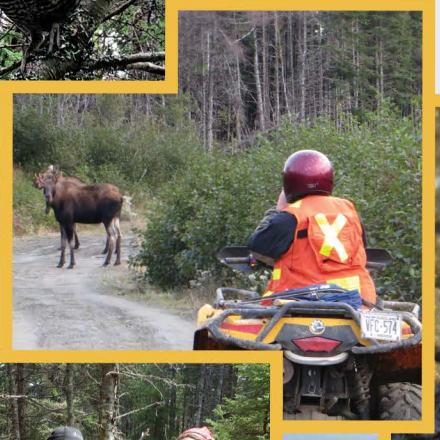
MARATHON GOLD

Valentine Gold Project Baseline Study Appendix 8: Species at Risk / Species of Conservation Concern (SAR / SOCC)

September 2020



Valentine Gold Project
Environmental Impact Statement

Report

Baseline Study Appendix 8: Species at Risk / Species of Conservation Concern

Prepared for:

Marathon Gold Corporation
36 Lombard Street, Suite 600
Toronto, ON M5C 2X3

Prepared by:

Stantec Consulting Ltd.
141 Kelsey Drive
St. John's, NL A1B 0L2
Tel: (709) 576-1458
Fax: (709) 576-2126

File No: 121416408

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Abbreviations and Acronyms

AC CDC	Atlantic Canada Data Conservation Center
ARD / ML	Acid Rock Drainage / Metal Leaching
BBMM	Brownian Bridge Movement Models
BBS	Breeding Bird Survey
BSA	Baseline Study Appendix
CBC	Christmas Bird Count
CMAs	Caribou Management Areas
COSEWIC	Committee on the Status of Endangered Wildlife Species in Canada
dBBMM	Dynamic Brownian Bridge Movement Models
DFO	Fisheries and Oceans Canada
DNA	deoxyribonucleic acid
EA	Environmental Assessment
EAC	Environmental Assessment Committee
EIS	Environmental Impact Statement
ELC	Ecological Land Classification (in this case, specifically Ecosystem Classification and Mapping of the Marathon Gold Corporation Valentine Gold Project, Central Newfoundland)
ELCA	Ecological Land Classification study Area
GPS	Global Positioning System
km	kilometres
km^2	square kilometres
LAA	Local Assessment Area
LiDAR	Light Detection and Ranging
Marathon	Marathon Gold Corporation
m	Metres
masl	Metres Above Sea Level
mm	Millimetres
NL	Newfoundland and Labrador
NLDECCM	NL Department of Environment, Climate Change and Municipalities
NLDFFA-WD	Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division

NLEPA	Newfoundland and Labrador *Environmental Protection Act*
NL ESA	Newfoundland and Labrador *Endangered Species Act*
RAA	Regional Assessment Area
SAR	Species at Risk
SARA	*Species at Risk Act*
SOCC	Species of Conservation Concern
SSAC	Species Status Advisory Committee
UD	Utilization Distributions
VC	Valued Components
VHF	Very High Frequency

1.0 INTRODUCTION

Marathon Gold Corporation (Marathon) is planning to develop an open pit gold mine south of Valentine Lake, located in the Central Region of the Island of Newfoundland, approximately 60 kilometres (km) southwest of the town of Millertown, Newfoundland and Labrador (NL) (Figure 1-1). The Valentine Gold Project (the Project) will consist primarily of open pits, waste rock piles, crushing and stockpiling areas, conventional milling and processing facilities (the mill), a tailings management facility, personnel accommodations, and supporting infrastructure including roads, on-site power lines, buildings, and water and effluent management facilities. The mine site is accessed by an existing public access road that extends south from Millertown approximately 88 km to Marathon's existing exploration camp. Marathon will upgrade and maintain the access road from a turnoff approximately 8 km southwest of Millertown to the mine site, a distance of approximately 76 km.

The Minister of the NL Department of Environment, Climate Change and Municipalities (NLDECCM) has determined that the Project will require preparation of an Environmental Impact Statement (EIS) under the provincial *Environmental Protection Act*, 2002 (NL EPA). Final EIS Guidelines were issued by the Environmental Assessment Committee (EAC) in January 2020 (Government of NL 2020a). The Provincial EIS Guidelines require the preparation of a number of baseline studies to describe and provide data on specific components of the EIS; to address baseline data requirements to support the assessment of one or more Valued Components (VCs); and to support the development of mitigation measures and follow-up monitoring programs. Each has been prepared as a stand-alone Baseline Study Appendix (BSA) to the EIS:

- BSA.1: Dam Safety
- BSA.2: Woodland Caribou
- BSA.3: Water Resources
- BSA.4: Fish, Fish Habitat and Fisheries
- BSA.5: Acid Rock Drainage / Metal Leaching (ARD / ML)
- BSA.6: Atmospheric Environment
- BSA.7: Avifauna, Other Wildlife and Their Habitats
- BSA.8: Species at Risk (SAR) / Species of Conservation Concern (SOCC)
- BSA.9: Community Health, Services and Infrastructure / Employment and Economy
- BSA.10: Historic Resources

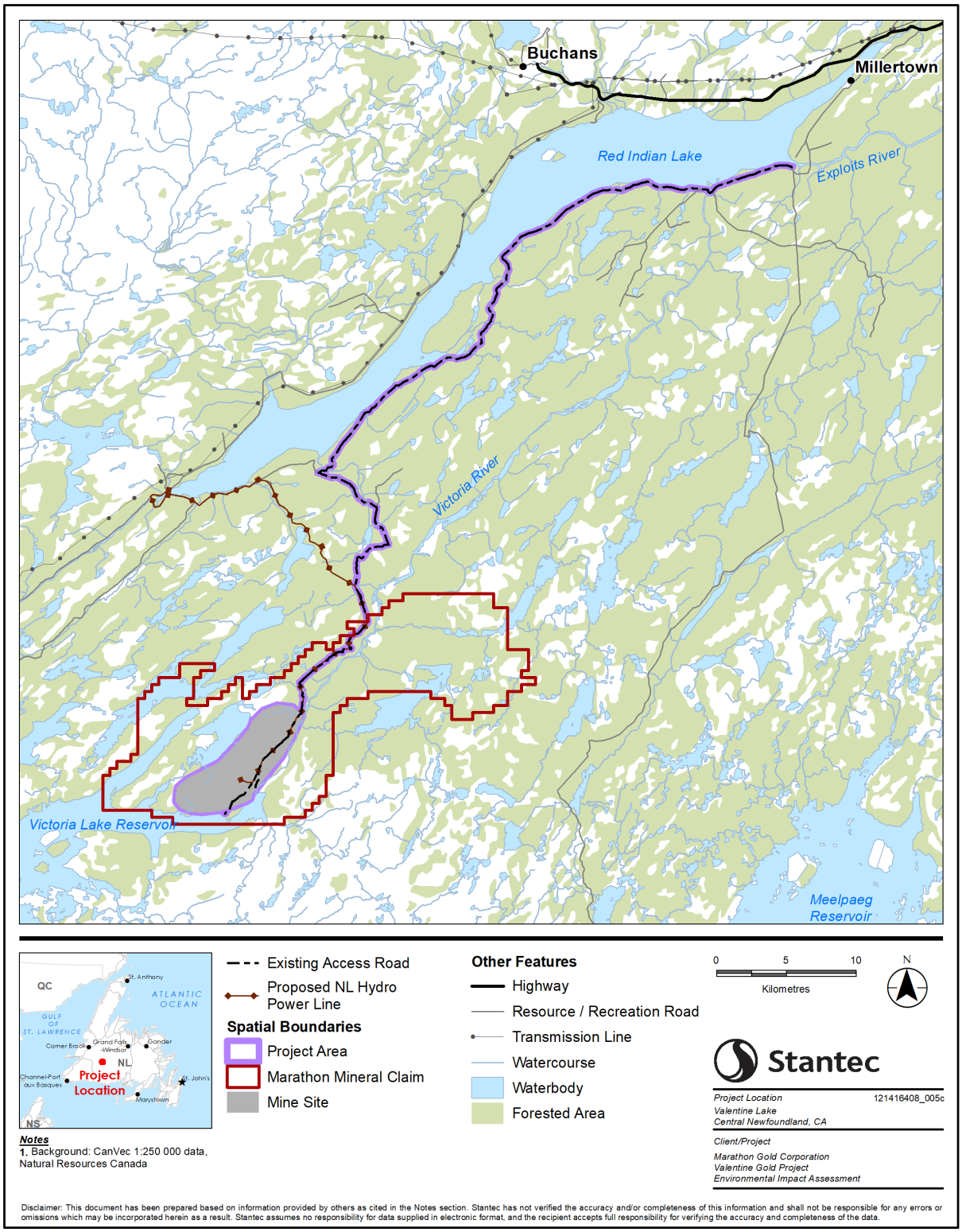

Figure 1-1 Project Area

Table 1.1 outlines the baseline studies and supporting reports (attachments) used to assess baseline conditions for SAR and SOCC within or near the Project Area. These studies are cross-referenced throughout this BSA.

Table 1.1 Listing of Baseline Study Appendices

Number	Baseline Study Appendix	Attachment Number	Attachment Name
BSA.2	Woodland Caribou	2-A	Fall 2019 Caribou Survey – Remote Cameras (2019)
		2-B	Spring 2020 Caribou Survey – Remote Cameras (2020)
		2-C	Seasonal Ranges of Caribou Herds near the Project Area, 2005-2018 (2020)
		2-D	Movement Analysis of Caribou Herds near the Project Area, 2006-2018 (2020)
BSA.4	Fish, Fish Habitat and Fisheries	4-A	Fish and Fish Habitat Data Report (2012)
		4-B	Valentine Project: 2018 Fish and Fish Habitat
		4-C	Aquatic Survey (2019)
BSA.7	Avifauna, Other Wildlife and Their Habitats	7-A	Winter Wildlife (2013)
		7-B	2011 Forest Songbird Surveys (2014)
		7-C	2011 Baseline Waterfowl and Waterfowl Habitat Study (2014)
		7-D	Ecological Land Classification (2015)
		7-E	Waterfowl (2017)
		7-F	Vegetation Baseline Study, Rare Plants Survey (2017)
		7-G	Newfoundland Marten (2018)
		7-H	Forest Songbird Survey (2019)
		7-I	Vegetation Baseline Study (2019)

2.0 RATIONALE / OBJECTIVES

This BSA is a compilation of the existing conditions presented for SAR / SOC within individual VC chapters (i.e., Fish and Fish Habitat VC, Vegetation, Wetlands, Terrain and Soils VC, Avifauna VC, Caribou VC and Other Wildlife VC) within the EIS. It has been prepared to satisfy the requirement of the Provincial EIS Guidelines and provides an understanding of SAR and SOCC species likely to occur in the Project Area (Figure 1-1) and surrounding areas.

SAR are those species:

- Designated under Schedule 1 of the federal *Species at Risk Act* (SARA)
- Listed as Extirpated, Endangered, Threatened, or Vulnerable under the *Newfoundland and Labrador Endangered Species Act* (NL ESA)
- Listed as Extirpated, Endangered, Threatened, Vulnerable, or Special Concern by the Committee on the Status of Endangered Wildlife Species in Canada (COSEWIC).

SOCC are those species identified as provincially rare in Newfoundland and Labrador (ranked as S1 or S2) by the Atlantic Canada Conservation Data Center (AC CDC).

SOCC include those species that are:

- Recommended for listing by the provincial Species Status Advisory Committee (SSAC) as Endangered, Threatened, Vulnerable, or Special Concern however not yet listed under NL ESA or SARA

- Considered provincially Rare, i.e., those species with provincial status ranks (S-ranks), of S1 (critically imperiled), S2 (imperiled)[1], or combinations thereof (e.g., S1S2) upon review by the Atlantic Canada Conservation Data Centre (AC CDC 2020a)

[1] While *S3* species may be of concern from a provincial biodiversity perspective, they are often not included, as their populations are considered less sensitive. This determination is typically at the discretion of the Newfoundland and Labrador Department of Fisheries , Forestry and Agriculture-Wildlife Division (NLDFFA-WD).

3.0 STUDY AREA

The spatial boundaries for this BSA are the same as those used for the respective VC assessments in the EIS. They were selected to support the assessment of fish, plant, avifauna, caribou, and other wildlife SAR and SOCC, and were therefore based on the geographic extent of the measurable potential environmental, social, heritage and human effects of the Project (including Project activities and components). The spatial boundaries are specific for each VC / environmental component but, in general, include the following:

- The Project Area encompasses the immediate area in which Project activities and components occur and is broken down into two distinct areas: the mine site and the access road. The mine site includes the area within which Project infrastructure will be located, and the access road is the existing road to the site plus a 20 m buffer on either side. The Project Area is the anticipated area of direct physical disturbance associated with the construction and operation of the Project (Figure 1-1) and is used consistently in the discussion of fish, plant, avifauna, caribou, and other wildlife SAR and SOCC.
- The Local Assessment Area (LAA) encompasses the area in which Project-related environmental effects (direct or indirect) can be predicted or measured. The LAA, which is specific to each VC / environmental component (i.e., fish, plant, avifauna, caribou and other wildlife SAR / SOCC), encompasses the Project Area and is selected in consideration of the geographic extent of effects on the given VC / environmental component. Refer to the figures in each of the following sections for the specific LAA boundaries.
- The Regional Assessment Area (RAA) is the larger surrounding area, established for context in the determination of significance of Project-specific effects, including the effects of potential accidental events. The RAA is VC specific and encompasses both the Project Area and the LAA. Refer to the figures in each of the following sections for the specific RAA boundaries.

4.0 FISH SAR / SOCC

4.1 STUDY AREA

The general spatial boundary definitions are outlined in Section 3.0. The following spatial boundaries were used to describe the baseline conditions for SAR and SOCC fish and fish habitat in areas surrounding the mine site and access road (Figures 4-1):

LAA: The LAA for fish and fish habitat incorporates the Project Area (described in Section 3.0) and watersheds that intersect with the Project Area, as shown in Figure 4-1. The LAA also includes portions of Victoria Lake Reservoir in the expected effluent mixing zones, which are typically considered to be up to several hundred metres from points of discharge in the lake. The LAA includes Valentine Lake and Victoria River to the point downstream where Project-affected tributaries converge with the main branch of the river. A 500 m buffer has also been applied to the access road to capture potential upstream and downstream effects related to upgrading (i.e., replacement of culverts and bridges) and operation and maintenance of the road.

RAA: The RAA for fish and fish habitat incorporates the Project Area and LAA, and extends to include where potential Project interactions may be observed, as shown in Figure 4-1 (Valentine Lake, a portion of Victoria Lake Reservoir, the Victoria River, and Red Indian Lake, including its discharge at the head of the Exploits River). This area encompasses the potential downstream receivers of surface water that may flow from the Project Area.

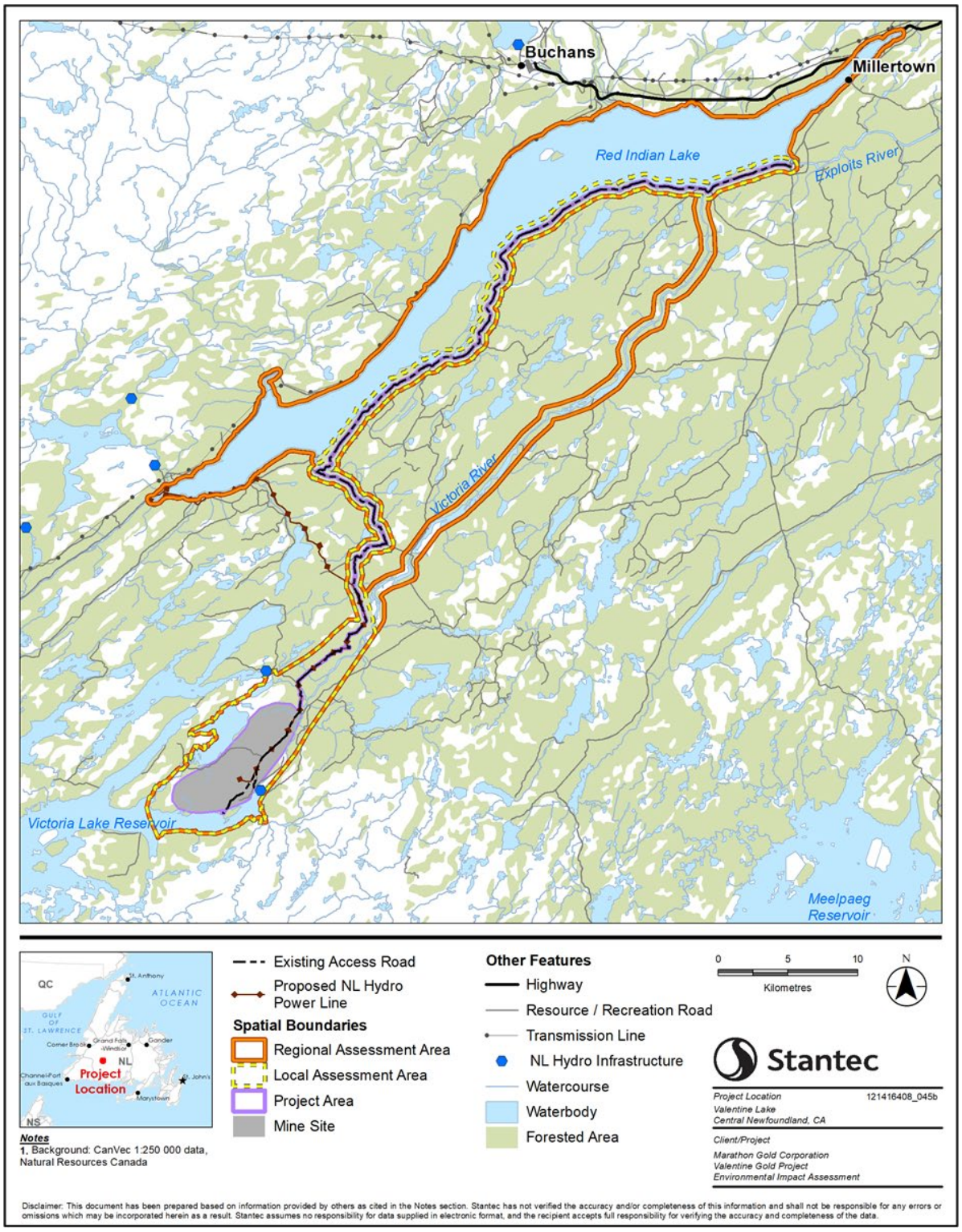

Figure 4-1 Local Assessment Area and Regional Assessment Area for Fish and Fish Habitat

4.2 METHODS

To characterize the baseline conditions for the Fish and Fish Habitat VC in the LAA and the RAA, existing literature and information was reviewed, public engagement sessions held, and field data were collected over multiple years and seasons in potentially affected aquatic environments.

4.2.1 Existing Information Sources

The review of existing literature and information included:

- Publicly available scientific information (Pippy 1966; Porter et al. 1974; Morry and Cole 1977)
- Project-specific light detection and ranging (LiDAR), which was collected for the Project Area in 2019
- Engagement sessions with the communities and stakeholders, and responses to questions emailed to town councils, outfitters and salmonid groups related to fishing activity in the RAA
- Recreational fisheries data obtained from Fisheries and Oceans Canada (DFO) reports and online databases

4.2.2 Field Studies

Field studies were completed in 2011, 2018, 2019 and winter 2020 to support the environmental assessment (EA) and the specific field study reports are found in BSA.4 (Table 1.1). The 2011 field study (BSA.4, Attachment 4-A) focused on the collection of fish presence / absence and fish habitat data in the vicinity of the Leprechaun deposit, while subsequent surveys in 2018 (BSA.4, Attachment 4-B), 2019 (BSA.4, Attachment 4-C) and 2020 (BSA.4, Attachment 4-D) focused on collection of fish presence / absence and fish habitat data in the vicinity of the Marathon deposit. The 2011 and 2018 field assessments also focused on watercourse crossing surveys along the portion of the access road closest to the mine site. The Aquatic Survey Area shown in Figure 4-2 encompasses survey areas for all four field programs.

Studies in 2011 and 2018 determined that pond and stream habitat within the Aquatic Survey Area were relatively homogeneous with respect to habitat type, hydrology and fish species present. Therefore, in 2019, representative pond and streams within each of the three major sub-watersheds within the LAA (Victoria Lake Reservoir, Valentine Lake and Victoria River) were sampled to provide information about primary and secondary productivity, sediment quality, water quality and fish productivity. The representative ponds and streams sampled within each sub-watershed and the type of survey completed are identified in Table 4.1. The survey components completed with each sub-watershed are provided in Table 4.1 and sampling locations within each sub-watershed area are shown in Figure 4-2.

