age population between 2011 and 2016 (i.e., 4.1%) is larger than the increase at the RSA level (i.e., 1.6%) and Indigenous provincial level (i.e., 2.0%). The 4.1% increase in the working age population was the highest among the LSA communities. The CRDN has a lower proportion of the population who are of retirement age (i.e., 4.3%) compared to both the RSA (i.e., 6.8%) and the Indigenous provincial average (i.e., 4.9%). The proportion of people of retirement age in the CRDN decreased by 0.8% between 2011 and 2016 relative to a 4.1% increase in the proportion of the working-age population. The decrease in people of retirement age in the CRDN is contrary to the trend in the RSA and Indigenous provincial average over the same period (i.e., 1.4% and 0.4% increase, respectively).

The gender ratio in the CRDN population has remained relatively consistent across the 10 years ending in 2016, with slightly more males in the community than females (i.e., 50.6% compared to 50.0%), which is generally consistent with the RSA (i.e., 50.3% compared to 49.7%) (Table 5). Analysis of specific age groups shows higher proportions of males than females in the 0 to 19 years and the 65 years and over age groups, consistent with the RSA. The high male proportion of population in the 0 to 19 age group skews the overall gender ratio in the community. At the Indigenous provincial level, there are more females in the total population, but more males for the 0 to 19 age group.

6.1.1.2.2.2 La Loche

Despite a recent population decline, La Loche remains the largest LSA community, with a 2016 population of 2,370 (Table 5). In 2016, La Loche had slightly more Métis residents (i.e., 1,185) than First Nations (i.e., 1,095) (Table 4). The proportion of Métis residents in the community has declined by 605 people since 2011 (i.e., 33.8% decrease) while the proportion of First Nation residents has increased by 355 people (i.e., 48.0% increase).

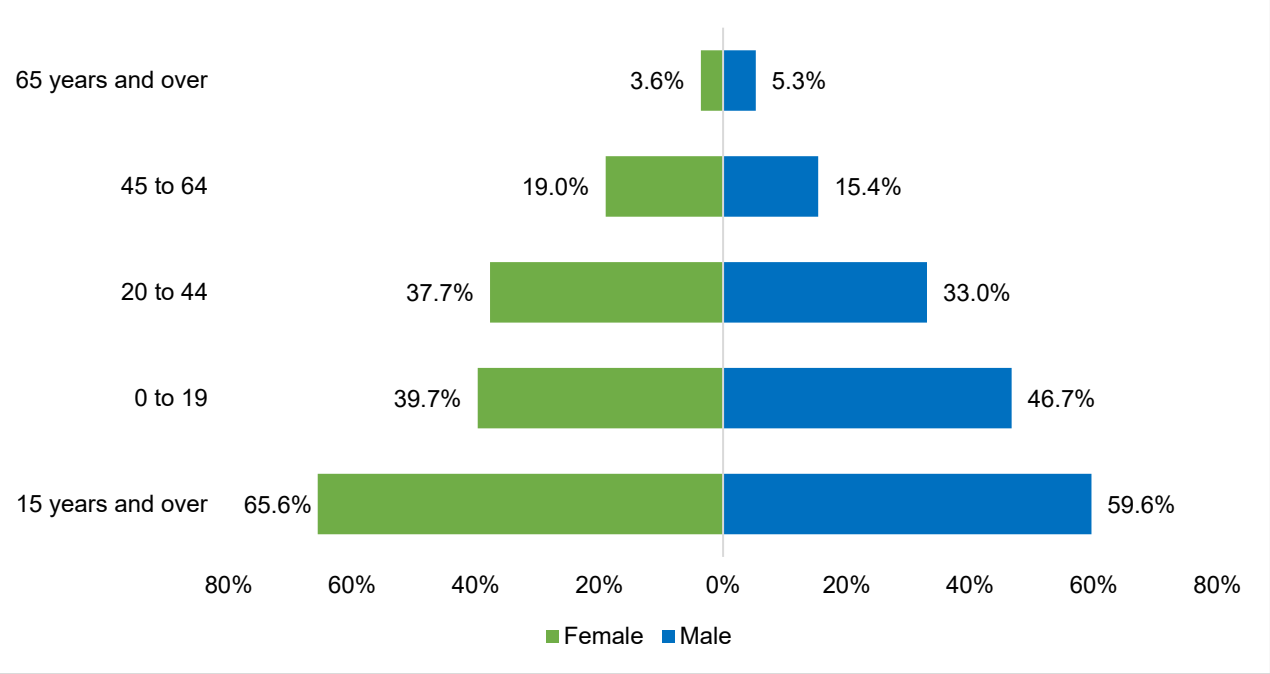
The Northern Village of La Loche is also the LSA community that experienced the largest decline in population between 2011 and 2016 (i.e., 9.2% decrease). This population decline is in contrast to the population increases experienced at the provincial level and in the Indigenous provincial population during the same period (Table 5). This decrease was specifically observed in the population younger than 50 years of age. Key person interviewees identified the need to pursue employment and education opportunities elsewhere and lack of housing availability locally as reasons for leaving La Loche. An economic analysis completed for La Loche noted the community did not show the typical signs of population decline, for example, there remains a housing shortage despite several new builds (DMCA 2018). However, this could be indicative of overcrowding and housing shortages prior to depopulation.

The median age of the La Loche population in 2016 was 24.0 years. Between 2006 and 2016, the median age of the La Loche population increased from 20.5 years to 24.0 years (Table 5). The La Loche population remains younger than the provincial population (i.e., 37.8 years in 2016) but is approaching the provincial Indigenous median of 24.3. Among the LSA communities, La Loche has the lowest proportion of population in the working-age cohort (i.e., 52.5%), which is comparable to the Indigenous provincial average (i.e., 52.5%) and slightly below the RSA (i.e., 53.0%). The village has a slightly lower proportion of the population who are of retirement age (i.e., 4.6%) compared to the provincial Indigenous average (i.e., 4.9%) and RSA (i.e., 6.8%). However, La Loche's population is aging, with the proportion of retirees increasing by 1.5% between 2011 and 2016 relative to a 0.2% decrease in the proportion of the working-age population. The decrease in working-age population is contrary to the RSA and Indigenous provincial trend, which had a 1.6% and 2.0% increase, respectively over the same

period. The increase in retirees was comparable to the RSA trend (i.e., 1.4% increase over the same period), but higher than the Indigenous provincial trend (i.e., 0.4% increase over the same period).

More females than males live within La Loche (i.e., 1,235 females or 52.1% of the population compared to 1,135 males or 47.9% of the population), with the sex ratio widening between 2006 and 2016 (Table 5). This trend is different to the majority of other LSA communities, the RSA, and the province, but consistent with the LSA as a whole. There are more females than males within the 20 to 64 age group, and more males than females in the 0 to 19 and 65 years and over age group. Figure 15 presents a more detailed age breakdown by sex for La Loche for 2016.

Figure 15: La Loche Population Pyramid, 2016



Note: Some population counts of geographic areas are adjusted to ensure confidentiality and may not total to 100%.

6.1.1.2.2.3 Birch Narrows Dene Nation

Birch Narrows Dene Nation is a predominantly First Nations community (i.e., 91.7% of overall population) with a small proportion that are Métis (i.e., 4.2%; Table 4). In 2016, the population of BNDN was 475, a 14.5% increase from 2011 (i.e., 415) and 2006 (i.e., 415). The rate of growth in the BNDN was the highest among the LSA communities between 2011 and 2016 (i.e., 14.5%) exceeding both the RSA average (i.e., 1.4%) and Indigenous provincial average (i.e., 11.0%; Table 4 and Table 5). The median age of BNDN residents in 2016 was 24.6 years, younger than the RSA median of 25.7 years and slightly older than Indigenous provincial median of 24.3 years. The BNDN has the highest proportion of population in the working-age cohort (i.e., 55.8%) among the LSA communities, which is higher than both the RSA (i.e., 53.0%) and the Indigenous provincial average (i.e.,52.5%).

However, BNDN's population is also aging. Birch Narrows Dene Nation has a higher proportion of the population who are of retirement age (i.e., 5.3%) compared to the Indigenous provincial average (i.e., 4.9%) but a slightly lower proportion than the RSA (i.e., 6.8%). The proportion of retirees increased by 2.9% between 2011 and 2016 relative to a 7.6% increase in the proportion of the working-age population. The rise in working age population was the highest among the LSA communities. The increase in retirees (i.e., 2.9%) was the highest among the LSA communities, and higher compared to the RSA trend (i.e., 1.4% increase over the same period) and Indigenous provincial trend (i.e., 0.4% increase over the same period). The increase in working-age population (7.6%) is much higher compared to the RSA trend (i.e., 1.6% increase) and the Indigenous provincial trend (i.e., 2.0% increase) over the same period.

There has been little change in the sex ratio in the community between 2011 to 2016, with the community continuing to have more females (i.e., 53.7%) than males (i.e., 47.4%) in 2016, a trend also seen at the provincial Indigenous level. The community has a larger percentage of females compared to the other LSA communities.

6.1.1.2.2.4 Buffalo River Dene Nation

Buffalo River Dene Nation is a predominantly First Nations (i.e., 96.8%) community with a small proportion of Métis (i.e., less than 1%; Table 4). In 2016, the population of BRDN was 785, a 3.3% increase from 2011 (i.e., 760) and 5.4% from 2006 (i.e., 745). Growth in the BRDN has been modest, with the growth rate between 2011 and 2016, less than a third of the Indigenous provincial average (i.e., 11.0%) but exceeding the RSA growth rate (i.e., 1.4%; Table 4 and Table 5).

Between 2006 and 2016, the median age of the BRDN increased (i.e., 22.8 to 26.8 years), and in 2016 is slightly older than the RSA median of 25.7 years and Indigenous provincial median of 24.3 years. The proportion of Buffalo River Dene Nation's population that is of working age (54.8%) is comparable to the RSA (i.e., 53.0%) and Indigenous provincial average (i.e., 44.0%). The proportion of BRDN's population that is of retirement age is 5.1%, slightly above the Indigenous provincial average (i.e., 4.9%), but lower than the RSA (i.e., 6.8%). The population of BRDN is aging like the other LSA communities, with the proportion of retirees increasing by 1.2% between 2011 and 2016 relative to a 4.4% decrease in the proportion of the working-age population. The decrease in working age population was highest among the LSA communities. The decrease in working-age population is also contrary to the trend seen at the Indigenous provincial level (i.e., 2.0% increase) and RSA (i.e., 1.6% increase).

Slightly more females than males lived in BRDN in 2016 (i.e., 50.3% compared to 49.7%); however, only the 20 to 44 year age group had more females, suggesting a disproportionate distribution of females in the community within this age cohort. There has been a slight change in the sex ratio in BRDN between 2006 and 2016, as the community had more males in 2006 (i.e., 50.6%).

6.1.1.2.2.5 Buffalo Narrows

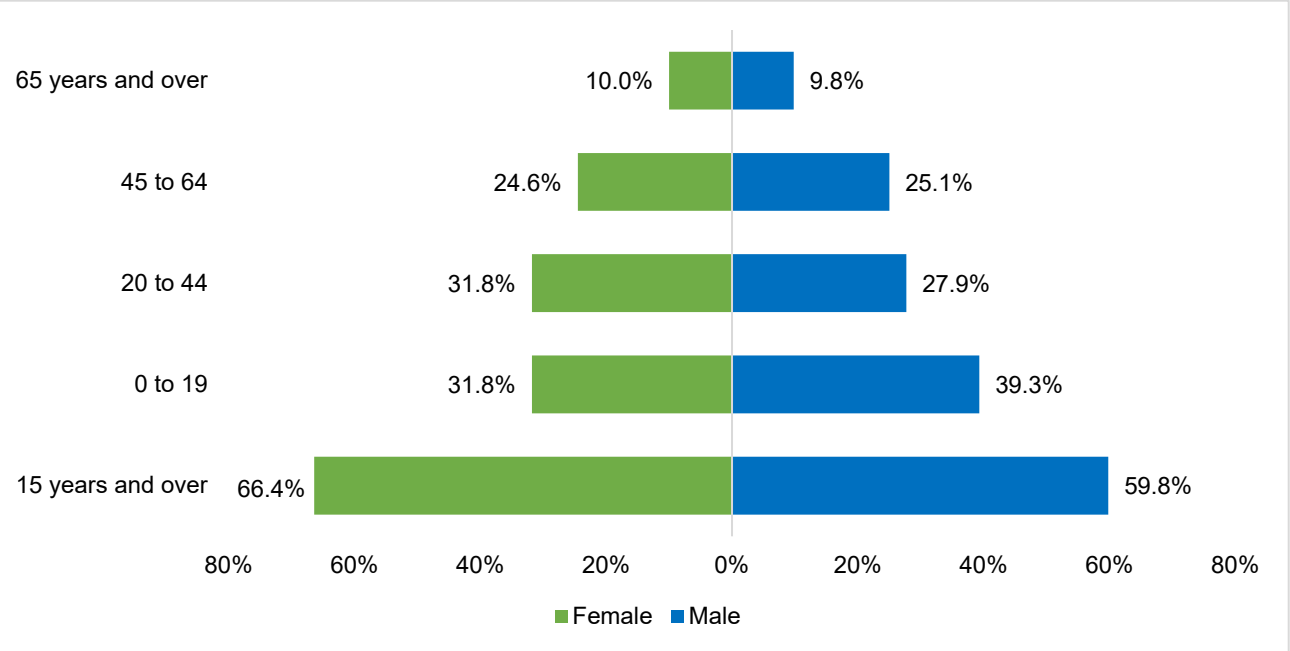
Buffalo Narrows is the second largest community in the LSA with a 2016 population of 1,110 (Table 5). The Buffalo Narrows population is predominantly Métis (i.e., 65.8%) with some First Nations (i.e., 16.2%; Table 4). The community has experienced fluctuations in the number of First Nation and Métis residents, with the number of Métis rising from 810 to 950 between 2006 and 2011, and falling to 730 in 2016. The number of First Nation residents in the community declined from 140 to 45 between 2006 and 2011, and rose to 180 in 2016 (Table 4). Part of this change could be attributed to the different census approach in 2011 which was voluntary and may

have resulted in fewer responses and reduced accuracy. Between 2011 and 2016, the population of Buffalo Narrows decreased by 3.9%, while the RSA and provincial Indigenous populations experienced population increases during the same period (i.e., 1.4% and 11.0%).

Buffalo Narrows has the oldest population of the LSA communities, with a median age of 30.8 years compared to the 2016 RSA median of 25.7 years and the provincial Indigenous median of 24.3 years. Between 2006 and 2016, the median age of the Buffalo Narrows population increased by 3.5 years. This is consistent with the provincial Indigenous population characteristics, as the provincial Métis population is younger (i.e., median age of 28.5 years) compared to the non-Indigenous population (i.e., 37.8 years), but oldest among the Indigenous Groups (i.e., 22.2 years for First Nations and 26.5 years for Inuit) (Statistics Canada 2018h). Buffalo Narrows has the second lowest proportion of population in the working-age cohort (i.e., 54.0%) amongst the LSA communities, and the highest proportion of the population who are of retirement age (i.e., 9.9%). The population of Buffalo Narrows is aging, with the proportion of retirees increasing by 2.5% between 2011 and 2016 relative to a 0.5% decrease in the proportion of the working-age population. The decrease in working-age population is contrary to the Indigenous provincial trend, which had a 2.0% increase over the same period. However, the increase in retirees (i.e., 2.5%) was above the Indigenous provincial trend (i.e., 0.4%).

There has been some change in the sex ratio of the Buffalo Narrows population between the most recent year of data (i.e., 2016) and ten years prior. Slightly more males than females now live in Buffalo Narrows; however, only the 0 to 19 years age group and the 45 to 64 years and over age group have more males (Figure 16; Table 5). As in other communities, the large size of the male 0 to 19 years age group population skews the sex ratio in the community. Figure 16 presents a more detailed age breakdown for 2016 by sex for Buffalo Narrows.

Figure 16: Buffalo Narrows Population Pyramid, 2016



Note: Some population counts of geographic areas are adjusted to ensure confidentiality and may not total to 100%.

6.1.1.2.2.6 Other Local Study Area Communities

The Other LSA Communities, Bear Creek, Descharme Lake, Garson Lake, Black Point, Michel Village, and St. George's Hill, are small communities, with a combined total population of 428 people, ranging in size from 10 to 149 people in 2016. Due to the small populations, demographic information about these communities is limited, with many census indicators rounded or supressed to maintain confidentiality of residents. Based on available information, Black Point, Turnor Lake, St. George's Hill, and Michel Village are understood to be predominantly Indigenous. No further quantitative population and demographics information is available for the Other LSA Communities.

More recent qualitative data is available for some of the individual communities that make up the Other LSA Communities. Less than 80 people resided in Black Point in 2019, a decrease in recent years as people moved to La Loche where there is a housing program (2019 to 2021 KP interview program). The largest age demographic in Black Point is the 40 to 60 cohort, which makes up approximately 50% of the population. It was also reported that around 30% of the population is over age 60, with the remainder under age 40 (2019 to 2021 KP interview program). In Michel Village, the most recent population count was 59, consisting primarily of adults, with few Elders and children.

6.1.1.2.3 Summary of LSA Population Structure

The LSA populations are predominantly Indigenous, with the Indigenous population ranging from 87.2 to 98.2% within the LSA communities (Table 4). Much of the Indigenous population identify as having First Nations ancestry, with a smaller number of people identifying as Métis (Table 5). Between 2006 to 2016, the proportion of people identifying as having First Nations ancestry has increased while the proportion identifying as having Métis ancestry has decreased (Table 5). Very few residents claim multiple Indigenous ancestries, and none claimed Inuit ancestry. With two exceptions, the LSA communities are predominantly of single First Nation identity (Table 5). The populations of the CRDN, BNDN, and BRDN are primarily First Nations, with little change in Indigenous identity between 2006 and 2016. Buffalo Narrows is a predominantly Métis community, and La Loche is a mixed community with more Métis residents than First Nation.

Population growth in the LSA communities over the past three census periods has been robust in BNDN, modest in some LSA communities (i.e., CRDN and BRDN), and fluctuating in other communities (i.e., Buffalo Narrows, La Loche). The LSA communities have a higher proportion of the population aged 19 and younger and a lower proportion of the population aged 65 and older when compared to the total population of Saskatchewan. This pattern is consistent with populations with higher-than-average birth rates and out-migration of post-secondary and working-aged people to pursue education and employment opportunities. Nationally, there is a trend of higher population growth rates for Indigenous Peoples in Canada, due to factors including a younger age structure and higher birth rates (Statistics Canada 2015a). The population growth rates in the LSA communities are variable, and the ten-year population growth is below the provincial average for most LSA communities except for the CRDN and BNDN. This may be attributed to other factors including out-migration, which can also affect population growth rates, and which may affect individual communities differently.

Communities with higher proportions of younger residents can experience more economic pressures on the working-age population to support children and families. Younger populations may also place additional demands on health, education, and other social services (Irvine et al. 2011). Additional discussion on demands for health, education, and social services is provided in Section 6.3, Community Features and Infrastructure. Overall,

females make up a slightly higher proportion of the total LSA population than men. There has been very little change in the gender composition of the LSA communities between 2006 and 2016.

6.1.2 Migration

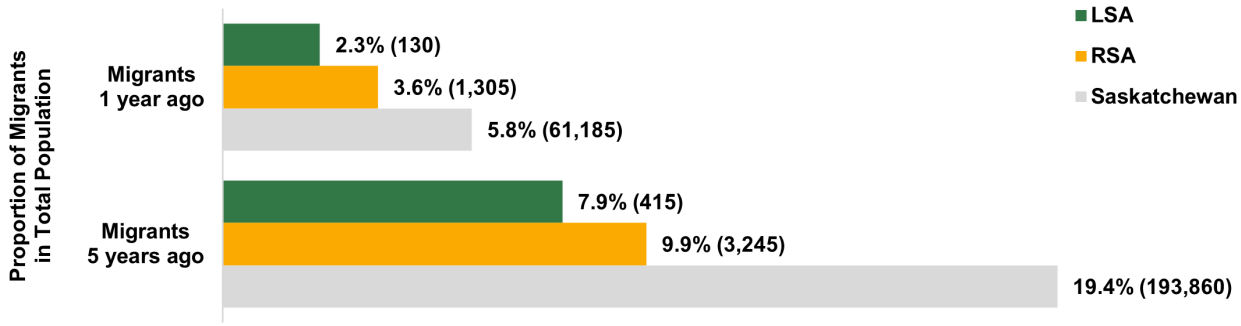
Population mobility can be a key driver of population changes. Migrants represent people who relocated to a new census subdivision and include both internal migrants who moved to a different city, town, township, village, or Indian Reserve within Canada, and external migrants who lived outside Canada at an earlier date. Migrants do not include people who moved within the same census subdivision[12] (Statistics Canada 2017b). The analysis of population migration data can assist in the determination of the stability of a community. Less migration occurrence can highlight the presence of long-established connections and strong community ties, while high rates of migration may be indicative of community dynamism and resilience due to increased ability to react to regular change and influxes of a diverse population.

Figure 17 shows the proportion of the LSA, RSA, and Saskatchewan population that migrated within the last year of available data and the five years previous to that (i.e., 2011-2016)(Appendix A, Table A-9). Note that in the context of the LSA and RSA, this does not capture outmigration from the communities. Rather, outmigration is better understood through the combined analysis of migrants within the community, and the overall population decline experienced by a community. A smaller proportion of the LSA population are migrants within the last year of available data and the five years previous compared to the RSA and Saskatchewan as a whole. Among the LSA communities, La Loche had the lowest migration rate within 1 year (i.e., 1.1%) and within 5 years (i.e., 3.8%). Buffalo Narrows had the highest migration rate with 1 year (i.e., 4.3%) and the BRDN had the highest migration rate within the last 5 years (i.e., 13.1%;) (Appendix A, Table A-9b).[13]. Much of Buffalo Narrow's migration is likely due to service sector workers and Crown corporation staff rotating into positions elsewhere.

Some common reasons for migration stated by LSA residents include attending school, limited housing availability within a community, and limited availability of employment. Residents of smaller communities within the LSA often move to larger communities such as Buffalo Narrows or La Loche for schooling and housing. Some LSA residents commented that people who leave the community for schooling often do not return, as they seek further education or employment opportunities elsewhere (2019 to 2021 KP interview program).

[12] Statistics Canada defines non-migrant movers as those who moved within the same census subdivision. Migrants are defined as those who do not live in the same census subdivision as they did in the last reference period.
[13] To minimize rounding error and due to data unavailability, LSA communities with less than 400 population as of the 2016 Census were not included in this comparison.

Figure 17: Proportion of Population Who Were Migrants within 1 Year and 5 Years , 2016

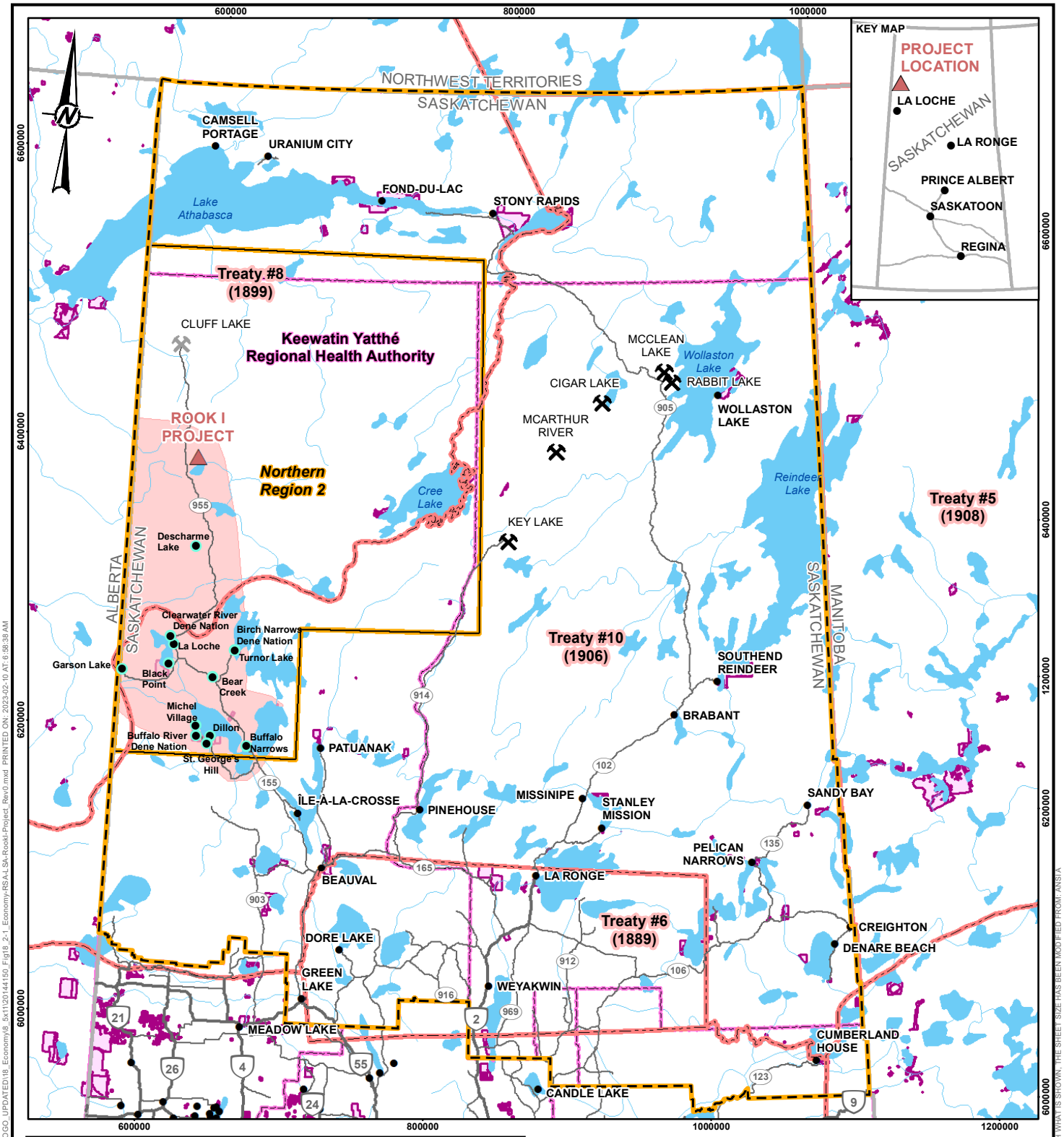


Source: Statistics Canada 2017a.
Note: Data were not available for Bear Creek, Descharme Lake, and Garson Lake.
LSA = local study area; RSA = regional study area.

6.1.3 Population Projections

Statistics Canada prepares population projection scenarios by health region[14,15] and include low-, medium-, and high-growth, as well as slow- and fast-aging scenarios. The projections are not available at the individual community level. The projections are developed considering trends in birth rate, mortality, and migration, and in discussion with experts (Chagnon et al. 2020). Additional detail on assumptions related to each scenario are provided in Appendix A, Table A-10a and Table A-10b. The Keewatin Yatthé Health Region (KYHR; Figure 18) includes the communities in the LSA (i.e., 5,991 people in 2016) as well as other communities, and included a population of approximately 11,000 in 2018 (Appendix A, Table A-10a). Figure 19 shows the range of cumulative percent changes in population for the KYHR from 2018 forecasted through to 2049 based on nine scenarios. The cumulative percentage changes were calculated by dividing the forecast population in each year by the 2018 base year, which was the year these future forecasts were projected from (i.e., the base year). The projections indicated a cumulative increase of approximately 7% from 2018 to 2049 in the High Growth Scenario to a decrease of approximately 10% in the Low Growth Scenario for the same period. Projections should be interpreted with caution due to the small population size of the health region and are intended to show a range of potential future population scenarios.

[14] Health region refers to administrative areas defined by the provincial ministries of health (Statistics Canada 2015b). Saskatchewan had 13 health regions but combined them in 2017 (Statistics Canada 2015c).
[15] The projections were not available at the individual community level. The projections were developed considering trends in fertility, mortality and migration, and in discussion with experts (Chagnon et al. 2020).



LEGEND

- POPULATED PLACE
- URANIUM MINING FACILITY (ACTIVE)
- URANIUM MINING FACILITY (DECOMMISSIONED)
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- INDIAN RESERVE
- WATERBODY
- PROJECT LOCATION
- ECONOMY LOCAL STUDY AREA COMMUNITIES
- SOCIO-ECONOMIC REGIONAL STUDY AREA
- FIRST NATION TREATY BOUNDARIES
- HEALTH REGIONS
- LOCAL PRIORITY AREA
- MÉTIS NATION-SASKATCHEWAN NORTHERN REGION 2

0 100 200
1:3,800,000 KILOMETRES

REFERENCE(S)

1. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. PARKS OBTAINED FROM IHS MARKIT CANADA ULC.

PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT: NexGen Energy Ltd. — ROOK I PROJECT

TITLE: SASKATCHEWAN HEALTH REGIONS

CONSULTANT: wsp

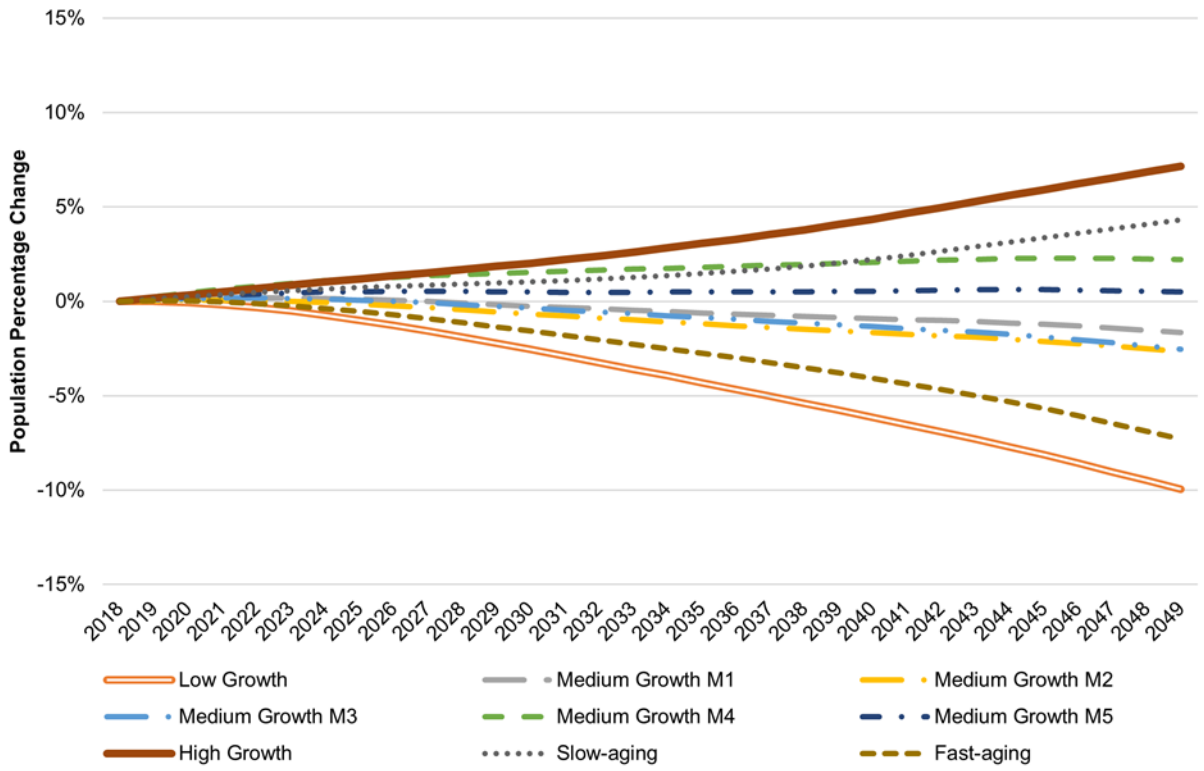
PROJECT		20144150	PHASE	3314 - 6
DESIGN	GE	2023-02-10	SCALE AS SHOWN	REV. 0
GIS	NO	2023-02-10		
CHECK	AM	2023-02-10		
REVIEW	KG	2023-02-10		

FIGURE 18

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

PATH: I:\CLIENTS\NexGen\20144150\Mapping\Products\FINAL_EIS_FIGURES_WSP_LOGO_UPDATED\18_Economy\8_5x11\20144150_Fig18_2-1_Economy-RSAL-SA-RookI-Project_Rev0.mxd PRINTED ON: 2023-02-10 AT: 6:58:38 AM

Figure 19: Cumulative Forecast Percentage Population Change by Scenario for Keewatin Yatthé Health Region, 2018 to 2049



Source: Statistics Canada, Custom projections for Health Regions in Canada (2018 to 2049). Raw data and discussions of assumptions presented in Appendix A, Table A-10, and Table A-10a.

Applying these increases and decreases to the LSA would result in a population range of approximately 5,400 to 6,400 by 2049, and average annual population changes ranging from a decrease of 0.34% to an increase of 0.22%. By contrast, Statistics Canada projects average annual population increases for Saskatchewan of between 0.84% and 1.72% for the period from 2018 through 2043 (Statistics Canada 2019; Appendix A, Table A-10a). This variability in the population projection estimated for the KYHR is consistent with past population trends for the LSA communities.

6.2 Economic Profile

The economic profile considers opportunities for employment and participation in the economic life of the community, including the monetary or financial resources that communities and municipalities use to achieve their economic objectives. Economic assets are key determinants of a community's overall economic vitality.

The following subsection documents the economic profile of the LSA communities in comparison to the RSA and Saskatchewan.

6.2.1 Economic Production

6.2.1.1 Regional Study Area Economy

The economy of the RSA is notably different than Saskatchewan overall. Mining, quarrying, and oil and gas extraction, educational services, public administration, and health care and social assistance accounted for a larger proportion of employment in the RSA in 2016 compared to the province (Section 6.4.2, Employment by Industry Sector). Other sectors such as agriculture, forestry, fishing and hunting, manufacturing, and retail trade, comprised a lower percentage of total employment in the RSA compared to the province.

The RSA had an employment rate of 37.2% in 2016, corresponding to a total of approximately 9,000 people employed among 902 employers, and a median income of $19,930 in 2015 (Statistics Canada 2017h,i). Overall, the economy of the RSA is relatively less diverse and underdeveloped compared with Saskatchewan as a whole.

The traditional economy or subsistence economy is also important to supporting the livelihood of many individuals and communities in the RSA; further information on the traditional economy and its importance can be found in Section 6.5.2, Traditional Economy.

In 2016, a report by Keewatin Career Development Corporation indicated that the high youth population in the RSA makes overall growth challenging. The report calculated youth entering the workforce at 600 per year against retirement at 240 per year. To maintain the current rate of employment, the RSA would have to create 360 new jobs or export that many workers. To match the provincial employment rate over the next 10 years, the RSA would need to add an additional 700 jobs per year. In total, the RSA would need to add around 1,000 jobs per year, or export that many workers or have a combination of the two to maintain current employment rates (KCDC 2016).

Saskatchewan employee wages and salaries in 2019 totaled $28.9 billion (in nominal [i.e., current] rather than real [i.e., inflation adjusted] dollars). The contribution of the mining and oil and gas extraction sector to employee wages and salaries in the province has been generally increasing between 2006 to 2016, with only a decrease from 2014 to 2016. In 2019, the sector contributed $2.5 billion in employee wages and salaries (i.e., 8.6% of the provincial total). This was a 65.6% increase from approximately $1.5 billion in 2009 (i.e., 7.3% of the provincial total) (Saskatchewan Bureau of Statistics 2021a). Information on wages and salaries at the RSA level was not available.

6.2.1.2 Gross Domestic Product

Gross domestic product (GDP) is a common measure of the value of goods and services produced in a jurisdiction over a particular time period. Mining and oil and gas extraction are the largest industries in Saskatchewan, accounting for over a quarter of the Saskatchewan GDP in 2020, or $19.8 billion (Table 6). Other industries supporting the mining industry such as transportation and warehousing, professional, scientific, technical, and hospitality-related services, are also important service-producing industries contributing to the provincial economy. Data disaggregation by type of mining was not available. The next highest producing industry sectors in Saskatchewan are management of companies and enterprises (i.e., 10.0% of total GDP) and agriculture, forestry, fishing, and hunting (i.e., 9.5%; Table 6).

Pre-pandemic, growth in the mining industry's GDP between 2016 and 2019 was 8.8%, outpacing almost all other goods-producing industries except for utilities (i.e., 9.4%). In 2020, the COVID-19 pandemic resulted in a notable decrease in the GDP of several industries. The mining industry sector experienced a 9.9% decrease in GDP from 2019 to 2020. In 2020, operations at Cameco's Cigar Lake mine and its partner mill, McClean Lake Mill, were temporarily shut down twice (a five-month suspension from March to July 2020 and December 2020 to April 2021) due to the threat posed by the COVID-19 pandemic (World Nuclear News 2021). The total workforce at Cigar Lake was 320 Cameco employees and 240 contractors; however, when under care and maintenance, the workforce dropped to about 75, split across two shifts. The workforce at McClean Lake Mill was reduced from 160 to 50 during care and maintenance (SaskToday 2020).

Table 6: Gross Domestic Product by Industry, Saskatchewan, Millions of Chained (2012) Dollars[16], 2016 to 2020

Metric	2016	2017	2018	2019	2020	% Change 2016-2019	% Change 2016-2020	Percentage of Total
All industries	79,317.50	81,121.10	82,387.50	81,454.20	77,272.80	2.7%	-2.6%	100.0%
Goods-Producing Industries	40,451.80	41,608.40	41,999.40	40,299.80	37,572.30	-0.4%	-7.1%	48.6%
Agriculture, forestry, fishing, and hunting	7,176.70	6,990.30	6,923.70	7,074.70	7,327.60	-1.4%	2.1%	9.5%
Mining, quarrying, and oil and gas extraction	20,187.10	22,023.70	22,609.60	21,971.50	19,805.10	8.8%	-1.9%	25.6%
Utilities	1,664.10	1,770.70	1,838.40	1,821.00	1,772.60	9.4%	6.5%	2.3%
Construction	6,210.50	6,094.20	5,844.00	5,203.60	4,575.80	-16.2%	-26.3%	5.9%
Manufacturing	4,707.30	4,751.40	4,951.30	4,562.10	4,225.90	-3.1%	-10.2%	5.5%
Service-producing industries	38,723.40	39,436.70	40,240.70	40,702.10	39,083.00	5.1%	0.9%	50.6%
Wholesale trade	3,740.80	3,782.80	3,941.50	3,917.00	3,849.80	4.7%	2.9%	5.0%
Retail trade	3,202.30	3,273.70	3,322.10	3,290.10	3,184.30	2.7%	-0.6%	4.1%
Transportation and warehousing	3,511.10	3,847.00	3,851.60	3,836.50	3,507.70	2.8%	-0.1%	4.1%
Information and cultural industries	1,293.60	1,250.20	1,249.30	1,292.80	1,264.80	2.9%	-2.2%	4.1%
Finance and insurance	2,472.80	2,606.40	2,693.50	2,761.60	2,899.80	9.3%	17.3%	4.5%
Real estate and rental and leasing	7,300.70	7,490.80	7,604.30	7,689.40	7,791.60	-0.1%	6.7%	1.6%
Professional, scientific, and technical services	1,608.50	1,545.90	1,567.30	1,645.70	1,582.10	11.7%	-1.6%	3.8%
Management of companies and enterprises	307.60	227.20	168.50	135.40	87.40	5.3%	-71.6%	10.1%
Administrative and support, waste management and remediation services	903.00	882.80	896.00	863.40	754.90	2.3%	-16.4%	2.0%
Educational services	3,376.00	3,447.00	3,555.60	3,642.80	3,459.10	-56.0%	2.5%	0.1%
Health care and social assistance	4,425.10	4,475.80	4,603.00	4,728.20	4,444.00	-4.4%	0.4%	1.0%
Arts, entertainment, and recreation	419.20	429.00	429.30	430.80	275.30	7.9%	-34.3%	4.5%
Accommodation and food services	1,172.60	1,141.20	1,157.30	1,175.20	852.9	6.8%	-27.3%	5.8%
Other services (except public administration)	1,156.50	1,185.30	1,202.10	1,210.00	1,072.50	2.8%	-7.3%	0.4%
Public administration	3,903.00	3,963.20	4,094.60	4,156.30	4,153.10	0.2%	6.4%	1.1%

Source: Statistics Canada 2021a.
Note: For chained dollars, the aggregates are not equal to the sum of their components.

[16] Chained Dollars is a method of adjusting real dollar amounts for inflation over time, so as to allow comparison of figures from different years.

In its 2020/2021 mid-year economic report, the Saskatchewan Bureau of Statistics (2021b) noted the provincial economy was affected by both the COVID-19 pandemic and fall in global oil prices. At the mid-point of the 2020/2021 fiscal year, the economy was noted to have performed better than originally anticipated in the 2020 budget. Employment recovery was noted to be uneven across industries, with employment in accommodation and food services in October 2020 still well below pre-pandemic levels while employment in construction and wholesale and retail trade had rebounded. Equivalent employment information for the mining and oil and gas sector was not provided in the mid-year economic report. The 2020/2021 mid-year economic report noted no material changes to the medium-term economic outlook compared to previous Government of Saskatchewan economic reports, which showed provincial revenues rebounding and reductions in provincial deficits through 2024/2025. This lack of material changes was driven in part by substantial growth in nonrenewable resource revenues, though resource revenues were not forecast to recover to 2019/2020 levels until 2023/2024 (Saskatchewan Ministry of Energy and Resources 2020).

6.2.1.3 Major Capital Projects

Major proposed projects in the RSA include the following (Government of Saskatchewan n.d.b):

Denison Wheeler River Project

- Denison Mines Corp. (Denison) is proposing to develop an in-situ recovery uranium mining and processing operation located in the eastern portion of the Athabasca Basin in northern Saskatchewan approximately 4 km west of Highway 914, midway between Cameco Corporation's Key Lake Mill and McArthur River Mine. The proposed project is expected to produce up to 5,400 tonnes of uranium octoxide (yellowcake) annually for 20 years. The project will be assessed under *Canadian Environmental Assessment Act, 2012* and the proponent is expected to enter the construction phase in 2022, with operations continuing until decommissioning in 2044 (IAAC 2020b).

Rabbit Lake Tailings Management Facility Expansion Project

- Cameco Corporation is proposing to extend the life of the Rabbit Lake Operation by expanding the tailings facility located at the current site. The project would consist of modifications to the site's existing facility components and processes, as well as licensed activities at Rabbit Lake including increasing the tailings management capacity from 9 to 12 million cubic meters. The additional 3 million cubic meters of tailings capacity would support continued mine activities. In 2018, Cameco suspended production at five uranium sites in North America including the Rabbit Lake facility under care and maintenance. However, in February 2022 announced that it would restart operations amid uranium price gains (S&P Global 2022).

Highway 914 All-Weather Road

- The Saskatchewan Ministry of Highways and Infrastructure is proposing a project which includes the construction of a 51.7 km all-weather road between the existing roads to the McArthur River and the Cigar Lake Mine Site in northeastern Saskatchewan. The project would include the construction of the all-weather road, water crossings, temporary structures including: construction roads, work camps, water withdrawal facilities, aggregate and borrow pits, as well as all physical works and undertakings associated with fish habitat compensation planning. The project is expected to take approximately three years to complete and will connect Highway 905 and 914 (MBC News 2021).

6.2.2 Overview of Local Study Area Economy

This subsection provides an overview of the LSA economy with specific reference to regional connectivity, key centres, and economic vitality. The proceeding subsections provide further detailed context to the overview.

The LSA is economically supressed by a lack of economic opportunity due to no suitably sized primary industry since the decline of the fur industry in the 1960s. Labour force participation rates in LSA communities are low and unemployment rates are high, with employment concentrated primarily in government-funded service sectors and Crown corporations. There are lower employment rates in rural sectors, including those associated with agriculture, forestry, fishing and hunting, manufacturing, and retail trade, than in the province overall. The LSA has a limited tourism industry or infrastructure and limited manufacturing. Fishing and commercial forestry activities contribute to the LSA economy, though to a limited scale. Mineral exploration and investment activity in the LSA is growing and northern businesses have expanded their scope of goods and services. However, challenges remain as distance to markets and energy costs remain high. From 2008 to 2017 there was 328.3 million pounds of measured and indicated uranium resources found in the west side of the province, with more than 70% of the resources located north of La Loche (DMCA 2018). La Loche is the closest urban settlement on Highway 955 to the uranium opportunities in northwestern Saskatchewan; however, the only mineral related activity occurring in this area at present is exploration activity.

6.2.2.1 Local Business Diversity

Residents of the LSA have noted there are a limited number of locally owned businesses, and that goods and services must often be sourced from outside the LSA communities (2019 to 2021 KP interview program). Key Person interview participants noted several local businesses in Buffalo Narrows and La Loche have experienced some growth in recent years due to mineral exploration in the area. Other customers include local residents, governments, government employees, the RCMP, and hospitals. CenterPoint Grocery and Pharmacy, and P&R Service in La Loche have been working with NexGen to provide food and fuel for the current exploration camp located at Patterson Lake (2019 to 2021 KP interview program). While the existing stores in Buffalo Narrows meet the needs of the community, interviews indicated that the price for products, food (especially fresh food), and fuel are high. Residents noted a strong interest in expanding local business opportunities, including exploring partnerships between communities. Local study area residents have commented they see substantial value not just in expanding employment opportunities, but also ownership interests in businesses (BNDN-JWG 2021a; BRDN-JWG 2020).

Table 7 presents the registered businesses in the LSA communities. Buffalo Narrows has the greatest variety of businesses amongst the LSA communities followed by La Loche and CRDN. The CRDN owns four construction corporations including RobWel constructors (in Meadow Lake), IWL Steel Fabricators (in Saskatoon and Martensville), Clearwater River Enviro Limited Partnership, and Clearwater Pipe Rentals Limited Partnership (RobWel 2018). The BRDN has partial ownership of two mills (Meadow Lake pulp mill, oriented strand board mill), Polar Oils, Mystic Management, and fisheries. Interviewees noted that there is only one store in the community.

In comparison to other northern communities in the RSA, the LSA communities exhibit less business activity. A 2018 study compared La Loche and the CRDN to other RSA communities to illustrate the shortage of business activity in the La Loche / CRDN area (DMCA 2018). In 2016, La Loche and the CRDN had a combined 23 businesses. For comparison, the community of Tisdale[17], a community located in central Saskatchewan with a

[17] Tisdale does not have a trading area and is not on a highway with large volumes of traffic.

similar population count as La Loche and the CRDN combined, had 241 businesses. La Ronge, a community with double CRDN's population and located on a highway near an operating mine in northeastern Saskatchewan, had 125 businesses.

Table 7: Registered Businesses in Local Study Area Communities

Sector	CRDN	La Loche	BNDN	BRDN	Buffalo Narrows
Gas bars, automotive services, and maintenance	n/a	5	n/a	n/a	6
Construction and trucking services	4	2	n/a	n/a	6
Restaurants and taverns	n/a	2	n/a	1	3
Lumber and hardware supply stores	n/a	2	n/a	n/a	1
Grocery and convenience stores	1	4	1	2	2
Outfitters	n/a	1	1	n/a	3
Financial and insurance services	n/a	n/a	n/a	n/a	2
Other Services	2	n/a	1	1	3

Source: BNDN 2013; CRDN 2013; BNEDC 2021a; RobWel 2018; Northern Business Directory 2016, 2017; 2019 to 2021 KP interview program.
Note: The smaller LSA communities do not have registered businesses.
CRDN = Clearwater River Dene Nation; BNDN = Birch Narrows Dene Nation; BRDN = Buffalo River Dene Nation; n/a = not applicable; LSA = local study area.

Various outfitting establishments outside La Loche provide seasonal income to residents. Businesses in La Loche hire local employees and report low staff turnover. Currently, there are no motels or temporary accommodations in La Loche (2019 to 2021 KP interview program). Temporary accommodations available in Buffalo Narrows include the Waterfront Inn and Krows Nest Inn, lodges, guest houses, and campgrounds (BNEDC 2021b). All staff are local, with low turnover rates reported (2019 to 2021 KP interview program).

The 2018 economic, sector, and demographic study identified the notable business shortages in the La Loche / CRDN region in the sectors of utilities; manufacturing; information; cultural; and arts, entertainment, and recreation (DMCA 2018). The study also noted that there were limited companies related to mining, construction, accommodation, and food services. The CRDN, BNDN, and BRDN have access to business planning and economic development support services as member Nations of the MLTC (MLTC 2021; MLTC 2020g). La Loche's Economic Development Corporation has a mission to showcase cultural identity, build capacity, and create economic opportunity so that people in the community can reach their potential while enhancing and encouraging personal and community development (LLEDC 2018). Buffalo Narrows has an Economic Development Corporation that was intended to identify and undertake viable opportunities for community business development, and to stimulate employment through business ventures (BNEDC 2021a). Other communities such as the BNDN and BRDN have economic development officers.

Funding programs available to support economic development include the following:

- Indigenous Business Funding Programs from the Government of Saskatchewan (Government of Saskatchewan n.d.c):
  - Clarence Campeau Development Fund (Métis Development Fund): provides equity for Métis businesses, loan support to community economic development initiatives, and assistance for Métis business owners and entrepreneurs to develop management skill.

- Saskatchewan Indian Equity Foundation Inc.: Indigenous financial institution that offers developmental lending to First Nations businesses in Saskatchewan.
- SaskMétis Economic Development Corporation: Aboriginal Capital Corporation that finances the start-up, acquisition, and expansion of Métis-controlled small businesses in Saskatchewan.

- The Saskatchewan Indigenous Economic Development Network.
- Indigenous Business Development Services: support for entrepreneurs in Saskatchewan.
- Business and economic development from the Government of Canada (Government of Canada 2021a):
  - Aboriginal Entrepreneurship Program;
  - Lands and Economic Development Program;
  - Aboriginal Forestry Initiative;
  - Strategic Partnerships Initiative;
  - Procurement Strategy for Aboriginal business; and
  - Community Opportunity Readiness Program.

6.2.2.2 Major Capital Projects

The only other major mining project, existing or proposed, in the LSA is the Fission Patterson Lake South Property, which is planned by Fission Uranium Corp. (Fission 2019, 2021). The lifespan of the Fission Patterson Lake South Property was estimated based on available information and some necessary assumptions. Public information describes a projected three-year construction period and seven-year operating period (i.e., production and processing; Fission 2019, 2021). The anticipated start of construction and duration of active decommissioning at the Fission Patterson Lake South Property were not publicly available at the time of report writing.

6.2.3 Government Revenues

6.2.3.1 Uranium Royalties

Uranium royalties in Saskatchewan are payable in accordance with *The Crown Mineral Royalty Regulations* pursuant to *The Crown Minerals Act*. The Saskatchewan uranium royalty system has three components (Government of Saskatchewan 2021d):

- basic royalty – 5% of gross revenue;
- profit royalty – rates increase from 10% to 15% as net profit increases; and
- Saskatchewan Resource Credit – a credit of 0.75% of gross revenue.

The Government of Saskatchewan reported total non-renewable resource revenues from all sources (including oil and gas, potash, and other non-renewable resources) for Saskatchewan of $1.750 billion in 2019/20 and $1.735 billion in 2018/19.

The Saskatchewan Ministry of Energy reported uranium resource revenues of $42.4 million in 2020/21 and a decrease from $53 million in 2019/20 due to a decrease in sales volumes (Saskatchewan Ministry Energy and Resources 2020, 2021). This can be attributed to the suspension of Cameco's Cigar Lake operations and the McClean Lake Mill due to COVID-19. However, this still represented a 51.4% increase from 2018/19, when uranium resource revenues were $28 million (Saskatchewan Ministry of Energy and Resources 2019).

6.2.3.2 Resource Surcharge

Large resource corporations in Saskatchewan are subject to the Corporation Capital Tax Resource Surcharge pursuant to *The Corporation Capital Tax Act*. A tax rate of 3.0% is applied to the value of resource sales (Ministry of Finance 2021).

Total resource surcharge revenues reported by the provincial government were $413 million in 2020 and $394 million in 2019, which includes the resource surcharge of 3% (Government of Saskatchewan 2020a).

6.2.3.3 Mineral Surface Lease Agreements

Section 5-16 of *The Crown Resource Lands Regulation*, 2019 under *The Provincial Lands Act, 2016* enables the minister responsible for the administration of *The Forest Resources Management Act* to issue a mineral surface lease to access Crown resource land for mineral extraction. Mineral Surface Lease Agreements apply to mines operating on Crown Land in the NSAD and are administered by the Ministry of Government Relations and ENV to provide long-term land rental (Government of Saskatchewan 2021e). Fees associated with MSLAs are set out in Section 6-3 of *The Crown Resource Lands Regulation, 2019*.

6.2.3.4 Corporate Income Tax

Federal corporate income taxes are payable to the Government of Canada pursuant to the *Income Tax Act*. The 2021 corporate tax rate after the general tax reduction was 15%. The Government of Canada reported corporate income tax revenues of $50.060 billion in 2019/2020 and $50.368 billion in 2018/19.

Provincial corporate income taxes are payable and to the Government of Saskatchewan pursuant to The *Income Tax Act, 2000*. The 2021 corporate income tax rate in Saskatchewan was 12% according to Section 56(1) of the *Income Tax Act, 2000*. The Government of Saskatchewan (2020a) reported corporation income tax revenues of $787 million in 2020 and $586 million in 2019.

6.2.3.5 Individual Income Tax

Federal individual income taxes are payable to the Government of Canada pursuant to the *Income Tax Act*. The 2021 individual income tax rates ranged from 15% to 33% depending on the tax bracket. The Government of Canada (2019b; 2021c) reported individual income tax revenues of $167.576 billion in 2019/2020 and $163.881 billion in 2018/2019.

Provincial personal income taxes are payable to the Government of Saskatchewan pursuant to *The Income Tax Act, 2000*. The 2021 personal income tax rates in Saskatchewan ranged from 10.5% to 14.5% depending on the tax bracket. The Government of Saskatchewan (2020a) reported individual income tax revenues of $2.629 billion in 2020 and $2.340 billion in 2019.

6.2.3.6 Government Revenue Summary

Several provincial and federal sources of revenue can be affected by the uranium sector. The primary sources of government revenue that could be affected by the Project are uranium royalties, resource surcharges, mineral surface lease payments, corporate income tax, and individual income tax.

Table 8 presents historical non-renewable resource revenue and mineral rights tax for the years 2017/2018 to 2020/2021. There have been substantial changes in uranium resource revenue from year-to-year. In the most recent period for which data are available (2020/2021), provincial uranium resource revenue totalled $4.2 billion, the lowest amount in recent years, and a 92.0% decrease over the previous period (i.e., 2019/2020). This can be attributed to the lower sales volumes due to the suspension of Cameco's Cigar Lake operations and the McClean Lake Mill.

Pre-pandemic revenue from uranium consistently made up the third or fourth largest share of revenue, ranging from 2.1% to 6.3% of the total from 2017/2018 to 2019/2020. Although the Government of Saskatchewan received a $59.8 million transfer from the federal government in the 2020/2021 fiscal year, overall revenue declined due to the precipitous drop in non-renewable resource revenue (especially oil and uranium) from lower demand during the COVID-19 pandemic and uranium mill shutdowns.

Table 8: Provincial Non-renewable Resource Revenue and Other Own-Source Revenue Summary, 2017/2018 to 2020/2021, Thousands of Dollars

Metric	2017/2018		2018/2019		2019/2020		2020/2021	
	$	%	$	%	$	%	$	%
Non-renewable resource revenue								
Oil	650,460	53.1	678,273	50.2	663,528	49.1	369,760	40.4
Crown Land sales	64,684	5.3	58,088	4.3	17,127	1.3	6,652	0.7
Natural gas	6,083	0.5	3,292	0.2	4,263	0.3	8,424	0.9
Potash	308,675	25.2	536,008	39.7	554,426	41.0	423,147	46.2
Uranium	76,736	6.3	28,230	2.1	53,264	3.9	4,237	0.5
Other minerals	34,018	2.8	37,384	2.8	44,346	3.3	33,937	3.7
Total non-renewable resources[(a)]	***1,140,656***	***93.1***	***1,341,275***	***99.2***	***1,336,954***	***98.9***	***846,157***	***92.4***
Other own-source revenue								
Mineral rights tax	9,365	0.8	9,429	0.7	11,409	0.8	9,704	1.1
Sales, services, and service fees	3,765	0.3	252	0.0	941	0.1	362	0.0
Other miscellaneous revenue	5,869	0.5	549	0.0	2,417	0.2	170	0.0
Total other own-source revenue	***18,999***	***1.6***	***10,230***	***0.8***	***14,767***	***1.1***	***70,046***	***7.6***
Transfers from the federal government	***65,201***	***5.3***	***n/a***	***n/a***	***n/a***	***n/a***	***59,810***	***6.5***
Total revenue ministry of energy and resources	**1,224,856**	**100.0**	**1,351,505**	**100.0**	**1,351,721**	**100.0**	**916,203**	**100.0**

Source: Saskatchewan Ministry of Energy and Resources 2018, 2019, 2020, 2021.
Totals may not add up due to rounding
a) Includes oil, Crown Land sales, natural gas, potash, uranium, and other minerals.
n/a = not applicable.

6.2.4 Economic Challenges and Development Priorities

This subsection describes the key challenges and development priorities for the RSA.

Economic diversification is a known driver of employment opportunities and increases to labour force participation rates. The RSA has limited economic diversity, with many economic sectors relatively underdeveloped, reflected in industry sector employment (Section 6.4.2, Employment by Industry Sector). Occupations are concentrated in the sectors of mining, education, and health (Section 6.4.2, Employment by Industry Sector). The RSA has relatively low employment rates and labour force participation rates (Section 6.4.1, Labour Market). While the RSA is the host for several major mining operations (Section 5.1.1.5, Uranium Mining Industry), the RSA economy often does not experience the value of the direct and indirect spending as many mining jobs are held by people who reside outside the RSA (KCDC 2016).

The high proportion of young people in the RSA population is a challenge in terms of expanding education and training and creating economic growth that can match the number of young people entering the workforce (KCDC 2016). The growing size of the senior population presents challenges for health service provision and supportive living services.

6.2.4.1 Economy

The low population density and remoteness of the communities in the RSA are a challenge to economic development. The RSA has a less diversified economy, a more limited access to services and educational opportunities, and higher transportation costs. In many of the RSA communities, transportation costs are very high or precarious (e.g., remote fly-in communities that may only be accessible by winter road). The lack of supporting infrastructure for the communities and the distance between communities and major urban hubs (of which none are located in the RSA) increases the cost of living and operating a business, with higher costs for transportation, construction materials, food, and utilities (Saskatchewan Chamber of Commerce 2014).

Based on previous feedback from Indigenous Groups, stakeholders, community workshops, research, and interviews, it has been identified that the lack of economic opportunity within the region is a contributing factor to diminishing interest in training and education, as there are limited employment opportunities available. Recommendations made in relation to improving continued economic growth include (DMCA 2018):

- promoting exploration and investments within the RSA;
- exploring additional industry development such as manufacturing, metal fabrication, and alternative energy production; and
- development of an all-season road to Fort McMurray to increase tourism development opportunities.

During the 1990s, northern Saskatchewan (predominantly the western portion) was the focus of large expansion within the uranium mining/milling industry. The exploration for, and discovery of, uranium gradually shifted from the east side of the province to the west side, where La Loche is located. La Loche remains the closest major community situated on the only corridor which provides access to the most recent uranium discovery/exploration projects.

6.2.4.1.1 Joint Federal-Provincial Panel on Uranium Developments in Northern Saskatchewan

The Joint Panel (Section 5.1.1.4.10) conducted public reviews of seven environmental impact statements covering the mining and milling of nine separate ore bodies. The Joint Panel provided over 100 recommendations focusing on stimulating changes in government policy, industry action, training-for-employment programs, employment statistics, and northern business development.

The Joint Panels recommendations included the following recommendations (Minister of Supply and Services Canada 1993):

- the approval of the Dominique-Janine Extension at the Cluff Lake mine;
- that permission to proceed not be granted to the proposed Mid-west Joint Venture mine;
- that the McClean Lake Project be delayed for at least 5 years to allow time for education, training and research;
- that start-up of any other approved projects also be spread over a number of years so that companies could work to keep training aligned with the pace of development in communities;
- that the adoption of a *Human Resource Development Agreement* take place to include employment objectives which would balance retention of workforce employees originating from nearby communities; and
- promotion of business opportunities for northerners to participate in available opportunities.

Human Resource Development Plans created for the purpose of proposed projects must include reporting on employment statistics for proposed projects to the Ministry of the Economy Labour Market Services on behalf of on-site contractors. Information must include:

- a list of employees on-site in each Employment Classification of the Operation;
- identification regarding who are residents of Saskatchewan’s North, as well as who is from the designated Priority Recruitment Communities;
- detailed information regarding the nature and value of goods and services purchased during the year during the construction, operation, reclamation, and decommissioning phases;
- a description of activities undertaken by the operator of the project and its on-site contractors to achieve any objectives in the Business Opportunities Forecast for the year;
- the preparation of a five-year rolling Business Opportunities Forecast which must be updated annually;
- information on compliance with the Social and Economic Benefits Commitments, which are listed in Appendix "C". [MSLA Article 18.2]; and
- outlined commitments to work with appropriate government agencies and industry counterparts, to develop and fund a means by which to study the impacts of uranium mining operations on the vitality of communities in the NSAD through the study of selected representative communities.

Although the Government of Saskatchewan did not accept the recommended 5-year delay for the McClean Lake Project, it did commit to implementing the majority of the other recommendations made by the Joint Panel largely due to outside political pressure. The Government of Saskatchewan also initiated the first 5-year Multi-Party Training Plan (MPTP) in late 1993 with regards to training for employment in the uranium mining industry, and based on early success, the MPTP was renewed in 1998, 2003, and 2010. Information on the current status of MPTP was not available. The MPTP is further discussed in Section 6.6.4, Mining-Specific Training.

6.2.4.1.2 Northern Development Fund

In February 1995, the province announced the $4-million NDF to stimulate economic development in northern Saskatchewan and to support northerners in business creation in response to an expanding uranium sector as describes in Section 5.1.1.4.8, Northern Development Fund. To qualify, individual applicants were required to have been resident in the NSAD for at least 10 years.

The NDF had three main program elements, for which the government initially allocated approximately $2.6 million annually. They were:

- a $2-million loan program for northern businesses, especially those pursuing diversification opportunities and resource industry contracts;
- support and $315,000 in funding for new Community-based Regional Economic Development Organizations; and
- $250,000 in targeted assistance to businesses for marketing, promotion, and research and development activities.

The NDF program development and implementation was driven by the Northern Economic Development office in La Ronge and administered by Saskatchewan Northern Affairs. In an area of the province with relatively few commercial banking services, the NDF provided an alternative source for northern residents who might not be able to obtain financing elsewhere.

The NDF program also established a Northern Review Board composed of northern residents. The Board was established to ensure that northerners had meaningful input on the fund's administration, planning, priority-setting, and coordination of government and community economic development.

It is important to note that the NDF also included a component to assist northerners who, rather than pursue business opportunities to supply goods or services to the mining sector, wanted to continue traditional economic activities such as commercial fishing and trapping by providing short-term loans for equipment and supplies.

An additional $1.4 million under the NDF was to be used to provide increased professional and technical business advice to northerners and to develop an organizational training and business skills enhancement package. It also provided for the creation of a "northern business directory".

By the end of the 2004-2005 fiscal year, the NDF had provided almost $16 million in loans and $5.7 million in grants, assisting northern residents to participate in the northern economy more fully. The NDF was discontinued sometime after 2007. In part, the NDF contributed to a large growth in the value of goods and services provided by northern business to the mining industry in the RSA. Analysis of annual mineral industry purchase data from northern businesses in Saskatchewan for the period 1991 to 2018 (Government of Saskatchewan 2018a) shows

an increase in spend from approximately $100 million in 1995 to a peak of approximately $624 million in 2012. Between 2012 and 2018, the total value of purchases decreased to approximately $178 million, which is similar to the years 2005 and 2006. The peak and later decline in purchase value aligns with fluctuations in the uranium mining industry in northern Saskatchewan. As of the writing of this report, no data has been provided by the Government of Saskatchewan since 2018.

6.2.4.1.3 Challenges for Local Businesses

Over time, northern businesses servicing the uranium sector have expanded their scope of goods and services to include heavy construction services, transportation, and bulk commodities, as well as the customer base for their existing services (CVMPP 2013). However, challenges remain largely because distance to markets and energy costs remain high. For example, there are only two larger stores in La Loche, and the prices and cost of living is reported to be high (2019 to 2021 KP interview program).

The highway leading to the La Loche region is not a thoroughfare, no developed attractions in the region are established, nor are hotel and restaurant amenities available. The region only contains one provincial park, which experiences a limited number of visitors annually. The outfitting industry in the region is also small and underdeveloped. Ideas to mitigate local business challenges include the construction of an all-season road link between Fort McMurray and La Loche to create development opportunities along the corridor to promote tourism and related activities in the region (DMCA 2018).

Improvements to the region's transportation infrastructure could work to lower energy costs and distance to markets, mitigate financial barriers local businesses may face in relation to developing opportunities and growth in relation to the manufacturing sector, and service the mineral sector (DMCA 2018). A local example includes the Northern Resource Trucking Limited Partnership, a joint venture between several communities including the CRDN and BNDN. Though based in Saskatoon, the joint venture focuses on long-distance hauling between mine sites in the RSA (NRTLP 2022). A study conducted on the socio-economic effects of uranium mining within the RSA highlighted that the size of contracts and the administrative requirements of managing uranium sector contracts also remain barriers to participation by northern-owned businesses (CVMPP 2013).

During JWG meetings, local residents noted economic development and contracting with local businesses is a priority for their communities, with a BRDN member stating, "we want to own the company, to be the contractor in a meaningful partnership – a huge percentage of the company" (BRDN-JWG 2020).

6.2.4.2 Employment, Education and Training

During KP interviews, several LSA residents noted they felt left out of the economic benefits of the uranium industry. Residents expressed that the mines in the Athabasca Basin tended to focus on the communities nearest to the uranium mines and that employment and business opportunities from those mines did not benefit communities in the northwest to the extent they should have. Despite this sentiment, many residents of the LSA communities have expressed interest in employment opportunities closer to home, including employment in the mining sector (CVMPP 2013; 2019 to 2021 KP interview program). Communities in the LSA have historically had lower employment rates in the uranium mining industry compared to other communities in the RSA. For example, employment rates in uranium mining in 2006 for LSA communities (i.e., 2.6% for La Loche and the CRDN, 5.2% for Buffalo Narrows, and 4.3% for Turnor Lake) were lower in comparison to select communities in the RSA

(i.e., 11.4% for Wollaston Lake, 11.7% for Air Ronge, and 9.2% for La Ronge[18]; CVMPP 2013). This lower employment rate was attributed to the considerable distance between the LSA communities and the current uranium mines in northeastern Saskatchewan; however, it could also be a result of other operations' Human Resource Development Agreements (required as a condition of MSLAs) that prioritize hiring in proximity to the respective sites.

The RSA has lower levels of educational attainment than Saskatchewan overall (Section 6.6.1, Educational Attainment) for high school, college, and university graduates. Lower educational levels are linked to lower employment and incomes as residents do not have the qualifications to fill some of the employment available. Residents of the RSA are underrepresented in professional, technical, and trade occupations relative to the number of positions employed, particularly in the mining industry (KCDC 2016).[19]

The median age in the RSA is much lower in comparison to Saskatchewan and somewhat lower compared to the broader north. This lower median age in the RSA gives the workforce an advantage due to the youthfulness of the population, whereas other places may face challenges surrounding aging workforces. However, lack of education and training opportunities has been cited by residents in the LSA as a barrier to employment in the uranium sector. Human Resources and Skills Development Canada estimates that 70% of new jobs will require a post-secondary education, which requires a Grade 12 education (DMCA 2018). Local study area residents have commented that positions that require higher education and skill levels are often not filled by local employees. Some LSA residents commented that various mines employing residents in the RSA closed before some employees had the opportunity to obtain their formal trade tickets on-the-job. Despite having training and relevant work experience that they felt should have allowed them to meet the qualification requirements, workers that did not have the formal trade tickets faced barriers in gaining other employment following mine closure (2019 to 2021 KP interview program).

6.3 Community Features and Infrastructure

Existing community features and infrastructure are further described in this subsection. Information included within this subsection is inclusive to communities within the LSA, but context regarding the RSA is provided. This subsection discusses aspects such as community housing stock and conditions, recreational services and facilities, healthcare services and social support, education and training institutions, and protective and emergency services. Information regarding topics on community infrastructure such as water and waste management, power and energy generation, telecommunications, and transportation are also discussed.

6.3.1 Regional Study Area

SaskBuilds is responsible for providing a central focus within the Government of Saskatchewan to coordinate infrastructure planning and delivery (SaskBuilds n.d.a). This includes the development of an annually updated integrated infrastructure plan that is used to inform the budget development process. Through this process, SaskBuilds helps ministries work toward strategically aligning infrastructure investments to the province's economic growth, population growth, and quality of life priorities.

[18] 2006 data were the most recent available at the time research for the 2013 Community Vitality Monitoring Partnership Program report was undertaken.

On 3 October 2018, the governments of Canada and Saskatchewan announced the signing of an Integrated Bilateral Agreement under the Investing in Canada Plan to provide long-term infrastructure funding over the next decade (SaskBuilds n.d.b). Projects under this agreement were intended to improve community health and safety, economic growth and sustainability, environmental protection, and quality of life through investments in:

- northern, rural, and remote roads and airports;
- municipal and regional infrastructure;
- greenhouse gas mitigation; and
- culture and recreation facilities.

6.3.2 Local Study Area

6.3.2.1 Housing

Housing in the LSA is described for both First Nations on-reserve and for other communities as the ownership and management of housing maintenance in these communities is distinct. At the time of writing, information on on-reserve housing in CRDN was not available. This information will be integrated when available.

6.3.2.1.1 Community Housing

Housing in the LSA is described for both First Nations on-reserve and for other communities as the ownership and maintenance of housing in these communities is distinct. “Providing and managing housing on-reserve is the responsibility of First Nations. The Government of Canada provides funding to First Nations for safe and affordable on-reserve housing” (Indigenous Services Canada 2016). In the LSA, housing on-reserve is largely provided by the bands, while some housing is privately owned by members in Dillon, Birch Narrows, and Clearwater River[20], which is not fully represented in Census of Population data (2019 to 2021 KP interview program). The bands maintain current housing stock and build new houses. Due to limited funding and high demand for housing, housing can be slow to build and maintain, which results in members moving to different communities until housing in available (Rook I Project KPI Program 2019-2021). There is currently a waitlist for band housing in Birch Narrows and Buffalo River Dene Nation (Dillon). Table 9 outlines the private households by tenure and occupied private dwellings by conditions for LSA reserves (i.e., CRDN, BNDN, and BRDN). It is important to note that the dataset has random round to 0 or 5, resulting in not all values adding up to totals. This data is therefore useful to provide an indication of the housing situation rather than precise data of the exact situation.

Due to limited funding and high demand for housing, housing can be slow to build and maintain, which results in members moving to different communities until housing is available (2019 to 2021 KP interview program). Housing was noted as an important part of community well-being by the BRDN, and it was indicated that there is currently a housing shortage at Clearwater River Band No. 222 (TSD V.3: CRDN Socio-economic and Harvest Study for NexGen Rook I Project). In particular, the need for better housing was identified, and there is some concern regarding a lack of available land supply for housing (TSD V.3: CRDN).

Due to the high demand for housing, prioritizing housing for families over single people occurs for members of both BNDN and BRDN. Housing conditions are variable in Dillon and Birch Narrows (2019 to 2021 KP interview

[20] All on-reserve CRDN residents, primarily residing in Clearwater River Dene Band No. 222, henceforth referred to as Clearwater River.

program). Housing was noted as an important part of community well-being by the BRDN, and it was indicated that there is currently a housing shortage in Dillon (BRDN-JWG 2020). There is currently a waitlist for band housing in Birch Narrows and BRDN (i.e., Dillon). In 2020, there was a waitlist of 30 or more people in Birch Narrows, and people may be on the waitlist for several years (2019 to 2021 KP interview program). In Dillon, the housing waitlist is extensive[21] and homelessness is an issue. In 2019, the BRDN bought a camper trailer for those in need as there is no formal housing for the homeless.

Due to the high demand for housing, prioritizing housing for families over single people occurs for members of both the BNDN and BRDN. Funding from Canada-Indigenous Relations and Northern Affairs Canada depends on population statistics, and interviewees noted that not everyone was available for the census count, making the statistics inaccurate (2019 to 2021 KP interview program).

In 2016, most dwellings on-reserve in the LSA required regular maintenance or minor repairs (i.e., 62% in Clearwater River, 69% in Birch Narrows, and 59% in BRDN [Dillon]; Table 9). Major repairs required in Birch Narrows and BRDN (Dillon) include treating black mould and fixing or replacing roofing (2019 to 2021 KP interview program). Extensive renovations since 2016 have occurred in Dillon. Black mould is a common problem in Dillon and Birch Narrows, and can often result in families moving into temporary housing while issues are addressed (2019 to 2021 KP interview program).

Table 9: Private Households by Tenure and Occupied Private Dwellings by Conditions for LSA Reserves, 2016

Housing Characteristics	CRDN[a,b,c]	BNDN[a,b,d]	BRDN[a,b,e]
Private households by tenure[f,g]	185	130	235
Owner	10 (5%)	0 (0%)	35 (15%)
Renter	15 (8%)	10 (8%)	15 (6%)
Band housing	170 (91%)	120 (92%)	180 (77%)
Occupied private dwellings by dwelling condition[g,h]	185	130	230
Only regular maintenance or minor repairs needed	115 (62%)	90 (69%)	135 (59%)
Major repairs needed	75 (41%)	40 (31%)	100 (43%)

Source: Statistics Canada 2016.
a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) Statistics Canada refers to CRDN as Clearwater River Dene Nation Band 222.
d) Statistics Canada refers to BNDN as Birch Narrows Dene Nation – Turnor Lake 193B.
e) Statistics Canada refers to BRDN as Buffalo River Dene Nation Band 193.
f) Tenure: refers to whether the household owns or rents their private dwelling. The private dwelling may be situated on rented or leased land or be part of a condominium. A household is considered to own their dwelling if some member of the household owns the dwelling even if it is not fully paid for, such as if there is a mortgage or some other claim on it. A household is considered to rent their dwelling if no member of the household owns the dwelling. A household is considered to rent that dwelling even if the dwelling is provided without cash rent or at a reduced rent or if the dwelling is part of a cooperative.
For historical and statutory reasons, shelter occupancy on Indian reserves or settlements does not lend itself to the usual classification by standard tenure categories. Therefore, a special category, band housing, has been created and is included in the classification of tenure.
g) 25% sample data.
h) Dwelling condition refers to whether the dwelling is in need of repairs. This does not include desirable remodelling or additions.
CRDN = Clearwater River Dene Nation; BNDN = Birch Narrows Dene Nation; BRDN = Buffalo River Dene Nation.

[21] The waitlist count is not exact, with some interviewees indicating that it is over 100 people; however, it should be noted that some applicants reapply multiple times (2019 to 2021 KP interview program).

6.3.2.1.2 Off-Reserve Housing

Information on off-reserve housing in the LSA communities was provided through KP interviews. Housing is reported to be very overcrowded in La Loche and some people reside in houses with 10 to 15 other people (2019 to 2021 KP interview program). La Loche has about 700 units, with no more than 10% privately owned. Based on available information, of these 700 units, over 300 units are owned by the La Loche Housing Corporation (affiliated with Sask Housing), 55 units are owned by Northern Lights School, approximately 20 units are owned by the RCMP, and approximately 20 units are owned by the health authority (2019 to 2021 KP interview program). Methy Housing Corporation owns 129 units in La Loche, the majority of which are duplexes and some four-plexes. In recent years, the only new housing stock in the community has been built by Methy Housing. In 2019, Methy Housing was in the process of building 16 new homes and had a waitlist of over 300 people. From 2020 to2021, NexGen seconded some of the LPA workers for the Project to Methy Housing to assist with a range of activities including house construction and renovations.

Housing in La Loche was previously developed by the provincial government through what evolved into the Saskatchewan Housing Corporation. In the 1990s, the Government of Saskatchewan stopped direct delivery from the province and eventually switched to providing funding through programs like the Rental Development Program through Saskatchewan Housing. Other funding is provided by the Provincial Métis Housing Corporation. Housing is funded through partnerships with programs. The village also has made efforts to secure housing for nurses of the health district. Methy Housing Corporation indicated that once the current subdivided lots are complete, the town will have no serviced lots remaining. Servicing new subdivisions comes at considerable costs (e.g., approximately $1.4 million per subdivision).

High rental costs and crowded conditions, along with lack of available housing relative to the demand, is also common in Buffalo Narrows. Although there is considered to be less homelessness in Buffalo Narrows compared to La Loche, exact numbers are unknown since many reside with friends and relatives (Prairie ID Consulting 2015). The lack of housing in municipalities in the LSA was noted as something that detracts from community well-being by Métis citizens (MN-S-JWG 2020).

Housing shortages also affect the northern hamlets and settlements in the LSA, which do not have enough housing or developed land to meet demand, often resulting in younger residents moving away. The people in northern hamlets and settlement believe that many residents would return if more housing were made available (2019 to 2021 KP interview program).

6.3.2.1.3 Housing Stock and Conditions

Black Point has 26 houses, of which 23 are inhabited full-time; the remainder are owned by those who live in southern Saskatchewan and stay in the community on a temporary basis (2019 to 2021 KP interview program). Many of the houses are older and a minority of them are newer. Some houses were built in the early 1990s through the Métis housing program and are not in good condition (2019 to 2021 KP interview program). In Black Point, most private dwellings require major repairs (Table 10). Many homeowners owe money on land taxes, so they do not qualify for grants to renovate them.

Housing conditions are variable in Dillon and Birch Narrows (2019 to 2021 KP interview program). In Dillon, mould is a persistent issue in homes and repairs are needed for roofing issues as the weather causes shingles to erode (2019 to 2021 KP interview program). In La Loche, Buffalo Narrows, Turnor Lake, St. George's Hill, and Michel

Village, most private dwellings require regular maintenance or minor repairs (Table 10). Issues include mould and inadequate windows and doors. Michel Village has 26 houses that are in fair condition and seasonally inhabited. In Dillon, those with mould in their homes receive modular homes (2019 to 2021 KP interview program). In La Loche, the homes are in average condition and typically last 30 years. While the community has the capability for repairs, their access to funding is limited.

Table 10 presents the number of private households by tenure and condition for La Loche, Turnor Lake, Buffalo Narrows, and other northern villages and hamlets within the LSA. Renting is more common in La Loche, with the majority of dwellings rented by residents (430 rented dwellings verses 225 owned by occupants) from local companies, such as Methy Housing Corporation. Except for Turnor Lake, most private dwellings in the other municipalities in the LSA are owned by the occupant.

In La Loche, some of the houses do not have running water or sewage. The community does not have sufficient revenues for upgrades. Some participants in key person interviews indicated that a number of communities members do not pay taxes due to their belief that they are receiving minimal services, which also leads to additional community members not paying taxes given their understanding that not all community members are paying taxes (2019 to 2021 KP interview program).

Table 10: Private Households by Tenure and Occupied Private Dwellings by Conditions for Local Study Area Communities, 2016

Metric	La Loche[a,b]	Buffalo Narrows[a,b]	Turnor Lake[a,b]	Black Point[a,b]	St. George's Hill[a,b]	Michel Village[a,b]
Private households by tenure[c,d]	655	400	45	20	45	20
Owner	225 (34%)	245 (61%)	20 (44%)	10 (50%)	30 (67%)	15 (75%)
Renter	430 (66%)	150 (38%)	20 (44%)	0 (0%)	15 (33%)	0 (0%)
Occupied private dwellings by dwelling condition[d,e]	655	400	45	15	45	25
Only regular maintenance or minor repairs needed	505 (77%)	345 (86%)	30 (67%)	0 (0%)	25 (56%)	15 (60%)
Major repairs needed	155 (24%)	55 (14%)	15 (33%)	10 (67%)	20 (44%)	0 (0%)

Source: Statistics Canada 2016.
Note: Due to supressed data, Ducharme Lake and Garson Lake have been omitted from the table.
a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) Tenure: refers to whether the household owns or rents their private dwelling. The private dwelling may be situated on rented or leased land or be part of a condominium. A household is considered to own their dwelling if some member of the household owns the dwelling even if it is not fully paid for, such as if there is a mortgage or some other claim on it. A household is considered to rent their dwelling if no member of the household owns the dwelling. A household is considered to rent that dwelling even if the dwelling is provided without cash rent or at a reduced rent or if the dwelling is part of a cooperative.
d) 25% sample data.
e) Dwelling condition: refers to whether the dwelling is in need of repairs. This does not include desirable remodelling or additions.

6.3.2.2 Recreational Services and Facilities

Recreational facilities are similar among the LSA communities, with each having some indoor and outdoor facilities. Each community has some form of organized recreational services that is volunteer- or community-run. Information on levels of use, capacity, and program/infrastructure gaps was not available for each LSA community.

6.3.2.2.1 Clearwater River Dene Nation

Recreation infrastructure provided to CRDN members living on-reserve include an indoor rink and an outdoor rink, a beach volleyball court, a local playground, a community hall, a small bike park, and baseball diamonds (CRDN 2013). NexGen has also supplied recreational equipment such as an indoor gym equipment for the CRDN Youth Centre in 2020.