Table 4.1 Survey Components Completed within each Sub-watershed in the Aquatic Survey Area

Major Watershed	Representative Ponds and Streams	Primary Productivity		Secondary Productivity		Fish and Fish Habitat Characterization		Water Quality		Sediment Quality	
		Lake / Pond	Stream	Lake / Pond	Stream	Pond	Stream**	Pond	Stream**	Pond	Stream**
Victoria Lake Reservoir (Vic)	Ponds Vic P1, Vic P2 and associated streams	VicP2, L1	16	VicP2, L1	16	VicP1, VicP2, L1, L2	15, 16, 17, 18	L1	16	VicP2, L1	16
Victoria Lake Reservoir (Vic)	Lake	Vic	NA	Vic	NA	Vic	NA	Vic	NA	Vic	Vic
Valentine Lake (Val)	Ponds ValP1 and ValP2 and associated streams	ValP2	20	ValP2	20	ValP1, ValP2	19, 20, 21	ValP2	20	ValP2	20
Valentine Lake (Val)	Pond ValP3 and associated streams	ValP3	1	ValP3	1	ValP3, M2, M3	1, 2, 3	ValP3	1	ValP3	-
Valentine Lake (Val)	Lake	Val	NA	Val	NA	Val	NA	Val	NA	Val	Val
Victoria River	Unnamed Tributary to Victoria River (C001 stream)	-	14	-	14	-	14*	-	14	-	14
Victoria River	Pond M1/M7 and associated streams	M7	8	M7	8	M1, M7, M8	8, 9*, 11*, 12	M7	8	M7	8

Notes:
* indicates stream crossing surveys were also completed
** does not include other streams associated with the access road upgrades
"-" indicates no data collected; NA = Not Applicable

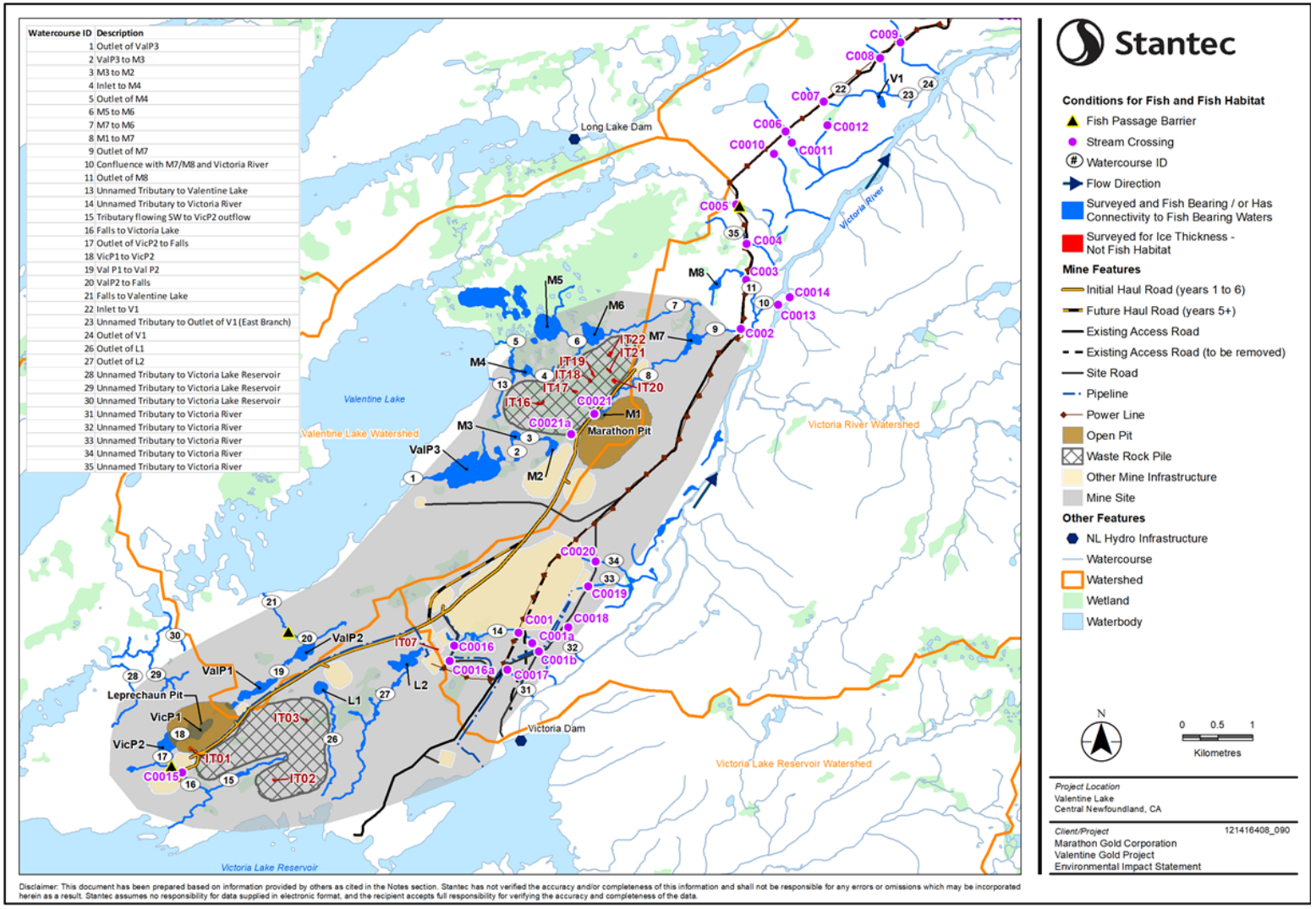

Figure 4-2 Aquatic Survey Area

4.2.3 Fish Community

To assess the potential for the occurrence of SAR, literature was reviewed on the distribution of SAR within the LAA and RAA and fish community studies were undertaken.

To assess fish communities, a variety of fishing methods were used, including minnow traps, gillnets or fyke nets to assess lacustrine habitat, and backpack electrofishing to assess riverine habitats. Fishing was completed according to methods described in the *Standard Methods Guide for Freshwater Fish and Fish Habitat Surveys in Newfoundland and Labrador: Rivers and Streams* (Sooley et al. 1998) and *A Review of Fish Sampling Methods Commonly Used in Canadian Freshwater Habitats* (Porter et al. 2006). The fishing effort and location were recorded. Captured fish were identified to species and released alive. A representative number were measured and weighed prior to release.

4.3 RESULTS

There are no aquatic SAR known to occur with the Project Area, LAA or RAA. While American eel is listed as Threatened under COSEWIC, the species does not yet have a SARA designation (COSEWIC 2012). No American eel were captured during the field studies and no historical records indicate American eel presence in Victoria Lake Reservoir (Pippy 1966; BSA.4-A and BSA.4-C). American eel is found within the LAA and RAA upstream of the Red Indian Lake Dam (Cunjak and Newbury 2005).

American eel spawn within the marine environment in the Sargasso Sea. The RAA provides adequate rearing, overwintering and migratory habitat to carry out their life processes. American eel is considered a single breeding population and is classified as Threatened by COSEWIC (COSEWIC 2012). Threats to the population include habitat alteration, dams and turbines, fishery harvest, changes to ocean conditions related to climate change, contaminants and parasites (COSEWIC 2012). Their migratory habitat is interrupted with a number of hydroelectric dams, which provide upstream passage; however, may not facilitate optimal downstream migratory passage.

5.0 PLANT SAR / SOCC

This chapter includes a description of baseline conditions for plant SAR / SOCC relative to the LAA and RAA.

5.1 STUDY AREA

The general spatial boundary definitions are outlined in Section 3.0. The following spatial boundaries were used to describe baseline conditions for plant SAR and/or SOCC (Figure 5-1):

LAA: The LAA is comprised of a 1 km buffer around the mine site and a 500 m buffer around the site access road. This has been selected to capture the area where effects on plant SAR and/or SOCC are likely to be most prevalent (e.g., effects to species / community diversity, wetland function, terrain stability, and soil quality and quantity).

RAA: The RAA includes the Project Area (described in Section 3.0), LAA and a 35 km buffer around the Project Area (Figure 5-1) encompassing Victoria River and Red Indian Lake, as well as the communities of Millertown, Buchans and Buchans Junction. This larger surrounding area is established for context in the determination of significance of Project-specific effects, including the effects of potential accidental events.

5.2 METHODS

Information on vascular plants that exist within the Project Area and surrounding area have been obtained through multiple sources, including an AC CDC data request for the area, and field surveys completed in support of the Project from 2014 to 2019.

The following publicly available data and reports were reviewed and used to characterize baseline conditions for vegetation and wetlands, including plant SAR / SOCC in the Project Area, LAA and RAA:

- AC CDC report for a 5 km buffer around the Project Area (AC CDC 2020b)
- The Ecological Land Classification (ELC) study (BSA.7, Attachment 7-D [Table 1.1])
- Valentine Lake Project: Vegetation Baseline Study (BSA.7, Attachment 7-F [Table 1.1])
- Valentine Gold Project: 2019 Vegetation Baseline Study (BSA.7, Attachment 7-I [Table 1.1])
- 2015 Land Cover of Canada Data (Natural Resources Canada 2019)

Field surveys include those completed in 2014 and 2015 in support of the ELC (BSA.7, Attachment 7-D [Table 1.1]) and two focused rare plant surveys completed within the Project Area in 2017 and 2019 (BSA.7, Attachments 7-F and 7-I [Table 1.1]).

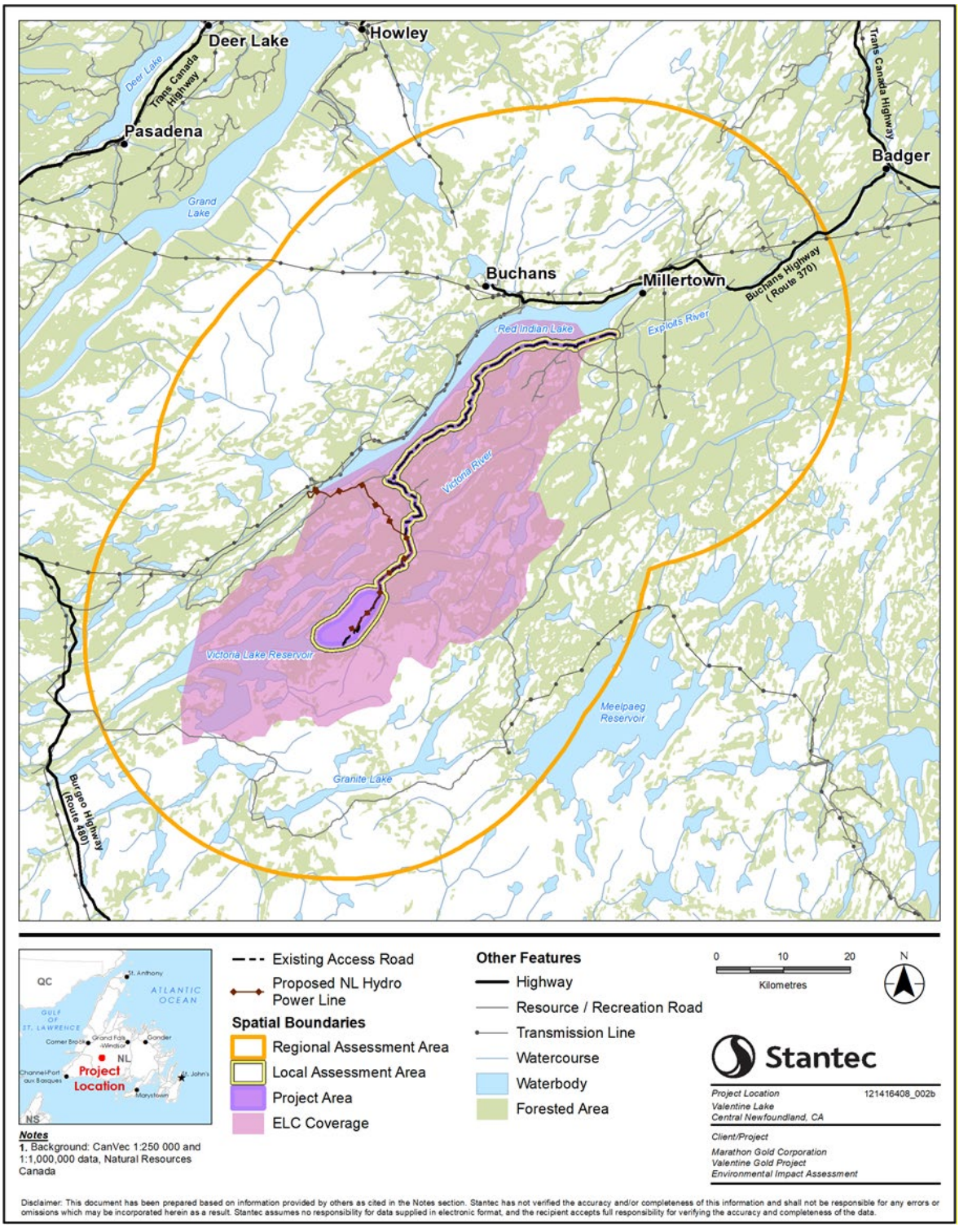

Figure 5-1 Spatial Boundaries for Vegetation, Wetlands, Terrain, and Soils

During the ELC field work, vascular plants were recorded in plots surveyed to describe various vegetated habitats. The two rare plant surveys were completed during the growing season at the time considered suitable for identification of those rare plants with potential to be encountered in the area. The first rare plant survey was completed from July 17 to 21, 2017. The second rare plant survey was completed from June 25 to 29, 2019. The 2019 survey occurred earlier in the growing season than the 2017 survey, as the timing of the 2019 survey was aligned with both the timing the flowering of plants and the timing of the forest songbird breeding surveys. Surveys, which used a floristic habitat sampling method, focused on locations that were selected based on the Project layout in use at the time of the field surveys and not on the current site layout. Survey locations included the Leprechaun pit and northern associated waste rock pile, the tailings management facility, the Marathon pit and associated waste rock pile, and other areas that were previously planned for components of the Project, as well as the portion of the access road closest to the previously-mentioned Project components (Figure 5-1).

Floristic habitat sampling is used in areas where plant community types are known and applies the greatest search effort in those habitats with the highest potential to support rare vascular plant species. Plant taxa were recorded using ArcGIS data collection tools developed by Stantec and a Bluetooth-paired submeter GPS (Global Positioning System). Encountered species were recorded once, and rare plants [i.e., SAR or SOCC] were recorded whenever they were encountered. When rare species were encountered, information was recorded on the location of the species, the population boundaries, and the number of individuals within the population. A single GPS point location was taken if the plant species or population was less than 10 m in diameter and more than 10 m from the next nearest occurrence of the same species.

5.3 RESULTS

Through the three field surveys, 290 vascular plant species were observed within the Project Area and surveyed portions of the LAA. During surveys completed in support of the ELC, 205 vascular plants were observed. During the 2017 rare plant survey, 255 vascular plant species were observed, and 176 vascular plant species were observed during the 2019 RPS. No vascular plant SAR were observed during the surveys completed in support of the Project. Three vascular plant SOCC were observed during the 2015 and 2017 studies (BSA.4, Attachment 7-F) (Figure 5-2), including short-scale sedge (*Carex deweyana*, S2), nodding water nymph (*Najas flexilis*, S2), and perennial bentgrass (*Agrostis perennans*, S2). None of the species observed in the 2019 study were SAR or SOCC (BSA.7, Attachment 7-I).

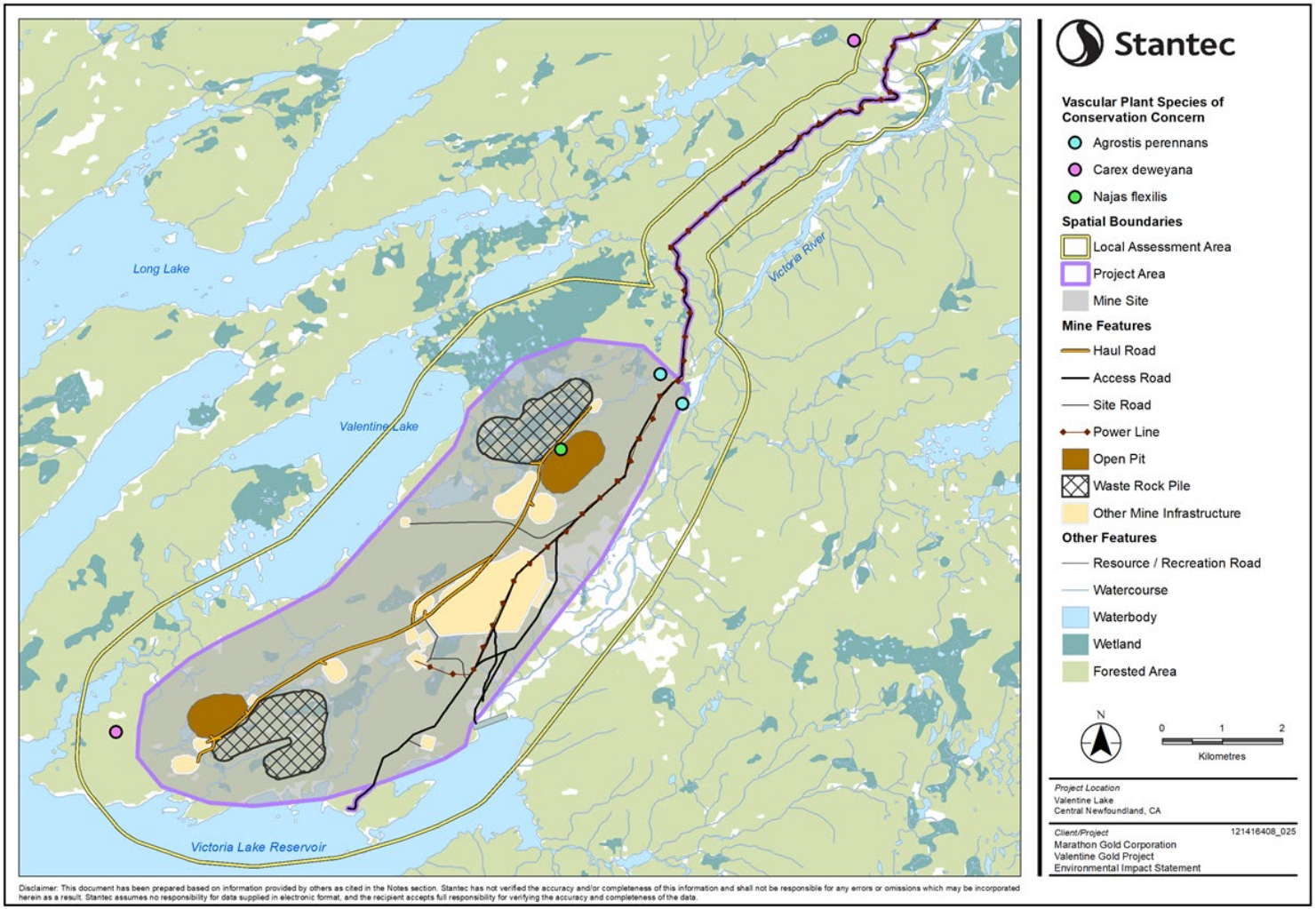

Figure 5-2 Locations of Observed Vascular Plant SOCC

Ten species ranked S3 were also observed during surveys (BSA.7, Attachment 7-F and 7-I). Four vascular plants ranked S3 were observed in 2019, including russet cotton-grass (*Eriophorum russeolum*), little yellow-rattle (*Rhinanthus minor*), twin-stemmed bladderwort (*Utricularia geminiscapa*), and northern yellow-eyed-grass (*Xyris montana*) (also observed in 2017) (BSA.4, Attachment 7-I). Nine species ranked S3 were also recorded during the 2017 study (BSA.7, Attachment 7-F) (one of which was recorded in 2019) and consultation with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division (NLDFFA-Wildlife Division) may be required to determine those potentially deemed "of conservation concern" to the Government of NL. They include sparse-flowered sedge (*Carex tenuiflora*), Wiegand's sedge (*Carex wiegandii*), purple false melic (*Schizachne purpurascens*), Arctic yellow-rattle (*Rhinanthus minor* subsp*. groenlandicus*), green addersmouth (*Malaxis unifolia*), Arctic bramble or plumboy (*Rubus arcticus* subsp. *acaulis*), northern blackberry (*Rubus arcticus*), American bur-reed (*Sparganium americanum*) and northern yelloweyed grass (*Xyris montana*). However, since 2017 the status of arctic bramble and northern blackberry has changed to S3S4 and is therefore not included in Table 5.1. Descriptions of the S2 species that are known to occur in the Project Area and/or LAA are provided in the following sections.

Although ranked Vulnerable (S3) by the AC CDC, these species are typically not considered SOCC in NL, a determination at the discretion of the NLDFFA-Wildlife Division. The remainder of plants observed during surveys are ranked S3S4 (between Vulnerable and Apparently Secure), S4 (Apparently Secure), S4S5, S5 (Secure), or SNA (Species Not Ranked, typically because it is considered exotic) on the Island of Newfoundland. Table 5.1 lists the vascular plant SOCC (Imperiled [S2]) and Vulnerable (S3) species observed within the Project Area and LAA.

Table 5.1 Plant SAR and SOCC that Occur or Have the Potential to Occur In or Near the Project Area

Species	NL ESA Status	Federal Status		AC CDC
		SARA Listing	COSEWIC Assessment	
Short-scale sedge (*Carex deweyana*)	-	-	-	S2
Nodding water nymph (*Najas flexilis*)	-	-	-	S2
Perennial bentgrass (*Agrostis perennans*)	-	-	-	S2
Russet cotton-grass (*Eriophorum russeolum*)	-	-	-	S3
Little yellow-rattle (*Rhinanthus minor*),	-	-	-	S3
Twin-stemmed bladderwort (*Utricularia geminiscapa*),	-	-	-	S3
Northern yellow-eyed-grass (*Xyris montana*).	-	-	-	S3

Species	NL ESA Status	Federal Status		AC CDC
		SARA Listing	COSEWIC Assessment	
Sparse-flowered sedge (*Carex tenuiflora*)	-	-	-	S3
Wiegand's sedge (*C. wiegandii*)	-	-	-	S3
Purple false melic (*Schizachne purpurascens*)	-	-	-	S3
Arctic yellow-rattle (*Rhinanthus minor* subsp. *groenlandicus*)	-	-	-	S3
Green addersmouth (*Malaxis unifolia*)	-	-	-	S3
American bur-reed (*Sparganium americanum*)	-	-	-	S3
S1: Critically Imperiled in Newfoundland S2: Imperiled in Newfoundland S3: Vulnerable in Newfoundland				

5.3.1 Short-Scale Sedge

Short-scale sedge is a low-growing, perennial sedge in the *Cyperaceae* family. It has a relatively small inflorescence that has a silvery appearance resulting from the translucent pistillate scales (Gleason and Cronquist 1991). The inflorescence is typically subtended by a long bract (Hinds 2000). It can grow densely to loosely clumped to a height of 120 cm but is typically shorter. Short-scale sedge has been reported from all Canadian provinces and territories except Nunavut (United States Department of Agriculture (USDA) n.d.a). Its range on the Island of Newfoundland includes western, southwestern, northwestern and eastern Newfoundland (BSA.7, Attachment 7-F [Table 1.1]). This species is ranked S2 on the Island of Newfoundland (AC CDC 2015); however, it is common (S4 to S5) in other Atlantic provinces (AC CDC 2020a) and other parts of its range.

The habitat preferences of short-scale sedge are reported as open hardwood or hardwood and mixedwood forests (Hinds 2000; Haines 2011). This species was observed in two locations during ELC field surveys completed in 2015 (Figure 5-2). Both observations were of small numbers of plants located in alder thicket habitat (Alder Thicket Ecotype identified by the ELC). One observation was within the LAA but outside of the Project Area, west of the Leprechaun pit, with the other adjacent to the portion of LAA associated with the access road. No additional populations were observed or located during the 2017 or 2019 RPSs, suggesting that plants may be restricted to a small range.

5.3.2 Nodding Water Nymph

Nodding water nymph is an aquatic monocot that grows in shallow water (Hinds 2000). It is a submerged and rooted annual plant, and its many-branched stems can range from 5 to 50 cm in length and 0.2 to 0.6 mm in width. Its minutely serrated leaves are 1 to 4 cm long and 0.2 to 0.6 mm wide (Gleason and Cronquist 1991). Nodding water nymph produces many fruits and is known to be a food source for waterfowl. This species is known from all Canadian provinces and Northwest Territories (USDA n.d.b). In NL, its range includes western, northern and central Newfoundland (Meades et al. 2000). This species is ranked S2 on the Island of Newfoundland (AC CDC 2015). It is considered common (S5) in New Brunswick and Nova Scotia but is ranked S1 in Prince Edward Island (AC CDC 2020a).

Nodding water nymph is typically found on the margins of lakes and rivers but is also known from pools in bogs (Gleason and Cronquist 1991; Reznicek et al. 2011). This species was observed during the 2017 RPS, in a pool of water within an Open Wetland Ecosystem Unit within the planned Marathon Pit (Figure 5-2).

5.3.3 Perennial Bentgrass

Perennial bentgrass is a graminoid that grows in tufts, from 50 to 100 cm in height. Its leaves are flat and from 2 to 6 millimetres (mm) wide (Gleason and Cronquist 1991). Perennial bentgrass has an elongated, pale inflorescence from 10 to 25 cm in length. This is an eastern species, known within Canada from the Island of Newfoundland, west to Ontario (USDA n.d.c). On the Island, its range includes northern to western-central Newfoundland (Meades et al. 2000). This species is ranked S2 on the Island of Newfoundland (AC CDC 2015). It is relatively common in New Brunswick and Nova Scotia (where it is ranked S5 and S4S5, respectively), but is considered Vulnerable (ranked S3) in Prince Edward Island (AC CDC 2020a).

Perennial bentgrass has various reported preferred habitats. Hinds (2000) states this species is found in moist woods and on flooded shores, while Gleason and Cronquist (1991) report it from various dry habitats. It was observed in two locations during the ELC surveys, both within Alder Thicket Ecotype habitat: one in the northeastern end of Project Area outside the planned Project components, and the other within the LAA near Victoria River (Figure 5-2).

5.3.4 AC CDC Rare Vascular Plant Records

AC CDC data was obtained for a 5 km buffer around the Project Area (AC CDC 2020b). Two vascular plant SOCC have been previously recorded in this area: red pine (*Pinus resinosa*) and pinesap (*Hypopitys monotropa*). Neither species was observed during field surveys of the mine site portion of the Project Area, and neither has been previously recorded within the mine site portion of the Project Area.

Red pine, which is ranked S2 on the Island of Newfoundland by the AC CDC, was recorded three times: twice in 1962 and once in 1965. The exact locations of these observations are not known as the provided coordinates, which have an accuracy of 1,000 m, place them near Victoria River. However, the descriptions associated with the records describe the locations as Overflow Pond and near Noel Paul's

Brook, which are approximately 50 km and over 18 km, respectively, from Victoria River. Regardless of the true locations, if red pines are still present, they appear to be located outside the LAA.

Pinesap is ranked S3 on the Island of Newfoundland by the AC CDC. It is a non-photosynthetic, mycotrophic forb that was recorded in 1999 along the road from Millertown to the mine site portion of the Project Area. While this observation has an accuracy of 1,000 m, if this species is still present at this location it is within the LAA and is also likely within the Project Area.

6.0 AVIFAUNA SAR / SOCC

6.1 STUDY AREA

The general spatial boundary definitions are outlined in Section 3.0. The following spatial boundaries were used to assess the baseline conditions for an assessment of potential Project effects, including residual environmental effects, on avifauna in areas surrounding the mine site and access road (Figures 6-1 and 6-2):

Project Area: The Project Area encompasses the immediate area in which Project activities and components occur and is comprised of two distinct areas: the mine site and the access road. The mine site includes the area within which Project infrastructure will be located, and the access road, which is the existing road to the site, plus a 20 m wide buffer on either side. The Project Area is the anticipated area of direct physical disturbance associated with the construction, operation and decommissioning, rehabilitation and closure of the Project.

LAA: The LAA includes the Project Area, plus a 1 km buffer around the mine site (Figure 6-1), and a 500 m buffer around the portion of the existing access road to be upgraded and maintained by Marathon.

RAA: The RAA includes the Project Area, LAA and a 35 km buffer around the Project Area (Figure 6-2) encompassing Victoria River and Red Indian Lake, as well as the communities of Millertown, Buchans and Buchans Junction.

This assessment of baseline conditions also refers to the Ecological Land Classification study area (ELCA), which is the area within which detailed habitat data have been collected (BSA.7, Attachment 7-D). While the extent of the ELC data does not fully cover the Project Area, LAA or RAA (Figure 6-1), the ELCA is used to assess quantitative effects on avifauna habitat. In particular, the magnitude of residual effects has been characterized in relationship to the ELCA (i.e., the percentage of the ELCA in which a loss or change will occur). In this context, the ELCA has been used as a surrogate for the RAA, as it is an area sufficiently large enough to provide regional context and is the area for which comparable ecological land classification data is available.

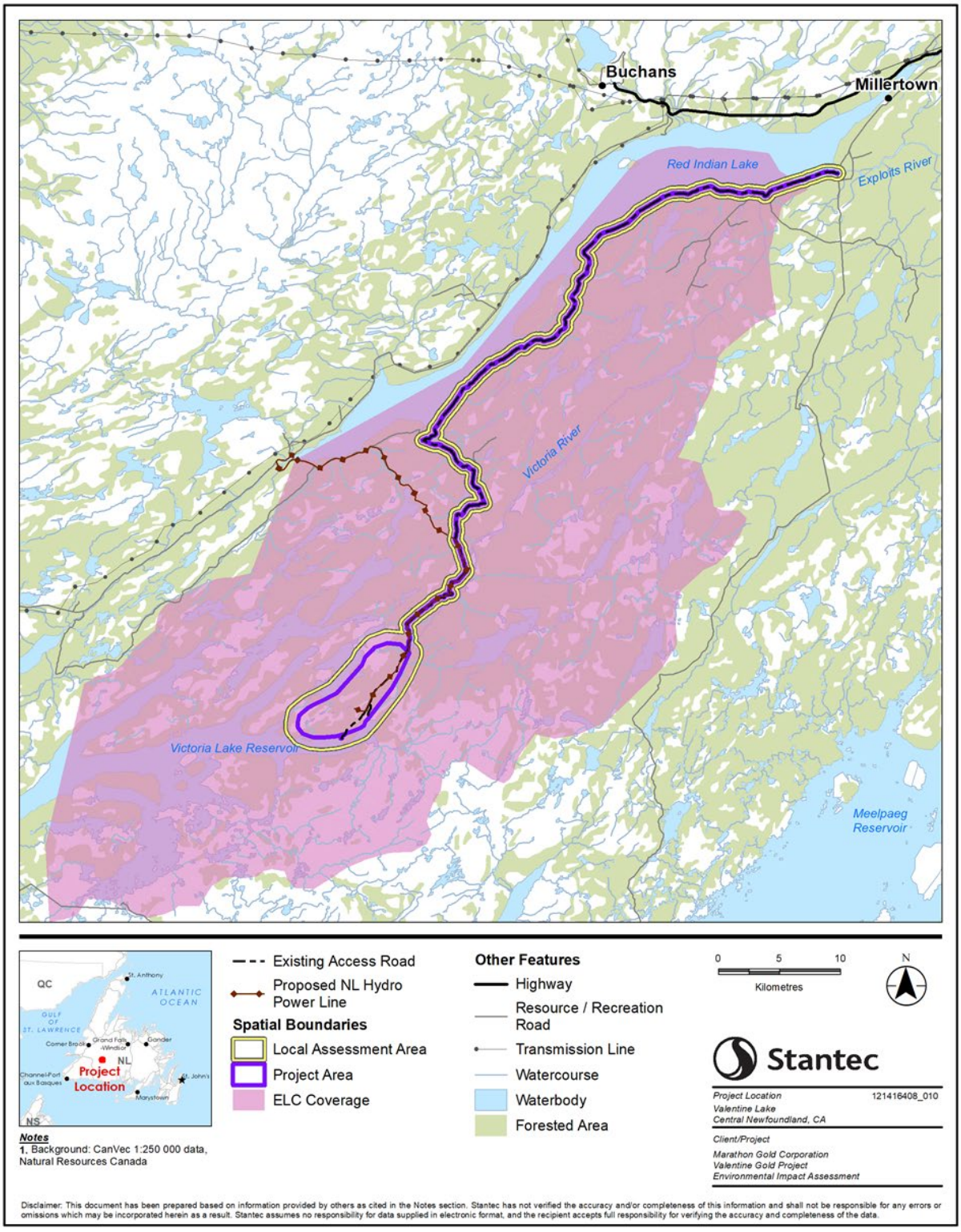

Figure 6-1 Local Assessment Area for Avifauna and ELCA

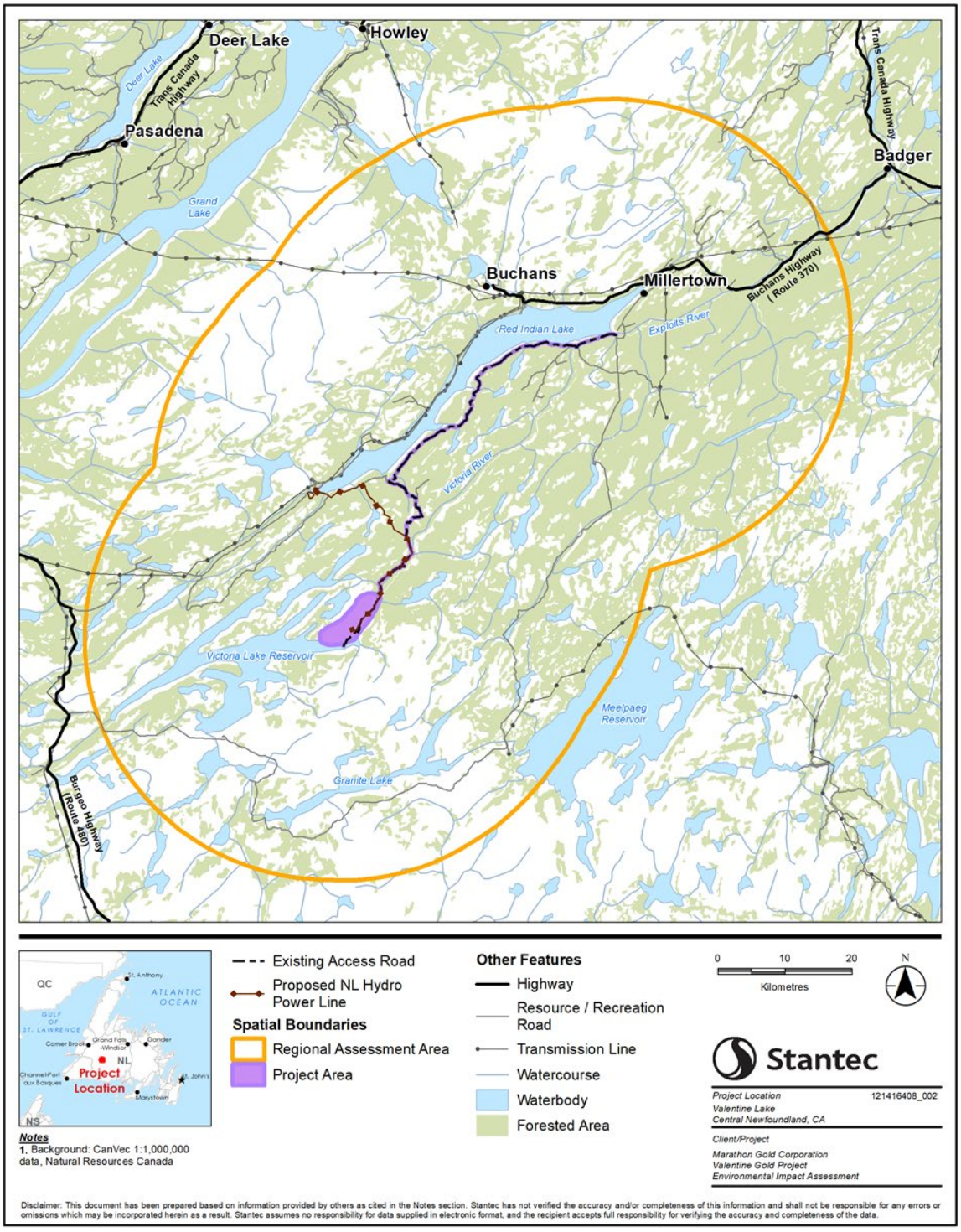

Figure 6-2 Regional Assessment Area for Avifauna

6.2 METHODS

6.2.1 Avifauna Surveys and Data

SAR and SOCC avifauna occurring or likely to occur within the Project Area or surrounding areas were compiled from sources including relevant publicly available primary and secondary literature, field studies completed in the Project Area and portions of the LAA, and federal and provincial databases.

The following key public resources were used to assist in establishing the baseline conditions for avifauna and avifauna habitat:

- COSEWIC Assessment and Status Update Reports
- AC CDC – observation data on SAR / SOCC in Atlantic Canada
- Labrador-Island Transmission Link Environmental Impact Statement (Nalcor Energy 2012)
- ELC and Wildlife Species Habitat Analysis, Alderon Iron Ore Corp (Alderon 2012)
- North American Breeding Bird Survey (BBS)
- Christmas Bird Count (CBC)
- Project-specific field surveys

6.2.1.1 Atlantic Canada Conservation Data Centre

The AC CDC is a registered charity that was established in 1997, and has the following mission statement: “To assemble and provide objective and understandable data and expertise about species and ecological communities of conservation concern, including those at risk, and to undertake field biological inventories in support of decision-making, research, and education in Atlantic Canada” (AC CDC 2020c). AC CDC data, including rare avifauna species, was requested for the LAA and was included in the consideration of species presence in the Project Area and LAA (AC CDC 2020d).

The AC CDC data included records of two rare species occurring within the LAA. These included common nighthawk (*Chordeiles minor*) (a record generated by an observation made by Stantec), and bank swallow (*Riparia riparia*). A list of species identified as present within or near the LAA, including those identified by the AC CDC, is presented in Table 6.1.

6.2.1.2 North American Breeding Bird Survey

The BBS began in 1966 and is now one of the longest-running BBSs in North America. The BBS database is extensive and can be used to determine long-term population trends of breeding bird species in Canada. A search of the BBS database was completed to obtain records of bird species observed near the Project Area (ECCC 2019).

The route nearest to the Project Area (i.e., NL 5704) lies to the east of the Project Area in Buchans. This route was surveyed annually from 2011 through 2018. A total of 68 species have been observed on this route, varying between 32 and 42 in the most recent survey years. The most numerous species in recent years were white-throated sparrow (*Zonotrichia albicollis*), American robin (*Turdus migratorius*) and yellow-rumped warbler (*Setophaga coronata*) (United States Geological Survey Patuxent Wildlife

Research Center 2020). A list of species identified as present within or near the LAA is presented in Table 6.1.

6.2.1.3 Christmas Bird Count

The nearest CBC (CBC n.d.) was completed in Buchans. This count was completed annually between 2000 and 2003, and in 2007. Typically, surveys are done in mid to late December, or early January. A total of 27 species have been observed from this annual survey since 2000 (Audubon 2020). The species observed every year of the count include hairy woodpecker (*Dryobates villosus*), Canada jay (*Perisoreus canadensis*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), boreal chickadee (*Poecile hudsonicus*), European starling (*Sturnus vulgaris*) (an exotic species), pine grosbeak (*Pinicola enucleator*), common redpoll (*Acanthis flammea*), evening grosbeak (*Coccothraustes vespertinus*) (SAR) and house sparrow (*Passer domesticus*) (an exotic species).

6.2.1.4 Project-specific Field Surveys

Four directed avifauna surveys have been completed by Stantec in the Project Area and surrounding areas to better understand the occurrence, distribution and habitat associations of avifauna SAR and SOCC. Incidental observations of avifauna species have also been recorded during other field studies. Avifauna field surveys completed between 2011 and 2019 during baseline data gathering are listed in Table 1.1 BSA.7 – Avifauna, Other Wildlife and Their Habitats, and attachments 7-A, 7-B, 7-C, 7-D, 7-E, and 7-H include relevant information on avifauna SAR and SOCC. The SAR and SOCC recorded in these studies are presented in the sections below.

6.2.1.5 Avifauna Habitat Assessment

The types of habitat present in the Project Area and the LAA were determined using an ELC (BSA.7, Attachment 7-D). Eleven satellite images (RapidEye, 5 m resolution, multispectral) of the ELC Area (ELCA) (1,830.6 km^2) (Figure 6-1) were processed and adjusted with ortho-corrected aerial images. Ecotypes were classified based on various characteristics including terrain, soils, moisture and nutrient regime, and plant species richness.

Discussion of habitat type availability in this chapter refers to the ELCA. The ELCA covers more than 99% of the Project Area and 97% of the LAA (Figure 10-1). The area of the Project Area and LAA outside the ELCA is restricted to a small portion of the site access road at its northern-most reach (i.e., furthest from the mine site) and is considered negligible in the context of assessing potential Project effects on the VC. An analysis of the remaining portion of the LAA was completed, although could not be combined with the ELCA as the methods are not comparable. A detailed explanation of this analysis is provided in Section 9.2.1.1 of the EIS.

Given the number of avifauna species that occur on the Island of Newfoundland, it is not practical to assess habitat use for each in detail. Therefore, representative species from each of the main groups of birds have been selected and considered further with respect to habitat use within the Project Area. In terms of spatial overlap with the Project Area, habitat use by avifauna during breeding is a key focus. The

representative SAR species were selected for this assessment included the Olive-sided flycatcher (*Contopus cooperi*) and Rusty blackbird (*Euphagus carolinus*).

The habitat requirements for the representative species were evaluated based on literature reviews, available information and discussion with experts. Each habitat type present in the Project Area and LAA was evaluated for features such as the presence of structural and compositional elements, and other factors such as forage availability.

Three ranks of habitat value were assigned to the ELC habitat types within the Project Area and LAA: high, moderate and low. High value habitat provides forage, protection, and nesting and resting habitat; moderate value habitat provides an abundance of one or more (or marginal amounts of all) of the critical elements (i.e., foraging, protection, nesting and resting); and low value habitat provides marginal foraging, protection, nesting or resting opportunities, or may be used only during transit or migratory periods. The evaluation of habitat suitability for the representative avifauna SAR provides an overview of the potential for portions of the Project Area and LAA to support these species and species with similar habitat preferences.

6.3 RESULTS

In total, 17 species designated at risk provincially or federally, or of conservation concern as assessed by COSEWIC, that occur or have the potential to occur in or near the Project Area (Table 6.1). Other avifauna SAR on the Island of Newfoundland are not likely to occur in the Project Area or LAA.

Table 6.1 Avifauna SAR and SOCC that Occur or have the Potential to Occur in or near the Project Area of LAA

Species	NL ESA Status	Federal Status		AC CDC
		SARA Listing	COSEWIC Assessment	
Olive-sided Flycatcher (*Contopus cooperi*)	Threatened	Threatened (Schedule 1)	Special Concern	S3B, SUM
Common Nighthawk (*Chordeiles minor*)	Threatened	Threatened (Schedule 1)	Special Concern	SNA
Rusty Blackbird (*Euphagus carolinus*)	Vulnerable	Special Concern (Schedule 1)	Special Concern	S2S3B, SUM
Bank Swallow (*Riparia riparia*)	-	Threatened (Schedule 1)	Threatened	S1S2B, SUM
Grey-cheeked Thrush (*Catharus minimus*)	Threatened	-	-	S2B, SUM
Evening Grosbeak (*Coccothraustes vespertinus*)	-	Special Concern (Schedule 1)	Special Concern	S4
Red Crossbill (*Loxia curvirostra*)	Endangered	Threatened (Schedule 1)	Threatened	S1S2

Species	NL ESA Status	Federal Status		AC CDC
		SARA Listing	COSEWIC Assessment	
Caspian tern (*Hydroprogne caspia*)	-	-	-	S2B
Nashville warbler (*Leiothlypis ruficapilla*)	-	-	-	S2B
Bay-breasted warbler (*Setophaga castanea*)	-	-	-	S2B
Harlequin Duck, Eastern pop. (*Histrionicus histrionicus* pop. 1)	Vulnerable	Special Concern	Special Concern	S3B, S2N, SUM
Barrow's Goldeneye (*Bucephala islandica*)	Threatened	Special Concern	Special Concern	S1N, SUM
Ivory Gull (*Pagophila eburnea*)	Endangered	Endangered	Endangered	S1N, SUM
Short-eared Owl (*Asio flammeus*)	Vulnerable	Special Concern	Special Concern	S3B, SUM
Chimney Swift (*Chaetura pelagica*)	Threatened	Threatened	Threatened	SNR
Barn Swallow (*Hirundo rustica*)	No Status	No Status	Threatened	S2B, SUM
Bobolink (*Dolichonyx oryzivorus*)	No Status	No Status	Threatened	S1B, SUM

SAR: Unhighlighted cells; SOCC: Grey highlighted cells

S1: Critically imperiled in Newfoundland

S2: Imperiled in Newfoundland

S3: Vulnerable in Newfoundland

S4: Apparently Secure - Uncommon but not rare in Newfoundland

SU: Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends

SNA: conservation status rank is not applicable because the species is not a suitable target for conservation activities in Newfoundland

SNR: Unranked - Provincial conservation status not yet assessed

B: Breeding - Conservation status refers to the breeding population of the species in the province

N: Nonbreeding - Conservation status refers to the non-breeding population of the species in the province

M: Migrant - Conservation status refers to the aggregating transient population of the species in the province

Sources: Government of Canada 2019; Government of NL 2020b; COSEWIC 2006, 2013, 2016, 2018a,b; SSAC 2005, 2009

6.3.1 SAR

A species is defined as rare when it has relatively few individuals, is uncommon or scarce, or occurs within a limited geographical range. The rarity of a species may also be a matter of scale, meaning that a species may not be rare in Canada, but may be considered “regionally rare” in a given province or

territory. The rarest species are those with small geographic ranges, few occurrences, and few individuals in each occurrence.

Although an understanding of rare or sensitive bird species and their protection is important for a variety of reasons, the protection of the rarest or most sensitive species is also a legal requirement for species listed under Schedule 1 of the federal SARA and the NL ESA. There are a variety of bird species designated or listed under the federal and provincial legislation in NL.

In the context of the Project, a rare or sensitive bird species is generally defined as a native species that, because of its biological characteristics, or because it occurs at the periphery of its range, or for some other reason, exists in low numbers or in very restricted areas, in Canada and/or NL. A bird SAR is defined as a species listed as Extirpated, Endangered, Threatened, Vulnerable, or Special Concern under the NL ESA and/or the federal SARA.