At the time of writing, additional information on recreational services and facilities in CRDN was not available. This information will be integrated when available.

6.3.2.2.2 La Loche

La Loche has a hockey arena, town park, skateboard park, two outdoor rinks, and a library available to residents. NexGen provides funding for the La Loche Sports, Recreation and Culture Board employees to maintain and operate the recreational facilities including the hockey arena and outdoor rinks. This funding also supports other recreational and cultural activities (e.g., crafts). In a partnership with La Loche Sports, Recreation and Culture Board, NexGen provided fencing for the children's spray park in La Loche.

The nearby lakes offer a range of activities including fishing, boating, swimming, camping, sightseeing, picnicking, and touring. In the winter, residents hunt, ice skate, snowmobile, and ski. The La Loche Arena Complex includes the Robbie Fontaine Memorial Arena, which is used regularly throughout the winter months. Sports programs such as hockey are available at the arena. Recreation programs for students such as volleyball are supported through the high school (NLSD 2020a).

Since 2017, NexGen has provided support to minor volleyball and hockey teams in the LPA communities. This supports local youth engagement in sports and provides opportunities to participate in sporting events throughout the province and across Canada. These sports programs were suspended during the pandemic but resumed for the 2021-2022 year and is an ongoing initiative.

Bingo and other community and social events are also available to the residents of La Loche. Bingo is provided by the local radio station, CHPN Radio, which also provides community TV (Northern Business Directory 2017). In 2016, a community wellness plan was developed for the community of La Loche, which included the planning of family events such as picnics to celebrate Mother's Day, Father's Day, and National Aboriginal Day (La Loche 2018, Appendix F). Treaty Days are an annual social event held in La Loche.

Since 2018, NexGen has provided funding for on-going recreational programming through the La Loche Sports, Recreation and Culture Board. This program provides structured after-school and summer-holiday recreational events and opportunities for the youth community and community members. The programming consists of activities such as beadwork, holiday decorating, traditional music lessons, and free public skating. The program was paused in Q2 2020 due to disruptions associated with the pandemic and resumed in Q3 2020. The

recreational programming was adjusted during the pandemic to accommodate all COVID-19 related restrictions and public health orders.

Dene High School has a weight room for students and is also open to community members for a small fee. The facility is in regular use and is fully staffed to assure being open to the community (2019 to 2021 KP interview program; 2020 youth workshop).

6.3.2.2.3 Birch Narrows Dene Nation and Turnor Lake

The BNDN recognizes that recreation is important to youth and adults and plays an important role in preventing social and health issues, including substance abuse (BNDN 2018). Birch Narrows Dene Nation members and residents of Turnor Lake have access to an indoor ice rink, baseball diamonds, school gym, weight room, and running track on the reserve (BNDN 2018; 2019 to 2021 KP interview program). The lake and surrounding areas provide opportunity for outdoor activities include fishing, canoeing, hiking, cross-country skiing, and other activities.

There is bingo two nights a week in Birch Narrows (2020 youth workshop; BNDN 2013; 2019 to 2021 KP interview program). The BNDN has one employee and one elected councillor who provide recreation activities. Volunteers run many of the programs and they rely on financial support from fundraising or corporations. Birch Narrows Dene Nation youth would like support for basketball, hockey, and soccer programming (BNDN 2018).

6.3.2.2.4 Buffalo River Dene Nation (Dillon)

The BRDN plan events for both winter and summer while working through the year with youth. The band holds local summer and winter games, which include activities such as hockey, basketball, running, canoeing, badminton, basketball, baseball, and volleyball. As the community is located along Peter Pond Lake, members fish and boat on the lake. The BRDN holds an annual fishing competition.

On-reserve recreational facilities include a hockey arena, beach volleyball court, and school gym. The hockey arena recently had an upgrade of the cooling system (2019 to 2021 KP interview program).

Gaps in the community include a lack of playgrounds, water parks, and recreational facilities where youth can play games and activities, such as pool. There is also a gap in Elders facilities for activities within the community (2019 to 2021 KP interview program). Other gaps include instructors for swimming and ball games.

6.3.2.2.5 Buffalo Narrows

Buffalo Narrows has various recreation opportunities. There is a hockey arena, the Lakeview Complex Arena, as well as a baseball and soccer field. The Lakeview Complex hockey arena uses artificial ice and is heavily used by the community (NLSD 2020b; 2019 to 2021 KP interview program).

Buffalo Narrows has a volunteer-run community recreation board. The board relies on fundraising and grants to offer recreation events. These events include movie nights, gym nights, craft nights, women- and men-specific event nights that provide various activities for the community members to participate in such as cooking and knife making, paint nights, bingo, and various sports nights (2019 to 2021 KP interview program).

Baseball is offered as a local activity in the summer, though it does not have a designated league. Hockey is offered primarily in the winter with various leagues, including an adult recreation league, minor leagues, and a senior league. Programming is limited by the amount of time volunteers can dedicate to recreation programming and funding (2019 to 2021 KP interview program).

The community is situated between Peter Pond Lake and Churchill Lake, which offers opportunities for outdoor recreation such as canoeing, kayaking, and fishing. There are also hiking trails close to the community (Tourism Saskatchewan n.d.). Other recreation activities near Buffalo Narrows include Buffalo Narrows Sand Dunes Park, which includes Big Buffalo Beach Recreation Area and is located a few kilometres from the village. This area is a sandy beach located along the southwest shore of Big Peter Pond Lake (Tourism Saskatchewan n.d.).

6.3.2.3 Social Services

6.3.2.3.1 Meadow Lake Tribal Council

The MLTC runs programs for members of the CRDN, BNDN, and BRDN. These programs include the Meadow Lake Child and Family Services, Youth Development Program, and the Justice Program. Programs are run by a committee of band councillors associated with the MLTC who make the decisions for funding and programming. Programs include the following:

- **The Child and Family Services Program** includes child prevention services, alternate/foster care services, family connections services, and family support. The program relies more heavily on prevention workers who work directly with families. It is preferred that children remain with their families whenever possible rather than apprehending and placing in alternate/foster care (MLTC 2018; 2019 to 2021 KP interview program).
- **The Youth Development Program** includes support to maintain youth programing, team building and prevention programming, and the National Aboriginal Youth Suicide Prevention Strategy. Resources distributed include those from Educators for Social Responsibility, Reclaiming Youth, Circle of Courage, Violence Prevention, Self Esteem Information, Developmental Assistance, and Search Institute (MLTC 2018).
- **The Sport Program** is a portion of youth development provided by the MLTC. To provide this program, the MLTC partners with various organizations such as Federation of Sovereign Indigenous Nations Sports, Culture, and Recreation Board, Saskatchewan Sports, sport governing bodies, and the Saskatchewan Lotteries. The purpose of this program is to support the delivery of community-based recreation and leisure programming and to give First Nation youth an opportunity to develop and grow into young adults (MLTC 2021).
- **The Justice Program** provides restorative and community-based justice services. The program is facilitated through a Justice Coordinator who provides services, which include mediation files, fine options plans, court appearances, and other justice initiatives (MLTC 2018). It was indicated during KP interviews that mediation and circles are generally supported in Dillon whenever possible through the Justice Program due to tensions with the RCMP (2019 to 2021 KP interview program).

Additional programming includes one that brings in social life skills programs for clients (2019 to 2021 KP interview program). Currently, the MLTC's social development department has 83 clients (2019 to 2021 KP interview program). Another program provides funding for post-secondary education for First Nation members, which pays for tutors, living allowances, books, and travel to and from the institute. The program has a maximum capacity of 20 students; currently, five students are supported.

6.3.2.3.2 Clearwater River Dene Nation

Programs offered in the CRDN included Project Venture, which provided to high-risk Indigenous youth from Clearwater River School and Dene High School. The program used outdoor activities and games to teach youth about their Indigenous culture, as well as life skills such as problem solving and communication. The program also aimed to reduce substance abuse, drug-related crime, and interpersonal violence. The Government of Canada provided $2.2 million in funding toward the project, which was distributed over five years between 2016 to 2021. In 2021, Public Safety Canada was conducting performance monitoring and assessment of the program (Public Safety Canada 2021).

At the time of writing, information on social supports in CRDN was not available. This information will be integrated when available.

6.3.2.3.3 La Loche

The La Loche Friendship Centre is an important resource and gathering place in the community and is dedicated to promoting sport, culture, recreation, youth, and community (La Loche Friendship Centre 2020). It is a not-for-profit organization run by the Aboriginal Friendship Centres of Saskatchewan, which runs friendship centres across the province and is funded by the Government of Canada via the Native Association of Friendship Centres and through Provincial and Territorial associations (Aboriginal Friendship Centres of Saskatchewan 2018). Programs run out of the La Loche Friendship Centre include:

- **The Justice Program** focuses on mediation in the court system. The purpose of the program is to assist those with low incidences of crime or those that have committed non-violent offences such as vandalism. To participate in the program, victims of the offender must agree to participation (2019 to 2021 KP interview program).
- **The Youth Intervention Program** is aimed at young offenders within the community between the ages of 14 and 23 and mandated by their probation officers. The program focuses on integrating youth into society and providing them with training and employment opportunities (2019 to 2021 KP interview program). The program has one staff member.
- **The Homelessness Initiative** provides a sheltered indoor space for the unhoused to spend their time during the day. The initiative focuses on providing necessary services to those in need, including seasonally appropriate clothing and three meals a week (i.e., Monday, Wednesday, and Friday) to unhoused individuals and low-income families (2019 to 2021 KP interview program). The program serves around 100 people a day.
- **The Family Support Program** works with at-risk families mandated by the Ministry of Social Services to participate. Those mandated into the program are at a higher risk of children being removed from the home based on court decisions. Other clients use the diversion services, which aim to assist in the development of healthy families and children. These clients are either community-referred or walk-in. The program has two program workers and a coordinator. The program has a diverse group of clients and over 100 applicants (La Loche Friendship Centre 2020; 2019 to 2021 KP interview program).

Other social services in La Loche include Project Venture (Section 6.3.2.3.2, Clearwater River Dene Nation), Kids First North, and Healthy Moms, Babies and Families. Kids First North is a voluntary, confidential support program designed to help families in early years of development when the child is five and under. It aims to provide support, knowledge, and build family strengths. It is provincially funded and directed (Kids First North 2018). Healthy Moms, Babies and Families is a prenatal and postnatal nutrition support group that assists in transportation to and from check-ups and referrals to other agencies in the community (Northern Business Directory 2017). The program provides services to Indigenous Groups, those living in rural and remote areas, single parents, and teen parents. Funding is provided by the Canada Prenatal Nutrition Program and the Public Healthy Agency of Canada (Government of Canada 2016b).

6.3.2.3.4 Birch Narrows Dene Nation and Turnor Lake

Social assistance is provided in BNDN through the MLTC. Along with funding assistance, MLTC bring programs in for clients, such as social life skills and helping members apply for jobs (2019 to 2021 KP interview program). Social services programs available at facilities such as the Annie Bagg Memorial Nursing Station (Northern Saskatchewan Health Services 2009a) are available for both BNDN members and Turnor Lake residents (2019 to 2021 KP interview program). The community has a land-based coordinator that combines healing and having youth go out on the land and participate in land-based activities such as going onto a trapline (2019 to 2021 KP interview program).

Along with programs run in the community through the MLTC, the BNDN has their own Youth Development Program that has run annually since 2005. The Youth Development Program provides an opportunity for youth in the community to get together in a combination of traditional and Christian approaches and share meals and time together, ending in a candlelight vigil. The program runs for four days and three nights. Other communities in the region, such as La Loche, have participated in the program in the past (2019 to 2021 KP interview program).

The community is looking to increase their outreach to members through a range of means, including:

- establishing programming for Elders;
- establishing a women's and men's group; and
- providing youth group activities.

The BNDN want to establish programming to ensure members with special needs are included and supported. In addition, the BNDN would like continuing and ongoing support for the community crisis team and increased education on community social issues such as addictions, suicide prevention, and reducing shame (BNDN 2018). The BNDN would also like a youth centre, since the old one has closed (BNDN-JWG 2020; 2020 youth workshop).

6.3.2.3.5 Buffalo River Dene Nation (Dillon)

Programs funded by Jordan's Principle are run out of the health centre. Jordan's Principle is a legal rule established in 2016 by the Government of Canada after the Canadian Human Rights Tribunal determined the government's method for services for First Nations children in Canada was discriminatory. Through the funding provided through Jordan's Principle, the BRDN can provide mental health support to youth in the community, as well as provide cost assistance for families with disabled children. Programs funded by Jordan's Principle assist

First Nations children in accessing products, services, and supports when they need them, which includes health, social, and educational needs (Government of Canada 2021b).

During National Addictions Awareness Week in 2019, many programs were run to inform residents of the causes of addictions and how to prevent or reduce the effects. These programs were run in association with the health centre and with help from funding from Jordan's Principle (2019 to 2021 KP interview program). The community also hosts several events throughout the year focusing on wellness for men, women, couples, and youth, and cultural and land-based activities for students.

Currently, there is no aftercare in the community to assist those that return from facilities to treat mental health and addictions. The only option offered within the community for those seeking support mental health and addiction support is the clinic (BRDN-JWG 2021c). There is a desire within the community to offer a program on mental health awareness (2019 to 2021 KP interview program). Key person interviewees indicated that often, residents are reluctant to seek assistance. It was further indicated by some interviewees that reasons for this include bullying from other residents and a reluctance to own up to their own actions and that residents are often struggling through grief and loss (2019 to 2021 KP interview program).

Buffalo River Dene Nation members have noted that there is a lack of social services and facilities in the community. Facilities the community would like to see in place include a youth centre, Elder's centre, and friendship centre (KP Interviews; BRDN-JWG 2020). Key person interviews also identified a need for homecare for Elders in Dillon as there are no services currently available.

In 2019, the Social Assistance department for the BRDN had a portfolio of around 200 clients. The social assistance programs assist members seeking employment with needs such as childcare, transportation, and health and safety certification. Future development of programs included an education upgrading program and driver's education. The Social Assistance Departments typically try not to have more than 10 to 20 clients in a program at once (2019 to 2021 KP interview program).

6.3.2.3.6 Buffalo Narrows

The Buffalo Narrows Friendship Centre oversees three programs in the community:

- **Kids First North** is designed to assist families in early years of development when the child is five and under (Kids First North 2018; 2019 to 2021 KP interview program).
- **Family Support Services** is mandated by the provincial government and includes three field workers (Government of Saskatchewan 2018b). The program focuses on families in crisis within the community. Workers check in on local families and provide recommendations based on living conditions and family structure. If recommended, children may be removed from the home temporarily. Parents continue to be contacted when children have been removed to determine whether children can be reunited with their parents in the future (2019 to 2021 KP interview program).
- **The Aboriginal Head Start School Program** consists of early education for ages three and four to allow them to be prepared for kindergarten. Programming is conducted at a secondary location near the Little Eagles Daycare and Twin Lakes Community School (2019 to 2021 KP interview program).

Homeless people in Buffalo Narrows often spend their day at the Friendship Centre. Occasionally, the Friendship Centre will provide meals for the homeless, but meal provision is limited by available funding. Community events at the Friendship Centre are also limited due to funding (2019 to 2021 KP interview program).

Other social services available in Buffalo Narrows include the Buffalo Narrows NorthSask Victim Services and Children Exposed to Violence. The NorthSask Victim Services includes crisis intervention, information support, and referrals to other specialized programs for victims of crime and is offered by the Government of Saskatchewan (Government of Saskatchewan 2018b). Children Exposed to Violence is a government program in Saskatchewan aimed at children and youth who have witnessed or experienced interpersonal violence or abuse with the goal of preventing them from becoming victims or perpetrators of violence and abuse in the future (Government of Saskatchewan 2018b).

Key person interviews identified a lack of a physical space for Elders in the community to gather.

6.3.2.3.7 Other Social Assistance Programs

Other social assistance programs include the Saskatchewan Income Support funded by the Government of Saskatchewan. In 2021, the Saskatchewan Income Support program replaced two previous programs: the Saskatchewan Assistance Program and Transitional Employment Allowance. Key person interviews indicated that this change from the separate social assistance programs to Saskatchewan Income Support would greatly affect low-income residents in La Loche and Buffalo Narrows, and the funding is insufficient to cover the cost of groceries and travel (2019 to 2021 KP interview program). Social Assistance is depended upon in La Loche as a financial lifeline. Previously, the Saskatchewan Assistance Program and Transitional Employment Allowance programs covered the cost of utilities for clients, but under the new Saskatchewan Income Support program, the costs of rent, utilities, taxes, and all other home-related costs are under a shelter benefit, meaning a single adult would have to pay for all the home-related costs with $500 to $600 a month (CTV News 2021).

Common issues in La Loche and Buffalo Narrows include housing, finances, food security, and child and family related matters. Although federal programs are available, residents will often call provincial government social services for additional information and referrals. Key person interviews indicated that additional programs and services that would benefit the community include teaching life skills, and financial management.

6.3.2.4 Education and Training Institutions

6.3.2.4.1 Daycare and Preschool

Data on the capacity of schools in the LSA communities was not available for each community. Childcare facilities are available in La Loche, BNDN, Dillon (BRDN), and Buffalo Narrows. All childcare available in the LSA has a waitlist due to limited space.

Dillon (BRDN) has a new pre-school and daycare modular facility with space for twelve children at the daycare and 10 children for the pre-school (2019 to 2021 KP interview program). The waitlist typically has three to five children. At the time of interviews, the previous daycare was at capacity and the building floor was collapsing. Indigenous Services Canada provided funding for the new building. Difficulty in finding childcare was noted as a barrier to employment and education during the KP interviews.

Buffalo Narrows has a daycare/pre-school facility, Buffalo Narrows Little Eagles Daycare, with nine staff members and space for 36 full-time children (2019 to 2021 KP interview program). The daycare had a waitlist of nine

children in 2019. Childcare spaces fill up quickly and many mothers will add their names to the waitlist when they are on maternity leave. In 2019, the facilities were sufficient for the community's needs. The facility typically has around six infants, 10 toddlers and around 20 pre-schoolers. Buffalo Narrows also has an Aboriginal Head Start Program with 40 pre-school spaces and six staff members. In 2019, the pre-school had an enrollment of 26. The program is free and paid for by Northern Lights School Division (NLSD). Parents will also use other parents and those on maternity leave for supplemental childcare. While the facility will take casual walk-ins, they do not become available until the day of after 9:30 am. Some spots include children in pre-Kindergarten and Kindergarten. Those students still count as a full slot as they arrive before school, have lunch at the daycare, and stay after school until pick-up. Since the daycare is located beside Twin Lakes Community School and the Aboriginal Head Start Pre-school, students are taken to the facilities by the staff at the daycare (2019 to 2021 KP interview program).

The La Loche Daycare has twelve spaces (three infant; five toddlers; three pre-Kindergarten, and one flexible pre-Kindergarten). Enrollment is full and there is a waitlist of two to three months. Priority spots are given to parents who are in high school so that they can continue to attend school. The La Loche Preschool, which opened in 2019, has capacity for 80 children.

6.3.2.4.2 Primary and Secondary Education

6.3.2.4.2.1 Administration

Public primary and secondary school education in the LSA communities is administered under the NLSD No.113, which is the administrative body for all public schools in the RSA. Most students between kindergarten and Grade 12 in the NLSD self-identify as Indigenous. Between 2015/2016 and 2018/2019, Indigenous students made up over two-thirds of the total enrollment in the LSA ,and in 2019/2020 they made up over three-quarters of total enrollment (NLSD 2020c). In 2020, the NLSD had 280 full-time equivalent (FTE) teachers and 265 other educational staff (positions that support educational programming). Transportation costs are waived by the NLSD for students in remote communities who are required to leave their communities to attend high school, which includes costs for mileage, room and board, and airfare.

6.3.2.4.2.2 Educational Institutions

Twin Lakes Community School in Buffalo Narrows offers Kindergarten through Grade 12 for approximately 300 children from Buffalo Narrows and the surrounding area, and is staffed with 20 teachers (Twin Lakes Community School n.d.; 2019 to 2021 KP interview program). The school can accommodate around 350 students and has class sizes of 25 students. Aside from the core school subjects, such as math and English, it offers welding, carpentry, commercial cooking, and drafting. The school offers Adult 12 (Grade 12 education for adults aged 18 to 21), after which students would have to transfer to Northlands College (2019 to 2021 KP interview program). Enrollment has decreased between 2006 and 2016 along with staff numbers. Contributing to this was the closure of certain mines, which caused some community members to leave. The school has an even distribution of students across grades.

Buffalo River School in Dillon offers Kindergarten to Grade 12 for approximately 300 students for the BRDN and neighbouring hamlets. Enrollment fluctuates year-to-year and at the end of the year as well. It is unknown why enrollment rates decrease towards the end of the school year (2019 to 2021 KP interview program). The school has six teachers for Kindergarten to Grade 9, four high school teachers, two coordinators, and six interventionists (e.g., for math, literacy, targeted behaviour) (Buffalo River School 2021). The school has a land-based teacher

who organizes a fish camp, berry picking, Elder stories, and rabbit snares. The school is understaffed and needs five additional teachers, and interviewees indicated that it would be good to have a separate high school (2019 to 2021 KP interview program). For Adult 12 education, the nearest campus is Northlands College in Buffalo Narrows. The community does not have the capital funds to build an education centre. Students from Michel Village and St. George's Hill are bussed to Buffalo River School for high school programs, while those in grades under Grade 9 attend school in St. George's Hill (2019 to 2021 KP interview program). Since 2017, the community has had a land-based coordinator with funding from the MLTC. The land-based coordinator sets up camps (e.g., fish camps) at Vermette Lake and takes students out for land- and water-based activities with Elders.

Birch Narrows Community School located in BNDN serves students from both the BNDN and Turnor Lake. In the 2019 to 2020 year, there were 206 students enrolled and the school can accommodate up to 350 students (KP Interviews). Adult students are integrated into the classroom and are allowed to attend until 21, after which they would have to pursue adult education elsewhere, such as Buffalo Narrows or La Loche (2019 to 2021 KP interview program). Enrollment in the school has slightly increased between 2006 to 2016 and there are more elementary students than secondary students (2019 to 2021 KP interview program). Enrollment fluctuates year-to-year. In 2017, many people left the community for further education and enrollment dropped to 180 (2019 to 2021 KP interview program). The school would like to expand its programming, but lacks the skilled labour to convert storerooms to offices and space for special education and home-economics (2019 to 2021 KP interview program). In the 2017/2018 school year, the school had eight graduates; graduation rates fluctuate. Interviews indicated that having assistance with post-secondary application processes would help the students. Graduates of the school may leave the community to continue further education at Northlands College, which is closer to home, and many become educational assistants.

Clearwater River School in CRDN is a Kindergarten to Grade 9 school and is staffed by 18 teachers (Clearwater River School 2021). In the 2019 to 2020 school year, the school had 230 students (CBC 2020). Students from the CRDN attend Dene High School in La Loche based on available programing.

Sasdaze in Bear Creek is a one-room elementary school that has one teacher and one educational assistant. The school has educated between six and 13 students in any given year since it opened in 2003. The school has had difficulties finding permanent staff and has had a new teacher every year or every other year between 2013 and 2019 (Saskatoon StarPhoenix 2019).

As the most populated LSA community, La Loche has the largest educational facilities and provides primary and secondary education for the community and surrounding areas, which includes Black Point, Descharme Lake, and Garson Lake. Black Point, Descharme Lake, and Garson Lake do not have any education facilities (2019 to 2021 KP interview program). The Ducharme Elementary School in La Loche is a Kindergarten to Grade 6 school with 31 teachers that provides education for approximately 500 students from La Loche and the surrounding areas (NLSD n.d.). Dene High School in La Loche provides Grade 7 to 12 education and has supporting programs including a breakfast and lunch program for students, and a wellness centre. The school has seen enrollment fluctuate between 350 to 450 students between 2015 and 2019; this fluctuation is linked to the classes offered and movement of students to surrounding communities. Attendance increased between 2016 to 2019 due to programs such as the breakfast and lunch program, and the open wellness centre, which is staffed by three workers and a therapist once a month.

The elementary school has traditional education programs that provide outdoor education opportunities for children, including a modular farm from President's Choice Children's Charity. The high school offers trades courses in construction and carpentry, as well as an Adult 12 program. Adult 12 is an educational program designed for adult learners (i.e., 18 and over) to achieve a Saskatchewan Grade 12 standing (Northlands College 2021). Students in the Adult 12 program are integrated into other classes as Adult 12 class sizes are often too small to have their own lessons, and because of limited teaching staff and classroom space. Interview participants noted that there is limited time or resources to offer many courses outside the standard high school level courses (2019 to 2021 KP interview program).

Since 2017, through a partnership with the Breakfast Club of Canada, NexGen has provided funding for the provision of healthy breakfasts to over 1,100 students each school day, and the employment of eight local cooks to prepare the breakfasts at the Ducharme Elementary School, Dene High School, and Clearwater River Dene School. Schools in Saskatchewan closed in Q2 2020 due to the pandemic, and in May 2020, food boxes were delivered to the homes of each student. The schools each had a uniquely modified breakfast program reflective of the current conditions at the school as the pandemic progressed and schools alternated between online and in-person learning. NexGen continues to fund the Breakfast Program in all three schools.

Participants in JWG sessions noted concerns about not enough training facilities for both youth and adults, not enough students taking maths and sciences in high school, and the frequent need for students to leave the community to pursue further education (MN-S-JWG 2020; BRDN-JWG 2020; BNDN-JWG 2020). Teacher retention is difficult, and many positions are filled by substitutes without degrees.

6.3.2.4.3 Post-Secondary Education

The only post-secondary education facilities in the LSA are located in La Loche and Buffalo Narrows.

Gabriel Dumont Institute (GDI) has a location in La Loche. Programs offered include programs to support adults to upgrade their education (including Adult 12), various post secondary courses, and industry-recognized training and programs leading into an apprenticeship (GDI 2021). Training courses that have been offered include (GDI 2021):

- industrial mechanic (millwright);
- multi-sector safety ticket training;
- enhanced introduction to carpentry;
- construction trades training;
- heavy equipment operator; and
- heavy equipment and truck and transport technician.

Training courses vary depending on labour market conditions and the GDI meets regularly with northern companies to determine the programs that may be required for current employment needs. There is high demand for training at the GDI, resulting in waitlists for most programs (GDI 2021). Currently, there are space and equipment constraints at GDI and they have rented space at the neighbouring high school. There is a waitlist for programs offered at the La Loche location for every program as enrollment is higher than available seats (2019 to

2021 KP interview program). The La Loche campus has requested mental health and addictions awareness courses as well as driving courses for the near future, though Class 5 driving lessons have occurred in Buffalo Narrows and Beauval in 2020 and 2021.

The GDI in La Loche also offers Adult Basic Education levels 1 to 4 to community members. These programs provide a range of educational skills from literacy to interpersonal skills to lifelong learning skills. The Northern Economic Development Intern Program run through the GDI offers online distance learning with a paid internship that involves data management, mapping, and workplace skill development (GDI 2021; 2019 to 2021 KP interview program). Currently, the GDI rents two buildings, and students taking essential skills are in the curling rink lobby due to space constraints. According to interviews with the GDI, community members do not face challenges in finding employment upon completion of post-secondary training and there is a shortage of trained workers.

Northlands College has a campus in Buffalo Narrows with a small satellite campus in La Loche located at Dene High School. Northlands College in Buffalo Narrows offers post-secondary education to approximately 80 students from Buffalo Narrows as well as surrounding communities including La Loche, Turnor Lake, Dillon, Île-à-la-Crosse, Beauval, Pinehouse, and others. Learning programs include Nursing, Institutional Cooking, Bachelor of Arts, Bachelor of Social Work, as well as other certificate and diploma programs. Northlands College offers Adult 12 as well as a variety of university level courses. The Buffalo Narrows campus has less capacity than the La Ronge campus (2019 to 2021 KP interview program). Interview respondents indicated that they could obtain safety tickets through Northlands College. Interviewees also identified a need for a community higher education building (2019 to 2021 KP interview program).

Currently, there are no post-secondary programs offered in Birch Narrows and Dillon (2019 to 2021 KP interview program). A BNDN member commented they would like to see more training offered in the community, stating, “I believe in bringing the training to our community rather than the students travelling out” (BNDN-JWG 2021a). While there are opportunities to get training for jobs in industry, a BRDN member noted that workers do not have the skills to get to the next steps such as obtaining a Driver’s licence. Additional information about post-secondary programs offered for the CRDN were not available at the time of writing.

Funding available for post-secondary community members includes a post-secondary alliance from the federal government, which pays for tuition, books, and living expenses (2019 to 2021 KP interview program).

6.3.2.5 Healthcare Facilities and Services

Multiple jurisdictions provide health services in the RSA, including Northern Saskatchewan Population Health Unit (NSPHU 2016):

- **Saskatchewan Health Authority**: previously, the LSA communities were under the health jurisdiction of the Keewatin Yatthé Regional Health Authority. All 12 health authorities in the province were amalgamated into the single SHA in 2017.
- **First Nations**: Some services in the LSA communities are currently provided by the MLTC as responsibilities related to the administration of health services have been transferred from the federal government to individual First Nations.
- **Population Health Unit** (northern health authorities): provides specialized services via the northern health authorities and First Nations’ co-operative partnership.

- **Northern Inter-Tribal Health Authority**: covers several communities outside of the northern health authorities.

The SHA facilities in the LSA include the La Loche Health Centre and Hospital and the Buffalo Narrows Health Centre. To access health services, residents in the smaller hamlets and villages travel to a larger community centre, primarily Dillon, for less severe, non-emergency medical issues, and Île-à-la-Crosse or La Loche for medical issues such as emergencies and more specialized services (2019 to 2021 KP interview program). To access further services, community members travel to larger centres such as Île-à-la-Crosse, Meadow Lake, Prince Albert, Saskatoon, and North Battleford (2019 to 2021 KP interview program).

Health services on-reserve in First Nations communities in the LSA are directed by the planning committee of the MLTC (2019 to 2021 KP interview program). The MLTC Health Committee is made up of band councillors from the communities that hold the health portfolio. The committees direct and implement changes for health services within the communities and occasionally conduct studies to inform further decisions (2019 to 2021 KP interview program).

The MLTC, which employs approximately 90 workers, provides services to their nine First Nations, which include the CRDN, BNDN, and BRDN. These services include addictions, community health and wellness, community education, counselling services, health advocacy, and nutrition. The MLTC has an agreement with the Northern Inter-Tribal Health Authority where the Northern Inter-Tribal Health Authority provides the MLTC with expertise in emergency situations, such as the COVID-19 pandemic, and other information including topics such as immunizations. The MLTC also works with the SHA as partners when required for health services such as doctor days on-reserve (2019 to 2021 KP interview program).

There are limited services provided to members of the CRDN, BRDN, and BNDN, including psychiatric, dental, and optometry services. Dental therapy and psychiatric care are available within the communities on a sporadic schedule, while no optometry is available within the communities. To access these services, members must travel to Île-a-la-crosse, Meadow Lake, Prince Albert, North Battleford, or Saskatoon. Mental health therapists, when brought into the community, are often not well received. During KP interviews, it was shared that often, residents do not trust the therapist, particularly if they have connections to the community, and would prefer to speak to someone from outside the community. Mental health therapists are not brought in on a regular schedule into the community, and are primarily brought in during a crisis (2019 to 2021 KP interview program).

A 2018 report on Indigenous Health in the SHA indicated that there is a need for better access to health services in northern Saskatchewan. Common visions of improved Indigenous health and health care include adopting a holistic approach, recognizing traditional medicines and practices, more respectful care, and enhanced and culturally responsive services. Currently, there is an absence of Indigenous-specific elements in programs for a predominantly Indigenous population in the former KYHR. This is partly due to a lack of capacity and resources to meet service demand in the north, making it difficult to enhance services to be more culturally responsive (Government of Saskatchewan 2018c). The largest former health regions, which also contain the largest urban centres (Saskatoon, Regina, and Prince Albert), have the most Indigenous-focused programs and services. No Indigenous awareness/cultural competence training is found in the former KYHR.

Data on system capacities and usage of the LSA healthcare facilities are not available.

6.3.2.5.1 Clearwater River Dene Nation

Services available at the CRDN Health Centre include (Northern Saskatchewan Health Services 2009b):

- primary care services (nurse practitioner, physician services, maternal child health worker);
- dental therapist;
- dietitian; and
- Nurse-in-charge/nurse manager; and
- mental health/holistic health services (services may include family support, suicide prevention, youth suicide services, addictions, National Native Alcohol and Drug Abuse Program (NNADAP) workers, and mental health therapists).

The Armand Bekkattla treatment centre, which is part of the NNADAP, is located in Clearwater River. The facility is available for all First Nation and Inuit individuals and has programs for concurrent disorders, residential schools, child counselling, and couples counselling. The facility accepts clients with physical disabilities, pregnant individuals, court referral or corrections clients, and clients on methadone, suboxone, or other psychoactive medications (Government of Canada 2021e).

6.3.2.5.2 La Loche

The La Loche Health Centre and Hospital provides health services and programming to the residents of La Loche and the surrounding area. The facility has physician services four days a week, with three full-time physicians available at any one time. Physicians work on a two week-in / two-week out schedule, each contributing 26 weeks of service annually (Keewatin Yatthé Regional Health Authority 2017). Physicians at the La Loche Health Centre and Hospital also travel to outlying clinics (2019 to 2021 KP interview program). It was indicated during KP interviews that there are staffing challenges due to cost of living, job availability for spouses, and culture shock due to the remoteness of the location (2019 to 2021 KP interview program).

Facilities and services available at the La Loche Health Centre and Hospital include:

- acute and emergency care;
- medical clinics (walk-in and appointments);
- long-term care;
- x-ray and laboratory services;
- public health clinic;
- home care;
- in-patient social detoxification;
- mental health and addictions;
- community outreach and educations services;

- dental therapy;
- physical therapy;
- tuberculosis and human immunodeficiency virus (HIV) educators; and
- community health development programs (Keewatin Yatthé Regional Health Authority 2017; 2019 to 2021 KP interview program).

La Loche residents will travel to Turnor Lake or Meadow Lake to access health services not available in La Loche. Mental health services within the community are on an outpatient basis. Addiction services, such as outpatient and detoxification services, are available at the La Loche Family Healing Unit. National Native Alcohol and Drug Abuse Program services for First Nation and Inuit residents are available in Clearwater River at the Armand Bekkattla treatment centre (WorkSafe Saskatchewan 2020; Government of Canada 2021e). In 2019, La Loche had four detoxification beds (2019 to 2021 KP interview program).

6.3.2.5.3 Birch Narrows Dene Nation

The Annie Bagg Memorial Nursing Station is in Birch Narrows and serves BNDN members and residents of Turnor Lake (Northern Saskatchewan Health Services 2009a; 2019 to 2021 KP interview program). The nursing station has a nurse practitioner on staff and physician services once a week from the La Loche Health Centre and Hospital. Dental therapy services are provided by the MLTC every few months, though the schedule may vary. Mental health therapy is a service provided in the community, with an approved list of therapists provided by Health Canada. Therapists are brought in when required, such as during a community crisis (2019 to 2021 KP interview program).

Services provided at the facility include (Northern Saskatchewan Health Services 2009a; 2019 to 2021 KP interview program):

- addiction services;
- dental therapy (provided by the MLTC, once every few months);
- home care services;
- mental health/holistic services (from approved list from Health Canada; no regular schedule, as needed);
- primary care services; and
- TeleHealth services.

The closest hospital to the community is the La Loche Health Centre. For services not available in Birch Narrows or La Loche, residents travel to Île à-la-crosse or Meadow Lake. Birch Narrows Dene Nation members would like a larger heath centre and a treatment centre for addictions and mental health in the community itself (BNDN-JWG 2020).

6.3.2.5.4 Buffalo River Dene Nation (Dillon)

The Buffalo River Health Clinic is located in Dillon and is over capacity. It is a primary care clinic that has approximately 29 staff members, including administrative staff and nursing staff, and provides the following services (Northern Saskatchewan Health Services 2009c; 2019 to 2021 KP interview program):

- addiction services;
- home care services (four homecare/home health aids);
- family support workers (two child and family service workers);
- medical transportation;
- primary care services;
- tuberculosis services; and
- wellness coordinator.

For services not available at the Buffalo River Health Clinic, BRDN and Dillon residents travel to St. Joseph's in Île-a-la-crosse. If further services not offered are required, members travel to Meadow Lake, North Battleford, Prince Albert, and Saskatoon. Services that could be used in the community include increased cancer screening. Key person interviewees shared that, when cancer is detected within the community, it is often at a more advanced stage, thus resulting in a greater likelihood of adverse outcomes (2019 to 2021 KP interview program). More nurses are needed in the community due to the population increase (2019 to 2021 KP interview program).

Providing adequate Elder care in Dillon is difficult within the community as there is no long-term care facility. Previously, Elders would remain in the community and family would care for them, but as more BRDN members participate in the wage economy and family members leave the community for work and education, Elders may have to leave the community for care if they require assistance. There is currently no hospice care in the community to assist in meals and home care for Elders (BRDN-JWG 2020; 2019 to 2021 KP interview program).

6.3.2.5.5 Buffalo Narrows

Buffalo Narrows has a primary care clinic with a 24/7 on-call registered nurse coverage and emergency medical services (Keewatin Yatthé Regional Health Authority 2017). Physician services are available four days a week with a nurse practitioner on staff and available during open hours five days a week (2019 to 2021 KP interview program). Other services available include:

- public health;
- home care;
- mental health and addictions;
- dental therapy;
- community outreach and education services;
- medical transportation; and
- community health development programs.

For services not available in Buffalo Narrows, residents often travel to Prince Albert, Saskatoon, and North Battleford, with some preferring to travel to Edmonton. The closest optometrists and dentists are in Meadow Lake, Prince Albert, and Saskatoon (2019 to 2021 KP interview program).

Outpatient services for mental health and addictions are available at the Buffalo Narrows Health Centre (WorkSafe Saskatchewan 2020). Key person interviewees indicated that the community has a lack of strong support groups for dealing with addictions. For treatment and one-on-one counselling, clients must go to southern Saskatchewan as there are insufficient beds in Buffalo Narrows. The youth development coordinator does in-home assessments in Buffalo Narrows and La Loche. Mental health programs offered address issues such as depression, anxiety, trauma, grief, anger, self-esteem, and conflict resolution (2019 to 2021 KP interview program). Key person interviews indicated that youth social services in northern Saskatchewan often have low uptake, possibly due to fear of stigmatization. Social services in northern Saskatchewan lack variety compared to the service offerings in cities.

6.3.2.5.6 Other Local Study Area Communities

In the Other LSA Communities, residents requiring social services contact provincial government social services for assistance (2019 to 2021 KP interview program). Additional information about social services in these communities was not available.

6.3.2.6 Protective and Emergency Services

6.3.2.6.1 Policing

Policing services in the LSA communities are provided by the RCMP from two main detachments: one in La Loche, and one in Buffalo Narrows. The Buffalo Narrows detachment has two additional stations, one in Turnor Lake / Birch Narrows and one in Dillon. Information on the capacity of these detachments is presented in Table 11. The posts in La Loche and Buffalo Narrows are three-year postings, while Turnor Lake and Dillon are two-year postings unless an extension is requested or required (2019 to 2021 KP interview program). A new RCMP detachment is expected to open in a few years in Dillon. The RCMP in Dillon (BRDN) enforce provincial laws and the federal *Indian Act*, but do not enforce community by-laws. Current by-laws in Dillon do not allow bootlegging, which is enforced by the BRDN council (2019 to 2021 KP interview program).

Table 11: Policing Services in Local Study Area Communities

Station	Communities Served	Staffing
Buffalo Narrows	Buffalo Narrows, Turnor Lake, BNDN, BRDN, Dillon, St. Georges Hill, Michel Village, the Landing (CRDN), Bear Creek	Seven regular staff Two support staff One victim services staff Five part-time guards
Dillon	Part of the Buffalo Narrows detachment	Five regular staff One support staff
Turnor Lake	Part of the Buffalo Narrows detachment	Five regular staff One support staff
La Loche	La Loche, CRDN, Black Point, Garson Lake, Descharme Lake, some of Clearwater Provincial Park	n/a[(a)]

Source: RCMP 2018a; RCMP 2018b; 2019 to 2021 KP interview program.
a) La Loche RCMP detachment did not provide staffing breakdown but stated that it was fully staffed.
n/a = not available; CRDN = Clearwater River Dene Nation; BNDN = Birch Narrows Dene Nation; BRDN = Buffalo River Dene Nation.

The main policing issues within the LSA communities include addiction and interpersonal violence, as well as traffic by-law violations, drug-related crime (i.e., home invasions), mischief, and violence (2019 to 2021 KP interview program). Previously, the Buffalo Narrows detachment had one location in Buffalo Narrows that also serviced the smaller LSA communities (such as Dillon, St. George's Hill, and Michel Village) but resulted in delays in response time due to travel. Communities requested that the detachment have locations in the smaller communities such as Dillon and Birch Narrows. There is dissatisfaction with the current system that requires calls to be directed outside the communities before police will attend an incident in the community. Facilities in Dillon currently require upgrading (2019 to 2021 KP interview program). Due to the requirement for upgrading, arrests in Dillon, St. George's Hill, and Michel Village are transported to Buffalo Narrows. Holding cells are available in Buffalo Narrows, Birch Narrows / Turnor Lake, and La Loche (2019 to 2021 KP interview program).

Provincial court dates vary throughout the LSA but are available locally depending on the nature of the offence. Court dates for trials and dockets vary by month. In the case of trials, they are conducted in person while dockets are conducted by video at the local circuit point. Circuit point locations are available in the La Loche Provincial Building, the Turnor Lake / BNDN arena, the BRDN Band Hall, and the Buffalo Narrows Provincial Building. Trials regarding traffic tickets currently occur over the phone (Courts Saskatchewan 2021a). Matters relating to the Court of Queen's Bench are handled in Meadow Lake and are filed through the Battleford Queen's Bench Local Registrar's Office or Sheriff's Office (Courts Saskatchewan 2021b), while court of appeal is handled through Saskatoon and Regina (Courts Saskatchewan 2021c).

6.3.2.6.2 Fire Suppression

Fire suppression services are conducted by communities in the LSA on a volunteer basis. The La Loche fire department provides services to La Loche, Black Point, and the CRDN (2019 to 2021 KP interview program). The fire department has 10 regular volunteers and 10 supplemental volunteers that also assist when available. The service has a few fire trucks, a water truck, and jaws of life (La Loche 2018; 2019 to 2021 KP interview program). In 2021, a new 4,800 square feet fire hall opened in a more central location in La Loche (LaRonge Now 2021). Black Point has some fire suppression equipment; however, this equipment is insufficient for a major fire incident (2019 to 2021 KP interview program).

Fire suppression services in Birch Narrows and Turnor Lake are provided by the BNDN (BNDN 2013). Additional information on the BNDN fire department was not publicly available. In Dillon, fire suppression is handled by two crews of 10 volunteer firefighters with fire trucks maintained and driven by the heavy equipment workers of the BRDN maintenance crew. Equipment is stored at the local fire hall and the community received a new fire truck in 2019 (2019 to 2021 KP interview program). Services in Buffalo Narrows are provided by the local fire hall, with approximately 10 volunteer firefighters. The fire hall has two response vehicles, one 400-gallon tank truck, and a 900-gallon pumper truck. Other fire services within the community are located at the Buffalo Narrows airport and consist of the Fire Management and Forest Protection base (Buffalo Narrows 2021). The Other LSA Communities have their own fire suppression equipment but may also rely on support from other communities during a fire event. For example, crews in La Loche may assist in Black Point either with personnel or with additional equipment, if necessary (2019 to 2021 KP interview program).

The Saskatchewan Public Safety Agency has four wildfire bases in the northwestern Buffalo Narrows response region (SPSA 2021). There is a fire base and regional response centre located in Buffalo Narrows, a fire base located in La Loche, and two satellite bases located at Turnor Lake and Dillon Lake (SPSA n.d.). Emergency

services officers and protections officers that are stationed at response centres are trained to assist first responders and communities during and after emergencies or disasters (SPSA n.d.). An emergency response team is typically a four-person team including a crew leader, with there being three different types of response crews based on their responsibilities. The Saskatchewan Public Safety Agency Type 1 response crews can assist Type 2 and Type 3 crews on sustained action fires and also work on initial and sustained wildfires and assist communities during times of flooding and other emergencies. Type 2 crews are referred to as First Nation and northern community crews, and through formal agreements with First Nations and northern communities, work on sustained fire action and assist Type 1 crews for the initial response to new wildfires (SPSA n.d.). The Type 2 crew consists of a five-person team including a crew leader, and Type 3 crews are emergency fire personnel that are qualified firefighters hired on an emergency basis to support Type 1 and Type 2 crews working on sustained action wildfires (SPSA n.d.).

In 2018, Prince Albert Grand Council initiated a Wildfire Task Force to evaluate the emergency response work crews in Northern Saskatchewan. In 2018, there were 58 Type 2 First Nation and 22 northern work crews but the Wildlife Task Force concluded it would be beneficial to move to an eight-person or ten-person crew including a cook and camp helper and switch to a remote camp model instead of flying in daily (PAGC 2018). Information on the current number of fire crews is not available.

6.3.2.6.3 Emergency Medical

Ambulance services for the LSA communities are based out of La Loche through the municipalities and SHA. In some instances, this means that ambulance services come from Île-à-la-Crosse, which is located in the RSA. Patients are typically transported to the La Loche and Île-à-la-Crosse health centres to receive primary care (Keewatin Yatthé Regional Health Authority 2017; 2019 to 2021 KP interview program).

6.3.2.7 Water and Waste Management

Information about the water and waste management systems in the LSA communities are presented in Table 12.

Table 12: Water Sources and Wastewater in Local Study Area Communities

Station	Water Source	Sewage Facilities
Bear Creek	Water hauled from the water treatment plant, with source water from a local well.	Privy pits or septic tanks for liquid waste disposal. Septic tanks are serviced by a septic truck owned by the settlement and waste is transported to either La Loche or Turnor Lake lagoons.
Black Point	Water trucked from La Loche.	Sewage holding tank, sewage trucked to La Loche treatment system.
Buffalo Narrows	Water treatment plant, with pump station.	On-site sewage tank.
Descharme Lake	Community well, no water treatment.	Individual pit privies, school pipes to marsh, no wastewater treatment.
Dillon	n/a	n/a
Garson Lake	Well water hauled to holding tanks.	Individual pit privies for sewer.
La Loche	Four wells located near water treatment plant #2. Three water treatment plants.	Gravity flow service connections and collection mains. Two sewage pump trucks to service buildings not connected to the sanitary sewer system. Three sewage pumping stations. Three-cell facultative lagoon.

Table 12: Water Sources and Wastewater in Local Study Area Communities

Station	Water Source	Sewage Facilities
Michel Village	Lake, with water treatment.	Piped water and sewer system to most businesses and residents. Wastewater treatment is facultative lagoon.
St. George's Hill	Wells with piped water to most businesses and residents, with water treatment.	Sewer system to most businesses and residents. Wastewater treatment is facultative lagoon.
Turnor Lake	Wells with piped water to most businesses and residents, with water treatment. Band supplies the Hamlet with water.	Sewer system to most businesses and residents; facultative lagoon. Band uses the Hamlet's lagoon.

Source: Bear Creek 2020; Village of La Loche 2018; 2019 to 2021 KP interview program.
n/a = information not available.

6.3.2.8 Power Generation and Distribution

SaskPower provides electrical services for the LSA communities as electricity is provincially regulated. Electricity in Saskatchewan is predominantly produced from fossil fuels (approximately 43% from natural gas, 40% from coal, and a very small fraction of petroleum in remote off-grid communities; Canada Energy Regulatory 2021). Natural gas is regulated and there are four natural gas companies (i.e., Just Energy, Peak Energy, Future Now Energy, and SaskEnergy; Energy Rates 2021). No natural gas is available in the smaller LSA communities (Bear Creek, Descharme Lake, Garson Lake, Black Point, Michel Village, St. George's Hill) and oil, propane, and wood are used as heating fuels (Planning for Growth 2012a,b,c,d,e; 2019 to 2021 KP interview program).

6.3.2.9 Telecommunications

La Loche does not have cellular coverage. Black Point has cellular service but does not have internet service (2019 to 2021 KP interview program). Internet and cellular service in Bear Creek, Descharme Lake, and Garson Lake are reported to be below average (2019 to 2021 KP interview program). Internet service and cellular coverage information for the Other LSA Communities was not available.

6.3.2.10 Transportation and Transportation Infrastructure

6.3.2.10.1 Public Transportation

Buffalo Narrows and La Loche each had one bus depot that provided passenger service north to La Loche and south to Prince Albert, which was operated by the Saskatchewan Transportation Company (Northern Business Directory 2016). However, this service was terminated in 2017 and no private companies have filled the gap left by the loss of service (CBC 2019). Buffalo Narrows can be reached through private bus charter transportation such as Prince Albert Northern Bus Lines (Prince Albert Northern Bus Lines n.d.).

The regional connectivity in the RSA and between the LSA communities is centred on Highway 155. The driving distance between LSA communities can take up to two hours (e.g., La Loche to BRDN) along the highway. Due to the distance between communities and lack of public transportation, private vehicles are the primary method of transportation in and out of the LSA communities (Section 6.3.2.4, Education and Training Institutions; Section 6.3.2.5, Healthcare Facilities and Services). Some residents must leave communities to work and the lack of access to private vehicles and driver's licence testing in certain communities has been cited by some interviewees as a barrier to employment (2019 to 2021 KP interview program).

6.3.2.10.2 Highways

The provincially managed paved and gravel highways leading to the proposed Project location include Provincial Highway 155 (paved) and Provincial Highway 955 (gravel). NexGen's exploration camp is approximately 160 km north of La Loche off Highway 955 and is accessed by a private 13 km all-season road which travels east from Highway 955.

6.3.2.10.2.1 Highway 155

Highway 155 is an all-weather paved highway with a speed limit of 100 km/h; however, the highway travels through Buffalo Narrows and La Loche where the speed reduces to 50 km/h (Wagner 2018). The total length of Highway 155 is about 300 km and intersects at Highway 55 at Green Lake and Highway 955 at La Loche. The narrowest portion is 8 m wide, shoulder-to-shoulder (Saskatchewan Government Insurance 2018; Wagner 2018). Current traffic volumes on Highway 155 are not an issue with respect to road integrity (Saskatchewan Government Insurance 2016). Current safety concerns relate to the large trucks on the highway, as well as the unevenness of the road and the speed of the vehicles (e.g., increased the risk of a trailer sliding into the other lane; 2019 to 2021 KP interview program).

Highway 155 is designated as a secondary highway (Government of Saskatchewan 2016a). As a secondary highway, trucks with a maximum gross vehicle weight of 61,800 kg and a nine-axle configuration (i.e., tridem drive truck tractor B train combination) are allowed to operate over this highway (Government of Saskatchewan 2016a). Updated weight restrictions for specific vehicles travelling on primary or secondary highways can be found by contacting the Saskatchewan Ministry of Highways and Infrastructure (Wagner 2018). Highway 155 has seasonal restrictions dependent on weather in the spring (freeze/thaw and flooding) that normally begins in March or April for a duration of six weeks. During this six-week period, the highway reduces to secondary weight limits, resulting in 1,650 kg maximum per tire (i.e., 5,000 for single axle, 13,200 for tandem, 19,800 for tridem; Wagner 2018).

Maintenance for highways in Saskatchewan is completed by the Ministry of Highways and Infrastructure; however, maintenance may be contracted out from time-to-time to address lack of resources due to equipment breakdowns or shortage of equipment operators (Read 2018). Maintenance is prioritized by average annual daily traffic (Read 2018):

- Level 1 highways (i.e., inter-provincial routes) receive the highest priority and have average annual daily traffic of over 1,500 vehicles;
- Level 2 highways have priority after Level 1 and have average annual daily traffic of 300 to 1,500 vehicles; and
- Level 3 highways have the lowest priority with average annual daily traffic of less than 300 vehicles.

Highway 155 is a Level 2 priority highway and maintenance is primarily provided by the highway maintenance shops in La Loche, Buffalo Narrows, and Green Lake. Within 12 hours of a storm, Level 2 highways receive snow plowing from driving lanes and ice treatment or assessment (Read 2018).

6.3.2.10.2.2 Highway 955

Highway 955, known locally as the Semchuk Trail, is an all-weather highway that is almost entirely unpaved, except for approximately 4.5 km of paved highway from La Loche to the turn off to the CRDN reserve. Highway

955 extends for 245 km from La Loche, to the closed Cluff Lake Mine, and then an additional 25 km to Carswell Lake for a total of approximately 270 km. The speed limit on Highway 955 is 80 km/h, although the portion of the highway through La Loche is 50 km/h (Wagner 2018). Highway 955 traffic volumes are not an issue with respect to road integrity (Wagner 2018). The narrowest portion of Highway 955 is 7 m wide shoulder-to-shoulder (Wagner 2018). Highway 955 does not have formal services, such as gas stations, and drivers using the route should carry extra fuel and other supplies (Wagner 2018).

Highway 955 is designated as a secondary highway (Government of Saskatchewan 2016a). As a secondary highway, trucks with a maximum gross vehicle weight of 61,800 kg and a nine-axle configuration (i.e., tridem drive truck tractor B train combination) are allowed to operate over this highway (Government of Saskatchewan 2016a). The highway has a permanent bridge and highway restriction from south of Douglas River bridge to the north limits of Highway 955 near Carswell Lake (Government of Saskatchewan 2016a). The maximum gross vehicle weight allowed on this stretch of Highway 955 is 41,500 kg (Government of Saskatchewan 2016a). The south point of the bridge and highway restriction, Douglas River bridge, is north of the 13 km all-season road to the NexGen exploration camp. Updated weight restrictions for specific vehicles travelling on primary or secondary highways are established by the Saskatchewan Ministry of Highways and Infrastructure (Wagner 2018). The highway has seasonal restrictions dependent on weather in the spring (freeze/thaw and flooding) that normally begins in March or April for a duration of six weeks. During this six-week period, the highway reduces to secondary weight limits resulting in 1,650 kg maximum per tire (i.e., 5,000 for single axle, 13,200 for tandem, 19,800 for tridem; Wagner 2018).

Maintenance on Highway 955 is based on Level 3 priority and is primarily provided by the highway maintenance shop in La Loche. During the winter months, snow removal commences as soon as resources are available without jeopardizing services on Level 1 or Level 2 highways. Snow should be plowed, and ice treated or assessed within 24 hours of the end of a storm (Wagner 2018). During the summer months, dust control, involving application of calcium chloride solution, occurs on Highway 955. The dust treatment is tendered out by the Government of Saskatchewan each year (Wagner 2018).

6.3.2.10.3 Traffic Volumes

Traffic volume is measured by annual travel (million-vehicle-kilometre [MVkm]) for Provincial Highway 155 and Provincial Highway 955 (Saskatchewan Government Insurance 2018). Highway 155 annual travel is 51 MVkm and Highway 955 annual travel is 10 MVkm (Saskatchewan Government Insurance 2018). In 2020, traffic volume along Highway 155 connecting the LSA communities ranged from 150 vehicles per day (Turnor Lake) to 1,650 vehicles per day (La Loche; Government of Saskatchewan 2020c). In 2020, Highway 955 north of La Loche had an average daily traffic volume of 190 vehicles (Government of Saskatchewan 2020c).

6.3.2.10.4 Traffic Collisions

Traffic accident rates are based off the number of accidents per annual travel (accidents per MVkm) for a given highway or region (i.e., Saskatchewan). The total number of accidents reported by Saskatchewan Government Insurance (2018) in 2018 for Highway 155 and 955, was 59 and 8 accidents, respectively. Given the annual travel of 51 MVkm for Highway 155, and annual travel of 10 MVkm for Highway 955, the accident rates (accidents per MVkm) were 1.16 for Highway 155 and 0.8 for Highway 955 (Saskatchewan Government Insurance 2018).

Traffic collisions in the RSA occur at a lower frequency compared to the province (Irvine and Quinn 2019). Between 1998 and 2014, the injury rate from traffic collisions in the RSA declined from 55 to 44 injuries per 10,000 population. During the same time period, the provincial injury rate decreased from 73 to 61 injuries per 10,000 population. However, the percentage of injuries from traffic collisions that involved an impaired driver was over double in the RSA, compared to the province, ranging from 26% to 28% compared with 10% to 12%. Data for the individual LSA communities was not available. Saskatchewan Government Insurance (2018) reported that 15.6% of rural traffic accidents involved wildlife, 0.4% of the rural traffic accidents involved pedestrians, and 0.1% of all traffic collisions involved a vehicle fire or explosion.

6.3.2.11 Air Transportation Infrastructure

6.3.2.11.1 La Loche Airport

The La Loche Airport is located southeast of La Loche off Highway 155. Maintenance at the airport, including repairs, salting, and plowing, is conducted by the La Loche-based provincial government highways crew. Aside from the runway and one hangar, there is no supporting infrastructure. Three- to nine-passenger charters are the most common planes that use the La Loche Airport. Charters typically include medical transportation, court party, and RCMP, with larger planes using it when required (Saskatchewan Highways and Transportation 2002; 2019 to 2021 KP interview program). The airport is busier in the summer.

6.3.2.11.2 Buffalo Narrows Airport

The Buffalo Narrows Airport is located south of Buffalo Narrows off Highway 155. The airport consists of a runway, passenger terminal, hanger, weather station, government building, highways crew building, a fire cache, and two privately owned small hangers. Primary maintenance for the runway, including repairs, salting, and plowing, is conducted by the Saskatchewan Ministry of Highways and Infrastructure (2019 to 2021 KP interview program).

The runway at the Buffalo Narrows Airport can accommodate airplanes in size up to an ATR 72, which can seat up to 78 passengers (ATR 2021), and provides sufficient capacity for the Project, which anticipates requiring capacity for a Bombardier Dash 8 Q300 (i.e., to accommodate 48 passengers) or ATR 42-320 (i.e., to accommodate 42 passengers), which is the most common plane using the airport (Stantec 2021; ATR 2021; 2019 to 2021 KP interview program). The most common use for the current air traffic services is charters. Typical air traffic at the airport includes medical transportation, court party, and RCMP (Saskatchewan Highways and Transportation 2002; 2019 to 2021 KP interview program).

6.4 Labour Force Characteristics

Existing labour force characteristics, including labour market information, employment challenges, and employment statistics by industry sector are explored within this subsection for both Indigenous and non-Indigenous communities located within the LSA and RSA.

6.4.1 Labour Market

Unemployment and labour force participation are two key indicators that characterize the labour market of a region or community. Labour force participation measures the proportion of people of working age (defined by Statistics Canada as aged 15 and over) who currently have a job (full-time or part-time), or who are actively

looking for work[22]. Over the last three decades, the Canadian labour force participation rate has ranged from approximately 64.5% to 67.5% (Trading Economics 2019). The unemployment rate measures the percentage of labour market participants who do not have a job[23]. Data on labour force participation and unemployment in the LSA communities and RSA are presented in Table 13. Given that most of the population and labour force of each LSA community identifies as Indigenous, the provincial Indigenous population's labour market indicators are discussed throughout this subsection for comparative purposes.

6.4.1.1 Regional Study Area

A 2013 review of the socio-economic effects of uranium mining in Northern Saskatchewan noted that the total number of RSA residents participating in the workforce increased from 5,924 in 1976 to 11,272 in 2006. Despite this increase, employment and unemployment rates in the RSA remained relatively stable from 1976 to 2006 due to concurrent population growth (CVMPP 2013). The labour force of the RSA increased by 6.7% from 2011 to 2016, to 12,360 people, while the participation rate rose from 46.7% to 48.9% (Table 13). Between 2006 and 2016, the participation rate in the RSA has been consistently lower than the provincial average. The RSA unemployment rate and percentage of people not in the labour force have also been consistently higher compared to the province during this same period. The RSA participation rate was higher among males (i.e., 51.9%) than females (i.e., 45.9%), a trend that is also reflected in the average provincial rates (i.e., 73.3% and 63.4%, respectively). In 2016, unemployment was higher in the RSA than the provincial average (i.e., 23.7% compared to 7.1%), with males having a higher rate than females (i.e., 28.7% compared to 18.2%, respectively). Unemployment in the overall RSA labour force has risen from 20.2% in 2006 to 23.7% in 2016.

[22] One demographic of people who are not considered to be in the labour force are discouraged workers (also known as discouraged job seekers). These are people who would like to work, but do not have a job and are not looking for a job because they do not believe they will be able to find suitable work (Statistics Canada 2014). Other people who are not considered labour force participants include full-time students (including those looking for work), stay-at-home parents and homemakers, retirees, seasonal workers in the off-season, and people who cannot work in the long-term for reasons of illness or disability (Statistics Canada 2007f).

[23] Taken alone, a low unemployment rate implies that the economy is doing well; however, low unemployment coupled with low participation rate can indicate a high proportion of discouraged workers or retirees. To better understand the unemployment rate as an indicator of labour market activity and health, the age distribution of the community should be considered. A large proportion of the population over 65 years of age suggests that retirees are influencing the lower participation rate. Similarly, a large population of people in their late teens and early twenties could indicate lower participation due to a large proportion of full-time students. Low unemployment coupled with high participation is typically an indicator of strong economic performance, as it implies that the majority of people who wish to be employed are.

Table 13: Labour Market Statistics for the Local Study Area Communities, Regional Study Area, and Saskatchewan

Metric by Year	CRDN			BNDN			BRDN			Buffalo Narrows			La Loche			Indigenous Census Division No.18 (RSA)			Census Division No.18 (RSA)			Saskatchewan Indigenous Population			Saskatchewan		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
2016																											
Number of people in the labour force	140	135	270	85	80.0	165	135	120	255	220	260	480	270	260	525	4,910.00	4,485.00	9,390.00	6,540.00	5,820.00	12,360.00	33,370.00	33,445.00	66,815.00	311,105.00	274,430.00	585,535.00
Participation rate (%)	50.9	46.6	47.8	56.7	50.0	52.4	50.0	43.6	46.8	60.3	64.2	62.7	36.7	30.4	33.1	47.1	41.4	44.2	51.9	45.9	48.9	60	54.2	56.9	73.3	63.4	68.3
Unemployment rate (%)	53.6	33.3	44.4	41.2	25.0	33.3	40.7	25.0	33.3	18.2	7.7	12.5	35.2	21.2	27.6	36.4	22.7	29.9	28.7	18.2	23.7	21.6	15.6	18.6	8	6.1	7.1
2011																											
Number of people in the labour force	80	85	165	a	a	a	120	115	235	195	230	425	245	225	470	4,645	4,055	8,695	6,210	5,380	11,585	28,920	29,595	58,515	300,420	261,885	562,310
Participation rate (%)	30.8	30.9	30.8	a	a	a	43.6	43.4	43.5	51.3	53.5	52.5	29.5	24.2	26.6	46.1	38.4	42.1	50.4	43.1	46.7	59.6	53.4	56.3	74.9	63.6	69.2
Unemployment rate (%)	37.5	17.6	24.2	a	a	a	29.2	26.1	27.7	15.4	0	9.4	26.5	17.8	22.3	25.3	20.6	23.1	19.7	15.8	17.9	18.1	15.7	16.9	5.9	5.9	5.9
2006																											
Number of people in the labour force	90	70	160	35	25	60	130	105	230	270	255	520	285	265	550	4,475	3,875	8,345	6,115	5,165	11,280	26,530	24,950	51,480	277,680	246,620	524,305
Participation rate (%)	41.9	33.3	37.6	24.1	20.8	22.6	49.1	41.2	44.2	76.1	62.2	68	39.6	33.3	36.4	49.5	41.6	45.5	54.6	46.2	50.4	60.8	52.3	56.4	74.4	62.8	68.4
Unemployment rate (%)	50	28.6	37.5	0	0	16.7	34.6	28.6	34.8	20.4	17.6	20.2	31.6	20.8	26.4	31.1	19.4	25.6	24	15.7	20.2	19.7	16.7	18.2	5.9	5.3	5.6

Source: Statistics Canada 2007 a,c,d,f,g,l,k,m,o; Statistics Canada 2013 a,c,e,g,l,k; Statistics Canada 2017 b,c,d,e,f,g; Statistics Canada 2018a.
Note: For confidentiality purposes, values, including totals were randomly rounded either up or down to a multiple of five or 10. The total value may not match the individual values since totals and sub-totals are independently rounded and may not total to 100%.
While the LSA includes Bear Creek, Descharme Lake, Garson Lake, Black Point, Michel Village, and St. George's Hill, information is not available for these communities due to low population.
a= data not available; M = male; F = female; T = total; CRDN = Clearwater River Dene Nation; BNDN = Birch Narrows Dene Nation; BRDN = Buffalo River Dene Nation; LSA = local study area; RSA = regional study area; n/a= not applicable. An Aboriginal population profile is not available for this area.
Possible reasons include:

- the area does not meet the threshold for 250 or more Indigenous identity population;
- the area has been suppressed for data quality or confidentiality reasons; or
- the area is composed of or contains incompletely enumerated Indian reserves or Indian settlements.

6.4.1.2 Local Study Area Communities

6.4.1.2.1 Clearwater River Dene Nation

The CRDN labour force increased in size from 165 to 270 people from 2011 to 2016 (i.e., 63% increase). As such, during this period, participation in the labour force grew from 30.8% to 47.8% relative to the slight rise in participation rate of the provincial Indigenous population (i.e., 56.3% to 56.9%). It is not clear why there was such a strong trend of people entering the labour force from 2011 to 2016. Participation in the labour force is higher for males (i.e., 50.9%) than females (i.e., 46.6%) in the CRDN, but both are lower than that for the Indigenous provincial population (i.e., 60.0% and 54.2%, respectively). The difference between male and female participation in the CRDN is the smallest among the LSA communities at 4.3% and is a smaller gap than in 2006 when there was an 8.6% difference.

In 2016, unemployment in the CRDN was higher than the provincial Indigenous population (i.e., 44.4% and 18.6%, respectively) and was the highest among the LSA communities. Unemployment in the community has fluctuated between 2006 and 2016. The 2016 unemployment rate increased from a low of 24.2% in 2011 and is higher than the 2006 rate of 37.5%. Interestingly, the increase in the unemployment rate between 2011 and 2016 corresponds with the increase in the labour force participation rate noted above. The unemployment rate in the community has been consistently higher for males (i.e., 53.6% in 2016, 37.5% in 2011, and 50.0% in 2006) than females (i.e., 33.3% in 2016, 17.6% in 2011, and 28.6% in 2006). Among the LSA communities, the CRDN had the largest difference between the unemployment rate of males and females, with a 20.3% difference in 2016, a slight improvement from a decade earlier when there was a 21.4% difference.

A larger proportion of working-aged females in the CRDN are likely discouraged from entering the labour market by external factors. With females more commonly filling the role as primary care giver to young children, access to childcare is likely a common barrier to their participation in the labour force and in obtaining higher education.

6.4.1.2.2 La Loche

The La Loche labour force increased by 12% between 2011 and 2016, from 470 people to 525 people. During this period, while the community's participation rate grew from 26.6% to 33.1%, it remained the lowest among the LSA communities. Participation in the labour force is higher for males (i.e., 36.7%) than females (i.e., 30.4%), but both are much lower than that of the provincial Indigenous population (i.e., 60.0% and 54.2%, respectively). The participation rate difference between sexes has remained the same between 2006 and 2016 at 6.3%. La Loche's participation rate has fluctuated between 2006 and 2016 and is slightly lower than the 2006 rate (36.4%).

Unemployment in La Loche was higher than the provincial Indigenous population (i.e., 27.6% and 18.6%, respectively) in 2016, and the second lowest among the individual LSA communities. This is reflective of the fact that only a small portion of the working-age population is participating in the labour force, likely meaning less competition for employment opportunities. Unemployment in the community has fluctuated between 2006 and 2016, dropping from 26.4% in 2006 to 22.3% in 2011, and rising again to 27.6% in 2016. The unemployment rate in the community is higher for males than females with a widening difference; 14.0% difference in 2016 compared to 10.8% in 2006.

According to a 2018 report, La Loche has a lack of economic opportunities, discouraging many from participating in the labour force (DMCA 2018). Contributing factors to the lack of economic opportunities include the small number of employers in the absence of major industries, as well as the community's lack of economic diversity,

which has resulted in a shortage of employment opportunities (Section 6.2.4, Economic Challenges and Development Priorities). The 2018 report indicated that re-training, programming, and counselling will not be impactful until there are more economic opportunities.

6.4.1.2.3 Birch Narrows Dene Nation

In 2016, the BNDN labour force was 165 people. Longitudinal labour force data are not available for the BNDN due to data suppression (i.e., confidentiality or data quality reasons) by Statistics Canada. Participation in the labour force was higher for males (i.e., 56.7%) than females (i.e., 50.0%), and lower than the provincial Indigenous population (i.e., 60.0% and 54.2%, respectively). Unemployment in BNDN (i.e., 33.3%) was nearly double the provincial Indigenous population unemployment rate (i.e., 18.6%). The unemployment rate in the community was higher for males than females (i.e., 41.2% compared to 25%, respectively).

6.4.1.2.4 Buffalo River Dene Nation

The BRDN labour force increased in size from 2011 to 2016, from 235 people to 255 people. During this period, participation in the labour force grew from 43.5% to 46.8% relative to the slight rise in participation rate of the provincial Indigenous population (i.e., 56.3% to 56.9%). Participation in the labour force was higher for males (i.e., 50.0%) than females (i.e., 43.6%) in the BRDN, but both are much lower than that for the provincial Indigenous population (i.e., 60.0% and 54.2%, respectively). The difference between male and female participation in the BRDN is the highest among the individual LSA communities with a 6.4% difference, although this difference has decreased since 2006 when the rate was 7.9%.

In 2016, unemployment in the BRDN was higher than for the provincial Indigenous population (i.e., 33.3% and 18.6%, respectively). The 2016 unemployment rate is an increase from a low of 27.7% in 2011, but slightly lower than the 2006 rate of 34.8%. The difference in unemployment rate between the sexes reported has widened, from 6% (i.e., 34.6% for males compared to 28.6% for females) in 2006 to 15.7% (i.e., 40.7% for males compared to 25.0% for females) in 2016.

6.4.1.2.5 Buffalo Narrows

The Buffalo Narrows labour force increased by 13% between 2011 and 2016, from 425 people to 480 people. During this period, participation in the labour force grew i.e., from 52.5% to 62.7%, with Buffalo Narrows being the only LSA community to have a higher participation rate than the provincial Indigenous population (i.e., 56.9%). However, this participation rate is a decline from 2006 (i.e., 68.0%). Buffalo Narrows is also the only LSA community with a higher participation rate for females (i.e., 64.2%) than males (i.e., 60.3%), both higher than the provincial Indigenous averages (i.e., 60.0% and 54.2%, respectively). This is a reversal from 2006, when the male participation rate in Buffalo Narrows was 13.9% higher than the female participation.

In 2016, unemployment in Buffalo Narrows (i.e., 12.5%) was considerably lower than the provincial Indigenous population unemployment rate (i.e., 18.6%). Buffalo Narrows is the only LSA community with an unemployment rate lower than the provincial Indigenous average. Unemployment in the community has fluctuated between 2006 and 2016, with a low of 9.4% in 2011, but has remained lower than the 2006 rate of 20.2%. The unemployment rate in the community has remained higher for males than females between 2006 (i.e., 20.4% compared to 17.6%, respectively) and 2016 (i.e., 18.2% compared to 7.7%, respectively). The difference in unemployment rate in the community has widened between males and females, from 2.8% in 2006 to 10.5% in 2016.

The last downturn in the mining sector in the RSA affected workers in Buffalo Narrows, with reportedly more than 20 workers being affected. It was indicated by some participants during KP interviews that others who had worked for decades in companies such as Cameco, were not formally trained, did not acquire health and safety tickets and would have had to take certification again (2019 to 2021 KP interview program). However, many of the unemployed in Buffalo Narrows are also reported to not be looking for work. As they had previously worked in the mining industry, interviewees reported that they do not want employment that pays less than what they had previously earned. Key person interviews indicated that some residents in Buffalo Narrows feel overlooked as companies are perceived to not hire from Buffalo Narrows and solely employ workers from La Loche.

6.4.1.3 Employment Challenges

Challenges to successfully participating in the wage economy in the LSA communities were associated with the lack of employment opportunities within communities and the lower levels of educational attainment of the labour force (BNDN-JWG 2021b). For the residents of La Loche and the CRDN, the lack of economic opportunities also diminishes interest in training and education, as there are few employment opportunities, trained or not (DMCA 2018). The core challenges appear to be a lack of employment opportunities in the region, not training, though both require focus (DMCA 2018).

The main drivers of employment in the RSA are government services, education, health, and seasonal work. The seasonal employment opportunities such as seasonal firefighting, outfitting, and construction, are more often filled largely by males (2019 to 2021 KP interview program). Without a minimum level of education (Section 6.6, Education and Training), the types of employment available in the communities are perceived as not within reach. In addition, people who obtain further education often leave the communities to find employment, and do not return (2019 to 2021 KP interview program). The private services sector (i.e., retail, wholesale, accommodation, and food services) comprises fewer than 20% of employment opportunities in the La Loche / CRDN area, compared to the 45% for the province overall and 28% for the RSA, indicating a much higher level of private sector activity in other northern centres (DMCA 2018). Employment by industry is discussed further in Section 6.4.2.

Many KP interviewees noted a reluctance to leave their families for extended periods as a barrier to obtaining training and education or securing employment outside of the community (2019 to 2021 KP interview program). While the school systems in the LSA communities are working on improving rates of attendance, graduation, literacy, and numeracy, success in these metrics remains challenging. In the past, students had to leave their communities for southern Saskatchewan to complete secondary education as there were no high schools locally. Now that there are high schools, current challenges include recruiting and retaining qualified educators for communities (BNDN-JWG 2021b).

Key person interviews with BRDN members regarding unemployment identified contributing factors, including that although many community members have qualifications, they lack employment experience. Further, like those in other LSA communities, many are reluctant to leave their family ties in the community in search of employment elsewhere. During the JWG on economies in August 2021, a BRDN participant commented that they expected the unemployment rate for their community was higher in 2021 due to the COVID-19 pandemic (BRDN-JWG 2021a).

Additional challenges to obtaining wage employment include costs and availability of obtaining safety tickets, Driver's licences, childcare, and transportation (2019 to 2021 KP interview program). Some residents noted there

were no local program available for driver's education in many of the LSA communities, and residents must go to La Loche for class and Buffalo Narrows for the road tests (2019 to 2021 KP interview program). Discussions with LSA driver instructors noted they travel to CRDN, La Loche, BNDN, Buffalo Narrows, and BRDN to provide class 7 instructions for high school students and adults; however, the class 5 road tests are conducted in La Loche and Buffalo Narrows by SGI. The LSA community residents noted that online employment application processes can make it difficult to obtain employment, as many people do not have access to a computer or internet in their homes. Distance to employment was noted as a barrier to employment in the mining sector, particularly for women, due to family and childcare responsibilities.

Some LSA residents noted women may be more likely to enter the mining industry if employment opportunities were closer to home. It was also noted that this would benefit families in general, particularly in the ability to respond to family emergencies (2019 to 2021 KP interview program). A number of these barriers to employment have also been identified as being broadly applicable to the RSA, including lower levels of educational attainment, limited job and work experience opportunities in smaller communities, and the short-term or seasonal nature of many jobs (NLMC et al. 2011).

6.4.1.4 Local Study Area Communities Summary

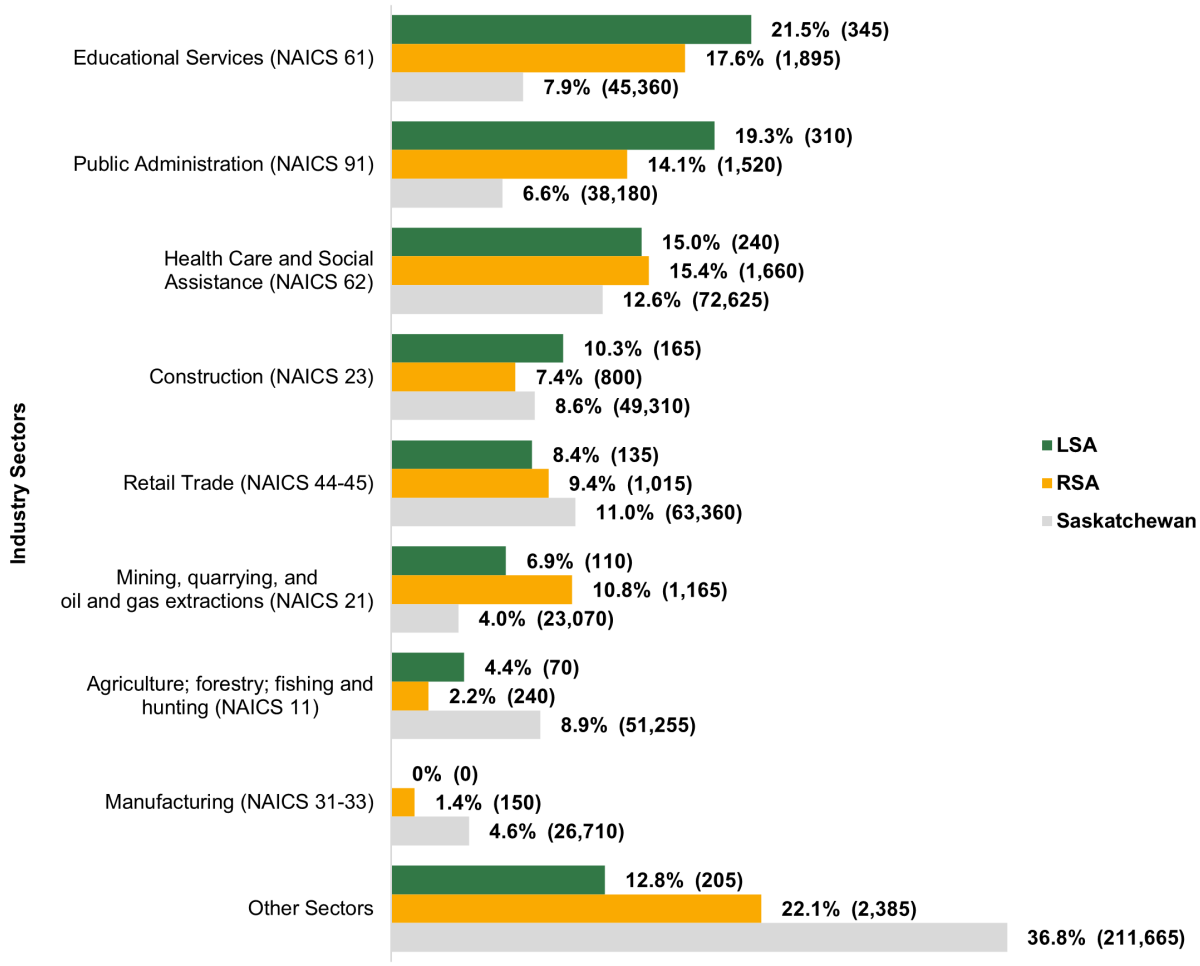
The participation rate in the LSA communities overall is lower than the provincial average; conversely the unemployment rate and percentage of people not in the labour force are higher than the provincial average. Unemployment rates among the LSA communities was highest in CRDN (i.e., 44.4%) and lowest in Buffalo Narrows (i.e., 12.5%). Buffalo Narrows had the highest participation rate (i.e., 62.7%) and La Loche had the lowest (i.e., 33.1%). In order to develop a stronger labour market in the LSA, there is a need to increase the low labour force participation and reduce the relatively high unemployment rates through increases in employment opportunities.

6.4.2 Employment by Industry Sector

6.4.2.1 Regional Study Area

Figure 20 shows the percentage of employment by sector for 2016 for the LSA, RSA and Saskatchewan (Appendix A, Table A-17a). The education sector is the primary employer in the RSA (17.6%) followed by the health care and social assistance sector (15.4%) and the public administration sector (14.1%) (Figure 20). Employment in the mining, quarrying and oil and gas extraction industry sector in the RSA in 2016 was higher than Saskatchewan (10.8% and 4.3% respectively). Employment in other primary industries such as agriculture, forestry, fishing, and hunting was lower in the RSA than in all of Saskatchewan (i.e., 2.2% and 8.9% respectively). Other industry sectors (a grouping of all other recorded, but not separately stated industry sectors) accounted for 22.1% of employment in the RSA.

Figure 20: Employment by Industry Sector for Local Study Area, Regional Study Area, and Saskatchewan, 2016



Source: Statistics Canada 2017a.
Note: Data were not available for Bear Creek, Descharme Lake, and Garson Lake.
LSA = local study area; RSA = regional study area; NAICS = North American Industry Classification System.

6.4.2.2 Local Study Area

In 2016, the industry sectors with the highest employment rates in the LSA were educational services, public administration, and health care and social services, consistent with the RSA. These sectors have consistently provided the highest proportion of employment in the LSA since 2001 (Figure 21). The industry sectors of construction, retail, and mining, quarrying and oil and gas extraction are also sizeable employment sectors in the LSA (i.e., 10.3%, 8.4% and 6.9% respectively). The agriculture, forestry, fishing, and hunting industry sector in the LSA had a low employment rate (i.e., 4.4%).