Three avifauna SAR were identified during field surveys in the vicinity of the Project Area including olive-sided flycatcher, common nighthawk, and rusty blackbird. Additionally, four SAR were identified as potentially occurring near the LAA by other data sources. A record of bank swallow was identified by the AC CDC as being potentially within the LAA, and records of grey-cheeked thrush (*Catharus minimus minimus*) and red crossbill (*Loxia curvirostra*) were noted within the BBS data recorded along the NL 5704 route in Buchans. The Buchans CBC count identified evening grosbeak in 2007. An additional seven species are included in Table 6.1 (Harlequin Duck (*Histrionicus histrionicus)*, Barrow's Goldeneye (*Bucephala islandica*), Ivory Gull (*Pagophila eburnea*), Short-eared Owl (*Asio flammeus*), Chimney Swift (*Chaetura pelagica*), Barn Swallow (*Hirundo rustica*), and Bobolink (*Dolichonyx oryzivorus*)) based on their known occurrence on the Island of Newfoundland, their range and preferred habitat, giving them potential to occur in the LAA or RAA. However, the majority of these birds are coastal birds or seabirds and therefore their occurrence inland is unlikely, and they are included as a conservative measure only. The locations of SAR and SOCC recorded during field surveys in the Project Area and LAA are shown in Figure 6-3. Descriptions of the SAR species that are known to occur in the Project Area and/or LAA are provided in the following sections and SOCC are described in Section 6.3.2.

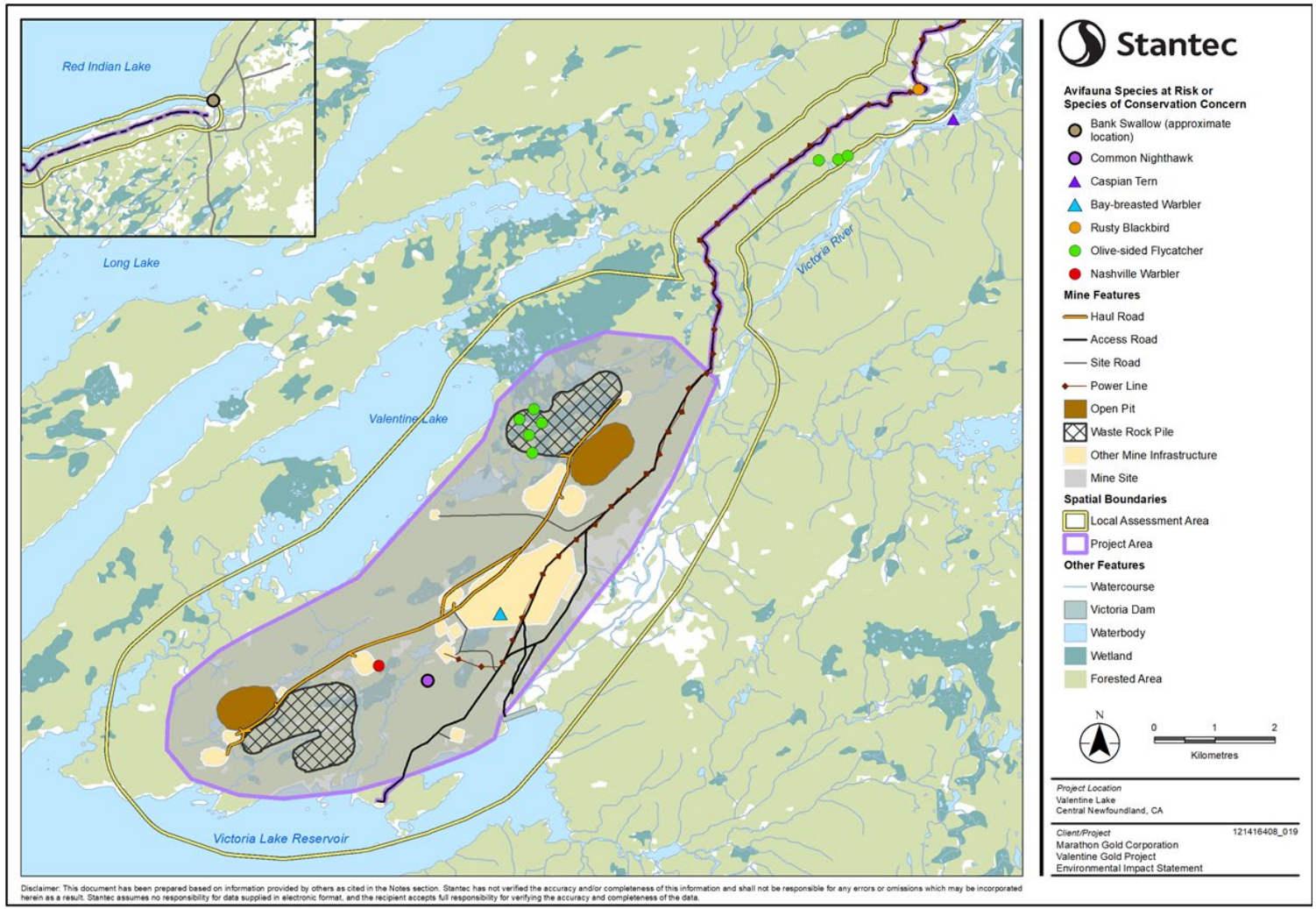

Figure 6-3 Locations of Avifauna SAR and SOCC Recorded in the Project Area and LAA during Field Surveys

6.3.1.1 Olive-sided Flycatcher

Olive-sided flycatcher is ranked as Threatened under Schedule 1 of SARA and as Special Concern by COSEWIC. The NL ESA ranks this species as Threatened and the AC CDC lists the olive-sided flycatcher as S3B, SUM, indicating that the breeding population of this species is considered Vulnerable and the migrating population is considered unrankable on the Island of Newfoundland. The olive-sided flycatcher is a stout, medium-sized passerine which breeds in scattered locations throughout most of forested Canada (COSEWIC 2018a) and the population is in decline in Canada. Main factors thought to be associated with the decline include habitat loss and alteration (COSEWIC 2018a). Declining insect populations on breeding and wintering grounds may also be a contributing factor.

Olive-sided flycatchers are most often associated with open areas, where they perch in tall live trees or snags and forage for flying insects (COSEWIC 2018a). Suitable habitat for this species is found within the Project Area. Olive-sided flycatchers were typically found in areas where there was an interspersion of small to medium sized coniferous forest stands and bogs or fens of similar size. These areas provide a combination of suitable nesting sites (islands of coniferous forest), open foraging areas (small to medium sized bogs and fens) and perch sites (tall trees and snags).

Olive-sided flycatcher was observed within the Project Area during BBSs in 2011 and 2019, with up to six individuals recorded in the Project Area in 2019 (Figure 6-3).

6.3.1.2 Common Nighthawk

Common nighthawk is ranked as Threatened under Schedule 1 of SARA and as Special Concern by COSEWIC. The NL ESA ranks this species as Threatened, and the AC CDC lists common nighthawk as SNA, indicating a conservation status rank is not applicable because the species is not a suitable target for conservation activities in Newfoundland. This species is the most frequently seen member of the nightjar family. It is a well camouflaged bird and is most often seen in flight, where it pursues and catches flying insects (COSEWEIC 2018b). Populations of common nighthawk in Canada have been in decline, with the declining abundance of aerial insects due to the effects of agricultural and other pesticides, changes in precipitation and hydrological regimes, and changes in temperature regimes thought to be the main threats and limiting factors (COSEWIC 2018b).

In the province of NL, this species breeds on bare ground, such as sand dunes, beaches, forest clearings, burned areas, and barrens. Although they are found in the province, common nighthawk are known to breed only in the southern part of Labrador and are considered an uncommon visitor on the Island of Newfoundland (Government of NL 2020b). A single common nighthawk was observed incidentally during field surveys completed in the LAA in 2011.

6.3.1.3 Rusty Blackbird

Rusty blackbird is ranked as Special Concern under Schedule 1 of SARA and as Special Concern by COSEWIC. The NL ESA ranks this species as Vulnerable and the AC CDC lists the rusty blackbird as

S2S3B, SUM indicating that the breeding population of this species is ranked between Imperiled and Vulnerable and the migrating population is considered unrankable on the Island of Newfoundland.

This species is not regularly found throughout the Island, but an established population is found in central Newfoundland. This species is associated with forested wetlands particularly those with waterbodies such as slow-moving streams and beaver ponds. It is also found in peat bogs, sedge meadows, and scrub edges (Government of NL 2020b; COSEWIC 2006).

Rusty blackbird was observed incidentally within a tall shrub swamp along the access road portion of the Project Area (Figure 6-3), approximately one km northeast of the northern end of the wider section of the Project Area. The observation was of a lone, singing male. Additionally, two rusty blackbirds were observed incidentally during aerial waterfowl surveys. A single individual was observed incidentally on two occasions during the surveys, and on both occasions the observation took place outside of the Project Area or LAA, but within the RAA.

6.3.1.4 Bank Swallow

Bank Swallow is ranked as Threatened under Schedule 1 of SARA and as Threatened by COSEWIC. The AC CDC lists the bank swallow as S1S2B, SUM, indicating that the breeding population of this species is ranked between Critically Imperiled and Imperiled and the migrating population is considered unrankable on the Island of Newfoundland.

Bank swallow is a widespread, insectivorous passerine species with an extensive distribution (COSEWIC 2013a). In Canada it breeds in all provinces and territories except perhaps Nunavut. This species is migratory and winters primarily in South America.

Bank swallows breed colonially, and a wide variety of sites may be used for constructing nest burrows, including natural and artificial sites with vertical banks. These include riverbanks, lake and ocean bluffs, aggregate pits, road cuts and stockpiles of soil. The preferred substrate for nest burrows appears to be a sand-silt mixture. Burrows are often situated near open terrestrial habitat, which is used for aerial foraging, including grasslands, meadows, pastures, and croplands. Large wetlands may be used as communal nocturnal roost sites during the non-breeding periods.

In NL, breeding has been reported in low-lying sand pits, in sand banks on shorelines, sand-clay banks, and sandy dunes, turf atop sea cliffs, and in gravel pits (SSAC 2009).

In NL, the SSAC recommends a status of Not at Risk be applied to this species. Despite populations of bank swallow experiencing declines in neighboring jurisdictions, there is insufficient evidence to establish that the species is presently at risk in NL (SSAC 2009). A record of bank swallow was reported on the edge of the LAA, near Buchans. The accuracy associated with this data point was approximately one km, indicating the record may or may not lie within the LAA. No bank swallows were recorded during field surveys completed in the Project Area or LAA.

6.3.1.5 Grey-cheeked Thrush

Grey-cheeked thrush is ranked as Threatened by the NL ESA. The AC CDC lists the grey-cheeked thrush as S2B, SUM, indicating that the breeding population of this species is considered Imperiled and the migrating population is considered unrankable on the Island of Newfoundland.

In NL, the grey-cheeked thrush is a subspecies, which is slightly larger than other *Catharus* thrushes, with greyish face and upperparts. This long-distance migrant is known to breed in coniferous and mixedwood boreal forests across North America. In the province, preferred breeding grounds for grey-cheeked thrush include dense low coniferous woods, including young regenerating forest, open-canopy old growth forests having a dense understory, and dense, stunted spruce stands (SSAC 2005). On the Island of Newfoundland, this species has been reported as being most common on the great Northern Peninsula, the northeast coast, and the Avalon Peninsula. It is less common on the west coast and in the interior (Government of NL 2020b).

Grey-cheeked thrush were observed along the BBS NL 5704 route in Buchans. The most recent observation of a single individual was reported in 2002; however, none has been recorded in the survey years since. No grey-cheeked thrush was noted during field surveys completed in the Project Area and LAA.

6.3.1.6 Evening Grosbeak

Evening grosbeak is ranked as Special Concern under Schedule 1 of SARA and by COSEWIC. It currently has no rank under the NL ESA. The AC CDC lists this species as S4, indicating that the populations of this species are considered Apparently Secure in NL.

The evening grosbeak is a stocky, boldly colored songbird with a large, distinctive bill. The species distribution includes all Canadian provinces and territories except for Nunavut (COSEWIC 2016). Distribution of evening grosbeak ranges widely in winter, and its distribution is dependent upon the quantity of seeds produced in the boreal forest. Optimal breeding habitat for this species includes open mature mixedwood forests, where fir or white spruce are dominant and spruce budworm is abundant (COSEWIC 2016).

Evening grosbeak has been recorded in winter during the CBC in Buchans, just northwest of the LAA. The most recent record of this species was from 2007. No specific location data is available.

6.3.1.7 Red Crossbill

Red crossbill is ranked as Threatened under Schedule 1 of SARA and as Threatened by COSEWIC. The species is ranked as Endangered by the NL ESA, and the AC CDC lists red crossbill as S1S2 indicating that the population of this species is ranked between Critically Imperiled and Imperiled on the Island of Newfoundland.

The red crossbill is a medium-sized finch that specializes in feeding on conifer cones. On the Island of Newfoundland, red crossbills belong to the *percna* subspecies, which is unique to the island and appears

to have become rare in recent years (Government of NL 2020b). Sporadic reports of this species occur in other Atlantic Provinces, but it is likely that it is mainly restricted to the Island of Newfoundland. Preferred habitat for red crossbill includes conifer habitats, with the highest abundance likely occurring in older, mature forests in western Newfoundland (Government of NL 2020b). AC CDC data suggests that the habitat within the LAA is potentially suitable for this species (AC CDC 2020d), and large stands of coniferous forest types are present which may provide foraging opportunities.

One record of red crossbill was identified along the NL 5704 route in Buchans. The observation, made in 1984, was of a single individual, with none recorded along this route in the survey years since. No red crossbills were observed during field surveys completed in the Project Area and LAA.

6.3.2 SOCC

For the purposes of this baseline report, SOCC includes bird species that are:

- Recommended for listing by the SSAC as Endangered, Threatened, Vulnerable, or Special Concern, but not yet listed under NL ESA or SARA
- Considered provincially rare, i.e., those species with provincial status ranks (S-ranks), of S1 (Critically Imperiled), S2 (Imperiled)[2], or combinations thereof (e.g., S1S2) upon review by the AC CDC (AC CDC 2020c)

Unlike some SAR, SOCC are not protected by federal or provincial legislation. Rather, they are included as a precautionary measure, reflecting observations and trends in their provincial population status. SOCC may be important indicators of ecosystem health and regional biodiversity. Thus, their presence in an area may warrant mitigation, given their rarity or importance. They are also often indicators of the presence of unusual and/or sensitive habitat, and their protection as umbrella species could possibly result in protection of their associated unusual habitats and co-existing species.

Three avifauna SOCC, Caspian tern (*Hydroprogne caspia*), Nashville warbler (*Leiothlypis ruficapilla)*, and bay-breasted warbler (*Setophaga castanea)*, were detected in the Project Area during field surveys. These three species are listed as S2B by the AC CDC, indicating that their breeding populations are Imperiled on the Island of Newfoundland. The locations of SOCC recorded during field surveys in the Project Area and LAA are shown in Figure 6-3.

Caspian terns typically breed in colonies located on islands in large lakes or offshore islands. During the 2011 waterfowl study, a single Caspian tern was observed incidentally. Given that the individual was alone and far from known colony sites in the marine environment, it is unlikely that this represents a breeding attempt within the Project Area.

For both warbler species, the low numbers of individuals present in the Newfoundland population may be attributable to the fact that NL represents the northern most distribution of their breeding ranges. Global populations of Nashville warbler and bay-breasted warbler are relatively stable.

[2] While *S3* species may be of concern from a provincial biodiversity perspective, they are often not included, as their populations are considered less sensitive. This determination is typically at the discretion of the NLDFFA-WD.

Nashville warblers typically inhabit open coniferous woodlands and brushy habitats. During the songbird survey, Nashville warblers were recorded in point count sites situated in coniferous forest. Nashville warblers were recorded at two locations in the Project Area (Figure 6-3). The first observed Nashville warbler was found in a relatively open balsam fir stand. The second was found in a mature forest stand dominated by black spruce and tamarack.

Bay-breasted warblers typically nest in mature forest stands dominated by spruce and fir. One bay-breasted warbler was recorded during the BBSs (Figure 6-3).

6.3.3 SAR Habitat Assessment

SAR include those bird species listed as Extirpated, Endangered, Threatened, Vulnerable, or Special Concern under the NL ESA, the federal SARA, or by COSEWIC. The protection of these species is important for a variety of reasons, as well as a legal requirement under Schedule 1 of SARA and/or the NL ESA. There are a variety of bird species designated or listed under the federal and provincial legislation in NL, and some have been found within the Project Area and LAA.

Twelve habitat types were identified within the Project Area and LAA (Table 6.2). Approximately 75% of the Project Area consists of upland, 20% consists of lowland and 4% is open water. Within the LAA, approximately 69% consists of upland, 14% is lowland and 22% is open water. Upland areas are dominated by softwood forests (i.e., the Balsam Fir Forest and Black Spruce Forest) and Mixedwood Forest. Lowland sites consist predominantly of open peatlands (i.e., Shrub / Graminoid Fen and Shrub Bog), alder thickets and treed wetlands (i.e., Wet Coniferous Forest).

Table 6.2 Ecosystem Units within the Project Area, LAA and ELCA

Ecosystem Units	Description	Area in Project Area[A] (km^2 / %)	Area in LAA[A] (km^2 / %)	Area in ELCA[A] (km^2 / %)
Alder Thicket	Alder-dominated communities on moist seepage slopes and riparian areas	2.2 / 6.5	11.9 / 9.3	97.4 / 5.3
Anthropogenic	Areas currently or historically subject to intense levels of human disturbance and use (does not include areas regenerating from forest management)	1.9 / 5.4	2.5 / 1.9	8.2 / 0.5
Balsam Fir Forest	Dry to moist and sometimes wet conifer-dominated forests	6.2 / 18.0	15.1 / 11.9	126.9 / 6.9
Black Spruce Forest	Dry to moist and sometimes wet conifer-dominated forests	4.3 / 12.5	17.6 / 13.9	233.1 / 12.7
Exposed Sand / Gravel Shoreline	Sparsely vegetated and/or un-vegetated shorelines	-	0.6 / 0.5	2.8 / 0.2

Table 6.2 Ecosystem Units within the Project Area, LAA and ELCA

Ecosystem Units	Description	Area in Project Area[A] (km^2 / %)	Area in LAA[A] (km^2 / %)	Area in ELCA[A] (km^2 / %)
Kalmia-Black Spruce Woodland	Dry to moist and sometimes wet stunted tree and shrub/heath dominated communities	3.6 / 10.3	8.6 / 6.8	208.8 / 11.4
Mixedwood Forest	Mesic to moist forests with high deciduous component	6.0 / 17.3	18.9 / 14.9	179.3 / 9.8
Open Wetlands	Very moist to wet shrub/herb dominated peatlands	4.6 / 13.3	11.2 / 8.8	280.3 / 15.3
Open Water	Waterbodies (lakes, ponds, rivers and streams)	1.3 / 3.7	21.8 / 17.2	408.5 / 22.3
Regenerating Forest	Forests regenerating as a result of influences such as harvesting, fire and windthrow	2.0 / 5.6	12.5 / 9.9	139.5 / 7.6
Riparian Thicket	Shrub thickets located in transitional areas and subject to periodic flooding	0.2 / 0.4	0.6 / 0.5	15.1 / 0.8
Wet Coniferous Forest	Very moist to wet conifer forests	2.5 / 7.2	5.7 / 4.5	130.7 / 7.1
	Total	**34.7 / 100**	**127.0 / 100**	**1,830.6 / 100**

Note:
[A] Numbers are rounded to one decimal place. Areas and percentages may not add up to the total due to rounding. Values pertain to the portion of the Project Area and LAA within the ELCA. Ecosystem unit descriptions from BSA.7, Attachment 7-D

6.3.3.1 Olive-sided Flycatcher

Life History and Distribution

Olive-sided flycatcher is listed as Threatened under SARA (Schedule 1) and under the NL ESA. This species is most often associated with open areas of the boreal forest which contain tall live trees or snags for perching, such as wetlands, forest clearings, forest edges near natural openings (such as rivers or swamps) or human made openings such as in logged and burned areas (Government of NL 2020b; COSEWIC 2018a). Preferred habitat types are most often characterized by mature trees and large numbers of dead trees. Coniferous or mixedwood stands may be used, and in the boreal forest, suitable habitat is more likely to be in or near wetland areas (COSEWIC 2018a). This species breeds throughout the forests of Canada, including on the Island of Newfoundland. They winter in Central America and the Andes Mountains of South America (Government of NL 2020b).

Olive-sided flycatcher was observed within the Project Area during BBSs in 2011 and 2019, with up to six olive-sided flycatchers recorded in the Project Area in 2019.

Habitat Occurrence in the Project Area

Wet Coniferous Forest and Open Wetlands were identified as being of high value to olive-sided flycatcher (Table 6.3). These habitats provide the preferred tall living or dead trees for perching, overlooking openings suitable for hunting and catching aerial insect prey. In the Project Area, olive-sided flycatchers were most often encountered in areas where these two habitat types occurred adjacent to each other.

Black Spruce Forest was identified as being of moderate value to olive-sided flycatcher. This habitat type provides tall trees for perching and cover, but may possess fewer open or wet areas that are suitable for foraging for aerial insect prey.

Other habitat types were ranked as low value as they provide limited protection, resting, and/or foraging opportunities.

Table 6.4 summarizes high, moderate, and low value breeding habitat for olive-sided flycatcher. High-value habitat for this species occupies 7.1 km^2 (20.4%) of the Project Area, and 16.9 km^2 (13.3%) of the Local Area. Proportionally, there is a greater percentage (7%) of high value habitat for olive-sided flycatcher available in the Project Area than in the LAA.

Table 6.3 Habitat Value Ranking for SAR

Habitat Type	Habitat Value Rank	
	Olive-sided Flycatcher	Rusty Blackbird
Balsam Fir Forest	Low	Low
Black Spruce Forest	Moderate	Low
Kalmia-Black Spruce Woodland[A]	Low	Low
Mixedwood Forest	Low	Low
Regenerating Forest	Low	Moderate
Alder Thicket	Low	Moderate
Riparian Thicket	Low	Moderate
Wet Coniferous Forest	High	High
Open Wetlands[B]	High	Moderate
Open Water	Low	Low
Exposed Sand / Gravel Shoreline	Low	Low
Anthropogenic	Low	Low
Sources	Government of NL 2020b; COSEWIC 2018a; Nalcor Energy 2012	Government of NL 2020b; COSEWIC 2006; Cornell Lab 2020; Avery 1995; Edmonds et al. 2010

Notes:
[A] – Includes Kalmia-Black Spruce Forest and Kalmia Health Ecotypes
[B] – Includes Shrub / Graminoid Fen and Shrub Bog Ecotypes

Table 6.4 Amount of Habitat Type by Habitat Value Ranking for SAR in Assessment Areas

Habitat Value Ranking	Olive-sided Flycatcher Habitat			Rusty Blackbird Habitat		
	Area in Project Area[A] (km² / %)	Area in LAA[A] (km² / %)	Area in ELCA[A] (km² / %)	Area in Project Area[A] (km² / %)	Area in LAA[A] (km² / %)	Area in ELCA[A] (km² / %)
High	7.1 / 20.5	16.9 / 13.3	411.0 / 22.5	2.5 / 7.2	5.7 / 4.5	130.7 / 7.1
Moderate	4.3 / 12.4	17.6 / 13.9	233.1 / 12.7	9.0 / 25.9	36.2 / 28.5	532.3 / 29.1
Low	23.4 / 67.4	92.5 / 72.8	1,186.4 / 64.8	23.3 / 67.1	85.1 / 67.0	1,167.6 / 63.8
Total	34.8 / 100.0	127.0 / 100.0	1,830.6 / 100.0	34.8 / 100.0	127 / 100.0	1,830.6 / 100.0

Notes:
[A] Numbers rounded to one decimal place. Areas and percentages may not add up to total amounts due to rounding
Values pertain to the portion of the Project Area and LAA with ELC data

Limiting Factors

Key limiting factors for olive-sided flycatcher include a decline in insect populations, predation (particularly eggs or young), habitat loss / modification (including reforestation), collision with motor vehicles, loss of nesting sites and climate change (COSEWIC 2018a). A reduction in suitable habitat and the use of pesticides are thought to be the primary limiting factors in the wintering habitat of this species (Nalcor Energy 2012).

6.3.3.2 Rusty Blackbird

Life History and Distribution

Rusty blackbirds are found breeding throughout most of Canada from northern Yukon, east to NL. This species is migratory, and winters primarily in the southern part of central and eastern United States (Cornell Lab 2020).

Rusty blackbird is listed as a species of Special Concern under SARA (Schedule 1) and as Vulnerable under the NL ESA. This species is not regularly found throughout NL, but there is an established population in central Newfoundland. This species is associated with forested wetlands particularly those associated with water bodies such as slow-moving streams and beaver ponds. They are also found in peat bogs, sedge meadows and scrub edges (Government of NL 2020b; COSEWIC 2006).

Rusty blackbird was observed incidentally within a tall shrub swamp along the access road portion of the Project Area approximately one km northeast of the northern end of the wider section of the Project Area. The observation was of a lone, singing male.

Habitat Occurrence in the Project Area

Wet Coniferous Forest was identified as being of high value to rusty blackbird (Table 6.3). This habitat type provides nesting, foraging and cover opportunities and the openings and required moisture regime preferred by this species.

Regenerating Forest, Alder Thicket, Riparian Thicket, and Open Wetland were identified as being of moderate value to rusty blackbird. Though this species may be found in Regenerating Forest, Alder Thicket and Riparian Thicket, these habitat types may contain few openings which provide foraging opportunities for rusty blackbird. Open Wetland habitat types provide little cover or nesting opportunities for this species, though they may be used for foraging activities

Other habitat types were ranked as low value as they provide limited protection, resting, and particularly foraging opportunities.

Table 6.4 summarizes high, moderate, and low value breeding habitat for rusty blackbird. High-value habitat for this species occupies 2.5 km^2 (7.2%) of the Project Area, and 5.7 km^2 (4.5%) of the LAA. Proportionally, there is a slightly higher availability (approximately 3%) of high value habitat for rusty blackbird within the Project Area than in the LAA.

Limiting Factors

Limiting factors for rusty blackbird include: the destruction of habitat through conversion of wetlands into other land uses (e.g., farm land or other anthropogenic types); creation of hydroelectric reservoirs; bird control programs designed to control populations of birds that damage crops (e.g., red-winged blackbirds) (COSEWIC 2006); predation by raptors and other birds of prey; and food shortages during severe weather in winter and late spring (Avery 1995). Destruction of primary wintering habitat in the forests of the Mississippi Valley have also played a role in the decline of this species (COSEWIC 2006). Additionally, mercury has been determined to be a key threat to rusty blackbirds (Edmonds et al. 2010).

7.0 WOODLAND CARIBOU

Caribou on the Island of Newfoundland were assessed by COSEWIC in 2014 and designated as Special Concern (COSEWIC 2014), although this population is not currently listed under SARA.

7.1 STUDY AREA

The general spatial boundary definitions are outlined in Section 3.0. The following spatial boundaries were used to assess the baseline conditions for an assessment of potential Project effects, including residual and cumulative environmental effects on caribou and their habitat (Figures 7-1 and 7-2):

Project Area: The Project Area encompasses the immediate area in which Project activities and components occur and is comprised of two distinct areas: the mine site and the access road. The mine site includes the area within which Project infrastructure will be located, and the access road is the existing road to the site, plus a 20 m buffer. The Project Area is the anticipated area of direct physical disturbance associated with the construction and operation of the Project.

LAA: includes a 1 km buffer surrounding the mine site and a 500 m buffer surrounding the access road (Figure 7-1). The LAA was established to reflect the area within which caribou-specific Project effects are most likely to occur, including indirect habitat loss due to sensory disturbance (i.e., displacement or avoidance) (e.g., Benítez-López et al. 2010).

RAA: includes the combined population ranges (28,809 km^2) of the Buchans, Gaff Topsails, Grey River and La Poile Herds (Figure 7-2) as determined by caribou telemetry data obtained from the NLDFFA-Wildlife Division. The method used to determine the RAA from the telemetry data (Section 7.2.3) resulted in a number of small, spatially discrete, areas of use (e.g., base of the Northern Peninsula, north of Grand Falls-Windsor), in addition to the comparatively larger 'core' area of use.

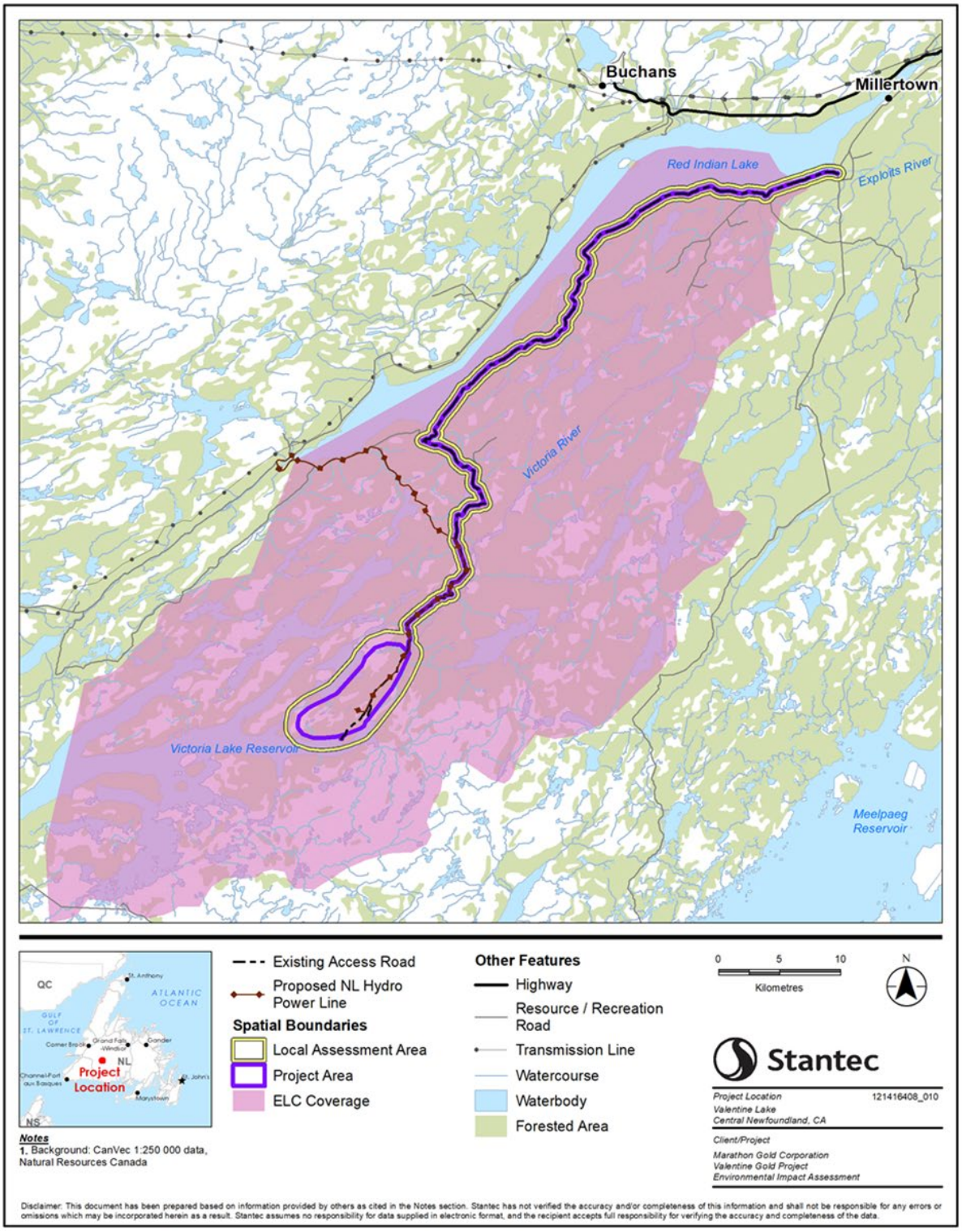

Figure 7-1 Local Assessment Area for Caribou and ELCA

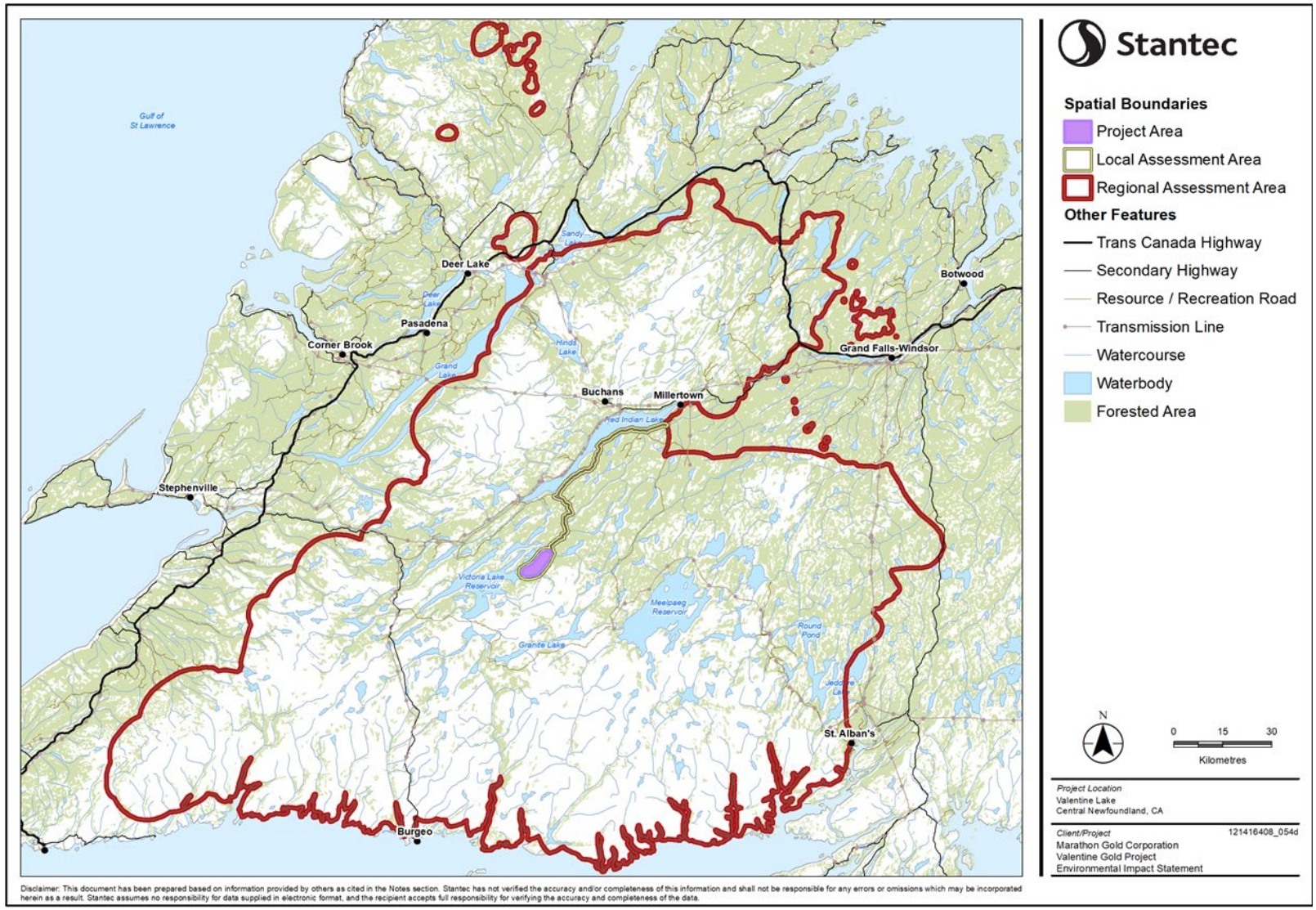

Figure 7-2 Regional Assessment Area for Caribou

7.2 METHODS

Baseline conditions for caribou and their habitat within the Project Area were compiled from various sources, including a review of available information from literature and provincial databases, communication with NLDFFA-Wildlife Division, Project-specific field studies, an analysis of caribou telemetry data, and a caribou habitat assessment.

7.2.1 Literature Review

The following key public resources were used during background reviews to assist in describing baseline conditions for caribou:

- Provincial Report on The Newfoundland Caribou (Government of NL 2015a)
- Provincial 2020-2021 Hunting and Trapping Guide (Government of NL 2020b)
- COSEWIC Assessment and Status Update Report (COSEWIC 2014)
- Labrador-Island Transmission Link Environmental Impact Statement (Nalcor 2012)
- Labrador-Island Transmission Link Caribou and Their Predators (Labrador and Newfoundland) Component Study (Stantec 2012)
- ELC and Wildlife Species Habitat Analysis, Alderon Iron Ore Corp (Alderon 2012)

7.2.2 Project-Specific Field Studies

Stantec completed several Project-specific field studies on wildlife in the Project Area, LAA and RAA between 2011 and 2020. The results of surveys undertaken for caribou are included in the BSA.2: Woodland Caribou (BSA.2) and include a fall 2019 remote camera caribou survey (BSA.2, Attachment 2-A), a spring 2020 remote camera caribou survey (BSA.2, Attachment 2-B) and a 2020 aerial post-calving survey (BSA.2, Attachment 2-C). In addition, caribou were detected during several other terrestrial field programs. A summary of these studies is provided in Table 7.1 and additional detail is provided in BSA.2 and BSA.7.

Table 7.1 Caribou Field Studies for the Valentine Gold Project

Study	Date	Summary
Caribou Field Studies (BSA.2)		
Fall 2019 Caribou Survey – Remote Cameras (BSA.2, Attachment 2-A)	October 5, 2019 – February 11, 2020	Results from 12 remote cameras on caribou fall migration movement pathways within the Project Area.
Spring 2020 Caribou Survey – Remote Cameras (BSA.2, Attachment 2-B)	March 26 – June 18, 2020	Results from 11 remote cameras on caribou spring migration pathways within the Project Area.
Post-Calving Aerial Survey 2020 (BSA.2, Attachment 2-C)	June 9 – 13, 2020	Aerial survey of post-calving areas to classify resident caribou and Buchans caribou, and provide a population

Table 7.1 Caribou Field Studies for the Valentine Gold Project

Study	Date	Summary
		estimate of the Buchans herd on the calving grounds.
Other Wildlife Field Studies (BSA.7) where Caribou were Detected		
Winter Wildlife Survey (BSA.7, Attachment 7-A)	February 28 – March 29, 2013	Aerial track survey, ground-based track survey and deployment of three marten hair snag traps and deoxyribonucleic acid (DNA) analysis.
2011 Forest Songbird Surveys at the Valentine Lake Prospect (BSA.7, Attachment 7-B)	June 14 and 18, 2011	Forty-five 10-minute point count surveys were completed. Incidental wildlife observations were also recorded.
2011 Baseline Waterfowl and Waterfowl Habitat Study, Valentine Lake Project (BSA.7, Attachment 7-C)	Breeding waterfowl survey: May 16, 2011 Brood survey: July 7, 2011	Aerial surveys to assess waterfowl utilization, and nesting, breeding and brood rearing habitat preferences. Incidental wildlife observations were also recorded.
Ecosystem Classification and Mapping of the Marathon Gold Corporation Valentine Lake Project, Central Newfoundland (BSA.7, Attachment 7-D)	2013 – 2014	Ecosystem classification based on interpretation of remotely sensed data. Field component included terrain, soil and vegetation surveys, and documentation of incidental wildlife observations.

7.2.3 Analysis of Caribou Telemetry Data

Stantec obtained caribou telemetry data from NLDFFA-Wildlife Division for the assessed herds. The data included telemetry locations from Very High Frequency (VHF), ARGOS and GPS collars spanning the period of 1994-2018 (Table 7.2). Collars were deployed by NLDFFA-WD, mainly on females.

Table 7.2 Summary of Collars on Assessed Caribou Herds

Herd	Collar Type[A]	Years	Number of Collars			
			Total	Females	Males	Unknown
Buchans	VHF	1994 – 1998	65	45	20	
	ARGOS	2005 – 2011	22	22		
	GPS	2006 – 2018	43	41	2	
Gaff Topsails	ARGOS	2005 – 2011	16	16		
	GPS	2006 – 2013	31	27	4	
Grey River	VHF	1979 – 1986	281	147	132	2

Table 7.2 Summary of Collars on Assessed Caribou Herds

Herd	Collar Type[A]	Years	Number of Collars			
			Total	Females	Males	Unknown
	ARGOS	2004 – 2011	25	25		
	GPS	2006 – 2013	17	17		
La Poile	VHF	1985 – 1990	263	161	100	2
	ARGOS	2004 – 2011	21	21		
	GPS	2006 – 2013	18	18		
Total			**802**	**540**	**258**	**4**

Notes:
[A] VHF – Very High Frequency radio tracking
ARGOS – tracking using the ARGOS satellite system; collar make – Telonics
GPS – Global Positioning System tracking; collar make – Lotek

7.2.3.1 Seasonal Analysis

Kernel or range density estimates were used to describe the location, area and seasonal range use of collared caribou. The seasons and dates used for this analysis (Table 7.3) are specific to caribou on the Island of Newfoundland (Emera Newfoundland and Labrador 2013).

Table 7.3 General Seasons for Island Caribou in NL

Season	Seasonal Dates
Winter	December 16 – March 31
Spring Migration / Pre-calving	April 1 – May 19
Calving	May 20 – June 10
Post-Calving Migration / Dispersal	June 11 – June 30
Post-Calving Rearing	July 1 – August 31
Fall Rut	September 1 – October 31
Fall Migration / Dispersal	November 1 – December 15
Source: Emera Newfoundland and Labrador (2013)	

Seasonal analysis included ARGOS and GPS locations only. VHF locations were not included as they were not available for all herds, they accounted for less than 2% of locations in each season, and had an irregular fix-rate (i.e., elapsed time between locations). ARGOS and GPS data were available for all herds and had a fix-rate of one hour (ARGOS) and two hours (GPS). The data were quality reviewed to remove

locations that were either low quality or faulty (e.g., Fix Status ≥ 2). Caribou distribution was analyzed by season (Table 7.3), and ranges (or kernels) were estimated from telemetry data using a geographic information system (GIS). The seasonal range calculations included only collared animals with at least 50 locations in the season of interest based on recommendations for wildlife kernel analyses (Seaman et al. 1999; Barg et al. 2005; Tri et al. 2014).

Caribou seasonal utilization distributions (UDs) were determined using the kernel density estimation method in ArcGIS™ v.10.7.1 (ESRI 2017) using Kernel Density in the Spatial Analyst Tools in ArcGIS™. Two contour intervals (isopleths) were calculated for each seasonal range. A 50% contour area was calculated to represent the area where there is a 50% probability of a collared caribou occurring (i.e., areas with higher densities of locations). Additionally, a larger 95% contour area was calculated to represent the area where there is a 95% probability that a collared caribou occurs. The 50% contour area is a representation of the "core area" where caribou live, and the 95% contour area is a representation of the estimated seasonal hoe range boundary. Smoothed cross-validation was used as the smoothing parameter for the calculation. Figures were created for each season illustrating the collared caribou seasonal range in relation to the Project Area and LAA (Section 7.3).

7.2.3.2 Migration Path Analysis

Data Preparation

Prior to the migration analysis, the telemetry data for the Gaff Topsails and Buchans herds were analyzed to investigate movement between the seasonal ranges. Specifically, the winter ranges (i.e., December 16 to March 31) were compared to the summer ranges (i.e., May 20 to August 31). Although there was a shift in distribution between the summer and winter ranges for the Gaff Topsails herd, the summer and winter ranges maintained a high degree of overlap. Additionally, both the summer and winter ranges occurred north of the Project and did not overlap with the Project Area. As the intent of the analysis was to describe the migration patterns with respect to the Project Area and the Gaff Topsails did not undergo a migration between two distinct ranges, the migration of the Gaff Topsails herd was not analyzed further.

Although the data for the Buchans herd was collected using a variety of collar types (including VHF, ARGOS and GPS), the migration analysis was limited to GPS collars as they record locations at the interval necessary to identify fine-scale movements relative to the Project (i.e., every 1 to 2 hours). Migration paths were identified using dates for seasonal migration periods determined by NLDFFA-Wildlife Division (Emera Newfoundland and Labrador 2013), which included April 1 to May 19 (spring migration / pre-calving) and November 1 to December 15 (fall migration / dispersal) (Table 7.3).

For the Buchans herd, GPS-collared caribou were excluded from the migration analysis if one of the following applied:

- GPS-collared caribou did not migrate (i.e., summer and winter ranges overlapped [n = 1])
- GPS-collared caribou locations did not include the entire migration period (i.e., 49-day spring migration or 45-day fall migration [n = 6])

- GPS-collared caribou did not interact with the mine site (i.e., migration path or home range did not overlap the Project LAA) [n = 3])

Except for two caribou that were collared in 2015 and programmed to record locations every hour, the remaining GPS-collars were programmed to record locations every two hours. Spring migration paths were identified using 29,578 GPS locations collected from 14 GPS-collared caribou between 2007 and 2012, and 13,379 GPS locations from 16 GPS-collared caribou during 2016 and 2017. Fall migration paths were identified using 30,691 GPS locations collected from 14 GPS-collared caribou between 2006 and 2012, and 19,963 GPS locations from 16 GPS-collared caribou between 2015 and 2017. A total of 74 spring and 93 fall migration paths from 30 GPS-collared caribou were used in the migration analysis described below.