In 2016, employment in the mining, quarrying and oil and gas extraction industry sector in the LSA (i.e., 6.9%) was lower than the RSA (i.e., 10.8%) but higher than Saskatchewan (i.e., 4.0%). The mining, forestry, and oil and

gas industries were once the dominant employers in the LSA communities. When the Cluff Lake Mine closed in 2002, many of the miners from the LSA communities left Saskatchewan to go to Ontario and British Columbia for mining work (2019 to 2021 KP interview program). Employment in the mining, quarrying, and oil and gas extraction peaked in 2011 in the LSA (i.e., 11.2% of total employment) followed by a decline by 2016 (i.e., 6.9% of total employment); however, it remained higher than the provincial average (i.e., 3.9%). Employment in the agriculture, forestry, fishing, and hunting industry sector in 2016 was lower in the LSA than in all of Saskatchewan. LSA employment in the agriculture, forestry, fishing, and hunting industry sector peaked in 2001 (i.e., 8% of total employment), before declining sharply to 2.6% in 2006 and 1.7% in 2011 and increasing again in 2016 (i.e., 4.4% of total employment). The decline in employment in the agriculture, forestry, fishing, and hunting industry sector between 2001 and 2011 occurred in parallel to an increase in employment in the mining, quarrying, and oil and gas extraction sector. Provincially, construction, retail trade, agriculture, forestry, fishing, and hunting accounted for a larger share of employment than educational services or public administration.

The data indicate that employment in the LSA and RSA is particularly concentrated in government-funded service sectors, with lower employment rates in sectors such as agriculture, forestry, fishing and hunting, manufacturing, and retail trade than in the province as a whole. This was confirmed during JWG meetings, where it was noted that government services represent a large portion of employment, with comparatively little private business employment opportunities (BNDN-JWG 2021b; BRDN-JWG 2020). A 2018 economic analysis completed for the La Loche region also confirmed government services accounted for the majority of employment with comparatively few employment opportunities in the private sector (DMCA 2018).

Community members confirmed major employers in the LSA include the health district, government, and schools. Other sectors have at times been substantial employers in individual LSA communities (Appendix A, Table A-18b)[24]:For example:

- In CRDN, in 2016, the construction sector was the second highest employer after educational services.
- In Buffalo Narrows, in 2011, the mining, quarrying, oil and gas extraction sector was the second highest employer after educational services.
- In BRDN, in 2011, the retail trade sector was the second highest after public administration and in 2001 the manufacturing sector was third highest after public administration and educational services (Appendix A, Table A-18a).
- No construction employment is available in Buffalo Narrows (2019 to 2021 KP interview program).
- Key person interview participants indicated that commercial fishing is declining as an industry due to regulations and stagnant quotas because of a focus on tourism and recreational fishing as a priority. Key person interviews identified a need to develop tourism in the LSA, as currently, tourists come in but do not spend their disposable income in the communities (e.g., bringing their own food). As a result, employment opportunities in the LSA are reliant to a large degree on government-funded service sectors.

[24] To minimize rounding error and due to data unavailability, LSA communities with less than 400 population as of the 2016 Census were not included in this comparison.

In Buffalo Narrows, the major employers were once forestry and mining but are now the government, education, and health sectors (2019 to 2021 KP interview program). While there are vacancies in these sectors in Buffalo Narrows, the employment requires degrees or trades certification and the positions were vacant for some time in 2019. The NLSD have several positions in the community that cannot be filled, which likely require teachers from outside the community. Most other employment opportunities in the community are seasonal (e.g., fire suppression, student programs). Those without educational certification or degrees must travel outside of the community for employment, with some working in Fort McMurray, Alberta, or mining in British Columbia, Ontario, or Southern Saskatchewan (2019 to 2021 KP interview program). Local contractors have been struggling in the community.

In Dillon (BRDN), the uranium and oil and gas industries were once the major employers in the community (2019 to 2021 KP interview program). Currently, the major employer in the community is the BRDN, which employs workers in education and healthcare. Between 2006 to 2016, there has been more variety in the types of jobs available to community members with more technical services, positions beyond entry level, and industrial technical jobs (e.g., environmental technicians, oil technicians, environmental monitors, gas technicians). Currently, many residents work at companies that provide services and goods to mining companies in Saskatchewan in jobs such as gas delivery, catering, drilling, environmental technician, security, geotechnical, and exploration (2019 to 2021 KP interview program). The type of employment skills needed in the community relate to positions in security, environment, heavy equipment, teaching, nursing, and law. The community has one company that builds houses employing around five workers and all other major construction is contracted out. Very few contractors are found in the community as those with trades certification tend to leave (2019 to 2021 KP interview program).

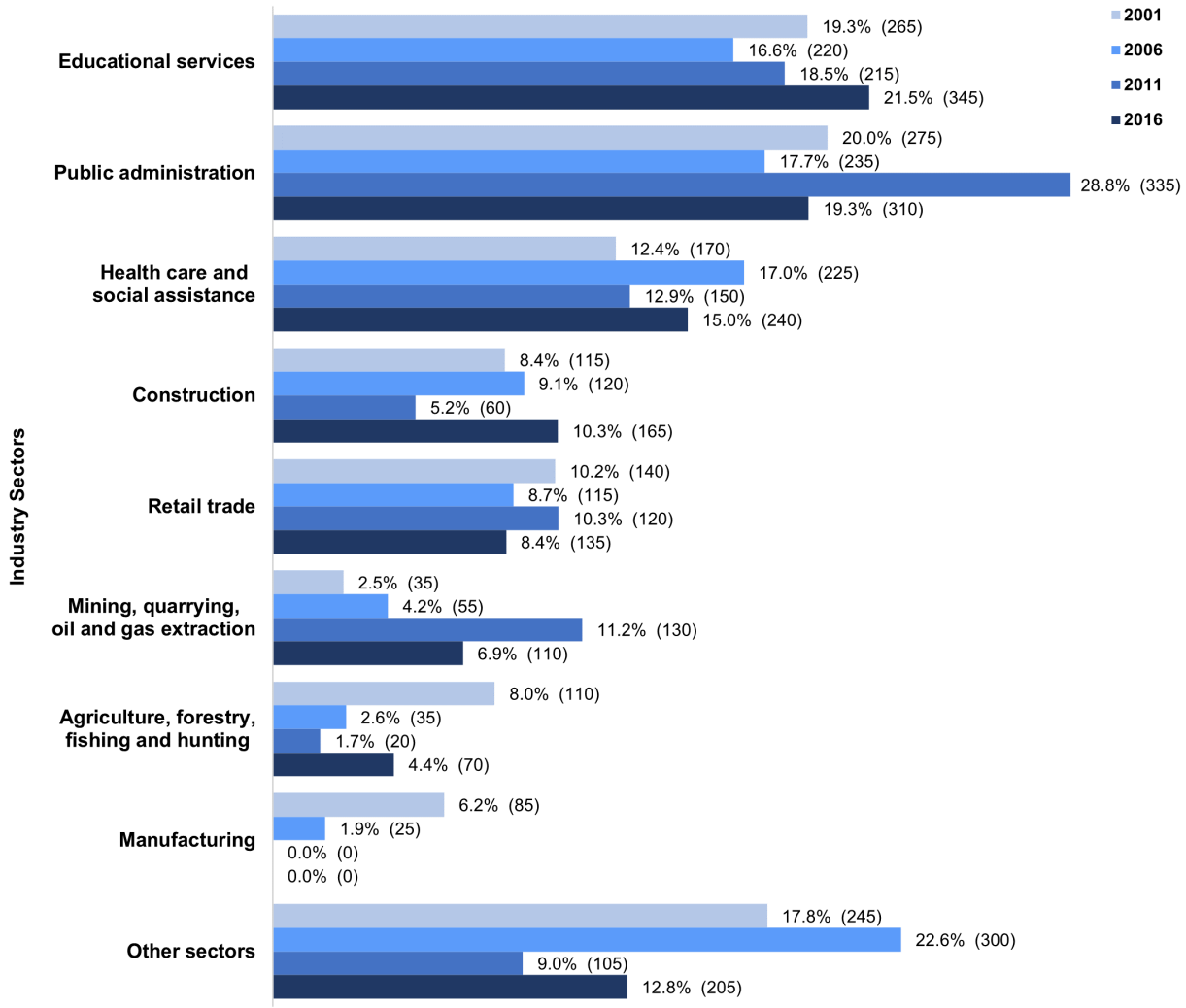
The LSA community members noted mining and oil and gas are also important sources of employment (2019 to 2021 KP interview program). Employment in mining, quarrying, and oil and gas extraction sector has ranged between 2.5% in 2001 and 11.2% in 2011 (Figure 21). During interviews, community members commented that there has been an increased awareness and opportunity for LSA residents to pursue employment opportunities in the oil and gas sector or mining outside of their home communities. More women in the BRDN are now involved in industrial employment such as heavy equipment and employment in the oil and gas industry (2019 to 2021 KP interview program). More recent estimates indicated approximately 200 LSA residents are potential workers with experience in mining, quarrying, or oil and gas; however, this value also likely included seasonal quarry workers and others with less transferable skills (BRDN-JWG 2021a).

Many community members that work in mining or the oil and gas sector still reside within the LSA while working on rotation elsewhere such as in Fort McMurray, Cold Lake, potash mines, or uranium mines in other parts of Saskatchewan. It was noted that those working in Alberta commute longer distances between the worksite and home depending on the rotation schedule, while those working in the uranium industry in Saskatchewan can use pick-up points in Buffalo Narrows, Beauval, and Prince Albert (BRDN-JWG 2021a; 2019 to 2021 KP interview program).

Similar to the LSA, public administration, educational services, and health care and social assistance accounted for the highest share of employment in 2016 in the RSA. However, in Saskatchewan as a whole, the three sectors contributing to the highest share of employment were health care and social assistance (i.e., 12.6%), retail trade (i.e., 11.0%), and agriculture, forestry, fishing, and hunting (i.e., 8.9%) (Figure 20).Appendix A, Table A-17).

The construction sector is also a large employer in many LSA communities, and for people living on reserve at CRDN, the construction sector was the second highest employer after educational services (Appendix A, Table A-17, and Table A-17a). Local study area residents noted that many employment opportunities in the construction sector are cyclical or intermittent and often depend on the availability of government funding for infrastructure projects (2019 to 2021 KP interview program).

Figure 21: Proportion of Employment by Industry Sector for Local Study Area, 2001 to 2016



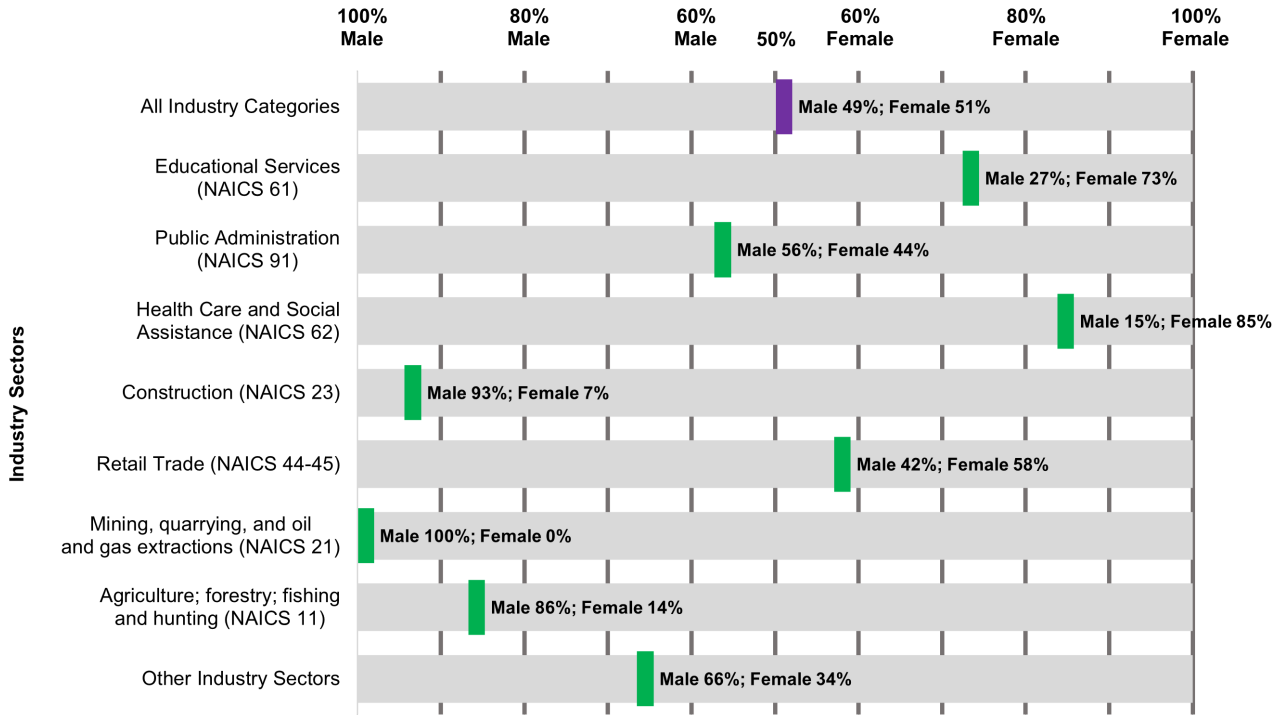
Source: Statistics Canada 2002, 2007a, 2012a, 2017a.
Note: Data were not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.

Local study area residents also noted during interviews that people may have to leave their home community to obtain work, and only return when local job opportunities are available, which may be a contributing factor to the decline in population from 2011 to 2016. Employment opportunities in the LSA are more common in healthcare

and education, and interview participants noted workers in these fields are more likely to be able to return to their home communities for employment. These sectors also predominantly employ women, which contributes to the generally higher employment rates for women in the LSA (Figure 22 and Appendix A, Table A-17a). Those seeking work in other sectors may not be able to find local employment that matches their skills and interests as easily. While some LSA residents continue to work in the mining sector, other former mine workers do not have credentials that are easily transferable to employment in other sectors (2019 to 2021 KP interview program). The remaining employment opportunities outside of healthcare and education are related to seasonal employment and are associated with band infrastructure (e.g., fire suppression, fishing in winter, working in the arena in winter) (2019 to 2021 KP interview program).

Figure 22 presents the distribution of employment by sector and sex in the LSA from the 2016 Census (Appendix A, Table A-17a). Females make up most of the employment in the educational services and health care and social services sectors in the LSA, which contributes to the higher employment rates for females in the LSA overall as compared to males. Females accounted for a larger proportion of employment in health care and social assistance (i.e., 85%) and educational services (i.e., 73%). Males accounted for a higher proportion of employment in public administration (i.e., 56%), construction (i.e., 93%), and mining, quarrying, and oil and gas extraction sector workforces (i.e., 100%).

Figure 22: Employment by Industry Sector and by Sex, for Local Study Area, 2016



Source: Statistics Canada 2017a.
Note: Data were not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.
NAICS = North American Industry Classification System.

In the RSA and Saskatchewan, distribution of employment by sector and sex in 2016 were similar to the LSA, except the mining, quarrying, and oil and gas extraction sectors, where approximately 13% of employees were women (Appendix A, Table A-17a). Key person interviews indicated that flexible working arrangements are needed due to childcare commitments and being able to attend to family, including relatives (2019 to 2021 KP interview program). For communities in the LSA, the highest proportion of employment by women is observed in Buffalo Narrows (i.e., 55.4%) and the lowest is in BNDN (i.e., 46.9%) (Appendix A, Table A-17b)[25].

6.5 Income

The following sections describe income levels and income sources in the LSA communities compared to the RSA and Saskatchewan. Both the wage and traditional economies are examined.

Effects on income are characterized considering both wage or market income (e.g., employment income, income from trapping or commercial fishing), and traditional economy income. The traditional economy or subsistence economy refers to activities such as hunting, fishing, trapping, plant harvesting, and crafting that take place outside of the market or wage economy (Section 6.5.2). Traditional economy activities provide food and other necessities of life that support people and communities through personal use, giving to other members of the community for personal use, exchange, or barter, but are not purchased with cash.

Participation in the traditional economy is typically not captured in Statistics Canada labour force and income statistics. For example, BRDN members described people in their community who are farmers, wild rice harvesters, and loggers but who would not be captured in census employment statistics (BRDN-JWG 2021a). Economic activities associated with the traditional economy are described based on IKTLU Studies prepared for the Project, literature, information obtained through JWG meetings, and KP interviews to capture the importance of the traditional economy in supporting individuals and communities in the LSA. Usher et al. (2003) have noted that a mixed economy that integrates the market and traditional economies typically exists in Indigenous communities across the north in Canada. The LSA community members noted the traditional economy makes important contributions to the economic well-being of people and communities and participation varies by individual (BRDN-JWG 2021a). People can participate in both the wage or market economy and the traditional economy to meet their needs (Tough 1996; Myers 1996). Many traditional economy activities are largely seasonal. Where traditional economic opportunities are reduced, other sources of income are required to maintain quality of life.

6.5.1 Wage Economy

6.5.1.1 Regional Study Area

Table 14 shows select income indicators for the LSA, RSA and province of Saskatchewan in 2015. Table 15 and Figure 23 shows the breakdown of household income sources by the LSA, RSA, and province of Saskatchewan in 2015. Within the RSA, the total median personal income in 2015 was $19,930, with minimal difference by sex (Table 14). This is lower than the median provincial income amongst of $38,299. The percentage of RSA residents receiving employment income in 2015 was 72%, with males being more likely to receive employment income than females (i.e., 78.8% compared to 64.2%). The percentage of RSA residents receiving employment

[25] To minimize rounding error and due to data unavailability, LSA communities with less than 400 population as of the 2016 Census were not included in this comparison.

income in 2015 was similar to the Indigenous provincial population (i.e., 73.6%) (Figure 23). The proportion of the RSA population working full-time, full year was 21.3%, with females slightly more likely to work full-time throughout the year than males (i.e., 21.6% to 21.0%, respectively). This is lower than the figure for Saskatchewan as a whole (i.e., 35.3%).

6.5.1.1.1 Income Disparity

Wilson and Macdonald (2010) examined data from the 1996, 2001, and 2006 censuses to measure the income gap between Indigenous Peoples in Canada and non-Indigenous Canadians. In 2006, the median income for Indigenous Peoples was $18,962, 30% lower than the median for other Canadians (i.e., $27,097). The study reveals that income inequality occurs irrespective of where Indigenous people live in Canada. The income gap is $7,083 higher in urban settings and $4,492 higher in rural settings. Non-Indigenous people working on urban reserves have a median income 34% higher than Indigenous workers. On rural reserves, non-Indigenous Canadians have a median income 88% higher than their Indigenous colleagues.

The study also found that that educational attainment had increased for Indigenous Peoples but had not influenced income inequality except in situations where they had a university degree, in which case the income gap was much less. In 2006 the median income gap between Indigenous and non-Indigenous people with a Bachelor's degree was only $646 while among those who had not completed secondary school the gap in median income between Indigenous and non-Indigenous people was $3,027. Within the Indigenous population, new and notable trends were evident between males and females. Indigenous females were found to be finishing secondary school and obtaining university degrees at a higher rate than Indigenous males (28% compared to 8%). Indigenous females were also found to be earning median incomes closer to those of Indigenous males — a trend that is not replicated in the general Canadian population. Finally, Indigenous females who have obtained at least a Bachelor's degree have higher median incomes than non-Indigenous Canadian females with equivalent education - a gap of $2,471 which increases to $4,521 if they obtain a Master's degree. This is the only segment of the Indigenous population that exceeds the median incomes of their non-Indigenous counterparts. The study concludes that despite new strides made by Indigenous females in attaining university degrees, there has been a limited reduction in income disparity between Indigenous Peoples in Canada and non-Indigenous Canadians in the past 10 years. The information detailed here is presented in order to show that income disparity among Indigenous people is a national issue and is not exclusive to the RSA and LSA communities.

Table 14: Income of the Local Study Area Communities, Regional Study Area, and Saskatchewan

Metric by Year	CRDN			BNDN			BRDN			Buffalo Narrows			La Loche			Census Division No.18 (RSA)			Saskatchewan			Census Division No.18 Indigenous (RSA)			Saskatchewan Indigenous Population		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
2015																											
Average total income in 2015 among recipients ($)	25,187	23,820	24,473	28,922	24,744	26,702	26,269	24,228	25,238	43,758	44,020	43,901	28,058	29,846	29,030	34,485	29,519	31,971	58,791	40,184	49,409	26,070	25,859	25,961	35,768	30,523	32,976
Median total income in 2015 among recipients ($)	9,056	16,960	14,688	16,384	19,648	19,008	16,640	16,080	16,352	32,896	31,552	31,872	15,728	24,589	21,043	19,618	20,612	19,930	46,117	31,978	38,299	14,744	19,215	17,278	23,087	23,825	23,553
Employment income (%)	74.8	61	67.8	82.2	57.3	67.6	75.1	62.1	70.2	80.4	73.5	78.2	70.2	45.3	56.3	78.8	64.2	72	76.8	68	73.2	77	58.8	67.6	81.6	65.5	73.6
Average employment income in 2015 among recipients ($)	36,908	28,485	32,528	40,116	23,634	31,188	36,444	29,507	33,029	47,453	45,338	46,312	34,551	34,288	34,432	42,995	32,342	37,826	55,728	37,207	46,853	33,958	28,406	31,228	41,229	30,501	35,725
Median employment income in 2015 among recipients ($)	20,224	17,451	18,816	23,232	17,600	20,309	23,744	17,504	21,312	38,016	34,432	36,736	21,280	26,880	24,672	27,168	23,920	25,455	44,551	30,027	36,612	19,793	20,356	20,101	29,981	23,736	26,222
Proportion of working-age population who worked full-year, full-time (%)	17.9%	24.6%	21.1%	23.3%	27.3%	25.4%	14.8%	20.0%	18.3%	24.4%	35.7%	30.4%	15.6%	16.4%	15.8%	21.0%	21.6%	21.3%	40.8%	29.9%	35.3%	15.4%	18.4%	17.0%	25.2%	23.1%	24.1%
Median employment income in 2015 for full-year, full-time workers ($)	33,920	39,040	38,528	44,928	20,544	32,064	34,688	33,728	34,176	77,539	66,822	70,460	51,840	51,968	51,904	60,018	44,783	50,924	62,070	48,579	55,368	42410	40095	40830	52209	43158	47038
2010																											
Average income ($)	16,293	18,843	17,578	n/a	n/a	n/a	19,606	18,159	18,899	42,840	39,802	41,181	20,080	22,196	21,203	28,612	24,599	26,604	48,611	33,119	40,798	22,204	21,322	21,754	28,478	24,522	26,354
Median income ($)	4,355	14,681	10,016	n/a	n/a	n/a	10,411	10,548	10,527	29,223	35,753	34,872	9,871	17,901	14,497	16,485	17,725	17,066	38,498	25,823	31,408	11,453	15,977	14,053	17,784	18,362	18,092
Employment income as a proportion of total income (%)	72.3	58.6	62.6	n/a	n/a	n/a	84.3	65.4	73	77.7	78.7	78.2	66.7	43	54.1	79.7	63.5	72.1	79.5	70.1	75.6	77.7	58.4	68	81.8	66.5	74.1
2005																											
Median income ($)	6,032	9,248	8,176	5,520	11,232	9,184	9,120	10,560	10,272	22,257	25,453	24,848	8,024	14,560	11,912	12,848	13,963	13,600	29,589	19,873	23,755	9,067	12,855	11,236	13,477	14,094	13,843
Earnings, as a% of total income	75.8	51.3	61.3	70.7	50.0	58.4	78	66.3	70.4	84.9	71.9	77.9	70.4	45.8	57.1	79	63.1	71.7	77.8	68.5	73.9	75.6	56.4	65.6	81.7	63.7	72.9

Source: Statistics Canada 2007 a,c,d,f,g,l,k,m,o; Statistics Canada 2013 a,c,e,g,l,k; Statistics Canada 2017 b,c,d,e,f,g; Statistics Canada 2018a.
M = male; F = female; T = total; CRDN = Clearwater River Dene Nation; BNDN = Birch Narrows Dene Nation; BRDN = Buffalo River Dene Nation; LSA = local study area; RSA = regional study area

Table 15: Total Income Sources, for Local Study Area Communities, 2015

	LSA[c,d]														
	CRDN			BNDN			BRDN			Buffalo Narrows			La Loche		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Employment income[a]	75%	61%	68%	82%	57%	68%	75%	62%	70%	80%	74%	78%	70%	45%	56%
Government transfer payments[b]	20%	37%	29%	20%	39%	28%	22%	35%	28%	14%	20%	17%	25%	53%	41%
Other	5%	2%	4%	n/a	4%	4%	3%	0%	2%	4%	5%	5%	5%	2%	3%

Source: Statistics Canada 2016.

Note: For confidentiality purposes, values, including totals were randomly rounded either up or down to a multiple of five or 10. The total value may not match the individual values since totals and sub-totals are independently rounded and may not total to 100%.

a) Employment income: All income received as wages salaries and commissions from paid employment and net self-employment income from farm or non-farm unincorporated business and/or professional practice during the reference period. For the 2016 Census the reference period is the calendar year 2015 for all income variables.

b) Government transfers: All cash benefits received from federal provincial territorial or municipal governments during the reference period. It includes: Old Age Security pension Guaranteed Income Supplement Allowance or Allowance for the Survivor; Retirement disability and survivor benefits from Canada Pension Plan and Québec Pension Plan; Benefits from Employment Insurance and Québec parental insurance plan; Child benefits from federal and provincial programs; Social assistance benefits; Workers' compensation benefits; Working income tax benefit; Goods and services tax credit and harmonized sales tax credit; Other income from government sources. For the 2016 Census the reference period is the calendar year 2015 for all income variables.

c) The LSA includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, Garson Lake, Michel Village, St. George's Hill, and Turnor Lake.

d) The LSA income source proportions in 2015 are calculated based on the weighted average of number of income recipients and Income source proportions of the Indian Reserves, villages, and hamlets.

LSA = local study area; M = male; F = female; T = total; BNDN = Birch Narrows Dene Nation; BRDN = Buffalo River Dene Nation; CRDN = Clearwater River Dene Nation.

6.5.1.2 Local Study Area Communities

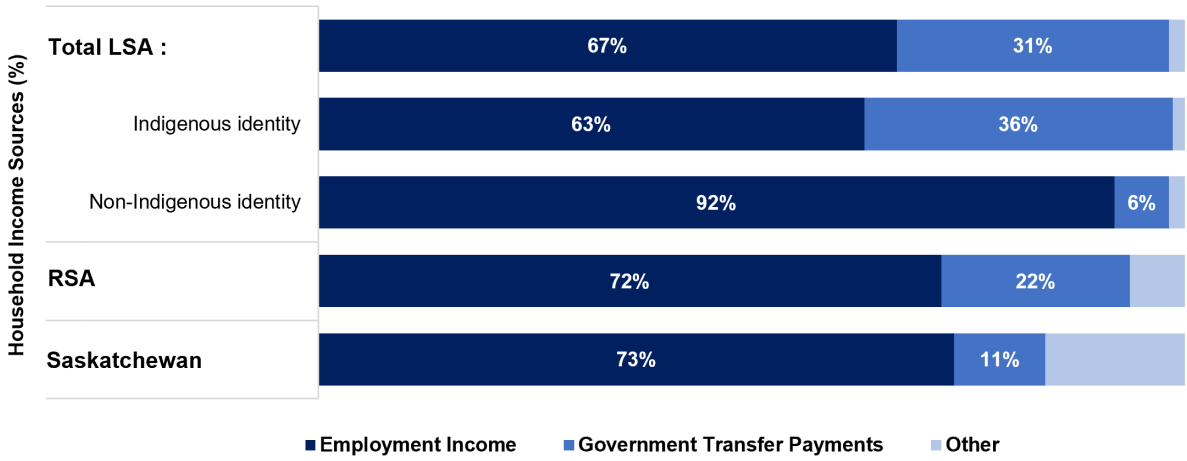
6.5.1.2.1 Income Sources

Government transfer payments in the LSA made up 31% of total income (Figure 23); this is notably higher among those residents who identify as Indigenous (i.e., 36%) as compared to non-Indigenous (i.e., 6%). Females in the LSA were also more likely to receive government transfers than males (i.e., 40% compared to 21%, respectively).

Within the RSA, 22% of the population received government transfer payments, which is higher among the Indigenous population (i.e., 29%) compared to the non-Indigenous population (i.e., 8%). The percentage of the population receiving income from government transfer payments is higher in the LSA (i.e., 31%) and RSA (i.e., 22%) compared to the province as a whole (i.e., 11%), as shown in Figure 23. At the provincial level, the Indigenous population is more likely to have received government transfers than the non-Indigenous population (i.e., 20% compared to 11%, respectively).

Further detail on income within each LSA community is presented in the following subsections.

Figure 23: Household Income Sources for the Local Study Area, Regional Study Area, and Saskatchewan, 2015



Source: Statistics Canada 2016.
Note: Data were not available for Bear Creek, Black Point, Descharme Lake, Garson Lake, Michel Village, St. George's Hill, or Turnor Lake.
LSA = local study area; RSA = regional study area.

6.5.1.2.2 Clearwater River Dene Nation

In the CRDN, the total median personal income (i.e., income from all sources) of $14,688 is lower than the Indigenous provincial median of $23,553, lagging for both males and females. Median income among females in the CRDN is higher than among males (i.e., $16,960 compared to $9,056, respectively). The population of the CRDN is 15% less likely to work full-time throughout the year than the provincial population, and accordingly, a lower proportion of income in the CRDN is employment income (i.e., 74.8% for males and 61.0% for females in the CRDN, compared to 76.8% for males and 68% for females in Saskatchewan). Among those community members who work full-time, full-year, females also have a higher income than males, with a median income of $39,040 compared to $33,920 for females and males, respectively. Among the entire working-age population,

males make slightly more than females ($25,187 compared to $23,820 average, respectively; Table 14). In terms of income sources within CRDN, 29% of the population received government transfer payments while 68% received employment income. Females were more likely to receive government transfer payments than males (37% compared to 20%; Table 15).

6.5.1.2.3 La Loche

The total median personal income in 2015 in La Loche was $21,043, which is slightly lower than the Indigenous provincial median of $23,553 but slightly higher than the Indigenous RSA population ($17,278). Female community members have a higher median income (i.e., $24,589) compared to males (i.e., $15,728). The population of La Loche is less likely to work full-time, full-year (i.e., 15.8%) compared to the RSA (i.e., 21.3%) and the province (i.e., 35.3%). Income among full-time, full-year workers shows little difference between males and females in La Loche. Males in La Loche were much more likely to receive employment income compared to females (i.e., 70.2% and 45.3%, respectively); this gap (i.e., 24.9%) is also observed in the Indigenous population of the RSA (i.e., 77.0% compared to 58.8%; a 18.2% gap) and province (i.e., 81.6% compared to 65.5%; a 16.1% gap; Table 14). In terms of income sources within La Loche, 41% of the population received government transfer payments while 56% received employment income. Females were more likely to receive government transfer payments than males (i.e., 53% and 25%, respectively; Table 15).

6.5.1.2.4 Birch Narrows Dene Nation

The total median personal income in the BNDN in 2015 was $19,008, with females having a slightly higher income than males (i.e., $19,648 and $16,384, respectively). The rate of income from employment in the BNDN is higher among male community members (i.e., 82.2%) compared to females (i.e., 57.3%). The overall community figure of 67.6% receiving employment income is equal to the Indigenous RSA population (i.e., 67.6%) and lower than Indigenous provincial population figure (i.e., 73.6%). As shown in Table 14, the population of the BNDN is more likely to work full-time, full-year (i.e., 25.4%) compared to the RSA (i.e., 21.4%) and less likely than the province (i.e., 35.3%), with females more likely than males to work full-time, full-year (Table 14). In terms of income sources within the BNDN, 29% of the population received government transfer payments while 67% received employment income. Females were more likely to receive government transfer payments than males (i.e., 37% and 19%, respectively; Table 15).

6.5.1.2.5 Buffalo River Dene Nation

The total median personal income in the BRDN in 2015 was $16,352, with no notable difference between males and females (Table 14). This figure is lower than the Indigenous RSA and provincial figures (i.e., $17,278 and $23,533, respectively). The percentage of people in the BRDN who work full-time, full-year was 17%), which was also lower than the RSA and province. The percentage of people in the BRDN who work full-time, full-year varied between males and females (i.e., 14.8% and 20.0%, respectively). In the BRDN, 70.2% of community members receive employment income, a figure that is higher among males (i.e., 75.1%) compared to females (i.e., 62.1%), and comparable to the RSA (i.e., 72%) and province (i.e., 73.2%; Table 15). In terms of income sources within the BRDN, 28% of the population received government transfer payments while 70% received employment income. Females were more likely to receive government transfer payments than males (i.e., 35% compared to 22%, respectively; Table 15).

6.5.1.2.6 Buffalo Narrows

Buffalo Narrows median personal income in 2015 was $31,872, higher than other communities and the Indigenous RSA, and the Indigenous provincial population (i.e., $17,278 and $23,533 respectively). There is no notable difference between male and female median income (Table 14). The number of people receiving employment income in Buffalo Narrows (i.e., 78.2%) is also higher than in other communities, which is also higher than the Indigenous RSA (i.e., 67.6%) and the provincial Indigenous population (i.e., 73.6%), and has been consistent over time. Median income among full-time, full-year workers was also higher than in other communities at $70,460, which is notably higher than the RSA (i.e., $50,924) and province (i.e., $55,368). Median income among full-time, full-year workers in Buffalo Narrows varied between males and females, being $77,539 and $66,822, respectively (Table 14). In terms of income sources within Buffalo Narrows, 17% of the population received government transfer payments, while 78% received employment income. Females were more likely to receive government transfer payments than males (i.e., 20% compared to 14%, respectively; Table 14).

As noted above, Buffalo Narrows has a higher median income when compared to the RSA and provincial Indigenous and non-Indigenous populations. As previously discussed in Section 6.4.1.2.5, Buffalo Narrows, has a higher participation rate in the labour force compared to other communities as well as a lower unemployment rate, both of which play a role in higher incomes. The median age in Buffalo Narrows is just over five years greater than in the rest of the LSA communities, which can affect income as most residents have been in the workforce for a longer duration, resulting in higher salaries. Buffalo Narrows also has the highest overall educational attainment among the LSA communities (Section 6.6.1.2.5, Buffalo Narrows). The community has seen increases for every level of education between 2006 and 2016 and exceeds the RSA averages and most provincial averages.

6.5.1.2.7 Other Local Study Area Communities

Data for Other LSA Communities was not available.

6.5.2 Traditional Economy

The importance of the traditional and wage economies were topics discussed with Indigenous Groups as part of KP interviews and the JWG meetings that took place in 2021. During those JWG meetings, it was indicated that Indigenous community members can meet their needs for food, clothing, and other necessities in various ways (e.g., via the market or modern economy [wage economy] or the sharing, subsistence, or non-wage, traditional economy). It is understood that many people may participate in the traditional economy, the wage economy, a combination of both, or neither. Feedback from JWGs and other LSA community members during KP interviews suggests that jobs such as fishing, logging, gathering wild rice, and trapping are the primary source of income for many individuals, but that they are not captured in census data because these are not part of the wage economy. Sources of income among community members come from many different avenues, with an estimated 80% of community members participating in the traditional economy in some form (2019 to 2021 KP interview program). The difference between government statistics and “real life” was highlighted by communities. Making a living off the land was noted as an important part of the local economy and one that should be protected. Understanding the extent of the traditional economy is an important step in ensuring that this information is considered within the assessment of the Project economic effects. The LSA community members noted the traditional economy makes important contributions to the economic well-being of people and communities. They also noted that participation in the traditional economy varied by individual. People with stable employment in the wage economy may spend less time harvesting but still may include Traditional Foods in their diet (BRDN-JWG 2021a).

Participation in the traditional economy also facilitates the transmission of social norms and cultural values across generations (Marks 1977; Usher et al. 2003; Duhaime et al. 2004). The IKTLU Studies completed by the CRDN, MN-S, BNDN, and BRDN all confirm the importance of participation in the traditional economy to community members in the LSA (TSD II: BNDN; TSD III: BRDN; TSD IV: MN-S; TSD V.1: CRDN). An IKTLU Study provided by the Ya'thi Néné Lands and Resources also provides context of the importance of these activities within the RSA (TSD VI: YLNR).

The traditional economy consists of many skills learned through kinship ties and operates at the household level. Butchering, skinning, net mending, mechanical repairs, and many other skills and specialized knowledge support the traditional economy (Usher et al. 2003). An LSA resident commented it takes a lot of skill and work to make garments from hides and furs (2021 trappers' workshop). Residents of the LSA that do not participate in the wage economy often turn to the traditional economy to meet their needs while those who have consistent employment in the wage economy may participate less frequently (BNDN-JWG 2021b; BRDN-JWG 2021a).

An LSA resident commented that trapping is a way of life as well as a hobby and fulfills a love of being outside (2021 trappers' workshop). Other residents have noticed many youths demonstrating a genuine interest in learning trapping and fishing (2021 trappers' workshop). An increase in youth interest may be supported by the increase in traditional land-based teaching in the schools within the LSA. Students are taught how to snare game, such as rabbits, and how to prepare the game (BNDN-JWG 2021b; BRDN-JWG 2021a; 2019 to 2021 KP interview program).

The wage or market economy supplies capital needed to participate in the traditional economy. For example, funds earned in the labour market support equipment and supply purchases such as snowmobiles, ammunition, and fuel (Tough 1996). As a result, a household that is successful in the traditional economy is often also successful in the wage or market economy as cash income can be used to purchase harvesting equipment and cover expenses (Usher et al. 2003). Clearwater River Dene Nation's IKTLU Study interim report states "a number of harvesters specifically described how wage-based jobs (individual or within the extended family) financially support the imperatives to live as Dene people engaged in land-based activities and the provision of food" (TSD V.1: CRDN).

Access to land and waters is essential to the traditional economy. This can be affected by downturns in commercial fishing and trapping industries that would otherwise help support travel to harvest areas or regional industrial development may reduce the land base or resources upon which the traditional economy depends. Reductions in harvests can lead to increased costs to purchase food and other necessities from the market economy and to increased impoverishment (Parlee 2015). A potential for increased commercial fishing in the region has been flagged as an opportunity for La Loche based on the increased demand for fish products that had occurred (DMCA 2018).

Traditional land and resource use is important for Indigenous Peoples throughout the LSA, as many LSA residents participate in the traditional economy. For those participating in both the traditional and wage economies, their increased level of activity in one often corresponds to a decreased level of activity in the other. This interaction between the traditional and wage economies enables some residents to maintain living standards when incomes levels are lower, including for seasonal workers. Specific information on participation in the traditional economy for each of the Indigenous Groups in the LSA communities is provided below.

6.5.2.1 Clearwater River Dene Nation

Traditional land and resource use is a primary value for CRDN members that is critical for many reasons, including economic considerations (TSD V.1). Clearwater River Dene Nation members have described the Patterson Lake area as a “backyard fridge” where harvesters know where to go to get the foods they need and noted:

> To this day, our families depend on our ancient lands for a range of cultural, sustenance, livelihood, spiritual and socio-economic purposes. Our ability to depend and rely on our lands is still critical to our community. Our families generally face high levels of unemployment and must continue to depend on the land to put food on the table. Any impact, disruption or diminution of our community's ability to rely on our wildlife, fish, berries, plants, forests and water resources can result in serious impacts and ramifications. (CRDN 2019)

Any diminishment in opportunities to secure food has a substantial negative economic effect on CRDN community families (TSD V.1). Clearwater River Dene Nation members have noted their ability to access harvesting sites has been constrained by industrial development, for example, the Cluff Lake mine, as well as by drilling operations and camps in the immediate vicinity of Patterson Lake (TSD V.1: CRDN).

6.5.2.2 Métis Nation – Saskatchewan

Métis Nation – Saskatchewan members have noted that hunting, trapping, fishing, and plant gathering has helped preserve the survival of families and the land is an integral part of their livelihoods. Métis Nation – Saskatchewan members provided estimates that, on average, 70% of their food comes from hunting, trapping, fishing, and gathering (TSD IV: MN-S). Fishing is noted as an activity that supports both personal and commercial economic activity. The MN-S members have noted that in their view, there have been effects of global warming and pollution on the land and wildlife and a decline in quality of meat and pelts (TSD IV: MN-S).

6.5.2.3 Birch Narrows Dene Nation

Birch Narrows Dene Nation community members have estimated that 80% or more of the people in the community participate in some form of traditional economic activity (BNDN-JWG 2021a). Birch Narrows Dene Nation members have described the importance of harvesting wild foods in feeding family members and supporting households and the broader community by sharing food with Elders and other community members (TSD II: BNDN). A BNDN member noted that at times in the past they relied on very little store-bought food. Income from commercial trapping and fishing has been noted to be important for BNDN members (TSD II: BNDN). A BNDN member commented that “because you’re working in a mine doesn’t mean you are going to discontinue (traditional activities). In fact, because you have income, you’re able to create that ability to be out there and to build cabins” (BNDN-JWG 2021a). Hunting, trapping, fishing, and other traditional economy activities are recognized by BNDN members as requiring considerable skill and practice (TSD II: BNDN; BNDN-JWG 2020; BNDN-JWG 2021a). Birch Narrows Dene Nation members have stated that in their view, their traditional hunting, trapping, and fishing has been affected by industrial development and disturbances related to the resource sector, including changes to animal quantities and migration patterns and decreased access to historically used areas (TSD II: BNDN). A BNDN member noted some youths are becoming more involved with traditional arts and crafts, noting “it’s coming back. With COVID, with our roads blocked, people needed something to do. It brought a lot of artistic abilities in some of our young ladies, and some of the older ladies too” (BNDN-JWG 2021a). It was also

noted that some BNDN residents relied on selling clothing and crafts for cash income to supplement lost income during the COVID-19 pandemic (BNDN-JWG 2021a).

6.5.2.4 Buffalo River Dene Nation

A BRDN community member estimated that approximately 80% of community members participate in some form of traditional economy activities (BRDN-JWG 2021a). Buffalo River Dene Nation members have indicated meat obtained through hunting, trapping, and fishing are important food sources that support households and the community (TSD III: BRDN). Wood harvesting, communal gardening, berry picking, and wild rice harvesting have also been noted as important traditional economy activities (BRDN-JWG 2021a). Commercial fishing remains important to the livelihood of BRDN members (TSD III: BRDN), but declines in fur prices have been noted to make commercial trapping a more tenuous occupation as the lower prices make it more difficult for individuals to make a living (TSD III: BRDN). The BRDN members have indicated traditional hunting, fishing, and trapping require experience and skills not only in harvesting animals but also in processing and preserving the meat (TSD III: BRDN). Buffalo River Dene Nation members have indicated that in their view, traditional hunting, trapping, and fishing has been affected by climate change, industrial development and pollution, increased use by non-Indigenous resource users, and institutional changes including the introduction of fur conservation areas (TSD III: BRDN). It was noted during women's interviews that both partners in several BRDN families participate in the traditional economy including hunting, gathering, and fishing (2019 to 2021 KP interview program). Buffalo River Dene Nation members also noted participation in the traditional economy can ebb and flow depending on the availability of employment in the wage economy. People may only be able to participate in the traditional economy on weekends or holidays when they are employed in the wage economy but may increase their traditional economic activities during periods when wage employment isn't available. The BRDN members attributed a recent increase in participation in the traditional economy in part to due to an increase in traditional teachings in school (BRDN-JWG 2021a).

6.6 Education and Training

The following subsection describes education and training throughout Indigenous and non-Indigenous communities located within the LSA and RSA. Information provided includes educational attainment, attendance and graduation rates, and available training programs as well as challenges and/or barriers residents may face in attaining educational certifications.

6.6.1 Educational Attainment

Educational attainment has been shown to improve employment and income opportunities as well as lead to better health and well-being outcomes (Public Health in Canada 2008). Community-specific analyses of educational attainment for 25- to 64-year-olds are provided in the subsections below with statistical data presented in Table 16. In general, the largest segment of the population in the LSA communities have less than a high school certificate (i.e., ranging from 22.8% to 60.8%), compared to 38.9% for the Indigenous provincial average and 57.5% for the RSA (Table 16). This is reflective, in part, of the young population in the LSA communities and RSA compared to the province, but also other challenges as discussed below.

6.6.1.1 Regional Study Area

The RSA has a relatively young population, with proportionally high numbers of children and youth in the education system. These are major factors for the education services industry sector having the highest

employment rate in the RSA (Section 6.4.2, Employment by Industry Sector). The lower educational attainment and fly-in mine sites require large camp facilities, which accounts for the high number of cleaners and custodians. The prominence of the mining industry is also seen in the high number of underground miners, drillers, and mine labourers, as well as jobs to support camp operations such as cooks and custodial staff. The lower levels of educational attainment seen in the RSA led to good representation in these occupations due to the shorter training path; however, representation in the technical occupations is low as these jobs require substantial post-secondary education. Professional positions that require post-secondary education are typically filled by non-northern residents who have the requisite education, and these individuals usually choose not to live in northern communities (KCDC 2016).

A 2013 study on the socio-economic effects of uranium mining in the RSA noted fewer educational programs in communities, lower levels of funding, low rates of attendance, and high drop-out rates as being challenges to educational attainment for RSA residents (CVMPP 2013). Indigenous residents in the LSA were much more likely to have less than a high school certificate and much less likely to have a university degree than non-Indigenous LSA residents.

A previous study on socio-economic effects of the uranium industry noted the proportion of the population of Northern Saskatchewan residents with apprenticeship or trades certificates or diplomas increased between 1981 and 2006 (CVMPP 2013). In 2018, the government of Saskatchewan noted education benefits from mining operations in Northern Saskatchewan included contributions to scholarships for students and outreach to schools to increase career awareness and promote future opportunities in mining (Government of Saskatchewan 2018a). However, participants in JWG sessions noted concerns related to insufficient training facilities for both youth and adults, not enough students taking maths and sciences in high school, and the need for students to leave the community to pursue further education beyond high school (MN-S-JWG 2020; BRDN-JWG 2020; BNDN-JWG 2020).

6.6.1.2 Local Study Area Communities

6.6.1.2.1 Clearwater River Dene Nation

Educational attainment in the CRDN has fluctuated between 2006 to 2016 and remained lower than RSA and provincial averages for every level of educational attainment during the same period. The majority of the population over the age of 15 (i.e., 64.9%) has no certificate, diploma, or degree, compared to 57.5% of the RSA population and 38.9% of the provincial Indigenous population[26]. However, the proportion of the CRDN population aged 15 and over without a certificate, diploma, or degree in 2016 was lower than both 2011 (i.e., 71.2%) and 2006 (i.e., 81.7%). A larger proportion of males (i.e., 73.2%) have no certificate, diploma, or degree compared to females (i.e., 58.6%), with the gap growing from 7.7% to 14.6% in the between 2006 and 2016.

Approximately 16.7% of the CRDN population over the age of 15 has high school as their highest level of education (Table 16). The high school graduation rate has continued to rise, increasing by 1.3% from 2011 to 2016, and 3.3% from 2006 to 2016. The high school graduation rate for males (i.e., 12.5%) was somewhat comparable to the RSA rate (i.e., 16.9%) but was less than a third of the provincial Indigenous rate (i.e., 43.6%).

[26] Due to differences in data collection, the Indigenous provincial average reported is for the population aged 15 years and over.

The high school graduation rate for females (i.e., 22.4%), was also near the RSA rate (i.e., 23.3%) but lower than the provincial Indigenous rate (i.e., 29.0%).

Much of the growth in the proportion of people with high school as their highest level of education was related to the fact that a smaller proportion of the population (both males and females) obtained an apprenticeship or trade during this period, dropping from 9.6% in 2011 to 6.1% in 2016, below the averages for the RSA (i.e., 7.4%) and provincial Indigenous population (i.e., 9.6%). This decrease is aligned with the RSA-level trend of a decrease in trades education attainment of 0.5% but is contrary to the provincial Indigenous trend, which saw a slight increase of 0.4%. Trades education is the one level of education where males have higher rates of attainment (i.e., 8.9%) than females (i.e., 5.2%) in the CRDN.

From 2006 to 2016, the proportion of the population aged 15 and over with a college or other non-university certificate or diploma increased from 1.9% to 6.1% (i.e., 4.2%), higher than the RSA increase (i.e., 2.8%) and provincial level increase during the same period (i.e., 2.5%); however, the actual proportion (i.e., 6.1%) remains below the provincial Indigenous average (i.e., 13.6%). This growth is fuelled primarily by female educational attainment. Attainment of a college diploma or certificate by females in the CRDN was 6.9% in 2016, still below the RSA (i.e., 10.8%) and province Indigenous average (i.e., 17.4%) in 2016.

While the proportion of university graduates in the CRDN has increased between 2006 to 2016 to 2.6% in 2016, it continues to be lower than the RSA (i.e., 4.2%) and provincial Indigenous averages (i.e., 7.6%). The increase in this metric (i.e., 2.6%) was a larger increase than for the RSA (i.e., 1.4%) but lower than the provincial increase during the same period (i.e., 3.1%). Like the trend in the RSA and Saskatchewan, CRDN females are more likely than CRDN males to hold a university degree, a trend that has continued between 2006 and 2016. Among the LSA communities, the CRDN has the lowest level of attainment at the university education level.

6.6.1.2.2 La Loche

Educational attainment in La Loche has fluctuated between 2006 to 2016, with increasing educational attainment in 2016 for all levels of education. Like other LSA communities, educational attainment in La Loche remains below RSA and provincial levels. The majority of populations aged 15 and over (i.e., 67.2%) have no certificate, diploma, or degree; this is substantially higher than the RSA (i.e., 57.5%) and provincial Indigenous average (i.e., 38.9%). The proportion of people without a certificate, diploma, or degree was lower in 2016 than in 2011 (i.e., 81.3) and 2006 (i.e., 80.4%). Like other LSA communities, a larger proportion of males aged 15 and over (i.e., 68.7%) continues to have no certificate, diploma, or degree compared to females (i.e., 65.9%).

Around 16.1% of the La Loche population aged 15 and over has completed high school as their highest level of education, lower than the RSA (i.e., 20.1%) and Indigenous provincial average (i.e., 28.2%). Mirroring the trends at the RSA and provincial level, this metric for La Loche has been steadily increasing between 2006 to 2016, from 12.2% in 2011 and 9.3% in 2006 (Table 16). The high school attainment rate for females (i.e., 17.6%) is above males (i.e., 13.6%).

In 2016, the proportion of the population aged 15 and over with an education in trades (i.e., 5.7%) had risen beyond 2011 levels (i.e., 1.1%) and the 2006 level (i.e., 3.4%). This mirrors the trend at the provincial Indigenous level, which also saw increases in trades education attainment during this period. However, the rates of attainment are still below the RSA (i.e., 7.4%) and Indigenous provincial averages (i.e., 9.6%). Like the other LSA

communities, males in La Loche are more likely to have a trades education than females (i.e., 8.2% compared to 2.9%, respectively) and this difference is widening, mirroring the RSA and provincial trends

From 2006 to 2016 the proportion of those with a college or other non-university certificate or diploma rose from 2.8% to 6.6% (i.e., 3.8% increase), comparable to the change at the RSA level (i.e., 3.9% increase), but lower than the provincial Indigenous average increase (i.e., 5.8%), This growth is fuelled primarily by females. Attainment of a college diploma or certificate by females in La Loche was 7.6% in 2016, higher than that for males (i.e., 5.4%).

The proportion of university graduates in La Loche has increased between 2006 and 2016 to 4.1% in 2016, still below the RSA and Indigenous provincial averages (i.e., 9.2% and 13.6%, respectively). The increase in this metric (i.e., 2.5%) was a larger increase than at the RSA (i.e., 1.4%) but lower than the provincial increase during the same period (i.e., 3.1%). Like the trend in the RSA and province, females are more likely than males to graduate university.

6.6.1.2.3 Birch Narrows Dene Nation

Educational attainment in the BNDN has improved between 2006 to 2016 for all levels. However, like other LSA communities, educational attainment in the community remains below RSA and provincial levels. The proportion of the population aged 15 and over that has no certificate, diploma, or degree (i.e., 45.2%) is lower than the RSA (i.e., 57.5%) but higher than the provincial Indigenous average (i.e., 38.9%). The proportion of people without a certificate, diploma, or degree was smaller than in 2006 (i.e., 66.1%). A larger proportion of males (i.e., 46.7%) have no certificate, diploma, or degree compared to females (i.e., 39.4%), a smaller difference (i.e., 7.3%) than in 2006 (a 22.2% difference). Disaggregated data for the BNDN from 2011 was not available.

Around 22.6% of the BNDN population aged 15 and over has high school as their highest level of education, a substantial increase from the 6.5% in 2006 (Table 16). Females have higher high school attainment (i.e., 24.2%) than males (i.e., 16.7%). Rates for this metric for both females and males are comparable to the RSA levels (i.e., 23.3% and 16.9%, respectively), but below the provincial Indigenous population (i.e., 27.3% and 29.0%, respectively).

The proportion of the population aged 15 and over with an education in trades (i.e., 12.9%) has risen substantially since 2006 (i.e., 8.9%), and is now higher than the RSA (i.e., 7.4%) and Indigenous provincial average (i.e., 9.6%). The increase for this metric (i.e., 12.9%) exceeded the increase experienced at the RSA level and provincial Indigenous level which have remained relatively constant. Males are over three times more likely to have a trades education than females in BNDN (i.e., 20.0% compared to 6.1%, respectively).

From 2006 to 2016, the proportion of those aged 15 and over with a college or other non-university certificate or diploma grew substantially from 0% to 12.9%, exceeding the RSA average (i.e., 9.2%) and just below the provincial Indigenous average (i.e., 13.6%). The increase in attainment in the BNDN for this metric was large compared to the change at the RSA level (i.e., 3.9%) and the provincial Indigenous population (i.e., 5.8%). Attainment of a college diploma or certificate by females in the BNDN was 15.2% in 2016, higher than the attainment levels for males (i.e., 10.0%).

The proportion of university graduates in the BNDN has increased over time from 0.0% to 8.1% in 2016, which is above the Indigenous RSA and Indigenous provincial averages (i.e., 4.2% and 7.6%, respectively). The increase

in this metric (i.e., 8.1%) was a larger increase than at the RSA and Indigenous provincial levels (i.e., 1.0% and 0.9%, respectively). Unlike the trend in the other LSA communities, the RSA, and the province, males are more likely than females to hold a university degree in BNDN. Birch Narrows Dene Nation has the second highest levels of university education achievement among the LSA communities.

6.6.1.2.4 Buffalo River Dene Nation

Educational attainment in BRDN has improved between 2006 to 2016 for all educational attainment levels. The proportion of the population with no certificate, diploma, or degree (i.e., 54.5%) is slightly lower than the RSA (i.e., 57.5%) and substantially higher than the provincial Indigenous average (i.e., 38.9%). The proportion of people aged 15 and over without a certificate, diploma, or degree (i.e., 54.5%) was smaller than in 2011 (i.e., 67.3%) and 2006 (i.e., 68.2%). A larger proportion of males (i.e., 56.4%) have no certificate, diploma, or degree compared to females (i.e., 52.7%), although the difference has narrowed from 18.2% to 3.7% between 2006 to 2016.

Approximately 10.0% of the BRDN population aged 15 or over has high school as their highest level of education, which is half of the RSA level (i.e., 20.1%) and considerably less than the Indigenous provincial level (i.e., 28.2%) (Table 16). This metric decreased slightly from 2011 (i.e., 11.4%) but was an improvement from 2006 (i.e., 9.8%). This trend contrasted with the trends at the RSA and provincial level, which continually saw increases between 2006 and 2016. Females are more likely to have a high school degree than males in the BRDN. The proportion of males in the BRDN with high school as their highest level of education (i.e., 7.3%) was less than a third of the provincial rate (i.e., 27.3%). The proportion of females in BRDN with high school as their highest level of education (i.e., 12.7%), was also substantially lower than the provincial rate (i.e., 29.0%).

Among the LSA communities, the BRDN has the largest proportion of its population with an education in trades (i.e., 19.1%) This is a substantial increase from 2011 (i.e., 7.3%) and 2006 (i.e., 5.5%) levels, while also exceeding the 2016 RSA (i.e., 7.4%) and provincial Indigenous (i.e., 9.6%) averages. Like most other LSA communities, more males are likely to have obtained a trades education than females in the BRDN. Interviews with key contacts indicated that limited construction training is available within the community, and some go to Northland College in Birch Narrows. The remainder go to large urban centres to obtain skills and do not return (2019 to 2021 KP interview program).

From 2006 to 2016, the proportion of those with a college or other non-university certificate or diploma doubled from 5.9% to 10.9%, comparable to the RSA (i.e., 9.2%), but still below the provincial Indigenous population (i.e., 13.6%). The increase in this metric was a larger increase than at the RSA during the same period (i.e., 3.9%) but slightly lower than the provincial increase (i.e., 5.8%). This growth is fuelled primarily by females. Attainment of a college diploma or certificate by males in the BRDN was 5.5%, an increase from 3.8% in 2006. Increases in the attainment of a college level education for females in the BRDN was similar, rising from 8.0% to 10.9% during the same period.

While the proportion of university graduates in the BRDN has increased over time to 5.5% in 2016, exceeding the RSA (i.e., 4.2%), it continues to be lower than the Indigenous provincial average (i.e., 7.6%). The improvement in this metric from 2006 to 2016 (i.e., 2.7%) was a larger increase than at the RSA (i.e., 1.4%) but lower than the provincial increase during the same period (i.e., 3.1%). Like the trend in the RSA and province, more females than males are likely to hold a university degree in the BRDN, a trend that has continued between 2006 to 2016 with

no males obtaining this level of education in 2016. Among the individual LSA communities, the BRDN has the third highest level of attainment at the university education level.

6.6.1.2.5 Buffalo Narrows

Buffalo Narrows has the highest overall educational attainment among the LSA communities (Table 16). The community has seen increases for every level of education between 2006 and 2016 and exceeds the Indigenous provincial educational attainment averages and almost all RSA averages. Only 32.2% of Buffalo Narrows have no certificate, diploma, or degree, lower than the Indigenous provincial average (i.e., 38.9%) and substantially lower than the RSA (i.e., 57.5%). The proportion of people without a certificate, diploma or degree was less than in 2011 (i.e., 43.4%) and 2006 (i.e., 43.3%). A substantially larger proportion of males (i.e., 43.1%) have no certificate, diploma or degree compared to females (i.e., 23.5%), with the difference remaining relatively constant between 2006 to 2016.

Around 19.1% of the Buffalo Narrows population aged 15 and over has completed high school as their highest level of education, lower than the Indigenous provincial average (i.e., 28.2%) and only slightly lower than the RSA average (i.e., 20.1%). This metric has fluctuated between 2006 to 2016, rising from 17.8% in 2006 to 29.6% in 2011 and falling to 19.1% in 2016. The high school attainment rate for males (i.e., 13.9%) was lower than the RSA (i.e., 16.9%) and provincial averages (i.e., 27.3%). The high school attainment rate for females (i.e., 23.5%), was also lower than the Indigenous provincial rate (i.e., 29.0%) but slightly higher than the RSA (i.e., 23.3%).

Among the LSA communities, Buffalo Narrows has the second largest proportion with an education in trades as their highest level of education (i.e., 16.4%), exceeding the 2016 RSA (i.e., 7.4%) and provincial Indigenous (i.e., 9.6%) averages. This is a substantial increase from 2011 (i.e., 5.1%) and 2006 (i.e., 10.4%) levels, while also exceeding the 2016 RSA (i.e., 7.4%) and Indigenous provincial (i.e., 9.6%) averages. Like most other LSA communities, more males (i.e., 19.4%) are likely to have obtained a trades education than females (i.e., 13.6%) in Buffalo Narrows.

Around 17.1% of the Buffalo Narrows population aged 15 and over has a college level education as their highest level of education, exceeding both the RSA (i.e., 9.2%) and Indigenous provincial populations (i.e., 13.6%). The increase in this metric (i.e., 6.6%) was a larger increase than at the RSA (i.e., 3.9%) and Indigenous provincial population increase (i.e., 5.8%) during the same period. Attainment of a college diploma or certificate by males in Buffalo Narrows was 15.5%, an increase from 10.3% in 2006. Increase in the attainment of a college level education for females in Buffalo Narrows (i.e., 5.2%) was smaller, rising from 13.3% to 18.5% during the same period.

The proportion of Buffalo Narrows residents aged 15 and over with a university degree or higher has steadily increased between 2006 to 2016, with a 2016 rate (i.e., 11.2%) substantially higher than the RSA (i.e., 4.2%) and Indigenous provincial average (i.e., 7.6%). The increase in this metric (i.e., 9.0%) was a substantial increase compared to the increases at the RSA and Indigenous provincial levels (i.e., 2.0% and 1.8%, respectively). Like the trend in the RSA and province, females are more likely than males to hold a university degree in Buffalo Narrows; however, the difference between females and male attainment has widened from 4.0% in 2006 to 6.7% in 2016. Among the LSA communities, Buffalo Narrows has the highest level of attainment at the university education level.

Although Buffalo Narrows has the highest level of overall educational attainment among the LSA communities, there are barriers to educational attainment that include lack of access to childcare, transportation, and housing (2019 to 2021 KP interview program). At Northlands College, only single housing is available with no housing for couples and families. The school also does not have staff members trained in mental health or councillors available that understand the trauma of students. Other challenges include the distance between post-secondary institutes and the community and community members commitments to their families. Interviewees noted that financial support is also difficult without scholarships or funding. English as a second language is another issue as Dene is the first language for the majority of residents (2019 to 2021 KP interview program).

6.6.1.2.6 Other Local Study Area Communities

Data for Other LSA Communities was not available.

Table 16: Highest Level of Educational Attainment in the Local Study Area Communities, Regional Study Area, and Saskatchewan (Indigenous)

Metric by Year	CRDN			BNDN			BRDN			Buffalo Narrows			La Loche			Census Division No.18 (RSA; Indigenous)			Saskatchewan (Indigenous)		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
2016																					
Total population aged 15 and over	280	290	570	150	165	310	275	275	550	360	405	760	735	850	1,585	10,415	10,825	21,245	55,640	61,685	117,325
No certificate; diploma or degree (%)	73.2	58.6	64.9	46.7	39.4	45.2	56.4	52.7	54.5	43.1	23.5	32.2	68.7	65.9	67.2	62.6	52.6	57.5	43.6	34.7	38.9
High school diploma or equivalent (%)	12.5	22.4	16.7	16.7	24.2	22.6	7.3	12.7	10	13.9	23.5	19.1	13.6	17.6	16.1	16.9	23.3	20.1	27.3	29	28.2
Apprenticeship or trades certificate or diploma (%)	8.9	5.2	6.1	20	6.1	12.9	25.5	12.7	19.1	19.4	13.6	16.4	8.2	2.9	5.7	10.6	4.4	7.4	13.8	5.8	9.6
College or other non-university certificate or diploma (%)	5.4	6.9	6.1	10	15.2	12.9	5.5	10.9	9.1	15.3	18.5	17.1	5.4	7.6	6.6	7.5	10.8	9.2	9.2	17.4	13.6
University certificate, diploma, or degree (%)	3.6	5.2	2.6	6.7	6.1	8.1	0	9.1	5.5	6.9	13.6	11.2	2.7	4.7	4.1	1.9	6.4	4.2	4.9	10.1	7.6
2011																					
Total population aged 15 and over	250	270	520	a	a	a	265	260	525	305	375	680	785	895	1685	10,070	10,555	20,625	48,525	55,435	103,960
No certificate, diploma, or degree (%)	76	66.7	71.2	a	a	a	77.4	63.5	70.5	54.1	34.7	43.4	86.6	77.1	81.3	67.3	57.0	62.0	49.2	40.4	44.5
High school diploma or equivalent (%)	14	16.7	15.4	a	a	a	5.7	15.4	11.4	23.0	42.7	33.1	7.6	15.6	12.2	13.6	21.5	17.6	23.3	25.3	24.4
Apprenticeship or trades certificate or diploma (%)	8	7.4	9.6	a	a	a	9.4	5.8	7.6	9.8	2.7	5.1	3.2	1.1	1.8	11.3	5.2	8.2	14.1	7.2	10.4
College or other non-university certificate or diploma (%)	0	3.7	1.9	a	a	a	3.8	5.8	4.8	4.9	16.0	11.0	1.3	4.5	3.3	4.7	8.1	6.4	7.4	14.4	11.1
University certificate, diploma, or degree (%) at bachelor level or above	0	3.7	1.9	a	a	a	3.8	7.7	5.7	0.0	5.3	5.1	0.0	1.7	1.2	1.5	4.9	3.2	4.1	9.0	6.7
2006																					
Total population aged 15 and over	210	205	410	140	115	250	260	250	510	290	375	670	670	730	1400	9,045	9,310	18,350	43,615	47,685	91,295
No certificate, diploma, or degree (%)	85.7	78.0	81.7	82.1	82.6	84.0	82.7	68.0	74.5	53.4	34.7	43.3	82.8	78.1	80.4	70.3	62.1	66.1	53.6	45.6	49.4
High school diploma or equivalent (%)	9.5	17.1	13.4	7.1	8.7	10.0	7.7	12.0	9.8	17.2	22.7	20.1	6.7	11.0	9.3	11.4	16.7	14.1	20.4	23.4	22.0
Apprenticeship or trades certificate or diploma (%)	4.8	0.0	0.0	7.1	0.0	4.0	5.8	4.0	5.9	10.3	10.7	10.4	6.7	3.4	5.0	10.1	5.0	7.5	12.3	7.4	9.8
College or other non-university certificate or diploma (%)	4.8	4.9	2.4	0.0	0.0	0.0	3.8	8.0	5.9	10.3	13.3	11.9	2.2	3.4	3.2	4.6	7.7	6.2	7.4	12.2	9.9
University certificate, diploma, or degree (%)	4.8	0.0	0.0	7.1	0.0	4.0	0.0	4.0	2.9	0.0	4.0	2.2	1.5	2.1	1.8	1.7	4.6	3.2	4.0	7.5	5.8

Source: Statistics Canada 2007 a,c,d,f,g,l,k,m,o; Statistics Canada 2013 a,c,e,g,l,k; Statistics Canada 2017 b,c,d,e,f,g; Statistics Canada 2018a.
Note: Statistics Canada data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5 and in some cases, 10. Totals may not add up due to rounding.
In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
Educational attainment data for 2016 were derived from 30% data. However, on Indian reserves and in remote communities, Statistics Canada attempts to obtain data from 100% of the population.
a= data not available; M = male; F = female; T = total; CRDN = Clearwater River Dene Nation; BNDN = Birch Narrows Dene Nation; BRDN = Buffalo River Dene Nation; n/a= not applicable; LSA = local study area; RSA = regional study area.

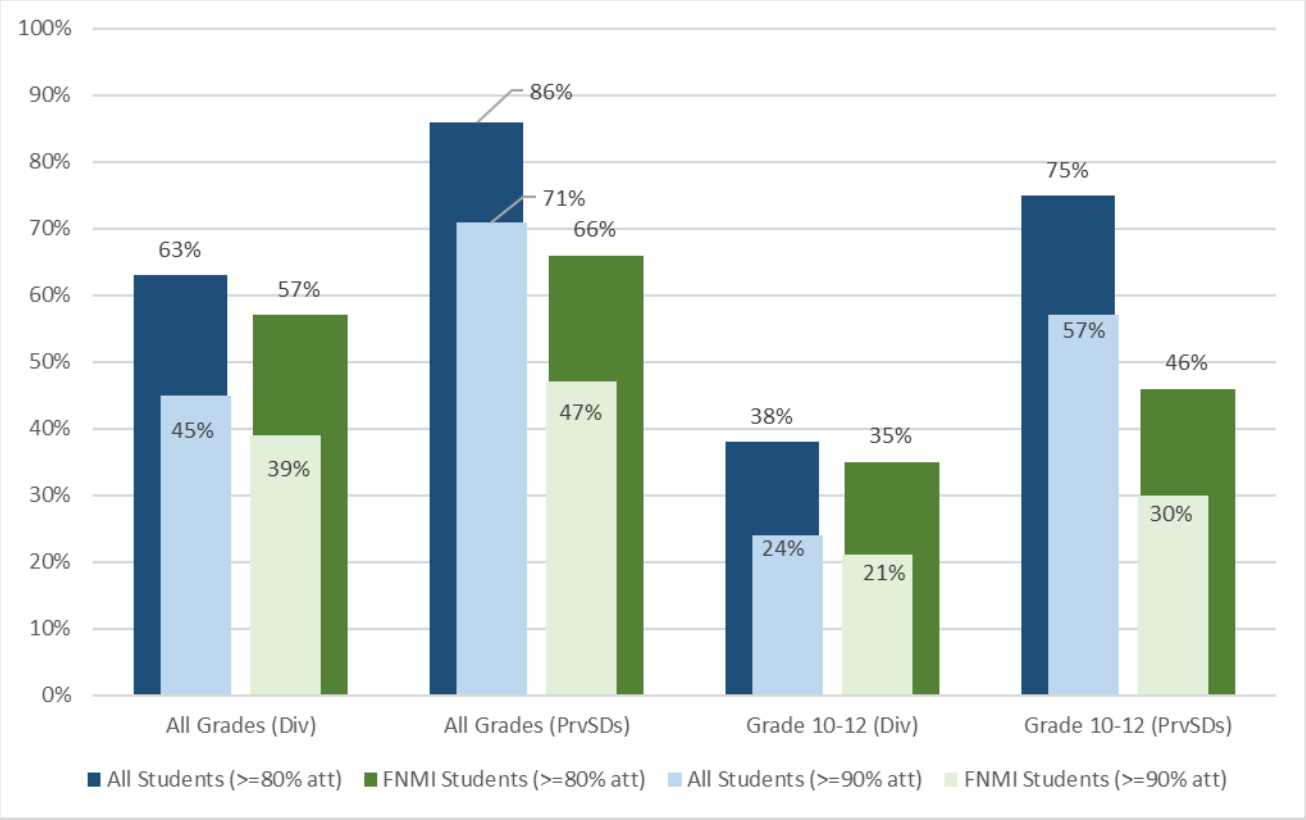
6.6.2 Primary and Secondary Education

6.6.2.1 Attendance Rates

Attendance is an important indicator with a strong correlation to measures of student achievement. Students with at least 80% attendance are much more likely to achieve higher educational outcomes than students with lower attendance (NLSD 2020c). Attendance for NLSD students overall was lower than the provincial average for all grades, with 63% of students achieving 80% attendance[27], in comparison to the provincial average of 86% (Figure 24). Attendance results have remained consistent between 2014/2015 to 2018/2019, with about 60% of students in all grades with at least 80% attendance (NLSD 2020c). In 2018/2019, the proportion of students in Grades 10 to 12 was considerably lower than the provincial average, with only 38% of all students in those grades achieving at least 80% attendance, compared to 75% of students in the province. Self-identified Indigenous students in the NLSD also had slightly lower rates of 80% attendance at 21%, lower than at the provincial level (i.e., 30%). Data on attendance rates for schools in each LSA community were not available.

[27] Percentages represent all attendance that occurred in the school division in the years reported. This includes all reported attendance for students attending the division during that year, whether or not they are currently enrolled in that division, but only includes attendance data while students were enrolled in the school division. Each percentage is a weighted average of the monthly percentages of students enrolled in the division with at least 80% and at least 90% attendance. Results for populations of fewer than 10 have not been reported to avoid identifying individuals or very small groups of students.

Figure 24: Percentage of Students with at Least 80% (and 90%) Attendance, Northern Lights School District 113, and Provincial School Divisions, 2018 to 2019



Source: NLSD 2019.
Note: Percentages represent all attendance that occurred in the school division in the years reported. This includes all reported attendance for students attending the division during that year, whether or not they are currently enrolled in that division, but only includes attendance data while students were enrolled in the school division. Each percentage is a weighted average of the monthly percentages of students enrolled in the division with at least 80% and at least 90% attendance. Results for populations of fewer than 10 have not been reported to avoid identifying individuals or very small groups of students.
FNMI = First Nations (Registered/Treat/Status Indian, Non-Status Indian), Métis, or Inuit/Inuk; Div = Northern Lights School Division; PrvSDs = Provincial School Divisions; ≥ = greater than or equal to.

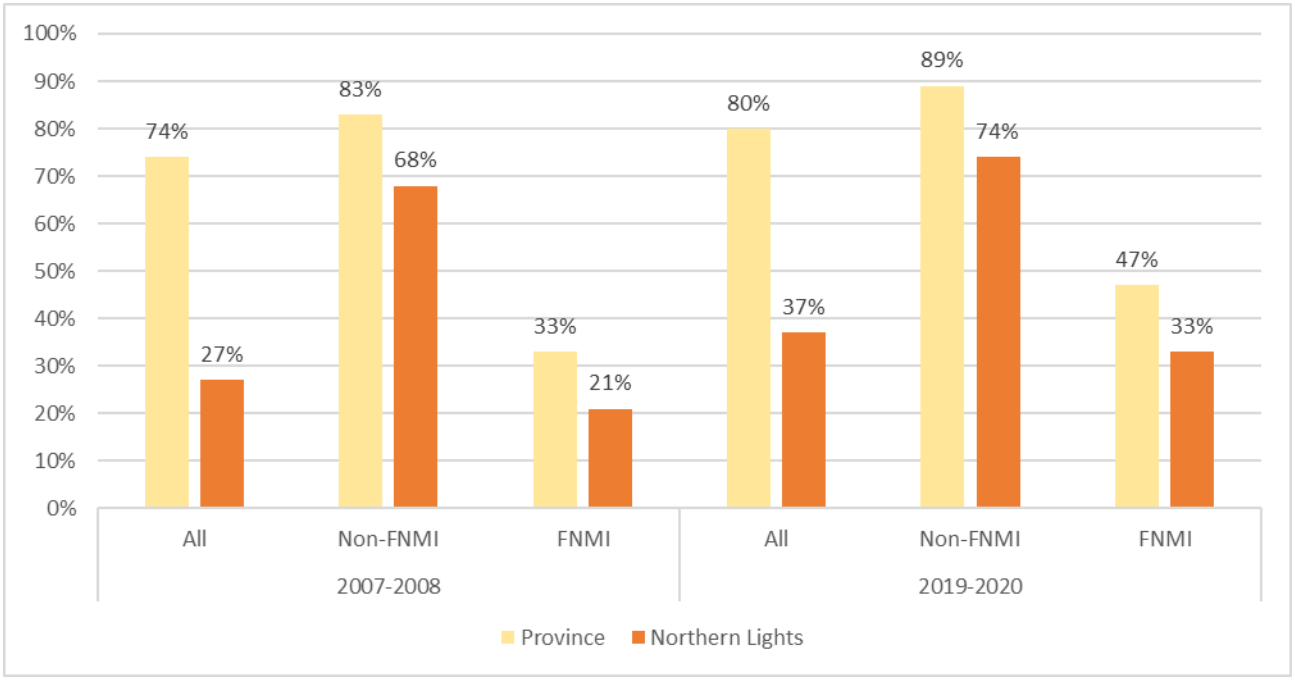
At Birch Narrows School in BNDN, attendance is reported to be low, and the school schedule was altered to start earlier with students staying longer during the day and ending earlier. Attendance decreases in November and December (2019 to 2021 KP interview program). At Buffalo River School in Dillon, attendance is average for the middle school grades and relatively good for elementary and high school (2019 to 2021 KP interview program).

At Twin Lakes Community School in Buffalo Narrows, attendance rates vary throughout the school year. The lack of basic services in the communities affects attendance rates. For example, when individuals need to leave the community for medical appointments out of town, often the entire family will go with them, and students will miss several days of school (2019 to 2021 KP interview program).

6.6.2.2 Graduation Rates

For the 2019 to 2020 school year, 61% of students in the school division graduated Grade 12 within five years, a 20-year high for this measure (NLSD 2020c). Figure 25 shows the change in three-year graduation rates (students completing Grade 12 within three years of starting Grade 10) for the NLSD and province for the 2007/2008 cohort and the 2017/2018 cohort. While increases have been made in overall graduation rates (including Indigenous and non-Indigenous students) in the NLSD from 2006, rising from 27% to 37%, there is still a considerable gap for the NLSD (i.e., 37%) compared to the province (i.e., 80%). Graduation rates for self-identified Indigenous students in the NLSD (i.e., 33%) also remain lower than self-identified Indigenous students at the provincial level (i.e., 47%).

Figure 25: Three Year Graduation Rates, Province, and Northern Lights School Division No. 113 (2007 to 2008 Cohort and 2017 to 2018 Cohort)



Source: NLSD 2020c.
FNMI = First Nations (Registered/Treat/Status Indian, Non-Status Indian), Métis, or Inuit/Inuk; Non-FNMI = those who do not identify as First Nations, Métis or Inuit/Inuk; however, may also include FNMI students who choose not to self-identify.

The Dene High School in La Loche has an average graduating class of 25 students in recent years, with approximately 5% to 10% of students pursuing post-secondary education. Key person interview program participants noted that some students choose work for a period of time before pursuing post-secondary education, as moving from the community can be stressful. Most students stay within the community. The school has a graduation team that consists of a career transition teacher, administration, student support worker, social worker, and classroom teacher. The graduation team help students, including students at risk, and provide assistance with applications, résumés, and university tours.

Graduation rates at Twin Lakes Community School in Buffalo Narrows have increased in recent years, ranging from 52% to 62% from 2015 to 2019 (2019 to 2021 KP interview program). Typically, out of 10 students, five pursue post-secondary education while two or three students complete it (2019 to 2021 KP interview program). The school has benefited from supporting their students and receiving student feedback and modifying classroom instructions accordingly. Key person interviews indicated that greater parental involvement is an area for improvement. Some students continue their education in post-secondary or trade schools. Interviewees remarked that many students do not feel comfortable leaving the community due to the financial costs for additional education and differences in culture. Courses offered in the school that lead to post-secondary education or employment include trades-based courses such as welding, carpentry, commercial cooking, drafting, and clothing.

Between six and twelve students at Birch Narrows School in BNDN graduate annually (2019 to 2021 KP interview program). Interview participants noted students that pursue post-secondary education often must upgrade their marks, which typically occurs through Northlands College in Buffalo Narrows (2019 to 2021 KP interview program; BNDN-JWG 2021a). Students that plan on moving on to post-secondary education and are utilizing Indigenous government (band) funding must go through an application process. In recent years, there have been more students applying than available funding to send them to receive post-secondary education. Information on NexGen's contribution to scholarships programs is presented in Section 6.6.3, Challenges to Attaining Post-Secondary Success. Common areas for post-secondary studies include education, nursing, and office management (BNDN-JWG 2021a). Interviewees indicated that education programs need to set higher standards to achieve higher skills (2019 to 2021 KP interview program). Adult students are accepted for high school courses. Challenges for adult education include the need for daycare services and lunch programs.

Graduation rates at Buffalo River School in Dillon are relatively low, with six to 10 graduates out of a class of 20 in 2018/2019. The highest graduation rate between 2006 to 2016 was 50% (2019 to 2021 KP interview program). The school also includes a small post-secondary upgrading classroom (BRDN-JWG 2021a). Interview participants noted that many students who pursue post-secondary education return to the community before completing the program. Students often go to Buffalo Narrows to take post-secondary education at Northlands College (2019 to 2021 KP interview program). Those that travel further for education to locations such as Saskatchewan Polytechnic can experience issues including culture shock and difficulty accessing childcare (BRDN-JWG 2021a).

6.6.3 Challenges to Attaining Post-Secondary Success

A 2008 report prepared for the Community Vitality Monitoring Partnership Program sought to understand the factors influencing the ability of people from the area to access and succeed at post-secondary education programs (CVMPP 2008). Although focused on the communities of the Athabasca Basin (i.e., a portion of the RSA), many of the aspects identified in the report apply equally to the LSA.

To understand the factors that influence residents' decisions to pursue and ability to succeed in post-secondary education, the study considered the perspectives of multiple stakeholders related to education in the Athabasca Basin. The results of consultation painted a complex picture of the factors that affected residents in attending and succeeding in post-secondary programs. Many of these challenges were paralleled by other research on access and affordability of post-secondary education in Canada.

The characteristics identified to be an impediment to post-secondary education include:

- not completing high school;
- having young families;
- having parents with no experience with post-secondary education; and
- living in remote communities without post-secondary facilities.

The study found that residents of the Athabasca Basin faced a series of challenges, many of which are common to many remote northern and Indigenous communities across Canada. Social challenges were found to be the largest barrier to overcome, followed by:

- Academic challenges, many of which resulted from the quality of education received in the communities;
- A general lack of awareness of the benefits of a post-secondary education; and
- A lack of awareness of employment opportunities in the region contributed to the low overall perceived value of education by many respondents.

Reinforcing the value of an education was seen as necessary not only at the post-secondary level, but also in the primary, middle, and secondary school levels.

Respondents also faced financial challenges associated with attending post-secondary institutions far from home. Most of the respondents were eligible for funding under Indigenous and Northern Affairs Canada's Post-Secondary Student Support Program and as such comments focused more on cost-of-living aspects of post-secondary education versus concerns about direct education costs like tuition and books. The study found some cultural challenges associated with attending and completing post-secondary programs, such as language and discrimination, though in comparison to other challenge areas, culture was less of a concern for respondents.

In 2016 NexGen established the summer student program. The program aims to build skills and confidence in young adults through skillful employment at the existing exploration site. To date, over 60 students have been employed in the summer student program. In 2020, the program did not proceed due to the pandemic. In 2021, the program resumed in a revised format in which summer students were hired to work within their LPA community. The 2021 program primarily consisted of a youth-Elder interview program. In 2021, four summer students participated in the program, two students in BRDN and two students in Buffalo Narrows with Métis Local 62. NexGen is planning to resume the summer student program at the Rook I site in 2022.