Migration Analysis

Dynamic Brownian bridge movement models (dBBMM) (Kranstauber et al. 2012) were used to estimate UDs for individual GPS-collared caribou during the spring and fall migration periods. Brownian bridge movement models (BBMM) estimate the missing movement path between two sequential locations (Horne et al. 2007). Similar to the BBMM, the dBBMM provides a probabilistic estimate of animal occurrence at each grid cell within the migration path by considering the distance and time between successive locations as well as location error and uncertainty of the movement path between locations (Horne et al. 2007; Kranstauber et al. 2012). The dBBMM represents an improvement over the BBMM because the Brownian motion variance (σ^2_m), which measures how irregular the movement path is, varies along the path of the animal resulting in more accurate estimates of the UD and changes in behaviour along a movement route (Kranstauber et al. 2012; Byrne et al. 2014). The dBBMM determines whether there is a behavioral change in movement (speed) by comparing model fit using estimates of σ^2_m within a sliding window of locations. A window size of 31 locations and margin of 11 locations were used in the analysis based on Kranstauber et al. (2012).

The fix success rate, as well as the 3D fix success rate, was high (>99%) for both spring and fall migration periods. As such, a 20 m location error was used in the analysis because 3D fixes typically have an estimated error that is less than 20 m (Di Orio et al. 2003). A 100 x 100-m grid cell was used to generate the dBBMM, which provided a reasonable level of spatial resolution and computer processing time. For each pixel within the migration path a UD was calculated, which represented the probability that an individual GPS-collared caribou was located within that grid cell during their spring or fall migration periods relative to other grid cells within the migration path. Because most caribou had more than one spring or fall migration recorded, probability cell values were summed and then rescaled to sum to 1 to represent one UD for each collared caribou within each season (Sawyer et al. 2009). A dBBMM was fit to each individual GPS-collared caribou for each season using the ‘move’ package (Kranstauber et al. 2020) in program R (R Core Team 2019).

For the purpose of this assessment, 'migration corridor' refers to an area used for migration at the population-level. The migration corridor may contain various smaller 'migration paths', which are used by individual caribou. A path may be used by a single individual or several caribou. Although the GPS telemetry data included individuals from two different sampling periods (2006 to 2012 and 2015 to 2017),

the UD from each collared caribou were combined to identify a population-level migration corridor for each season because there was relatively strong fidelity to migration paths across years. A population-level migration corridor was estimated by summing the UD for each collared caribou and rescaling cell values to sum to 1 (Sawyer et al. 2009). The UD values for each population-level spring and fall migration corridor was classified into quartiles where the upper 25% quartile of the UD for each seasonal migration period was considered to be areas of high use and assumed to represent 'migratory stopovers' (e.g., resting, foraging) similar to Sawyer et al. (2009) and Sawyer and Kauffman (2011). The remaining quartiles (25-50% and 50-75%) were considered connecting movement pathways between stopover sites, and the last quartile (75-99%) represented relatively low use areas. This collection of migration paths identified by the dBBMM is referred to as a migration corridor.

As a migration corridor was defined for the Buchans herd only, the possibility of GPS-collared caribou in the Buchans herd using priority or preferred travel paths during spring and fall migration was explored. The number of individual migration paths that occurred in each 100 x 100-m grid cell was calculated as a proportion of the total number of GPS-collared caribou (n=30) following Sawyer et al. (2009). A preferred path was defined as one used by > 15% of the GPS-collared caribou. For the portion of a preferred path that overlapped the Project Area, the proportion of caribou using the path was determined.

The length of the migration corridor was defined using the results of the analysis. Based on the distribution of the areas of use identified by the dBBMM, boundaries were delineated between the seasonal ranges at both ends of the distinct population-level migration corridor. In the north, the migration corridor was separated from the calving range by the boundary between the elevated Buchans Plateau and the lower, forested area. In the south, the migration corridor was separated from the winter range by the Grey River. The dates of spring and fall migration through the Project Area were determined from the telemetry data.

7.2.4 Caribou Habitat Assessment

Habitat types in the LAA were determined from the ELC (BSA.7, Attachment 7-D), which included a desktop analysis of satellite imagery supported by soils and vegetation field surveys. Eleven satellite images (RapidEye, 5 m resolution, multispectral) of the ELC Area (ELCA) (1,830.6 km^2) (Figure 7-3) were processed and adjusted with ortho-corrected aerial images. Ecotypes were classified based on various characteristics including terrain, soils, moisture and nutrient regime, and plant species richness.

Discussion of habitat type availability in this chapter refers to the ELCA. The ELCA covers more than 99% of the Project Area and 97% of the LAA (Figure 7-1). The area of the Project Area and LAA outside the ELCA is restricted to a small portion of the site access road at its northern-most extent (i.e., furthest from the mine site) and is negligible in the context of assessing potential Project effects on the VC. An analysis of the remaining portion of the LAA was completed but could not be combined with the ELCA as the methods are not comparable. A detailed explanation of this analysis is provided in Section 9.2.1.1 of the EIS.

Habitat suitability was assessed for caribou based on habitat requirements from the literature review, field studies, telemetry locations during migration (Buchans herd only) and discussions with experts. The

identification of caribou-habitat associations from the literature were based on a range of approaches used within those studies, including Chi-square analysis and Bonferroni z-statistics (Chubbs et al. 1993), mechanistic modelling (Bastille-Rousseau et al. 2015; Bastille-Rousseau 2018), and resource selection function [RSF] models (Rettie and Messier 2000; Mahoney and Virgl 2003; Fortin et al. 2008; Stewart 2016). Based on this information, each ELC habitat type present in the Project Area and LAA was evaluated in consideration of its ability to provide structural and compositional elements, and forage availability for life requisites. Seasonal habitat requirements such as foraging, breeding, calving or migration were also considered. Habitat suitability was ranked based on the availability of three critical elements: forage, refuge and habitat used during migration.

ELC habitat types were assigned one of three value ratings: high, moderate or low. High value habitat types provide an abundance of all three critical elements (forage, refuge and habitat used during migration); moderate habitat types provide an abundance of one or two of the critical elements; and low value habitat types provide marginal forage or refuge, or are rarely used during migration. The evaluation of habitat suitability provides an overview of the potential for portions of the Project Area and LAA to support caribou.

7.3 RESULTS

The Project is in rural central Newfoundland in the Red Indian Lake Subregion of the Central Newfoundland Forest Ecoregion, which covers most of the central and north-eastern portions of the Island of Newfoundland. This region is characterized by boreal forest comprised primarily of coniferous trees and is influenced by a continental climate with colder winters and warmer summers compared to coastal areas. The area is characterized as a rolling landscape with domed bogs and dense forest. Elevation within the LAA (calculated in ArcGIS™ v.10.7.1 [ESRI 2017]) ranges from approximately 160 to 440 m above sea level (masl).

The distribution of assessed caribou herds also occurs within the Maritime Barrens Ecoregion and the Long Range Barrens Ecoregion. Within the Maritime Barrens Ecoregion, caribou occur in the South Coast and Central Barrens Subregions, which have extensive barrens. While both subregions experience fog, strong winds and low temperatures in the summer, the South Coast Subregion has much milder winters than the interior Central Barrens Subregion, although both receive considerable snowfall which persists through the winter (PAA 2008a, 2008b). Vegetation in both subregions consists primarily of stunted balsam fir and dwarf shrub heaths. Within the Long Range Mountains Ecoregion, caribou occur in the Southern Long Range and Buchans Plateau / Topsails Subregions. Elevation in both subregions ranges from approximately 200 to 650 masl, and string bogs and string fens are common (PAA 2008c, 2008d).

Twelve ecosystem units were identified within the LAA, with eleven occurring in the Project Area (Table 6.2). Upland areas are dominated by coniferous forests (i.e., Balsam Fir Forest and Black Spruce Forest), Alder Thicket and Mixedwood Forest. Lowland sites consist of open peatlands (i.e., Shrub / Graminoid Fen and Shrub Bog) and treed wetlands (i.e., Wet Coniferous Forest).

7.3.1 Life History and Distribution

Woodland caribou are distributed across northern North America from Alaska to the Island of Newfoundland and are generally associated with mature, lichen-rich, boreal forest, barrens, bogs and fens. Under the federal SARA, woodland caribou on the Island of Newfoundland are recognized as a distinct population (Newfoundland Population) (COSEWIC 2014). While considered sedentary (Government of NL 2009), some herds undergo seasonal migrations (Government of NL 2015a). Caribou are distributed over much of the Island of Newfoundland, occurring on the Northern Peninsula, Central and Eastern Newfoundland and on the Avalon Peninsula (Government of NL 2015a). The caribou population on the Island of Newfoundland has decreased by approximately 60% since the late 1990s (COSEWIC 2014; Government of NL 2015a). While woodland caribou on the Island of Newfoundland are not listed under the federal SARA or the provincial *Endangered Species Act* (ESA), they are considered of Special Concern by COSEWIC (COSEWIC 2014).

On the Island of Newfoundland, the caribou population includes several sub-populations that are differentiated based on annual movement patterns, spatial affiliations and genetic structure (Wilkerson 2010; Government of NL 2015a). The Project, situated in west-central Newfoundland, is within the South Coast sub-population range (Wilkerson 2010; Schaefer and Mahoney 2013; Government of NL 2019a). The South Coast sub-population is comprised of several herds which share winter ranges near the south coast between Burgeo and the Connaigre Peninsula (Weir et al. 2014), yet have separate calving and summer ranges. The RAA is based on the ranges of the following South Coast sub-population herds: Buchans, Grey River, Gaff Topsails and La Poile (Government of NL 2019a, 2020c). Collectively, these herds represent approximately 36% of the caribou population on the Island of Newfoundland (Government of NL 2019a).

Caribou were considered abundant on the Island of Newfoundland during the early 1900s, however, populations declined rapidly between 1915 and 1920 (Government of NL 2015a), possibly as a result of the introduction of a parasite associated with reindeer (Ball et al. 2001). Following this decline, caribou herds remained in relatively low numbers until the 1980s (Government of NL 2015a). By the mid-1990s, the population had returned to historic levels, peaking in the year 2000 at 94,000 caribou (Government of NL 2015a) with a density of approximately 150 caribou/100 km^2 (Thomas and Gray 2002). Since that time, numbers have declined to approximately 30,000 caribou (NLDFLR in Randell 2019), which has led to hunting closures in some Caribou Management Areas (CMAs) (e.g., Avalon Peninsula in 2002 [Government of NL 2002], Grey River in 2008 [Government of NL 2008], and Northern Peninsula in 2019 [Government of NL 2019b]). The Project Area overlaps with the Grey River CMA. Recent population estimates indicate that the Grey River, Gaff Topsails and La Poile herds have decreased by 60-80% compared to the population peaks recorded in the late 1980s (Table 7.5). Recent surveys indicate that population trends for the assessed caribou herds may be stabilizing (Table 7.5) (Government of NL 2019a).

Table 7.4 Population Estimates for Assessed Caribou Herds

Herd	Buchans	Gaff Topsails	Grey River	La Poile
Period of Population Increase				
1960[A]	450+		1,200	500
1962[A]	1,000		1,300	650
1963[A]	643		1,800	692
1964[A]	1,341		1,772	
1965[A]	892		2,400	800
Peak Population				
1986[B]				8,569 (8,105-9 089)[C]
1987[B]			9,973 (8,089-13,001)[C]	
1988[B]				11,176 (10,478-12,001)[C]
1989[B]		4,664 (3,984-5,813)[C]		
1992[B]				8,861 (7,817-10,342)[C]
1997[D]				10,565 (±1,908)[E]
Period of Population Decrease				
2007[F]	4,474 (±992)[G]	2,183 (±444)[G]	1,223 (±219)[G]	5,612 (±867)[G]
2011[F]	4,651 (±743)[G]	1,890 (±244)[G]	2,133 (±165)[G]	4,197 (±642)[G]
2016[H]	4,149	1,688	1,945	3,304
2019[H]	4,112	1,824	2,022	3,154
Year of Peak Population		1996[I]	1991[I]	1988[I]

Notes:
Empty cells = no information available
[A] Bergerud 1971 – strip transects survey from fixed wing
[B] Mahoney et al. 1998 – mark-resight survey from helicopter; Petersen Population estimator
[C] 95% Confidence Interval
[D] Mahoney et al. 2011
[E] 90% Confidence Interval
[F] Government of NL 2020e – spring survey, strip transect survey
[G] Confidence Interval
[H] Government of NL 2020e – winter survey, mark-resight survey
[I] Bastille-Rousseau et al. 2016

Woodland caribou require large interconnected, lichen-rich, mature coniferous forests interspersed with barrens and wetlands (Environment Canada 2012; Weir et al. 2014; Government of NL 2020d). Lichens are the most important vegetation for woodland caribou (Government of NL 2020d) and are consumed as forage in all seasons (Boertje 1984; Thomas et al. 1994; Thompson et al. 2015). Caribou also consume mosses and shrubs, as well as some herbs and grasses (Government of NL 2015a), and their diet varies seasonally as follows:

- Winter: primarily terrestrial lichens with some use of arboreal lichens, shrubs (e.g., sheep-laurel [*Kalmia angustifolia*], leatherleaf [*Chamaedaphne calyculata*], Labrador tea [*Rhododendron groenlandicum*]), graminoids, forbs and bryophytes (Bergerud and Russell 1964; Bergerud 1972; Boertje 1984; Thomas et al. 1994; Thompson et al. 2015; Shaefer et al. 2016).
- Spring: primarily leafy-green vegetation such as shrubs (e.g., alder species [*Alnus sp*.], Rhodora [*Rhododendron canadense*], lowbush blueberry [*Vaccinium angustifolium*], sweet gale [*Myrica gale*], birch species [*Betula sp*.], leatherleaf, sheep-laurel, bog laurel [*Kalmia polifolia*], Labrador tea), and also includes forbs (e.g., cloudberry [*Rubus chamaemorus*], bunchberry [*Cornus canadensis*]), graminoids, lichens and bryophytes (Bergerud and Russell 1964; Bergerud 1972; Boertje 1984; Thomas et al. 1994; Thompson et al. 2015; Schaefer et al. 2016).
- Summer: mostly shrubs (e.g., Rhodora, blueberry, sweet gale, chuckley pear [*Amelanchier bartramiana*], birch species, Labrador tea, sheep-laurel, bog laurel, leatherleaf) and forbs (e.g., bunchberry, bottlebrush [*Sanguisorba canadensis*]), and some graminoids and lichens (Bergerud and Russell 1964; Bergerud 1972; Boertje 1984; Thomas et al. 1994; Thompson et al. 2015; Schaefer et al. 2016).
- Fall: primarily lichens and also shrubs (e.g., Labrador tea, sheep-laurel, bog laurel, leatherleaf, blueberry), forbs, graminoids, mosses, and occasionally fungi (Bergerud and Russell 1964; Bergerud 1972; Boertje 1984; Thomas et al. 1994; Thompson et al. 2015; Schaefer et al. 2016).

Research on the Island of Newfoundland found that when caribou populations were declining in the 2000s, caribou diets showed an increase in the proportion of mosses consumed, and a decrease in the proportion of shrubs, graminoids and lichens consumed (Schaefer et al. 2016). The shift in diet to low-quality forage indicates that the availability of preferred forage was limited by high caribou density (Schaefer et al. 2016).

Caribou are polygynous, with males corralling females into harems during the mating season (COSEWIC 2014). Females can begin reproducing at two or three years old (Bergerud 1971; COSEWIC 2014), and males can breed at 1.5 years old (Government of NL 2020d), although they generally do not have the maturity and dominance to breed successfully until approximately four years old (Bergerud 1974). Mating occurs in early to late October during the rut. Gestation lasts approximately seven months, with calves being born in June. Although females continue to nurse through fall or early winter, calves are generally reliant on natural forage within 45 days (Shefferly 2000). Caribou live approximately 12 to 15 years, with a maximum documented life span of 17 years (Neville, J., NLDEC in COSEWIC 2014; Canadian Geographic n.d.).The assessed caribou herds undergo seasonal movements between ranges and intermix on winter ranges with other herds. The Buchans herd moves between ranges and migrate from central Newfoundland during spring to wintering areas on the south coast. The Buchans herd has an overall range of approximately 15,650 km^2 between Sandy Lake to the north and the south coast of the

Island of Newfoundland, and between Highways 480 and 360 (Figure 7-4). The calving and post-calving ranges occur primarily north of the Project Area, while the other seasons include range near the south coast (Figure 7-5). The sizes of the seasonal ranges are provided in Table 7.5. The range of the Gaff Topsails herd (approximately 5,685 km^2) also occurs between Sandy Lake and the Twin Lakes in the north and Star Lake in the south (Figure 7-6). Based on available telemetry data, the Gaff Topsails herd may have smaller seasonal movements within the range and did not migrate south through the Project Area (Figure 7-7). Recent data collected by the NLDFFA-Wildlife Division (since 2013; Table 7.2) indicate that the Gaff Topsail herd is no longer using traditional winter range north of Buchans, and is now wintering on the south coast with the Buchans herd (W. Barney, pers. comm. 2020).

Table 7.5 Areas[†] of Seasonal Use by Collared Caribou from the Assessed Caribou Herds

Season	Buchans[A]		Gaff Topsails[B]		Grey River[C]		La Poile[D]	
	Area[E] in km^2 (n = no. of collared caribou)							
	50% kernel	95% kernel	50% kernel	95% kernel	50% kernel	95% kernel	50% kernel	95% kernel
Winter	2,589 (n=47)	9,493 (n=47)	1,087 (n=32)	3,403 (n=32)	1,958 (n=23)	7,138 (n=23)	1,480 (n=29)	5,018 (n=29)
Spring Migration / Pre-Calving	4,481 (n=36)	14,382 (n=36)	953 (n=28)	3,443 (n=28)	1,857 (n=16)	10,389 (n=16)	3,566 (n=18)	9,218 (n=18)
Calving	270 (n=35)	1,351 (n=35)	424 (n=28)	1,887 (n=28)	777 (n=16)	4,579 (n=16)	530 (n=18)	2,363 (n=18)
Post-Calving Migration / Dispersal	399 (n=33)	1,128 (n=33)	481 (n=28)	1,858 (n=28)	605 (n=16)	3,611 (n=16)	513 (n=18)	2,243 (n=18)
Post-Calving Rearing	1,517 (n=37)	4,834 (n=37)	890 (n=28)	3,261 (n=28)	454 (n=16)	2,990 (n=16)	1,003 (n=18)	2,900 (n=18)
Fall Rut	617 (n=39)	2,526 (n=39)	461 (n=27)	2,030 (n=27)	271 (n=16)	2,238 (n=16)	575 (n=18)	2,873 (n=18)
Fall Migration / Dispersal	2,730 (n=41)	7,640 (n=41)	614 (n=27)	2,117 (n=27)	950 (n=16)	4,823 (n=16)	1,718 (n=18)	5,682 (n=18)

Notes:

[†] Area calculated using only collars with more than 50 locations in the season.

[A] Telemetry data from 2005 – 2018.

[B] Telemetry data from 2006 – 2013. Gaff Topsails data from 2005 was not included in the calculation because the collars had less than 50 locations per season.

[C] Telemetry data from 2006 – 2013. Grey River data from 2005 was not included in the calculation because the collars had less than 50 locations per season.

[D] Telemetry data from 2006 – 2013. La Poile data from 2005 was not included in the calculation because the collars had less than 50 locations per season.

[E] Areas rounded to integers.

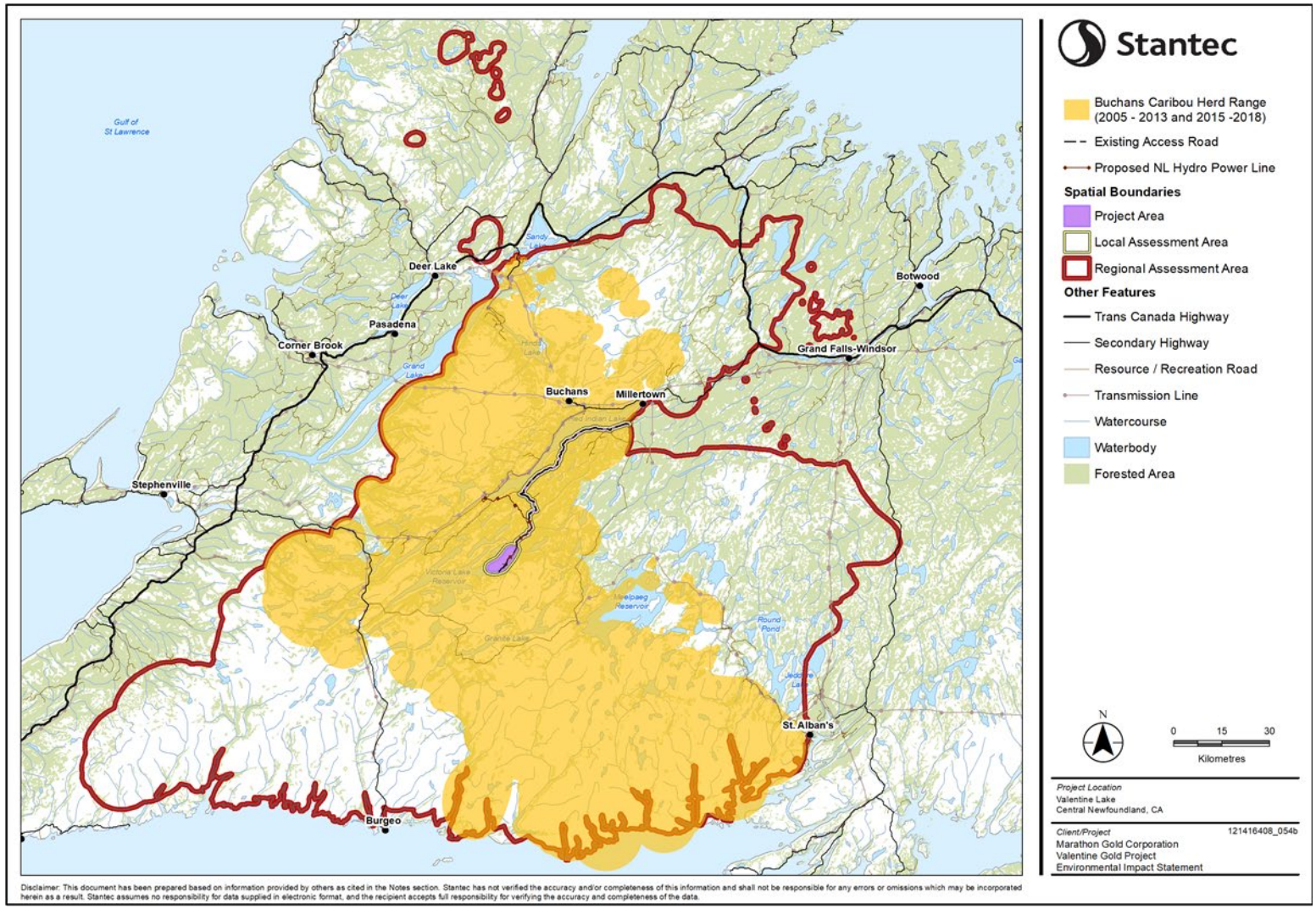

Figure 7-3 Distribution of the Buchans Caribou Herd

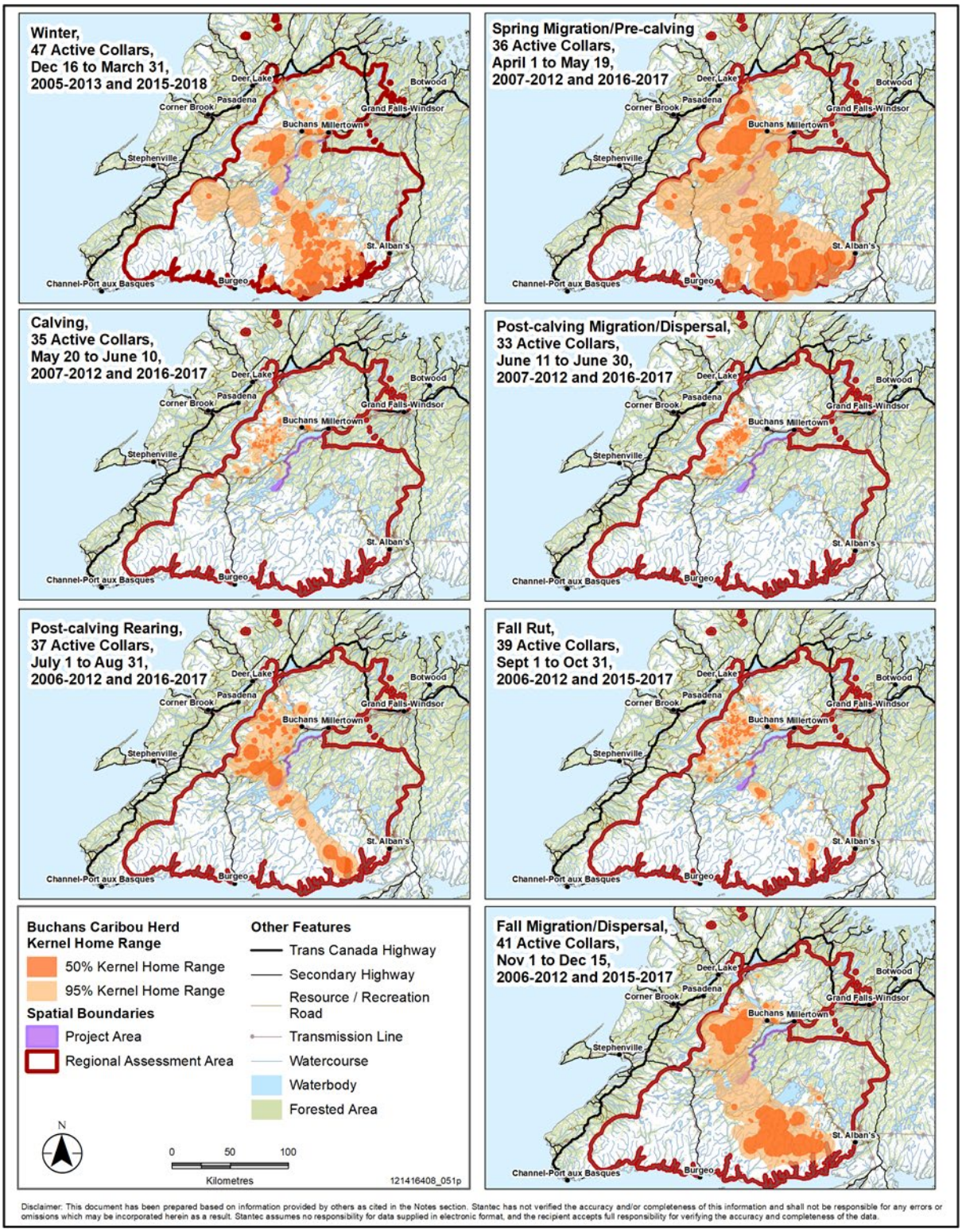

Figure 7-4 Seasonal Ranges for the Buchans Caribou Herd

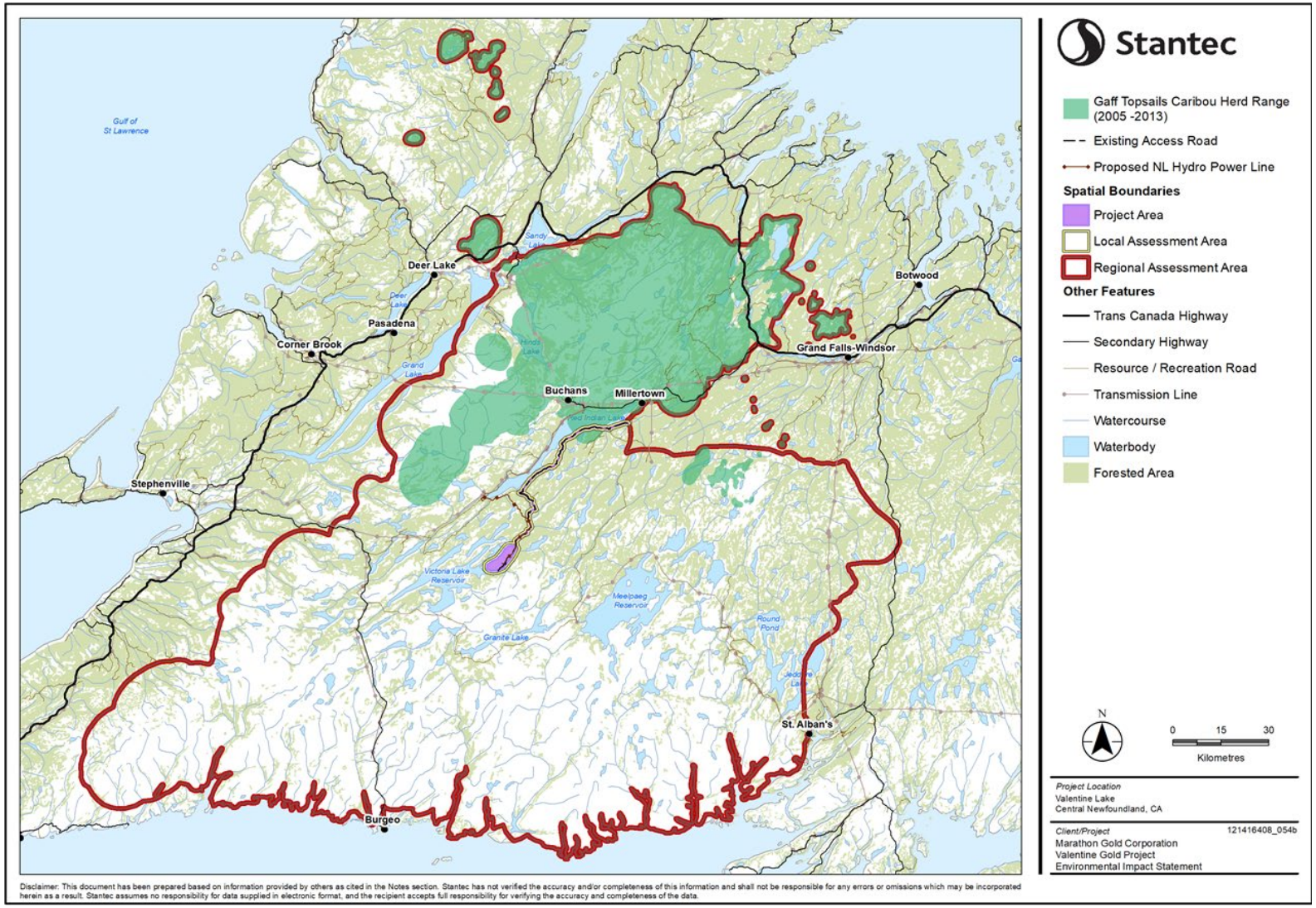

Figure 7-5 Distribution of the Gaff Topsails Caribou Herd

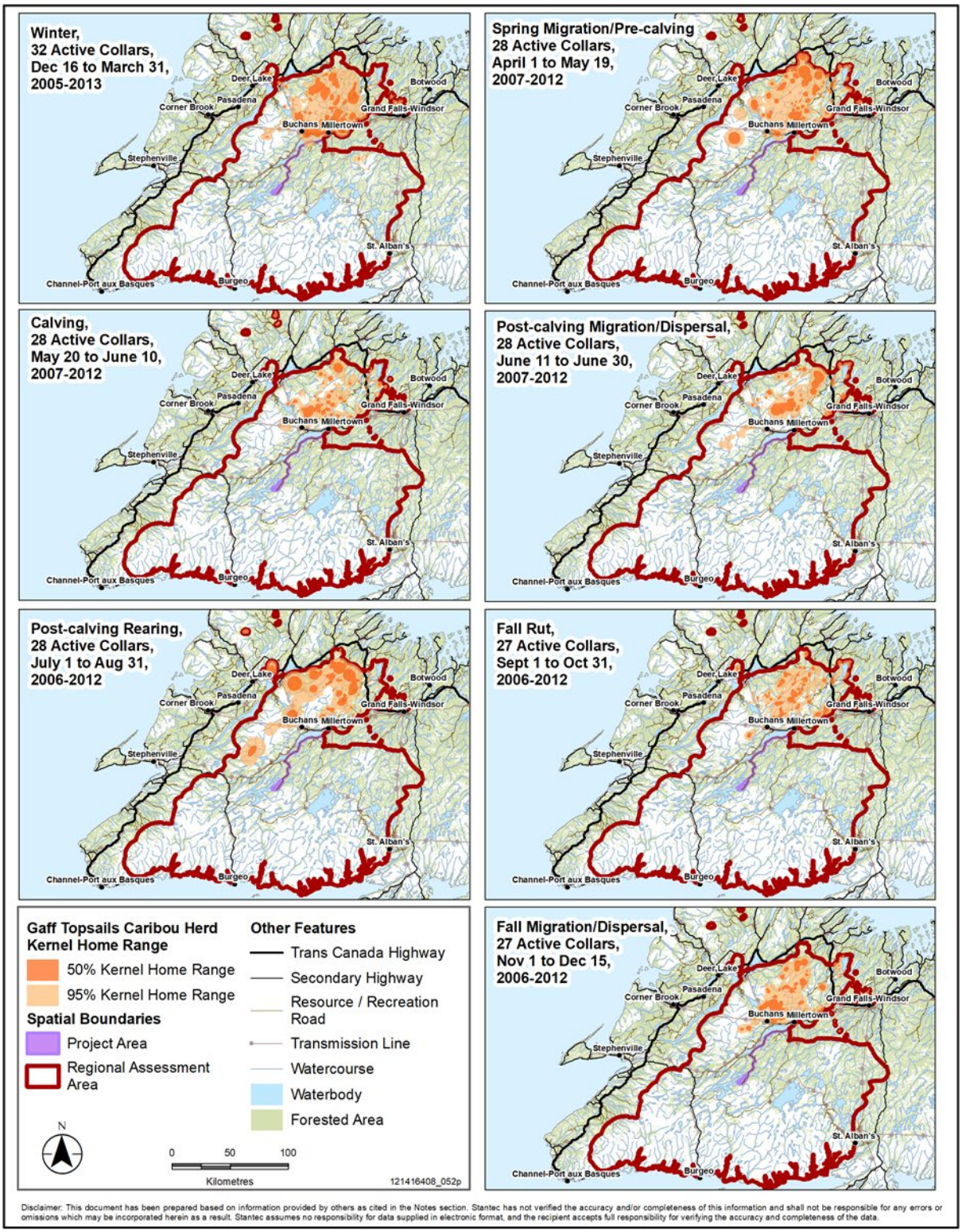

Figure 7-6 Seasonal Ranges for the Gaff Topsails Caribou Herd

The Grey River and La Poile herds move between calving and summer ranges in south-west Newfoundland and winter range on the south coast. The range of the Grey River herd is approximately 15,500 km^2 and is generally located between Meelpaeg Lake in the north and the coast in the south, and between Highway 360 in the east and the area near Channel-Port Aux Basques in the west (Figure 7-8). The fall and winter ranges occur southeast of the Project Area towards St. Alban's, while the spring and summer ranges occur further west (Figure 7-9). The overall range of the La Poile herd (approximately 11,200 km^2) occurs between Channel-Port Aux Basques and St. Alban's in the east and extends no further north than Victoria Lake Reservoir (Figure 7-10). To the south of the Project Area, the La Poile herd is furthest east in fall and winter, and moves toward Channel-Port Aux Basques for calving in spring (Figure 7-11).

Caribou display site fidelity (the tendency to return to a previously used area) in their seasonal ranges, with highest site fidelity occurring during the spring, calving and post-calving seasons (Ferguson and Elkie 2004). In the 2000s during peak population, the La Poile herd showed reduced site fidelity and the Buchans and Grey River herds showed increased site fidelity, compared to the 1990s (Schaefer and Mahoney 2013). In the Buchans herd, differences in calving season fidelity may be influenced by the amount of snowfall in early spring (Mahoney and Schaefer 2002). Additionally, the Buchans herd spent six more weeks on the calving and summer ranges in the 2000s than in the 1990s (Schaefer and Mahoney 2013).

While seasonal ranges are important for caribou, migration corridors are also essential to maintain connectivity between seasonal ranges. The assessed herds move between seasonal ranges, with the Buchans herd undertaking the largest movements. Previous research has indicated some variability in the timing of migration on the Island of Newfoundland; between 1995 and 2000, the median dates of migration of the Buchans herd varied by almost a month (spring: April 17 to May 23; fall: October 8 to November 7) (Mahoney and Schaefer 2002). The migration corridors may be used for short periods of time and produce relatively few telemetry locations compared to the rest of the season; therefore, these important migration corridors may not be captured by the kernel analysis used to delineate seasonal ranges.

Following discussion with the NLDFFA-Wildlife Division, the spring and fall migration movement patterns of the Buchans and Gaff Topsails herds were analyzed. Based on available telemetry data for 2006 – 2013, no movements between distinct summer and winter ranges were identified for the Gaff Topsails herd (Section 7.2.3) and a migration corridor through the Project Area was not identified. While there was movement north-east towards Sandy Lake during the spring migration and south-east towards Star Lake during the fall, the summer and winter ranges are not spatially discrete (Figure 7-7). Similar seasonal range use has been reported for the Gaff Topsails herd in the 1980s when the herd range occurred primarily between Sheffield Lake and Hinds Lake (Mahoney 2000). Although there were differences in seasonal distribution, the calving and winter ranges were not spatially discrete (Mahoney 2000). As a migration corridor through the Project Area was not identified, the migration corridor for the Gaff Topsails herd was not analyzed further for this assessment.