Since 2017, NexGen has provided up to four scholarships per year to students from LPA communities to successfully pursue their post-secondary education. To date, seven students have received scholarships, many of which have received scholarships throughout multiple academic years due to continued eligibility. Due to disruptions associated with the pandemic, the 2020/2021 scholarship program was focused on the continued support of the current scholarship recipients and there were no new scholarship recipients. The program accepted a new recipient for the 2021/2022 academic year. This is an ongoing initiative. NexGen also currently provides bursaries to support students pursuing post-secondary education (NexGen 2021a).

6.6.4 Mining-Specific Training

The uranium sector and government partners have historically provided several training opportunities for northern workers including student work placements originally through the MPTP and more recently in partnerships with Northern Career Quest (Government of Saskatchewan 2018a). The MPTP was a collaborative effort developed by government, industry, and local public and Indigenous communities to maximize training and advancement opportunities in the uranium sector.

6.6.4.1 Multi-Party Training Plan

The recommendations of the Joint Panel (Section 6.2.4.1.1) included many that influenced government and industry in terms of northern community wellness, northern employment, and business participation in the industry. The recommendations stimulated changes in government policy and industry actions, which resulted in changes in the northern training-for-employment programs, employment statistics, northern business development, and the industry's purchases of goods and services from those businesses.

The MPTP was a unique multi-stakeholder partnership between public, private and non-profit organizations. Phase I of the MPTP was started in July 1993 as a $10.5 million training-to-employment initiative among the province, federal government, Aboriginal agencies, Northlands College, and the northern mining industry.

Phase II was signed in 1998, expanding the total commitment to $13 million and its membership and goals to include economic development. Phase III of the MPTP was announced in 2003, and by 2008, a total of $40 million had been invested in training northerners for highly skilled jobs, primarily in the mining industry in northern Saskatchewan.

The MPTP enabled mining companies to pool their labour projections and other partners to combine resources in linking training directly to the mineral sector's demand. Training initiatives were identified by the Mineral Sector Steering Committee of the Northern Labour Market Committee, which consisted of 14 partnering agencies including:

- Apprenticeship and Trade Certification Commission;
- Northlands College;
- Prince Albert Grand Council;
- MLTC;
- Methy Pathways Board Inc.;
- Northcote Métis Development Corporation;
- Métis Employment and Training, Beauval;
- Jim Brady Employment and Training Centre;
- Cameco Corporation;
- Claude Resources Inc.;

- COGEMA Resources Inc.;
- Saskatchewan Learning;
- Saskatchewan Northern Affairs; and
- Saskatchewan Community Resources and Employment.

The MPTP-coordinated programs included education upgrading, apprenticeship training, workplace preparation, and technical skills training. Programs were planned by the Mineral Sector Steering Committee to meet current skill needs. Types of programs offered included underground mining, mill operator, chemical technician, mineral exploration technician, and academic upgrading (NLMC et al. 2011). In its 1997 report (Cumulative Observations), the Joint Panel noted programs such as the MPTP were important to make sure northern Saskatchewan residents can continue to access economic opportunities in the uranium sector (IAAC 2016).

During its initial two phases (i.e., 10 years), the MPTP supported the training, hiring and advancement of residents of northern Saskatchewan in the mining industry. More than 1,200 training certificates were awarded in apprenticeship, technical and skills training, and in academic upgrading during MPTP Phase I and Phase II. Eighty-three percent of the students in Phase I and Phase II completed their programs, and it has been estimated that 81 per cent of the students in the first two phases of the MPTP were Indigenous.

When the three phases (i.e., 15 years) are examined, a total of 4,933 residents of Northern Saskatchewan enrolled in the programs, with the majority enrolling during the second phase (i.e., 2,109 enrollments). Total enrollment included 1,947 enrollments for workplace education, 1,149 enrollments for basic education, 1,132 enrollments for skills training, 414 enrollments for apprenticeship training, and 291 enrollments for technical training (CVMPP 2013). A fourth and final five-year term for the MPTP was signed and implemented in 2010.

6.6.4.2 Northern Career Quest

Today, Indigenous community members in northern Saskatchewan can access mine-specific training through the Northern Career Quest Partnership. Northern Career Quest Inc. (NCQ) is a registered “not-for-profit”, industry-led training program directed toward Indigenous residents in northern Saskatchewan. Northern Career Quest has linked with the MPTP for the Mineral Sector to expand the job and training links for its clients in partnership with government and companies in Saskatchewan and Alberta (ASKI 2011).

Working with training institutions active in northern Saskatchewan (i.e., Northlands College, Gabriel Dumont Institute and the Saskatchewan Indian Institute of Technologies), NCQ leverages its industry partnerships to meet the needs of both labour supply and demand in response to emerging needs of businesses, including, but not limited to, the mining, natural resource, and infrastructure sectors. Since its inception, both uranium mining companies active in northern Saskatchewan have partnered on a regular basis with NCQ to deliver training specific to employment within their operations. Training is offered on-site at mines for employees of companies such as ORANO Canada (formerly Areva Resources Canada Inc.), Cameco Corporation, and Athabasca Basin Security (Northern Career Quest 2021). Residents from CRDN, La Loche, Birch Narrows, Turnor Lake, Dillon, and Buffalo Narrows are noted to have participated from 2008 to 2012 (Northern Career Quest 2013). Additionally, Aggressive Drilling provides training and employment for community members in partnership with Northern Career Quest Partnership and NexGen (NexGen 2021b). Between 2008 and 2017, Northern Career Quest, saw a total of 3,834 graduates from various communities in Northern Saskatchewan (Northern Career Quest 2021).

The majority of funding to support NCQ programs is secured from the federal and provincial governments, under four-year funding agreements, with mining companies generally providing ‘in-kind” contributions related to their specific training needs. Northern Career Quest funding is for the training of Indigenous people in programs that lead to new long-term and/or full-time employment opportunities, or for training with existing employees leading to succession opportunities. All programs delivered by NCQ must have guaranteed employment and the training delivered must be either industry or institution approved.

In November 2021 the Government of Saskatchewan, through the Canada-Saskatchewan Labour Market Transfer Agreements, provided approximately $2 million in funding to Northern Career Quest to support training and employment services to Indigenous job seekers residing in the northern part of the Saskatchewan (Government of Saskatchewan 2021f). The funding enables Northern Career Quest to diversify its training and employment services beyond just the resource sector.

Advances have been made towards increasing education levels in the RSA since 1992, particularly in post-secondary training relevant to the mining industry, such as apprenticeships and trades where attainment rates for apprentices are higher than in other parts of the province. This reflects considerable efforts by industry and government in post-secondary programming through initiatives such as the MPTP. While the number of northern Saskatchewan residents 15 years and older with at least a high school certificate or equivalent has increased substantially from 1976 to 2006, education attainment rates in northern Saskatchewan have not reached parity with provincial rates (CVMPP 2013). Analysis of historical mining sector employment data for northern Saskatchewan for the period 1992-2018 shows a steady increase in the participation of northern contractors and northern mine employees in northern mining workforces (Government of Saskatchewan 2018a). Consistent with trends in the value of annual mineral industry purchases from northern businesses, northern Saskatchewan participation in the uranium mining industry peaked in 2012 at approximately 1,800 people before declining substantially to a little over 500 people in 2018.

NexGen initiated a summer student internship program in 2016 for both high school and post-secondary students (NexGen 2021c). High school students experience opportunities in areas including geology, surveying, camp maintenance, and industrial cooking. Post-secondary students receive hands-on work experience. A summer student mentorship program brings participants who have completed the high school program back to mentor new students (NexGen 2021c).

In addition, NexGen has initiated discussions with LPA community representatives, training institutions active in the NSAD (i.e., Northlands College, the GDI, and the Saskatchewan Indian Institute of Technologies), and Northern Career Quest Partnership in an effort to stimulate the development of a MPTP-style training program to maximize training opportunities for LPA community members to facilitate securing employment opportunities at the Project.

In 2013, the Community Vitality Monitoring Partnership[28] reviewed the socio-economic effects of the modern era of uranium mining on northern Saskatchewan and noted that initiatives like the MPTP contributed to increased education levels, specifically post-secondary training relevant to the mining sector. Based on the review, the Community Vitality Monitoring Partnership made several recommendations to further improve northern

[28] The Community Vitality Monitoring Partnership is a partnership of government ministries, regional health units and uranium mining producers that works to identify and track indicators that provide insight into community vitality.

participation in economic benefits from the uranium sector (CVMPP 2013). Some of the more pertinent recommendations were:

- Multi-stakeholder approaches (i.e., provincial government, federal government, tribal councils, school boards, and communities) should:
  - discuss how to place more effort on early childhood development; and
  - provide support for bridging programs between high schools and colleges/universities.
- Uranium mining companies should target some education efforts and donations to invest in early childhood development.
- Uranium mining companies should explore ways for small northern companies to participate more in mine contract opportunities.
- School boards, tribal councils and education institutions should provide dedicated career counselling in schools in northern Saskatchewan with the support of industry, where appropriate.

A lack of educational and training opportunities is often noted as a barrier to educational attainment as well as affordability of programs. By implementing programs that target those communities that find access to education and training challenging, attainment can be improved.

6.7 Community Health

This subsection describes the health and well-being of the RSA with reference to a suite of key health indicators. Health indicator data are presented at the level of the RSA[29] and Keewatin KYHR level (Figure 18), which was the health authority that included the LSA communities before Saskatchewan amalgamated the health regions in the province in 2017. Data are presented at the regional level to ensure the confidentiality of the communities in the LSA, many of which have small populations. Data at the community level are not publicly available. More recent data was not available.

This subsection also discusses LSA community perspectives of health with reference to the findings of KP interviews.

6.7.1 Physical Health

In a 2016 report on Northern Saskatchewan Health Indicators, a smaller proportion of the RSA off-reserve population reported perceiving their own health status as very good or excellent compared to the province as a whole (Irvine et al 2017). The perceptions of health status in the RSA remained relatively stable between 2007 to 2008 and 2013 to 2014, ranging between 44% and 48% of people feeling their mental health status was good or very good while the provincial rate ranged from 55% to 60%.

[29] The RSA contains the former health regions of Keewatin Yatthé, Mamawetan Churchill River, and Athabasca health Authority.

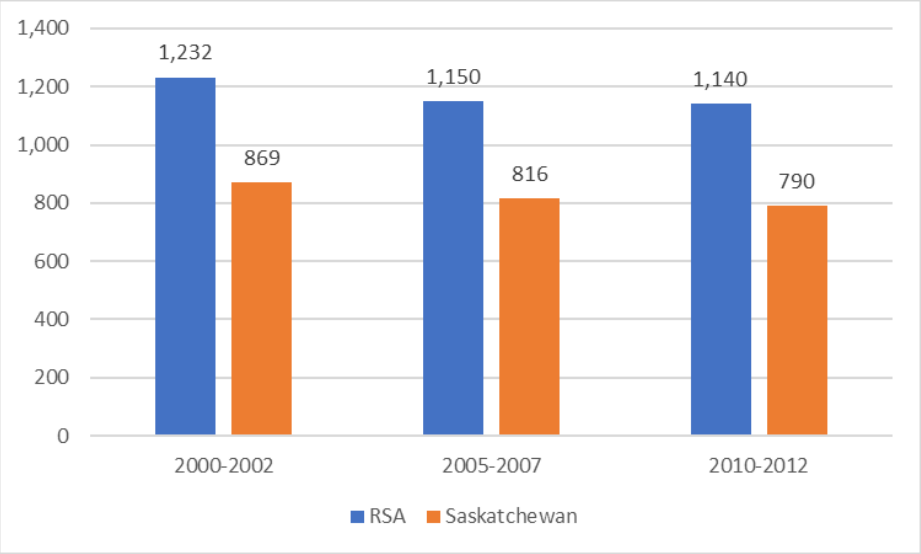
6.7.1.1 Regional Study Area

6.7.1.1.1 Mortality Rate

Mortality data can further help provide insight on the health status of an entire community. For example, the premature mortality rate (i.e., occurring before the age of 75) has been identified as one of the best single measures of overall community health. Communities with higher premature mortality rates tend to have higher rates of illnesses, hospital utilization, and poorer overall health. Mortality data by cause allows for the determination of the number of deaths that may have been preventable. Mortality data are taken from the Saskatchewan Vital Statistics Database and excludes out-of-province deaths.

In the RSA, total crude mortality rates are approximately 1.5 to 2 times as high as the province (NSPHU 2017a). Between 2000 and 2012, total mortality in the RSA has decreased slightly, but remains at rates greater than the province overall (Figure 26). Mortality rates, like in other parts of the country, progressively increase with age and are highest in both males and females aged 85 years and over. Males have higher morality rates than females in almost all age groups (NSPHU 2017a).

Figure 26: Age-Standardized Mortality, All Causes, 3-Year Average, Regional Study Area, and Saskatchewan, 2000-2002 to 2010-2012



Source: Statistics Canada Table 102-4313, via NSPHU 2017a.
RSA = regional study area.

The leading causes of death in the RSA are injuries, cancers, circulatory diseases, and respiratory diseases (Table 17). In the former KYHR, the leading cause of death was cancers.

Table 17: Number of Deaths by Common Causes in the Keewatin Yatthé Health Region and the Regional Study Area, 2005 to 2012

Metric	KYHR	RSA
External causes of morbidity/mortality (injuries)	130	430
Cancers	152	366
Circulatory	113	321
Respiratory	50	131
Endocrine, nutritional, and metabolic	21	n/a
Digestive	24	n/a
Mental disorders	22	n/a
Infectious and parasitic diseases	17	n/a
Nervous system	20	n/a
Genitourinary	20	n/a
Congenital anomalies	5	n/a
Symptoms, signs, and ill-defined conditions	14	n/a
Conditions originating in the perinatal period	6	n/a
Other	7	496
Unknown	18	n/a
Total	**619**	**1,744**

Source: Saskatchewan Vital Statistics via NSPHU 2017a.
KYHR = Keewatin Yatthé Health Region; RSA = regional study area; n/a = not available.

Some of the main specific causes of death in the RSA include ischemic heart disease, intentional self-harm, lung cancer, motor vehicle collisions, cerebrovascular disease, and chronic obstructive pulmonary disease (COPD; Table 18). Injuries are the leading causes of death in most age groups in the RSA, with intentional self-harm, motor vehicle traffic crashes, assault, and accidental poisonings being most common. In the older age groups (i.e., 50 to 59 and 50 and above), chronic disease becomes the leading causes of death with ischemic heart disease, lung cancer and diabetes being most common.

Table 18: Ranking of Common Causes of Mortality by Age Group Regional Study Area, 2005 to 2014

Age Group	First	Second	Third	
1 to 9	Drowning	<5	<5	
10 to 19	Intentional self-harm	Assault	Motor vehicle collisions	
20 to 29	Intentional self-harm	Motor vehicle collisions	Accidental poisoning	Assault
30 to 30	Intentional self-harm	Motor vehicle collisions	Accidental poisoning	Assault
40 to 49	Intentional self-harm	Motor vehicle collisions	Ischemic heart disease	
50 to 59	Ischemic heart disease	Lung cancer	Motor vehicle collisions	
50 and above	Ischemic heart disease	Lung cancer	Diabetes mellitus	
Overall	Ischemic heart disease	Intentional self-harm	Lung cancer	

Source: Saskatchewan Vital Statistics via NSPHU 2017a.
< = less than.

Avoidable deaths are defined as untimely deaths that should not occur in the presence of timely and effective health care (i.e., treatable deaths) or other public health practices, programs, and policy interventions (i.e., preventable deaths)[30]. The RSA has close to twice the rate of avoidable mortality compared to both the province and nation as a whole (NSPHU 2017a). Between 2005 and 2014, 74% of all deaths in the RSA were premature, having occurred in individuals aged 74 years and younger. Rates of preventable mortality are between two to three times the rates of treatable mortality in the RSA. Across the north (i.e., in the RSA), this discrepancy has remained similar between 2005 and 2014. Of total deaths in the RSA, 57% are considered avoidable, 14% are unavoidable, and 3% unknown. These three subcategories are classified as premature deaths and combined, account for 74% of total mortality in the RSA. The avoidable deaths (57%) are further divided into the two sub-categories of preventable at 41% and treatable at 16%. The leading causes of preventable mortality in the RSA are suicide, transport accidents, lung cancer, alcohol-related diseases, ischaemic heart disease, accidental poisonings, assault other external causes of accidental injury, drowning, and chronic obstructive pulmonary disorders (NSPHU 2017a). The leading causes of treatable mortality include ischaemic heart disease, congenital malformations, complications of perinatal period, colorectal cancer, breast cancer, diabetes mellitus, pneumonia, sepsis, cerebrovascular diseases, and renal failure.

6.7.1.1.2 Infant Mortality

Infant and maternal health indicators provide good information about the health of the overall community and are closely linked to non-medical determinants of health such as poverty, education, levels, and employment (FNIGC 2012). Premature mortality rates and infant mortality have often been found to be some of the best measures of health in a community, with higher rates of infant mortality corresponding with poorer overall health. Data from the Saskatchewan Year-end Hospitalization File (Discharge Abstract Database) and the Saskatchewan Vital Statistics Database were used to calculate infant mortality (NSPHU 2017a).

The infant mortality rate in the RSA was 10.6 deaths per 1,000 live births in the period between 2004 and 2013 and was lower in the KYHR over the same period at 7.6 infant deaths per 1,000 live births. Causes of mortality by northern health unit were unavailable; therefore, RSA data are presented in aggregate. The major causes of infant mortality in the RSA included congenital anomalies (i.e., 33%), perinatal conditions (i.e., 23%), and symptoms and signs of ill-defined conditions including sudden infant death syndrome (i.e., 14%), respiratory conditions (i.e., 7%), and infectious and parasitic diseases (i.e., 7%). Congenital anomalies remain the leading cause of infant mortality for both the greater Province of Saskatchewan and Canada as a whole. Rates for the whole of Canada (i.e., 23%) are lower in comparison to the Province of Saskatchewan, which remains similar to what is found within the RSA (i.e., 33%). Recent research has identified a gene in one fatal congenital condition found in northern Saskatchewan, which could be mitigated to a degree by screening and enhanced genetic counselling (NSPHU 2017a).

6.7.1.1.3 Chronic Disease

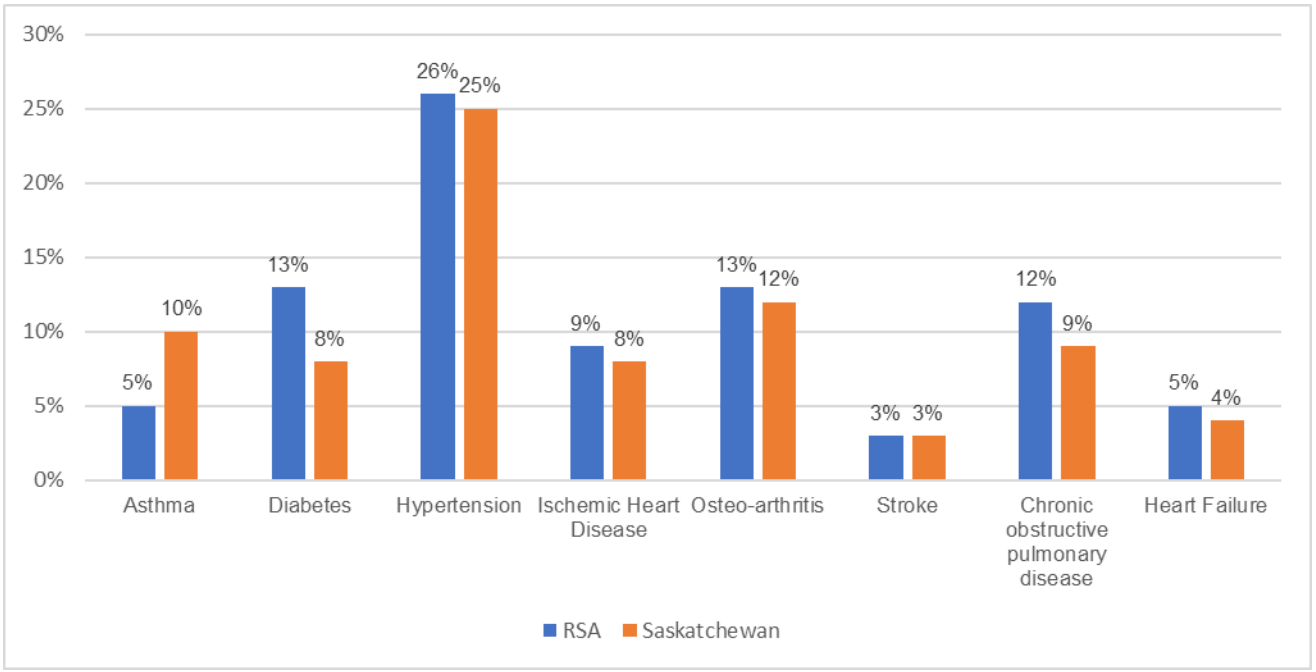
Chronic disease is an important measure of a community's overall health because not only does it reflect a community's demographics, but it also has negative effects on the quality of life of affected individuals, causes premature deaths, and creates adverse economic effects on families, communities, and societies (WHO 2005). In Canada, two-thirds of all deaths each year are a result of major chronic diseases (e.g., cardiovascular diseases,

[30] Preventable deaths are linked to factors which can be modified, such as physical activity, healthy eating, smoking, or alcohol consumption, in addition to public health interventions such as vaccination or safety legislation (NSPHU 2017a).

cancers, chronic respiratory diseases, diabetes) and they are largely preventable (Public Health Agency of Canada 2016). The Northern Saskatchewan Population Health Unit Mortality Report identifies the leading causes of death in northern Saskatchewan to be injuries, cancers, circulatory diseases, and respiratory diseases (NSPHU 2017a).

Crude rates of most chronic diseases are either similar or slightly lower in the RSA, compared to the province. Age-standardized rates, which control for the effect of age, indicate a lower risk of many chronic diseases, including diabetes, ischemic heart disease, COPD, and heart failure (Irvine and Quinn 2019). Figure 27 shows the age-standardized rates for selected chronic diseases in the RSA and province. The most common chronic disease in the RSA is hypertension, followed by diabetes and COPD.

Figure 27: Age-Standardized Rates, Selected Chronic Diseases, Regional Study Area, and Saskatchewan, 2014/2015



Source: Ministry of Health 2014/15 via Irvine and Quinn 2019
RSA = regional study area.

6.7.1.1.3.1 Diabetes

Over the 2005 to 2014 period, diabetes is the third ranked common cause of mortality for the 60 years and above age group in the RSA (NSPHU 2017a; Figure 27). Indigenous Peoples are among the highest-risk populations for diabetes and diabetes-related complications in Canada (Harris et al 2013). The 10-year average crude mortality rate from diabetes mellitus in the treatable sub-category (i.e., Type 2), in northern Saskatchewan, was 5.5 cases per 100,000 population from 2005 to 2014. Sixty-nine people died of diabetes in northern Saskatchewan in the 2005 to 2014 period, out of a total 1,745 deaths in the period (NSPHU 2017a). The age-standardized prevalence rate of diabetes in northern Saskatchewan was over 12%, which was the highest for the health regions in Saskatchewan and higher than the provincial prevalence rate of just under 8% (Government of Saskatchewan

2016b). Individuals who are overweight or obese are at higher risk of developing a variety of health conditions, including Type 2 diabetes, heart disease, and some cancers. Diabetes usually has multiple risk factors and may take many years to develop. In a 2006 report from the Indigenous Peoples' Health Research Centre, diabetes was the most common identified health issue affecting Saskatchewan Indigenous populations in the category of chronic diseases, nutrition, and lifestyle. Overall, diabetes ranked as the third most common mentioned health issue, with many participants observing that it is tied to larger issues of lifestyle, physical activity, and nutrition (Sinclair et al. 2006).

6.7.1.1.3.2 Cancer

Incidence rates and mortality rates for cancer are presented below for the three northern health regions in aggregate in Saskatchewan Cancer Agency's Saskatchewan Cancer Control Report: Profiling Cancer in Regional Health Authorities. The data are taken from the Saskatchewan Cancer Registry, maintained by the Saskatchewan Cancer Agency. The incidence of cancer, or total number of new cases (i.e., crude rate), in the three northern health regions in the 2010 to 2014 period was 216 cases in females and 224 cases in males (Saskatchewan Cancer Agency 2017).

Breast cancer was the cancer with the highest incidence rate in females in northern Saskatchewan in the 1995 to 2014 period. The age-adjusted rate of breast cancer females in the three northern health regions fluctuated between 64.3 per 100,000 and 111.1 per 100,000 in the 20-year period, displaying an upward fluctuating trend, compared to the relatively stable provincial trend in the same time period. Age-adjusted breast cancer mortality rates in the three northern health regions comprising the RSA have been declining since the 2007 to 2010 period, when they reached a peak at 42.0 per 100,000. Provincial rates have also been declining, though less dramatically with rates falling from approximately 21.0 per 100,000 in 2007-2010 to 19.0 per 100,000 in 2011-2014 (Saskatchewan Cancer Agency 2017).

Prostate cancer was the cancer with the highest incidence rate for males in the three northern health regions in the 1994 to 2014 period. The age-adjusted prostate cancer incidence rate in northern Saskatchewan has increased in the 1995 to 2014 period from 56.7 per 100,000 to 93.1 per 100,000. The age-adjusted prostate cancer incidence rate in northern Saskatchewan was initially much lower than the very high provincial rate; however, has been slowly increasing toward the provincial rate, which, in turn, has been declining. Prostate cancer mortality rates have been increasing in the northern health regions, from 9.9 per 100,000 to 26.4 per 100,000 over the 20-year period and simultaneously declining in the province as whole (Saskatchewan Cancer Agency 2017).

Lung cancer was the second most prominent cancer for both males and females in northern Saskatchewan. Lung cancer incidence rates in females in the northern health regions remained consistently higher than provincial rates over the 1995 to 2014 period, climbing to 82.5 per 100,000 in 2011 to 2014. For males, age-adjusted lung cancer incidence rates have been declining in the north after a high rate of incidences in the late 1990s of 115.2 per 100,000 in the 1999 to 2002 period, to a rate which is closer to, but still slightly higher than the province as a whole. As opposed to incidence, age-adjusted lung cancer mortality rates for both sexes have been declining in the 1995 to 2014 time period, but remain higher than provincial rates, particularly for females. For males, the age-adjusted mortality rate for lung cancer in the north peaked at 109.8 per 100,000 in 1999 to 2002, then declined to 51.4 per 100,000 in 2011 to 2014. For females, age-adjusted lung cancer mortality rates in northern

Saskatchewan declined from 67.1 per 100,000 to 48.4 per 100,000 over the 20-year period (Saskatchewan Cancer Agency 2017).

Colorectal cancer is the third most common type of cancer in males and females in northern Saskatchewan, with rates increasing over time for both sexes. For females, colorectal cancer rates increased from 28.7 per 100,000 in 1995 to 1998 to 47.6 per 100,000 in 2011 to 2014, while in males the rates increased from 49.6 per 100,000 to 66.4 per 100,000 over the period. In males, northern Saskatchewan rates, though increasing, remained below provincial rates, which are also increasing. For females, the northern Saskatchewan rate started out lower than the provincial rate at the outset of the period and ended the 20-year period close to par with the provincial rate. Age-adjusted mortality rates for colorectal cancer in the 1995 to 2014 period have shown an increase in both sexes, for females it increased from 8.2 per 100,000 to 15.4 per 100,000 over the 20-year period (Saskatchewan Cancer Agency 2017).

6.7.1.1.4 Communicable Disease

Common communicable diseases in the RSA include chlamydia, gonorrhea, HIV, hepatitis C, and tuberculosis (Irvine et al. 2017). Rates of these communicable diseases in the RSA were substantially higher than the provincial averages (NSPHU 2017b).

6.7.1.1.4.1 Human Immunodeficiency Virus

Crude rates of new diagnoses of HIV are higher in northern Saskatchewan compared to the rest of the province, there was a peak in 2012. In the northern Saskatchewan population, there were an average of eight new diagnoses of HIV per 100,000 cases between 2007 and 2011, which doubled to an average of 16 per 100,000 cases between 2012 and 2016. The crude rate of newly diagnosed persons with HIV was found to be 29 per 100,000 in the KYHR in the 2007 to 2011 period, with a jump to 50 per 100,000 in the 2012 to 2016 period. In the 2007 and 2016 period, the highest number of cases were among males aged 30 to 49. Self-reported risk factors among newly diagnosed individuals included intravenous drug use at 47% and heterosexual contact at 35%, with the remaining 18% in the “other” category (NSPHU 2017b).

6.7.1.1.4.2 Sexually Transmitted Infections

In terms of sexually transmitted infections, northern Saskatchewan's chlamydia rate was approximately eight to twelve times the Canadian crude rate and the gonorrhea rate was approximately 14 to 36 times greater than the Canadian crude rate. The KYHR has a higher crude rate than the northern Saskatchewan rate for both chlamydia and gonorrhea. The age-standardized, 10-year average (2007 to 2016) chlamydia rate was at 2,096 cases per 100,000 in northern Saskatchewan while in the KYHR, the age-standardized, 10-year average chlamydia rate for the same period was 2,300 cases per 100,000. For gonorrhea, the age-standardized, 10-year average for northern Saskatchewan (2007 to 2016) was 704 cases per 100,000 population, and 824 cases per 100,000 in the KYHR. Overall, gonorrhea and chlamydia rates were found to be higher in the 15 to 29 age group, particularly in females. The higher rate among females may reflect increased screening during routine check-ups for prenatal care, contraceptive counselling, pap smear screening, or other related interactions with the health care system where diagnoses would occur (NSPHU 2017b).

6.7.1.1.4.3 Hepatitis C

Crude rates of newly diagnosed hepatitis C fluctuates annually in northern Saskatchewan and have been higher than the rest of the province since 2012. From 2007 through 2016, there were 30% more cases of newly diagnosed hepatitis C in males compared to females in the northern Saskatchewan. In 2016, the crude rate in northern Saskatchewan was 110 cases per 100,000, about 1.8 times the rate of Saskatchewan as a whole. The crude rate of newly diagnosed hepatitis C infections for KYHR was 64 per 100,000 in the 5-year period between 2007 and 2011 and 94 per 100,000 in the period between 2012 and 2016 (NSPHU 2017b).

6.7.1.1.4.4 Tuberculosis

There has been a declining trend in the crude rates of new and relapsed tuberculosis cases in northern Saskatchewan between 2004 and 2016; however, rates remain between eleven and 22 times greater than the province. The KYHR has seen a decrease in crude rates of new and relapsed tuberculosis cases at 233 per 100,000 in the 2007 to 2011 period and 151 cases per 100,000 in the 2012 to 2016 period. The other northern health regions also exhibit declining trends (NSPHU 2017b).

6.7.1.1.5 Personal Behaviours

Personal behaviours and lifestyle choices also contribute to the overall level of health in a community. Some personal behaviours, such as smoking or diet (to the extent that is not influenced by socio-economic factors) can be altered to minimize the risks of other health conditions. The individual behaviours discussed below are smoking, alcohol use, physical activity, and dietary practices.

Data are derived from the Canadian Community Health Survey, a national cross-sectional survey for individuals twelve years of age and older, and includes data collection for health status, health care utilization and health determinants. Individuals living on reserves and other Aboriginal settlements are excluded. The Mamawetan Churchill River Health Region, KYHR, and the Athabasca Health Authority are grouped together to provide one northern Saskatchewan off-reserve estimate (NSPHU 2016).

6.7.1.1.5.1 Smoking

Smoking refers to the population aged twelve and over who reported being a current daily or occasional smoker. Smoking rates in northern Saskatchewan are higher than provincial rates. In 2014, the smoking rate for females was 49% and 46% for males as compared to the provincial female rate of 20%, and the provincial male rate of 23%. The overall smoking rate of northern Saskatchewan in 2013 to 2014 was 41%, which is high in comparison to many other northern regions in Canada.

Due to the higher smoking rates, non-smokers in northern Saskatchewan are more likely to be exposed to second-hand smoke compared to their provincial counterparts. In 2013 to 2014, 21% and 14% of non-smokers, respectively, in northern Saskatchewan reported being exposed to second-hand smoke in vehicles/public places or at home, on every day or almost every day in the past month, compared to 17% and 4%, respectively, of non-smoking Saskatchewan residents (NSPHU 2016).

6.7.1.1.5.2 Heavy Drinking

Heavy drinking refers to males who reported having five or more drinks, or women who reported having four or more drinks, during one occasion, at least once per month over the past year. Northern Saskatchewan has similar rates of heavy drinking for males compared to Saskatchewan and other northern regions in Canada, whereas

there are higher rates in northern Saskatchewan for females. In 2013 to 2014, 18% of females and 26% of males in northern Saskatchewan reported heavy drinking compared to 13% and 25% of their provincial counterparts, respectively (NSPHU 2016).

6.7.1.1.5.3 Physical Activity

Physical activity refers to the nature, frequency, and duration of Canadian Community Health Survey respondents' participation in leisure-time physical activity. Respondents are classified as active, moderately active, or inactive based on an index of average daily physical activity over the past three months. The rates of active or moderately active physical activity levels in northern Saskatchewan range between 50% in 2007 to 2008 and 58% in 2013 to 2014. Corresponding rates in Saskatchewan range between 48% and 53% (NSPHU 2016).

6.7.1.1.5.4 Dietary Practices

Dietary practices are influenced by socio-economic status and food security. Poor nutrition, defined as a low rate of fruit and vegetable consumption in the NSPHU report (2016a) Social Determinants of Health: Personal Health Practices and Personal Resources, is connected to the high cost of healthy food in the region, as well as to the limited facilities and resources for operating programs for physical activity (Sinclair et al. 2006).

The proportion of the northern population that reports consuming five or more fruit and vegetables a day has remained fairly stable, from 35%, between 2007 to 2008 and 41% between 2013 to 2014. During the same time period, the provincial rate ranged between 35% and 39% (NSPHU 2016).

6.7.1.1.6 Food

6.7.1.1.6.1 Food Insecurity

Food insecurity is "the inability to acquire or consume an adequate diet quality or sufficient quantity of food in socially acceptable ways, or the uncertainty that one will be able to do so" (Health Canada 2020). According to the Regional Health Survey Phase 3 (FNIGC 2018), people living in First Nations communities (i.e., reserves and settlements) have higher rates of food insecurity nationally than the general population in Canada, though the rate has decreased slightly for adults since the Regional Health Survey Phase 2, which was conducted between 2008 and 2010. Access to Traditional Foods is an important way to help alleviate food insecurity for First Nations people, as more than half of First Nations adults who had Traditional Foods shared with their households reported always or almost always eating nutritious, balanced meals. Traditional Foods are spiritually or nutritionally valuable native plant or wildlife species that are harvested locally. They reflect Indigenous Knowledge, and the relationship Indigenous Peoples have with the area where they live (Council of Canadian Academies 2014). More First Nations adults were considered severely food insecure when they never had Traditional Food shared with their household (i.e., 17.4%; FNIGC 2018).

Statistical information describing provincial Indigenous food insecurity is available through the First Nations Food, Nutrition and Environment Study. For First Nations people living in Saskatchewan, 37% of First Nations households were classified as food insecure. Twenty-seven percent of all households were considered moderately food insecure and 10% were considered severely food insecure. Households with children experienced greater food insecurity than households without children (i.e., 41% and 25%, respectively; Chan et al. 2018). High food prices are common, particularly for fresh produce in the RSA (DMCA 2018).

Grocery stores in the LSA are in La Loche (Centerpoint Grocery Story and Northern Store), Birch Narrows (Birch Narrows Grocery-Gas Bar), and Buffalo Narrows (i.e., Northern Store). A convenience store is in BRDN (Dillon). Prices in grocery stores in the communities have been noted to be high due to transportation costs, low volumes of sales (as compared to larger centres), and limited competition. Many residents purchase groceries when they travel to larger cities such as North Battleford, Prince Albert, and Saskatoon. The types of foods available and costs influence diets in the LSA. In La Loche, the President's Choice modular farm is used to provide fresh produce to students in La Loche schools. There is a community garden located in Buffalo Narrows with a food bank available. Country foods are typically shared with Elders and other community members by family and friends (2019 to 2021 KP interview program).

6.7.1.1.6.2 Traditional Diet

Harvesting country foods (i.e., Traditional Foods) is important to Indigenous communities for a range of reasons, including its importance in supporting social bonds within families and communities, maintaining cultural identities, forming a nutritious part of the Indigenous diet (Council of Canadian Academies 2014), and offsetting the high cost of living in northern Saskatchewan and food insecurity (Council of Canadian Academies 2014; CVMPP 2005). The importance of harvesting country foods is shared by the Indigenous communities in the LSA, as they noted in the quotes below:

> Many CRDN members depend on food harvested from Up North. Diminished opportunities to secure food will have a tangible and substantial negative economic impact on community families. This impact will be compounded if foods from preferred harvesting areas are not deemed to be safe, forcing households to resort to imported store-bought food. As noted by one CRDN member, being cash-poor and eating well is not the same as simply being cash-poor. Not only would such a shift impose an economic (cash) hardship; it would deprive CRDN families of healthy, nutritious, and culturally affirming foods, customs, and traditions which are fundamental to Denesųłiné heritage and identity. (TSD V.1: CRDN)

> Reliance on the land is still considerable, members estimating that on average 70% of their food comes from hunting, trapping, fishing, and gathering. Another member estimates that 50% of his diet consists of Traditional Food, the likes of fish, duck and moose. Others in the community almost exclusively rely on Traditional Food: one member, for example, estimates that 95% of his diet comes from the land, primarily moose but also deer, grouse, and fish, as well as dried meat; one couple lived for an entire year in a cabin up the river, eating bannock, fish, rabbit, deer, and the like; another member eats Traditional Food every day. The closest store to St. George's Hill is in Dillon, which is 9 km from St. George's Hill and 26 km from Michel Village. Additionally, store-bought food is not only too expensive but also unhealthy, leaving them with no other option than to live off the land. (TSD IV: MN-S)

> Mostly off the land instead of always having to run to the store where you spend your money on high-priced food. . . . I . . . hardly eat . . . from the store. I always make sure I have a lot of moose meat, fish and rabbits and whatever I can get. . . . I've been living that way for quite a while now, ever since . . . I was able to get a gun and go out and shoot. And I have nets that I get people to set for me and I get fish. ... It's very important to me [for her to get her food from the land]. Because . . . when I go

> to the south –. . . I go to the restaurants, I eat fast food. Oh, I get sick. I really get sick for a couple days…. (TSD II: BNDN)
>
> Well, like we're talking about, this is very important, . . fishing and hunting and you know all these animals, what we use it for food, that's what we care for. . . . I don't [want to] buy a big steak all the time from the store here because it costs so . . . much. You know? We like fishing, we like fish. If I didn't eat whitefish for one month, . . . I get hungry for fish. I [have to] get one or two, you know. (TSD III: BRDN)

For Indigenous Peoples, one aspect of food security and healthy diets is continued access to traditional or country foods. "In Saskatchewan, Traditional Food harvesting (hunting, fishing, and gathering of wild plants), is an important part of the Traditional Food systems and food security of First Nations communities" (Chan et al. 2018). The First Nations Food Nutrition and Environment Study (Chan et al. 2018) found that almost all First Nation adults in Saskatchewan (i.e., 94%) reported eating Traditional Foods as part of their diet. Of the population included in the survey, First Nations adults in Saskatchewan ate land mammals (i.e., 83%), berries (i.e., 78%), fish (i.e., 51%), wild birds (i.e., 46%), and wild plant foods and teas (i.e., 43%; Chan et al. 2018).

The communities in the LSA have noted the importance of Traditional Foods in their diet. The CRDN (TSD V.1: CRDN) engage in land-based activities in part to provide food for their families and members are concerned about the potential for harvesting contaminated resources in their traditional territory.

Métis Nation – Saskatchewan citizens who participated in the IKTLU Study (TSD IV: MN-S) estimate that, on average, 70% of their diet comes from hunting, trapping, fishing, and gathering plants, with one citizen estimating that 95% of his diet came from the land. Aside from continuing to eat as their ancestors did, MN-S citizens rely on Traditional Foods to supplement store-bought food because going to a grocery store for some citizens can involve travel, store-bought food is expensive, and store-bought food is considered unhealthy.

The proportion of Traditional Food varies for BRDN members depending on their lifestyle. Some members estimate that their diet is over 80% country foods, while others note that the amount of country foods in one's diet depends on lifestyle and the season (BRDN-JWG 2021a). The BNDN and BRDN noted that approximately 80% of their populations were active in the traditional economy, which included harvesting for personal, family, and community consumption (BNDN-JWG 2021b; BRDN-JWG 2021a).

6.7.2 Local Study Area Community Perspectives on Health

The following subsection presents community perspectives of health in each LSA community. The perspectives presented are not based on formal health indicator data for the RSA or LSA, though there are similarities in the prevalence of some conditions and concerns expressed by community members and administrative staff in LSA communities. Where possible, community health concerns have been linked to regional health statistics and community and health authority planning.

6.7.2.1 Clearwater River Dene Nation

The CRDN indicated a desire to undertake KP interviews for their community independently, and NexGen provided the KP interview guide and directions for interviewers. At the timing of the writing of this report, the CRDN interview results had not yet been provided to NexGen.

6.7.2.2 La Loche

Health issues in La Loche are described as varying by group within the population. Men are considered to have a poorer health status due to lifestyle and employment. The homeless in La Loche are often men rather than women (Prairie ID Consulting 2015; 2019 to 2021 KP interview program). Community health concerns for La Loche include (2019 to 2021 KP interview program; 2020 youth workshop):

- addictions (drugs and alcohol);
- mental health;
- HIV and tuberculosis;
- suicide;
- heart problems;
- lack of health and wellness resources;
- lack of local heath services such as dentistry and optometry; and
- access to adequate health services.

Elders and seniors in the community are the age group most afflicted by respiratory disease and heart disease. Elders and seniors experience difficulties accessing services and lack access to long-term care homes and home care services (2019 to 2021 KP interview program).

6.7.2.3 Birch Narrows Dene Nation and Turnor Lake

Residents of Birch Narrows and Turnor Lake report overall good health within both communities. Interviewees indicated that social support contributes to good health in the community, and activities that bring individuals together (2019 to 2021 KP interview program). The community has several social activities such as poker rallies, skating parties, food hampers, and home visits that serve to bring a sense of community and provide activities for people.

While the nursing station (the Annie Bagg Memorial Nursing Station in Turnor Lake) has regularly scheduled physician visits, resident access to health services could be improved. Residents must travel for any specialist treatments, often travelling as far as Saskatoon (2019 to 2021 KP interview program). Community health concerns for the BNDN and Turnor Lake include (2019 to 2021 KP interview program; 2020 youth workshop):

- addictions (drugs and alcohol);
- mental health;
- diabetes; and
- forest fires.

With drugs entering the community, residents have expressed concern about the health of community residents in the next five to 10 years. Additionally, government policies such as the removal of trapping cabins affect their ability to be on the land, which can affect health (2019 to 2021 KP interview program). Residents of BNDN expressed that the uncertainty regarding the future of their cabins can influence their health as they do not know that “culturally things are being honoured and respected”.

The concern about mental health and addictions in Birch Narrows and Turnor Lake is reflected in northern Saskatchewan health statistics. Residents of the RSA reported higher rates of life stress (i.e., ranging between 19% and 23%) and lower mental health status (i.e., ranging between 56% and 64% self-reporting excellent or very good mental health) overall when compared to provincial rates (Section 6.7.1, Physical Health). The BNDN's concerns about mental health and addictions are reflected in the community's goals to improve social services, increase awareness and education on community social issues, provide preventative services, and address addictions (Section 6.10, Aspirations). The SHA's Recovery Plan for 2021 to 2022 also hopes to address recommendations in the Mental Health and Addictions Plan and invest in healthcare infrastructure. Birch Narrows Dene Nation would like a treatment centre for mental health and addictions in their own community, rather than having to travel to neighbouring communities to access treatment (Section 6.3.2.5).

The BNDN's concern about diabetes as a health issue in the community reflects the prevalence rate of diabetes in northern Saskatchewan (i.e., over 12%), which was the highest of the Saskatchewan health regions and higher than the provincial prevalence rate (i.e., under 8%; Section 6.7.1.1.3.1, Diabetes). The BNDN hopes to address these concerns through the following goals in the comprehensive community plan: investing in community health facilities, introducing new health services, and improving medical transportation services (Section 6.10.4, Birch Narrows Dene Nation).

Forest fires are an issue due to smoke inhalation and proximity to communities, homes, and other infrastructure, including hunting cabins. Forest fires also reduce the availability of country foods as animals move out of the area after a fire (2019 to 2021 KP interview program).

6.7.2.4 Buffalo River Dene Nation (Dillon)

Community health concerns for the BRDN include (2019 to 2021 KP interview program; 2020 youth workshop; BRDN-JWG 2021a):

- diabetes;
- cancer;
- tuberculosis;
- cardiac diseases;
- addictions (drugs and alcohol); and
- mental health.

Diabetes is the most common physical health issue in the community and primarily affects men and women of middle age and above (2019 to 2021 KP interview program). The BRDN's concern about diabetes as a health issue in the community reflects the prevalence rate of diabetes in northern Saskatchewan (i.e., over 12%), which was the highest of the Saskatchewan health regions and higher than the provincial prevalence rate (i.e., under 8%; Section 6.7.1.1.3.1).

Cancer is noted to affect women more than men in the community. Concern for the effects of cancer on women in BRDN reflects the incidence of breast cancer in the three northern health regions, which displayed an upward

fluctuating trend between 64.3 per 100,000 and 111.1 per 100,000 from 1995 to 2014, compared to the relatively stable provincial trend in the same period (Saskatchewan Cancer Agency 2017).

Tuberculosis was found in high rates within the community until the past 10 years. As a result of a successful tuberculosis program in the community, the instances of the disease have been greatly reduced (2019 to 2021 KP interview program). Cardiac diseases primarily affect residents aged 50 years and over (2019 to 2021 KP interview program).

Respiratory health concerns were also raised in relation to the condition of the roads leading into the community (2019 to 2021 KP interview program). The roads are uneven, have potholes, and are very dusty. The quality of the roads has also been noted to extend emergency response times from ambulances that travel from Buffalo Narrows or Ile-à-la-Crosse (2019 to 2021 KP interview program; 2020 youth workshop).

6.7.2.5 Buffalo Narrows

Community health concerns in Buffalo Narrows include (2019 to 2021 KP interview program; 2020 youth workshop):

- mental health, including intergenerational trauma;
- access to fresh, affordable foods;
- available medical services;
- cancer;
- respiratory disease;
- cardiac disease;
- air quality due to dust;
- water quality when partaking in activities on the lands/waters; and
- addictions (drugs and alcohol).

Common health issues for adults include cancer, mental health, and addictions, with cancer affecting men more than women in the community. Concern for the effects of cancer on men in Buffalo Narrows reflects the incidence of prostate cancer in the three northern health regions. Prostate cancer had the highest incidence rate for males in the three regions, with its incidence rate in northern Saskatchewan increasing from 56.7 per 100,000 to 93.1 per 100,000 from 1995 to 2014. Breast cancer is more likely to be identified by visiting health professionals due to visits from the Cancer Bus, which travels between communities throughout Saskatchewan. The purpose of the bus is to assist in the early detection of breast cancer and is fully booked when it has arrived in the community (2019 to 2021 KP interview program; Saskatchewan Cancer Agency 2017).

Prevalent health conditions amongst Elders and seniors in the community often include lung disease, COPD, emphysema, and heart problems, with many of these issues often affecting females at a higher proportion than males. Seniors in the community do not have access to free transportation to medical appointments located outside the community. Seniors can book for medical appointment transportation provided there is available

space, though they are responsible for their own meals, accommodation, and any associated transportation costs during the trips (2019 to 2021 KP interview program).

Various residents of Buffalo Narrows noted that a primary concern related to health is the differences in the quality of water in the lakes in recent years, noting an increase in sludge in the river system. This affects the fish and animals the community uses as food (2019 to 2021 KP interview program).

6.7.2.6 Other Local Study Area Communities

Health issues in the Other LSA Communities was not available.

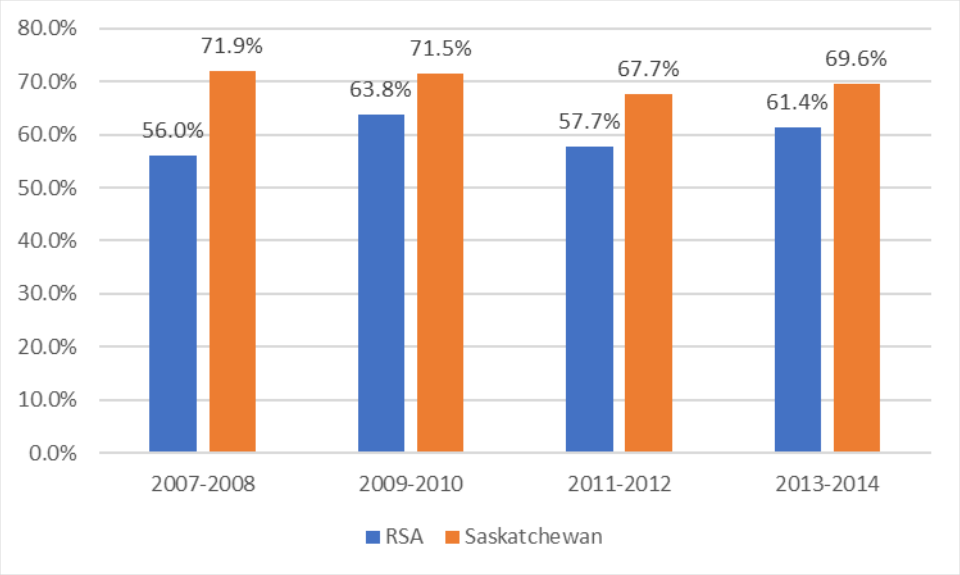
6.7.3 Mental Health

This subsection provides a description of mental health conditions based on quantitative data available for the RSA, as well as qualitative information for the LSA communities. Quantitative data on the mental health of the LSA communities was not available.

6.7.3.1 Regional Study Area

In a 2016 report on Northern Saskatchewan Health Indicators, a smaller proportion of the RSA off-reserve population reported perceiving their own mental health status as very good or excellent compared to the province (Irvine and Quinn 2016). The RSA rate remained relatively stable between 2007/2008 and 2013/2014, ranging between 56% and 64% while the provincial rate ranged from 68% to 72% (Figure 28). Between 2007/2008 and 2013/2014, the RSA off-reserve population indicated similar rates of life stress compared to the province at a whole, with rates ranging from 19% to 23%, compared to the provincial rates of 19% to 20% (Irvine and Quinn 2016). The SHA's Recovery Plan for 2021 to 2022 also hopes to address recommendations in the Mental Health and Addictions Plan (SHA 2021).

Figure 28: Population Aged 12 and Over, Off-Reserve, with Mental Health Status as Very Good or Excellent, Regional Study Area, and Saskatchewan 2007/2008 to 2013/2014



RSA = regional study area.

6.7.3.2 Local Study Area

6.7.3.2.1 Clearwater River Dene Nation

The CRDN indicated a desire to undertake KP interviews for their community independently, and NexGen provided the KP interview guide and directions for interviewers. At the timing of the writing of this report, the CRDN interview results had not yet been provided to NexGen.

6.7.3.2.2 La Loche

Mental health is thought to be one of the largest challenges facing the community. Suicide is a major challenge for youth and is more prevalent now than in the 1980s. Lack of full-time mental health professionals in the community is considered an issue by residents (TSD IV: MN-S). The remoteness of the community has been cited in interviews as a contributing factor to mental health challenges and suicide (2019 to 2021 KP interview program).

Mental health and addictions concerns are reflected in current programming in La Loche, including services such as Project Venture, and those that run out of the La Loche Friendship Centre (Section 6.3.2.3.3, La Loche). The community hopes to address mental health and addictions further through the La Loche Official Community Plan, particularly through its Holistic Health and Youth Wellness themes (Section 6.10.3, La Loche).

6.7.3.2.3 Birch Narrows Dene Nation and Turnor Lake

Results from KP interviews noted that stigmatization prevents people from coming forward when they have mental health issues, though people are becoming more open with their mental wellness and seeking help. There is reported to be a lack of supports for mental health in BNDN and Turnor Lake. Intergenerational trauma, feelings of marginalization in society, and addictions are major issues in mental health within the community and contributes to poor health (2019 to 2021 KP interview program). Having more openness to discuss mental wellness, especially from Elders, can help community members heal and understand how to deal with issues. Some improvement in mental wellness has also been made by creating a connection to the environment.

The BNDN's concerns about mental health and addictions are reflected in the community's goals to improve social services, increase awareness and education on community social issues, provide preventative services, and address addictions. Birch Narrows Dene Nation would like a treatment centre for mental health and addictions in their own community, rather than having to travel to neighbouring communities to access treatment (Section 6.10.4).

6.7.3.2.4 Buffalo River Dene Nation (Dillon)

Key person interview participants indicated that young people have substance use issues and the community has seen several suicides, including youth suicides (2019 to 2021 KP interview program). Participants in the KP interviews also indicated that alcohol is still present in the community, despite the reserve being a dry reserve (i.e., no alcohol is permitted) and bylaws being in place (2019 to 2021 KP interview program). There have been periods of high suicides in the LSA communities and the RCMP noted that a few years ago the number of calls received that related to suicide had increased (2019 to 2021 KP interview program).

For BRDN members with mental health and addictions issues, members who leave for treatment have no aftercare available to them upon return, which could lead to relapse (BRDN-JWG 2021a). The community also has a high suicide rate due to the lack of available care. Currently, the only available care is at the health centre

(BRDN-JWG 2021a). The BRDN would like a mental health awareness program established in the community (Section 6.10.5, Buffalo River Dene Nation [Dillon]).

6.7.3.2.5 Buffalo Narrows

Youth in the community often suffer from mental health issues such as depression, aggression, and addictions (2019 to 2021 KP interview program). Lack of mental health professionals in the community full time is considered an issue by residents (TSD IV: MN-S). Buffalo Narrows is working to address mental health concerns through programs such as the Buffalo Narrows NorthSask Victim Services and Children Exposed to Violence, which provide crisis intervention, information, and referrals to other programs.

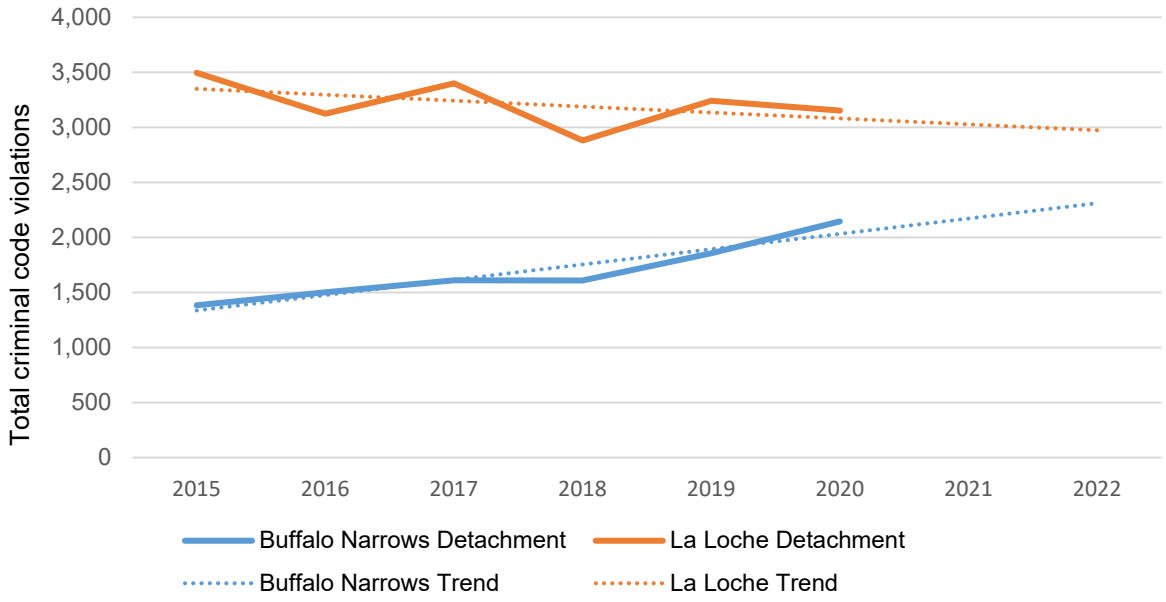
6.7.3.2.6 Other Local Study Area Communities

Information about mental health in the Other LSA Communities was not available.

6.8 Public Safety

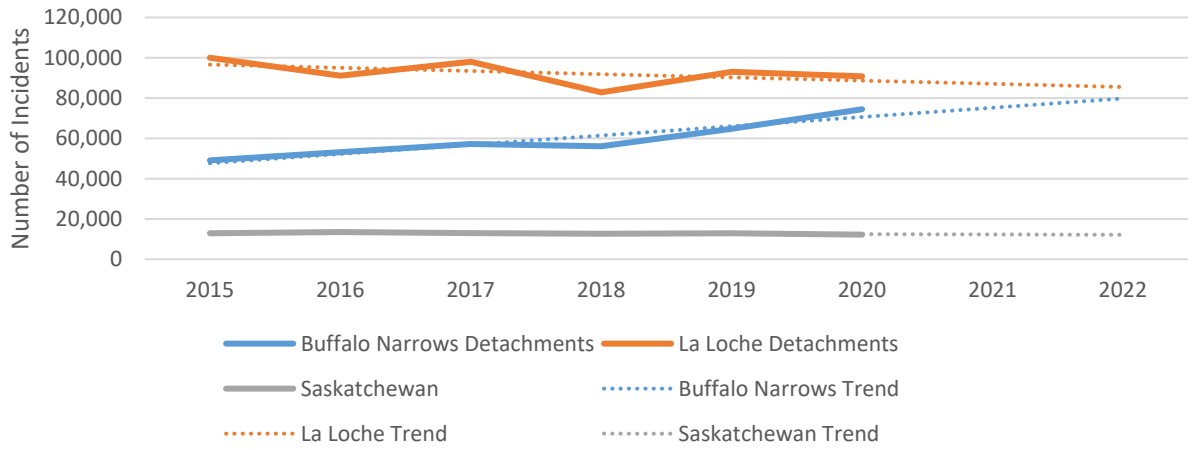
Figure 29 outlines the criminal code violations (i.e., crimes) committed each year for the Buffalo Narrows and La Loche RCMP Detachment areas (i.e., the two detachments in the LSA). The data shows the number of violations in the Buffalo Narrows RCMP Detachment area are lower than those in the La Loche RCMP Detachment area; however, violations in the Buffalo Narrows RCMP Detachment area are increasing each year and trending higher, while the La Loche RCMP Detachment area are more variable but trending lower. There was a 55.1% increase in total criminal code violations from 2015 to 2020 for the Buffalo Narrows RCMP Detachment area. The La Loche RCMP Detachment area reported total criminal code violations decreased 9.8% from 2015 to 2020. Despite the decrease in criminal code violations in the La Loche RCMP Detachment area, interviews indicated that there is a perception that the community is not safe (2019 to 2021 KP interview program). Saskatchewan criminal code violations increased by 2.2% in the same period. Data for Saskatchewan are not shown on the graph below due to the comparatively large numbers of violations that would make presentation against Buffalo Narrows and La Loche data illegible.

Figure 29: Criminal Code Violation Data for Buffalo Narrows and La Loche Detachments, 2015 to 2020



Additional crime rate data shows the Buffalo Narrows RCMP Detachment area experienced a 51.7% increase in the crime rate[31] from 2015 to 2020, while the La Loche RCMP Detachment area crime rate decreased by 9.2% (Figure 30). The provincial crime rate decreased by 5.4% in the same period. The Buffalo Narrows RCMP Detachment area crime rate is trending to surpass the La Loche RCMP Detachment area rate around 2023. Incarceration rates for the LSA communities and RSA are not available.

Figure 30: Crime Rate Data for Buffalo Narrows and La Loche Detachments, 2015 to 2020



Source: Statistics Canada 2021b

[31] Crime rate is presented as the number of incidences per 100,000 people.

Interviewees in the KP interview program felt that substance abuse issues (e.g., alcohol) are prevalent in many of the LSA communities (e.g., Turnor Lake, Dillon, La Loche, and Buffalo Narrows) and drug abuse (e.g., crack cocaine) is prevalent in Buffalo Narrows and La Loche and also in the smaller communities to a lesser extent (2019 to 2021 KP interview program). Poverty, unemployment, lack of education, isolation, lack of pro-social relationships, inadequate resources, and intergenerational trauma were identified as contributing factors for issues within the communities. The communities do not have social supports related to domestic abuse and the closest women's shelter is in Meadow Lake. Due to lack of local support services in the LSA, the RCMP is then used as Family Services and Social Services on a 24-hour basis (2019 to 2021 KP interview program).

Feedback during KP interviews indicated that members in Turnor Lake and BNDN feel very safe in the community due to its isolated location; some community members sleep with unlocked doors. Community members in BRDN also report feeling safe in their community, though they have noted that there are higher rates of addiction than before (2019 to 2021 KP interview program).

6.9 Community Well-Being

Defined very broadly, community well-being is "the combination of social, economic, environmental, cultural, and political conditions identified by individuals and their communities as essential for them to flourish and fulfill their potential" (Wiseman and Brasher 2008). This subsection describes the community well-being of each community, where data is available, based on their community well-being index score and is complemented by information obtained through community interviews and engagement.

The community well-being index calculated by Statistics Canada (Figure 31) uses data on education, labour force, income, and housing to provide "a relatively quick and convenient measure of well-being, focusing on the socio-economic dimensions" (Murphy 2010). The index is intended to provide a systematic summary of socio-economic well-being for communities, illustrate differences across communities, enable tracking over time, and be compatible with other community-level data on well-being (Indigenous Services Canada 2019a). Data for the smaller LSA communities were not available.

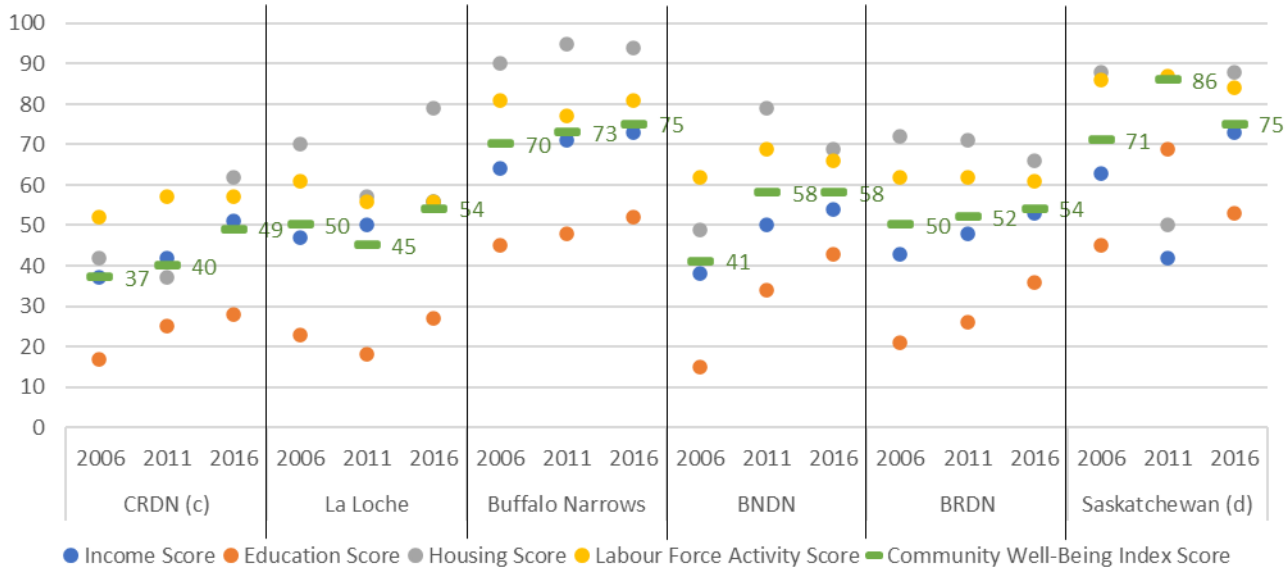
The component scores consider the following indicators:

- income, which is based on income per capita;
- education, which factors in the proportion of a community's population, 20 years and older, that has at least a high school certificate and the proportion of a community's population, 25 years and older that has at least a bachelor's level degree;
- housing, which comprises indicators on housing quantity and quality; and
- labour force activity, which quantifies the labour force participation and employment rate in the community for members between the age of 20 and 64 (Indigenous Services Canada 2019b).

Of the four component scores, education, income, and housing are generally acknowledged as key social determinants of health. The community well-being index presents a quantitative assessment of community well-being based on census data. These data can all be tied to the social determinants of health as quantitative data from a point in time (i.e., the census) for a select set of measurement indicators, but do not capture all aspects of well-being.

Figure 31 highlights the community well-being index scores across the four indicators for each main LSA community for the past three census years (i.e., 2006 to 2016). The scores show variations by indicators in all communities, with education scores the lowest, and housing the highest except for the CRDN, which had labour force activity as the highest in 2006 and 2011. Buffalo Narrows' scores are more similar to Saskatchewan, while the others are well below Saskatchewan scores.

Figure 31: Community Well-Being Index Scores[(a)] for the Local Study Area Communities[(b)] and Saskatchewan, 2006 to 2016 Census Years

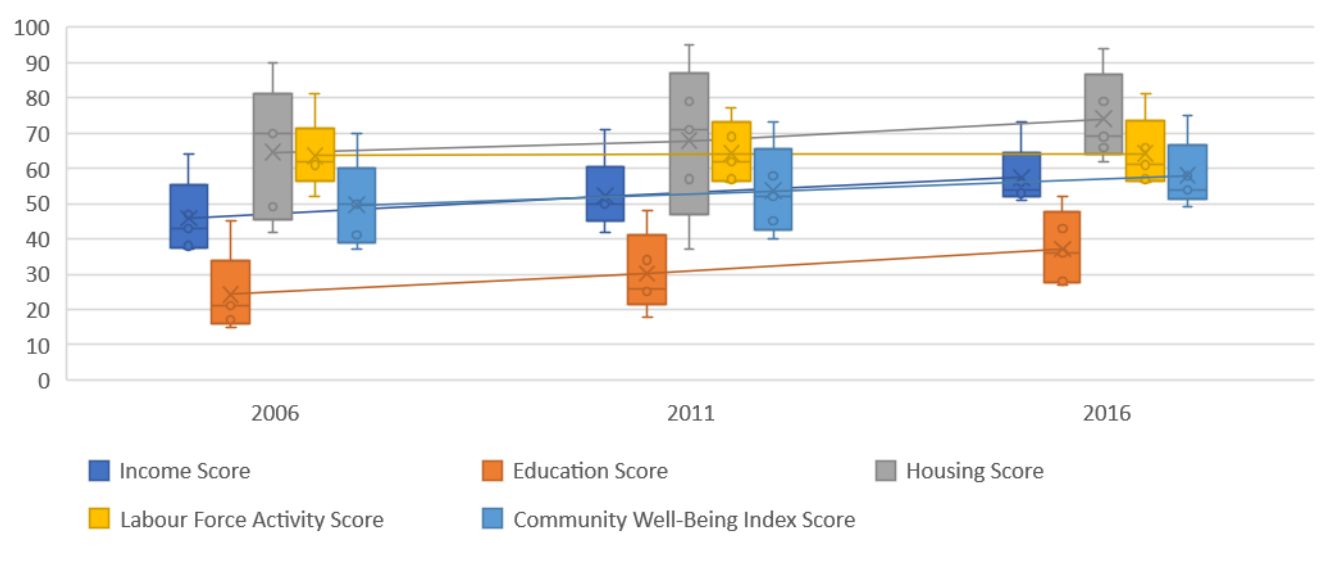


Source: CIRNAC 2019b.

a) Each community well-being score and each component score can range from a low of 0 to a high of 100.
b) Data for the Other LSA Communities were not available.
c) The community well-being index is calculated for Clearwater River Dene 222.
d) Mean score for Saskatchewan calculated by InterGroup Consultants.
CRDN = Clearwater River Dene Nation; BRDN = Buffalo River Dene Nation; BNDN = Birch Narrows Dene Nation; LSA = local study area.

Figure 32 highlights the LSA composite community well-being index across the four indicators for the past three census years (i.e., 2006 to 2016). This composite index for the LSA shows the range of scores from a regional perspective. Trend lines are also applied to show the average trend across the region. This shows income, education, and housing scores trending upward, while labour force activity is stagnant.

Figure 32: Local Study Area Composite Community Well-Being Index Scores [(a)], 2006 to 2016 Census Years



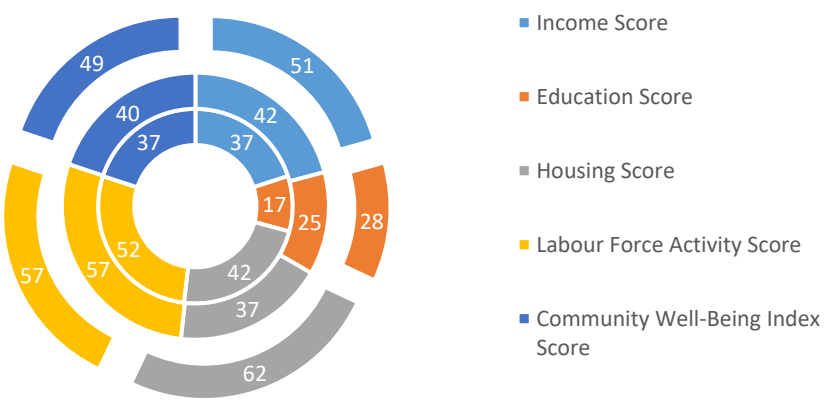
Source: CIRNAC 2019b.

a) Each community well-being score and each component score can range from a low of 0 to a high of 100.

6.9.1 Clearwater River Dene Nation

Figure 33 shows the community well-being score for the CRDN for the last three census years, with 2006 in the innermost ring and 2016 the outermost ring. The CRDN has the lowest community well-being score (i.e., 49) among the LSA communities in 2016, due to it having the lowest component scores for income (i.e., 51) and housing (i.e., 62), and only a slightly higher education score (i.e., 28) than La Loche (i.e., 27). However, the CRDN's community well-being score has improved by 12 points between 2006 to 2016 (Figure 33), the second highest increase among the LSA communities (Figure 31). Between 2006 and 2016, the CRDN has seen increases in every metric, specifically housing, income, and education, with increases of 20, 14, and 11 points, respectively. A slight increase in labour force activity score (i.e., 5-points) was also observed for the CRDN between 2006 and 2016 (Figure 33). Between 2006 and 2016, the CRDN experienced greater increases in component scores and overall community well-being than the province during the same period, but scores were still substantially lower, ranging from 22 to 27 points behind provincial index scores.

Figure 33: Clearwater River Dene Nation[(a)] Community Well-Being Index Scores[(b)], 2006 to 2016 Census Years



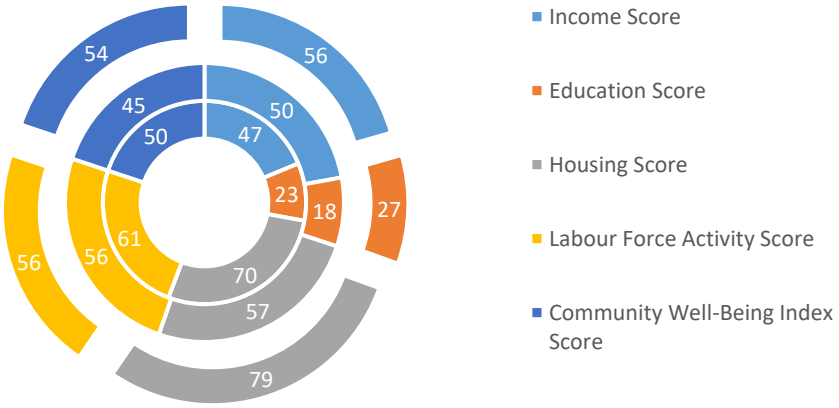
Source: CIRNAC 2019b.
a) The community well-being index is calculated for Clearwater River Dene 222.
b) Each community well-being score and each component score can range from a low of 0 to a high of 100.

6.9.2 Métis – Nation Saskatchewan Northern Region 2

Figure 34 and Figure 35 shows the community well-being score for the predominantly Métis communities of La Loche and Buffalo Narrows, respectively, for the last three census years. In Figure 34 and Figure 35, community well-being scores are presented with 2006 in the innermost ring and 2016 in the outermost ring.

For residents of La Loche, the community well-being score has remained fairly consistent between 2006 and 2016, decreasing to 45 in 2011 and improving to 54 in 2016 (Figure 34). The decrease in score in 2011 was driven by lower component scores in education, housing, and labour force activity. In 2016, La Loche had the lowest component scores for education and labour force activity among the LSA communities at 27 and 56, respectively, and experienced a drop in its labour force activity score from 61 to 56 (Figure 31). Between 2006 and 2016, La Loche experienced a greater increase in its housing score with a 9-point increase compared to Saskatchewan, which had no increase. Like most of the other LSA communities, La Loche has consistently had lower component scores and overall community well-being score compared to the province.

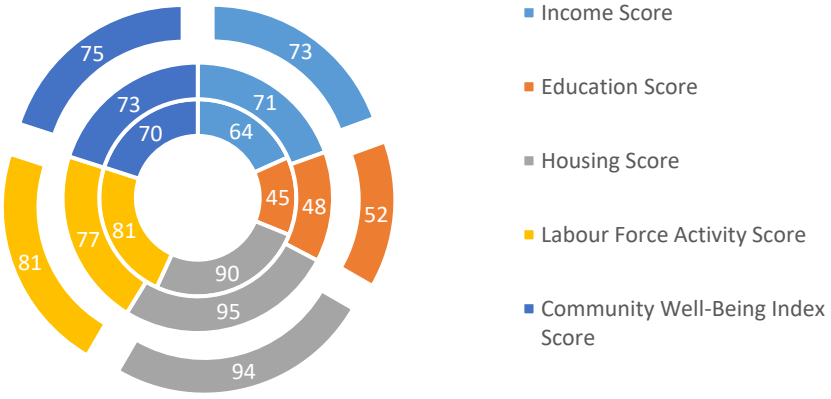
Figure 34: Métis Nation – Saskatchewan Northern Region 2 Community Well-Being Index Scores[(a)] for La Loche, 2006 to 2016 Census Years



Source: CIRNAC 2019b.
a) Each community well-being score and each component score can range from a low of 0 to a high of 100.

Buffalo Narrows has the highest community well-being score of the LSA communities, with a 75 in 2016 and the highest scores for all components (Figure 31). In 2016, Buffalo Narrows had a community well-being score that matched the provincial score; Buffalo Narrows scored at the provincial level for income, and exceeded it for housing (Figure 35). The community has experienced increases in almost all component scores between 2006 and 2016, but experienced lower score component increases compared to Saskatchewan as a whole (Figure 31). Between 2006 and 2016, the community's community well-being score increased from 70 to 75, with increases in all components except for labour force activity (Figure 35).

Figure 35: Métis Nation – Saskatchewan Northern Region 2 Community Well-Being Index Scores[(a)] for Buffalo Narrows, 2006 to 2016 Census Years

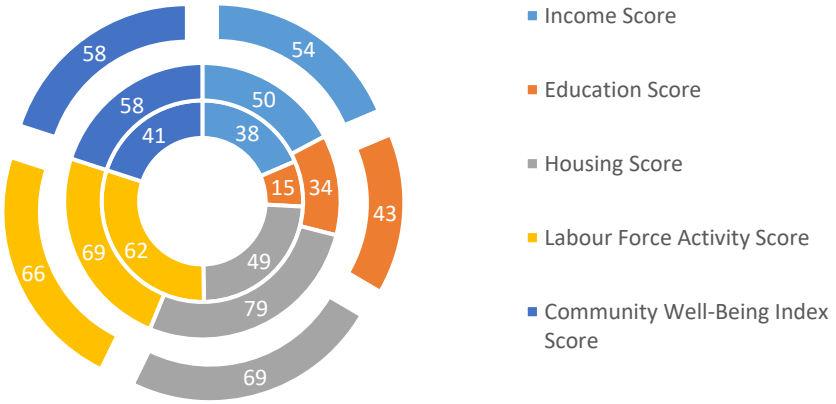


Source: CIRNAC 2019b.
a) Each community well-being score and each component score can range from a low of 0 to a high of 100

6.9.3 Birch Narrows Dene Nation

Figure 36 shows the community well-being score for the BNDN for the last three census years, with 2006 in the innermost ring and 2016 the outermost ring. The BNDN has the second highest community well-being score among the LSA communities, with 58 in 2016. The community well-being score for the BNDN increased between 2006 and 2016 from 41 to 58 but remains below the provincial score of 75 (Figure 31). between 2006 and 2016, there were substantial increases in education, income, and housing, with larger increases than Saskatchewan as a whole during the same period; however, during this period, scores were still lower than the province by 10 to 19 points. Among the LSA communities, the BNDN experienced the largest increases in education component scores, rising from 15 to 43 points between 2006 and 2016. The BNDN's labour force activity score increased the least of the community well-being index scores between 2006 to 2016 (i.e., 4 points) and was higher in 2011 than in 2006 and 2016 (Figure 36).

Figure 36: Birch Narrows Dene Nation Community Well-Being Index Scores [(a)], 2006 to 2016 Census Years

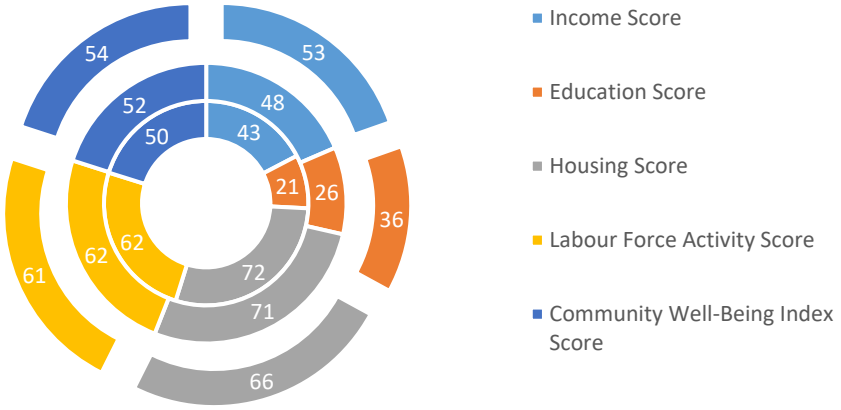


Source: CIRNAC 2019b.
a) Each community well-being score and each component score can range from a low of 0 to a high of 100.

6.9.4 Buffalo River Dene Nation

Figure 37 shows the community well-being score for the BRDN for the last three census years, with 2006 in the innermost ring and 2016 the outermost ring. The BRDN had a community well-being score of 54 in 2016, the same as La Loche (Figure 31). Between 2006 and 2016, the BRDN saw steady increases in its community well-being score, driven primarily by increases in its education and income scores with 15- and 10-point increases, respectively (Figure 37). However, the BRDN is the only LSA community to see decreases in both housing and labour force activity scores, with 6- and 1-point decreases, respectively, during the same period (Figure 31). The decrease in the BRDN's housing score was the largest decrease among LSA communities for any component. The BRDN has lower component scores than the province for every component by 17 to 23 points (Figure 31).

Figure 37: Buffalo River Dene Nation Community Well-Being Index Scores[a], 2006 to 2016 Census Years



Source: CIRNAC 2019b.
a) Each community well-being score and each component score can range from a low of 0 to a high of 100.

6.9.5 Community Definitions of Well-being

Participants in the KP interviews had similar had similar answers regarding what contributed to their quality of life in their communities. Health, societal and cultural, economic, educational, and neighbourhood and physical environment elements were identified during KP interviews as the key components of well-being. Many KP interview participants reported that they felt a sense of community in their respective communities and liked that their smaller communities were quieter and had slower paces of life [than the cities] (2019 to 2021 KP interview program). Interviewees indicated that the majority of peoples' families are nearby, and people know their community members and can count on them in times of crisis. Some remarked on how caring, hilarious, helpful, and resilient the people were. Others remarked on the land, clean air, freedom, and the ability to conduct land-based activities (e.g., camping, snowshoeing, quad rides, hunting, fishing, swimming, berry picking, picnics) and live off the land. The people and respective communities contribute to the quality of life, and the lower cost of living is considered an advantage (2019 to 2021 KP interview program). Interviewees report that employment also improves their quality of life. No information from the CRDN is reported in this subsection as a separate KP interview program is being undertaken by the CRDN at their request; at the time of writing, findings from these activities were not available.

6.9.5.1 Metis – Nation Saskatchewan Northern Region 2

Freedom and access to nature are important aspects of community well-being for the Métis (MN-S-JWG 2020). The friendliness of the community is comparable to that of a family. The importance of language and living off the land was described by MN-S members. Access to safe hunting, fishing, and trapping is important, as many live off Traditional Foods. One respondent talked about the importance of hearing the noises of nature within the community. Interviewees also expressed concerns about how access to Traditional Foods will be affected by resource development (MN-S-JWG 2020).

6.9.5.2 Birch Narrows Dene Nation

Participants in the KP interview program felt that aspects that detract from BNDN members' quality of life include the presence of bootleggers, drug dealers, and gangs. Interview respondents indicated that some current issues could arise from higher incomes and that there is a lack of economic opportunity and leaving the community for education and work leads to a loss of culture, identity, language, and land. Key person interview participants suggested that leaving the community for opportunity also weakens familial bonds. Some KP interviewees indicated that younger workers have higher incomes from working in the mining industry but have difficulty with financial management and have substance use issues (2019 to 2021 KP interview program). Members of the BNDN shared their opinion that when those working out of the community return home, they can experience challenges with bonding with family, and some individuals use drugs while away from work (BNDN-JWG 2021b). Interview respondents suggested that having financial management education would be beneficial before employment. Lack of immediate resources was also identified as an issue that affects quality of life for BNDN residents. Doctors in the community are not consistent and residents do not have a regular family doctor or an ambulance. Respondents also mention concern over land use, as people are afraid that they will lose access to the lands they use for traditional hunting, trapping, and fishing. Others noted that quality of life has changed for the BNDN due to the community members becoming more materialistic and distracted by technology (2019 to 2021 KP interview program). In KP interviews, it was suggested that children and youth do not spend as much time outside, have poor attendance and when they do attend, they are tired.

6.9.5.3 Buffalo River Dene Nation

In Dillon, BRDN members described that the close-knit community has members feeling like everyone in the community is like family. Having a connection to the land and water for hunting, trapping, and fishing for sustenance and family connections is critical to community well-being (BRDN-JWG 2020). Interviewees described quality of life as good for those with employment, but with the high rates of unemployment, many of the young people have substance use issues and the community has high suicide rates. The lack of recreational programs and afterschool programs contributes to feelings of ennui for young people. Aspects that detract from the quality of life in BRDN include the lack of opportunities, employment, housing, and cycle of hopelessness of being reliant on welfare (2019 to 2021 KP interview program).

6.9.5.4 Buffalo Narrows

Interviews with Buffalo Narrows members indicated that the overall well-being of Buffalo Narrows was considered good as there is employment and more resources in the community than neighbouring communities (2019 to 2021 KP interview program). Like the other LSA communities, interviewees stated that the close-knit, small-town feeling contributes to the quality of life in the community. Outdoor lifestyle contributes positively to mental health and stress relief. Elders were also noted to be a positive factor in quality of life in the community.

Addictions and substance use detracts from quality of life in Buffalo Narrows. Interviews indicated that there is a lack of resources to address addictions within the community and they must leave the community to get treatment and support (2019 to 2021 KP interview program). Concerns were expressed about how resource development within the area will affect animals in the area since hunting and trapping is a primary method to access food for some families (BNDN-JWG 2021b). The community has a limited selection of stores and services such as grocery stores, restaurants, and medical services. Since there is such a limited selection, many families struggle as prices for basic goods and necessities can be higher than in other areas (BNDN-JWG 2021b). Difficulty in obtaining

medical treatment was also described as a detriment to quality of life, as travelling for medical treatment to see dentists or optometrists are a three-hour long drive (2019 to 2021 KP interview program).

6.9.5.5 La Loche

Interviews with La Loche residents indicated that quality of life in the community has declined over time. Contributing factors include the lack of services and infrastructure resulting in travel to other communities for medical treatment (2019 to 2021 KP interview program). The community also lacks health and wellness resources, especially mental health. Some noted that the community is losing many depressed youths to suicide. The community also lacks recreational infrastructure and there is no place for youth to go. The lack of improvement to housing is a detriment to quality of life (2019 to 2021 KP interview program). Social issues are apparent in the community and include alcohol and drug use, which was cited multiple times as a detriment to quality of life. Interviewees indicated that there is more apathy in the younger generation and more distractions such as cell phones and video games, which detract from quality of life. While there are more opportunities, fewer younger people are taking advantage of the opportunities. Many remarked that they wished for more economic opportunities and employment for young people.

6.9.6 Summary of NexGen Community Investments

NexGen has and plans to continue to make investments within the LSA communities. Community initiatives conducted include, but are not limited to:

- **school breakfast program**: Since 2017, through a partnership with the Breakfast Club of Canada, healthy breakfasts are provided to over 1,100 students each school day and eight local cooks are employed to prepare the breakfasts at the Ducharme Elementary School, Dene High School, and Clearwater River Dene School. Schools in Saskatchewan closed in Q2 2020 due to the pandemic, and in May 2020, food boxes were delivered to the homes of each student. The schools each had a uniquely modified breakfast program reflective of the current conditions at the school as the pandemic progressed and schools alternated between online and in-person learning. NexGen continues to fund the Breakfast Program in all three schools. NexGen also funded renovations at Ducharme Elementary to create and upgrade a kitchen space suitable to make breakfast for the students.
- **summer student program**: This program was established in 2016 and aims to build skills and confidence in young adults through skillful employment at the existing Rook I exploration site. To date, over 60 students have been employed in the summer student program. In 2020, the program did not proceed due to the circumstances of the COVID-19 pandemic. In 2021, NexGen adapted to ensure the program resumed in a revised format, in which summer students were hired to work within their communities. The 2021 program primarily consisted of a youth-Elder interview program whereby four summer students participated in the program: two students in the BRDN and two students in Buffalo Narrows with Métis Local 62. NexGen is planning to resume the summer student program at the existing Rook I exploration site in 2022.
- **scholarships for local students**: Since 2017, NexGen has provided up to four scholarships per year to students from the LPA to successfully pursue their post-secondary education. To date, seven students have received scholarships, many of which have received scholarships throughout multiple academic years due to continued eligibility. Due to disruptions associated with the pandemic, the 2020/2021 scholarship program was focused on the continued support of the current scholarship recipients and there were no new

scholarship recipients. The program accepted a new recipient for the 2021/2022 academic year. This is an ongoing initiative.

- **recreational program**: Initiative began in 2018 in which NexGen provides funding for recreational programming through the La Loche Sports, Recreation and Culture Board. This program provides structured after-school and summer-holiday recreational events and opportunities for the youth community and community members. The programming consists of activities such as beadwork, holiday decorating, traditional music lessons, and free public skating. Program was paused in Q2 2020 due to disruptions associated with the pandemic and resumed in Q3 2020. The recreational programming was adjusted during the pandemic to accommodate all COVID-19 related restrictions and public health orders. This is an ongoing initiative.
- **youth sports program**: Since 2017, each year, NexGen provides support to minor volleyball and hockey sports teams in the LPA. This support keeps the local youth engaged in sports and provides them with opportunities to participate in sporting events throughout the province and across Canada. These sports programs were suspended during the pandemic, but have resumed for the 2021-2022 year. This is an ongoing initiative, currently sponsoring the La Loche Lakers club volleyball team.
- **dog adoption program**: Since 2015, through collaboration with the Meadow Lake Humane Society, NexGen has fostered over 35 dogs at the Project site and is proud to say nearly 100% of the fostered dogs have found a forever home somewhere in Canada. This is an ongoing initiative that continued throughout the pandemic.
- **community liaison**: In July 2021, NexGen retained a dedicated community liaison officer in La Loche who will act as a conduit between communities and NexGen. Housed in a permanent office in La Loche, the community liaison officer is involved in engagement events and community discussions and is available to answer questions and discuss the Project with community members.
- **other community initiatives**: These initiatives include a diamond driller helper training course (2018), funding a Métis Youth Cultural Music Program (2019), and funding the Community Pandemic Coordinators (2020). Additional information on the Community Pandemic Coordinators is included in Section 2.5.6, Engagement Challenges.

All community initiatives will continue to be developed based on the needs and wants of the community and will be reviewed and amended as required to meet the changing needs of the community.

6.10 Aspirations

Aspirations of Indigenous communities within the LSA and RSA are described within this subsection related to potential future development and growth opportunities. Aspirations range from the expansion of employment, training, and labour markets, to increased development of social, cultural, and tourism programs. Additional information regarding community goals pertaining to aspirations outlined throughout this subsection were largely obtained through KP interviews, JWG meetings, and IKTLU Studies with participating communities.

Effective governance has been identified as a key contributing factor to a community's socio-economic progress and overall well-being as it allows Indigenous communities to (AANDC 2015):

- “take greater control over the decisions that affect their lives;
- carry out effective relationships with other governments;
- take advantage of economic development opportunities;
- improve programs and services; and
- enhance their social and economic well-being.”

Indigenous governance needs to balance the traditions and culture. Indigenous Peoples are not homogenous, and the most appropriate form of governance will vary among nations (RCAP 1996).

Governance is an important tool for self-determination (Missens 2008), which is a key social determinant of health for Indigenous Peoples as it influences other social determinants of health, such as education, housing, and safety by ensuring that Indigenous People are participating in decision making that affects the well-being of their communities (Reading and Wien 2009). Aspects of self-determination through discussions about freedom and control at JWG meetings reinforce the influence of self-determination on community well-being. This subsection describes formal goals and plans based in information that is publicly available, along with the hopes and aspirations community members shared during the KP interview program and JWG meetings.

6.10.1 Clearwater River Dene Nation

The CRDN indicated a desire to undertake KP interviews for their community independently, and NexGen provided the KP interview guide and directions for interviewers. At the timing of the writing of this baseline report, the CRDN interview results had not yet been provided to NexGen.

6.10.2 Métis Nation – Saskatchewan

Through the JWG processes and KP interviews, MN-S citizens living in the NR2 communities shared their goals and aspirations for the future, which include economic opportunities, maintaining Métis ways of life, and preserving environmental integrity.

When MN-S citizens talked about economic opportunities, it was typically within the context of future opportunities such as those potentially available through mining operations: “It is important that our youth go into technical fields too, not just labour. Other uranium companies have good training programs for technical fields and train students just out of school into trades like power engineering” (MN-S-JWG 2019). Opportunities that are close to home are important, “We have qualified people who are going out to BC and Ontario looking for work, when they could be working close to home. They should be employed before people from the south are hired to work in this area” (MN-S-JWG 2019). Participants in the KP interview program also see substantial future economic opportunities that could help community members end the cycle of poverty (2019 to 2021 KP interview program).

Maintaining Métis identity is another important goal for MN-S citizens, which they described through their connection and relationship with the land and freedom. Citizens noted that cultural identity and taking pride in their Métis identity is important. Without a sense of identity, social issues arise, and people feel lost (2019 to 2021 KP interview program). Another citizen echoed this sentiment at a JWG meeting: “All children want to learn where

they are from, who they are and where they are going. If we do not teach them our culture, they are angry at us later" (MN-S-JWG 2019). Métis Nation – Saskatchewan citizens of NR2 have taken steps to ensure that their goal of maintaining Métis ways of life continues through school programming and culture days.

Another goal of MN-S citizens is the preservation of environmental integrity for current and future generations.

> Environment is very important; I am an Elder today. I was born in the North, and it was pristine. Today with the mining industry, I see changes coming. Changes that relate to pollution affect my children, my grandchildren and the children still not born. That is my biggest focus: make sure we don't leave the uranium sitting behind. We want to see no footprint. I want to see a clean environment. I have nothing against what you are doing, the world needs it, but at the same time don't leave us the garbage. (MN S JWG 2019a)

and

> When it comes to environment, we only have one command and that is respect for all living things and all the dead things. If you do not respect the earth and can't grow food, you won't last for more than two months. If you don't respect the water and keep it clean and pure, you only live for two weeks. If you don't respect the air and keep it clean, you only live for two minutes. (MN-S-JWG 2019)

6.10.3 La Loche

In 2016 and 2017, La Loche embarked on a process to develop a community wellness plan in response to the 2016 shooting at Dene High School (La Loche 2017). One product of the community wellness plan was a vision and mission statement for the community. The vision statement is Ela nadetser (together we are strong) and the mission statement is: "The Northern Village of La Loche is a Dene-Métis community focused on assisting its people to become healthy productive community members through economic development and culture while protecting its natural resources." Supporting the community's vision are the six themes to support a safer and healthier community in the Community Wellness Plan and the goals articulated in the Official Community Plan (La Loche 2018), which was developed to meet the requirements set out in *The Planning and Development Act*, 2007.

The Community Wellness Plan is in place from 2017 to 2022 with the understanding that it will be revised and updated continuously. It is intended to be a living document. The Community Wellness Plan established six themes and 26 actions to support a safer and healthier community (La Loche 2017). The themes are:

- holistic health, which includes a range of actions including securing five trained Indigenous doulas / birth workers in the north, developing a traditional parenting program, and suicide prevention;
- empowerment (accountability), which includes actions to support intra-community and intra-agency collaboration, increasing awareness of services available in La Loche, and planting a community garden;
- language and culture, which includes creating strategies to promote language and culture as protective factors and working to support Elders;
- youth wellness, which includes developing a mentorship program, a for-credit land-based course, and building a new Ducharme School Cabin;

- public safety, which includes revitalizing the women's wellness group and increasing awareness of alternative justice measures; and
- reduction of poverty, which includes creating an economic development corporation and planning for construction of an office/business building in the community.

The Official Community Plan (La Loche 2018) also articulates a series of goals, which are presented in Table 19. The goals developed for the Official Community Plan reflect some of the same values expressed in the KP interviews and JWG meetings. La Loche's goals for managing and maintaining the natural environment, supporting the culture of residents, and ensuring that the services provided in the community support the health and well-being of residents are relevant to fostering community well-being.

Table 19: Official Community Plan Goals

Theme	Goals
Responsible governance	La Loche will be known for its leadership through transparency, responsiveness, and accountability. Residents of La Loche will have a voice and be encouraged to participate, where possible, on decisions that affect the future of the community. Leaders will have a broad and long-term perspective that is rooted in an understanding of the historical, cultural, and social complexities of the community.
Natural environment	Planning and developments will be integrated with the natural environment to better manage municipal land and water resources. Protection of the shoreline, wetlands, and land with ecological value will be encouraged to improve the environmental quality and enhance biodiversity in the community.
Built environment	La Loche will be a pleasant, livable, walkable, and accessible community. The community will grow sustainably and efficiently maximize the use of existing infrastructure and buildings to avoid unforeseen operating and development costs. Diverse and affordable housing opportunities will be available that reflect the needs of current residents and future generations.
Economic diversification and growth	La Loche will strive to create a diverse economy with a wide range of rewarding jobs and training opportunities. Entrepreneurial activities will be promoted for a sustainable economy. Diverse employment opportunities will be encouraged to ensure sustainable growth by promoting tourism, recreation, commercial and industrial ventures, and natural resource industries.
Culture and society	Cultural heritage will be expressed by supporting events and business avenues that embrace the culture of residents. La Loche will promote cultural attractions and community facilities such as schools, libraries, daycare centres, and leisure and cultural facilities. Use of public spaces will encourage informal social activity, scheduled recreation, and civic gatherings. Opportunities will be provided for leisure, recreation, sports, and other activities.
Health, safety, and community well-being	Council will continue to play a significant role in the community's health, safety, and well-being in terms of provision of supporting services, including social, administrative, judicial, and medical services. Council will support development that ensures residents of the community have access to a range of services and facilities that meet their needs. Planning decisions ill embrace and reflect strong cultural values.
Community engagement and inter-municipal cooperation	Effective and inclusive resident participation will be encouraged in community planning decisions. Council will commit to continual cooperation with the neighbouring CRDN to enhance regional partnerships, promote regional services and facilities, and support regional growth and development. La Loche will be a community that strives for health, well-being, and safety for all residents.

Source: La Loche 2018.
CRDN = Clearwater River Dene Nation.

The major regional tourism opportunities in La Loche are centred around a potential all-season road from La Loche to Fort McMurray (DMCA 2018). This road would create a development opportunity for cottage and recreation property development as La Loche is the first community that would be encountered when travelling east from Alberta. A 2018 report noted that there would be considerably more interest in building hotels, restaurants, and service stations in a northwestern tourism corridor if the La Loche-Fort McMurray road link were constructed.

6.10.4 Birch Narrows Dene Nation

In 2018, the BNDN completed a comprehensive community plan. The Comprehensive Community Plan outlines the goals for growth and development in Birch Narrows and provides direction to leadership, staff, and community members on how to address key issues. The Comprehensive Community Plan was developed through engagement with leadership, staff, and community members (BNDN 2018).

The community vision statement for the BNDN is:

> We are the Indigenous Denesųłiné of the Eghes t'oni'a (Clear Lake) Region and the Creator put us in this region to act for the benefit of our children and their children.
>
> As a unified community, we continue to affirm our authority to manage the affairs of the Birch Narrows Dene Nation which include the passing of a constitution, laws, ordinances, statues, regulations, codes, policies and resolutions. (BNDN 2018)

The value statement is "As proud and united Birch Narrows Dene Nation citizens, we value health, self-reliance, education, and our culture" (BNDN 2018). To support the vision and values of the BNDN, the comprehensive community plan establishes goals for 12 areas, which are presented in Table 19.

- Governance and administration:
  - Establish and enforce bylaws and policies to govern the community.
  - Engage members in governing the community.
- Language and culture:
  - Support members in conducting traditional ceremonies.
  - Ensure that the Dene and Cree languages are preserved for future generations.
  - Provide opportunities for members to learn traditional skills.
  - Provide opportunities for Elders to share their teachings with youth members.
  - Study, document, and share Birch Narrows history with members.
- Caring for community:
  - Improve community social services.
  - Create opportunities for members to gather.

- Encourage community involvement and support member lead initiatives.
- Provide Preventative Support Programs.
- Education members and increase awareness of community social issues.

- Justice:
  - Ensure the community is a safe place to live.
  - Strengthen the relationship between community members and the RCMP.
- Recreation:
  - Ensure members have access to recreation opportunities.
- Healing and wellness.
  - Invest in community health facilities.
  - Provide additional health services.
  - Improve health staff capacity.
  - Address addictions in the community.
  - Improve the community medical transportation service.
- Education:
  - Enhance school programming.
- Make positive connections between school and community.
- Invest in and support post-secondary education for members.
- Employment and training:
  - Create employment opportunities in the community.
  - Provide training and workshops to build members' employable skills.
- Economic Development:
  - Support local business development and entrepreneurship in the community.
  - Pursue the development of additional commercial enterprises in the community.
  - Research and prepare for resource companies' interest in the community.
- Lands and resources:
  - Keep a strong personal connection with land and environment.
  - Protect natural areas in the community.

- Housing:
  - Provide more housing in the community.
  - Maintain current housing stock.
  - Support members living in urban centres.
- Infrastructure and facilities:
  - Build additional community facilities.
  - Ensure that community infrastructure and facilities are well equipped to support programs and services.

While all the goals presented in the comprehensive community plan support community well-being by ensuring engaged, healthy, supported, and culturally connected members, of particular importance, as discussed during KP interviews and the JWG meetings, are the goals to foster language and culture, improve and expand social and health services, and protect the environment.

Many of these goals came up during the KP interviews and JWG meetings. Birch Narrows Dene Nation members expressed the hope for additional community facilities, including a bigger health centre and band office, more classroom space, and a youth centre (BRDN-JWG 2020) as well as the need for more housing in the community (2019 to 2021 KP interview program). The community-wide commitment to maintain cultural activities is demonstrated by the commitment to land-based education. The BNDN's goals to protect the environment and pursue economic development opportunities are both advanced through the establishment of Nuh Nene (Our Land) Department.

Nuh Nene

During the JWG process and in the IKTLU Studies, BNDN members have noted the need to organize internally:

> We have to organize as a community, and as leadership within the community, it is upon us to how we are going to participate with NexGen or other companies. The north is going to change. What does that mean for us? There will be major impact, but also major benefits. It will change with or without us, so preferably with us. (BNDN-JWG 2019)

The need to organize comes from the increase in industrial development and encroachment on BNDN traditional territory by government policies, recreational users, and industry:

> The biggest fear for Indigenous land users is, when you look at the Saskatchewan government's Duty to Consult document, with agricultural land and leased land to agriculture, First Nations people and Indigenous land users are prohibited from going on without permission. That's one of the greatest fears we have, that with a lot of leases throughout the north, we hope the government will not play dirty and impose – so far, they haven't mentioned anything related to mining leases and that whole concept of needing permission from the lessees to go and hunt and use the land. It hasn't happened as far as we are aware. But one of the fears we have is that maybe at some point government will impose such an idea to prevent people going on these leased lands. It may come to that, who knows. (BNDN-JWG 2021c)

The increase in mineral exploration and development and the need for a consistent, proactive approach to consultation to preserve environmental integrity and Indigenous and Treaty rights, while advancing partnership opportunities and the associated benefits, led the BNDN to establish the Nuh Nene Department. In June 2021, Chief and Council endorsed the creation of the Nuh Nene Department and provided a mandate. The following principles guide the department:

- **Rights**: Talks on a nation-to-nation basis, acknowledge unceded territory, honour Aboriginal and Treaty rights, self-determination, United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), and free, prior, and informed consent; acknowledge the Truth and Reconciliation Commission findings and the legacy of colonialism; and exercise good faith and mutual respect.
- **Environmental protection**: integration of Indigenous Knowledge, environmental stewardship and protection, and roles for members in environmental monitoring.
- **Meaningful consultation and accommodation**: community participation, capacity building, net benefit, early involvement, and collaboration with neighbours (e.g., Turnor Lake Métis Local 40, northern hamlet of Turnor Lake).

The Nuh Nene Department will report directly to Chief and Council and includes a board, manager, and staff. The board will include five to seven members, including a councillor, three to five BNDN members, and an Elder Advisor. All members are appointed by Chief and Council. The manager is responsible for day-to-day operations.

The Nuh Nene Department is a tool to assert self-determination and control over developments that affect the BNDN, their members, and their traditional territory. As a BNDN member shared on the importance of self determination and having a say regarding developments in their traditional territory:

> We have been brainwashed that we don't own this land, and perhaps we do have a say. We are trying to overcome this. We are telling our kids you have a right or a say of what happens on our land. We used to hear words of hopelessness, but UNDRIP has breathed rights into us, and we want our kids to catch hope. It is time we start talking Nation to Nation; we can't lose that. (BNDN-JWG 2019)

6.10.5 Buffalo River Dene Nation (Dillon)

In BRDN, the community has goals of preserving their culture, language, and helping youth understand what it is to be Dene (2019 to 2021 KP interview program). Other aspirations include community facilities for Elders and youth to gather and host activities. The community also aspires to get back to the forestry industry, which used to have a large sawmill in the community and residents were employed in all areas (e.g., loggers, drivers, planters). Diversifying the economy would increase employment and help families to pay for education (2019 to 2021 KP interview program). The community is also interested in developing its tourism industry, setting up lodges, and hosting excursions, like fishing.

The BRDN has a custom electoral act that has the following declaration outlining the overall goals for community leadership:

- The BRDN Government recognizes the responsibility of the elected leadership to the Creator and the Dene people and will uphold the responsibility to the Creator and the Dene people to protect:
  - The inherent and Aboriginal Rights of the Dene people as an indigenous people;
  - The Treaty 10 signed with the Dene Nation and all rights of the Dene people accorded by Treaty 10;
  - The democratic laws, institutions, and principles which have always been part of our history;
  - The spiritual beliefs, language, traditions, culture, and customs of the Dene people; and
  - The natural laws and responsibilities and obligations that govern our relationship with the Creator and the right to live in harmony with nature and mankind. (*Buffalo River Dene Nation Band Custom Election Act* 2017)

The responsibilities included in the declaration are apparent in, for example, the land-based programming provided to BRDN members to support language traditions, culture, and customs of the Dene people. The ability to fully express their culture, maintain their way of life, and govern themselves supports values related to community well-being shared in the KP interviews and JWG meetings.

6.10.6 Buffalo Narrows

In 2019, Buffalo Narrows adopted its Official Community Plan. The Official Community Plan provides a framework of goals, objectives, and policies to guide land management and use within municipal boundaries. The municipal goals set out by Buffalo Narrows in the Official Community Plan echo some of the goals from the village's earlier strategic plan (Buffalo Narrows 2016). The goals are (Buffalo Narrows 2019):

- Diverse and sustainable growth, including diverse land use activities and maintenance a positive relationship with environmental values, resource capabilities, and community strength.
- Orderly and efficient development, including cost-efficient development consistent with the vision and goals of the community.
- Serve as a strong regional centre, including maintaining and enhancing the role of the village as an administrative and service centre in northwest Saskatchewan.
- Enhance community attractiveness to enhance the Buffalo Narrows as a recreation and tourism destination.
- Build a healthy, resilient community to ensure that the village can take advantage of economic development opportunities.

The strategic plan established goals related to economic development, serving as a regional centre, and attracting tourists to the area. The strategic plan also highlighted the need for additional infrastructure and services in the community, which participants in the KP interview program noted were still needed. Participants in the KP interview program also expressed their desire to pursue economic development opportunities (2019 to 2021 KP interview program).

7.0 SUMMARY OF RESULTS

Population and Demographics

The RSA and LSA are predominantly Indigenous with the majority identifying as First Nations, followed by Métis. Buffalo Narrows and La Loche are the only LSA communities that are primarily Métis. Between 2006 to 2016, the proportion of people identifying as having First Nations ancestry in the RSA and LSA has increased while the proportion identifying as having Métis ancestry has decreased. Population growth in the LSA communities over the past three census periods has been robust in BNDN, modest in some LSA communities (i.e., CRDN and BRDN), and fluctuating in other communities (i.e., Buffalo Narrows, La Loche). Buffalo Narrows has the oldest population among the LSA communities and CRDN has the youngest.

The RSA and LSA communities have large youth populations with a considerably higher proportion of the population aged 0 to 19 and lower retirement age population than the provincial averages but near the provincial Indigenous averages. This suggests a younger population with a greater share having yet to reach working age relative to that of the province. Communities with higher proportions of younger residents can experience more economic pressures on the working-age population to support children and families. Younger populations may also place additional demands on health, education, and other social services. Overall, women make up a slightly higher proportion of the total LSA population than men, which is common in cities but not in rural areas. There has been very little change in the gender composition of the LSA communities between 2006 and 2016.

Economic Profile

The economy of the RSA is driven by the industry sectors of mining, quarrying, and oil and gas extraction, educational services, and health care and social assistance, with jobs relating to these sectors dominating the workforce. Other sectors such as agriculture, forestry, fishing and hunting, manufacturing, and retail trade comprised a lower percentage of total employment in the RSA compared to the province as a whole.

Uranium is the primary commodity in the RSA and capital investment in the RSA is tied to the activity levels in uranium mining. Since the discovery of uranium deposits in the RSA, the primary economic focus has been building human resource and business capacity to meet the needs of the mining sector. Northern workers have been successful in securing positions at northern sites and northern-owned businesses provide a large portion of services to the operations.

Although rich in natural resources, the RSA faces several challenges in terms of economic development, employment, and service delivery. The RSA has lower levels of educational attainment than the province overall for high school, college, and university graduates. Lower educational levels are linked to lower employment and incomes as residents do not have the qualifications to fill some of the employment opportunities available. Residents of the RSA are underrepresented in professional, technical, and trade occupations relative to the number of positions employed, particularly in the mining industry. Other challenges to economic development in the RSA are the low population density and remoteness of the communities. The RSA has a less diversified economy and more limited access to services and educational opportunities as well as higher transportation costs. In many of the RSA communities, transportation is very costly or precarious (e.g., only accessible by winter road). The lack of supporting infrastructure for the communities and the distance between communities and major

urban hubs increases the cost of living and operating a business, with higher costs for transportation translate into higher costs for such items as construction materials, food, and utilities.

The LSA is economically supressed by a lack of economic opportunity due to no suitably sized primary industry since the decline of the fur industry in the 1960s. Most employment is concentrated in public sector positions including Indigenous governance and municipalities. In addition, most industries in the LSA are traditionally female-dominated industries like health, education and social services. There is also evidence that some economic activities associated with the traditional economy are occurring in the LSA which may not be captured in the census data.

A limited number of locally owned businesses operate within the LSA communities and goods and services are often sourced externally. In comparison to other northern communities in the RSA, the LSA communities exhibit less business activity. While several local businesses in Buffalo Narrows and La Loche have experienced some growth in recent years due to mineral exploration in the area, a 2018 study noted that there were limited companies in the La Loche / CRDN region related to mining, construction, accommodation, and food services. Interviews with residents indicated a strong interest in expanding local business opportunities, including exploring partnerships between communities. Local study area residents have commented they see substantial value not just in expanding employment opportunities, but also ownership interests in businesses.

Labour Force Characteristics

The RSA has seen an increase in people participating in the workplace over the past 10 years, with stable levels of unemployment and employment. The participation rate in the RSA has been consistently lower than the provincial average from 2011 to 2016. Among LSA communities, the participation rate is lower than the provincial average; correspondingly, the unemployment rate and percentage of people not in the labour force are higher than the provincial average. There are lower employment rates in rural industry sectors in the LSA, including those associated with agriculture, forestry, fishing and hunting, manufacturing, and retail trade, than in the province overall.

Clearwater River Dene Nation

The labour force of the CRDN increased by 63% between 2011 and 2016. During this period, participation in the labour force grew from 30.8% to 47.8% relative to the slight rise in participation rate of the provincial Indigenous population (56.3% to 56.9%). Unemployment in CRDN was considerably higher than the provincial Indigenous population and is the highest among LSA communities. Among the LSA communities, CRDN had the largest difference between the unemployment rate of males and females, with a 20.3% difference in 2016, a slight improvement from 2006 when there was a 21.4% difference.

La Loche

In 2016, the labour force in La Loche was 525 people which increased from 170 people in 2011. The labour force and participation in the labour force in La Loche decreased between 2011 and 2016 (26.6% to 33.1%). Growth for La Loche remained the lowest among the LSA communities. Participation in the labour force for males (36.7%) remains higher than females (30.4%) for La Loche and unemployment rates have fluctuated in the community between 2006 to 2016 – dropping from 26.4% in 2006 to 22.3% in 2011 and rising again to 27.6% in 2016.

Unemployment in La Loche (27.6%) was higher than the provincial Indigenous population (18.6%) in 2016, and the second lowest among the individual LSA communities.

Birch Narrows Dene Nation

In 2016, the labour force in BNDN was 165 people. Extensive data on labour force characteristics for BNDN are not available due to data suppression (confidentiality or data quality reasons) by Statistics Canada. However, participation in the labour force was higher for males (56.7%) than females (52.4%) and lower than the provincial Indigenous population (60.0% and 54.2% respectively). Unemployment in BNDN (33.3%) in 2016 was approximately double than that of the provincial Indigenous population (18.6%).

Buffalo River Dene Nation

From 2011 to 2016, the workforce in BRDN increased substantially (from 235 to 255 individuals) and participation grew from 43.5% to 46.8%. Participation in the labour force in BRDN was higher for males (50.0%) than females (43.6%). However, these percentages remain lower than the provincial Indigenous population (60.0% and 54.2% respectively). The unemployment rate in BRDN was higher in 2016 (33.3%) than that of the provincial Indigenous population (18.6%).

Buffalo Narrows

The labour force in Buffalo Narrows increased by 13% between 2011 and 2016 (from 425 to 480 individuals) and participation grew from 52.5% to 62.7%. During this time, Buffalo Narrows was the only LSA community to have a higher participation rate than the provincial Indigenous population (56.9%). However, this participation rate is a decline from 2006 (68.0%). The community of Buffalo Narrows is also the only LSA community which has a higher participation rate for females (64.2%) than males (60.3%) which are both higher than the provincial Indigenous averages (60.0% and 54.2% respectively). Unemployment in Buffalo Narrows (12.5%) was considerably lower than the provincial Indigenous average (18.6%) and unemployment rates for males (18.2%) are higher than females (7.7%) as of 2016.

Industry Sector of Employment and Wage Economy

The mining, forestry, and oil and gas industries were once the dominant employers in the LSA communities. Information from community members suggests that when the Cluff Lake Mine closed in 2002, some miners from the LSA communities left the province to go to Ontario and British Columbia for mining work. Employment in the mining, quarrying, and oil and gas extraction peaked in 2011 in the LSA communities (11.2% of total employment) followed by a decline by 2016 (6.9% of total employment); however, it remained higher than the provincial average. Employment in other primary industries such as agriculture, forestry, fishing, and hunting was lower in the LSA and RSA than in all of Saskatchewan. Provincially, construction, retail trade, agriculture, forestry, fishing, and hunting accounted for a larger share of employment than educational services or public administration.

The sectors with the highest employment rates in the LSA and RSA are educational services, public administration, and health care and social services. These sectors have consistently provided the highest portion of employment since 2001 and are almost entirely public sector positions. In Buffalo Narrows, the major employers were once forestry and mining and are now the government, education, and health sectors while in Dillon, the uranium and oil and gas industries were once the major employers in the community. Currently, the

major employer in the community is BRDN, which employs workers in education and healthcare. This has meant an increasing dominance of public sector employment in the LSA communities, coupled with limited to no private sector opportunities in the LSA, particularly primary industry.

Wage Economy

In terms of income amongst LSA communities, at $31,872 per year, Buffalo Narrows had a substantially higher median income compared to other communities. This is mainly due to higher numbers of employment opportunities associated with Buffalo Narrows hosting more provincial government corporations and services. This median income is slightly less than the median income for the Indigenous provincial population but more than the median income for the RSA. The CRDN had the lowest median income among LSA communities of $14,688.

Participation rates in the LSA are well below those for the province. Buffalo Narrows also has a higher participation rate in the labour force compared to other communities, as well as lower unemployment rate, which play a role in higher incomes and aligns with the increased number of employment opportunities. The median age in Buffalo Narrows is just over five years greater than in the rest of the LSA communities, which can affect income as the majority of residents have been in the workforce for a longer duration resulting in higher salaries. Buffalo Narrows also has the highest overall educational attainment among the LSA communities. Among the LSA communities, the role of the wage economy is notably the strongest in Buffalo Narrows. The wage economy in Buffalo Narrows is something of an outlier, among other LSA communities La Loche has the highest median income of $21,043 while CRDN has the lowest at $14,688. Excluding Buffalo Narrows, LSA communities have similar labour force profiles in terms of median income and participation rates; participation rates are highest in BNDN (52.4%) and lowest in La Loche (33.1%). All LSA communities have a participation rate lower than the Indigenous population of Saskatchewan (56.9%) except for Buffalo Narrows (62.7%).

Traditional Economy

The traditional economy is important to livelihoods in the LSA communities. The traditional economy provides food and other necessities of life that support people and communities through personal use, giving to other members of the community, exchange, or barter. Participation in the traditional economy also facilitates the transmission of social norms and cultural values across generations. Participation levels vary by community and individuals, though smaller communities tend to be more engaged in the traditional economy than individuals in larger communities. The BNDN and BRDN both noted that approximately 80% of their members were engaged in the traditional economy to some extent.

The First Nations Food Nutrition and Environment Study found that almost all Indigenous adults in Saskatchewan (94%) reported eating Traditional Foods as part of their diet. Of the population included in the survey, Indigenous adults in Saskatchewan ate land mammals (83%), berries (78%), fish (51%), wild birds (46%), and wild plant foods and teas (43%). The LSA community members noted the traditional economy makes important contributions to the economic well-being of people and communities. They also noted that participation in the traditional economy varied by individual. People with stable employment in the wage economy may spend less time harvesting but still may include Traditional Foods in their diet (BRDN-JWG 2021a).

The wage or market economy supplies capital needed to participate in the traditional economy. For example, funds earned in the labour market support equipment and supply purchases such as snowmobiles, ammunition,

and fuel. As a result, a household that is successful in the traditional economy is often also successful in the wage or market economy as cash income can be used to purchase harvesting equipment and cover expenses.

Education and Training

The population within the LSA communities generally has a lower educational attainment compared with the Indigenous provincial population and the RSA. Among other challenges, this is reflective of the young population in the LSA communities and RSA compared to the province. The geographic isolation and relatively small population contribute to limited educational opportunities in the LSA. The highest proportion of the population aged 15 years old or older with less than a high school certificate in 2016 was in La Loche and the lowest was in Buffalo Narrows. Buffalo Narrows has the highest share of population aged 15 years old or older with a post-secondary non-university certificate or diploma, a university certificate or diploma below the bachelor's level, and a university degree at bachelor level or above among communities in the LSA. Buffalo Narrows has higher levels of educational attainment than the other LSA communities, possibly influenced by its labour market indicators and more robust business environment.

The proportion of the population aged 15 and over with an apprenticeship or trades certificate or diploma as their highest level of education in the LSA in 2016 is similar to the proportion for Saskatchewan as a whole. However, participants in JWG sessions noted concerns related to insufficient training facilities for both youth and adults, not enough students taking maths and sciences in high school, and the need for students to leave the community to pursue further education beyond high school.

Educational attainment has fluctuated between 2006 and 2016 for CRDN and La Loche and remains below RSA and provincial levels for both communities. From 2006 to 2016 in CRDN, the proportion of those aged 15 and over with a college or other non-university certificate or diploma as their highest level of education had a comparable increase to the RSA but lower than the provincial level increase during the same period. The actual proportion remains below the provincial Indigenous average. The proportion of university graduates in La Loche has increased between 2006 and 2016 but was still below the RSA and Indigenous provincial averages. La Loche has the lowest proportion of females achieving a university degree among the LSA communities and the second lowest for the total population aged 15 and over.

Educational attainment has increased in every level of education between 2006 and 2016 for BNDN, BRDN, and Buffalo Narrows. Educational attainment is still below the RSA and provincial levels for BNDN. While the proportion of university graduates in BNDN has increased over time, it is still below the RSA and Indigenous provincial averages. Unlike the trend in the other LSA communities, the RSA, and the province, males are more likely than females to hold a university degree in BNDN. Among the LSA communities, BRDN has the largest proportion of its population with a trades education, and exceeds the 2016 RSA and provincial Indigenous averages. More males are likely to have obtained a trades education than females in BRDN.

Buffalo Narrows has the highest overall educational attainment among the LSA communities. The community has seen increases for every level of education between 2006 and 2016 and exceeds the Indigenous provincial educational attainment averages and almost all RSA averages. There are barriers to educational attainment that include lack of access to childcare, transportation, and housing. Interviewees noted that financial support is difficult without scholarships or funding. English as a second language is another issue as Dene is the first language for the majority of residents.

Community Health

Between 2006 and 2016, total mortality in the RSA has decreased slightly, but remains at rates greater than the province overall. Mortality rates progressively increase with age and are highest in both males and females age 85 years and over. Males have higher morality rates than females in almost all age groups.

Injuries are the leading causes of death in most age groups in the RSA with intentional self-harm, motor vehicle traffic crashes, assault, and accidental poisonings being most common. In the older age groups, chronic disease becomes the leading causes of death with ischemic heart disease, lung cancer, and diabetes being most common.

Crude rates of most chronic diseases are either similar or slightly higher in the province, compared to the RSA. The most common chronic disease in the RSA is hypertension followed by diabetes and COPD. The prevalence rate of diabetes in northern Saskatchewan was highest among all health regions in Saskatchewan and higher than the provincial prevalence rate. Overall, diabetes ranked as the third most commonly noted health issue, with many observing that it is tied to larger issues of lifestyle, physical activity, and nutrition. Breast cancer had the highest incidence rate in females and prostate cancer had the highest incidence rate in males, followed by lung cancer and colorectal cancer for both sexes.

Common communicable diseases in the RSA include chlamydia, gonorrhea, HIV, hepatitis C, and tuberculosis. Self-reported risk factors among newly diagnosed individuals included intravenous drug use and heterosexual contact. Rates of these communicable diseases in the RSA were substantially higher than the provincial averages.

Looking at personal behaviours and lifestyle choices, smoking rates in northern Saskatchewan are higher than provincial rates, which also increases exposure to second-hand smoke in vehicles / public spaces and at home. Northern Saskatchewan has similar rates of heavy drinking compared to Saskatchewan and other northern regions in Canada.

Households with children experienced greater food insecurity than households without children. High food prices are common, particularly for fresh produce in the RSA. Traditional foods are an important part of the Traditional Food systems and food security and help offset the high cost of living in northern Saskatchewan.

Social support contributes to good health in the community, and activities that bring individuals together. There were expressed concerns about mental heath and addictions, as well as the prevalence of diabetes, cancer, and tuberculosis within the communities. The effect of forest fires on health and Traditional Food security were also mentioned.

Residents of northern Saskatchewan reported higher rates of life stress and lower mental health status overall when compared to provincial rates. Suicide is a major issue with the LSA. There are programs in place to support mental health issues in La Loche and BNDN, and Buffalo Narrows. However, stigmas remain against seeking assistance and a reported lack of support for mental health and addictions issues when individuals return home from programs and treatment centres. There is a drive within communities to provide more crisis intervention, information, and referrals to other programs.

Poverty, unemployment, lack of education, isolation, lack of pro-social relationships, inadequate resources, and intergenerational trauma were identified as contributing factors for policing issues in the communities. The

communities do not have social supports related to domestic abuse and the closest women's shelter is in Meadow Lake.

Buffalo Narrows Detachment experienced a large increase in total criminal code violations within the last five years in comparison to the province, while La Loche Detachment reported a decrease in criminal code violations and the crime rate. Members in Turnor Lake and BNDN feel very safe in the community due to its isolated location with some sleeping with unlocked doors.

Mortality, chronic illness, and communicable diseases are greater risks for those in the RSA than for the province. Hypertension and diabetes are the most prevalent chronic diseases within the area. Residents within northern Saskatchewan face greater poverty, unemployment, lack of education, isolation, and intergenerational trauma, which contribute to reported higher rates of life stress and lower mental health status than the province. Lack of social supports increase isolation, decreases mental health well-being, and increases addiction and relapse in the RSA.

Community Features and Infrastructure

In the LSA, housing on-reserve is largely provided by the bands, while some housing is privately owned by members in Dillon, Birch Narrows, and CRDN. Due to limited funding and high demand for housing, housing can be slow to build and maintain, which results in members moving to different communities until housing in available. Waitlists for band housing are common and housing in the LSA communities are overcrowded. Housing conditions are variable with most dwellings on-reserve in the LSA requiring regular maintenance or minor repairs. Common issues include mould and inadequate windows and doors.

Recreational facilities are similar among the LSA communities with each having some indoor and outdoor facilities. Each community has some form of organized recreational services that is volunteer- or community-run. Gaps in recreational services include support for sports programming, playground facilities, and facilities specific for youth and Elders. The MLTC runs programs for members of CRDN, BNDN, and BRDN. These programs include the Meadow Lake Child and Family Services, Youth Development Program, and the Justice Program. Common issues in the La Loche and Buffalo Narrows include housing, finances, food security, and child and family related matters. Communities indicated that they want to increase their community outreach, establish programming for members with special needs, mental health, and addictions, and have programs and facilities for youth and Elders.

Multiple jurisdictions provide health services in the RSA and LSA communities. To access health services, residents in the smaller hamlets and villages must travel to a larger community centre, primarily Dillon, for less severe, non-emergency medical issues and Île-à-la-Crosse or La Loche for medical issues such as emergencies and more specialized services. To access further services, community members must travel to larger centres such as Île-à-la-crosse, Prince Albert, Saskatoon, Meadow Lake, and North Battleford. Mental health professionals, such as therapists, are often not well received when brought into the community.

Policing services are provided by the RCMP, who have two main detachments in the LSA: one in La Loche and one in Buffalo Narrows. Violations in the Buffalo Narrows RCMP Detachment area are lower than those in the La Loche Detachment Area. However, the rate of violations in the Buffalo Narrows Detachment increased by 55.1% between 2015 and 2020 in comparison to La Loche, where rates declined by 9.8% between 2015 and 2020. The

crime rates for the Buffalo Narrows and La Loche detachment areas remain well above the average for the Province of Saskatchewan despite the provincial average decreasing during the same period (5.4% from 2015 to 2020; Section 6.8, Public Safety). The main policing issues within the LSA communities include addiction and interpersonal violence, as well as traffic by-law violations, drug-related crime (i.e., home invasions), mischief, and violence. There is dissatisfaction with the current system that requires calls to be directed outside the communities before police will attend an incident in the community. Fire suppression services are conducted by all LSA communities on a volunteer basis. Ambulance services for the LSA communities are based out of La Loche through the municipalities and SHA.

Water is typically sourced from local wells in the LSA communities and waste is sent to various lagoons, pit privies, or trucked to La Loche. Power generation is predominantly from fossil fuels and regulated for both electricity and natural gas. Cell and internet coverage is not consistent among the LSA communities.

The regional connectivity in the RSA and between the LSA communities is centred on Highway 155. The driving distance between LSA communities can be up to two hours along the highway. Due to the distance between communities and lack of public transportation, private vehicles are the primary method of transportation. Also due to the unevenness of services provided in the LSA communities, residents must often travel outside of their communities to access education, medical, and social services. Traffic volume and traffic collisions are relatively low in the RSA compared to the provincial average. There are two airports near the LSA communities of Buffalo Narrows and La Loche that are primarily used for charter flights.

Community Well-Being

Clearwater River Dene Nation has the lowest community well-being score among the LSA communities (49), due to it having the lowest component scores for income (51) and housing (62). However, CRDN's community well-being score has improved by 12 points between 2006 to 2016, the second highest increase among the LSA communities. Buffalo Narrows has the highest community well-being score (75) of the LSA communities in 2016 and the highest scores for all components. In Buffalo Narrows in 2016, the community well-being income component matched the provincial income component score, and the housing component score exceeded the provincial housing component score a; the Buffalo Narrows community has experienced increases in almost all component scores between 2006 and 2016.

KP interviews from the LSA communities had similar answers regarding what contributed to their quality of life in their communities. Community members identified the following as affecting community well-being:

- employment, incomes, and economic opportunity;
- quality of housing;
- land, clean air, freedom, and the ability to do land-based activities;
- the presence of bootleggers, drug dealers, and gangs in the community;
- loss of culture, traditions, and language;
- substance abuse and alcoholism;
- suicides;

- reliance on welfare; and
- maintaining the close-knit community environment.

Maintaining employment and providing opportunities to be financially independent are crucial in maintaining the well-being of communities; this is viewed as a keystone to local socio-economic development. Economic prosperity is also supported by having an educated and healthy population, along with planning and governance. It is important to note that growth must not, however, come at the expense of traditional practices, culture, or heritage. Ensuring that economic prosperity and traditional ways can develop in tandem will be important for developing and sustaining community well-being.

Aspirations

Aspirations of Indigenous communities within the LSA and RSA range from the expansion of employment, training, and labour markets to increase the development of social, cultural, and tourism programs. Communities within the LSA and RSA expressed an interest in continued engagement and participation opportunities regarding the Project and Project-related activities and noted the need for further relationship-building with NexGen. The preservation of the ecological environment, the health of local people and the integration of community and Indigenous knowledge into the assessment process for the Project was also noted by Indigenous communities as highly important. Project engagement with LSA communities in the form of KP interviews, JWG meetings, and IKTLU Studies identified the following Project specific community aspirations:

- active community participation and engagement;
- commitments related to additional community infrastructure;
- health, safety, and community well-being;
- preservation of historical and cultural heritage;
- protection and conservation of the natural environment; and
- training, education, employment, business and contracting opportunities.

NexGen is committed to ensuring that the Project does not result in disadvantages for community members and helps them to achieve their goals and aspirations. NexGen has already and plans to continue to make investments in LSA communities through various initiatives. Continued engagement with communities will continue throughout the life of the Project.

7.1 Community Strengths and Challenges

The following subsections provide a summary of community strengths and challenges for the LSA based on the socio-economic baseline profile provided in this report. These present both opportunities and areas where additional work is required to realize the full benefits of the Project.

7.1.1 Strengths

Population and Demographics

The LSA population is younger than the province of Saskatchewan but comparable with the Indigenous provincial population average. The large youth population represents a potential untapped employment resource, with a relatively large and available pool of labour due to its favourable age structure. Population projections indicate that the population is expected to increase at a higher rate than the provincial average. These demographic factors indicate that LSA communities could play a key role in mitigating future labour shortages in the RSA and Saskatchewan, both of which have an older age structure.

Economic Profile

Mineral exploration and investment activity in the LSA is growing. The LSA communities and businesses have some experience with mining given the long-term prominence of the industry in northern Saskatchewan, though considerably less than other RSA communities. Several local businesses in Buffalo Narrows and La Loche have experienced some growth in recent years due to mining exploration in the area. Residents have expressed a strong interest in expanding local business opportunities including exploring partnerships between communities to develop businesses together.

Community Features and Infrastructure

Several LSA communities noted strong community facilities and supports including schools, childcare, and recreational facilities. Facilities such as the La Loche Friendship Centre are an important resource and gathering place in the community and is dedicated to promoting sport, culture, recreation, youth, and community. Other social services in La Loche include Project Venture, Kids First North, and Healthy Moms, Babies and Families.

Social assistance is provided in BNDN through the MLTC which provides services for members of the CRDN, BNDN and BRDN. Along with funding assistance, the MLTC bring programs in for clients such as social life skills and helping members apply for jobs (2019 to 2021 KP interview program). Along with programs run in the community through MLTC, the BNDN has their own Youth Development Program that has run annually for the past 14 years. The BNDN has expressed a desire to further grow programming to support members with special needs.

Information on recreational services, on-reserve housing, social supports in CRDN was not available at the time of the report. However, this information will be integrated when available. Clearwater River School is located in CRDN and serves Kindergarten to Grade 9 aged children and the community has one treatment centre (The Armand Bekkattla Treatment Centre) which is part of the National Native Alcohol and Drug Abuse Program. The facility provides services related to programs aimed at concurrent disorders, residential school survivors, counselling, rehabilitation, and pregnancy care.

Labour Force Characteristics

Analysis of the LSA communities shows notable differences in the labour force, employment, and income characteristics of Buffalo Narrows compared to La Loche and other communities of the LSA. Relative to other LSA communities, Buffalo Narrows had higher participation and employment rates, and higher personal and

household income levels in 2016, which is likely due to the increased number of employment opportunities because it operates as a regional services centre for many provincial corporations and services. La Loche is the closest municipality on Highway 955 to the uranium opportunities in north-western Saskatchewan; however, only exploration activities are currently ongoing in this area and therefore limited employment opportunities currently exist.

The LSA population has some experience with the mining sector given that the uranium industry was once the major employer in many of the communities. However, limited opportunities exist as there have been no active mines in the LSA since Cluff Lake mine (i.e., only fly-in/fly-out and drive-in/drive-out). Many community members that work in mining or the oil and gas sector still reside within the LSA while working on rotation elsewhere such as in Fort McMurray, Cold Lake, and potash mines in Alberta, or uranium mines in northeastern Saskatchewan.

Residents of the LSA that do not participate in the wage economy often turn to the traditional economy to meet their needs, while those who have consistent employment in the wage economy may participate less frequently. The traditional economy in LSA communities is an important part of the socio-economic fabric and the livelihoods of residents and remains strong. A large portion of the LSA population's income is derived from government transfers.

Education and Training

Educational attainment has improved in all LSA communities between 2006 and 2016. Females have overall higher rates of educational attainment for almost all levels of education. Buffalo Narrows has higher levels of educational attainment than the other LSA communities, possibly influenced by the Northlands College campus located within the community, economic opportunities (as evidenced by its higher participation rates and lower unemployment rates), and more robust business environment (e.g., its role as a regional centre providing government and commercial services to the northwest of the province). Improved educational attainment has a direct effect on labour market outcomes and is associated with other benefits such as economic growth, reduced criminal activity and improved health.

Transportation costs are paid for students in remote communities who are required to leave their communities to attend high school, which includes costs for mileage, room and board, and airfare. At the Dene High school in La Loche, there is a graduation team that assist students, including students at risk, aiding with applications, résumés, and university tours. Post-secondary education funding is available which includes funding for tuition, books, and living expenses. Two post-secondary campuses in La Loche and Buffalo Narrows offer a variety of post-secondary education and training courses, and these locations are relatively close to the other LSA communities.

Health and Well-Being

A noted strength in this area included perceptions of personal safety, which in most communities, were self-reported as good, with people generally feeling safe and some people noting sleeping with unlocked doors. The health of community members varied by community; however, residents of Birch Narrows and Turnor Lake report good overall heath within their respective communities. Social activities in these communities such as poker rallies, skating parties, food hampers and home visits helping to bring a sense of community.

Community Features and Infrastructure

All communities were noted to have recreational facilities available to them in some form such as sports facilities, libraries, and parks. Several social supports were recorded in communities such as child and family services, youth development programs, and sports programs. Healthcare facilities such as hospitals and primary care centres, as well as emergency services, are reported to be available in communities. Road infrastructure is deemed sufficient for the local population and roads are generally safe with lower-than-average collision rates.

Community Well-being

Several community members mentioned the importance of close-knit communities in strengthening community well-being. Residents' connection to the land was also noted as a strength. Community members noted several factors in helping improve and maintain community well-being including ensuring employment opportunities for community members and making sure that housing standards are high.

7.1.2 Challenges

Economic Profile

The LSA is economically supressed with a lack of economic opportunity due to no suitably sized primary industry since the decline of the fur industry in the 1960s and the unrelated increase in population. The private services sector comprises fewer than 20% of employment in the La Loche / CRDN area, compared to the 45% for the province overall and 28% for the RSA, indicating a much higher level of private sector activity in other northern centres (DMCA 2018). There are limited employment opportunities for all residents in the LSA. There is limited tourism industry or infrastructure in the LSA, and limited manufacturing. Fishing and commercial forestry activities contribute to the LSA economy, though to a limited scale.

The RSA also has a less diversified economy, more limited access to services and educational opportunities, and high transportation costs. The lack of supporting infrastructure for the communities and the distance between communities and major urban hubs (of which none are located in the RSA) increases the cost of living and operating a business due to higher costs for transportation and therefore higher costs for construction materials, food, and utilities. Within the RSA, the size of contracts and the administrative requirements of managing uranium sector contracts are barriers to participation by many northern-owned businesses. Residents of the LSA have noted there are a limited number of locally owned businesses, and that goods and services must often be sourced from outside the LSA communities.

Community Features and Infrastructure

Housing within LSA communities is a key challenge and can be slow to build and maintain due to limited funding and high demand. There is currently a waitlist for band housing in BNDN and BRDN (Dillon). In 2020, there was a waitlist of 30 or more people in BNDN and people may be on the waitlist for several years. Many homes on reserve lands require regular maintenance or minor repairs, issues such as black mould has been noted in some communities and has resulted in families moving into temporary housing. The majority of the LSA communities rely on water wells as their water source. The majority of LSA communities use facultative lagoons for wastewater treatment, with a few using individual pit privies.

Housing is reported to be very overcrowded in La Loche and some people reside in houses with 10 to 15 other people. Issues with running water and sewage services in La Loche have also been reported. High rental costs and crowded conditions, along with lack of available housing relative to the demand, is also common in Buffalo Narrows. Housing shortages also affect the northern hamlets and settlements in the LSA, which do not have enough housing or developed land to meet demand, often resulting in younger residents moving away, such as from Black Point to La Loche.

Buffalo River Dene Nation members have noted that there is a lack of social services and facilities in the community. Facilities the community would like to see in place include a youth centre, Elder's centre, and friendship centre. Key person interviews also identified a need for homecare for Elders in Dillon as there are no services currently available and identified a lack of a physical space for Elders to gather in the Buffalo Narrows.

The LSA is characterized by a dispersed settlement pattern of primarily small and highly remote communities and has limited regional connectivity. Highway 155 is the primary transport route that connects the LSA communities to the regional centres in southern Saskatchewan and has been identified by numerous sources as in need of serious repairs in multiple locations. Regional connectivity is identified as a challenge to economic expansion in the LSA.

Labour Force Characteristics

Labour force participation and employment rates in the RSA and LSA communities are lower than the provincial average; conversely, the unemployment rate and percentage of people not in the labour force are higher than the provincial average. Within the RSA, the main employers are mining, quarrying, oil and gas extraction, education services, public administration, and health care and social assistance. Employment in the LSA is particularly concentrated in government-funded service sectors, with lower employment rates in common rural sectors including agriculture, forestry, fishing and hunting, manufacturing, and retail trade than in the province overall. Challenges for Indigenous youths/young adults are likely to be different than older age groups such as not having enough work experience for available jobs, having less availability for work, and not knowing what type of job to explore.

Challenges to successfully participating in the wage economy in the LSA communities were associated with the lack of employment and training opportunities within communities and the lower levels of educational attainment of the labour force. The lack of employment opportunities was also cited as a factor for outmigration from the LSA communities. Many others have noted a reluctance to leave their families for extended periods as a barrier to obtaining training and education or securing employment outside of the community. Distance to employment was noted as a barrier to employment in the mining sector, particularly for women, due to family and childcare responsibilities. Some LSA residents noted women may be more likely to enter the mining industry if employment opportunities were closer to home. It was also noted that this would benefit families in general, particularly in the ability to respond to family emergencies.

Education and Training

In general, the largest segment of the population in the LSA communities have less than a high school certificate, ranging from 32.2% (Buffalo Narrows) to 67.2% (La Loche). Lower levels of education attainment in the LSA communities indicate that employment in industries that require post-secondary or trades education may be

difficult. Therefore, these types of occupations are typically filled by non-northern residents who have the requisite education. Participants in JWG sessions noted concerns about not enough training facilities for both youth and adults, not enough students taking maths and sciences in high school, and the frequent need for students to leave the community to pursue further education. While the school systems in the LSA communities are working on improving rates of attendance, graduation, literacy, and numeracy, success in these metrics remains challenging and below the RSA and provincial averages. Educational staffing challenges include recruiting and retention of qualified educators for communities, which also affects the types of programs available.

Additional challenges to educational attainment include costs and that most post-secondary education requires students to complete all or part of their schooling outside their community or the LSA. There are also challenges with the availability of obtaining safety tickets, driver's licences, childcare, and transportation. The LSA community residents noted that online employment application processes can make it difficult to obtain employment, as many people do not have access to a computer or internet in their homes. Interviewees indicated that leaving their communities for further education can be stressful, a financial burden, and a culture shock.

Health and Well-being

In the RSA, total crude mortality rates are approximately 1.5 to 2 times as high as the provincial rate. Age-standardized rates indicate a higher risk of many chronic diseases in the RSA, including diabetes, ischemic heart disease, COPD, and heart failure. Smoking rates in the RSA are also higher than provincial rates. High food prices are common, particularly for fresh produce in the RSA, which may be contributing factors to the higher mortality rates. Many community members noted difficulties with keeping doctors and healthcare providers within the community and having to travel outside their communities for specialized medical services such as psychiatric, dental, and optometry services. These travel distances can deter some community members from seeking early treatment or diagnosing illnesses. Common community health concerns include addictions (drugs and alcohol), mental health, and lack of access to medical services.

The number of crimes in the Buffalo Narrows RCMP Detachment area are lower than those in the La Loche RCMP Detachment area; however, criminal code violation (i.e., crime) rates in the Buffalo Narrows RCMP Detachment area are increasing each year and trending higher, while crime rates in the La Loche RCMP Detachment area are more variable but trending lower. Despite the decrease in criminal code violations in the La Loche RCMP Detachment area, interviews indicated that there is a perception that the community is not safe (2019 to 2021 KP interview program).

Community Well-being

Challenges and obstacles to community well-being included low income and a lack of employment opportunities. For young people, this can result in out migration, including having to travel outside the community for employment, as well as drug and alcohol abuse. The loss of culture and tradition was also viewed as a challenge as the make up of communities change over time. Social service programs are lacking for youth, special needs, mental health, and Elders in the LSA communities.

Review of community well-being indexes showed that CRDN had the lowest score among LSA communities, which was largely due to lower scores in income and housing. Buffalo Narrows had the highest community well-being index score, which is linked to their higher incomes and employment figures compared to other LSA

communities. All communities in the LSA have low education scores, which resulted in overall scores lower than Saskatchewan.

7.2 Closure

The purpose of the socio-economic baseline was to present a comprehensive overview of the existing socio-economic conditions in the LSA communities and evaluate these in relation to the RSA and the province. This baseline report provides a detailed account of each LSA community and their strengths, challenges and aspirations and is intended to provide context on the day to day lives of community members when reviewing other components evaluated in the EA.

NexGen is committed to managing the negative effects of the Project on community members and sustainably maximize opportunities to help communities to achieve their goals and aspirations. Mitigation measures to minimize adverse effects to communities and enhance benefits would be developed in collaboration with communities, which would include respecting Indigenous and Local Knowledge and Indigenous practices and traditions. Benefit Agreements have been developed and are being negotiated to define the environmental, cultural, economic, training, employment, and business opportunities and other benefits to be provided to the primary Indigenous Groups by NexGen and to confirm the consent and support of those groups for the Project. Continued engagement with communities will continue throughout the remainder of the EA and beyond, as has been the strategic approach by NexGen since early exploration activities.

CLOSING

WSP is pleased to submit this report to NexGen in support of the Environmental Assessment for the Rook I Project. For details on the limitations and use of information presented in this report, please refer to the Study Limitations section following this page. If you have any questions or require additional details related to this study, please contact the undersigned.

Sara Jarrett, BA
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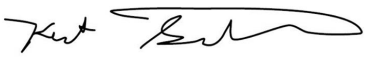

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STUDY LIMITATIONS

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The scope and the period of WSP's services are as described in WSP's proposal and are subject to restrictions and limitations. WSP did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the report. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by WSP in regard to it. Any assessments, designs and advice made in this report are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this report. Where data supplied by the Client or other external sources (including without limitation, other consultants, laboratories, public databases), including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by WSP for incomplete or inaccurate data supplied by others.

The passage of time affects the information and assessment provided in this report. WSP's opinions are based upon information that existed at the time of the production of the report. The Services provided allowed WSP to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to WSP by the Client, communications between WSP and the Client, and to any other reports prepared by WSP for

the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be to the foregoing and to the entirety of the report. WSP cannot be responsible for use of portions of the report without reference to the entire report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client and were prepared for the specific purpose set out herein. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. WSP accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

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Appendix A Socio-Economic Statistical Data

Table A-1a: Population of LSA, Northern Saskatchewan (RSA), and Saskatchewan, 1981 to 2016

Region	Population							
	1981	1986	1991	1996	2001	2006	2011	2016
LSA [a,b,c]	3,487	4,075	4,249	4,766	5,129	5,454	6,215	5,991
Northern Saskatchewan [a,b,d]	25,304	25,340	26,735	31,104	32,029	33,919	36,557	37,064
Saskatchewan [a,b]	968,313	1,009,613	988,928	990,237	978,933	968,157	1,033,381	1,098,352

Region	Average Annual Change in Population (%)[e]						
	1982-1986	1987-1991	1992-1996	1997-2001	2002-2006	2007-2011	2012-2016
LSA	3.2%	0.8%	2.3%	1.5%	1.2%	2.6%	-0.7%
Northern Saskatchewan	0.0%	1.1%	3.1%	0.6%	1.2%	1.5%	0.3%
Saskatchewan	0.8%	-0.4%	0.0%	-0.2%	-0.2%	1.3%	1.2%

Source: Statistics Canada 1981-2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake for 1981-2006.

d) North Saskatchewan is defined as Census Division No.18.

e) Average annual percentage population changes calculated by InterGroup Consultants Ltd.

LSA = local study area.

Table A-1b: Population of Local Study Area Communities, 1981 to 2016

Community	Population[a,b]							
	1981	1986	1991	1996	2001	2006	2011	2016
Bear Creek	n/d	n/d	n/d	n/d	n/d	n/d	55	33
Birch Narrows Dene Nation	137	104	224	302	338	413	419	476
Black Point	n/d	n/d	n/d	n/d	n/d	n/d	80	43
Buffalo Narrows	1,088	1,183	1,060	1,053	1,137	1,081	1,153	1,110
Buffalo River Dene Nation 193	312	423	423	539	607	741	764	783
Clearwater River Dene 222	0	301	455	548	584	658	778	822
Descharme Lake	n/d	n/d	n/d	n/d	n/d	n/d	10	5
Garson Lake	n/d	n/d	n/d	n/d	n/d	n/d	0	10
La Loche	1,632	1,623	1,691	1,966	2,136	2,348	2,611	2,372
Michel Village	130	110	87	75	70	79	66	57
St. George's Hill	115	112	124	85	102	19	100	131
Turnor Lake	73	219	185	198	155	115	179	149
LSA Total[c]	**3,487**	**4,075**	**4,249**	**4,766**	**5,129**	**5,454**	**6,215**	**5,991**

Community	Average Annual Change in Population (%)[d]						
	1982-1986	1987-1991	1992-1996	1997-2001	2002-2006	2007-2011	2012-2016
Bear Creek	n/d	n/d	n/d	n/d	n/d	n/d	-9.7%
Birch Narrows Dene Nation	-5.4%	16.6%	6.2%	2.3%	4.1%	0.3%	2.6%
Black Point	n/d	n/d	n/d	n/d	n/d	n/d	-11.7%
Buffalo Narrows	1.7%	-2.2%	-0.1%	1.5%	-1.0%	1.3%	-0.8%
Buffalo River Dene Nation 193	6.3%	0.0%	5.0%	2.4%	4.1%	0.6%	0.5%
Clearwater River Dene 222	n/d	8.6%	3.8%	1.3%	2.4%	3.4%	1.1%
Descharme Lake	n/d	n/d	n/d	n/d	n/d	n/d	-12.9%
Garson Lake	n/d	n/d	n/d	n/d	n/d	n/d	n/d
La Loche	-0.1%	0.8%	3.1%	1.7%	1.9%	2.1%	-1.9%
Michel Village	-3.3%	-4.6%	-2.9%	-1.4%	2.4%	-3.5%	-2.9%
St. George's Hill	-0.5%	2.1%	-7.3%	3.7%	-28.5%	39.4%	5.5%
Turnor Lake	24.6%	-3.3%	1.4%	-4.8%	-5.8%	9.3%	-3.6%
LSA Total[c]	**3.2%**	**0.8%**	**2.3%**	**1.5%**	**1.2%**	**2.6%**	**-0.7%**

Source: Statistics Canada 1981-2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) The LSA includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data are not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake for 1981 to 2006.

d) Average annual percentage population changes calculated by InterGroup Consultants Ltd.

LSA = local study area; n/d = no data available.

Table A-2a: Population Distribution by Age Group for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 2016

Age Group	Population [a,b]			Age Group Proportions[e]		
	LSA[c]	Northern Saskatchewan (RSA)[d]	Saskatchewan	LSA	Northern Saskatchewan (RSA)	Saskatchewan
Total - Population in private households	**5,805**	**37,065**	**1,098,350**	**100.0%**	**100.0%**	**100.0%**
0 to 14 years	1,805	11,565	215,685	31.1%	31.2%	19.6%
15 to 24 years	1,030	6,550	137,720	17.7%	17.7%	12.5%
25 to 34 years	855	5,310	155,045	14.7%	14.3%	14.1%
35 to 44 years	660	4,005	136,540	11.4%	10.8%	12.4%
45 to 54 years	680	4,005	138,825	11.7%	10.8%	12.6%
55 to 64 years	430	3,115	144,110	7.4%	8.4%	13.1%
65 to 74 years	230	1,690	90,970	4.0%	4.6%	8.3%
75 years and over	120	835	79,455	2.1%	2.3%	7.2%

Source: Statistics Canada 2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Descharme Lake, and Garson Lake.

d) Northern Saskatchewan (RSA) is defined as Census Division No.18.

e) Age group proportions calculated by InterGroup Consultants Ltd.

LSA = local study area; RSA = regional study area.

Table A-2b: Population Distribution by Age Group for Local Study Area Communities, 2016

Age Group	Population[a,b]								
	Birch Narrows Dene Nation - Turnor Lake 193B	Black Point	Buffalo Narrows	Buffalo River Dene Nation 193 (Peter Pond Lake 193)	Clearwater River Dene 222	La Loche	Michel Village	Turnor Lake	LSA Total[c]
Total - Population in private households	**475**	**45**	**1,110**	**785**	**820**	**2,370**	**55**	**145**	**5,805**
0 to 14 years	165	10	295	235	255	780	10	55	1,805
15 to 24 years	80	0	175	125	180	440	10	20	1,030
25 to 34 years	100	5	120	125	125	355	5	20	855
35 to 44 years	45	5	130	80	110	275	0	15	660
45 to 54 years	40	10	140	115	70	265	20	20	680
55 to 64 years	30	5	130	55	50	145	5	10	430
65 to 74 years	10	5	70	30	25	75	10	5	230
75 years and over	20	5	35	15	5	35	0	5	120
Age distribution[d]									
0 to 24	51.6%		42.3%	45.9%	53.0%	51.5%	n/c	n/c	n/c
25 to 54	38.9%		35.1%	40.8%	37.2%	37.8%	n/c	n/c	n/c
55+	12.6%		21.2%	12.7%	9.8%	10.8%	n/c	n/c	n/c

Source: Statistics Canada 2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) The LSA includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data are not available for Bear Creek, Descharme Lake, and Garson Lake.

d) Age distribution percentages calculated by InterGroup Consultants Ltd.

LSA = local study area, n/c = not calculated due to lack of data.

Table A-3a: LSA Population Distribution by Age Group for 1986 through 2016

Age Group	Population in the LSA [a,b,c]						
	1986	1991	1996	2001	2006	2011	2016
Total - Population in private households	**4,075**	**4,240**	**4,765**	**5,125**	**5,445**	**5,885**	**5,805**
0 to 14 years	1,555	1,695	1,960	2,010	1,820	1,835	1,805
15 to 24 years	1,020	920	840	865	1,130	1,245	1,030
25 to 34 years	635	730	840	840	725	770	855
35 to 44 years	340	385	490	640	745	805	660
45 to 54 years	255	250	295	375	500	630	680
55 to 64 years	155	185	190	240	270	355	430
65 to 74 years	85	85	85	100	170	175	230
75 years and over	50	45	65	65	70	80	120

Age Group	Age Group Proportions in LSA [d]						
	1986	1991	1996	2001	2006	2011	2016
0 to 14 years	38.2%	40.0%	41.1%	39.2%	33.4%	31.2%	31.1%
15 to 24 years	25.0%	21.7%	17.6%	16.9%	20.8%	21.2%	17.7%
25 to 34 years	15.6%	17.2%	17.6%	16.4%	13.3%	13.1%	14.7%
35 to 44 years	8.3%	9.1%	10.3%	12.5%	13.7%	13.7%	11.4%
45 to 54 years	6.3%	5.9%	6.2%	7.3%	9.2%	10.7%	11.7%
55 to 64 years	3.8%	4.4%	4.0%	4.7%	5.0%	6.0%	7.4%
65 to 74 years	2.1%	2.0%	1.8%	2.0%	3.1%	3.0%	4.0%
75 years and over	1.2%	1.1%	1.4%	1.3%	1.3%	1.4%	2.1%

Source: Statistics Canada 1986-2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) The LSA includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data are not available for Bear Creek, Descharme Lake, and Garson Lake for all Census years, Black Point for 1986 to 2011, St. George's Hill for 2006 and 2016, and Turnor Lake for 2011.

d) Age group proportions calculated by InterGroup Consultants Ltd.

LSA = local study area.

Table A-3b: Population Distribution by Age Group for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 1986 and 2016

Age Group	Number of Population					
	LSA [a,b,c]		Northern Saskatchewan (RSA) [a,b,d]		Saskatchewan [a,b]	
	1986	2016	1986	2016	1986	2016
Total - Population in private households	**4,075**	**5,805**	**25,340**	**37,065**	**1,009,610**	**1,098,350**
0 to 14 years	1,555	1,805	9,795	11,565	245,715	215,685
15 to 24 years	1,020	1,030	5,300	6,550	167,515	137,720
25 to 34 years	635	855	3,985	5,310	170,505	155,045
35 to 44 years	340	660	2,430	4,005	118,160	136,540
45 to 54 years	255	680	1,600	4,005	89,010	138,825
55 to 64 years	155	430	1,155	3,115	90,105	144,110
65 to 74 years	85	230	720	1,690	75,545	90,970
75 years and over	50	120	350	835	53,050	79,455

Age Group	Age Group Proportions[e]					
	LSA		Northern Saskatchewan (RSA)		Saskatchewan	
	1986	2016	1986	2016	1986	2016
0 to 14 years	38.2%	31.1%	38.7%	31.2%	24.3%	19.6%
15 to 24 years	25.0%	17.7%	20.9%	17.7%	16.6%	12.5%
25 to 34 years	15.6%	14.7%	15.7%	14.3%	16.9%	14.1%
35 to 44 years	8.3%	11.4%	9.6%	10.8%	11.7%	12.4%
45 to 54 years	6.3%	11.7%	6.3%	10.8%	8.8%	12.6%
55 to 64 years	3.8%	7.4%	4.6%	8.4%	8.9%	13.1%
65 to 74 years	2.1%	4.0%	2.8%	4.6%	7.5%	8.3%
75 years and over	1.2%	2.1%	1.4%	2.3%	5.3%	7.2%

Source: Statistics Canada 1986-2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) The LSA includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data are not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake for 1986 and St. George's Hill for 2016.

d) Northern Saskatchewan (RSA) is defined as Census Division No.18.

e) Age group proportions calculated by InterGroup Consultants Ltd.

LSA = local study area; RSA = regional study area.

Table A-3c: Population Distribution by Age Group for Local Study Area Communities, 1986 and 2016

Age Group	Number of Population[a,b]																			
	Birch Narrows Dene Nation		Black Point		Buffalo Narrows		Buffalo River Dene Nation 193		Clearwater River Dene 222		La Loche		Michel Village		St. George's Hill		Turnor Lake		LSA [c]	
	1986	2016	1986	2016	1986	2016	1986	2016	1986	2016	1986	2016	1986	2016	1986	2016	1986	2016	1986	2016
Total - Population in private households	**105**	**475**		**45**	**1,185**	**1,110**	**420**	**785**	**300**	**820**	**1,625**	**2,370**	**110**	**55**	**110**	**n/d**	**220**	**145**	**4,075**	**5,805**
0 to 14 years	40	165		10	410	295	145	235	135	255	665	780	40	10	35	n/d	85	55	1,555	1,805
15 to 24 years	25	80		0	235	175	130	125	80	180	420	440	30	10	45	n/d	55	20	1,020	1,030
25 to 34 years	10	100		5	245	120	55	125	35	125	245	355	10	5	10	n/d	25	20	635	855
35 to 44 years	10	45		5	115	130	25	80	25	110	120	275	5	0	10	n/d	30	15	340	660
45 to 54 years	10	40		10	85	140	25	115	25	70	80	265	10	20	5	n/d	15	20	255	680
55 to 64 years	10	30		5	50	130	20	55	10	50	60	145	5	5	0	n/d	0	10	155	430
65 to 74 years	0	10		5	35	70	15	30	0	25	30	75	5	10	0	n/d	0	5	85	230
75 years and over	0	20		5	20	35	10	15	0	5	15	35	0	0	0	n/d	5	5	50	120

Age Group	Age Group Proportions[d]																			
	Birch Narrows Dene Nation		Black Point		Buffalo Narrows		Buffalo River Dene Nation 193		Clearwater River Dene 222		La Loche		Michel Village		St. George's Hill		Turnor Lake		LSA [c]	
	1986	2016	1986	2016	1986	2016	1986	2016	1986	2016	1986	2016	1986	2016	1986	2016	1986	2016	1986	2016
0 to 14 years	38.1%	34.7%		22.2%	34.6%	26.6%	34.5%	29.9%	45.0%	31.1%	40.9%	32.9%	36.4%	18.2%	31.8%	n/d	38.6%	37.9%	38.2%	31.1%
15 to 24 years	23.8%	16.8%		0.0%	19.8%	15.8%	31.0%	15.9%	26.7%	22.0%	25.8%	18.6%	27.3%	18.2%	40.9%	n/d	25.0%	13.8%	25.0%	17.7%
25 to 34 years	9.5%	21.1%		11.1%	20.7%	10.8%	13.1%	15.9%	11.7%	15.2%	15.1%	15.0%	9.1%	9.1%	9.1%	n/d	11.4%	13.8%	15.6%	14.7%
35 to 44 years	9.5%	9.5%		11.1%	9.7%	11.7%	6.0%	10.2%	8.3%	13.4%	7.4%	11.6%	4.5%	0.0%	9.1%	n/d	13.6%	10.3%	8.3%	11.4%
45 to 54 years	9.5%	8.4%		22.2%	7.2%	12.6%	6.0%	14.6%	8.3%	8.5%	4.9%	11.2%	9.1%	36.4%	4.5%	n/d	6.8%	13.8%	6.3%	11.7%
55 to 64 years	9.5%	6.3%		11.1%	4.2%	11.7%	4.8%	7.0%	3.3%	6.1%	3.7%	6.1%	4.5%	9.1%	0.0%	n/d	0.0%	6.9%	3.8%	7.4%
65 to 74 years	0.0%	2.1%		11.1%	3.0%	6.3%	3.6%	3.8%	0.0%	3.0%	1.8%	3.2%	4.5%	18.2%	0.0%	n/d	0.0%	3.4%	2.1%	4.0%
75 years and over	0.0%	4.2%		11.1%	1.7%	3.2%	2.4%	1.9%	0.0%	0.6%	0.9%	1.5%	0.0%	0.0%	0.0%	n/d	2.3%	3.4%	1.2%	2.1%

Source: Statistics Canada 1986-2016 Census.
a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) The LSA includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data are not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake for 1986 and St. George's Hill for 2016.
d) Age group proportions calculated by InterGroup Consultants Ltd.
LSA = local study area, n/d = no data or guideline available.

Table A-4: LSA and La Loche Population Change from 2011 to 2016

Age Group	La Loche			LSA [a,b,c]		
	2011	2016	Change	2011	2016	Change
Total - Population in private households	**2,610**	**2,370**	**(240)**	**5,885**	**5,805**	**(80)**
0 to 49 years	2,295	1,985	(310)	5,015	4,690	(325)
50 years and over	310	385	75	880	1,115	235

Source: Statistics Canada 2011-2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, Garson Lake, and Turnor Lake for 2011, for Bear Creek, Descharme Lake, Garson Lake, and St. George's Hill for 2016.

Table A-5a: Population Age Structure by Sex, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 2016

Age Group[e]	LSA [a,b,c]					Northern Saskatchewan (RSA) [a,b,d]					Saskatchewan [a,b]				
	Total	Male - LSA	Female - LSA	% Male	% Female	Total	Male - RSA	Female - RSA	% Male	% Female	Total	Male - SK	Female - SK	% Male	% Female
Total Population	**5,775**	**2,810**	**2,955**			**37,065**	**18,640**	**18,425**			**1,098,355**	**545,785**	**552,565**		
0 to 4 years	615	325	285	-5.63	4.94	3,850	1,960	1,890	-5.29	5.10	73,130	37,335	35,795	-3.40	3.26
5 to 9 years	680	355	305	-6.15	5.28	4,165	2,165	1,995	-5.84	5.38	74,460	38,150	36,305	-3.47	3.31
10 to 14 years	510	250	265	-4.33	4.59	3,555	1,785	1,775	-4.82	4.79	68,095	34,920	33,175	-3.18	3.02
15 to 19 years	525	285	245	-4.94	4.24	3,345	1,725	1,610	-4.65	4.34	67,655	34,680	32,980	-3.16	3.00
20 to 24 years	510	255	250	-4.42	4.33	3,210	1,635	1,575	-4.41	4.25	70,060	36,070	33,990	-3.28	3.09
25 to 29 years	510	230	270	-3.98	4.68	2,900	1,425	1,475	-3.84	3.98	77,525	39,290	38,235	-3.58	3.48
30 to 34 years	355	150	210	-2.60	3.64	2,410	1,140	1,270	-3.08	3.43	77,520	38,610	38,915	-3.52	3.54
35 to 39 years	300	155	155	-2.68	2.68	2,005	990	1,015	-2.67	2.74	71,590	35,940	35,650	-3.27	3.25
40 to 44 years	340	160	200	-2.77	3.46	2,000	960	1,040	-2.59	2.81	64,950	32,510	32,440	-2.96	2.95
45 to 49 years	335	145	190	-2.51	3.29	1,965	950	1,010	-2.56	2.72	63,575	31,780	31,795	-2.89	2.89
50 to 54 years	350	160	185	-2.77	3.20	2,040	985	1,050	-2.66	2.83	75,245	37,230	38,015	-3.39	3.46
55 to 59 years	250	120	135	-2.08	2.34	1,750	890	860	-2.40	2.32	76,195	38,070	38,130	-3.47	3.47
60 to 64 years	170	95	65	-1.65	1.13	1,365	685	675	-1.85	1.82	67,915	33,935	33,985	-3.09	3.09
65 to 69 years	150	70	75	-1.21	1.30	1,060	585	480	-1.58	1.30	53,230	26,285	26,945	-2.39	2.45
70 to 74 years	90	40	40	-0.69	0.69	630	325	305	-0.88	0.82	37,740	18,225	19,510	-1.66	1.78
75 to 79 years	60	30	20	-0.52	0.35	425	225	200	-0.61	0.54	29,400	13,410	15,985	-1.22	1.46
80 to 84 years	30	15	15	-0.26	0.26	250	125	120	-0.34	0.32	23,120	9,950	13,170	-0.91	1.20
85 to 89 years	10	5	15	-0.09	0.26	110	60	55	-0.16	0.15	16,280	6,305	9,975	-0.57	0.91
90 to 94 years	0	0	5	0.00	0.09	40	20	25	-0.05	0.07	8,005	2,510	5,485	-0.23	0.50
95 to 99 years	0	0	0	0.00	0.00	0	0	0	0.00	0.00	2,290	525	1,760	-0.05	0.16
100 years +	0	0	0	0.00	0.00	5	0	0	0.00	0.00	370	50	325	0.00	0.03

Source: Statistics Canada 2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, Garson Lake, and St. George's Hill.

d) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.

e) Male and female proportions by age groups calculated by InterGroup Consultants Ltd.

LSA = local study area; RSA = regional study area; SK = Saskatchewan; n/c = not calculated.

Table A-5b: Proportion of Population by Sex, Average and Median Ages of Population, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 2016

Metric[e]	Birch Narrows Dene Nation [a,b]	Black Point [a,b]	Buffalo Narrows [a,b]	Buffalo River Dene Nation 193 [a,b]	Clearwater River Dene 222 [a,b]	La Loche [a,b]	Michel Village [a,b]	Turnor Lake [a,b]	Local Study Area (LSA) [a,b,c]	Northern Saskatchewan (RSA) [a,b,d]	Saskatchewan [a,b]
Total - Age groups and average age of the population - 100% data	**475**	**45**	**1,110**	**785**	**820**	**2,370**	**55**	**145**	**5,805**	**37,065**	**1,098,350**
Male	225	20	560	390	415	1,135	20	70	2,835	18,640	545,785
Female	255	20	550	390	410	1,235	30	85	2,975	18,425	552,565
Proportions by Sex											
Male	47.4%	44.4%	50.5%	49.7%	50.6%	47.9%	36.4%	48.3%	48.8%	50.3%	49.7%
Female	53.7%	44.4%	49.5%	49.7%	50.0%	52.1%	54.5%	58.6%	51.2%	49.7%	50.3%
Average age of the population	**27.8**	**38.1**	**34.0**	**29.7**	**27.1**	**27.6**	**38.8**	**27.2**	**29.2**	**29.7**	**39.1**
Male	28.0	39.0	33.1	30.5	26.7	26.5	44.2	23.8	28.6	29.6	38.2
Female	27.7	37.2	35.0	29.0	27.5	28.5	34.8	30.0	29.7	29.9	40.0
Median age of the population	**24.6**	**39.8**	**30.8**	**26.8**	**23.8**	**24.0**	**40.8**	**23.4**	**N/A**	**25.7**	**37.8**
Male	23.4	39.8	29.4	27.6	23.1	21.8	50.0	21.3	N/A	25.1	36.9
Female	25.4	38.5	33.3	26.2	24.1	26.3	31.8	23.9	N/A	26.2	38.7

Source: Statistics Canada 2016 Census.
a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Descharme Lake, Garson Lake, and St. George's Hill.
d) Northern Saskatchewan (RSA) is defined as Census Division No.18.
e) Proportions by sex calculated by InterGroup Consultants Ltd.
LSA = local study area; RSA = regional study area; n/c = not calculated.

Table A-6a: Proportion of Population Identifying as Indigenous, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 2016

Age Group[e]	Local Study Area (LSA) [a,b,c]									Northern Saskatchewan (RSA) [a,b,d]									Saskatchewan [a,b]								
	Total			Indigenous identity			Non-Indigenous identity			Total			Indigenous identity			Non-Indigenous identity			Total			Indigenous identity			Non-Indigenous identity		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total - Population in private households - 25% sample data	**5,820**	**2,840**	**3,050**	**5,565**	**2,700**	**2,915**	**255**	**130**	**135**	**36,850**	**18,515**	**18,335**	**32,205**	**16,035**	**16,165**	**4,650**	**2,480**	**2,165**	**1,070,560**	**533,385**	**537,170**	**175,020**	**84,730**	**90,290**	**895,535**	**448,655**	**446,885**
0 to 14 years	1,800	940	890	1,785	915	875	30	10	10	11,555	5,900	5,650	10,955	5,615	5,345	600	290	310	213,260	109,120	104,140	57,690	29,085	28,605	155,570	80,035	75,540
15 to 24 years	1,015	535	490	1,015	520	500	20	-	10	6,435	3,305	3,135	6,000	3,060	2,935	440	240	200	135,065	68,855	66,205	31,810	15,900	15,910	103,250	52,960	50,295
25 to 34 years	890	395	505	805	365	455	90	50	50	5,385	2,575	2,810	4,670	2,225	2,440	715	350	370	152,675	76,695	75,975	25,630	11,820	13,805	127,045	64,875	62,170
35 to 44 years	635	280	345	595	275	320	60	10	25	3,915	1,920	1,995	3,325	1,600	1,725	590	315	270	134,695	67,290	67,405	19,770	9,065	10,705	114,925	58,230	56,695
45 to 54 years	740	305	430	700	275	410	35	20	30	4,045	1,935	2,115	3,385	1,605	1,780	665	325	340	136,815	67,860	68,955	18,535	8,600	9,935	118,270	59,265	59,010
55 to 64 years	390	215	190	350	200	175	10	25	10	3,055	1,560	1,490	2,180	1,070	1,105	875	495	385	142,065	70,665	71,405	13,005	6,235	6,770	129,060	64,430	64,630
65 years and over	380	200	180	340	165	185	35	35	10	2,460	1,315	1,145	1,695	855	840	765	460	305	155,985	72,895	83,095	8,580	4,025	4,550	147,410	68,865	78,545
Proportion																											
0 to 14 years	31%	33%	29%	32%	34%	30%	12%	8%	7%	31%	32%	31%	34%	35%	33%	13%	12%	14%	20%	20%	19%	33%	34%	32%	17%	18%	17%
15 to 24 years	17%	19%	16%	18%	19%	17%	8%	0%	7%	17%	18%	17%	19%	19%	18%	9%	10%	9%	13%	13%	12%	18%	19%	18%	12%	12%	11%
25 to 34 years	15%	14%	17%	14%	14%	16%	35%	38%	37%	15%	14%	15%	15%	14%	15%	15%	14%	17%	14%	14%	14%	15%	14%	15%	14%	14%	14%
35 to 44 years	11%	10%	11%	11%	10%	11%	24%	8%	19%	11%	10%	11%	10%	10%	11%	13%	13%	12%	13%	13%	13%	11%	11%	12%	13%	13%	13%
45 to 54 years	13%	11%	14%	13%	10%	14%	14%	15%	22%	11%	10%	12%	11%	10%	11%	14%	13%	16%	13%	13%	13%	11%	10%	11%	13%	13%	13%
55 to 64 years	7%	8%	6%	6%	7%	6%	4%	19%	7%	8%	8%	8%	7%	7%	7%	19%	20%	18%	13%	13%	13%	7%	7%	7%	14%	14%	14%
65 years and over	7%	7%	6%	6%	6%	6%	14%	27%	7%	7%	7%	6%	5%	5%	5%	16%	19%	14%	15%	14%	15%	5%	5%	5%	16%	15%	18%

Source: Statistics Canada 2016 Census.
a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.
d) Northern Saskatchewan (RSA) is defined as Census Division No.18.
e) Proportions by age groups calculated by InterGroup Consultants Ltd.
LSA = local study area; RSA = regional study area; n/d = no data available.

Table A-6b: Proportion of Population Identifying as Indigenous, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 2016

Metric	Local Study Area (LSA) [a,b,c]									Northern Saskatchewan (RSA) [a,b,d]									Saskatchewan [a,b]								
	Total identity[e]	Aboriginal identity, total[f]	Single Aboriginal responses, total[g]	First Nations[h]	Métis	Inuk (Inuit)	Multiple Aboriginal responses[i]	Aboriginal responses NIE[j]	Non-Aboriginal identity	Total identity[e]	Aboriginal identity, total[f]	Single Aboriginal responses, total[g]	First Nations[h]	Métis	Inuk (Inuit)	Multiple Aboriginal responses[i]	Aboriginal responses NIE[g]	Non-Aboriginal identity	Total identity[e]	Aboriginal identity, total[f]	Single Aboriginal responses, total[g]	First Nations[h]	Métis	Inuk (Inuit)	Multiple Aboriginal responses[i]	Aboriginal responses NIE[g]	Non-Aboriginal identity
Population																											
Total - both sex	**5,820**	**5,565**	**5,550**	**3,430**	**2,120**	**0**	**20**	**0**	**255**	**36,850**	**32,205**	**32,010**	**25,575**	**6,435**	**10**	**135**	**50**	**4,650**	**1,070,560**	**175,020**	**172,810**	**114,565**	**57,880**	**360**	**1,300**	**905**	**895,535**
Male	2,840	2,700	2,710	1,720	995	0	10	0	130	18,515	16,035	15,945	12,730	3,215	10	60	25	2,480	533,385	84,730	83,750	55,275	28,330	150	600	380	448,655
Female	2,985	2,850	2,850	1,710	1,125	0	n/d	0	135	18,335	16,165	16,065	12,845	3,220	0	70	30	2,165	537,170	90,290	89,055	59,290	29,555	215	705	530	446,885
Ratio in Total Population[k]																											
Total - both sex	**100.0%**	**95.6%**	**95.4%**	**58.9%**	**36.4%**	**0.0%**	**0.3%**	**0.0%**	**4.4%**	**100.0%**	**87.4%**	**86.9%**	**69.4%**	**17.5%**	**0.0%**	**0.4%**	**0.1%**	**12.6%**	**100.0%**	**16.3%**	**16.1%**	**10.7%**	**5.4%**	**0.0%**	**0.1%**	**0.1%**	**83.7%**
Male	100.0%	95.1%	95.4%	60.6%	35.0%	0.0%	0.4%	0.0%	4.6%	100.0%	86.6%	86.1%	68.8%	17.4%	0.1%	0.3%	0.1%	13.4%	100.0%	15.9%	15.7%	10.4%	5.3%	0.0%	0.1%	0.1%	84.1%
Female	100.0%	95.5%	95.5%	57.3%	37.7%	0.0%	0.0%	0.0%	4.5%	100.0%	88.2%	87.6%	70.1%	17.6%	0.0%	0.4%	0.2%	11.8%	100.0%	16.8%	16.6%	11.0%	5.5%	0.0%	0.1%	0.1%	83.2%
Ratio in Total Aboriginal identity[k]																											
Total - both sex	**n/c**	**100.0%**	**99.7%**	**61.6%**	**38.1%**	**0.0%**	**0.4%**	**0.0%**	**n/c**	**n/c**	**100.0%**	**99.4%**	**79.4%**	**20.0%**	**0.0%**	**0.4%**	**0.2%**	**n/c**	**n/c**	**100.0%**	**98.7%**	**65.5%**	**33.1%**	**0.2%**	**0.7%**	**0.5%**	**n/c**
Male	n/c	100.0%	100.4%	63.7%	36.9%	0.0%	0.4%	0.0%	n/c	n/c	100.0%	99.4%	79.4%	20.0%	0.1%	0.4%	0.2%	n/c	n/c	100.0%	98.8%	65.2%	33.4%	0.2%	0.7%	0.4%	n/c
Female	n/c	100.0%	100.0%	60.0%	39.5%	0.0%	0.0%	0.0%	n/c	n/c	100.0%	99.4%	79.5%	19.9%	0.0%	0.4%	0.2%	n/c	n/c	100.0%	98.6%	65.7%	32.7%	0.2%	0.8%	0.6%	n/c

Source: Statistics Canada 2016.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.

d) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.

e) Users should be aware that the estimates associated with this variable are more affected than most by the incomplete enumeration of certain Indian reserves and Indian settlements in the 2016 Census of Population. For more information on Aboriginal variables including information on their classifications the questions from which they are derived data quality and their comparability with other sources of data refer to the Aboriginal Peoples Reference Guide Census of Population 2016 and the Aboriginal Peoples Technical Report Census of Population 2016.

f) 'Aboriginal identity' includes persons who are First Nations (North American Indian) Métis or Inuk (Inuit) and/or those who are Registered or Treaty Indians (that is registered under the Indian Act of Canada) and/or those who have membership in a First Nation or Indian band. Aboriginal peoples of Canada are defined in the Constitution Act 1982 section 35 (2) as including the Indian Inuit and Métis peoples of Canada.

g) 'Single Aboriginal responses' includes persons who are in only one Aboriginal group that is First Nations (North American Indian) Métis or Inuk (Inuit).

h) Users should be aware that the estimates associated with this variable are more affected than most by the incomplete enumeration of certain Indian reserves and Indian settlements in the 2016 Census of Population. For additional information refer to the Aboriginal Peoples Reference Guide Census of Population 2016.

i) 'Multiple Aboriginal responses' includes persons who are any two or all three of the following: First Nations (North American Indian) Métis or Inuk (Inuit).

j) 'Aboriginal responses not included elsewhere' includes persons who are not First Nations (North American Indian) Métis or Inuk (Inuit) but who have Registered or Treaty Indian status and/or Membership in a First Nation or Indian band.

k) Ratios in total population and total Aboriginal identity, including by sex, calculated by InterGroup Consultants Ltd.

LSA = local study area; RSA = regional study area; n/c = not calculated.

Table A-6c: Proportion of Population Identifying as Indigenous, for Local Study Area Communities, 2016

Identity	Birch Narrows Dene Nation[a,b]	Buffalo Narrows[a,b]	Buffalo River Dene Nation 193[a,b]	Clearwater River Dene 222[a,b]	La Loche[a,b]	Michel Village[a,b]	St. George's Hill[a,b]	Turnor Lake[a,b]	LSA Total[c]
Total identity[d]	**475**	**1,040**	**780**	**820**	**2,365**	**60**	**130**	**150**	**5,820**
Aboriginal identity[e]	460	910	770	810	2,280	60	130	145	**5,565**
Single Aboriginal responses[f]	465	905	770	810	2,280	55	120	145	**5,550**
First Nations[g]	440	180	755	780	1,095	20	100	60	**3,430**
Métis	20	730	10	30	1,185	35	20	90	**2,120**
Inuk (Inuit)	0	0	0	0	0	0	0	0	**0**
Multiple Aboriginal responses[h]	0	0	0	0	10	0	10	0	**20**
Aboriginal responses not included elsewhere[i]	0	0	0	0	0	0	0	0	**0**
Non-Aboriginal identity	15	135	10	10	85	0	0	0	**255**
Proportions of Aboriginal and Non-Aboriginal identity[j]									
Aboriginal identity	96.8%	87.5%	98.7%	98.8%	96.4%	100.0%	100.0%	96.7%	95.6%
Non-Aboriginal identity	3.2%	13.0%	1.3%	1.2%	3.6%	0.0%	0.0%	0.0%	4.4%
Proportions of Aboriginal identity groups[j]									
Single Aboriginal responses	101.1%	99.5%	100.0%	100.0%	100.0%	91.7%	92.3%	100.0%	99.7%
First Nations	95.7%	19.8%	98.1%	96.3%	48.0%	33.3%	76.9%	41.4%	61.6%
Métis	4.3%	80.2%	1.3%	3.7%	52.0%	58.3%	15.4%	62.1%	38.1%
Inuk (Inuit)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Multiple Aboriginal responses	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	7.7%	0.0%	0.4%
Aboriginal responses not included elsewhere	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Statistics Canada 2016 Census.
a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.
d) Users should be aware that the estimates associated with this variable are more affected than most by the incomplete enumeration of certain Indian reserves and Indian settlements in the 2016 Census of Population. For more information on Aboriginal variables including information on their classifications the questions from which they are derived data quality and their comparability with other sources of data refer to the Aboriginal Peoples Reference Guide Census of Population 2016 and the Aboriginal Peoples Technical Report Census of Population 2016.
e) 'Aboriginal identity' includes persons who are First Nations (North American Indian) Métis or Inuk (Inuit) and/or those who are Registered or Treaty Indians (that is registered under the Indian Act of Canada) and/or those who have membership in a First Nation or Indian band. Aboriginal peoples of Canada are defined in the Constitution Act 1982 section 35 (2) as including the Indian Inuit and Métis peoples of Canada.
f) 'Single Aboriginal responses' includes persons who are in only one Aboriginal group that is First Nations (North American Indian) Métis or Inuk (Inuit).
g) Users should be aware that the estimates associated with this variable are more affected than most by the incomplete enumeration of certain Indian reserves and Indian settlements in the 2016 Census of Population. For additional information refer to the Aboriginal Peoples Reference Guide Census of Population 2016.
h) 'Multiple Aboriginal responses' includes persons who are any two or all three of the following: First Nations (North American Indian) Métis or Inuk (Inuit).
i) 'Aboriginal responses not included elsewhere' includes persons who are not First Nations (North American Indian) Métis or Inuk (Inuit) but who have Registered or Treaty Indian status and/or Membership in a First Nation or Indian band.
j) Proportions of Aboriginal and non-Aboriginal identity, and proportions of Aboriginal identity groups calculated by InterGroup Consultants Ltd.
LSA = local study area.

Table A-7: LSA First Nation Communities Registered Population as of June, 2021

Residency	Number of People				Ratio in Total			
	Clearwater River Dene	Buffalo River Dene Nation	Birch Narrows First Nation	Total	Clearwater River Dene	Buffalo River Dene Nation	Birch Narrows First Nation	Total
Registered On Own Reserve	1,049	794	448	**2,291**	38.0%	51.7%	51.5%	**44.3%**
Registered On Other Reserves	39	46	42	**127**	1.4%	3.0%	4.8%	**2.5%**
Registered On Own Crown Land	0	0	0	**0**	0.0%	0.0%	0.0%	**0.0%**
Registered On Other Band Crown Land	0	0	0	**0**	0.0%	0.0%	0.0%	**0.0%**
Registered On No Band Crown Land	7	0	0	**7**	0.3%	0.0%	0.0%	**0.1%**
Registered Off Reserve	1,669	696	380	**2,745**	60.4%	45.3%	43.7%	**53.1%**
Total Registered Population	**2,764**	**1,536**	**870**	**5,170**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Indigenous and Northern Affairs Canada
Note: Ratios in total calculated by InterGroup Consultants Ltd.

Table A-8: Persons who were eligible for Saskatchewan health insurance benefits

Community	Health Coverage Report (HCR)							HCR Region
	2015	2016	2017	2018	2019	2020	2021	
Buffalo Narrows	1,421	1,443	1,428	1,374	1,369	1,426	1,379	Keewatin Yatthé
Clearwater River Dene Band Indian Reserve	661	716	733	765	796	806	830	Keewatin Yatthé
Dillon (for Buffalo River Dene Nation 193 [Peter Pond Lake 193])	958	986	994	995	1,022	1,022	1,027	Keewatin Yatthé
La Loche	3,270	3,302	3,308	3,176	3,270	3,359	3,289	Keewatin Yatthé
Turnor Lake	676	688	695	682	688	690	713	Keewatin Yatthé
TOTAL	**6,986**	**7,135**	**7,158**	**6,992**	**7,145**	**7,303**	**7,238**	

Source: eHealthSaskatchewan, Saskatchewan Health Coverage Reports
https://opendata.ehealthsask.ca/MicroStrategyPublic/asp/Main.aspx

Note:

The Saskatchewan Health Coverage Report is a count of persons who were eligible for Saskatchewan health insurance benefits as of June 30 of the year.

The Saskatchewan Health Coverage Report is not a population census and should not be used as such.

Coverage for an individual begins on the first day of the third month following their arrival to Saskatchewan. Residents with at least one day of coverage in the month of June are counted. Residents leaving the province remain eligible for coverage for this same period. In the case of death, people who had coverage any time in June are included. Coverage is available to residents temporarily living outside of the province (i.e. students, contract employees, etc.) For these cases, addresses from outside of Saskatchewan are acceptable. In the event that only the out-of-province address is available, the person is counted in the Out-of-Province category.

In previous years, individuals were distributed into residence codes based on the address hierarchy explained above. Reporting, starting in 2010, will now present distribution based on the community locations provided by PHRS (Person Health Registration System).

The correspondence address is the only address that is mandatory for collection in PHRS. In cases where the correspondence address is different from the residence, this may result in inaccuracies in the distribution.

Table A-9a: Proportion of Population who are migrants within 1-year and 5-years, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 2016

Metric	LSA[a,b,c]			Northern Saskatchewan (RSA) [a,b,d]			Saskatchewan [a,b]		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total - Mobility status 1 year ago - 25% sample data [e]	**5,755**	**2,800**	**2,950**	**36,110**	**18,140**	**17,970**	**1,055,820**	**525,975**	**529,850**
Non-movers	5,280	2,565	2,705	32,390	16,310	16,080	905,630	451,665	453,965
Movers	475	230	245	3,720	1,825	1,885	150,195	74,310	75,880
Non-migrants	345	180	170	2,415	1,160	1,260	89,005	43,990	45,015
Migrants	130	85	60	1,305	670	630	61,185	30,320	30,865
Internal migrants	150	55	70	1,275	660	620	49,930	24,855	25,075
Intraprovincial migrants	95	55	75	1,040	525	520	35,965	17,690	18,275
Interprovincial migrants	30	20	10	235	135	105	13,970	7,165	6,805
External migrants	-	-	-	25	15	15	11,255	5,465	5,790
Proportion[g]									
Non-movers	91.7%	91.6%	91.7%	89.7%	89.9%	89.5%	85.8%	85.9%	85.7%
Movers	8.3%	8.2%	8.3%	10.3%	10.1%	10.5%	14.2%	14.1%	14.3%
Non-migrants	6.0%	6.4%	5.8%	6.7%	6.4%	7.0%	8.4%	8.4%	8.5%
Migrants	2.3%	3.0%	2.0%	3.6%	3.7%	3.5%	5.8%	5.8%	5.8%
Internal migrants	2.6%	2.0%	2.4%	3.5%	3.6%	3.5%	4.7%	4.7%	4.7%
Intraprovincial migrants	1.7%	2.0%	2.5%	2.9%	2.9%	2.9%	3.4%	3.4%	3.4%
Interprovincial migrants	0.5%	0.7%	0.3%	0.7%	0.7%	0.6%	1.3%	1.4%	1.3%
External migrants	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	1.1%	1.0%	1.1%
Total - Mobility status 5 years ago - 25% sample data [f]	**5,255**	**2,545**	**2,710**	**32,915**	**16,490**	**16,430**	**998,200**	**496,505**	**501,695**
Non-movers	3,880	1,885	1,985	23,980	12,180	11,800	602,890	300,715	302,175
Movers	1,380	650	745	8,940	4,315	4,630	395,310	195,790	199,520
Non-migrants	975	460	510	5,700	2,760	2,935	201,450	99,955	101,495
Migrants	415	195	220	3,245	1,550	1,690	193,860	95,835	98,025
Internal migrants	410	190	240	3,130	1,490	1,645	147,360	72,815	74,540
Intraprovincial migrants	295	135	170	2,375	1,085	1,295	98,780	47,825	50,950
Interprovincial migrants	85	55	50	755	405	350	48,585	24,995	23,590
External migrants	20	20	20	115	65	50	46,500	23,015	23,485
Proportion[g]									
Non-movers	73.8%	74.1%	73.2%	72.9%	73.9%	71.8%	60.4%	60.6%	60.2%
Movers	26.3%	25.5%	27.5%	27.2%	26.2%	28.2%	39.6%	39.4%	39.8%
Non-migrants	18.6%	18.1%	18.8%	17.3%	16.7%	17.9%	20.2%	20.1%	20.2%
Migrants	7.9%	7.7%	8.1%	9.9%	9.4%	10.3%	19.4%	19.3%	19.5%
Internal migrants	7.8%	7.5%	8.9%	9.5%	9.0%	10.0%	14.8%	14.7%	14.9%
Intraprovincial migrants	5.6%	5.3%	6.3%	7.2%	6.6%	7.9%	9.9%	9.6%	10.2%
Interprovincial migrants	1.6%	2.2%	1.8%	2.3%	2.5%	2.1%	4.9%	5.0%	4.7%
External migrants	0.4%	0.8%	0.7%	0.3%	0.4%	0.3%	4.7%	4.6%	4.7%

Source: Statistics Canada 2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Descharme Lake, and Garson Lake.

d) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.

e) Refers to the status of a person with regard to the place of residence on the reference day May 10 2016 in relation to the place of residence on the same date one year earlier at the provincial level. Persons who have not moved are referred to as non-movers and persons who have moved from one residence to another are referred to as movers. Movers include non-migrants and migrants. Non-migrants are persons who did move but remained in the same city town township village or Indian reserve. Migrants include internal migrants who moved to a different city town township village or Indian reserve within Canada. External migrants include persons who lived outside Canada at the earlier reference date.

f) Refers to the status of a person with regard to the place of residence on the reference day 10 May 2016 in relation to the place of residence on the same date five years earlier at the provincial level. Persons who have not moved are referred to as non-movers and persons who have moved from one residence to another are referred to as movers. Movers include non-migrants and migrants. Non-migrants are persons who did move but remained in the same city town township village or Indian reserve. Migrants include internal migrants who moved to a different city town township village or Indian reserve within Canada. External migrants include persons who lived outside Canada at the earlier reference date.

g) Proportions of mobility status by groups calculated by InterGroup Consultants Ltd.

LSA = local study area; RSA = regional study area.

Table A-9b: Proportion of Population who are migrants within 1-year and 5-years, for Local Study Area Communities, 2016

Community	1 year ago[a,b,c]			5 years ago[a,b,d]		
	Total	Migrants	%	Total	Migrants	%
Birch Narrows Dene Nation	465	15	3.2%	420	55	13.1%
Black Point	40	10	25.0%	40	10	25.0%
Buffalo Narrows	1,040	45	4.3%	955	120	12.6%
Buffalo River Dene Nation 193	760	10	1.3%	710	55	7.7%
Clearwater River Dene 222	805	15	1.9%	730	50	6.8%
La Loche	2,315	25	1.1%	2,090	80	3.8%
Michel Village	60	0	0.0%	55	0	0.0%
St. George's Hill	125	0	0.0%	120	20	16.7%
Turnor Lake	145	10	6.9%	135	25	18.5%
LSA Total[e]	**5,755**	**130**	**2.3%**	**5,255**	**415**	**7.9%**

Source: Statistics Canada 2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Refers to the status of a person with regard to the place of residence on the reference day May 10 2016 in relation to the place of residence on the same date one year earlier at the provincial level. Persons who have not moved are referred to as non-movers and persons who have moved from one residence to another are referred to as movers. Movers include non-migrants and migrants. Non-migrants are persons who did move but remained in the same city town township village or Indian reserve. Migrants include internal migrants who moved to a different city town township village or Indian reserve within Canada. External migrants include persons who lived outside Canada at the earlier reference date.

d) Refers to the status of a person with regard to the place of residence on the reference day May 10 2016 in relation to the place of residence on the same date five years earlier at the provincial level. Persons who have not moved are referred to as non-movers and persons who have moved from one residence to another are referred to as movers. Movers include non-migrants and migrants. Non-migrants are persons who did move but remained in the same city town township village or Indian reserve. Migrants include internal migrants who moved to a different city town township village or Indian reserve within Canada. External migrants include persons who lived outside Canada at the earlier reference date.

e) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Descharme Lake, and Garson Lake.

LSA = local study area.

Table A-10a: Population Projection for Saskatchewan Keewatin Yatthé Regional Health Authority for 2018-2049

Years	Projection[a]								
	Low Growth	Medium Growth M1 [b]	Medium Growth M2 [b]	Medium Growth M3 [b]	Medium Growth M4 [b]	Medium Growth M5 [b]	High Growth	Slow-aging	Fast-aging
2018	11,139	11,139	11,139	11,139	11,139	11,139	11,139	11,139	11,139
2019	11,139	11,148	11,144	11,149	11,166	11,154	11,158	11,154	11,143
2020	11,132	11,154	11,147	11,154	11,189	11,166	11,177	11,167	11,141
2021	11,120	11,158	11,146	11,158	11,210	11,175	11,196	11,180	11,135
2022	11,103	11,159	11,143	11,158	11,229	11,183	11,215	11,192	11,126
2023	11,082	11,159	11,139	11,157	11,246	11,190	11,235	11,203	11,114
2024	11,057	11,156	11,132	11,153	11,260	11,194	11,253	11,212	11,098
2025	11,028	11,151	11,123	11,147	11,271	11,196	11,271	11,220	11,079
2026	10,998	11,145	11,114	11,140	11,282	11,198	11,290	11,228	11,060
2027	10,965	11,138	11,103	11,131	11,291	11,198	11,308	11,234	11,038
2028	10,929	11,129	11,091	11,121	11,298	11,197	11,326	11,241	11,014
2029	10,892	11,120	11,078	11,110	11,304	11,195	11,345	11,247	10,989
2030	10,855	11,111	11,065	11,099	11,310	11,194	11,364	11,254	10,964
2031	10,816	11,103	11,053	11,088	11,316	11,193	11,385	11,261	10,939
2032	10,778	11,095	11,041	11,077	11,322	11,193	11,407	11,270	10,913
2033	10,739	11,086	11,029	11,066	11,329	11,193	11,430	11,280	10,887
2034	10,700	11,079	11,018	11,055	11,335	11,194	11,455	11,291	10,861
2035	10,660	11,071	11,007	11,044	11,341	11,194	11,480	11,303	10,834
2036	10,619	11,064	10,996	11,033	11,347	11,195	11,506	11,316	10,806
2037	10,579	11,057	10,985	11,022	11,353	11,196	11,534	11,331	10,777
2038	10,537	11,049	10,975	11,011	11,358	11,196	11,562	11,347	10,747
2039	10,496	11,043	10,964	11,000	11,364	11,197	11,592	11,365	10,717
2040	10,454	11,037	10,955	10,990	11,370	11,199	11,624	11,386	10,685
2041	10,412	11,031	10,946	10,979	11,376	11,202	11,658	11,409	10,653
2042	10,369	11,026	10,936	10,968	11,382	11,205	11,692	11,434	10,619
2043	10,326	11,020	10,927	10,957	11,387	11,207	11,729	11,461	10,584
2044	10,280	11,012	10,916	10,944	11,391	11,208	11,764	11,487	10,546
2045	10,233	11,003	10,903	10,930	11,393	11,208	11,799	11,514	10,506
2046	10,184	10,993	10,890	10,913	11,393	11,206	11,834	11,540	10,463
2047	10,133	10,982	10,875	10,896	11,392	11,203	11,868	11,567	10,419
2048	10,082	10,969	10,858	10,877	11,389	11,199	11,902	11,593	10,374
2049	10,029	10,956	10,842	10,857	11,385	11,195	11,936	11,620	10,327
Average annual population change[c]	-0.34%	-0.05%	-0.09%	-0.08%	0.07%	0.02%	0.22%	0.14%	-0.24%
Cumulative population change[c]	-9.96%	-1.64%	-2.67%	-2.53%	2.21%	0.50%	7.16%	4.32%	-7.29%

Source: Statistics Canada, Custom projections for Health Regions in Canada (2018-2043).
Note:
a) These projections use the same methodology, assumptions and scenarios as in the Population Projections for Canada (2018 to 2068), provinces and territories (2018 to 2043), adapted to Health Regions (a description of the methodology and assumptions of these projections can be found here: https://www150.statcan.gc.ca/n1/pub/91-620-x/91-620-x2019001-eng.pdf.) The methods combine the use of historical data and the opinion of experts for each component of growth to develop future trajectories specific to each Health Regions. Generally, the same method has been used for all Health Regions. However, in Health Regions with small populations, where the counts of demographic events recorded annually are usually small, the past trends are often noisy, being very affected by random fluctuations. For this reason, some compromises were made in the less populated Health Regions (including Keewatin Yatthé), such as using the trends in both sex together instead of doing it for each sex separately, or keeping the age structure constant over time (for the projected changes in a given component of growth).
b) To account for the high uncertainty associated with internal migration projection, five assumptions are proposed, each based on a distinct reference period, and constituting the basis for a distinct scenario. Together, these assumptions demonstrate the high volatility of this component over time. Assumption M1, which can be considered an average scenario to some extent, is based on the longest period for which data are available for all provinces and territories (after the creation of Nunavut), from 1991/1992 to 2016/2017.67 Assumptions M2 to M5 reflect shorter intervals within the aforementioned period. Reference periods were selected so that each province and territory has at least one past period of relatively favourable net interprovincial migration, and another past period of relatively unfavourable net interprovincial migration.
c) Average annual population change and cumulative population change calculated by InterGroup Consultants Ltd.

Table A-10b: Population Projection for Saskatchewan for 2018-2043

Years	Projection								
	Low Growth [b]	Medium Growth M1 [c]	Medium Growth M2 [d]	Medium Growth M3 [e]	Medium Growth M4 [f]	Medium Growth M5 [g]	High Growth [h]	Slow-aging [i]	Fast-aging [j]
2018 [a]	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162
2019	1,176	1,178	1,178	1,179	1,181	1,177	1,181	1,180	1,177
2020	1,191	1,195	1,195	1,198	1,200	1,194	1,200	1,199	1,192
2021	1,205	1,213	1,212	1,217	1,221	1,211	1,221	1,219	1,207
2022	1,219	1,231	1,230	1,236	1,242	1,228	1,243	1,240	1,222
2023	1,234	1,250	1,248	1,256	1,263	1,246	1,266	1,262	1,237
2024	1,247	1,268	1,266	1,277	1,285	1,264	1,289	1,284	1,252
2025	1,261	1,287	1,285	1,297	1,306	1,282	1,313	1,307	1,267
2026	1,274	1,306	1,303	1,317	1,328	1,300	1,338	1,330	1,282
2027	1,287	1,325	1,322	1,338	1,350	1,318	1,363	1,354	1,296
2028	1,300	1,343	1,340	1,358	1,372	1,336	1,389	1,378	1,310
2029	1,312	1,362	1,358	1,378	1,394	1,354	1,414	1,402	1,324
2030	1,324	1,380	1,376	1,398	1,416	1,372	1,441	1,427	1,337
2031	1,335	1,399	1,394	1,418	1,438	1,390	1,467	1,451	1,350
2032	1,346	1,417	1,412	1,438	1,460	1,407	1,493	1,475	1,363
2033	1,356	1,434	1,429	1,457	1,482	1,425	1,520	1,500	1,375
2034	1,366	1,452	1,446	1,476	1,503	1,442	1,546	1,524	1,387
2035	1,375	1,469	1,462	1,495	1,524	1,458	1,573	1,549	1,398
2036	1,384	1,486	1,479	1,514	1,545	1,475	1,600	1,573	1,409
2037	1,392	1,502	1,494	1,532	1,566	1,491	1,626	1,597	1,419
2038	1,400	1,518	1,510	1,550	1,586	1,507	1,652	1,622	1,429
2039	1,407	1,534	1,525	1,567	1,606	1,522	1,678	1,646	1,438
2040	1,414	1,549	1,539	1,584	1,626	1,537	1,704	1,669	1,446
2041	1,421	1,563	1,553	1,600	1,645	1,552	1,730	1,693	1,455
2042	1,426	1,578	1,567	1,616	1,664	1,566	1,755	1,716	1,462
2043	1,432	1,591	1,580	1,632	1,683	1,580	1,780	1,739	1,469
Average annual population change[k]	0.84%	1.26%	1.24%	1.37%	1.49%	1.24%	1.72%	1.62%	0.94%

Table A-10b: Population Projection for Saskatchewan for 2018-2043

Years	Projection								
	Low Growth [b]	Medium Growth M1 [c]	Medium Growth M2 [d]	Medium Growth M3 [e]	Medium Growth M4 [f]	Medium Growth M5 [g]	High Growth [h]	Slow-aging [i]	Fast-aging [j]
Cumulative population change[k]	23.20%	36.92%	35.94%	40.41%	44.80%	35.93%	53.19%	49.63%	26.41%

Source: Statistics Canada. Table 17-10-0057-01 Projected population, by projection scenario, age and sex, as of July 1 (x 1,000).

Note:

a) The base population for these projections is derived from the official preliminary postcensal estimates of the population for Canada, provinces and territories as of July 1, 2018. In all scenarios, the population is projected until 2043 for the provinces and territories, and until 2068 for Canada as a whole. For more detail on the assumptions and scenarios, please refer to the projection report (catalogue 91-520) and the technical report (catalogue 91-620). Because of rounding, counts within tables may differ from the totals.

b) The low-growth scenario contains the following assumptions at the Canada level: the total fertility rate reaches 1.40 children per woman in 2042/2043 and remains constant thereafter; life expectancy at birth reaches 85.6 years for males and 88.8 years for females in 2067/2068; interprovincial migration is based on the trends observed between 1991/1992 and 2016/2017; the immigration rate reaches 0.65% in 2042/2043 and remains constant thereafter; the annual number of non-permanent residents reaches 1,080,910 in 2043 and remains constant thereafter; the net emigration rate reaches 0.18% in 2042/2043 and remains constant thereafter.

c) The medium-growth (M1) scenario contains the following assumptions at the Canada level: the total fertility rate reaches 1.59 children per woman in 2042/2043 and remains constant thereafter; life expectancy at birth reaches 87.0 years for males and 89.0 years for females in 2067/2068; interprovincial migration is based on the trends observed between 1991/1992 and 2016/2017; the immigration rate reaches 0.83% in 2042/2043 and remains constant thereafter; the annual number of non-permanent residents reaches 1,397,060 in 2043 and remains constant thereafter; the net emigration rate reaches 0.15% in 2042/2043 and remains constant thereafter.

d) The medium-growth (M2) scenario contains the following assumptions at the Canada level: the total fertility rate reaches 1.59 children per woman in 2042/2043 and remains constant thereafter; life expectancy at birth reaches 87.0 years for males and 89.0 years for females in 2067/2068; interprovincial migration is based on the trends observed between 1995/1996 and 2010/2011; the immigration rate reaches 0.83% in 2042/2043 and remains constant thereafter; the annual number of non-permanent residents reaches 1,397,060 in 2043 and remains constant thereafter; the net emigration rate reaches 0.15% in 2042/2043 and remains constant thereafter.

e) The medium-growth (M3) scenario contains the following assumptions at the Canada level: the total fertility rate reaches 1.59 children per woman in 2042/2043 and remains constant thereafter; life expectancy at birth reaches 87.0 years for males and 89.0 years for females in 2067/2068; interprovincial migration is based on the trends observed between 2003/2004 and 2008/2009; the immigration rate reaches 0.83% in 2042/2043 and remains constant thereafter; the annual number of non-permanent residents reaches 1,397,060 in 2043 and remains constant thereafter; the net emigration rate reaches 0.15% in 2042/2043 and remains constant thereafter.

f) The medium-growth (M4) scenario contains the following assumptions at the Canada level: the total fertility rate reaches 1.59 children per woman in 2042/2043 and remains constant thereafter; life expectancy at birth reaches 87.0 years for males and 89.0 years for females in 2067/2068; interprovincial migration is based on the trends observed between 2009/2010 and 2016/2017; the immigration rate reaches 0.83% in 2042/2043 and remains constant thereafter; the annual number of non-permanent residents reaches 1,397,060 in 2043 and remains constant thereafter; the net emigration rate reaches 0.15% in 2042/2043 and remains constant thereafter.

g) The medium-growth (M5) scenario contains the following assumptions at the Canada level: the total fertility rate reaches 1.59 children per woman in 2042/2043 and remains constant thereafter; life expectancy at birth reaches 87.0 years for males and 89.0 years for females in 2067/2068; interprovincial migration is based on the trends observed between 2014/2015 and 2016/2017; the immigration rate reaches 0.83% in 2042/2043 and remains constant thereafter; the annual number of non-permanent residents reaches 1,397,060 in 2043 and remains constant thereafter; the net emigration rate reaches 0.15% in 2042/2043 and remains constant thereafter.

h) The high-growth scenario contains the following assumptions at the Canada level: the total fertility rate reaches 1.79 children per woman in 2042/2043 and remains constant thereafter; life expectancy at birth reaches 88.0 years for males and 91.3 years for females in 2067/2068; interprovincial migration is based on the trends observed between 1991/1992 and 2016/2017; the immigration rate reaches 1.08% in 2042/2043 and remains constant thereafter; the annual number of non-permanent residents reaches 1,944,400 in 2043 and remains constant thereafter; the net emigration rate reaches 0.13% in 2042/2043 and remains constant thereafter.

i) The slow-aging scenario contains the following assumptions at the Canada level: the total fertility rate reaches 1.79 children per woman in 2042/2043 and remains constant thereafter; life expectancy at birth reaches 85.6 years for males and 88.8 years for females in 2067/2068; interprovincial migration is based on the trends observed between 1991/1992 and 2016/2017; the immigration rate reaches 1.08% in 2042/2043 and remains constant thereafter; the annual number of non-permanent residents reaches 1,944,400 in 2043 and remains constant thereafter; the net emigration rate reaches 0.13% in 2042/2043 and remains constant thereafter.

j) The fast-aging scenario contains the following assumptions at the Canada level: the total fertility rate reaches 1.40 children per woman in 2042/2043 and remains constant thereafter; life expectancy at birth reaches 88.0 years for males and 91.3 years for females in 2067/2068; interprovincial migration is based on the trends observed between 1991/1992 and 2016/2017; the immigration rate reaches 0.65% in 2042/2043 and remains constant thereafter; the annual number of non-permanent residents reaches 1,080,910 in 2043 and remains constant thereafter; the net emigration rate reaches 0.18% in 2042/2043 and remains constant thereafter.

k) Average annual population change and cumulative population change calculated by InterGroup Consultants Ltd.

Table A-11: Labour Force Status Change, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 1986 to 2016

	Local Study Area (LSA) [a,b,c]							Northern Saskatchewan (RSA) [a,b,d]							Saskatchewan [a,b]						
	1986	1991	1996	2001	2006	2011	2016	1986	1991	1996	2001	2006	2011	2016	1986	1991	1996	2001	2006	2011	2016
Total - Population aged 15 years and over [e]	**2,500**	**2,565**	**2,805**	**3,095**	**3,605**	**3,735**	**4,045**	**15,500**	**16,360**	**19,035**	**20,105**	**22,365**	**24,795**	**25,295**	**751,090**	**738,680**	**748,135**	**755,520**	**766,230**	**812,505**	**857,295**
In the labour force [e]	1,155	1,160	1,515	1,690	1,555	1,315	1,815	8,315	8,545	10,445	10,785	11,280	11,585	12,355	501,750	506,295	503,500	512,240	524,305	562,310	585,540
Employed [f]	765	820	1,075	1,105	1,165	1,060	1,320	6,345	6,630	8,330	8,180	9,005	9,520	9,420	461,515	470,475	467,285	479,735	494,900	529,100	544,095
Unemployed [g]	405	315	445	580	400	250	500	1,975	1,915	2,110	2,610	2,275	2,070	2,935	40,225	35,820	36,215	32,505	29,400	33,210	41,445
Not in the labour force [h]	1,345	1,410	1,285	1,410	2,050	2,420	2,250	7,185	7,815	8,590	9,320	11,085	13,205	12,940	249,340	232,380	244,630	243,285	241,930	250,190	271,760
Participation rate [i]	46.2%	45.2%	54.0%	54.6%	43.1%	35.2%	44.9%	53.6%	52.2%	54.9%	53.6%	50.4%	46.7%	48.8%	66.8%	68.5%	67.3%	67.8%	68.4%	69.2%	68.3%
Employment rate [j]	30.6%	32.0%	38.3%	35.7%	32.3%	28.4%	32.6%	40.9%	40.5%	43.8%	40.7%	40.3%	38.4%	37.2%	61.4%	63.7%	62.5%	63.5%	64.6%	65.1%	63.5%
Unemployment rate [k]	35.1%	27.2%	29.4%	34.3%	25.7%	19.0%	27.5%	23.8%	22.4%	20.2%	24.2%	20.2%	17.9%	23.8%	8.0%	7.1%	7.2%	6.3%	5.6%	5.9%	7.1%

Source: Statistics Canada 1981-2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available: for all years for Bear Creek, Black Point (except 2016), Descharme Lake, and Garson Lake; for 2011 for Birch Narrows Dene Nation - Turnor Lake 193B and Turnor Lake.

d) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.

e) Refers to whether a person aged 15 years and over was employed unemployed or not in the labour force during the week of Sunday May 1 to Saturday May 7 2016.

f) "Employed" refers to persons 15 years and over, excluding institutional residents who, during the week prior to Census Day: “(a) Did any work at all at a job or business, that is, paid work in the context of an employer-employee relationship, or self-employment. This also includes persons who did unpaid family work, which is defined as unpaid work contributing directly to the operation of a farm, business or professional practice owned and operated by a related member of the same household; or (b) Had a job but were not at work due to factors such as their own illness or disability, personal or family responsibilities, vacation or a labour dispute. This category excludes persons not at work because they were on layoff or between casual jobs, and those who did not then have a job (even if they had a job to start at a future date).” (Source: 2016 Census Dictionary).

g) “Unemployed" refers to persons who, during the week of Sunday May 1 to Saturday May 7 2016, were without paid work or without self-employment work and were available for work and either: a) had actively looked for paid work in the past four weeks; or b) were on temporary lay-off and expected to return to their job; or c) had definite arrangements to start a new job in four weeks or less.” (Source: 2016 Census Dictionary).

h) “Not in the labour force" refers to persons who, during the week of Sunday May 1 to Saturday May 7 2016, were neither employed nor unemployed. It includes students, homemakers, retired workers, seasonal workers in an 'off' season who were not looking for work, and persons who could not work because of a long-term illness or disability.” (Source: 2016 Census Dictionary).

i) The “Participation Rate” refers to the number of people in the labour force in the week of Sunday May 1 to Saturday May 7 2016, as a percentage of the population 15 years and over. (Source: 2016 Census Dictionary).

j) The “Employment Rate” refers to the number of people employed in the week of Sunday May 1 to Saturday May 7 2016 as a percentage of the total population 15 years and over. (Source: 2016 Census Dictionary).

k) The “Unemployment Rate” refers to the number of people unemployed in the week of Sunday May 1 to Saturday May 7 2016 expressed as a percentage of the population in the labour force. (Source: 2016 Census Dictionary).

Table A-12: Labour force survey (LFS) estimates for Census Division No. 17 and 18, and Saskatchewan, for 2015/2016 to 2019/2020

Metric	Census Division No. 17 and 18 [a]					Saskatchewan [a]				
	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020
Participation rate [b]	74.0%	74.6%	73.3%	71.0%	67.8%	69.5%	68.9%	68.3%	68.3%	67.6%
Employment rate [c]	65.8%	67.5%	67.8%	65.6%	62.0%	65.5%	64.5%	64.0%	64.3%	62.9%
Unemployment rate [d]	11.1%	9.6%	7.4%	7.3%	8.5%	5.7%	6.4%	6.3%	5.9%	7.0%

Source: Statistics Canada, Labour Force Survey, obtained from Bureau of Statistics of Saskatchewan.

a) Labour force survey (LFS) estimates with 2-year moving averages.

b) The “Participation Rate” is the number of labour force participants expressed as a percentage of the population 15 years of age and over. The participation rate for a particular group (age, sex and marital status) is the number of labour force participants in that group expressed as a percentage of the population for that group. Estimates are percentages, rounded to the nearest tenth.

c) The “Employment Rate” (formerly the employment and population ratio) is the number of persons employed expressed as a percentage of the population 15 years of age and over. The employment rate for a particular group (age, sex and marital status) is the number employed in that group expressed as a percentage of the population for that group. Estimates are percentages, rounded to the nearest tenth.

d) The “Unemployment Rate” is the number of unemployed persons expressed as a percentage of the labour force. The unemployment rate for a particular group (age, sex and marital status) is the number unemployed in that group expressed as a percentage of the labour force for that group. Estimates are percentages, rounded to the nearest tenth.

Table A-13a: Labour Force Status, for Local Study Area, 1986 to 2016

	Local Study Area (LSA) [a,b,c]																				
	1986			1991			1996			2001			2006			2011			2016		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
Total - Population aged 15 years and over [e]	**2,500**	**1,330**	**1,170**	**2,565**	**1,285**	**1,275**	**2,805**	**1,370**	**1,440**	**3,095**	**1,475**	**1,625**	**3,605**	**1,755**	**1,850**	**3,735**	**1,780**	**1,940**	**4,045**	**1,925**	**2,140**
In the labour force [e]	1,155	775	380	1,160	705	455	1,515	840	675	1,690	920	775	1,555	830	730	1,315	655	655	1,815	905	905
Employed [f]	765	470	295	820	465	380	1,075	575	495	1,105	555	550	1,165	585	570	1,060	490	555	1,320	575	725
Unemployed [g]	405	320	85	315	235	85	445	275	170	580	355	215	400	235	150	250	160	85	500	320	190
Not in the labour force [h]	1,345	555	790	1,410	595	800	1,285	525	775	1,410	570	845	2,050	925	1,125	2,420	1,120	1,295	2,250	1,025	1,235
Participation rate [i]	46.2%	58.3%	32.5%	45.2%	54.9%	35.7%	54.0%	61.3%	46.9%	54.6%	62.4%	47.7%	43.1%	47.3%	39.5%	35.2%	36.8%	33.8%	44.9%	47.0%	42.3%
Employment rate [j]	30.6%	35.3%	25.2%	32.0%	36.2%	29.8%	38.3%	42.0%	34.4%	35.7%	37.6%	33.8%	32.3%	33.3%	30.8%	28.4%	27.5%	28.6%	32.6%	29.9%	33.9%
Unemployment rate [k]	35.1%	41.3%	22.4%	27.2%	33.3%	18.7%	29.4%	32.7%	25.2%	34.3%	38.6%	27.7%	25.7%	28.3%	20.5%	19.0%	24.4%	13.0%	27.5%	35.4%	21.0%

Source: Statistics Canada 1986-2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available: for all years for Bear Creek, Black Point (except 2016), Descharme Lake, and Garson Lake; for 2011 for Birch Narrows Dene Nation - Turnor Lake 193B and Turnor Lake.
d) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.
e) Refers to whether a person aged 15 years and over was employed unemployed or not in the labour force during the week of Sunday May 1 to Saturday May 7 2016.
f) "Employed" refers to persons 15 years and over, excluding institutional residents who, during the week prior to Census Day: “(a) Did any work at all at a job or business, that is, paid work in the context of an employer-employee relationship, or self-employment. This also includes persons who did unpaid family work, which is defined as unpaid work contributing directly to the operation of a farm, business or professional practice owned and operated by a related member of the same household; or (b) Had a job but were not at work due to factors such as their own illness or disability, personal or family responsibilities, vacation or a labour dispute. This category excludes persons not at work because they were on layoff or between casual jobs, and those who did not then have a job (even if they had a job to start at a future date).” (Source: 2016 Census Dictionary).
g) “Unemployed" refers to persons who, during the week of Sunday May 1 to Saturday May 7 2016, were without paid work or without self-employment work and were available for work and either: a) had actively looked for paid work in the past four weeks; or b) were on temporary lay-off and expected to return to their job; or c) had definite arrangements to start a new job in four weeks or less.” (Source: 2016 Census Dictionary).
h) “Not in the labour force" refers to persons who, during the week of Sunday May 1 to Saturday May 7 2016, were neither employed nor unemployed. It includes students, homemakers, retired workers, seasonal workers in an 'off' season who were not looking for work, and persons who could not work because of a long-term illness or disability.” (Source: 2016 Census Dictionary).
i) The “Participation Rate” refers to the number of people in the labour force in the week of Sunday May 1 to Saturday May 7 2016, as a percentage of the population 15 years and over. (Source: 2016 Census Dictionary).
j) The “Employment Rate” refers to the number of people employed in the week of Sunday May 1 to Saturday May 7 2016 as a percentage of the total population 15 years and over. (Source: 2016 Census Dictionary).
k) The “Unemployment Rate” refers to the number of people unemployed in the week of Sunday May 1 to Saturday May 7 2016 expressed as a percentage of the population in the labour force. (Source: 2016 Census Dictionary).

Table A-13b: Labour Force Characteristics for Local Study Area Communities, 2016

Metric	Local Study Area (LSA) [a,b,c]																										
	Birch Narrows Dene Nation			Buffalo Narrows			Buffalo River Dene Nation 193			Clearwater River Dene 222			La Loche			Michel Village			St. George's Hill			Turnor Lake			LSA Total		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total Population 15 Years and Over by Labour Force Activity [d]	**315**	**150**	**165**	**765**	**360**	**400**	**545**	**270**	**275**	**570**	**280**	**290**	**1,585**	**735**	**850**	**50**	**20**	**25**	**100**	**50**	**50**	**95**	**35**	**55**	**4,025**	**1,900**	**2,110**
In the Labour Force [d]	165	90	75	475	220	260	260	135	120	270	140	130	525	270	255	30	15	15	35	25	15	45	20	25	1,805	915	895
Employed [e]	115	50	60	415	175	240	175	85	90	150	60	90	380	175	205	20	0	15	30	15	10	25	15	10	1,310	575	720
Unemployed [f]	55	35	15	65	40	20	85	55	35	120	75	45	145	90	50	10	10	10	10	10	0	15	10	10	505	325	185
Not in the Labour Force [g]	150	60	85	285	140	145	290	135	150	300	145	155	1,060	470	590	20	0	10	60	30	35	55	15	30	2,220	995	1,200
Participation Rate [h]	52.4%	60.0%	45.5%	62.1%	61.1%	65.0%	47.7%	50.0%	43.6%	47.4%	50.0%	44.8%	33.1%	36.7%	30.0%	60.0%	75.0%	60.0%	35.0%	50.0%	30.0%	47.4%	57.1%	45.5%	44.8%	48.2%	42.4%
Employment Rate [i]	36.5%	33.3%	36.4%	54.2%	48.6%	60.0%	32.1%	31.5%	32.7%	26.3%	21.4%	31.0%	24.0%	23.8%	24.1%	40.0%	0.0%	60.0%	30.0%	30.0%	20.0%	26.3%	42.9%	18.2%	32.5%	30.3%	34.1%
Unemployment Rate [j]	33.3%	38.9%	20.0%	13.7%	18.2%	7.7%	32.7%	40.7%	29.2%	44.4%	53.6%	34.6%	27.6%	33.3%	19.6%	33.3%	66.7%	66.7%	28.6%	40.0%	0.0%	33.3%	50.0%	40.0%	28.0%	35.5%	20.7%

Source: Statistics Canada 2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.
d) Refers to whether a person aged 15 years and over was employed unemployed or not in the labour force during the week of Sunday May 1 to Saturday May 7 2016.
e) "Employed" refers to persons 15 years and over, excluding institutional residents who, during the week prior to Census Day: “(a) Did any work at all at a job or business, that is, paid work in the context of an employer-employee relationship, or self-employment. This also includes persons who did unpaid family work, which is defined as unpaid work contributing directly to the operation of a farm, business or professional practice owned and operated by a related member of the same household; or (b) Had a job but were not at work due to factors such as their own illness or disability, personal or family responsibilities, vacation or a labour dispute. This category excludes persons not at work because they were on layoff or between casual jobs, and those who did not then have a job (even if they had a job to start at a future date).” (Source: 2016 Census Dictionary).
f) “Unemployed" refers to persons who, during the week of Sunday May 1 to Saturday May 7 2016, were without paid work or without self-employment work and were available for work and either: a) had actively looked for paid work in the past four weeks; or b) were on temporary lay-off and expected to return to their job; or c) had definite arrangements to start a new job in four weeks or less.” (Source: 2016 Census Dictionary).
g) “Not in the labour force" refers to persons who, during the week of Sunday May 1 to Saturday May 7 2016, were neither employed nor unemployed. It includes students, homemakers, retired workers, seasonal workers in an 'off' season who were not looking for work, and persons who could not work because of a long-term illness or disability.” (Source: 2016 Census Dictionary).
h) The “Participation Rate” refers to the number of people in the labour force in the week of Sunday May 1 to Saturday May 7 2016, as a percentage of the population 15 years and over. (Source: 2016 Census Dictionary).
i) The “Employment Rate” refers to the number of people employed in the week of Sunday May 1 to Saturday May 7 2016 as a percentage of the total population 15 years and over. (Source: 2016 Census Dictionary).
j) The “Unemployment Rate” refers to the number of people unemployed in the week of Sunday May 1 to Saturday May 7 2016 expressed as a percentage of the population in the labour force. (Source: 2016 Census Dictionary).

Table A-14a: Labour Force Characteristics by Age Groups, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 2016

	Local Study Area (LSA) [a,b,c]			Northern Saskatchewan (RSA) [a,b,d]			Saskatchewan [a,b]		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total Population 15 Years and Over by Labour Force Activity [e]	**4,025**	**1,900**	**2,110**	**25,295**	**12,610**	**12,685**	**857,300**	**424,260**	**433,035**
In the Labour Force [e]	1,805	915	895	12,360	6,540	5,820	585,535	311,105	274,430
Employed [f]	1,310	575	720	9,415	4,665	4,755	544,090	286,330	257,760
Unemployed [g]	505	325	185	2,935	1,875	1,060	41,445	24,775	16,665
Not in the Labour Force [h]	2,220	995	1,200	12,940	6,070	6,870	271,760	113,155	158,605
Participation Rate [i]									
Total Population 15 Years and Over	44.8%	48.2%	42.4%	48.9%	51.9%	45.9%	68.3%	73.3%	63.4%
15 to 24 years	24.4%	27.4%	19.2%	29.8%	32.7%	26.6%	62.7%	64.0%	61.3%
25 to 34 years	53.7%	56.6%	49.5%	56.2%	62.1%	50.7%	84.7%	90.1%	79.3%
35 to 44 years	61.4%	66.1%	50.0%	65.9%	68.8%	62.9%	87.5%	91.9%	83.2%
45 to 54 years	62.1%	62.9%	58.4%	66.6%	69.3%	64.2%	86.5%	89.3%	83.8%
55 to 64 years	44.0%	48.7%	50.0%	56.3%	60.4%	52.3%	70.8%	76.5%	65.2%
65 years and over	25.0%	20.5%	25.7%	17.3%	20.2%	14.4%	22.1%	29.4%	15.8%
Employment Rate [j]									
Total Population 15 Years and Over	32.5%	30.3%	34.1%	37.2%	37.0%	37.5%	63.5%	67.5%	59.5%
15 to 24 years	11.7%	10.4%	16.2%	17.7%	17.7%	17.9%	54.0%	54.3%	53.7%
25 to 34 years	36.2%	34.2%	37.1%	38.5%	39.6%	37.5%	77.8%	82.5%	73.0%
35 to 44 years	46.5%	49.2%	39.7%	52.3%	51.0%	53.4%	82.4%	85.8%	79.0%
45 to 54 years	53.1%	43.5%	51.7%	56.2%	55.6%	57.1%	82.3%	83.9%	80.7%
55 to 64 years	37.3%	25.6%	36.1%	49.3%	49.5%	49.0%	67.4%	71.6%	63.2%
65 years and over	12.5%	15.4%	8.6%	15.5%	17.9%	12.7%	21.2%	28.0%	15.3%
Unemployment Rate [k]									
Total Population 15 Years and Over	28.0%	35.5%	20.7%	23.7%	28.7%	18.2%	7.1%	8.0%	6.1%
15 to 24 years	54.0%	62.1%	42.1%	40.2%	46.3%	32.3%	13.8%	15.1%	12.3%
25 to 34 years	33.7%	44.2%	27.1%	31.4%	36.2%	26.0%	8.2%	8.5%	7.9%
35 to 44 years	23.1%	35.9%	17.6%	20.6%	25.8%	15.1%	5.9%	6.6%	5.0%
45 to 54 years	20.0%	23.1%	11.5%	15.6%	20.1%	11.4%	4.9%	6.0%	3.7%
55 to 64 years	6.1%	10.5%	0.0%	12.8%	16.9%	7.1%	4.9%	6.4%	3.2%
65 years and over	11.1%	75.0%	0.0%	10.6%	9.4%	9.1%	4.2%	4.7%	3.4%

Table A-14a: Labour Force Characteristics by Age Groups, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 2016

	Local Study Area (LSA) [a,b,c]			Northern Saskatchewan (RSA) [a,b,d]			Saskatchewan [a,b]		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Not in the Labour Force Ratio[j,l]									
Total Population 15 Years and Over	55.2%	52.4%	56.9%	51.2%	48.1%	54.2%	31.7%	26.7%	36.6%
15 to 24 years	74.6%	70.8%	77.8%	70.2%	67.3%	73.2%	37.3%	36.0%	38.7%
25 to 34 years	46.3%	46.1%	50.5%	43.9%	38.1%	49.3%	15.3%	9.9%	20.7%
35 to 44 years	40.2%	32.2%	48.5%	34.1%	31.3%	37.1%	12.5%	8.1%	16.8%
45 to 54 years	37.9%	35.5%	40.4%	33.5%	30.7%	35.8%	13.5%	10.7%	16.2%
55 to 64 years	57.3%	53.8%	58.3%	43.5%	39.6%	47.7%	29.2%	23.5%	34.7%
65 years and over	83.3%	82.1%	71.4%	82.9%	79.8%	86.0%	77.9%	70.7%	84.2%

Source: Statistics Canada 2016 Census.
a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.
d) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.
e) Refers to whether a person aged 15 years and over was employed unemployed or not in the labour force during the week of Sunday May 1 to Saturday May 7 2016.
f) "Employed" refers to persons 15 years and over, excluding institutional residents who, during the week prior to Census Day: “(a) Did any work at all at a job or business, that is, paid work in the context of an employer-employee relationship, or self-employment. This also includes persons who did unpaid family work, which is defined as unpaid work contributing directly to the operation of a farm, business or professional practice owned and operated by a related member of the same household; or (b) Had a job but were not at work due to factors such as their own illness or disability, personal or family responsibilities, vacation or a labour dispute. This category excludes persons not at work because they were on layoff or between casual jobs, and those who did not then have a job (even if they had a job to start at a future date).” (Source: 2016 Census Dictionary).
g) “Unemployed" refers to persons who, during the week of Sunday May 1 to Saturday May 7 2016, were without paid work or without self-employment work and were available for work and either: a) had actively looked for paid work in the past four weeks; or b) were on temporary lay-off and expected to return to their job; or c) had definite arrangements to start a new job in four weeks or less.” (Source: 2016 Census Dictionary).
h) “Not in the labour force" refers to persons who, during the week of Sunday May 1 to Saturday May 7 2016, were neither employed nor unemployed. It includes students, homemakers, retired workers, seasonal workers in an 'off' season who were not looking for work, and persons who could not work because of a long-term illness or disability.” (Source: 2016 Census Dictionary).
i) The “Participation Rate” refers to the number of people in the labour force in the week of Sunday May 1 to Saturday May 7 2016, as a percentage of the population 15 years and over. (Source: 2016 Census Dictionary).
j) The “Employment Rate” refers to the number of people employed in the week of Sunday May 1 to Saturday May 7 2016 as a percentage of the total population 15 years and over. (Source: 2016 Census Dictionary).
k) The unemployment rate refers to the number of people unemployed in the week of Sunday 1 May to Saturday 7 May 2016 expressed as a percentage of the population in the labour force (Statistics Canada 2017b).
l) Not in the labour force ratios calculated by InterGroup Consultants Ltd.
LSA = local study area; RSA = regional study area.

Table A-14b: Labour Force Characteristics by Age Groups for Local Study Area Communities, 2016

	Birch Narrows Dene Nation[a,b]			Buffalo Narrows[a,b]			Buffalo River Dene Nation 193[a,b]			Clearwater River Dene 222[a,b]			La Loche[a,b]			Michel Village[a,b]			St. George's Hill[a,b]			Turnor Lake[a,b]			LSA[a,b,c]		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total Population 15 Years and Over by Labour Force Activity [d]	**315**	**150**	**165**	**765**	**360**	**400**	**545**	**270**	**275**	**570**	**280**	**290**	**1,585**	**735**	**850**	**50**	**20**	**25**	**100**	**50**	**50**	**95**	**35**	**55**	**4,025**	**1,900**	**2,110**
In the Labour Force [d]	165	90	75	475	220	260	260	135	120	270	140	130	525	270	255	30	15	15	35	25	15	45	20	25	1,805	915	895
Employed [e]	115	50	60	415	175	240	175	85	90	150	60	90	380	175	205	20	-	15	30	15	10	25	15	10	1,310	575	720
Unemployed [f]	55	35	15	65	40	20	85	55	35	120	75	45	145	90	50	10	10	10	10	10	-	15	10	10	505	325	185
Not in the Labour Force [g]	150	60	85	285	140	145	290	135	150	300	145	155	1,060	470	590	20	-	10	60	30	35	55	15	30	2,220	995	1,200
Participation Rate [h]																											
Total Population 15 Years and Over	52.4%	60.0%	45.5%	62.1%	61.1%	65.0%	47.7%	50.0%	43.6%	47.4%	50.0%	44.8%	33.1%	36.7%	30.0%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	44.8%	48.2%	42.4%
15 to 24 years	31.2%	44.4%	28.6%	34.6%	28.6%	45.5%	19.2%	23.1%	23.1%	27.8%	29.4%	15.8%	19.1%	22.9%	14.6%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	24.4%	27.4%	19.2%
25 to 34 years	68.4%	77.8%	54.5%	71.4%	69.2%	78.6%	57.7%	63.6%	57.1%	64.0%	58.3%	61.5%	38.6%	44.8%	36.6%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	53.7%	56.6%	49.5%
35 to 44 years	87.5%	75.0%	75.0%	75.0%	88.9%	72.7%	66.7%	85.7%	57.1%	66.7%	72.7%	54.5%	50.9%	58.3%	41.9%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	61.4%	66.1%	50.0%
45 to 54 years	55.6%	66.7%	50.0%	83.8%	84.6%	80.0%	65.2%	66.7%	58.3%	64.3%	50.0%	71.4%	43.4%	47.6%	39.4%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	62.1%	62.9%	58.4%
55 to 64 years	60.0%	66.7%	66.7%	64.7%	60.0%	83.3%	45.5%	50.0%	40.0%	44.4%	50.0%	60.0%	27.6%	28.6%	26.7%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	44.0%	48.7%	50.0%
65 years and over	0.0%	0.0%	0.0%	38.5%	42.9%	41.7%	22.2%	0.0%	0.0%	33.3%	0.0%	66.7%	20.0%	16.7%	22.2%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	25.0%	20.5%	25.7%
Employment Rate [i]																											
Total Population 15 Years and Over	36.5%	33.3%	36.4%	54.2%	48.6%	60.0%	32.1%	31.5%	32.7%	26.3%	21.4%	31.0%	24.0%	23.8%	24.1%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	32.5%	30.3%	34.1%
15 to 24 years	18.8%	22.2%	28.6%	15.4%	0.0%	36.4%	7.7%	15.4%	15.4%	5.6%	11.8%	10.5%	10.1%	10.4%	9.8%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	11.7%	10.4%	16.2%
25 to 34 years	42.1%	55.6%	36.4%	57.1%	53.8%	64.3%	30.8%	27.3%	42.9%	36.0%	25.0%	46.2%	27.1%	27.6%	26.8%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	36.2%	34.2%	37.1%
35 to 44 years	50.0%	75.0%	50.0%	75.0%	77.8%	63.6%	40.0%	57.1%	42.9%	38.1%	36.4%	36.4%	40.0%	45.8%	35.5%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	46.5%	49.2%	39.7%
45 to 54 years	44.4%	0.0%	50.0%	81.1%	76.9%	80.0%	52.2%	50.0%	58.3%	42.9%	25.0%	42.9%	34.0%	33.3%	33.3%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	53.1%	43.5%	51.7%
55 to 64 years	60.0%	0.0%	66.7%	58.8%	50.0%	66.7%	27.3%	33.3%	40.0%	44.4%	0.0%	40.0%	20.7%	21.4%	20.0%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	37.3%	25.6%	36.1%
65 years and over	0.0%	0.0%	0.0%	34.6%	28.6%	25.0%	0.0%	40.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	12.5%	15.4%	8.6%
Unemployment Rate [j]																											
Total Population 15 Years and Over	33.3%	38.9%	20.0%	13.7%	18.2%	7.7%	32.7%	40.7%	29.2%	44.4%	53.6%	34.6%	27.6%	33.3%	19.6%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	28.0%	35.5%	20.7%
15 to 24 years	60.0%	50.0%	0.0%	44.4%	75.0%	40.0%	60.0%	66.7%	66.7%	70.0%	100.0%	66.7%	47.1%	54.5%	33.3%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	54.0%	62.1%	42.1%
25 to 34 years	30.8%	42.9%	33.3%	25.0%	22.2%	27.3%	46.7%	57.1%	25.0%	43.8%	71.4%	25.0%	33.3%	38.5%	26.7%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	33.7%	44.2%	27.1%
35 to 44 years	28.6%	66.7%	0.0%	0.0%	0.0%	0.0%	30.0%	33.3%	50.0%	35.7%	50.0%	33.3%	21.4%	28.6%	15.4%	n/d	n;/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	23.1%	35.9%	17.6%
45 to 54 years	40.0%	0.0%	66.7%	0.0%	18.2%	0.0%	20.0%	25.0%	0.0%	44.4%	50.0%	40.0%	21.7%	30.0%	15.4%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	20.0%	23.1%	11.5%
55 to 64 years	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	50.0%	0.0%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	6.1%	10.5%	0.0%
65 years and over	0.0%	0.0%	0.0%	0.0%	66.7%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	11.1%	75.0%	0.0%
Not in the Labour Force Ratio																											
Total Population 15 Years and Over	47.6%	40.0%	51.5%	37.3%	38.9%	36.3%	53.2%	50.0%	54.5%	52.6%	51.8%	53.4%	66.9%	63.9%	69.4%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	55.2%	52.4%	56.9%
15 to 24 years	62.5%	55.6%	71.4%	65.4%	71.4%	63.6%	76.9%	69.2%	76.9%	72.2%	70.6%	78.9%	80.9%	77.1%	85.4%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	74.6%	70.8%	77.8%
25 to 34 years	36.8%	22.2%	45.5%	28.6%	30.8%	28.6%	38.5%	36.4%	42.9%	36.0%	41.7%	38.5%	61.4%	55.2%	65.9%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	46.3%	46.1%	50.5%
35 to 44 years	25.0%	50.0%	50.0%	15.0%	0.0%	27.3%	40.0%	28.6%	42.9%	42.9%	27.3%	45.5%	49.1%	41.7%	58.1%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	40.2%	32.2%	48.5%
45 to 54 years	33.3%	66.7%	33.3%	18.9%	15.4%	20.0%	34.8%	33.3%	41.7%	35.7%	37.5%	28.6%	56.6%	52.4%	60.6%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	37.9%	35.5%	40.4%
55 to 64 years	60.0%	66.7%	66.7%	35.3%	40.0%	33.3%	63.6%	50.0%	80.0%	44.4%	50.0%	40.0%	72.4%	71.4%	73.3%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	57.3%	53.8%	58.3%
65 years and over	100.0%	100.0%	100.0%	57.7%	50.0%	66.7%	77.8%	60.0%	66.7%	116.7%	125.0%	66.7%	100.0%	91.7%	100.0%	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	83.3%	82.1%	71.4%

Source: Statistics Canada 2016 Census.
a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.
d) Refers to whether a person aged 15 years and over was employed unemployed or not in the labour force during the week of Sunday May 1 to Saturday May 7 2016.
e) "Employed" refers to persons 15 years and over, excluding institutional residents who, during the week prior to Census Day: “(a) Did any work at all at a job or business, that is, paid work in the context of an employer-employee relationship, or self-employment. This also includes persons who did unpaid family work, which is defined as unpaid work contributing directly to the operation of a farm, business or professional practice owned and operated by a related member of the same household; or (b) Had a job but were not at work due to factors such as their own illness or disability, personal or family responsibilities, vacation or a labour dispute. This category excludes persons not at work because they were on layoff or between casual jobs, and those who did not then have a job (even if they had a job to start at a future date).” (Source: 2016 Census Dictionary).
f) “Unemployed" refers to persons who, during the week of Sunday May 1 to Saturday May 7 2016, were without paid work or without self-employment work and were available for work and either: a) had actively looked for paid work in the past four weeks; or b) were on temporary lay-off and expected to return to their job; or c) had definite arrangements to start a new job in four weeks or less.” (Source: 2016 Census Dictionary).
g) “Not in the labour force" refers to persons who, during the week of Sunday May 1 to Saturday May 7 2016, were neither employed nor unemployed. It includes students, homemakers, retired workers, seasonal workers in an 'off' season who were not looking for work, and persons who could not work because of a long-term illness or disability.” (Source: 2016 Census Dictionary).
h) The “Participation Rate” refers to the number of people in the labour force in the week of Sunday May 1 to Saturday May 7 2016, as a percentage of the population 15 years and over. (Source: 2016 Census Dictionary).
i) The “Employment Rate” refers to the number of people employed in the week of Sunday May 1 to Saturday May 7 2016 as a percentage of the total population 15 years and over. (Source: 2016 Census Dictionary).
j) The “Unemployment Rate” refers to the number of people unemployed in the week of Sunday May 1 to Saturday May 7 2016 expressed as a percentage of the population in the labour force. (Source: 2016 Census Dictionary).

Table A-15: Full time and Part time Workers, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 2016

Metric	Local Study Area (LSA) [a,b,c]			Northern Saskatchewan (RSA) [a,b,d]			Saskatchewan [a,b]		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total - Work activity during the reference year for the population aged 15 years and over in private households - 25% sample data [e]	**4,015**	**1,905**	**2,110**	**25,295**	**12,610**	**12,685**	**857,295**	**424,265**	**433,030**
Did not work [f]	**2,255**	**1,025**	**1,225**	**13,490**	**6,460**	**7,030**	**242,835**	**100,140**	**142,700**
Worked	**1,765**	**900**	**880**	**11,805**	**6,150**	**5,655**	**614,465**	**324,125**	**290,335**
Worked FULL time [g]	1,510	750	750	9,800	5,260	4,540	479,940	277,490	202,455
Worked FULL time 40+ weeks	1,000	420	575	6,710	3,275	3,435	394,230	226,780	167,450
Worked FULL time not all year	500	310	170	3,095	1,985	1,110	85,720	50,710	35,000
Worked PART time [h]	270	130	150	2,005	885	1,115	134,515	46,635	87,885
Worked PART time 40+ weeks	75	30	45	695	265	425	64,720	19,830	44,890
Worked PART time not all year	185	100	85	1,300	625	685	69,800	26,800	42,985
Proportion of Full and Part Time									
Worked full time	85.6%	83.3%	85.2%	83.0%	85.5%	80.3%	78.1%	85.6%	69.7%
Worked FULL time 40+ weeks	56.7%	46.7%	65.3%	56.8%	53.3%	60.7%	64.2%	70.0%	57.7%
Worked FULL time not all year	28.3%	34.4%	19.3%	26.2%	32.3%	19.6%	14.0%	15.6%	12.1%
Worked part time	15.3%	14.4%	17.0%	17.0%	14.4%	19.7%	21.9%	14.4%	30.3%
Worked PART time 40+ weeks	4.2%	3.3%	5.1%	5.9%	4.3%	7.5%	10.5%	6.1%	15.5%
Worked PART time not all year	10.5%	11.1%	9.7%	11.0%	10.2%	12.1%	11.4%	8.3%	14.8%

Source: Statistics Canada 2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.

d) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.

e) Refers to the number of weeks in which a person worked for pay or in self-employment in 2015 at all jobs held even if only for a few hours and whether these weeks were mostly full time (30 hours or more per week) or mostly part time (less than 30 hours per week).

f) Includes persons aged 15 years and over who never worked persons who worked prior to 2015 persons who worked in 2016 but not in 2015.

g) Full time is 30 hours or more per week.

h) Part time is less than 30 hours per week.

Table A-16: Labour Force Characteristics by Educational Attainment, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 2016

Metric	Local Study Area (LSA) [a,b,c]						Northern Saskatchewan (RSA) [a,b,d]						Saskatchewan [a,b]					
	Total - Population aged 15 years and over	No certificate, diploma or degree	Secondary (high) school diploma or equivalency certificate	Apprenticeship or trades certificate or diploma	College, CEGEP, or University certificate or diploma below bachelor level	University certificate, diploma or degree at bachelor level or above	Total - Population aged 15 years and over	No certificate, diploma or degree	Secondary (high) school diploma or equivalency certificate	Apprenticeship or trades certificate or diploma	College, CEGEP or certificate or diploma below bachelor level	University certificate, diploma or degree at bachelor level or above	Total - Population aged 15 years and over	No certificate, diploma or degree	Secondary (high) school diploma or equivalency certificate	Apprenticeship or trades certificate or diploma	College, CEGEP or certificate or diploma below bachelor level	University certificate, diploma or degree at bachelor level or above
Total Population 15 Years and Over by Labour Force Activity [e]	**4,015**	**2,255**	**670**	**425**	**420**	**225**	**25,295**	**12,865**	**5,200**	**2,080**	**3,290**	**1,860**	**857,300**	**177,210**	**261,205**	**89,440**	**174,965**	**154,480**
In the Labour Force [e]	1,795	615	345	280	360	195	12,355	3,990	2,895	1,415	2,445	1,610	585,535	73,960	187,530	67,280	130,800	125,960
Employed [f]	1,300	360	265	180	290	210	9,420	2,435	2,215	1,140	2,095	1,545	544,095	63,675	172,750	62,570	124,335	120,765
Unemployed [g]	500	250	100	85	65	0	2,935	1,560	685	280	350	65	41,445	10,290	14,785	4,705	6,470	5,200
Not in the Labour Force [h]	2,220	1,645	325	145	90	10	12,935	8,875	2,305	665	845	250	271,760	103,245	73,675	22,160	44,165	28,515
Participation Rate [i]	44.7%	27.3%	51.5%	65.9%	85.7%	86.7%	48.8%	31.0%	55.7%	68.0%	74.3%	86.6%	68.3%	41.7%	71.8%	75.2%	74.8%	81.5%
Employment Rate [j]	32.4%	16.0%	39.6%	42.4%	69.0%	93.3%	37.2%	18.9%	42.6%	54.8%	63.7%	83.1%	63.5%	35.9%	66.1%	70.0%	71.1%	78.2%
Unemployment Rate [k]	27.9%	40.7%	29.0%	30.4%	18.1%	0.0%	23.8%	39.1%	23.7%	19.8%	14.3%	4.0%	7.1%	13.9%	7.9%	7.0%	4.9%	4.1%

Source: Statistics Canada 2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases, 10. Totals may not add-up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.

d) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.

e) Refers to whether a person aged 15 years and over was employed unemployed or not in the labour force during the week of Sunday May 1 to Saturday May 7 2016.

f) "Employed" refers to persons 15 years and over, excluding institutional residents who, during the week prior to Census Day: “(a) Did any work at all at a job or business, that is, paid work in the context of an employer-employee relationship, or self-employment. This also includes persons who did unpaid family work, which is defined as unpaid work contributing directly to the operation of a farm, business or professional practice owned and operated by a related member of the same household; or (b) Had a job but were not at work due to factors such as their own illness or disability, personal or family responsibilities, vacation or a labour dispute. This category excludes persons not at work because they were on layoff or between casual jobs, and those who did not then have a job (even if they had a job to start at a future date).” (Source: 2016 Census Dictionary).

g) “Unemployed" refers to persons who, during the week of Sunday May 1 to Saturday May 7 2016, were without paid work or without self-employment work and were available for work and either: a) had actively looked for paid work in the past four weeks; or b) were on temporary lay-off and expected to return to their job; or c) had definite arrangements to start a new job in four weeks or less.” (Source: 2016 Census Dictionary).

h) “Not in the labour force" refers to persons who, during the week of Sunday May 1 to Saturday May 7 2016, were neither employed nor unemployed. It includes students, homemakers, retired workers, seasonal workers in an 'off' season who were not looking for work, and persons who could not work because of a long-term illness or disability.” (Source: 2016 Census Dictionary).

i) The “Participation Rate” refers to the number of people in the labour force in the week of Sunday May 1 to Saturday May 7 2016, as a percentage of the population 15 years and over. (Source: 2016 Census Dictionary).

j) The “Employment Rate” refers to the number of people employed in the week of Sunday May 1 to Saturday May 7 2016 as a percentage of the total population 15 years and over. (Source: 2016 Census Dictionary).

k) The “Unemployment Rate” refers to the number of people unemployed in the week of Sunday May 1 to Saturday May 7 2016 expressed as a percentage of the population in the labour force. (Source: 2016 Census Dictionary).

Table A-17a: Employment by Industry Sector, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 2016

Metric	Employment									Percentage of Employment by Sector									Distribution of Employment by Sector and Sex[h]					
	Local Study Area (LSA) [a,b,c]			Northern Saskatchewan (RSA) [a,b,d]			Saskatchewan [a,b]			Local Study Area (LSA) [a,b,c]			Northern Saskatchewan (RSA) [a,b,d]			Saskatchewan [a,b]			Local Study Area (LSA) [a,b,c]		Northern Saskatchewan (RSA) [a,b,d]		Saskatchewan [a,b]	
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Male	Female	Male	Female	Male	Female
Total labour force population aged 15 years and over by Industry - NAICS [e]	**1,815**	**905**	**905**	**12,360**	**6,540**	**5,820**	**585,535**	**311,110**	**274,430**	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c
Industry - not applicable [f]	205	115	75	1,570	910	655	10,225	5,200	5,020	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/d	n/c	n/c
All industry categories [g]	**1,605**	**785**	**820**	**10,790**	**5,630**	**5,160**	**575,310**	**305,905**	**269,410**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**48.9%**	**51.1%**	**52.2%**	**47.8%**	**53.2%**	**46.8%**
Agriculture; forestry; fishing and hunting (NAICS 11)	70	60	10	240	220	20	51,255	36,820	14,440	4.4%	7.6%	1.2%	2.2%	3.9%	0.4%	8.9%	12.0%	5.4%	85.7%	14.3%	91.7%	8.3%	71.8%	28.2%
Mining; quarrying; and oil and gas extractions (NAICS 21)	110	105	0	1,165	1,025	145	23,070	20,040	3,025	6.9%	13.4%	0.0%	10.8%	18.2%	2.8%	4.0%	6.6%	1.1%	100.0%	0.0%	87.6%	12.4%	86.9%	13.1%
Construction (NAICS 23)	165	140	10	800	735	70	49,310	43,460	5,850	10.3%	17.8%	1.2%	7.4%	13.1%	1.4%	8.6%	14.2%	2.2%	93.3%	6.7%	91.3%	8.7%	88.1%	11.9%
Manufacturing (NAICS 31-33)	0	10	0	150	120	30	26,710	21,000	5,710	0.0%	1.3%	0.0%	1.4%	2.1%	0.6%	4.6%	6.9%	2.1%	100.0%	0.0%	80.0%	20.0%	78.6%	21.4%
Retail Trade (NAICS 44-45)	135	65	90	1,015	455	555	63,360	30,185	33,180	8.4%	8.3%	11.0%	9.4%	8.1%	10.8%	11.0%	9.9%	12.3%	41.9%	58.1%	45.0%	55.0%	47.6%	52.4%
Transportation and Warehousing (NAICS 48-49)	55	50	15	445	325	120	24,755	19,385	5,370	3.4%	6.4%	1.8%	4.1%	5.8%	2.3%	4.3%	6.3%	2.0%	76.9%	23.1%	73.0%	27.0%	78.3%	21.7%
Educational Services (NAICS 61)	345	85	235	1,895	530	1,365	45,360	13,670	31,690	21.5%	10.8%	28.7%	17.6%	9.4%	26.5%	7.9%	4.5%	11.8%	26.6%	73.4%	28.0%	72.0%	30.1%	69.9%
Health Care and Social Assistance (NAICS 62)	240	35	195	1,660	290	1,370	72,625	11,285	61,335	15.0%	4.5%	23.8%	15.4%	5.2%	26.6%	12.6%	3.7%	22.8%	15.2%	84.8%	17.5%	82.5%	15.5%	84.5%
Accommodation and Food Services (NAICS 72)	55	20	45	585	270	310	37,785	14,295	23,490	3.4%	2.5%	5.5%	5.4%	4.8%	6.0%	6.6%	4.7%	8.7%	30.8%	69.2%	46.6%	53.4%	37.8%	62.2%
Other Services (Except Public Administration) (NAICS 81)	20	40	0	250	135	115	25,680	12,590	13,090	1.2%	5.1%	0.0%	2.3%	2.4%	2.2%	4.5%	4.1%	4.9%	100.0%	0.0%	54.0%	46.0%	49.0%	51.0%
Public Administration (NAICS 91)	310	180	140	1,520	955	570	38,180	19,640	18,535	19.3%	22.9%	17.1%	14.1%	17.0%	11.0%	6.6%	6.4%	6.9%	56.3%	43.8%	62.6%	37.4%	51.4%	48.6%
Other industry categories not included above (NAICS 22, 31-33, 41, 51, 52, 53, 54, 55, 56, 71)	75	70	40	1,105	630	475	123,445	69,200	54,230	4.7%	8.9%	4.9%	10.2%	11.2%	9.2%	21.5%	22.6%	20.1%	63.6%	36.4%	57.0%	43.0%	56.1%	43.9%

Source: Statistics Canada 2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases 10. Totals may not add up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Descharme Lake, and Garson Lake.

d) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.

e) Includes the experienced labour force which refers to persons aged 15 years and over who during the Census were employed and the unemployed who had last worked for pay or in self-employment prior to the Census.

f) Includes unemployed persons aged 15 years and over who have never worked for pay or in self-employment or who had last worked prior to January 1, 2015.

g) Refers to the general nature of the business carried out in the establishment where the person worked. The data are produced according to the NAICS 2012.

h) Percentages of employment by sector and distribution of employment by sector and sex calculated by InterGroup Consultants Ltd.

LSA = local study area; RSA = regional study area; NAICS = North American Industry Classification System; n/c = not calculated.

Table A-17b: Employment by Industry Sector for Local Study Area Communities, 2016

Industry Sector	Birch Narrows Dene Nation [a,b]			Black Point [a,b]			Buffalo Narrows [a,b]			Buffalo River Dene Nation 193 [a,b]			Clearwater River Dene 222 [a,b]			La Loche [a,b]			Michel Village [a,b]			St. George's Hill [a,b]			Turnor Lake [a,b]			LSA [a,b,c]		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total labour force population aged 15 years and over by Industry - NAICS [d]	**165**	**90**	**80**	**10**	**0**	**0**	**475**	**220**	**260**	**260**	**135**	**125**	**270**	**140**	**130**	**525**	**270**	**255**	**30**	**15**	**15**	**40**	**20**	**15**	**40**	**15**	**25**	**1,815**	**905**	**905**
Industry - not applicable [e]	10	0	0	0	0	0	15	10	0	30	20	10	55	35	20	75	40	35	0	0	0	10	0	0	10	10	10	205	115	75
All industry categories [f]	160	85	75	10	0	0	460	205	255	230	120	110	210	100	110	455	230	225	25	10	15	30	20	15	25	15	15	1,605	785	820
Agriculture; forestry; fishing and hunting (NAICS 11)	10	10	0	0	0	0	30	25	0	20	15	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	70	60	10
Mining; quarrying; and oil and gas extractions (NAICS 21)	10	10	0	0	0	0	25	25	0	15	15	0	15	10	0	35	35	0-	0	0	0	0	0	0	10	10	0	110	105	0
Construction (NAICS 23)	10	15	0	0	0	0	25	25	0	25	25	0	40	35	0	45	40	10	10	0	0	10	0	0	0	0	0	165	140	10
Manufacturing (NAICS 31-33)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	10	0
Retail Trade (NAICS 44-45)	15	10	10	0	0	0	30	10	25	15	10	10	20	10	15	55	25	30	0	0	0	0	0	0	0	0	0	135	65	90
Transportation and Warehousing (NAICS 48-49)	0	10	0	0	0	0	25	10	15	15	10	0	0	0	0	15	10	0	0	0	0	0	0	0	0	10	0	55	50	15
Educational Services (NAICS 61)	35	10	25	10	0	0	85	20	65	45	10	35	45	10	35	115	35	75	10	0	0	0	0	0	0	0	0	345	85	235
Health Care and Social Assistance (NAICS 62)	20	0	15	0	0	0	85	0	80	25	10	20	30	10	25	70	15	55	0	0	0	0	0	0	10	0	0	240	35	195
Accommodation and Food Services (NAICS 72)	10	10	10	0	0	0	25	10	15	0	0	0	0	0	10	10	0	10	0	0	0	10	0	0	0	0	0	55	20	45
Other Services (Except Public Administration) (NAICS 81)	0	0	0	0	0	0	0	10	0	0	0	0	0	10	0	10	10	0	10	10	0	0	0	0	0	0	0	20	40	0
Public Administration (NAICS 91)	35	30	10	0	0	0	110	55	55	40	25	15	35	15	15	70	35	35	10	10	10	10	10	0	0	0	0	310	180	140
Other industry categories not included above (NAICS 22, 31-33, 41, 51, 52, 53, 54, 55, 56, 71)	0	0	0	0	0	0	25	20	10	10	10	0	20	10	30	20	30	0	0	0	0	0	0	0	0	0	0	75	70	40

Source: Statistics Canada 2016 Census.
a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases 10. Totals may not add up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Descharme Lake, and Garson Lake.
d) Includes the experienced labour force which refers to persons aged 15 years and over who during the Census were employed and the unemployed who had last worked for pay or in self-employment prior to the Census.
e) Includes unemployed persons aged 15 years and over who have never worked for pay or in self-employment or who had last worked prior to January 1, 2015.
f) Refers to the general nature of the business carried out in the establishment where the person worked. The data are produced according to the North American Industry Classification System (NAICS) 2012.
LSA = local study area; NAICS = North American Industry Classification System.

Table A-18a: Employment by Industry Sectors, for Local Study Area, 2001 to 2016

Industry Sector	Employment[a,b,c]												Percentage of Employment by Sector [a,b,c,d]											
	2001			2006			2011			2016			2001			2006			2011			2016		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total labour force population aged 15 years and over by Industry	1685	905	770	1555	825	720	1305	660	650	1815	905	905	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c
Industry - Not applicable	300	180	130	225	130	80	145	80	50	205	115	75	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c
All industry categories	1375	740	640	1325	690	660	1165	565	595	1605	785	820	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
11 Agriculture, forestry, fishing and hunting	110	70	10	35	35	10	20	20	0	70	60	10	8.0%	9.5%	1.6%	2.6%	5.1%	1.5%	1.7%	3.5%	0.0%	4.4%	7.6%	1.2%
21 Mining, quarrying, oil and gas extraction	35	30	10	55	70	0	130	110	20	110	105	0	2.5%	4.1%	1.6%	4.2%	10.1%	0.0%	11.2%	19.5%	3.4%	6.9%	13.4%	0.0%
22 Utilities	10	40	0	10	0	0	0	0	0	0	0	0	0.7%	5.4%	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
23 Construction	115	120	0	120	110	10	60	45	0	165	140	10	8.4%	16.2%	0.0%	9.1%	15.9%	1.5%	5.2%	8.0%	0.0%	10.3%	17.8%	1.2%
31-33 Manufacturing	85	50	0	25	20	15	0	0	0	0	10	0	6.2%	6.8%	0.0%	1.9%	2.9%	2.3%	0.0%	0.0%	0.0%	0.0%	1.3%	0.0%
41 Wholesale trade	0	10	0	20	20	10	0	0	0	0	0	0	0.0%	1.4%	0.0%	1.5%	2.9%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
44-45 Retail trade	140	80	70	115	50	60	120	50	60	135	65	90	10.2%	10.8%	10.9%	8.7%	7.2%	9.1%	10.3%	8.8%	10.1%	8.4%	8.3%	11.0%
48-49 Transportation and warehousing	80	45	10	65	40	30	50	20	10	55	50	15	5.8%	6.1%	1.6%	4.9%	5.8%	4.5%	4.3%	3.5%	1.7%	3.4%	6.4%	1.8%
51 Information and cultural industries	10	0	0	20	10	0	0	0	0	0	0	10	0.7%	0.0%	0.0%	1.5%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%
52 Finance and insurance	15	0	10	30	10	20	0	0	0	0	0	0	1.1%	0.0%	1.6%	2.3%	1.4%	3.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
53 Real estate and rental and leasing	30	20	10	10	0	0	0	0	10	10	0	10	2.2%	2.7%	1.6%	0.8%	0.0%	0.0%	0.0%	0.0%	1.7%	0.6%	0.0%	1.2%
54 Professional, scientific and technical services	0	0	0	10	20	0	0	0	0	0	10	0	0.0%	0.0%	0.0%	0.8%	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	0.0%
55 Management of companies and enterprises	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
56 Administrative and support, waste management and remediation services	10	10	10	30	30	0	10	0	0	55	40	20	0.7%	1.4%	1.6%	2.3%	4.3%	0.0%	0.9%	0.0%	0.0%	3.4%	5.1%	2.4%
61 Educational services	265	75	180	220	75	150	215	65	150	345	85	235	19.3%	10.1%	28.1%	16.6%	10.9%	22.7%	18.5%	11.5%	25.2%	21.5%	10.8%	28.7%
62 Health care and social assistance	170	30	130	225	30	195	150	10	130	240	35	195	12.4%	4.1%	20.3%	17.0%	4.3%	29.5%	12.9%	1.8%	21.8%	15.0%	4.5%	23.8%
71 Arts, entertainment and recreation	0	10	0	10	0	0	10	0	0	10	10	0	0.0%	1.4%	0.0%	0.8%	0.0%	0.0%	0.9%	0.0%	0.0%	0.6%	1.3%	0.0%
72 Accommodation and food services	65	15	15	55	20	35	35	0	35	55	20	45	4.7%	2.0%	2.3%	4.2%	2.9%	5.3%	3.0%	0.0%	5.9%	3.4%	2.5%	5.5%
81 Other services (except public administration)	25	20	40	40	25	20	0	0	0	20	40	0	1.8%	2.7%	6.3%	3.0%	3.6%	3.0%	0.0%	0.0%	0.0%	1.2%	5.1%	0.0%
91 Public administration	275	160	105	235	140	90	335	160	165	310	180	140	20.0%	21.6%	16.4%	17.7%	20.3%	13.6%	28.8%	28.3%	27.7%	19.3%	22.9%	17.1%

Source: Statistics Canada 2001-2016 Census.
a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases 10. Totals may not add up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) The LSA includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data are not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.
d) Percentages of employment by sector calculated by InterGroup Consultants Ltd.
n/c = not calculated.

Table A-18b: Employment by Industry Sectors for Local Study Area Communities, 2001 to 2016

Industry Sector	Birch Narrows Dene Nation[a,b,c]				Buffalo Narrows[a,b,c]				Buffalo River Dene Nation 193[a,b,c]				Clearwater River Dene 222[a,b,c]				La Loche[a,b,c]			
	2001	2006	2011	2016	2001	2006	2011	2016	2001	2006	2011	2016	2001	2006	2011	2016	2001	2006	2011	2016
Total labour force population aged 15 years and over by Industry	80	60	n/d	165	505	520	420	475	220	230	235	260	205	155	165	270	570	550	470	525
Industry - Not applicable	0	0	n/d	10	25	25	10	15	30	50	35	30	40	50	15	55	195	90	85	75
All industry categories	75	55	n/d	160	475	495	415	460	190	185	200	230	165	100	150	210	375	455	385	455
11 Agriculture, forestry, fishing and hunting	10	0	n/d	10	40	15	0	30	10	10	10	20	0	0	0	10	20	10	10	0
21 Mining, quarrying, oil and gas extraction	0	0	n/d	10	15	25	55	25	0	0	20	15	10	0	15	15	10	30	40	35
22 Utilities	10	0	n/d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
23 Construction	10	0	n/d	10	35	35	10	25	15	20	10	25	10	15	15	40	35	50	25	45
31-33 Manufacturing	0	0	n/d	0	15	15	0	0	30	10	0	0	10	0	0	0	10	0	0	0
41 Wholesale trade	0	10	n/d	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44-45 Retail trade	10	0	n/d	15	55	30	30	30	10	15	30	15	25	10	15	20	40	60	45	55
48-49 Transportation and warehousing	10	0	n/d	0	30	35	25	25	10	0	10	15	0	0	0	0	10	10	15	15
51 Information and cultural industries	0	0	n/d	0	10	10	0	0	0	0	0	0	0	0	0	0	0	10	0	0
52 Finance and insurance	0	0	n/d	0	15	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53 Real estate and rental and leasing	0	0	n/d	0	10	0	0	0	0	0	0	0	10	10	0	10	10	0	0	0
54 Professional, scientific and technical services	0	0	n/d	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55 Management of companies and enterprises	0	0	n/d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56 Administrative and support, waste management and remediation services	0	10	n/d	0	10	0	0	15	0	0	0	10	0	0	0	10	0	10	10	20
61 Educational services	15	20	n/d	35	60	35	40	85	35	20	30	45	30	25	45	45	100	110	100	115
62 Health care and social assistance	0	10	n/d	20	60	100	55	85	20	20	20	25	25	20	15	30	55	75	60	70
71 Arts, entertainment and recreation	0	0	n/d	0	0	0	0	10	0	0	0	0	0	0	0	0	0	10	10	0
72 Accommodation and food services	0	0	n/d	10	20	15	25	25	10	10	0	0	10	10	0	0	25	20	10	10
81 Other services (except public administration)	0	0	n/d	0	10	30	0	0	0	0	0	0	0	0	0	0	15	10	0	10
91 Public administration	25	15	n/d	35	90	95	170	110	45	45	50	40	50	15	30	35	45	55	75	70

Source: Statistics Canada 2001-2016 Census.
a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases 10. Totals may not add up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
n/d = no data available.

Table A-19a: Personal Income, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan (2015)

Personal Income	Local Study Area (LSA) [a,b,c,d,e]									Northern Saskatchewan (RSA) [a,b,c,d,f]									Saskatchewan [a,b,c,d]								
	Total			Indigenous identity			Non-Indigenous identity			Total			Indigenous identity			Non-Indigenous identity			Total			Indigenous identity			Non-Indigenous identity		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Average Total Income in 2015 Among Recipients [g,h]	**$30,810**	**$30,718**	**$30,910**	**$28,009**	**$27,735**	**$28,257**	**$68,440**	**$64,923**	**$71,183**	**$31,971**	**$34,485**	**$29,519**	**$25,961**	**$26,070**	**$25,859**	**$60,580**	**$70,208**	**$49,175**	**$49,409**	**$58,791**	**$40,184**	**$32,976**	**$35,768**	**$30,523**	**$51,838**	**$61,973**	**$41,704**
Total Number of Individuals 15 Years and Older with Income	3,390	1,580	1,810	3,160	1,455	1,695	240	120	130	22,760	11,235	11,525	18,815	9,100	9,715	3,950	2,140	1,810	822,540	407,835	414,705	105,925	49,535	56,390	716,620	358,305	358,315
Under $10,000	970	525	360	960	520	350	-	-	-	7,070	4,050	3,020	6,750	3,910	2,840	325	145	180	106,475	46,815	59,665	27,765	14,945	12,820	78,715	31,875	46,845
$10,000 to $19,999	705	280	355	690	265	355	-	-	-	4,435	1,790	2,640	3,975	1,600	2,375	455	190	265	117,515	46,740	70,780	19,560	7,935	11,630	97,955	38,805	59,150
$20,000 to $29,999	475	135	305	460	125	295	-	-	-	2,860	1,160	1,700	2,440	980	1,460	420	180	240	108,430	42,550	65,880	14,615	5,420	9,190	93,815	37,130	56,685
$30,000 to $39,999	300	85	180	285	85	180	-	-	-	2,035	825	1,215	1,675	665	1,010	365	160	200	95,735	41,515	54,220	11,650	4,535	7,115	84,090	36,980	47,105
$40,000 to $49,999	230	70	130	220	65	130	-	-	-	1,495	615	875	1,125	435	685	370	180	185	88,575	41,635	46,940	8,880	3,500	5,380	79,700	38,135	41,565
$50,000 to $59,999	150	70	65	135	60	55	-	-	-	1,050	465	580	710	300	405	345	165	170	70,625	37,265	33,360	6,320	2,955	3,365	64,310	34,315	29,995
$60,000 to $69,999	140	65	60	90	45	50	-	-	-	870	485	380	530	260	270	335	225	115	53,855	30,935	22,920	4,520	2,365	2,155	49,335	28,570	20,765
$70,000 to $79,999	120	50	65	105	50	50	-	-	-	605	315	295	360	170	190	245	145	100	41,680	24,930	16,745	3,360	1,775	1,585	38,320	23,150	15,165
$80,000 to $99,999 [i]	160	95	95	100	45	35	-	-	-	1,055	570	495	585	280	310	475	280	195	60,370	37,025	23,345	4,660	2,670	1,985	55,710	34,360	21,355
$100,000 and over	140	85	50	95	65	30	-	-	-	1,285	960	325	670	495	175	615	460	150	79,280	58,415	20,860	4,605	3,440	1,170	74,670	54,980	19,690

Source: Statistics Canada 2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases 10. Totals may not add up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Income variables do not account for inflation.

d) Personal income variables were derived from 25% sample data. However, on Indian Reserves and in remote communities, attempts are made to obtain data from 100% of the population.

e) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available: for Bear Creek, Black Point, Descharme Lake, Garson Lake, Michel Village, St. George's Hill, and Turnor Lake; by income breakdown for male and female groups for Birch Narrows Dene Nation - Turnor Lake 193B; and by income breakdown for Non-Indigenous identity income recipients.

f) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.

g) Total income (i.e. personal income) refers to the total money income received during the calendar year prior to the Census year. Sources of income are: wages and salaries, net farm income; net non-farm income from unincorporated business and/or professional practice; child benefits; Old Age Security pension and Guaranteed Income Supplement; benefits from Canada Pension Plan or Quebec Pension Plan; benefits from Employment Insurance; other income from government sources; dividends, interest on bonds, deposits and savings certificates and other investment income; retirement pensions, superannuation and annuities, including those from RRSPs and RRIFs; and other money income. Not included in all Census years as total income: income tax refunds, lump sum inheritance payments, gambling revenue, lump sum insurance policy settlements, capital gains or losses, receipts from the sale of property or belongings, loan repayments, property tax rebates or refunds of pension contributions.

h) LSA average total income in 2015 among recipients is calculated based on the weighted average of Number of employment income recipients and Average employment income of the Indian Reserves, villages and hamlets.

i) The 2015 data sets group $80,000 to $99,999 as $80,000 to $89,999 and $90,000 to $99,999. These categories have been collapsed in the table.

LSA = local study area; RSA = regional study area; n/d = no data available.

Table A-19b: Personal Income, for Local Study Area Communities (2015)

Personal Income	Local Study Area (LSA) [a,b,c,d,e]																	
	Birch Narrows Dene Nation			Buffalo Narrows			Buffalo River Dene Nation 193			Clearwater River Dene 222			La Loche			LSA Total		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Average Total Income in 2015 Among Recipients [f,g]	**$26,702**	**$28,922**	**$24,744**	**$43,901**	**$43,758**	**$44,020**	**$25,238**	**$26,269**	**$24,228**	**$24,473**	**$25,187**	**$23,820**	**$29,030**	**$28,058**	**$29,846**	**$30,810**	**$30,718**	**$30,910**
Total Number of Individuals 15 Years and Older with Income	285	135	155	725	330	395	485	240	245	490	230	255	1,405	645	760	3,390	1,580	1,810
Under $10,000	85	-	-	120	65	55	195	105	90	215	120	95	355	235	120	970	525	360
$10,000 to $19,999	70	-	-	145	80	70	80	25	50	85	25	60	325	150	175	705	280	355
$20,000 to $29,999	40	-	-	70	15	50	65	35	35	60	30	35	240	55	185	475	135	305
$30,000 to $39,999	30	-	-	40	15	30	40	15	25	40	15	20	150	40	105	300	85	180
$40,000 to $49,999	15	-	-	65	20	40	20	10	-	25	10	15	105	30	75	230	70	130
$50,000 to $59,999	10	-	-	30	15	15	20	10	10	25	10	10	65	35	30	150	70	65
$60,000 to $69,999	10	-	-	65	30	30	15	10	-	10	-	10	40	25	20	140	65	60
$70,000 to $79,999	10	-	-	55	25	35	10	-	-	10	10	10	35	15	20	120	50	65
$80,000 to $99,999 [h]	-	-	-	75	35	45	20	20	20	20	10	20	45	30	10	160	95	95
$100,000 and over	10	-	-	55	30	25	15	15	-	15	10	10	45	30	15	140	85	50

Source: Statistics Canada 2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases 10. Totals may not add up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Income variables do not account for inflation.

d) Personal income variables were derived from 25% sample data. However, on Indian Reserves and in remote communities, attempts are made to obtain data from 100% of the population.

e) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available: for Bear Creek, Black Point, Descharme Lake, Garson Lake, Michel Village, St. George's Hill, and Turnor Lake; by income breakdown for male and female groups for Birch Narrows Dene Nation - Turnor Lake 193B; and by income breakdown for Non-Indigenous identity income recipients.

f) Total income (i.e. personal income) refers to the total money income received during the calendar year prior to the Census year. Sources of income are: wages and salaries, net farm income; net non-farm income from unincorporated business and/or professional practice; child benefits; Old Age Security pension and Guaranteed Income Supplement; benefits from Canada Pension Plan or Quebec Pension Plan; benefits from Employment Insurance; other income from government sources; dividends, interest on bonds, deposits and savings certificates and other investment income; retirement pensions, superannuation and annuities, including those from RRSPs and RRIFs; and other money income. Not included in all Census years as total income: income tax refunds, lump sum inheritance payments, gambling revenue, lump sum insurance policy settlements, capital gains or losses, receipts from the sale of property or belongings, loan repayments, property tax rebates or refunds of pension contributions.

g) LSA average total income in 2015 among recipients is calculated based on the weighted average of Number of employment income recipients and Average employment income of the Indian Reserves, villages and hamlets.

h) The 2015 data sets group $80,000 to $99,999 as $80,000 to $89,999 and $90,000 to $99,999. These categories have been collapsed in the table.

LSA = local study area; n/d = no data available due to data suppression.

Table A-20a: Household Income, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan (2015)

Household Income	Local Study Area (LSA) [a,b,c,d,e]			Northern Saskatchewan (RSA) [a,b,c,d,f]			Saskatchewan [a,b,c,d]		
	Total	Indigenous identity	Non-Indigenous identity	Total	Indigenous identity	Non-Indigenous identity	Total	Indigenous identity	Non-Indigenous identity
Average Income in 2015 for Private Households (Before Taxes) [g,h]	**$64,906**	**$62,750**	**$89,361**	**$71,111**	**$63,370**	**$106,767**	**$93,942**	**$75,155**	**$97,253**
Total Number of Private Households with Income in 2015 [i]	1,600	1,490	105	10,230	8,410	1,825	432,625	64,830	367,790
Under $5,000	65	70	10	460	455	10	7,020	2,375	4,640
$5,000 to $9,999	60	60	0	315	310	10	4,585	1,630	2,955
$10,000 to $14,999	85	85	10	400	375	25	7,725	2,135	5,590
$15,000 to $19,999	130	135	0	780	735	45	17,985	3,820	14,170
$20,000 to $29,999 [j]	170	160	0	1,145	1,045	95	33,620	6,230	27,395
$30,000 to $39,999 [j]	200	180	0	955	850	100	35,345	6,380	28,970
$40,000 to $49,999 [j]	135	125	10	845	730	125	33,595	5,870	27,720
$50,000 to $59,999	100	95	10	715	600	115	31,285	4,585	26,700
$60,000 to $69,999	100	75	0	610	460	150	30,150	4,290	25,860
$70,000 to $79,999	115	95	10	515	425	95	27,360	3,630	23,730
$80,000 to $89,999	70	50	0	475	360	115	25,860	3,495	22,365
$90,000 to $99,999	85	65	20	425	290	135	23,115	2,900	20,215

Table A-20a: Household Income, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan (2015)

Household Income	Local Study Area (LSA) [a,b,c,d,e]			Northern Saskatchewan (RSA) [a,b,c,d,f]			Saskatchewan [a,b,c,d]		
	Total	Indigenous identity	Non-Indigenous identity	Total	Indigenous identity	Non-Indigenous identity	Total	Indigenous identity	Non-Indigenous identity
$100,000 to $124,999	120	100	20	870	640	230	48,580	6,055	42,525
$125,000 to $149,999	80	75	10	605	390	215	34,875	4,145	30,725
$150,000 and over [j]	165	110	15	1,115	745	370	71,525	7,280	64,245

Source: Statistics Canada 2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases 10. Totals may not add up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Income variables do not account for inflation.

d) Household income variables were derived from 25% sample data. However, on Indian Reserves and in remote communities, attempts are made to obtain data from 100% of the population.

e) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, Garson Lake, Michel Village, St. George's Hill, and Turnor Lake.

f) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.

g) Income refers to Total Income (i.e. household income). Total income is the total money income received during the calendar year prior to the Census year. Sources of income are: wages and salaries, net farm income; net non-farm income from unincorporated business and/or professional practice; child benefits; Old Age Security pension and Guaranteed Income Supplement; benefits from Canada Pension Plan or Quebec Pension Plan; benefits from Employment Insurance; other income from government sources; dividends, interest on bonds, deposits and savings certificates and other investment income; retirement pensions, superannuation and annuities, including those from RRSPs and RRIFs; and other money income. Not included in all Census years as total income: income tax refunds, lump sum inheritance payments, gambling revenue, lump sum insurance policy settlements, capital gains or losses, receipts from the sale of property or belongings, loan repayments, property tax rebates or refunds of pension contributions.

h) LSA average income in 2015 for private households is calculated based on the weighted average of Number and Average income of private households of the Indian Reserves, villages and hamlets.

i) Private household refers to a person or a group of persons (other than foreign residents) who occupy the same dwelling and do not have a usual place of residence elsewhere in Canada. It may consist of a family group (census family) with or without other persons, of two or more families sharing a dwelling, of a group of unrelated persons, or of one person living alone. Household members who are temporarily absent on Census Day (e.g., temporary residents elsewhere) are considered as part of their usual household. For census purposes, every person is a member of one and only one household. Unless otherwise specified, all data in household reports are for private households only.

j) 2015 data sets grouped include: $20,000 to $29,999 as $20,000 to $24,999 and $25,000 to $29,999. These categories have been collapsed in the table; $30,000 to $39,999 as $30,000 to $34,999 and $35,000 to $39,999. These categories have been collapsed in the table; $40,000 to $49,999 as $40,000 to $44,999 and $45,000 to $49,999. These categories have been collapsed in the table; $150,000 and over as $150,000 to $199,999 and $200,000 and over. These categories have been collapsed in the table.

Table A-20b: Household Income, for Local Study Area Communities (2015)

Household Income	Local Study Area (LSA) [a,b,c,d,e]					
	Birch Narrows Dene Nation	Buffalo Narrows	Buffalo River Dene Nation 193	Clearwater River Dene 222	La Loche	LSA Total
Average Income in 2015 for Private Households (Before Taxes) [f,g]	**$58,296**	**$79,638**	**$52,534**	**$63,786**	**$62,036**	**$64,906**
Total Number of Private Households with Income in 2015 [h]	130	400	230	185	655	1,600
Under $5,000	10	-	30	15	10	65
$5,000 to $9,999	10	10	20	10	10	60
$10,000 to $14,999	10	15	10	15	35	85
$15,000 to $19,999	10	50	15	10	45	130
$20,000 to $29,999 [i]	25	25	25	10	85	170
$30,000 to $39,999 [i]	25	30	25	25	95	200
$40,000 to $49,999 [i]	10	30	20	10	65	135
$50,000 to $59,999	10	10	15	15	50	100
$60,000 to $69,999	10	30	10	10	40	100
$70,000 to $79,999	10	35	15	15	40	115
$80,000 to $89,999	10	15	0	10	35	70
$90,000 to $99,999	10	25	10	15	25	85
$100,000 to $124,999	10	55	10	0	45	120
$125,000 to $149,999	10	15	15	10	30	80
$150,000 and over [i]	20	65	20	20	40	165

Source: Statistics Canada 2016 Census.

a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases 10. Totals may not add up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Income variables do not account for inflation.

d) Household income variables were derived from 25% sample data. However, on Indian Reserves and in remote communities, attempts are made to obtain data from 100% of the population.

e) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, Garson Lake, Michel Village, St. George's Hill, and Turnor Lake.

f) Income refers to Total Income (i.e. household income). Total income is the total money income received during the calendar year prior to the Census year. Sources of income are: wages and salaries, net farm income; net non-farm income from unincorporated business and/or professional practice; child benefits; Old Age Security pension and Guaranteed Income Supplement; benefits from Canada Pension Plan or Quebec Pension Plan; benefits from Employment Insurance; other income from government sources; dividends, interest on bonds, deposits and savings certificates and other investment income; retirement pensions, superannuation and annuities, including those from RRSPs and RRIFs; and other money income. Not included in all Census years as total income: income tax refunds, lump sum inheritance payments, gambling revenue, lump sum insurance policy settlements, capital gains or losses, receipts from the sale of property or belongings, loan repayments, property tax rebates or refunds of pension contributions.

g) LSA average income in 2015 for private households is calculated based on the weighted average of Number and Average income of private households of the Indian Reserves, villages and hamlets.

h) Private household refers to a person or a group of persons (other than foreign residents) who occupy the same dwelling and do not have a usual place of residence elsewhere in Canada. It may consist of a family group (census family) with or without other persons, of two or more families sharing a dwelling, of a group of unrelated persons, or of one person living alone. Household members who are temporarily absent on Census Day (e.g., temporary residents elsewhere) are considered as part of their usual household. For census purposes, every person is a member of one and only one household. Unless otherwise specified, all data in household reports are for private households only.

i) 2015 data sets grouped include: $20,000 to $29,999 as $20,000 to $24,999 and $25,000 to $29,999. These categories have been collapsed in the table; $30,000 to $39,999 as $30,000 to $34,999 and $35,000 to $39,999. These categories have been collapsed in the table; $40,000 to $49,999 as $40,000 to $44,999 and $45,000 to $49,999. These categories have been collapsed in the table; $150,000 and over as $150,000 to $199,999 and $200,000 and over. These categories have been collapsed in the table.

Table A-21a: Total Income Sources, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan (2015)

Income Sources	Local Study Area (LSA) [c,d]									Northern Saskatchewan (RSA) [e]									Saskatchewan								
	Total			Indigenous identity			Non-Indigenous identity			Total			Indigenous identity			Non-Indigenous identity			Total			Indigenous identity			Non-Indigenous identity		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Employment Income [a]	67%	75%	60%	63%	72%	56%	92%	85%	91%	72%	79%	64%	68%	77%	59%	81%	82%	78%	73%	77%	68%	74%	82%	66%	73%	77%	69%
Government Transfer Payments [b]	31%	21%	40%	36%	24%	44%	6%	3%	0%	22%	14%	30%	29%	19%	37%	8%	6%	10%	11%	7%	15%	20%	12%	28%	10%	7%	14%
Other	2%	3%	0%	1%	4%	0%	2%	12%	9%	6%	7%	6%	4%	4%	4%	12%	12%	12%	16%	16%	17%	7%	7%	6%	17%	16%	18%

Source: Statistics Canada 2016 Census.

a) Employment income - All income received as wages salaries and commissions from paid employment and net self-employment income from farm or non-farm unincorporated business and/or professional practice during the reference period. For the 2016 Census the reference period is the calendar year 2015 for all income variables.

b) Government transfers - All cash benefits received from federal provincial territorial or municipal governments during the reference period. It includes: Old Age Security pension Guaranteed Income Supplement Allowance or Allowance for the Survivor; Retirement disability and survivor benefits from Canada Pension Plan and Québec Pension Plan; Benefits from Employment Insurance and Québec parental insurance plan; Child benefits from federal and provincial programs; Social assistance benefits; Workers' compensation benefits; Working income tax benefit; Goods and services tax credit and harmonized sales tax credit; Other income from government sources. For the 2016 Census the reference period is the calendar year 2015 for all income variables.

c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, Garson Lake, Michel Village, St. George's Hill, and Turnor Lake.

d) LSA income source proportions in 2015 are calculated based on the weighted average of Number of income recipients and Income source proportions of the Indian Reserves, villages and hamlets.

e) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.

LSA = local study area; RSA = regional study area.

Table A-21b: Total Income Sources, for Local Study Area Communities (2015)

Income Sources	Local Study Area (LSA) [c,d]																	
	Birch Narrows Dene Nation			Buffalo Narrows			Buffalo River Dene Nation 193			Clearwater River Dene 222			La Loche			LSA Total		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Employment Income [a]	67%	77%	56%	78%	82%	76%	70%	75%	65%	68%	75%	61%	56%	70%	45%	67%	75%	60%
Government Transfer Payments [b]	29%	19%	37%	17%	14%	20%	28%	22%	35%	29%	20%	37%	41%	25%	53%	31%	21%	40%
Other	5%	4%	7%	5%	4%	5%	2%	3%	0%	4%	5%	2%	3%	5%	2%	2%	3%	0%

Source: Statistics Canada 2016 Census.

a) Employment income - All income received as wages salaries and commissions from paid employment and net self-employment income from farm or non-farm unincorporated business and/or professional practice during the reference period. For the 2016 Census the reference period is the calendar year 2015 for all income variables.

b) Government transfers - All cash benefits received from federal provincial territorial or municipal governments during the reference period. It includes: Old Age Security pension Guaranteed Income Supplement Allowance or Allowance for the Survivor; Retirement disability and survivor benefits from Canada Pension Plan and Québec Pension Plan; Benefits from Employment Insurance and Québec parental insurance plan; Child benefits from federal and provincial programs; Social assistance benefits; Workers' compensation benefits; Working income tax benefit; Goods and services tax credit and harmonized sales tax credit; Other income from government sources. For the 2016 Census the reference period is the calendar year 2015 for all income variables.

c) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, Garson Lake, Michel Village, St. George's Hill, and Turnor Lake.

d) LSA income source proportions in 2015 are calculated based on the weighted average of Number of income recipients and Income source proportions of the Indian Reserves, villages and hamlets.

LSA = local study area.

Table A-22a: Educational Attainment for the population 15 years of age and older, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 2016

Educational Attainment	Educational Attainment for the population 15 years of age and older																									Proportions by Educational Attainment														
	Local Study Area (LSA) [a,b,c,d]									Northern Saskatchewan (RSA) [a,b,c,e]									Saskatchewan [a,b,c]									Local Study Area (LSA)									Northern Saskatchewan			Saskatchewan		
	Total			Indigenous identity			Non-Indigenous identity			Total			Indigenous identity			Non-Indigenous identity			Total			Indigenous identity			Non-Indigenous identity			Total			Indigenous identity			Non-Indigenous identity								
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total Population 15 and Over by Highest Certificate, Diploma or Degree [f]	**4,025**	**1,905**	**2,115**	**3,785**	**1,780**	**2,005**	**225**	**120**	**120**	**25,295**	**12,605**	**12,685**	**21,245**	**10,415**	**10,825**	**4,055**	**2,190**	**1,860**	**857,295**	**424,265**	**433,030**	**117,325**	**55,640**	**61,685**	**739,970**	**368,620**	**371,345**	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Less than High School Certificate	2,255	1,170	1,105	2,235	1,140	1,070	35	35	0	12,865	6,945	5,925	12,210	6,520	5,690	655	425	230	177,205	96,680	80,530	45,655	24,255	21,395	131,555	72,425	59,130	56.3%	60.3%	52.2%	58.7%	63.9%	54.7%	12.5%	24.1%	0.0%	50.8%	55.1%	46.7%	20.7%	22.8%	18.6%
High School Certificate or Equivalent [g]	675	240	420	625	220	425	45	35	20	5,200	2,245	2,955	4,280	1,755	2,525	920	490	425	261,205	133,730	127,480	33,065	15,185	17,880	228,145	118,545	109,600	16.9%	12.4%	19.9%	16.4%	12.3%	21.7%	16.1%	24.1%	15.4%	20.6%	17.8%	23.3%	30.5%	31.5%	29.4%
Apprenticeship or Trades Certificate or Diploma	420	275	150	420	270	140	10	20	10	2,080	1,500	585	1,575	1,100	475	510	400	105	89,440	64,100	25,340	11,270	7,675	3,590	78,175	56,425	21,755	10.5%	14.2%	7.1%	11.0%	15.1%	7.2%	3.6%	13.8%	7.7%	8.2%	11.9%	4.6%	10.4%	15.1%	5.9%
Post-Secondary Non-University Certificate or Diploma [h]	380	150	235	350	135	200	55	10	15	2,815	1,180	1,630	1,950	780	1,170	865	400	465	146,765	51,240	95,525	15,900	5,135	10,760	130,870	46,100	84,765	9.5%	7.7%	11.1%	9.2%	7.6%	10.2%	19.6%	6.9%	11.5%	11.1%	9.4%	12.8%	17.1%	12.1%	22.1%
University Certificate or Diploma Below the Bachelor's Level	60	30	55	65	10	55	10	0	0	480	110	365	345	70	270	130	40	90	28,195	10,785	17,405	2,495	685	1,815	25,695	10,100	15,595	1.5%	1.5%	2.6%	1.7%	0.6%	2.8%	3.6%	0.0%	0.0%	1.9%	0.9%	2.9%	3.3%	2.5%	4.0%
University Degree at Bachelor Level or Above	215	75	150	115	10	65	125	45	85	1,860	630	1,230	885	195	690	980	435	540	154,475	67,725	86,745	8,945	2,700	6,245	145,530	65,030	80,500	5.4%	3.9%	7.1%	3.0%	0.6%	3.3%	44.6%	31.0%	65.4%	7.4%	5.0%	9.7%	18.0%	16.0%	20.0%

Source: Statistics Canada 2016 Census.

a) Statistics Canada data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5 and in some cases, 10. Totals may not add up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) Educational attainment data for 2016 were derived from 30% data. However, on Indian reserves and in remote communities, Statistics Canada attempts to obtain data from 100% of the population.
d) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.
e) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.
f) “Highest certificate, diploma or degree” refers to the highest certificate, diploma or degree the individual has completed based primarily on time spent” in-class.” For high school graduates, a university education is considered to be a higher level of education than a college diploma, while a college education is considered to be a higher level of education than a trade. Although some trades requirements may take as long or longer to complete than a given college or university program, the majority of time acquiring trade certification may be on-the-job, as opposed to being in a classroom.
g) “High school certificate or equivalent” includes persons who have graduated from a secondary school or equivalent. Excludes persons with a postsecondary certificate, diploma or degree.
h) “Postsecondary non-university certificate or diploma” includes non-degree-granting institutions such as community colleges, CEGEPs, private business colleges and technical institutes.
LSA = local study area; RSA = regional study area; CEGEP = Collège d'enseignement général et professionnel.

Table A-22b: Educational Attainment for the population 15 years of age and older, for Local Study Area Communities, 2016

Educational Attainment	Local Study Area (LSA) [a,b,c,d]																										
	Birch Narrows Dene Nation			Buffalo Narrows			Buffalo River Dene Nation 193			Clearwater River Dene 222			La Loche			Michel Village			St. George's Hill			Turnor Lake			LSA Total		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total Population 15 and Over by Highest Certificate, Diploma or Degree [e]	**315**	**150**	**165**	**760**	**360**	**405**	**550**	**270**	**275**	**570**	**280**	**290**	**1,585**	**735**	**850**	**45**	**20**	**25**	**105**	**50**	**50**	**95**	**40**	**55**	**4,025**	**1,905**	**2,115**
Less than High School Certificate	135	75	65	245	155	95	300	160	140	370	205	170	1,065	505	560	20	10	10	70	35	35	50	25	30	2,255	1,170	1,105
High School Certificate or Equivalent [f]	70	25	45	145	50	95	55	20	35	95	35	65	255	100	150	15	0	10	20	0	10	20	10	10	675	240	420
Apprenticeship or Trades Certificate or Diploma	40	30	10	125	70	55	105	70	35	35	25	15	90	60	25	15	10	0	0	10	0	10	0	10	420	275	150
Post-Secondary Non-University Certificate or Diploma [g]	40	10	30	130	55	75	45	20	25	35	15	20	105	40	65	nd	n/d	n/d	10	10	10	15	0	10	380	150	235
University Certificate or Diploma Below the Bachelor's Level	0	10	0	30	0	35	10	10	10	10	0	0	10	0	10	n/d	n/d	n/d	0	0	0	0	10	0	60	30	55
University Degree at Bachelor Level or Above	20	10	15	85	25	55	30	0	25	15	10	15	65	20	40	n/d	n/d	n/d	0	10	0	0	0	0	215	75	150

Source: Statistics Canada 2016 Census.

a) Statistics Canada data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5 and in some cases, 10. Totals may not add up due to rounding.

b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.

c) Educational attainment data for 2016 were derived from 30% data. However, on Indian reserves and in remote communities, Statistics Canada attempts to obtain data from 100% of the population.

d) Local Study Area includes Bear Creek, Birch Narrows Dene Nation (Turnor Lake 193B), Black Point, Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, Garson Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Bear Creek, Black Point, Descharme Lake, and Garson Lake.

e) “Highest certificate, diploma or degree” refers to the highest certificate, diploma or degree the individual has completed based primarily on time spent” in-class.” For high school graduates, a university education is considered to be a higher level of education than a college diploma, while a college education is considered to be a higher level of education than a trade. Although some trades requirements may take as long or longer to eomplete than a given college or university program, the majority of time acquiring trade certification may be on-the-job, as opposed to being in a classroom.

f) “High school certificate or equivalent” includes persons who have graduated from a secondary school or equivalent. Excludes persons with a postsecondary certificate, diploma or degree.

g) “Postsecondary non-university certificate or diploma” includes non-degree-granting institutions such as community colleges, CEGEPs, private business colleges and technical institutes.

LSA = local study area; CEGEP = Collège d'enseignement général et professionnel; n/d = no data available.

Table A-23a: Labour Force Characteristics by Highest certificate, diploma or degree, for Local Study Area, Northern Saskatchewan (Regional Study Area), and Saskatchewan, 2016

Educational Attainment	Local Study Area (LSA) [a,b,c]					Northern Saskatchewan (RSA) [a,b,d]				Saskatchewan [a,b]			
	Population aged 15 years and over [e]	Not in the Labour Force	In the labour force	Employed	Unemployed	Population aged 15 years and over [e]	In the labour force	Employed	Unemployed	Population aged 15 years and over [e]	In the labour force	Employed	Unemployed
Total - Highest certificate, diploma or degree [f]	**4,015**	**2,220**	**1,795**	**1,300**	**500**	**25,295**	**12,355**	**9,420**	**2,935**	**857,300**	**585,535**	**544,095**	**41,445**
No certificate, diploma or degree	2,255	1,640	615	360	250	12,865	3,990	2,435	1,560	177,210	73,960	63,675	10,290
Secondary (high) school diploma or equivalency certificate	670	325	345	265	100	5,200	2,895	2,215	685	261,205	187,530	172,750	14,785
Apprenticeship or trades certificate or diploma	425	145	280	180	85	2,080	1,415	1,140	280	89,440	67,280	62,570	4,705
College, CEGEP or other non-university certificate or diploma	370	70	300	235	55	2,815	2,100	1,785	315	146,770	111,365	105,860	5,505
University certificate or diploma below bachelor level	50	(10)	60	55	10	475	345	310	35	28,195	19,435	18,475	965
University Degree	225	30	195	210	-	1,860	1,610	1,545	65	154,480	125,960	120,765	5,200

Source: Number of Positions (Payroll) from NexGen Energy Rook I Feasibility Study Spreadsheet.
a) Data have been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases 10. Totals may not add up due to rounding.
b) In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available. Suppression of data can be due to poor data quality or to other technical reasons.
c) Local Study Area includes Birch Narrows Dene Nation (Turnor Lake 193B), Buffalo Narrows, Buffalo River Dene Nation 193, Clearwater River Dene 222, Descharme Lake, La Loche, Michel Village, St. George's Hill, and Turnor Lake. However, data is not available for Descharme Lake.
d) Northern Saskatchewan (Regional Study Area) is defined as Census Division No.18.
e) Refers to whether a person aged 15 years and over was employed, unemployed or not in the labour force during the week of Sunday, May 1 to Saturday, May 7, 2016.
f) Users are advised to consult data quality comments for 'Highest certificate diploma or degree ' available in the Education Reference Guide Census of Population 2016 Catalogue no. 98-500-X2016013.
LSA = local study area; RSA = regional study area; CEGEP = Collège d'enseignement général et professionnel.

Table A- 23b: Construction On-Site Labour, Annual Peak

Construction On Site	Year -4	Year -3	Year -2	Year -1
Surface construction	101	63	138	3
Underground: shaft sinking – contactor	88	129	64	0
Underground: lateral development / construction – contractor	0	0	78	88
Process plant / paste plant	0	0	1	59
Integrated execution team	18	40	49	28
Visitors, contractors, and consultants	10	12	17	17
Total	216	243	348	248

Source: Stantec 2021, Table 10-16 and Table 10-18.

Table A-24: Number of Labour Positions in Payroll at Peak Year

	Estimated Level of Education	Total Labour Positions
	Number of Labour Positions in Payroll	
1	On The Job Training	26
2	Trade	140
3	Trade / Diploma / On The Job Training	4
4	Trade / Diploma	2
5	Diploma	24
6	Diploma / On The Job Training	245
7	University	43
8	University / Diploma	2
	Total	**486**
	Grouping of the Number of Labour Positions in Payroll	
1	Diploma / On The Job Training	295
2	Trades	146
3	University	45
	Total	**486**

Source: Number of positions (payroll) with estimated level of education are based on the data provided by NexGen Energy Ltd. as Rook I Project Feasibility Study Workbook (Halliday 2021a, 2021b; Oakes 2021).

Table A-25: Detailed Labour Positions at Peak Year with Estimated Level of Education

Role	On-site	Payroll	Estimated Level of Education
Mine Labour Profile - Peak Year			
Mine Management			
Mine Superintendent	1	1	University
UG Mine General Supervisor	1	2	Diploma / On The Job Training
Mine Clerk	1	2	Diploma / On The Job Training
Training Coordinator	2	4	Diploma / On The Job Training
Safety Officer	2	4	Diploma
Subtotal Mine Management	**7**	**13**	
Technical Services			
Mine Technical Services Manager	1	1	University
Senior Mine Engineer	3	6	University
Mine Engineer	2	4	University
Mine Technician and Surveyor	4	8	Diploma / On The Job Training
Automation Technician	4	8	Diploma / On The Job Training
Ventilation and Radiation Technician	4	8	Diploma / On The Job Training
Senior Mine Geologist	1	2	University
Geologist	2	4	University
Geological Technician	3	6	Diploma / On The Job Training
Subtotal Technical Services	**24**	**47**	
Mine Operations			
Shift Supervisor	6	12	Diploma / On The Job Training
Development Miner	6	12	Diploma / On The Job Training
Bolter	8	16	Diploma / On The Job Training
LHD Operator	13	26	Diploma / On The Job Training
Shotcrete Operator	6	12	Diploma / On The Job Training
Service Miner	5	10	Diploma / On The Job Training
Trainee / Supply Delivery	4	8	On The Job Training
Production Driller	8	16	Diploma / On The Job Training
Cablebolt Driller	4	8	Diploma / On The Job Training
Blasting Operator	4	8	Diploma / On The Job Training
Construction Miner	8	16	Diploma / On The Job Training
Skip / Cage Tender	2	4	Diploma / On The Job Training
Batch Plant Operator	4	8	Diploma / On The Job Training
Paste Backfill Deposition Crew	4	8	Diploma / On The Job Training
Hoist Operator	2	4	Diploma / On The Job Training
Rock Breaker Operator	2	4	Diploma / On The Job Training
Grader Operator	1	2	Diploma / On The Job Training
UG Truck Operator	2	4	Diploma / On The Job Training
Surface Truck Operator	6	12	Diploma / On The Job Training
Surface Labourer	1	2	On The Job Training

Table A-25: Detailed Labour Positions at Peak Year with Estimated Level of Education

Role	On-site	Payroll	Estimated Level of Education
Subtotal Mine Operations	**96**	**192**	
Mine Maintenance			
Maintenance Supervisor	1	2	Trade
Maintenance Planner	1	2	Diploma
Maintenance Clerk	1	2	Diploma / On The Job Training
Mechanical Leader	1	2	Trade
Electrical Leader	1	2	Trade
Mechanic	22	44	Trade
Hoist Mechanic	1	2	Trade
Electrician	4	8	Trade
Drill Repair	1	2	Trade
Maintenance Shop Labourers	4	8	On The Job Training
Warehouse Operator	3	6	Diploma / On The Job Training
Subtotal Mine Maintenance	**40**	**80**	
Mine Labour Positions, Total	**167**	**332**	
Process Plant / Paste Plant Labour Profile - Peak Year			
Process Operations			
Superintendent Process Plant	1	1	University
General Supervisor, Process Plant	1	2	University
Shift Supervisor, Process Plant	3	6	University
Control Room Operator	4	8	Diploma / On The Job Training
Grinding Operator			
Processing / Milling Operator II	2	4	Trade
Labourer	2	4	On The Job Training
Leaching and CCD Operator			
Processing / Milling Operator II	2	4	Trade
Labourer	2	4	On The Job Training
SX Operator			
Processing / Milling Operator III	2	4	Trade
Processing / Milling Operator I	2	4	Trade
Gypsum Precipitation Operator			
Processing / Milling Operator II	2	4	Trade
YC Precipitation and Calcining Operator			
Processing / Milling Operator III	2	4	Trade
Processing / Milling Operator I	2	4	Trade
Product Handling Operator			
Processing / Milling Operator II	2	4	Trade
Effluent Treatment Operator			
Effluent Treatment Plant Operator	1	2	Trade / Diploma
Processing / Milling Operator I	2	4	Trade

Table A-25: Detailed Labour Positions at Peak Year with Estimated Level of Education

Role	On-site	Payroll	Estimated Level of Education
Subtotal – Process Operations	**32**	**63**	
Acid Plant			
Acid Plant Operator			
Processing / Milling Operator III	1	2	Trade
Processing / Milling Operator I	2	4	Trade
Subtotal – Process Acid Plant	**3**	**6**	
Process Maintenance			
Mill Maintenance General Supervisor			
General Supervisor, Maintenance	1	2	Trade
Mechanical Engineer	1	2	University
Maintenance Planner / Scheduler			
Maintenance Planner	1	2	Diploma / On The Job Training
Maintenance Clerk	1	2	Diploma / On The Job Training
Mechanical Supervisor			
Shift Supervisor, Maintenance	1	2	Trade
Electrician Supervisor			
Shift Supervisor, Maintenance	1	2	Trade
Electrician			
Electrician / Instrumentation Technician	2	4	Trade
Instrumentation Technician			
Electrician / Instrumentation Technician	2	4	Trade
Millwright			
Millwright / Welder	4	8	Trade
Mill Pipefitter / Welder			
Millwright / Welder	2	4	Trade
Mill Machinist			
Maintenance Mechanic III	1	2	Trade
Subtotal – Process Maintenance	**17**	**34**	
Process Technical Services			
Senior Metallurgist	1	1	University
Metallurgist	2	3	University
Laboratory Supervisor	1	2	University / Diploma
Lab Technician	4	8	Diploma
Subtotal – Process Technical Services	**8**	**14**	
Paste Plant			
Paste Plant Operator			
Processing / Milling Operator III	2	4	Trade
Processing / Milling Operator I	2	4	Trade
Subtotal – Paste Plant	**4**	**8**	
Detailed Process Plant / Paste Plant Labour Profile, Total	**64**	**125**	

Table A-25: Detailed Labour Positions at Peak Year with Estimated Level of Education

Role	On-site	Payroll	Estimated Level of Education
G&A Labour Profile [a]			
Management and Administration			
General Manager	1	1	University
Administrative Assistant	1	1	Diploma / On The Job Training
Health and Safety			
Superintendent, Health, Safety, and Radiation Protection	1	1	University
Emergency Response Team (ERT) Captain	1	1	Diploma
Radiation Protection Officer	1	1	University
Radiation Protection Specialist	1	1	University
Radiation Technician	3	3	Diploma
Environment			
Superintendent, Environment, and Permitting	1	1	University
Environmental Coordinator	1	1	University
Environmental Technician	2	2	Diploma
Procurement and Logistics			
Buyer	1	1	Diploma
Contracts Lead	1	1	Diploma
Accounting			
Accounts Payable (AP) Clerk	1	1	Diploma / On The Job Training
Site Controller	1	1	University
Finance Clerk	1	1	Diploma
IT and Communications			
IT / Communications Technician	1	1	Diploma
Surface Support and Maintenance			
Superintendent, Maintenance	1	1	University
Flight / Logistics (Travel) Coordinator	1	1	Diploma / On The Job Training
Site Services Supervisor	1	1	Trade / Diploma / On The Job Training
Warehouse Supervisor	1	1	Trade / Diploma / On The Job Training
Warehouse Technician	2	2	Trade / Diploma / On The Job Training
Human Resources (HR)			
Superintendent, HR	1	1	University
HR Coordinator	1	1	University
Security			
Security Supervisor	1	1	Diploma / On The Job Training
Security Officer	1	1	Diploma / On The Job Training
G&A Labour Positions, Total	**29**	**29**	
TOTAL	**260**[b]	**486**	

Source: Stantec 2021, Table 10-19, Table 10-21, and Table 10-22.
a) General and administration labour on-site labour numbers in Table 10-22 of the Feasibility Study are assumed equal to payroll.
b) The 260 people are expected to be on site at any one time at peak employment. Most personnel will work a two-week-in, two-week-out rotation, on a fly-in and fly-out basis. Some of the senior staff will work a rotation of four days on site, and three days off site, without a cross shift.

Table A-26: Estimated Direct Payments to Government for a Typical Operating Year

Government Level	Payment to Government	Estimated Payment in Typical Operating Year ($ millions [2020])
Saskatchewan Government	Resource Surcharge	$32.6
	Basic Royalty	$46.2
	Profit Royalty	$127.7
	Corporate Income Tax	$80.9
	Personal Income Tax	$1.1
	Saskatchewan Government Total	**$288.5**
Federal Government	Corporate Income Tax	$101.1
	Personal Income Tax	$2.8
	Federal Government Total	**$103.9**
Total	**Saskatchewan and Federal Government Totals**	**$392.4**

Estimates of federal and provincial personal income taxes were calculated based on median effective tax rates reported by Statistics Canada.

GEOLOGY BASELINE REPORT FOR THE ROOK I PROJECT

Prepared by:

NexGen Energy Ltd.

June 2021

Executive Summary

The Rook I Project (Project) is a proposed new uranium mining and milling operation located in northwestern Saskatchewan, approximately 40 km east of the Saskatchewan-Alberta border, 130 km north of the town of La Loche, and 640 km northwest of the city of Saskatoon. The proposed Project site is in a sub-Arctic climactic region typical of mid-latitude continental areas, with elevations ranging from 583 metres above sea level (masl) on drumlins to 480 masl in lowland lakes. The local topography around the Project site is variable with drumlins and lakes/wetlands dominating the northwest and southeast portion of the area, respectively. Lowland lakes, rivers, and muskegs dominate the central part of the study area. The Project is 100% owned by NexGen Energy Ltd. and hosts the Arrow deposit, a land-based, high-grade uranium deposit; the Arrow deposit is the focus of the study area of the geology baseline program.

The Arrow deposit has undergone considerable advancement since discovery in February 2014, with mineral resources completed in 2016, 2017, 2018, and 2021, each supported by successive systematic drill programs. Currently, the Arrow deposit has Measured Mineral Resources of 209.6 million pounds (Mlb) of triuranium octoxide (U_3O_8) contained in 2,183 kilotonnes (kt) grading 4.35% U_3O_8, Indicated Mineral Resources of 47.1 Mlb of U_3O_8 contained in 1,572 kt grading 1.36% U_3O_8, and Inferred Mineral Resources of 80.7 Mlb of U_3O_8 contained in 4,399 kt grading 0.83% U_3O_8 (NexGen 2021).

The Arrow deposit consists of several high-grade, near-vertical, uranium veins within at least six reactivated high strain zones, known as the A0 through A5 shears, which comprise part of the Patterson Lake structural corridor. The main uranium-bearing mineral present at the Arrow deposit is uraninite, whereas secondary uranium minerals such as coffinite or uranophane may partially or wholly replace uraninite. The mineralized area is 315 m wide with an overall strike of 980 m. Mineralization occurs 100 m below surface and extends to a depth of 950 m. The individual shear zones vary in thickness from 2 m to 60 m. The heterogeneous high strain zones hosting the Arrow deposit evolved through episodic reactivation events creating various small-scale brittle fault linkages oblique to, and connecting, the main fault zones.

The Arrow deposit is hosted in the Paleoproterozoic basement rocks of the Taltson Domain along the Patterson Lake corridor. The bedrock geology is composed of variably silicified and metasomatized intermediate to mafic orthogneisses. Local mafic-rich amphibolite and pyroxenite, ultrabasic and syenitic dykes, and porphyroblastic feldspar- and quartz-rich pegmatites intrude the gneissic granulite facies rocks. The main fabrics and contacts of crystalline basement rocks in the Arrow deposit area are all steeply dipping, dominantly southeast, with a northeast-southwest strike. Basement rocks are unconformably overlain by late Paleoproterozoic to Mesoproterozoic Athabasca Supergroup sandstones of variable thickness, rarely exceeding 50 m. Devonian and/or Cretaceous sedimentary rocks overlie the Athabasca sandstones, with Quaternary glacial deposits capping the geologic sequence and forming the present-day topography.

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FIGURES

APPENDICES

Abbreviations and Units of Measure

Abbreviation	Definition
3-D	three-dimensional
acQuire	acQuire Technology Solutions Pty Ltd.
EIS	Environmental Impact Statement
EM	electromagnetic
HLEM	horizontal loop electromagnetic
LiDAR	Light Detection and Ranging
MEGATEM	fixed-wing transient electromagnetic
MWH	MWH Geo-Surveys Ltd.
NAD	North American Datum
NexGen	NexGen Energy Ltd.
NTS	National Topographic System
Project	Rook I Project
QA	quality assurance
QC	quality control
RSA	regional study area
SBTZ	Snowbird Tectonic Zone
SHRIMP	sensitive high mass resolution ion microprobe
SRC	Saskatchewan Research Council
Taltson	Paleoproterozoic Taltson Magmatic Zone
Titan	Titan Uranium Inc.
TLU	Traditional Land Use
U_3O_8	triuranium octoxide
UTM	Universal Transverse Mercator
VLF	magnetic-radiometric-very low frequency
VRSZ	Virgin River shear zone
VTEM	versatile time-domain electromagnetic
WCSB	Western Canada Sedimentary Basin
ZTEM	Z-Axis Tipper Electromagnetic

Unit of Measure	Definition
%	percent
°	degree
±	plus or minus
>	more than
<	less than
µm	micron
Ga	billion years
km	kilometre

Unit of Measure	Definition
km^2	square kilometre
kt	kilotonne
m	metre
Ma	million years
masl	metres above sea level
Mlb	million pounds

1.0 INTRODUCTION

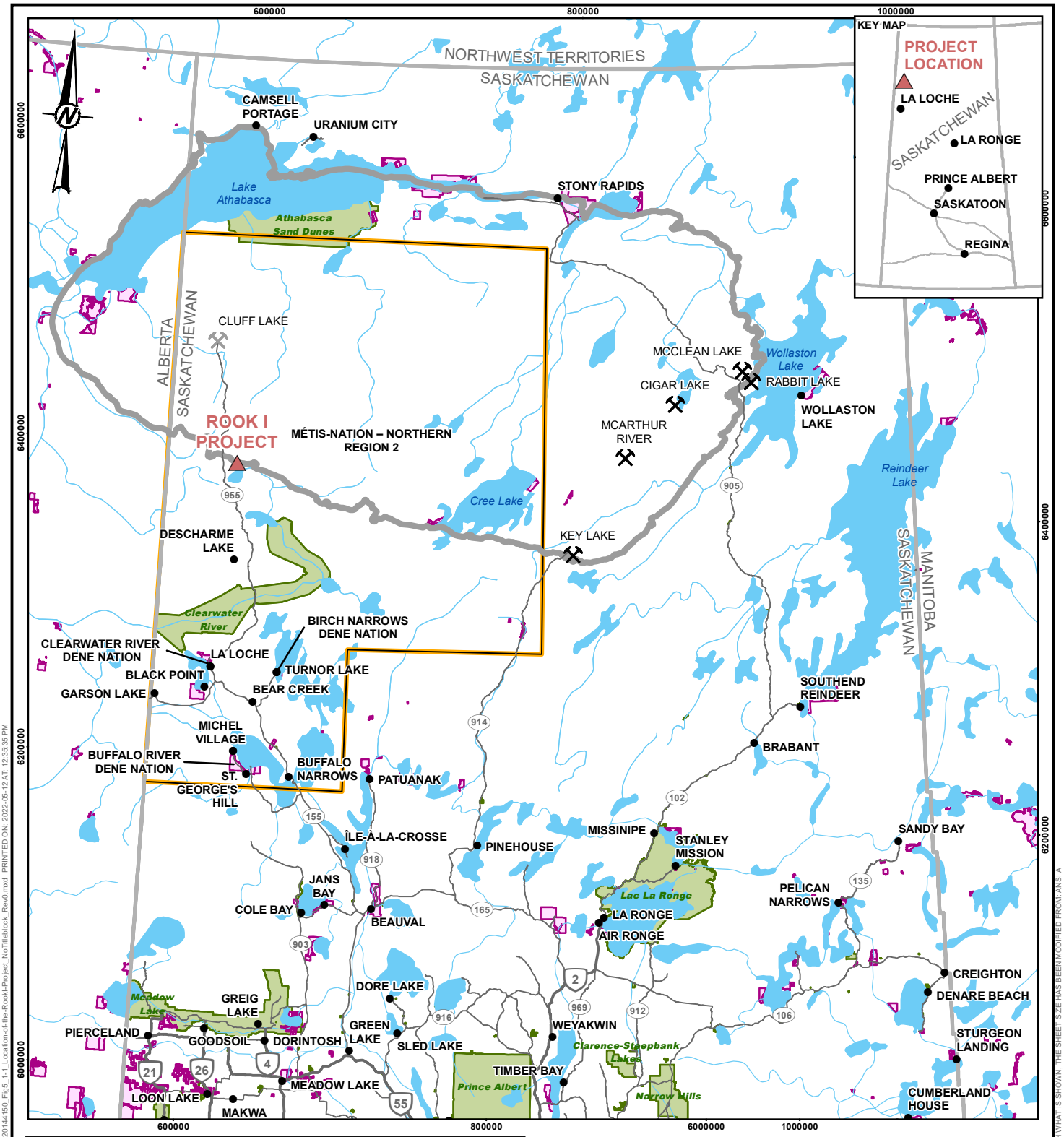
The Rook I Project (Project) is a proposed new uranium mining and milling operation that is 100% owned by NexGen Energy Ltd. (NexGen). The Project would be located in northwestern Saskatchewan, approximately 40 km east of the Saskatchewan-Alberta border, 130 km north of the town of La Loche, and 640 km northwest of the city of Saskatoon (Figure 1). The Project would reside within Treaty 8 territory and within the Métis Homeland. At a regional scale, the Project would be situated within the southern Athabasca Basin adjacent to Patterson Lake, and along the upper Clearwater River system (Figure 2). Access to the Project would be from an existing road off Highway 955. The Project would include underground and surface facilities to support the extraction and processing of uranium ore from the Arrow deposit, a land-based, basement-hosted, high-grade uranium deposit.

The geology baseline report represents a component of a comprehensive baseline program that documents the natural and socio-economic environments in the anticipated area of the Project. The geology baseline program was undertaken to provide context from which Project environmental effects could be assessed in the Environmental Impact Statement (EIS).

Since exploration at the Project commenced in 2013, NexGen has engaged regularly and established relationships with local Indigenous Groups and northern communities, specifically those closest and with greatest access to the proposed Project. NexGen respects the rights of Indigenous Peoples and the unique relationship Indigenous Peoples have with the environment, and recognizes the importance of full and open discussion with interested or potentially affected Indigenous communities regarding the development, operation, and decommissioning of the proposed Project. Engagement activities to date, as well as future planned engagement activities, reflect the value NexGen places on meaningful engagement with Indigenous and northern communities who could be potentially affected by the proposed Project. Engagement mechanisms have included, but are not limited to: meetings with leadership, workshops and community information sessions, Project site tours, establishing Joint Working Groups to support the gathering and incorporation of Indigenous Knowledge throughout the Environmental Assessment process, and providing funding for Traditional Land Use (TLU) Studies[1] to understand how the proposed Project may interact with the Indigenous communities' traditional use of the anticipated area of the Project.

Feedback received during engagement activities was documented for contribution to the EIS for the Project; examples of feedback received include discussion of concerns, interests, potential adverse effects, mitigation, and design alternatives. Many baseline studies were initiated in advance of formal engagement on the Environmental Assessment for the Project; however, engagement during the execution of baseline studies has helped inform the understanding of baseline conditions and confirmed components of the natural and socio-economic environments that required study. A summary of feedback related to the geology baseline program is presented in Appendix A, Joint Working Group Feedback Applicable to Geology Baseline Report.

[1] Traditional Land Use (TLU) Studies include all land use studies developed by the Project's affected Indigenous Groups, including Traditional Land Use and Occupancy studies, Traditional Knowledge and Use studies, and Indigenous Rights and Knowledge studies, henceforth referred collectively as TLU Studies.



LEGEND

- POPULATED PLACE
- URANIUM MINING FACILITY (ACTIVE)
- URANIUM MINING FACILITY (DECOMMISSIONED)
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- ATHABASCA BASIN BOUNDARY
- INDIAN RESERVE
- PROVINCIAL PARKS
- WATERBODY
- PROJECT LOCATION
- MÉTIS NATION-SASKATCHEWAN NORTHERN REGION 2

0 100 200
1:3,500,000 KILOMETRES

REFERENCE(S)

1. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. PARKS OBTAINED FROM IHS MARKIT CANADA ULC.

PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT: NexGen Energy Ltd. — ROOK I PROJECT

TITLE: LOCATION OF THE ROOK I PROJECT

CONSULTANT: GOLDER MEMBER OF WSP

PROJECT 20144150 | SCALE AS SHOWN | REV. 0

FIGURE 1

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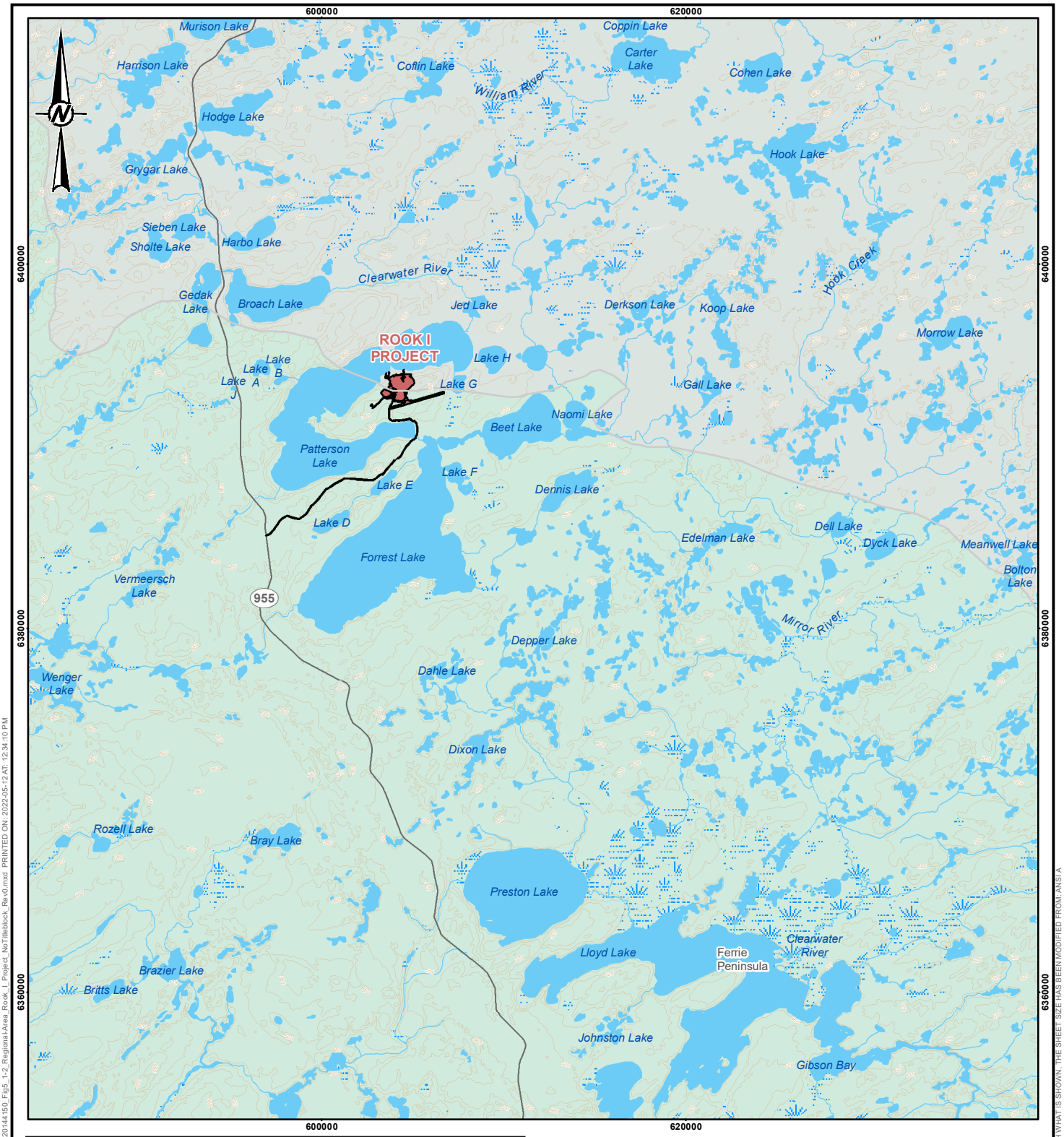
25mm



LEGEND

- ELEVATION CONTOUR (20 m INTERVAL)
- SECONDARY HIGHWAY
- WATERCOURSE
- ATHABASCA BASIN
- WATERBODY
- WETLAND
- WOODED AREA
- PROPOSED PROJECT FOOTPRINT

0 5 10
1:300,000 KILOMETRES

REFERENCE(S)
1. PROJECT FEATURES OBTAINED FROM NEXGEN, APRIL 6, 2021.
2. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT
NexGen Energy Ltd.

ROOK I PROJECT

TITLE

REGIONAL AREA OF THE ROOK I PROJECT

CONSULTANT
GOLDER MEMBER OF WSP

PROJECT 20144150 | SCALE AS SHOWN | REV. 0

FIGURE 2

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2.0 STUDY OBJECTIVES

The geology baseline study was completed to describe the existing geologic setting prior to potential development of the Project. Geology refers to the physical composition of rocks in the environment, and the physical and chemical processes by which these rocks change over time. This baseline program included information gathered, compiled, and analyzed from 2014 through 2019 inclusive.

The objectives of the geology baseline study were to:

- describe the proposed Project's location, physiography, and climate;
- summarize work completed on the Project to date by NexGen and preceding companies, as well as describe drilling and sampling methods;
- describe the regional and local geologic framework and other relevant characteristics of the area of the Project;
- identify the geological composition of host rocks, alteration, and ore resources of the Arrow deposit; and
- describe the structural geology of the Arrow deposit, including geometry and characteristics of major faults and shear zones.

This report is based on detailed review, compilation, and interpretation of previously published work in the area including academic studies and previous technical reports published by NexGen and consulting companies.

3.0 STUDY AREA

The study area of the geology baseline program includes the Arrow deposit, a land-based, high-grade uranium deposit that is 100% owned by NexGen. The Arrow deposit is basement hosted and considered to be an example of a vein-style unconformity-related uranium deposit where mineralization occurs in open-space filling as well as chemical replacement. This deposit is hosted almost exclusively within crystalline basement rocks of the Taltson Domain.

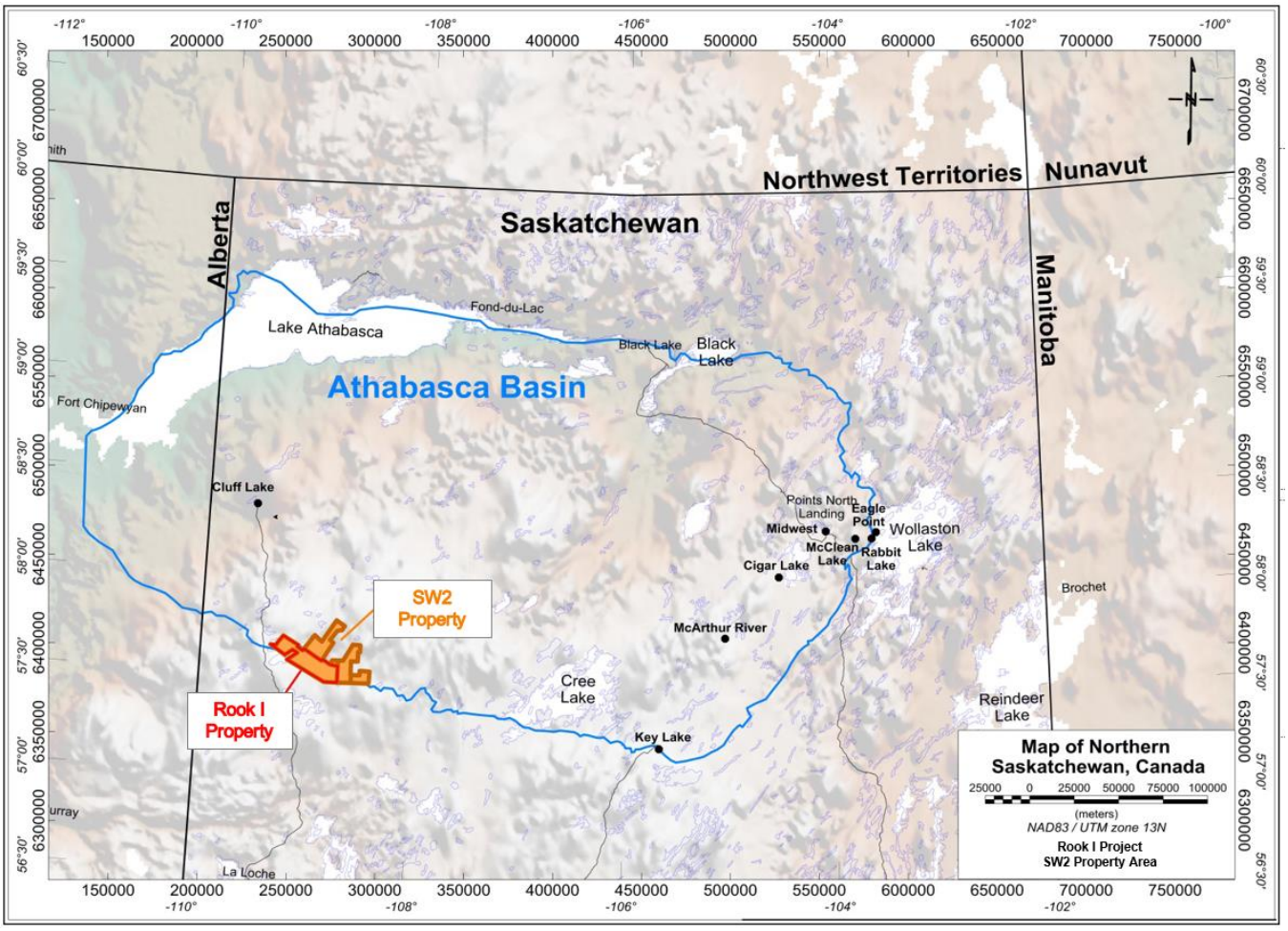
The Arrow deposit is located within NexGen's Rook I property, which is a subset of NexGen's broader SW2 mineral claim package (i.e., SW2 property). The proposed Project is centred at roughly 620,000 m E and 6,385,000 m N, Universal Transverse Mercator (UTM) projected coordinate system using North American Datum 1983 (NAD83), Zone 12N, and occupies portions of 1:50,000 scale National Topographic System (NTS) index map sheets 74F/07, 74F/10, and 74F/11 (Figure 3). The Arrow deposit is located at approximate UTM coordinates of 604,530 E and 6,3939,600 N (57˚40'21"N and -109˚15'2"W).

The topography in the study area is variable with drumlins dominating the northwest, and lakes and wetlands dominating the southeast. Lowland lakes, rivers, and muskeg dominates the central part of the study area. The northwest part of the study area overlies portions of Patterson Lake and Forrest Lake (Figure 4), which are two of the largest waterbodies within 100 km of the proposed Project. Both lakes are part of the Clearwater River watershed. Elevations range from 583 metres above sea level (masl) on drumlins to 480 masl in lowland lakes. The elevation of Patterson Lake is approximately 499 m.

The study area has a sub-Arctic climate typical of mid-latitude continental areas. The proposed Project site is covered by Boreal forest common to the Canadian Shield. The area surrounding the Project site consists of recent burns with residual stands of jack pine (*Pinus banksiana*) and some black spruce (*Picea mariana*), with shrub and

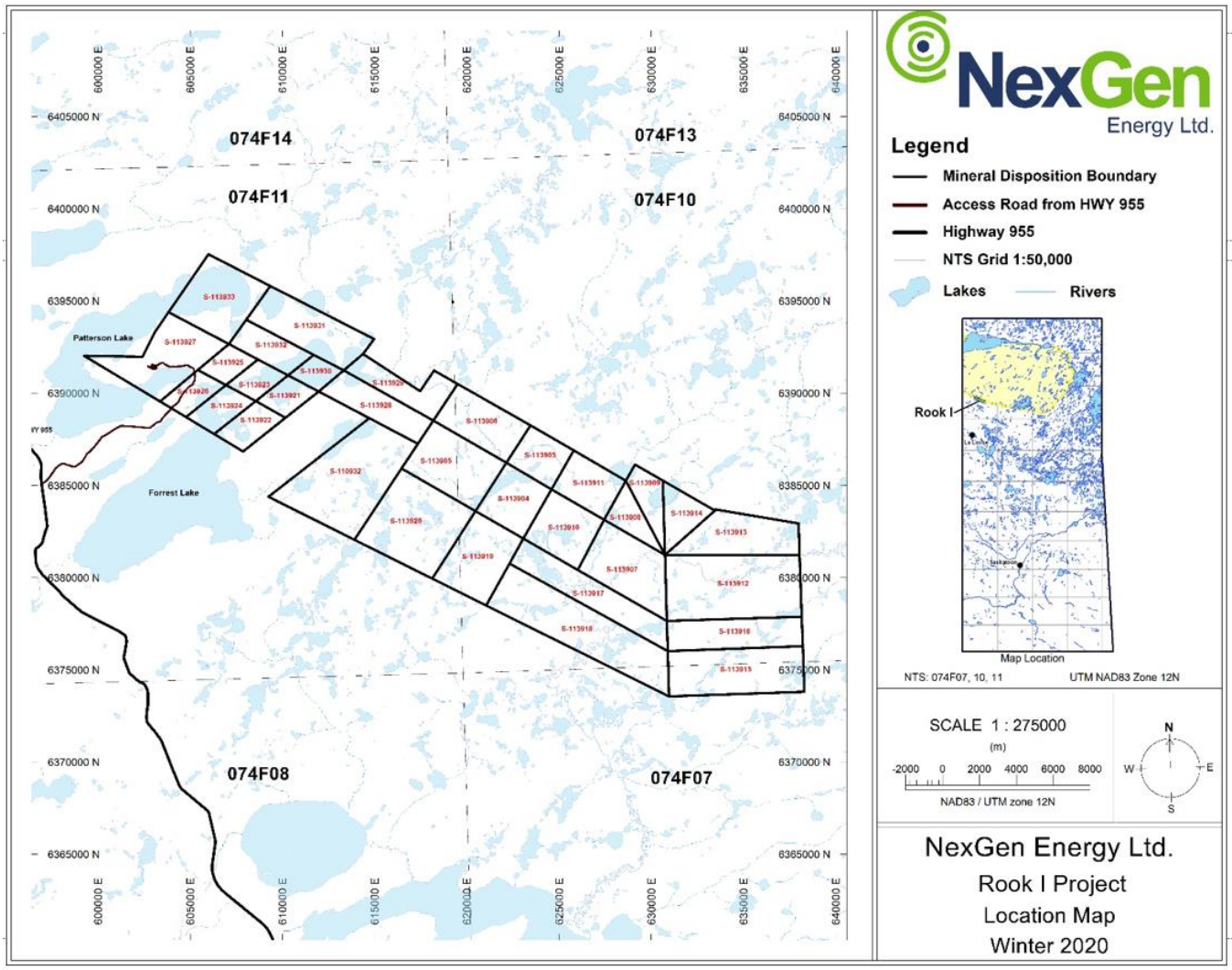
lichen as ground cover. Bedrock outcrops are very rare but are known to exist in areas of the eastern half of the Project site.

Figure 3: Location of the Rook I Property within NexGen's SW2 Property, Southwestern Athabasca Basin, Northern Saskatchewan



Note: Previous and current mine locations are shown by black dots. Map in NAD83, UTM Zone 13N.

Figure 4: Rook I Property Location and Mineral Disposition Map



4.0 METHODS

4.1 Review of Existing Information

Recorded exploration in and around the mineral dispositions of the Rook I property began in 1968. Exploration activities in the area prior to NexGen's ownership consisted of geological mapping, prospecting, lake sediment sampling, soil and rock geochemical sampling, airborne geophysical surveys (i.e., magnetic and radiometric, helicopter-borne radiometric, fixed-wing transient electromagnetic [MEGATEM], and versatile time-domain electromagnetic [VTEM]), ground geophysical surveys (i.e., MaxMin II, gravity), and diamond core drilling.

Since 2013, NexGen has completed ground radiometric and geophysical surveys (i.e., gravity, direct current induced polarization), boulder prospecting programs, airborne geophysical surveys (i.e., magnetic-radiometric-very low frequency [VLF], VTEM, Z-Axis Tipper EM [ZTEM], gravity), and Light Detection and Ranging (LiDAR), as well as a bathymetric survey on Patterson Lake, and diamond core drilling. Drill programs conducted around the Project site have discovered uranium mineralization in the following areas: Area A occurrence in 2013; Arrow deposit in 2014; Camp East, Harpoon, and Cannon occurrences in 2016; and South Arrow in 2017.

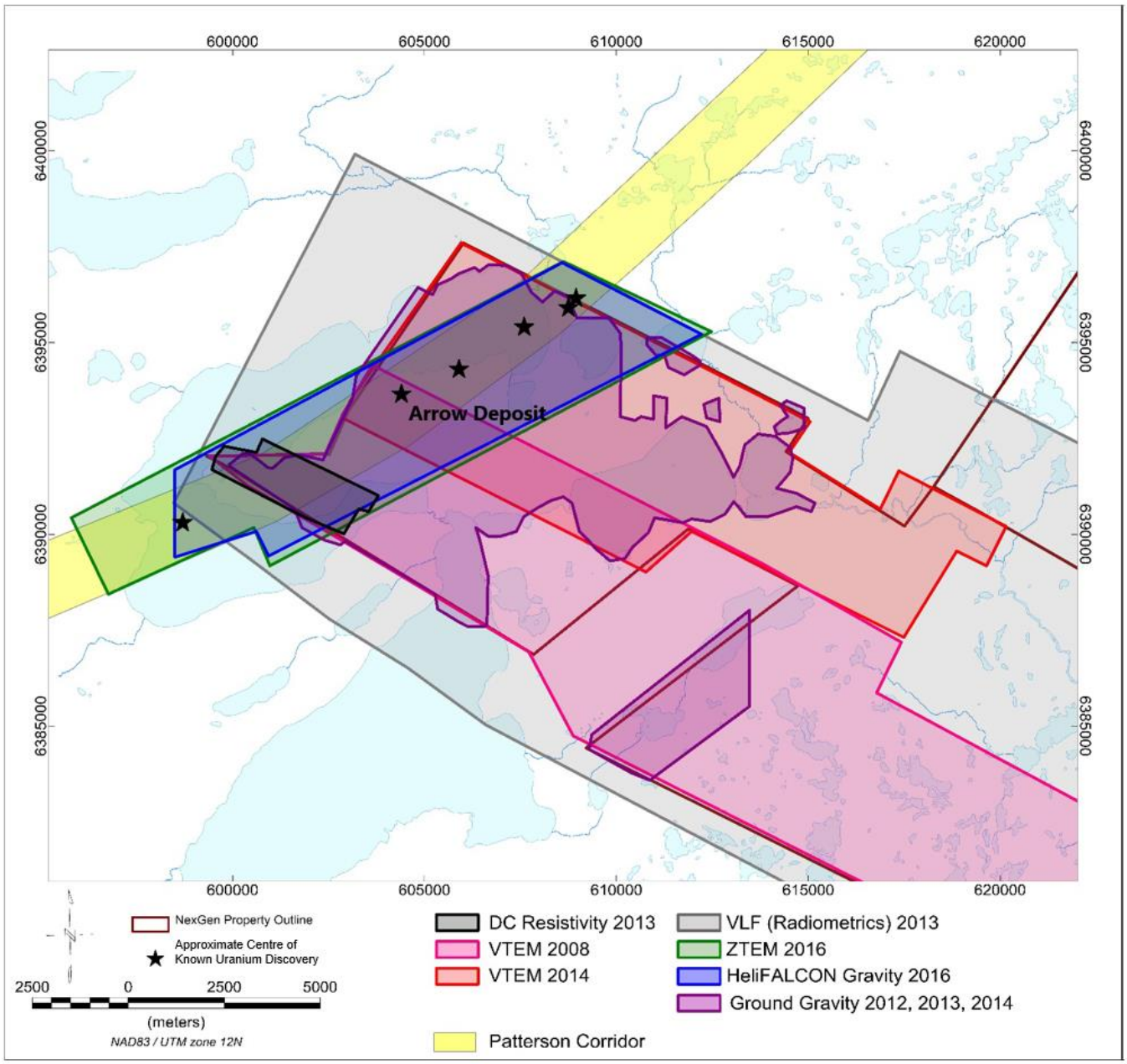
4.2 Geophysical Surveys

Compilation and interpretation of numerous geophysical surveys have contributed to the refinement of the geological interpretation of the Arrow deposit. These geophysical surveys were completed by previous owners (i.e., Titan Uranium Inc. [Titan] in 2006 and 2008, Mega Uranium Ltd. in 2012), as well as by NexGen from 2013 to present (Figure 5). Data derived from a suite of geophysical techniques were used, with compilations and interpretations completed by Condor Consulting Inc.

Titan completed airborne electromagnetic (EM) surveys (i.e., MEGATEM and VTEM) and ground and horizontal loop electromagnetic (HLEM) surveys that detected numerous strong EM anomalies (Carriere 2008; Ostapovitch 2009). Mega Uranium Ltd. subsequently acquired all nine dispositions comprising the Rook I property from Titan, and between September 2012 and October 2012, a ground gravity survey comprising 2,942 individual stations was completed by MWH Geo-Surveys Ltd. (MWH) of Vernon, British Columbia.

Since acquiring the Rook I property in November 2012, NexGen has carried out various geophysical surveys from 2013 to present, including ground gravity and three-dimensional (3-D) resistivity, airborne EM surveys (i.e., VLF, VTEM, VTEM Maxwell, ZTEM), airborne gravity and HeliFALCON™ airborne gravity gradient surveys, aerial magnetic susceptibility geometrics, airborne radiometric surveys, and aerial LiDAR.

Figure 5: Survey Flight Paths, Line Paths, and Stations over the Patterson Lake Corridor and Arrow Deposit in the Northwestern Portion of the Rook I Property



Source: Pendrigh and Witherly 2017.

4.3 Drilling and Sampling

A total of 566 diamond drill holes (318,096 m total drilled length) have been completed on the Arrow deposit by NexGen between 2014 and 19 July 2019. Of the 566 drill holes completed, 45 drill holes were drilled on the South Arrow discovery.

Each core box was initially surveyed with a Radiation Solutions RS-120 scintillometer to determine if any core boxes contained mineralization. Before the core was split for sampling, the following steps were undertaken: depth markers were checked; core was carefully reconstructed, washed, geotechnically and geologically logged for lithologies, alteration, structures, mineralization, and rock mass rating; resurveyed in detail with the scintillometer; photographed while wet; and marked for sampling. Sampling of the drill holes for assay was guided by the observed geology and readings from the hand-held scintillometer. Logging and sampling information was entered into a Microsoft Access database template on a computer, which was integrated into the master digital database, daily. The Microsoft Access database was replaced by a comprehensive acQuire Technology Solutions Pty Ltd. (acQuire) database in December 2018. All existing data were migrated to the new system, and all new data have been collected in acQuire since December 2018.

All NexGen drill hole collars have been surveyed using a differential base station global positioning system instrument. The trajectory of all drill holes was determined during drilling with a Reflex Instrument North America Ltd. instrument in single point mode, which measured the dip and azimuth at 30 m intervals. Both immediately below casing and after completion, holes drilled after winter 2014 at the Arrow deposit were surveyed via Stockholm Precision Tools north-seeking gyro survey tool, which measures the dip and azimuth continuously down the drill hole. Prior to winter 2014, drill hole deviation was monitored with an EZ-shot borehole survey tool manufactured by Reflex Instruments Canada.

Three types of samples were collected for geochemical analysis: point samples, composite samples, and split samples; split samples were typically collected in areas of elevated radioactivity. Samples were sent to Saskatchewan Research Council (SRC) Geoanalytical Laboratories in Saskatoon, Saskatchewan. The SRC operates in accordance with the General Requirements for the Competence of Testing and Calibration Laboratories (CAN-P-4E [ISO/IEC 17025:2005]; ISO/CASCO 2005) and is independent of NexGen.

Detailed information pertaining to SRC sample preparation methods and analytical details can be obtained from the SRC website (SRC 2021).

The quality assurance (QA) and quality control (QC) program used for the Arrow deposit included the insertion of standard reference materials, blanks, and duplicates into the sample stream. Results from the QA/QC samples were continually tracked by NexGen as certificates for each batch were received. If QA/QC samples of a batch passed within acceptable limits, the results of the batch were imported into the master database.

Only approved contractor and NexGen geological staff were authorized to be at drill sites and in the core processing facility. After logging, sampling, and shipment preparation, samples were transported directly from the Project site to SRC by NexGen staff.

All logged geological data were imported to Leapfrog Geo 5.0 following appropriate QA/QC checks. From there, 3-D models were generated from the drill hole data and publicly available government data (e.g., Athabasca Basin outline), based on contact surfaces and geological characteristics.

5.0 RESULTS

5.1 Geology of Northern Saskatchewan

The regional geology described in this section is based primarily on historical work compilations and recent work completed by Colin Card and Sean Bosman of the Saskatchewan Geological Survey and is summarized in Hillacre et al. (2020).

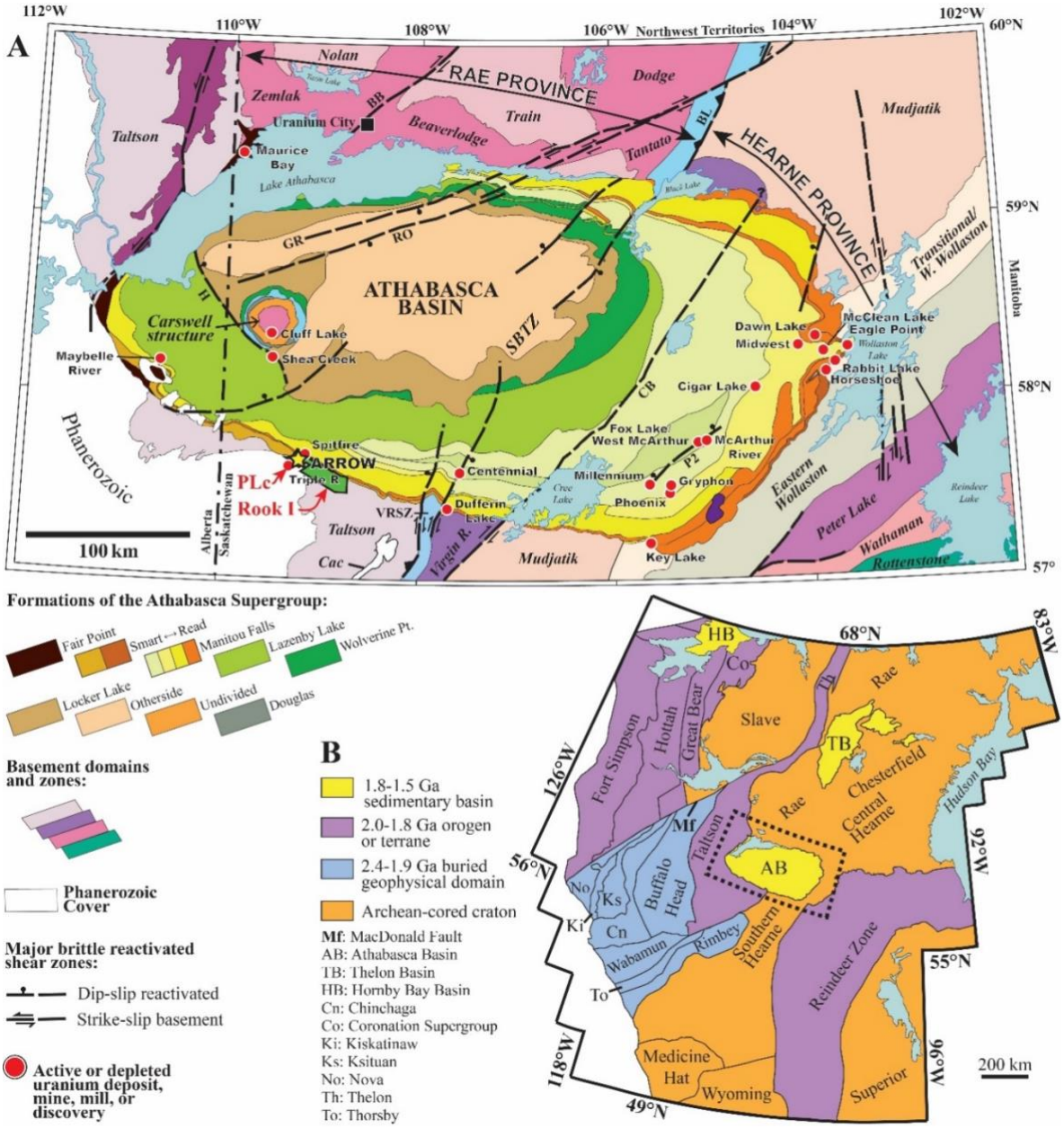
5.1.1 Bedrock Geology

5.1.1.1 Crystalline Basement

The Project site is situated in the Western Churchill Structural Province of the Canadian Shield (Figure 6A and Figure 6B), which is divided into the Rae Province to the west and the Hearne Province to the east, separated by the Snowbird Tectonic Zone (SBTZ). Historically, the basement rocks south of the Athabasca Basin and west of the Virgin River shear zone (VRSZ), where the proposed Project is located, have been termed the Western Granulite Domain (Lewry and Sibbald 1977) and the Lloyd Domain (Card 2009) and considered to be Archean in age. However, recent mapping, geochronology, and geophysical analysis in the Lloyd Domain (Card 2012; Card et al. 2014) suggest that the rocks, and their metamorphic and structural history, are correlative with the 2,460 million years (Ma) to 1,985 Ma old rocks present within the Paleoproterozoic Taltson Magmatic Zone (Taltson) in Alberta, and that these rocks extend below the southwest Athabasca Basin (Figure 6A and Figure 6B). This package of Taltson-aged rocks and plutons terminates against the MacDonald Fault along the eastern shore of Great Slave Lake in the Northwest Territories (Figure 6B) and re-emerges south of the southwest Athabasca Basin, extending to the east where this package is truncated by the VRSZ as seen in Figure 6A (Hoffman 1988; Ashton et al. 2009; Card et al. 2014).

The VRSZ is a northeast-southwest trending segment of the SBTZ south of the Athabasca Basin, which separates the rocks of the Taltson and Virgin River domains (Figure 6A) and is demarcated by a 5 km to 7 km wide zone of mylonitic rocks at Careen Lake (Card 2002) and a 5 km to 7 km wide zone of heterogeneous mylonitization to the northeast (Card and Bosman 2007). Rocks of the Taltson Domain lie within the hanging wall of the VRSZ and are dominated by north-northeast- to east-northeast-striking, sub-vertical oriented granulite-facies (M_1) intermediate orthogneisses, namely a ‘quartz dioritic suite’ (Card 2009). A sample of the Taltson Domain quartz diorite from Lloyd Lake, southeast of the proposed Project, was dated by Card et al. (2014) using uranium-lead sensitive high mass-resolution ion microprobe (SHRIMP) analysis on zircon and yielded an interpreted crystallization age of 2,459 Ma ± 14 Ma, with a Concordia age of 1,899 Ma ± 26 Ma, interpreted as a metamorphic overprint coincident with amphibolite-facies metamorphism (M_2).

Figure 6: (A) Lithostructural domains of Northern Saskatchewan and Alberta illustrating the Major Components of the Churchill Structural Province of the Precambrian Shield and Overlying Phanerozoic Cover; (B) Cratonic Map of Western Laurentia showing (A) (dashed box) in Context of Continent-Scale Tectonics



Source: Hillacre et al. 2020

Note: (A) The location of the Rook I Project and Clearwater anorthosite complex (Cac) within the Taltson Domain, and with respect to the Snowbird Tectonic Zone (SBTZ), the Virgin River Shear Zone (VRSZ), the Grease River Shear Zone (GR), and the Cable Bay Shear Zone (CB). Athabasca Basin unconformity-related uranium deposits are shown, with the Arrow deposit (yellow star) along the Patterson Lake corridor (PLc) in the southwest Basin. Major uranium deposits, mines, and prospects are highlighted, as well as major brittle-reactivated shear zones:
BB = Black Bay, BL = Black Lake, CB = Cable Bay, GR = Grease River, H = Harrison, RO = Robillard, VRSZ = Virgin River shear zone.

Previously, Taltson Domain rocks have been interpreted to be intercalated with gneissic charnockitic granites and Paleoproterozoic-aged metasedimentary psammitic gneiss and pelitic diatexite of the Careen Lake Group (Card 2009). However, more recent studies (e.g., Card et al. 2018) suggest that many of these metasedimentary rocks previously described in outcrop are of metasomatic origin (i.e., chemically altered by hydrothermal and other fluids), and that true metasedimentary rocks may only comprise a few percent of the Taltson Domain. Late intrusive leucogranite to granite, pegmatitic granite, and quartz diorite units have been observed cross cutting these metasedimentary rocks outcrop southeast of the Project site at both Lloyd and Fournier lakes (Card 2009). The Taltson Domain also hosts a younger (i.e., 2,110 Ma ± 16 Ma) northeast-elongated gabbro-anorthosite intrusion termed the Clearwater anorthosite complex, covering approximately 375 km^2, as shown in Figure 6A (Hulbert 1988; Crocker et al. 1993; Card et al. 2014). The Taltson orthogneisses were also intruded by younger Hudson granites (Peterson et al. 2002) between 1.85 billion years (Ga) and 1.82 Ga (Bickford et al. 1994; Stern et al. 2003).

The Clearwater Domain lies immediately west of the Project site, identifiable as a massive north-northeast-trending aeromagnetic high feature that truncates the western boundary and overprints magnetic trends of the Taltson Domain in Saskatchewan. The Clearwater Domain is interpreted as a structurally bound zone of weakly deformed K-feldspar-rich[2] porphyritic granite and granitoid gneiss (Sibbald 1974; Card 2002; Jefferson et al. 2007). Geochronology work (i.e., rock formation and geological event dating) completed on the Clearwater Domain by Stern et al. (2003) has provided a uranium-lead zircon crystallization age for the porphyritic granites of 1,843 Ma, indicating they are contemporaneous with the intrusion of Hudson granites from approximately (i.e., circa) 1.85 Ga to 1.82 Ga into the orthogneisses of the Taltson Domain (Bickford et al. 1994; Stern et al. 2003). However, the gneissic granitoid rocks of the Clearwater yielded an imprecise uranium-lead zircon age of circa 2,529 Ma (Stern et al. 2003).

The crystalline basement rocks underlying the southwestern Athabasca Basin were subjected to a protracted metamorphic and deformational history, involving multiple thermotectonic events. Taltson Domain rocks underwent a high-grade metamorphic event of undefined age (M_0) prior to the emplacement of the Clearwater anorthosite complex circa 2,110 Ma (Card et al. 2014). Subsequently, a high-temperature metamorphic event (M_1) Paleoproterozoic in age, circa 1.94 Ga to 1.93 Ga (Stern et al. 2003; Card et al. 2018), reached upper amphibolite- to granulite-facies conditions in most parts of the Taltson Domain in Saskatchewan contemporaneous with the Taltson-Thelon orogeny and was accompanied by the formation of a regional S_1 foliation (Card et al. 2007, 2014). The S_1 foliation characterizes the bulk of the domain, dipping gently southeast (Card et al. 2008, 2014), with a composite gneissic S_1-S_2 foliation defined by preferred orientation of pyroxene, biotite, and hornblende, supporting that S_1 foliation was imparted during M_1 metamorphism under granulite-facies. S_1 intrafolial, isoclinal F_2 folding has been locally observed throughout the Domain. The S_1-S_2 transposition foliation represents the dominant regional gneissosity of the Taltson Domain. The composite S_1-S_2 foliation has been subsequently folded and transposed into northeast to east-northeast-striking F_3 folds (Card 2009). The refolding of intrafolial F_2 folds with sub-horizontal to gently dipping axial planes by upright F_3 folds resulted in an early Type 3 fold interference pattern, which is overprinted by a Type 1 fold interference pattern created by refolding of F_3 by northwest-striking F_4 cross folds with axial surfaces nearly orthogonal to those of F_3 (Card et al. 2008). Transposition with the F_3-axial planar foliation resulted in a steeply dipping transposition foliation, which is intensified proximal to and within high strain corridors such as the VRSZ. The D_3 deformation was generally weak in the central Taltson Domain but were more intense within high strain zones; this deformation is accompanied by an amphibolite-facies metamorphic (M_2) overprint

[2] K = potassium.

(Card 2009). The second phase of metamorphism (M_2) is interpreted to be synchronous with D_3 deformation during Snowbird-related (i.e., SBTZ) deformation, circa 1.92 Ga to 1.90 Ga (Stern et al. 2003; Card et al. 2014), resulting in amphibolite-facies retrogression indicated by replacement of granulite-facies assemblages in the country rocks. A third major thermotectonic event records mid-greenschist facies metamorphism (M_3) coincident with the Trans-Hudson orogeny.

Brittle-ductile to brittle shear zones and faults are abundant across the Precambrian Shield rocks in northern Saskatchewan. The VRSZ contains outcrop evidence for multiple displacement episodes under ductile, brittle-ductile, and brittle conditions. West from the VRSZ, lineaments trending in several orientations, including northeast, northwest, and west, likely represent late brittle-ductile and brittle fault zones with unknown displacements (Card et al. 2014). Shear zone development linked to F_3 folding is widespread in the Cable Bay straight belt, and analogous structures are common in the Lloyd fold domain described by Card (2009). Many of these structures are related to reactivation of major shear zones in the region during the long-lived metamorphic and deformation history spanning from the Taltson-Thelon to Hudsonian orogenic events circa 1.94 Ga to <1.84 Ga (Hoffman 1988; Card et al. 2014), which led to the exhumation (i.e., rising towards surface or surface exposure).

5.1.1.2 Paleoproterozoic-Mesoproterozoic Sandstones

The present-day Athabasca Basin is an erosional remnant of a large Paleoproterozoic-Mesoproterozoic sedimentary basin as seen in Figure 6A and Figure 6B (Ramaekers et al. 2007), which covers most of northern Saskatchewan and extends into northern Alberta. At the center of the basin, the Athabasca Supergroup sandstones have a maximum depth of approximately 1,500 m thick (Ramaekers 1979, 1980; Tremblay 1982). The Basin consists of a series of unmetamorphosed siliciclastic sedimentary rocks, predominantly sandstone, of the Athabasca Supergroup (Figure 6A) (Bosman and Ramaekers 2015). These sedimentary rocks were deposited during the period of circa 1,710 Ma to 1,500 Ma (Ramaekers et al. 2007; Jeanneret et al. 2017), spanning the boundary between the Aphebian (2,500 Ma to 1,600 Ma) and Helikian (1,600 Ma to 850 Ma) stages of the Canadian Shield region. The sedimentary rocks that comprise the Athabasca Basin dominantly consist of flat-lying, planar- and cross-bedded, medium- to coarse-grained and conglomeratic quartz arenite, with subordinate mudstones and siltstones, which comprise three superimposed basins: the Jackfish Basin, which is recognized as a northeast-trending trough underlying the west part of the Athabasca region; the Cree Basin, defined as a northwest-trending trough that extends throughout the region; and the Mirror Basin, also trending northwest, which is interpreted as a possible half-graben with its active margin along the southwestern side of the basin (Bosman and Ramaekers 2015). The older Martin Group may therefore represent the earliest of four stacked basins resulting from the Trans-Hudson orogeny; the latter three being the Jackfish, Cree, and Mirror basins that comprise the current Athabasca Basin (Bosman and Ramaekers 2015).

Below the Athabasca basal nonconformity with crystalline basement rock, basement rocks commonly exhibit a bleached zone (i.e., white zone), red hematite-stained zone (i.e., red zone), mixed hematite- and chlorite-altered zone (i.e., red-green zone), and a chlorite zone (i.e., green zone) where mafic and feldspathic minerals have been altered to chlorite. This has been interpreted to represent a paleoregolith and/or paleoweathering profile that has been overprinted by diagenetic and/or hydrothermal fluids (MacDonald 1980; Adlakha et al. 2014). Any combination of these repeating alteration zones may be present below the Athabasca sandstones.

5.1.1.3 Devonian Rocks

A portion of the southwest Athabasca Basin is locally overlain by flat-lying Phanerozoic stratigraphy of the Western Canada Sedimentary Basin (Figure 6A), including carbonate-rich rocks of the Lower to Middle Devonian Elk Point Group. The Devonian sequences are largely made up of two distinct units. The most basal Devonian rocks are of the La Loche Formation, consisting of regolithic, poorly sorted breccia with clasts of older Athabasca sandstone and/or basement rock, and fine- to coarse-grained, white to medium brown-grey arkosic sandstone and conglomeratic sandstones (Norris 1963; Bosman et al. 2018). The La Loche Formation grades into the Meadow Lake Formation, equivalent to the Contact Rapids Formation in Alberta, which consists of poorly sorted, green to red, fine- to coarse-grained sandstones with carbonate cement (Bosman et al. 2018).

5.1.1.4 Cretaceous Rocks

Cantaur Formation rocks of the Cretaceous Mannville Group, where present, overlie Devonian sequences in the southwestern Basin. These Cantaur Formation rocks consist of green-grey to black, very fine- to medium-grained sandstone interbedded with fissile mudstones, and fine- to coarse-grained, cross-bedded beige sandstone with minimal mudstone (Bosman et al. 2018). The latter is commonly saturated with bitumen and often contains centimetre- to decimetre-scale coal beds. The distribution of the Cretaceous strata in the area of Phanerozoic cover in the southwestern Basin is widespread; however, the Devonian sequences appear to be somewhat restricted to areas overlying the known uranium deposits in the area (i.e., Arrow deposit, Triple R deposit) suggesting that underlying structural controls affected deposition well into the Phanerozoic eon (Bosman 2017).

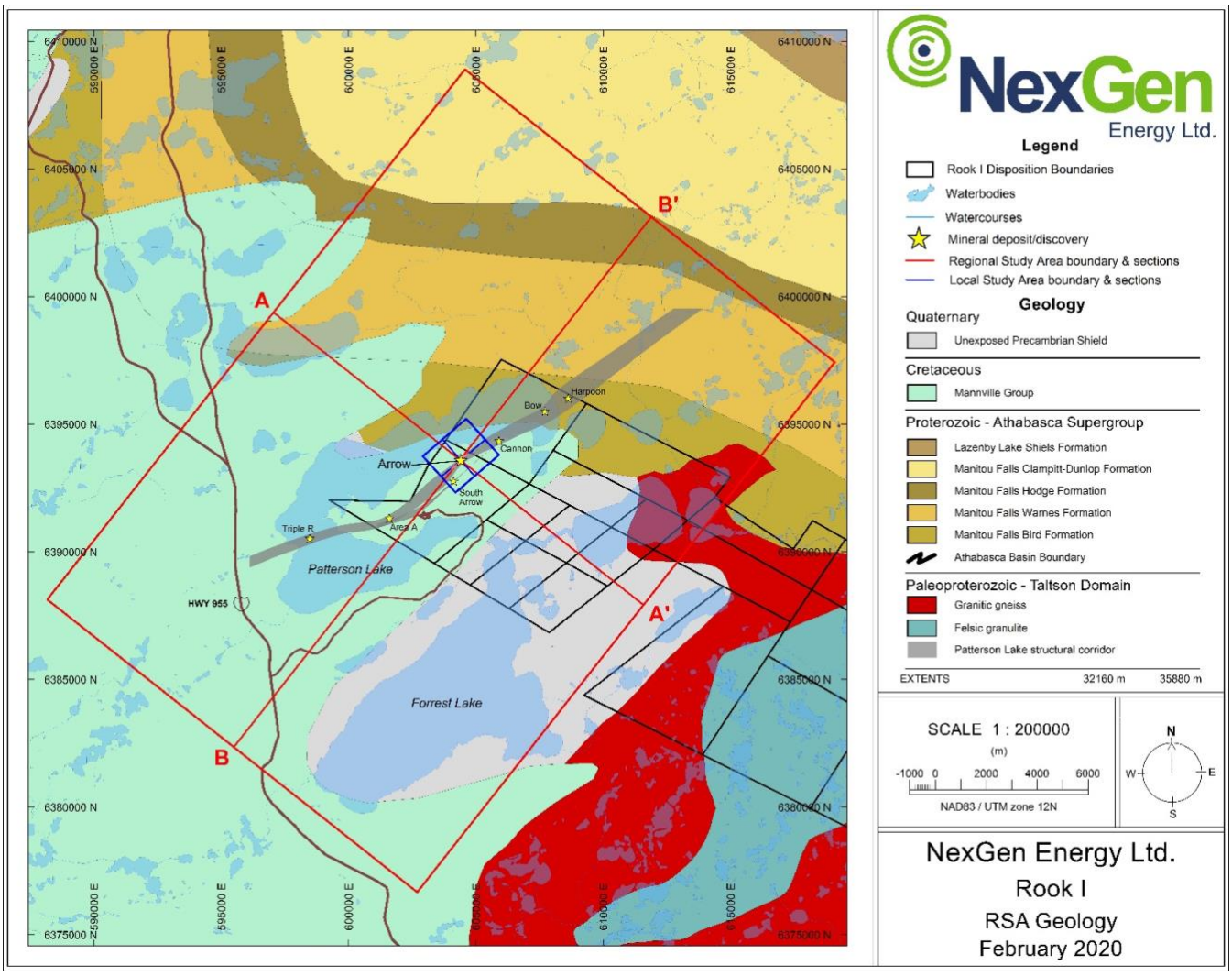
5.1.2 Quaternary Surficial Geology

Pleistocene glacial tills blanket the entire northern Saskatchewan region, with minor outcrops locally exposed. Extensive moraines, drumlin fields, outwash plains, and large sinuous eskers characterize the present-day topography. The glacial tills are derived from both crystalline basement rocks as well as relatively soft Athabasca sandstones. In general, the thickness of the glacial tills increases towards the southwest (Campbell 2007).

5.2 Regional Study Area Geology

The Arrow deposit is hosted along the Patterson Lake corridor within Paleoproterozoic basement rocks of the Taltson Domain (Figure 7), which is characteristic of other portions of the southwest Rae Province in Saskatchewan (Card 2017). The Patterson Lake corridor is a deep-seated structural corridor of heterogeneous strain, which hosts multiple uranium discoveries, along with the Arrow and Triple R uranium deposits (Figure 7). The crystalline basement rocks, in which the Patterson Lake corridor is rooted, comprise a spectrum of variably altered mafic to ultramafic, intermediate, and local alkaline rock types (Figure 8 and Figure 9). Fresh examples of any of these basement rock types are notably rare, as they are overprinted by protracted episodes of deformation and metasomatism. The most abundant basement lithologies within the regional study area (RSA) consist of gneissic, metasomatized feldspar-rich granitoid rocks and dioritic to quartz dioritic and quartz monzodioritic gneiss, with lesser granodioritic and tonalitic gneiss, as seen in Figure 7 (Card et al. 2018). Distinct white-, blue-, or purple-coloured quartz is ubiquitous throughout all metamorphic rock types along the Patterson Lake corridor.

Figure 7: Geological Map of the Regional and Local Study Areas, including Locations of Sections A-A' and B-B' through the Regional Study Area (Figure 8 and Figure 9, respectively)



Note: The Rook I property outline is shown, along with uranium occurrences and road access via Highway 955.

Minor rock types encountered along the Patterson Lake corridor include weakly foliated or schistose ultrabasic rocks, mafic-rich gabbro and amphibolite, porphyroblastic feldspar-rich syenite, granitic and syenitic anatectic pegmatite, migmatite, and relatively young mafic and alkaline dyke rocks including alkaline clinopyroxenite. Alkaline intrusive rocks (Figure 8) postdate regional metamorphism and are typically associated with alkalic metasomatism of wall rocks, resulting in haloes of fenitic alteration. Card (2018) suggests that these rocks form part of the Patterson Lake Alkaline Igneous Complex.

The crystalline basement rocks that host the Patterson Lake corridor and Arrow deposit are unconformably overlain by flat-lying Athabasca Supergroup sandstones (Figure 8 and Figure 9). The Athabasca sandstones are planar- and cross-bedded, poorly sorted, medium- to coarse-grained, quartz arenite to conglomeratic sedimentary layers of the Bird, Warnes, Hodge, and Clampitt-Dunlop Formations of the Manitou Falls Group, as seen in Figure 7 (Bosman and Ramaekers 2015).

The Athabasca Supergroup sandstones in the RSA are unconformably overlain by a series of Phanerozoic rocks associated with the Western Canada Sedimentary Basin (WCSB), composed of Devonian and Cretaceous aged strata (Figure 8 and Figure 9). Where Athabasca sandstone cover is thin towards the southern edge of the Rook I property, basement rocks are unconformably overlain by Devonian or Cretaceous sedimentary rocks.

The most basal Devonian rocks comprise the La Loche Formation, consisting of regolithic, poorly sorted breccia with clasts of older Athabasca sandstone and/or basement rock, and fine- to coarse-grained, white to medium brown-grey arkosic sandstone and conglomeratic sandstones (Norris 1963; Bosman et al. 2018). The La Loche Formation grades into the Meadow Lake Formation above, which consists of poorly sorted, green to red, fine- to coarse-grained sandstones with carbonate cement (Bosman et al. 2018).

Cretaceous rocks in the area are composed of green-grey to black, very fine- to medium-grained sandstones of the Cantaur Formation of the Manville Group, interbedded with mudstones, and fine- to coarse-grained, cross-bedded beige sandstone with minimal mudstone. Bitumen-saturated sandstones are common, along with basal coal marker beds.

The sequence of Phanerozoic rocks in the RSA is overlain by a series of variably consolidated Quaternary deposits consisting of glacial tills and glacial drift (Figure 8 and Figure 9). Glacial geomorphological topographic features are common and include northeast- to east–northeast-trending drumlins, outwashes, hummocky terrain, and kettle lakes. The glacial deposits are typically at least 30 m thick and may be up to 100 m thick.

Figure 8: Schematic Northwest-Southeast Cross-Section through the Arrow Deposit Showing Regional Study Area Sedimentary and Basement Geology, Structure, and Zones of Uranium Mineralization

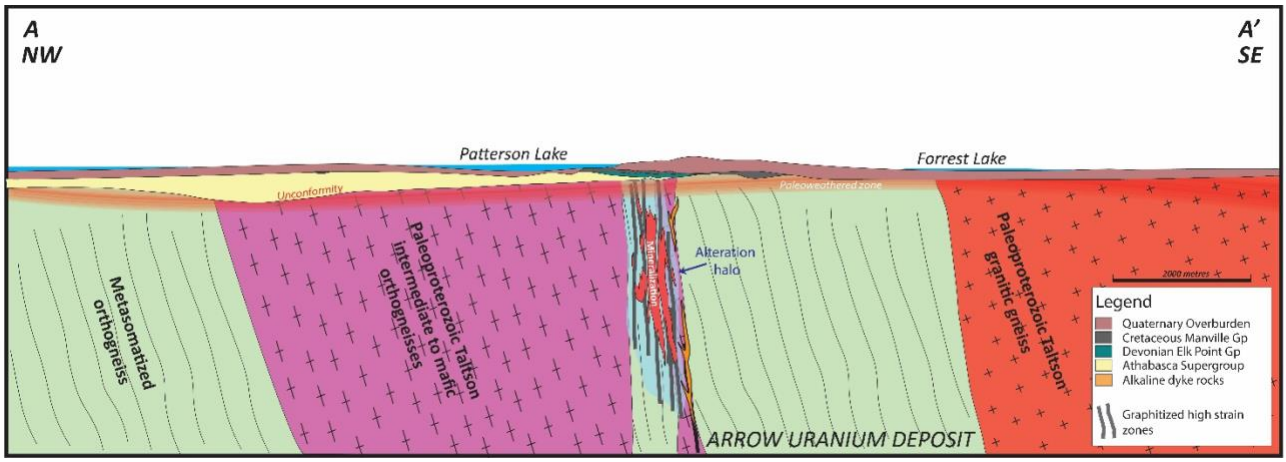
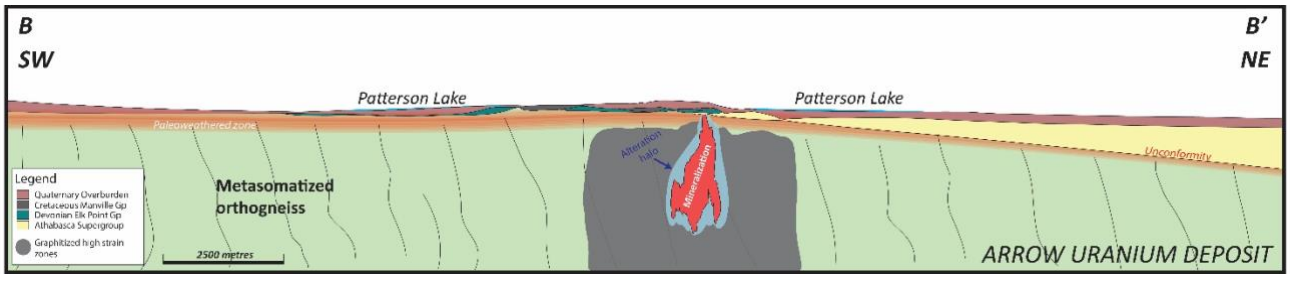


Figure 9: Schematic Southwest-Northeast Long-Section through the Arrow Deposit Showing Regional Study Area Sedimentary and Basement Geology, Structure, and Zones of Uranium Mineralization



5.3 Local Study Area Geology

The Arrow deposit is within the crystalline basement rocks of the Taltson Domain (Figure 10). In the vicinity of the Arrow deposit, the dominant basement lithologies encountered are variably silicified porphyroblastic quartz-feldspar-garnet-biotite (± graphite) gneiss and intermediate orthogneisses consisting of quartz monzodioritic to quartz dioritic gneiss with subordinate tonalitic, granodioritic, and granitic gneiss. Minor rock types include mafic-rich amphibolite and pyroxenite, ultrabasic and syenitic dykes, migmatite, and local porphyroblastic feldspar- and quartz-rich in situ anatectic pegmatites (Card and Noll 2016). The main fabrics and contacts of crystalline basement rocks in the Arrow deposit area are all steeply dipping, with a northeast to southwest strike (Figure 11).

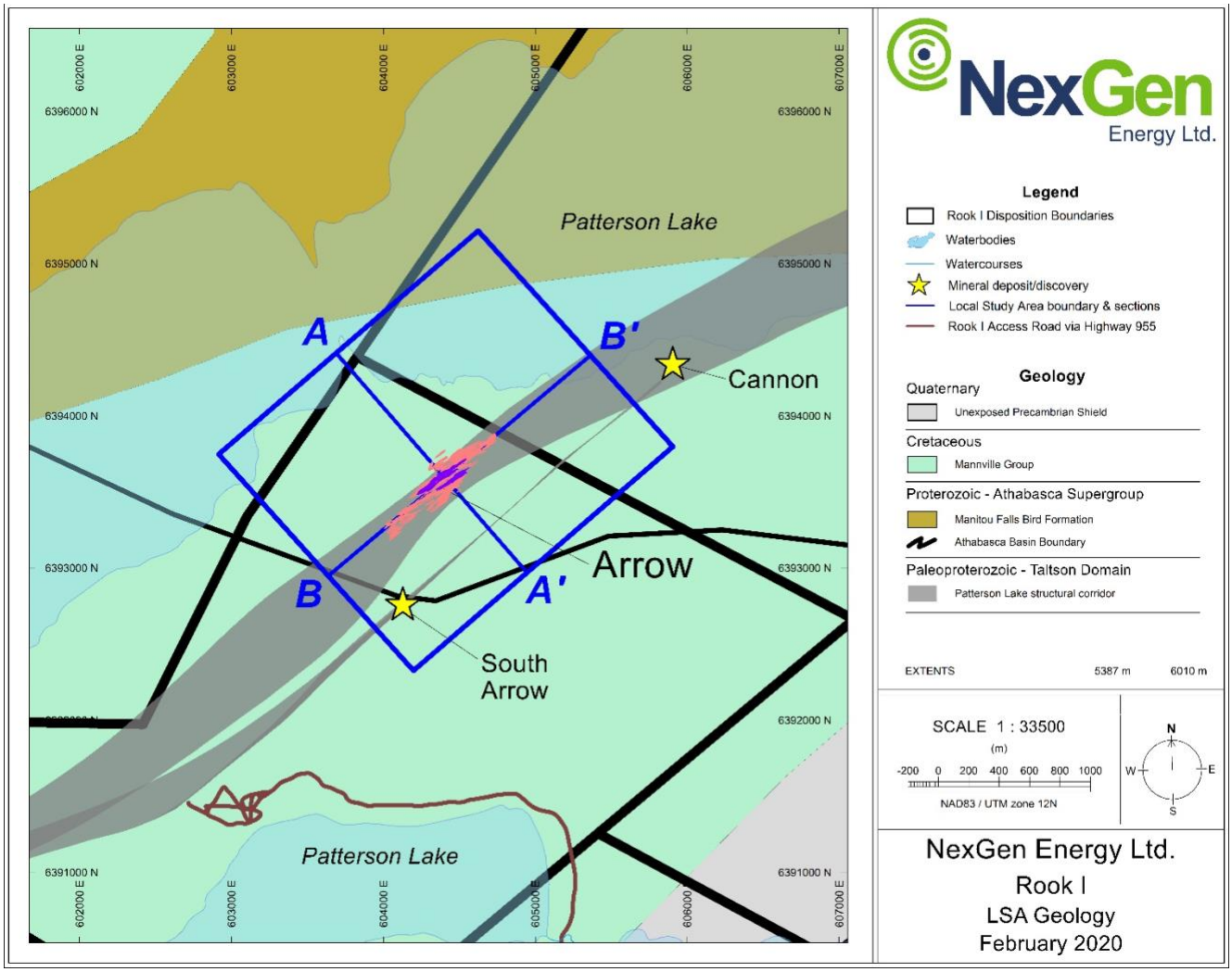
The dominant host rock of the Arrow deposit is porphyroblastic, weakly to moderately gneissic and/or augen textured, pervasively quartz-flooded quartz-feldspar-garnet-biotite (± graphite) gneiss. This host rock consists of approximately 30% to 80% blue quartz, 15% to 20% potassium feldspar (commonly replaced by white mica), 10% to 30% garnet (commonly replaced by chlorite), 1% to 10% graphite, and 1% to 5% biotite. Accessory minerals include sillimanite, tourmaline, and rutile/anatase. This metasomatic rock type is extensive within the Arrow locality, hosting over 50% of the deposit (Figure 11), and exhibits a wide range of alteration styles and intensities.

The basement host rocks of the Arrow deposit are unconformably overlain by flat-lying Athabasca Supergroup sandstones. The Athabasca sandstones are planar- and cross-bedded, poorly sorted, medium- to coarse-grained, quartz arenite to conglomeratic sedimentary layers of the Bird Formation of the Manitou Falls Group (Figure 10; Bosman and Ramaekers 2015). The Athabasca Supergroup sandstones in the local study area are covered by a series of Phanerozoic and Quaternary rock types and deposits of variable thickness (Figure 11 and Figure 12).

Phanerozoic WCSB rocks in the Arrow deposit area are composed of Devonian Meadow Lake Formation sandstones and Cretaceous Manville Group interbedded sandstones and mudstones of the Cantaur Formation (Figure 10). Bitumen-saturated sandstones and basal coal beds are common within the Cretaceous strata above the deposit.

Quaternary deposits consisting of glacial till and glacial drift successions cap the geological sequence at the Arrow deposit. The lowermost till unit is composed of moderately consolidated, weakly lithified, clay-rich and silty sand matrix hosting cobbles and boulders of various lithologies including Athabasca sandstone, Phanerozoic rocks, and carbonaceous material. The unit is likely related to early glacial events and is spatially variable in thickness around the proposed Project. The lower till is far less permeable than the upper till unit, both vertically and laterally, due to clay and silt layers. Pleistocene deposits of sandy glacial drift cap the geological sequence at the Arrow deposit, composed of unconsolidated sand and Athabasca sandstone boulders, and rare basement and Manville Group boulders. Above the Arrow deposit, glacial overburden is approximately 60 m thick.

Figure 10: Geological Map of the Local Study Area



Note: Map includes a 3-D structural model of the Patterson Lake corridor constructed using EM geophysical data and oriented drill core data from the Arrow deposit, and South Arrow, Harpoon, Bow, Cannon, and Area A uranium showings. Cross-sections A-A' and B-B' through the local study area are shown in Figure 11 and Figure 12, respectively. Rook I property mineral dispositions are shown, along with uranium occurrences and road access via highway 955.

Figure 11: Schematic Northwest-Southeast Cross-Section through the Arrow Deposit showing Local Study Area Geology, Structure, and Zones of Uranium Mineralization

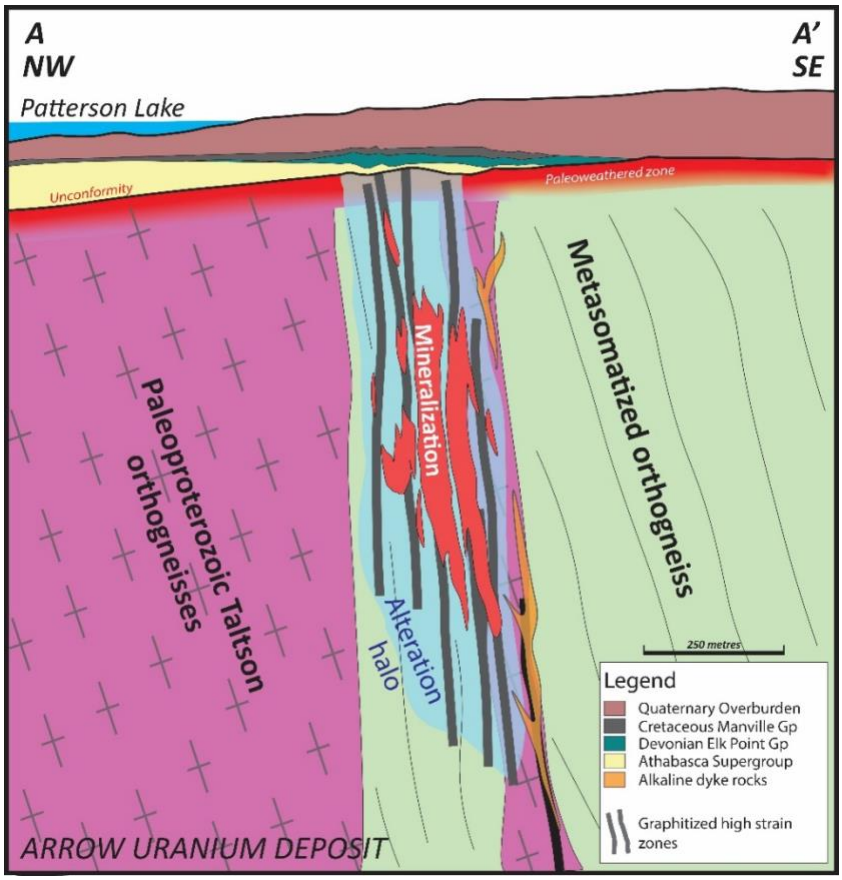
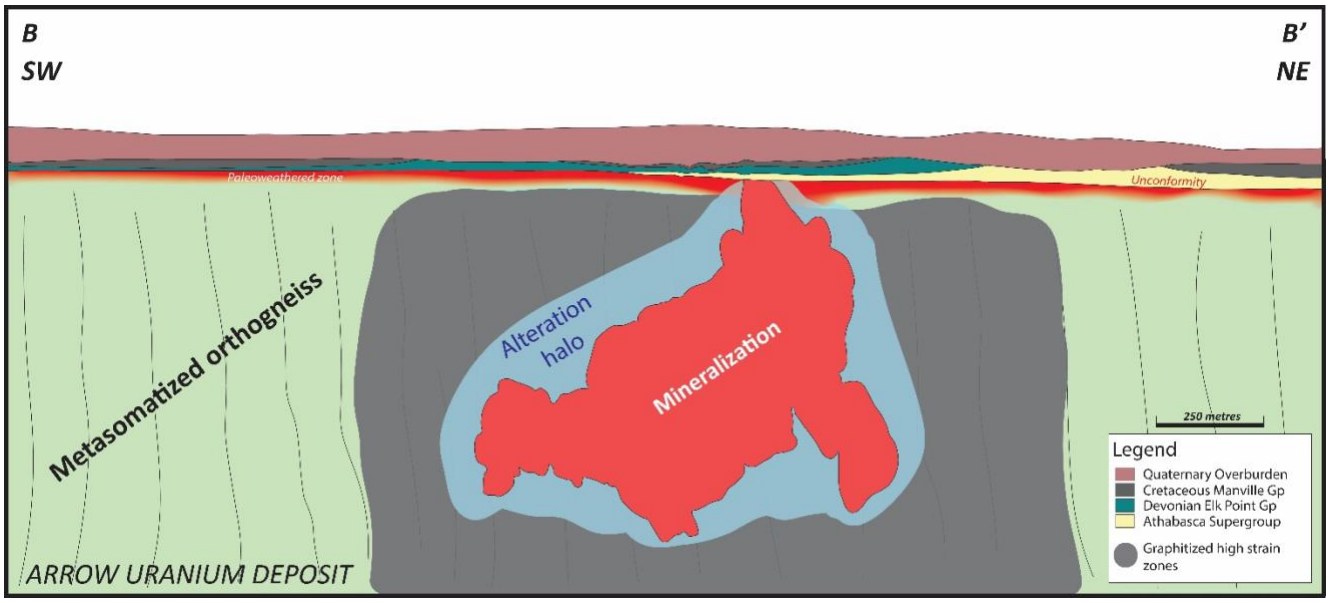


Figure 12: Schematic Southwest-Northeast Long-Section through the Arrow Deposit Showing Local Study Area Geology, Structure, and Uranium Mineralization



5.3.1 Structure

Multiple phases of deformation and related sets of structures have been recognized in the Taltson Domain rocks hosting the Arrow deposit. As discussed above, D_1 through D_3 events resulted in the formation of a broadly northeast-striking and southeast-dipping structural grain, multiple generations of folds, and ductile to brittle-ductile high-strain zones post peak metamorphism and syn- to late-D_3. Subsequent deformation episodes reactivated ductile basement structures and formed brittle structures also affecting Athabasca Supergroup sedimentary rocks.

The Arrow deposit lies within the southeast limb domain of a regional northeast-plunging synform, and thus general gneissosity and basement lithological contacts at the Arrow deposit dominantly dip southeast with a general northeast strike. The oldest identifiable ductile fabric at the Arrow deposit (i.e., S_1-S_2 composite foliation) is transposed sub-parallel to the S_3 fabric contemporaneous with D_3 deformation across the Taltson Domain, manifested through the Arrow deformation zone as a sub-vertical and anastomosing, steeply southeast dipping S_1-S_3 transposition foliation. The composite foliation observed at the Arrow deposit contains a sub-horizontal stretching lineation related to deformation associated with high strain along the Arrow shear zones.

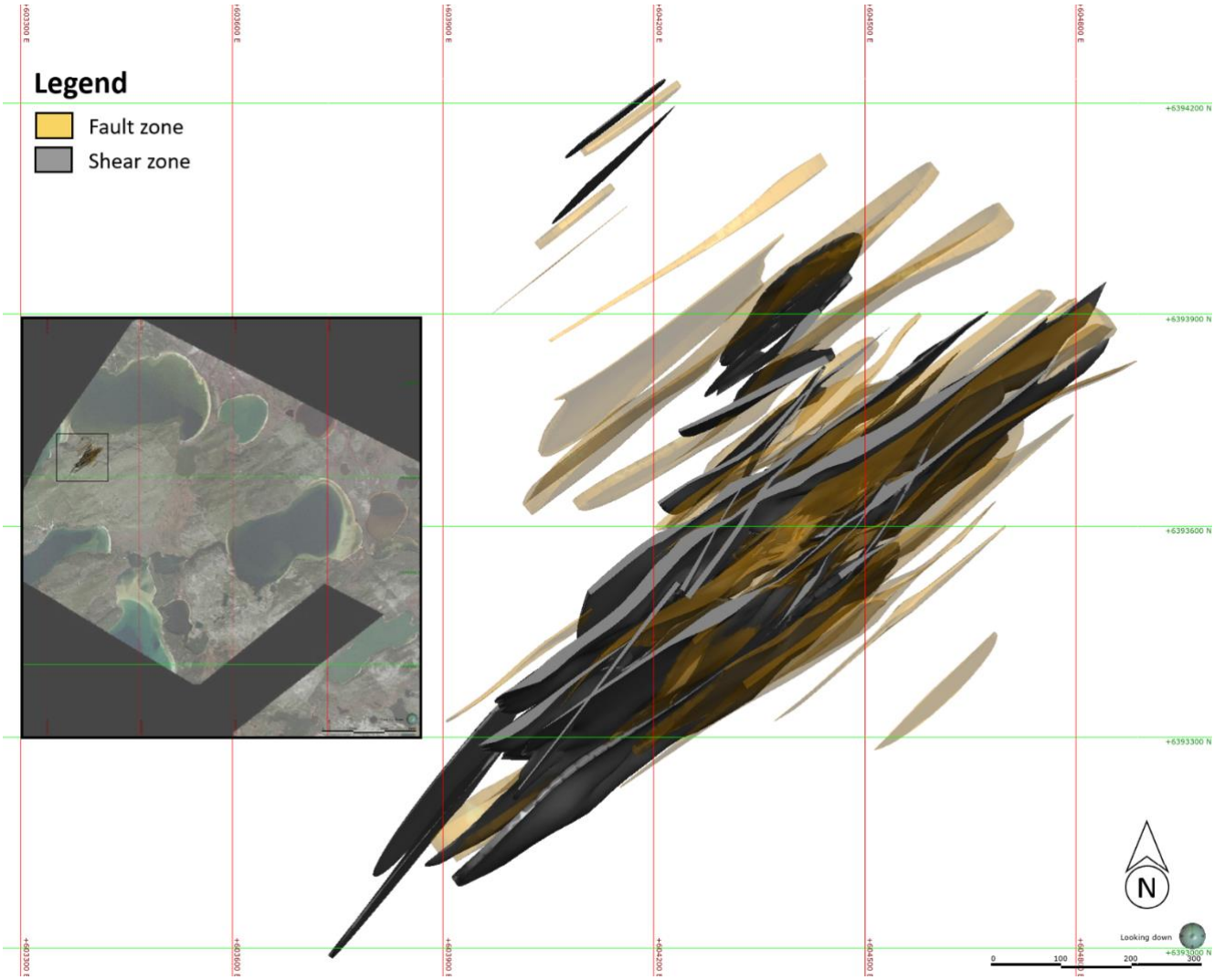
Stacked, near-vertical, northeast-southwest-striking, relatively quartz-poor, low- to medium-grade mylonites and phyllonites (termed the A0 to A5 shears) are interpreted to have subsequently developed within the southeastern limb domain of the regional-scale F_3 fold structure. The major high strain zones are separated by relatively unstrained, silicified blocks of wall rock, and connected by northeast to southwest- and north-northeast-south-southwest-trending oblique shear bends and flexures (Figure 13).

The Arrow deformation zone contains abundant brittle fault rocks including incohesive fault breccias, cataclasites, and fault gouge, with rare cohesive cataclasites. Metre-scale extensional ‘fault-fill’ veins also overprint ductile strain and are encompassed by fault damage zones of shear fractures and linkages, tension gashes, and hydraulic (i.e., fluid over-pressuring) breccias. These brittle structures overprint the ductile to brittle-ductile high strain zones

at the Arrow deposit and crosscut relatively unstrained wall rock in the hanging wall and foot wall blocks (Figure 13), often at low angles relative to the near-vertical ductile to brittle-ductile shear zones.

Cohesive quartz-healed breccias are extremely prolific at the Arrow deposit, often showing evidence for multiple phases of brecciation with quartz matrix becoming clasts along with wall rock in younger, overprinting breccias. Fault breccia zones have been logged as deep as 1 km in drill hole depth, and as shallow as the unconformity surface, which averages approximately 110 m in drill hole depth. These fault breccias exhibit a variety of alteration assemblages and mineralogical composition based on their proximity to surface and wall rock interactions.

Figure 13: Plan Section View of Both Ductile (grey) and Brittle (yellow) Major Structural Zones at the Arrow Deposit



Note: How the ductile structural zones are overprinted and bound by younger brittle fault and damage zones.

5.3.2 Alteration and Mineralization

The Arrow high strain zones exhibit a range of alteration types replacing matrix-forming minerals (i.e., phyllonites) and are variable in their mineralogy. Dominant alteration assemblages include sericite (e.g., fine-grained white mica), chlorite (e.g., sudoite, clinochlore ± chamosite), and clay minerals (e.g., kaolinite, illite – often associated with mineralization), forming the sheared groundmass or present within crosscutting structures. Quartz-rich mylonitic rocks are also observed locally within the Arrow deformation zone, indicating pervasive silicification prior to ductile deformation.

The competent, relatively undeformed wall rocks within the Arrow zone exhibit pervasive syn- to post-peak metamorphic silicification, often so intense that it replaces more than 80% of the rock. The dominant host rock of the Arrow deposit is particularly affected by this immense quartz flooding event. In less altered rocks, the metasomatic quartz is commonly transposed with foliation, or the foliation may have helped to focus the silicifying fluid. The ensuing quartz is dominantly blue, blue-grey, grey-purple, or milky blue-white in hand specimen.

Younger quartz phases form druzy veins and cavity fills, breccia matrices, and irregular vein stockworks. These younger veins are commonly overprinted and form clasts within breccias healed by clay minerals or yet another phase of quartz. Massive quartz breccias several metres thick are common features overprinting sheared rocks at the Arrow deposit. Late quartz phases exhibit a spectrum of colours ranging from clear to milky white, pink, and smoky grey, brown, or black. Pink quartz veins and breccia zones exhibit a spatial arrangement with respect to the overall Arrow deformation zone, being concentrated within the hanging wall block of the deposit.

Uranium minerals within the Arrow deformation zone are associated with a variety of hydrous aluminum silicates, including a variety of pre-ore chlorite group minerals and muscovite. The most prominent alteration type involving these minerals is early partial to complete sericitization of all pre-existing minerals. Sericitic muscovite and/or illite dominantly forms as alteration of feldspars and pyroxene, but in extreme cases may replace all minerals present in the parent rock, including quartz.

Chlorite is not as ubiquitous as sericite; however, there is evidence for multiple episodes of chloritization. The most common varieties of chlorite are sudoite and clinochlore, based on mineral chemistry and colour in hand specimen, with sudoite being predominant. Retrograde metamorphic chlorite (clinochlore) commonly rims or completely replaces pre-existing biotite and garnet and commonly defines ductile lineations along foliation planes. Later episodes of hydrothermal chlorite (sudoite) form cross-cutting fracture linings, small veins, breccia matrices, or mineral replacements.

Biotitization of feldspars is a common alteration phase within relatively unaltered, coarser-grained feldspar-rich country rocks. Mineral textures and crosscutting relationships indicate that this non-metamorphic biotite grew at the expense of feldspar grains, forming replacement masses and veins of brown, crystalline biotite.

Graphite (and/or carbonaceous matter where lacking crystallinity) overprints previously chloritized mylonitic rocks in the Arrow zone, pre-uranium mineralization, but post-metasomatic alteration (i.e., quartz flooding events) of the host rocks.

Sulphide mineralization within the Arrow system consists largely of iron-bearing phases including pyrite and chalcopyrite, with subordinate pyrrhotite, pentlandite, galena, covellite, cobaltite, and arsenopyrite. Sulphides occur typically as disseminated blebs or as stringer veins, commonly with quartz and/or carbonate, which commonly crosscut the dominant foliation and late alteration phases such as dravite.

Trace concentrations of gold and other metals (e.g., bismuth, platinum-group elements) are a common feature of complex, polymetallic unconformity-related uranium deposits (Wilde et al. 1988; Morelli and MacLachlan 2012). At the Arrow deposit, telluride minerals containing lead, bismuth, and copper-selenium have been identified in thin section. Native gold (containing silver) and bismuth have also been identified in a suite of samples and are commonly associated with telluride minerals. Gold (± silver) mineralization occurs as fine grained (5 µm to 250 µm) native gold, which frequently exhibits intergrowth textures with bismuth and telluride minerals.

Although commonly observed proximal to and within mineralized zones, pale bluish-grey tourmaline (i.e., dravite and/or magnesiofoitite) forms either in late vein stockworks or larger hydraulic breccias that crosscut the wall rock, and in many cases, uranium mineralization. The tourmalines form a substantial alteration halo around the Arrow deposit, extending from over 900 m depth to the unconformity surface. At least two generations of tourmaline minerals have been observed in the matrices of hydrothermal breccias and in veins at the Arrow deposit, with the first being relatively coarse-grained and the second being dominantly fibrous or acicular. Quartz veins (especially pink) are very commonly lined with dravite and/or clay minerals (e.g., illite, kaolinite, muscovite).

The most common clay minerals encountered at the Arrow deposit are kaolinite and illite. Kaolinite is the most common clay mineral proximal to the unconformity, whereas mixtures of illite and muscovite (i.e., sericitic and coarser-grained white mica) appear to be more commonly associated with mineralization.

Carbonate minerals form relatively late phases being associated with fenitic alteration or comprising late-stage veins cutting wall rock and uranium mineralization. Black or white calcite ($CaCO_3$) veins are observed crosscutting barren wall rock as well as high-grade uranium mineralization as micro stockworks or druzy veins. Late siderite (Fe_2+CO_3) veins and druzy void fills are common within the upper 50 m to 100 m of basement rock below the unconformity, and locally extend into the overlying Athabasca Supergroup sandstones.

Hematite (Fe_2O_3) and limonite ($FeO(OH)\cdot nH_2O$) alteration are variable, occurring as discrete stains intimately associated with uranium mineralization and overprinting earlier sericite alteration, or contemporaneous with sericitization, and as groundmass alteration of quartz-clastic breccias. Moderate to strong hematization is also well-developed in the upper portion of the crystalline basement rock, interpreted to be part of the paleoweathering profile.

The Athabasca sandstones overlying the Arrow deposit exhibit a variety of alteration features such as bleaching, de-silicification and complete friability, silicification, and clay alteration. The alteration profiles in the Athabasca Supergroup in the Patterson Lake area are similar to alteration halos observed above and around uranium deposits in the eastern Basin, though these alteration halos are generally not as intense or widespread due to the depth of mineralization relative to the unconformity. Directly above the Arrow deposit, alteration in the sandstones increases with proximity to the upwards propagation of structures into the overlying Athabasca Supergroup.

The main uranium-bearing mineral present at the Arrow deposit is uraninite, whereas secondary uranium minerals such as coffinite or uranophane may partially or wholly replace uraninite. Cubic uraninite and massive void-fill or replacement pitchblende are the main styles of uranium mineralization in the Arrow deposit, along with local fracture-filling veins, colloform or botryoidal “crusts”, relatively fine-grained aggregates, and disseminated grains.

Uraninite mineralization at the Arrow deposit is locally accompanied by uranoan pyrobitumen (i.e., thucholite); however, instances of pyrobitumen in barren rock proximal to mineralization has also been observed.

Primary uranium mineralization within the Arrow deposit is composed of dominantly subhedral to euhedral isometric crystals and semi-massive occurrences of variably altered uraninite. Secondary uranium minerals correspond to texturally younger uranium silicates and hydroxides/oxyhydroxides such as coffinite or uranophane. The different uranium mineral groups are clearly visible in drill core and backscattered electron images.

Uranium mineralization occurs proximal to the margins of the major graphite-bearing mylonitic structures (A0 to A5) in both footwall and hanging wall blocks, as well as within the structures themselves. Mineralized structures at the Arrow deposit range from hydrothermal fluid over-pressuring and corrosive replacement-style breccias, massive "fault-fill" veins or "shoots", shear fracture and extensional vein fills, and disseminated uraninite within cohesive gouge or breccia fills. Metre-scale uranium fault-fill veins hosted within and proximal to the brittle-ductile shears comprise the high-grade domains of semi-massive to massive uraninite mineralization, roughly paralleling the high strain zones with moderate to steep dip. These uranium fault-fill veins have great vertical extent (i.e., >100 m) and represent dilational zones during slip, with the densest accumulations of uraninite at the Arrow deposit hosted within the A2 and A3 shear cores. Younger and/or remobilized veins of uraninite are also observed to crosscut prior mineralization phases, evidencing polyphase fluid movement through the structures post primary mineralization.

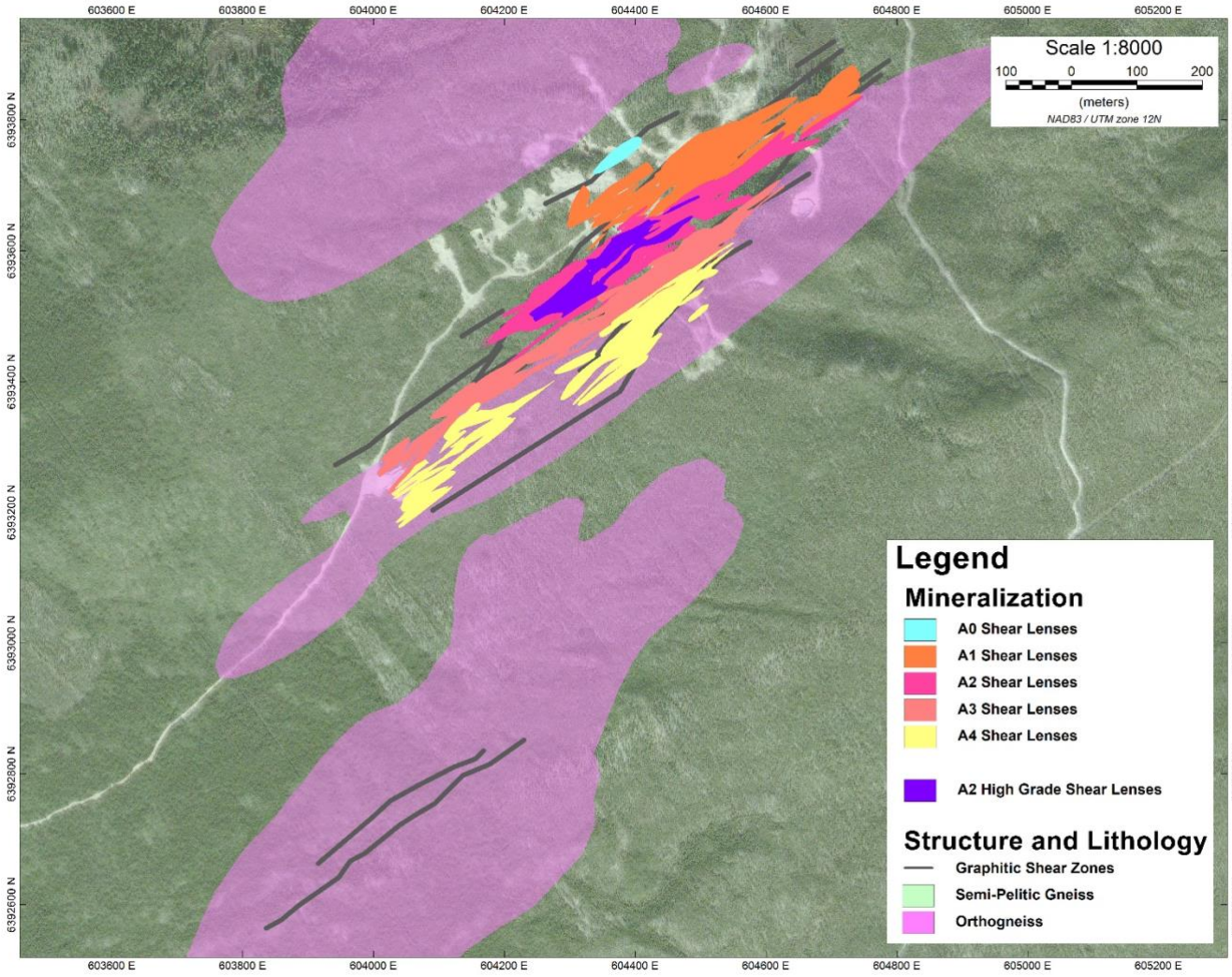
5.3.3 Deposit Geometry and Ore Resources

Currently, the Arrow deposit is composed of a series of at least six sub-vertical mineralized shear zones (A0 to A5; Figure 14), which vary in thicknesses between 2 m and 60 m. The mineralized area is 315 m wide with an overall strike of 980 m. Mineralization occurs 100 m below surface and extends to a depth of 950 m. The zone contains multiple narrow graphitic high strain zones that are oriented sub-parallel to the main structural grain, striking at approximately 050° to 060° with vertical to sub-vertical dip. These graphitic shear zones are host to many of the uranium mineralized lenses and pods, which are also oriented parallel and sub-parallel to the local transposition foliation.

During the period(s) of fault reactivation, heterogeneity in the rheological characteristics of the basement lithologies, ductile fabric elements of D_3 transposed foliations and anastomosing shear planes, and overprinting brittle structures appear to have mechanically controlled the locale and geometry of uranium mineralization at the Arrow deposit (Hillacre et al. 2020).

The Arrow deposit has Measured Mineral Resources of 209.6 million pounds (Mlb) of triuranium octoxide (U_3O_8) contained in 2,183 kilotonnes (kt) grading 4.35% U_3O_8, Indicated Mineral Resources of 47.1 Mlb of U_3O_8 contained in 1,572 kt grading 1.36% U_3O_8, and Inferred Mineral Resources of 80.7 Mlb of U_3O_8 contained in 4,399 kt grading 0.83% U_3O_8 (NexGen 2021). Of the six recognized main parallel structural shear panels (i.e., A0, A1, A2, A3, A4, and A5), the A2 and A3 shears host higher-grade, thicker, and more continuous mineralization than the other shear zones (Figure 14). A continuous zone of higher-grade mineralization in the A2 shear is known as the higher grade A2 sub-zone (Figure 14). Due to a limited number of drill holes, it was not possible to fully differentiate between the A4 and A5 shears; thus, mineralized intercepts in the A5 shear zone were grouped into the A4 shear for the Mineral Resource estimate (Figure 14). The deposit currently remains open in most directions, including at depth.

Figure 14: Arrow Deposit Mineral Resource Outline and Simplified Basement Geology Projected to Surface



6.0 SUMMARY

The proposed Project site is located in a sub-Arctic climactic region typical of mid-latitude continental areas, with elevations ranging from 583 metres above sea level (masl) on drumlins to 480 masl in lowland lakes. The local topography around the Project site is variable with drumlins and lakes/wetlands dominating the northwest and southeast portion of the area, respectively. Lowland lakes, rivers, and muskegs dominate the central part of the study area.

The Arrow deposit is rooted in the Paleoproterozoic basement rocks of the Taltson Domain along the Patterson Lake corridor, east of the Clearwater River Domain and west of the Virgin River Domain. The bedrock geology is composed of variably silicified and metasomatized intermediate to mafic orthogneisses. Local mafic-rich amphibolite and pyroxenite, ultrabasic and syenitic dykes, and porphyroblastic feldspar- and quartz-rich pegmatites intrude the gneissic granulite facies rocks. The main fabrics and contacts of crystalline basement rocks in the Arrow deposit area are all steeply dipping, dominantly southeast, with a northeast-southwest strike. Basement rocks are unconformably overlain by late Paleoproterozoic to Mesoproterozoic Athabasca Supergroup sandstones of variable thickness, rarely exceeding 50 m. Devonian and/or Cretaceous sedimentary rocks overlie the Athabasca sandstones, with Quaternary glacial deposits capping the geologic sequence and forming the present-day topography.

The rocks hosting the Arrow deposit display evidence of episodic structural reactivation and exhumation (i.e., rising towards surface or surface exposure) at progressively shallower crustal levels, related to the protracted tectonic evolution of the Precambrian shield in this region spanning from the Taltson-Thelon to Hudsonian orogenic events circa 1.94 Ga to <1.84 Ga. Structural analysis along the ore-hosting portion of the Patterson Lake corridor at the Arrow deposit indicates a sequential development of early ductile and brittle-ductile, to late brittle episodes of movement along the southeast limb of a regional northeast-plunging fold complex (Hillacre et al. 2020). Structural and metamorphic relationships suggest that mylonitization was initiated in a ductile environment during D_3 deformation circa 1.92 Ga to 1.90 Ga, with subsequent overprinting by brittle-ductile and brittle faulting involving widespread cataclasis and brecciation, reflecting the progressive unroofing of the high strain zones to shallower lithospheric levels over time (Hillacre et al. 2020).

The structural system at the Arrow deposit has been interpreted to have originally developed along near vertical dipping northeast-southwest-trending brittle-ductile high strain zones (A0 to A5 shears). The stacked high strain zones at the Arrow deposit are nearly parallel and are grouped into a deformation zone approximately 200 m wide, with ore shoots defining an overall plunge to the south-southwest. The heterogeneous high strain zones hosting the Arrow deposit further evolved through episodic reactivation events creating various small-scale brittle fault linkages oblique to and connecting the main fault zone. Primary formation of the uranium veins at the Arrow deposit is related to this episodic reactivation and reuse of pre-existing structures, which formed during the late phases of orogenic events affecting the area circa 1.8 Ga and younger. Fluid flow and reactivation of mineralized structures then further concentrated, remobilized, and altered ore within previously established and newly formed subsidiary fractures, cataclasis zones, and shear and mylonite zones. Multiple phases of uranium mineralization have been identified and classified based on mineral chemistry and textural relationships (Hillacre et al. 2020). Two groups of uraniferous phases have been identified; the first comprising early euhedral, brecciated, and remobilized uraninite, and the second composed of late uranium silicates and hydroxides/oxyhydroxides, such as coffinite and uranophane.

The Arrow deposit has Measured Mineral Resources of 209.6 Mlb of U_3O_8 contained in 2,183 kt grading 4.35% U_3O_8, Indicated Mineral Resources of 47.1 Mlb of U_3O_8 contained in 1,572 kt grading 1.36% U_3O_8, and Inferred

Mineral Resources of 80.7 Mlb of U_3O_8 contained in 4,399 kt grading 0.83% U_3O_8 (NexGen 2021). The mineralized area is 315 m wide with an overall strike of 980 m. Mineralization occurs 100 m below surface and extends to a depth of 950 m. The individual shear zones vary in thickness from 2 m to 60 m.

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APPENDIX A

Joint Working Group Feedback Applicable to Geology Baseline Report

Table A-1 presents the comments and feedback NexGen has received from members of local Indigenous communities through established Joint Working Group meetings. NexGen continues to engage with communities, and the feedback presented in Table A-1 reflects comments and feedback received through March 2020 that were related to the geology baseline program or the comprehensive baseline program generally.

Table A-1: Joint Working Group Feedback – Geology

Community	Comment
Birch Narrows Dene Nation (BNDN)	Are you aware of any huge adverse environmental impacts in any of the current mine sites?
	Important topics for the Joint Working Group (JWG) moving forward are Indigenous knowledge, traditional land use, the species discussion, water quality, environmental monitoring, employment, and business opportunities.
	Could we ask that you take samples here? That way we can see changes into the future. Even if it isn't affected by the mine. Respectfully, I request that samples are taken here.
Buffalo River Dene Nation (BRDN)	Have you gone to communities to show what you are doing? If so, what was the feedback?
	It's important to explain the Project to elders in a way that they can then explain it to other elders in the communities.
	I met an old guy in Lac Brochet; I was standing there and he came up to me. Lac Brochet is landscaped by rocks. He's from Brochet and he goes back and forth to Lac Brochet. He said, see that rock there? I said yes. It's alive, he said. There's one spot on the lake where everyone stops to have tea. One trip a few years ago he stopped at that island and started a fire to make tea. He heard rumbling; it was a clear sky. He thought it was maybe jets flying over, but it got louder and he could feel the ground shaking. He could see the water rippling where the boat launch was. Suddenly he saw the top of a rock come out through the top of the lake. He got scared. He left and went to Lac Brochet. On the way home he didn't want to stop there but he went around the island looking, and that rock was up on the shore. He said it crawled right up there. That's why he said those rocks are alive. That story is from not even 30 years ago.
Clearwater River Dene Nation (CRDN)	So is that the depth of Arrow and Eagle then? (in relation to the schematic of uranium deposits in northern Saskatchewan).
	Remember we're trying to implement a plain speak document because of visual concepts of understanding. That is what the Chief is talking about.
	In terms of baseline studies, are there any opportunities for community involvement with any of your residual baseline work, from fish, terrestrial, etc.?
	And we will eventually throw in our environmental monitors. I don't know if you knew that. We want to train our own people because of lack of trust of government and industry.
	The interim CRDN Rights and Knowledge study will come out of the CRDN-defined initial list of VCs that we want to talk to you about. As we go through there may be additional ones. We know there's a certain window, but we'll try to be as comprehensive as possible. It may not be as linear as moose; it might be having undisturbed places on waterbodies. They might be more complex.
	There are things that haven't happened in our area, but eventually they will, like earthquakes. We didn't have tornados in Canada before and now we're having them.
	Are you looking at the Fox Creek and Fort St John area that are having all these earthquakes because of fracking? Does Golder do that? They're not allowing any fracking close to the Site C dam because of that.
	Golder does the same thing – hires three or four band members to do the interviews, then takes the notes and puts the document together. When you find the stuff it's not always based on the relationship to the stuff. It's based on what the government's qualifications are on the environmental assessment's impacts, and not the actual concerns of it. I'm trying to reach what [CRDN member] is saying between traditional and modern ways.

Table A-1: Joint Working Group Feedback – Geology

Community	Comment
Clearwater River Dene Nation (CRDN) continued	When we started looking at the strategy process, there's that interpretation of cumulative effects. Then we define and introduce an interpretation for that. It's not just one side, western science, we're doing the traditional side as well. That's what the Chief's referring to.
	Both traditional and western science are very important.
	Will we see the results of those studies?
	How many other projects are in that square box (referring to map)?
	Do other companies have mineral holdings in that box on the map – like for oil and gas?
	I think it's really important to compare Cluff Lake to what's happening in the baseline studies. It's a good question.
	What's the purpose of trying to gather all this information?
Métis Nation – Saskatchewan (MN-S)	Is it correct that the uranium ore content is higher grade, but has less other chemicals?
	Also, it would be good to see baseline radiometric data.
	We have to understand all living and non-living things.
	Are any community members involved in the establishment of the baseline for environmental monitoring, so can they verify their accuracy?
	Would the results be released and reviewed by the community?
	From a trust point of view, our people will want to know that those numbers are accurate now, not later. Just a comment to think about.
	How would this group know – is there a way for the people involved in the studies to inform the group of what they saw and if they are confident, they are accurate? Once the stuff hits the EIS, how do we know that it's good? If community folks that were involved in that process and they can validate the results, that brings comfort to community members.
	How often are you monitoring?
	It's that validation we're looking for. When I had to involve community members in monitoring, I would get them to write a report if they couldn't speak to the broader community in general. If they didn't feel like writing it, they could talk so someone who would transcribe it. That report could give a summary of how things went, what they saw, were the readings accurate; that could come back to this group, if they couldn't present themselves. The point [MN-S member]'s trying to make is, we need some connection to that community resource that's out there doing the monitoring and seeing this stuff. We know who they are, and we're confident in the results. That builds trust.
	Do you have instruments or people taking samples? What does an instrument look like?
	The studies we did a few years back, these guys don't want to use them. That's what I heard.
	I had feedback on community engagement, and I'm trying to figure out how we can move forward in a responsible way where people have their input without being offended. We're working towards a bigger goal than what is currently perceived. We need a discussion on how we can approach it. I can offer some high-level thinking to help bring my community around.
	We should have more of these meetings with other companies like this. I'd like to get a Métis community member to work side by side with you guys and report the environmental side to the community instead of you guys doing it, so we know where we are and how much damage is being done to the land.
	This is general – the same information will come back to all the JWGs?
	It was brought up that some of the leftovers (tailings) will be put down underground. In order to really understand everything, you have to have to understand how water moves underground.

BNDN = Birch Narrows Dene Nation; BRDN = Buffalo River Dene Nation; CITES = Convention on International Trade in Endangered Species of Wild Fauna and Flora; CRDN = Clearwater River Dene Nation; EIS = Environmental Impact Statement; JWG = Joint Working Group; MN-S = Métis Nation – Saskatchewan; VC = valued component.