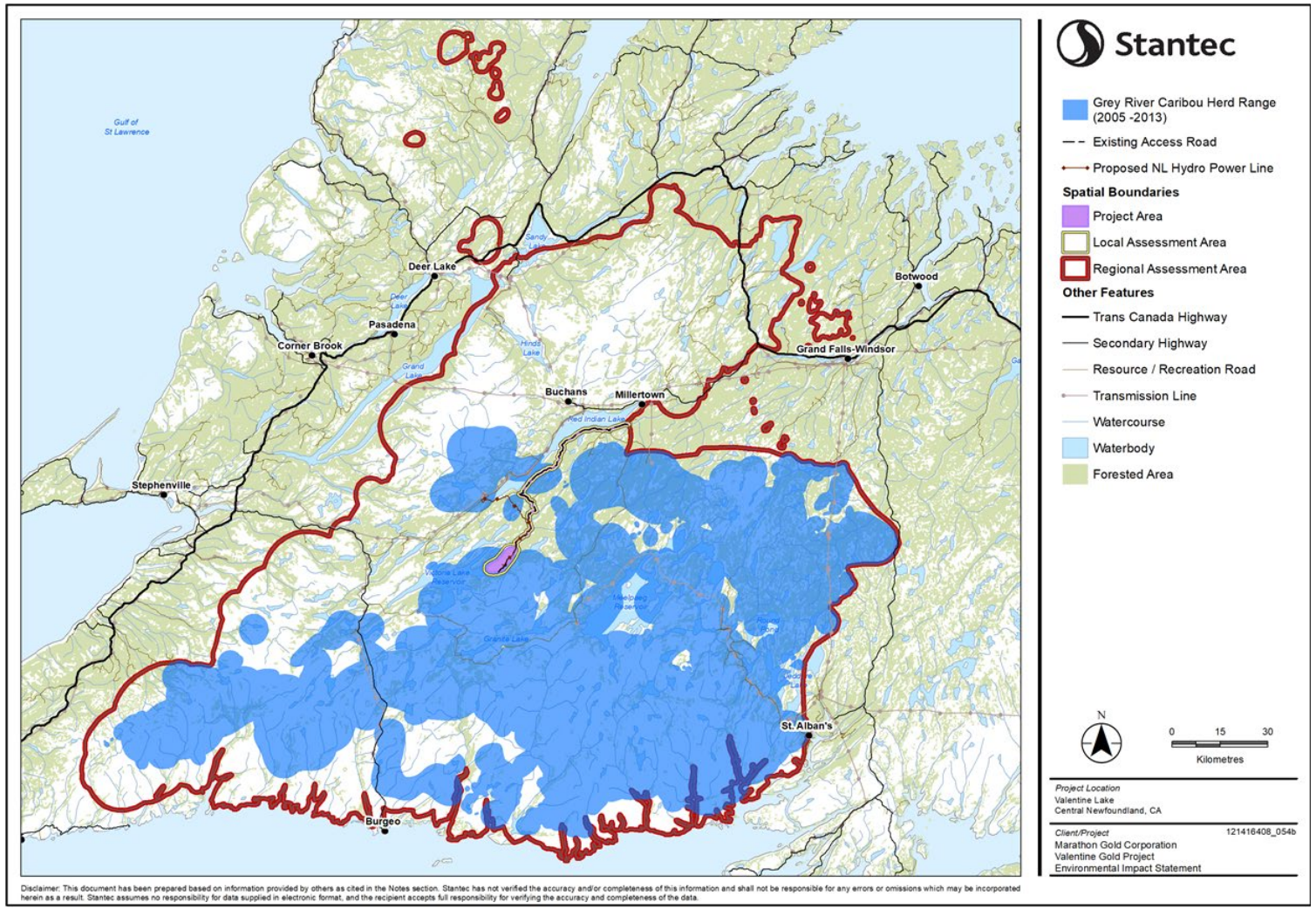

Figure 7-7 Distribution of the Grey River Caribou Herd

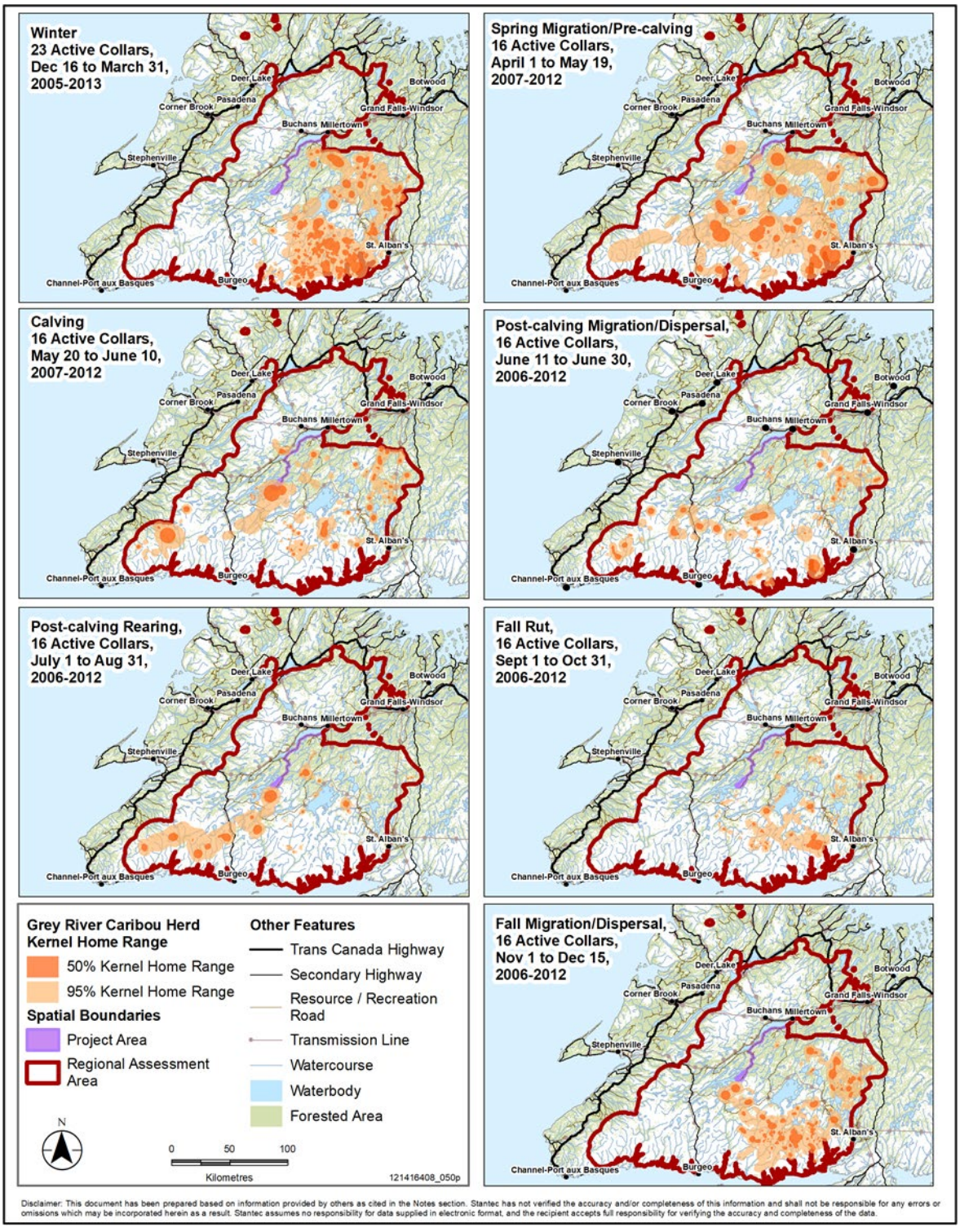

Figure 7-8 Seasonal Ranges for the Grey River Caribou Herd

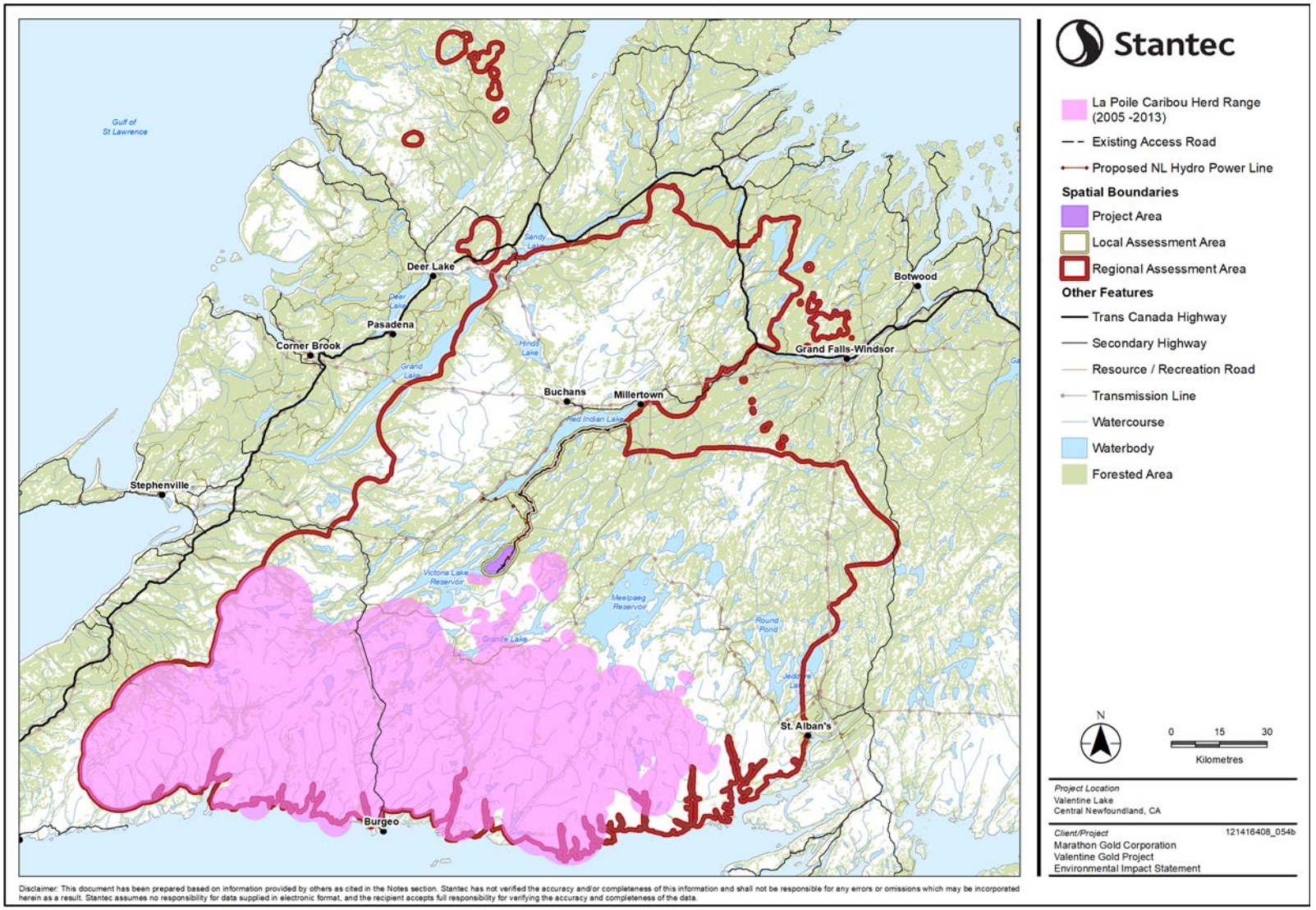

Figure 7-9 Distribution of the La Poile Caribou Herd

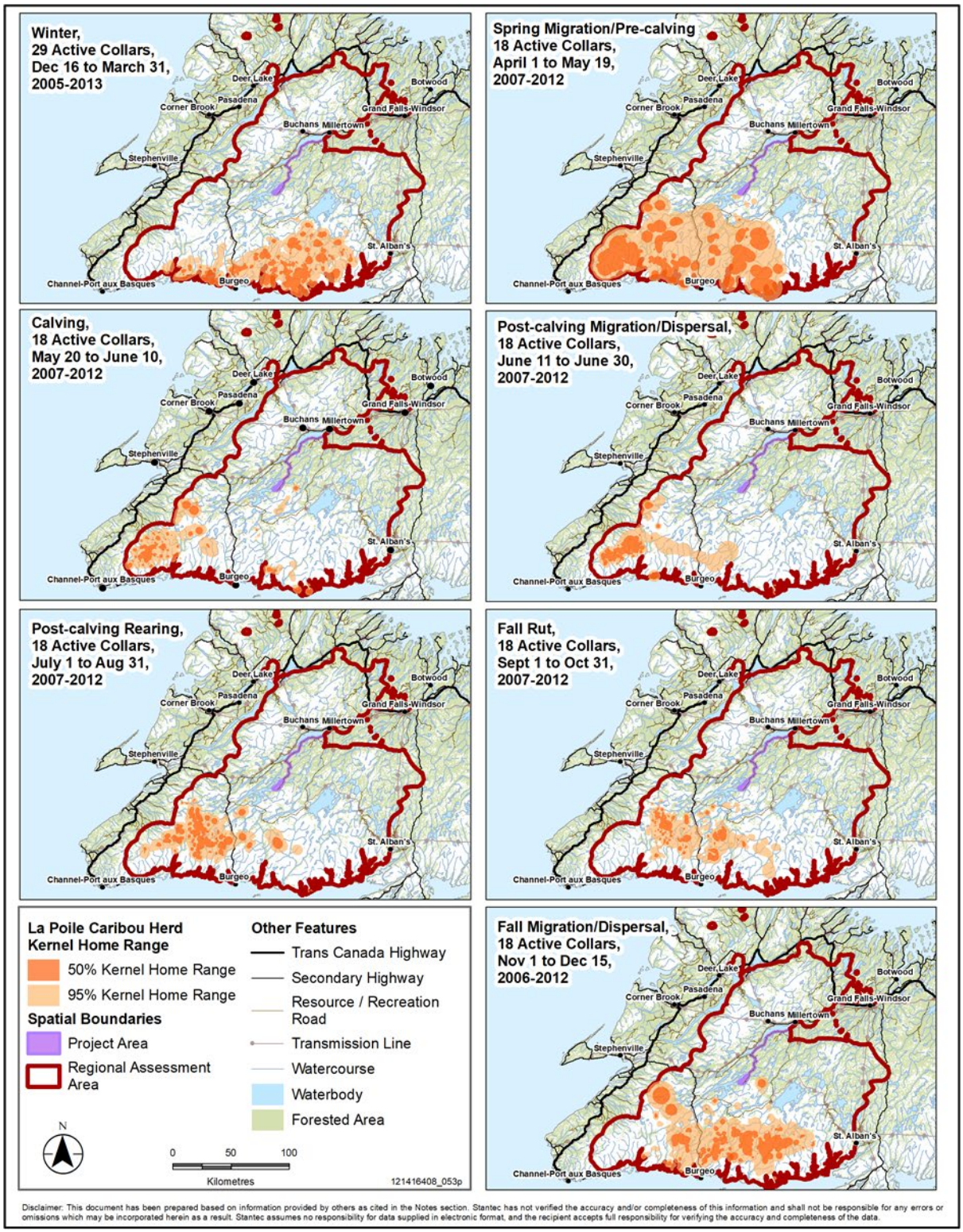

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Figure 7-10 Seasonal Ranges for the La Poile Caribou Herd

For the Buchans herd, the dBBMM models identified areas where individual GPS-collared caribou occurred during seasonal migration periods, which included a network of travel paths that extended approximately 30 to 86 km wide. However, there was only one distinct population-level path identified that included high use areas (stopover sites) connected by a migration corridor during both spring (Figure 7-12) and fall migration periods (Figure 7-13). The proposed mine site intersected the spring migration corridor for approximately 5.5 km where caribou moved through a relatively narrow area (< 3 km wide) as they headed north from their winter range. The spring migration corridor crossed the northern section of Victoria Lake Reservoir and Long Lake and included one stopover (high use) area located on the south side of Star Lake, west of the hydroelectric development (Figure 7-12). Two other stopover areas were located east of Victoria Lake Reservoir, one of which overlapped with the Project Area (Figure 7-12). Another two stopovers were located just south of Granite Lake. There were some low use paths in spring migration that crossed Red Indian Lake; these paths overlapped the existing access road.

The fall migration corridor had four stopover sites, which included the same high use area used during spring migration (south of Star Lake) and a new stopover area near the south arm of Granite Lake (Figure 7-13). There were two smaller stopover area near Victoria Lake Reservoir: one south of the Project Area, and one that overlapped the Project Area (Figure 7-13). Although the dBBMM identified one population-level migration corridor during both spring and fall migration periods, the fall migration included a narrower network of low use travel paths compared to spring when some individuals travelled west of Victoria Lake Reservoir and across Red Indian Lake (Figure 7-13).

Because the dBBMM model identified a single population-level migration path during both spring and fall migration, the preferred path analysis did not identify other paths based on a proportion of the sampled population. Up to 55.1% of the collared caribou used the dominant migration path during spring, and up to 58.4% used it in fall. While this result is based on collared caribou, the assumption is that the movement patters are representative of the herd generally. This implies that over half of the Buchans herd migrates through the higher use area of the migration path.

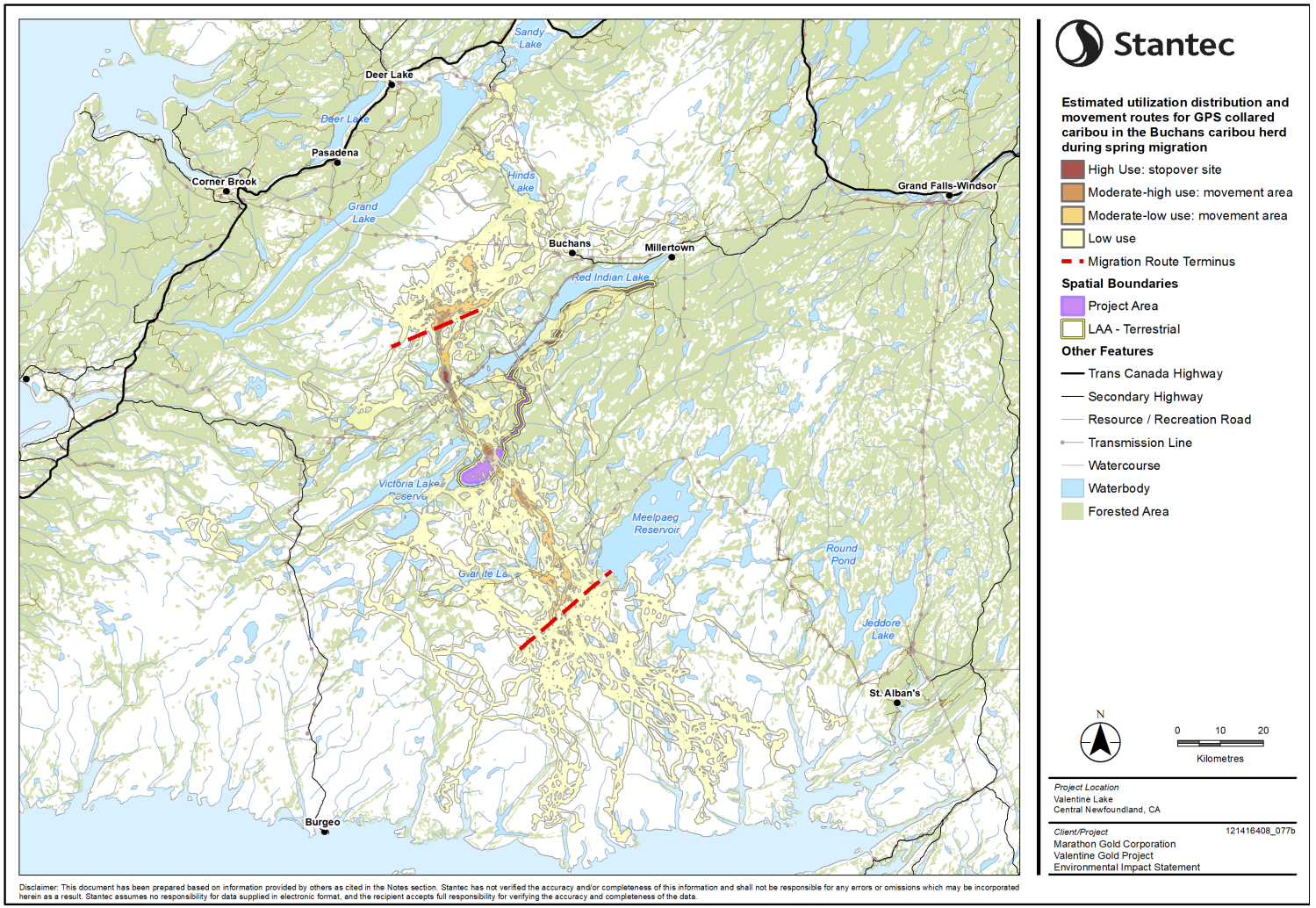

Figure 7-11 Estimated Utilization Distribution and Migration Corridors for GPS Collared Caribou In Buchans Herd During Spring Migration

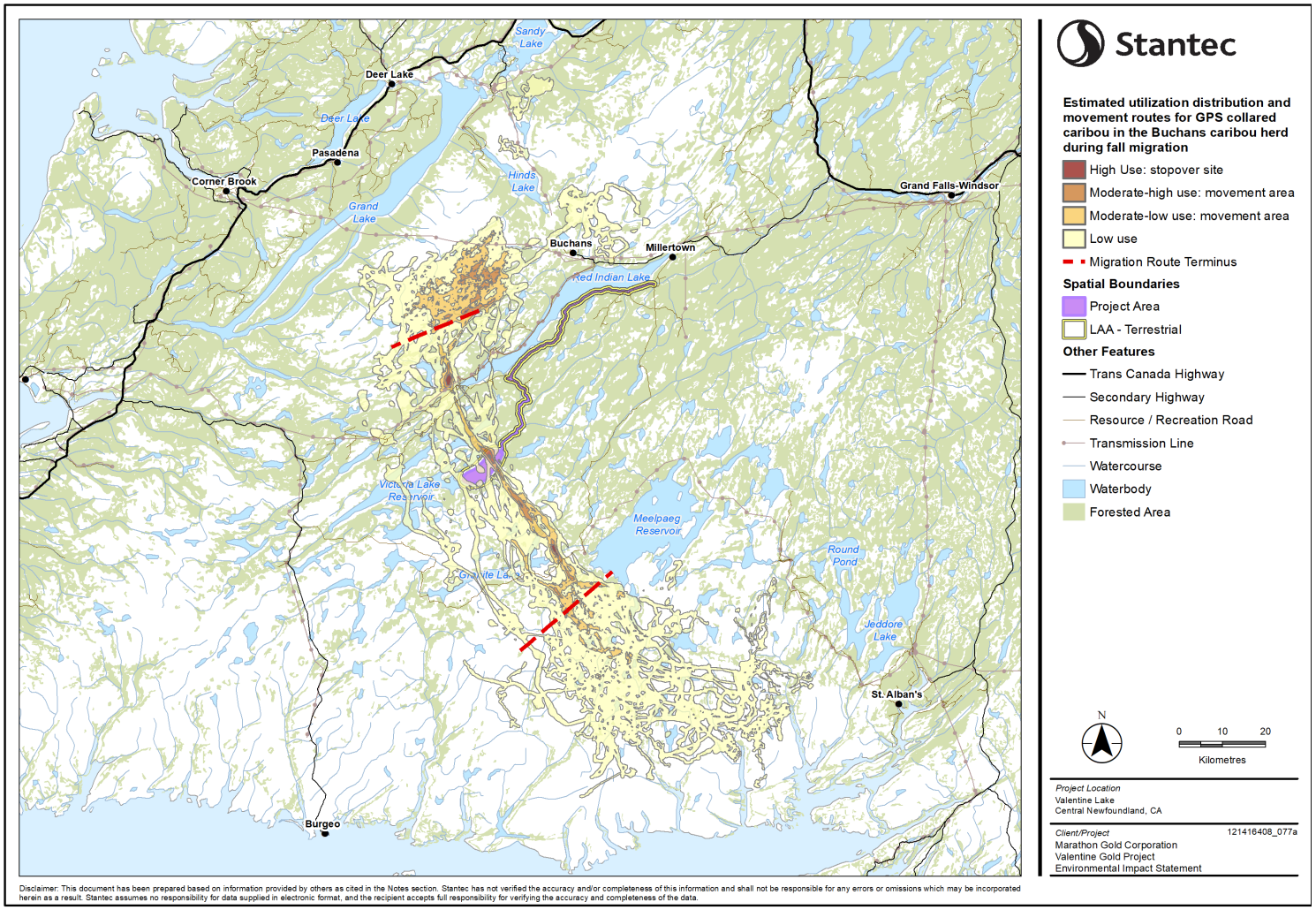

Figure 7-12 Estimated Utilization Distribution and Migration Corridors for GPS Collared Caribou in the Buchans Herd During Fall Migration

The length of the migration corridor between the Buchans Plateau and Grey River is 145 km. Within the migration corridor, the area used for migration was wider and more dispersed in spring (3,639 km^2) than in fall (3,005 km^2). The timing of migration for the Buchans herd has been shown to vary. Between 1995 to 2000, Buchans caribou crossed the north shore of Red Indian Lake between April 17 and May 25 during spring migration, and between October 8 to November 7 during fall migration (Mahoney and Schaefer 2002). Based on the telemetry data (2005 to 2013 and 2015 to 2017), dates of movement through the Project Area in the spring ranged from April 22 to May 6; however, these dates varied between years. Telemetry locations from collared caribou occurred within the Project Area between April 18 to April 22 in 2016, and between April 29 and May 10 in 2017. Results from remote cameras deployed for the Spring 2020 Caribou Survey indicated peak female caribou movement through the Project Area was between April 25 to May 7, 2020 and peak of movement for males was between May 15 and May 27, 2020 (BSA.2, Attachment 2-B). Remote cameras deployed in the Project Area during fall 2019 detected caribou moving north through the Project Area from November 9 to November 12 (BSA.2, Attachment 2-A). The dates of telemetry locations within the Project Area during fall indicated variability in the timing of fall migration as well. Overlap with the Project Area during fall occurred between November 17 to 20 in 2015, November 28 to 30 in 2016, and December 6 to 12 in 2017.

Although recent surveys indicate that population estimates of some herds in the south coast sub-population may be stabilizing (Government of NL 2019a), research also indicates that caribou populations on the Island of Newfoundland continue to be limited by poor calf survival (Government of NL 2015a) and, subsequently, poor recruitment rates. The calf survival rate (i.e., proportion of calves surviving to six months) between 1979 and 1997 was approximately 66% however it decreased to less than 8% in 2003 (Mahoney et al. 2015). The calf survival rate appears to be increasing gradually (Government of NL 2015a) and reached nearly 50% in 2012 (Mahoney et al. 2015). In the assessed caribou herds, the proportion of calves (i.e., percent calves out of total caribou classified) is near 10% (Table 7.6). Although calf mortality rates have increased (i.e., higher in the early 2000s compared to 1979 –1997), adult survival is high and is comparable to earlier estimates (i.e., rates from 2004 – 2011 are similar to 1979 – 1997) (Government of NL 2015a). Analyses completed in the late 2010s indicated that the average age of the caribou population on the Island of Newfoundland had increased overall (Government of NL 2015a), and an improvement in calf survivorship is necessary to increase population size (Randell et al. 2012; Weir et al. 2014). The sex ratio for the Island of Newfoundland caribou population is generally more females to males, with a decreasing trend in males observed between the 1970s to 2006 (Weir et al. 2014). The previously observed decline in sex ratio may have slowed, as a higher number of males has been observed since 2006 (Weir et al. 2014).

Table 7.6 Classification Results for the Assessed Caribou Herds

Year	Buchans		Gaff Topsails		Grey River		La Poile	
	% Calves	% Bulls	% Calves	% Bulls	% Calves	% Bulls	% Calves	% Bulls
2007[A]	11.3	16.2	10.8	15.8	5.7	23.6	7.1	23.3
2011[A]	15.8	19.2	10.3	22.8	6.6	13.9	8.7	17.1
2016[B]	9.4	21.6	14.5	24.3	15.3	29.0	11.3	23.8

Table 7.6 Classification Results for the Assessed Caribou Herds

Year	Buchans		Gaff Topsails		Grey River		La Poile	
	% Calves	% Bulls	% Calves	% Bulls	% Calves	% Bulls	% Calves	% Bulls
2018[C]	10.5	26.1	11.4	21.2	5.6	26.7	9.9	32.9
2019[B]	8.3	28.2	10.7	25.4	11.9	37.3	5.9	22.5
2020[D]	30.6	10.5			11.3[E]	31.6[E]		

Note:
Numbers rounded to one decimal place.
[A] Government of NL 2020e – spring survey, strip transect survey
[B] Government of NL 2020e – winter survey, mark-resight survey
[C] Government of NL 2020f
[D] BSA.2, Attachment 2-C – June survey, strip transect survey from helicopter

There is a regulated annual hunt for caribou on the Island of Newfoundland from September 12 to December 6 (Government of NL 2020c). Licenses are available to both residents and non-residents. The 2020 – 2021 total caribou quota for the Island of Newfoundland was 359 licenses, down from 366 licenses issued in 2018 with a hunter success rate over 75% (Government NL 2020c). The Project Area overlaps with CMAs 62 and 63 (Figure 7-14); however, CMA 63 (Grey River Zone) has been closed to hunting since 2008 (Government of NL 2008). The caribou quota in CMA 62 for 2020/21 consists of 38 resident licenses and 37 non-resident licenses (Government of NL 2020c).

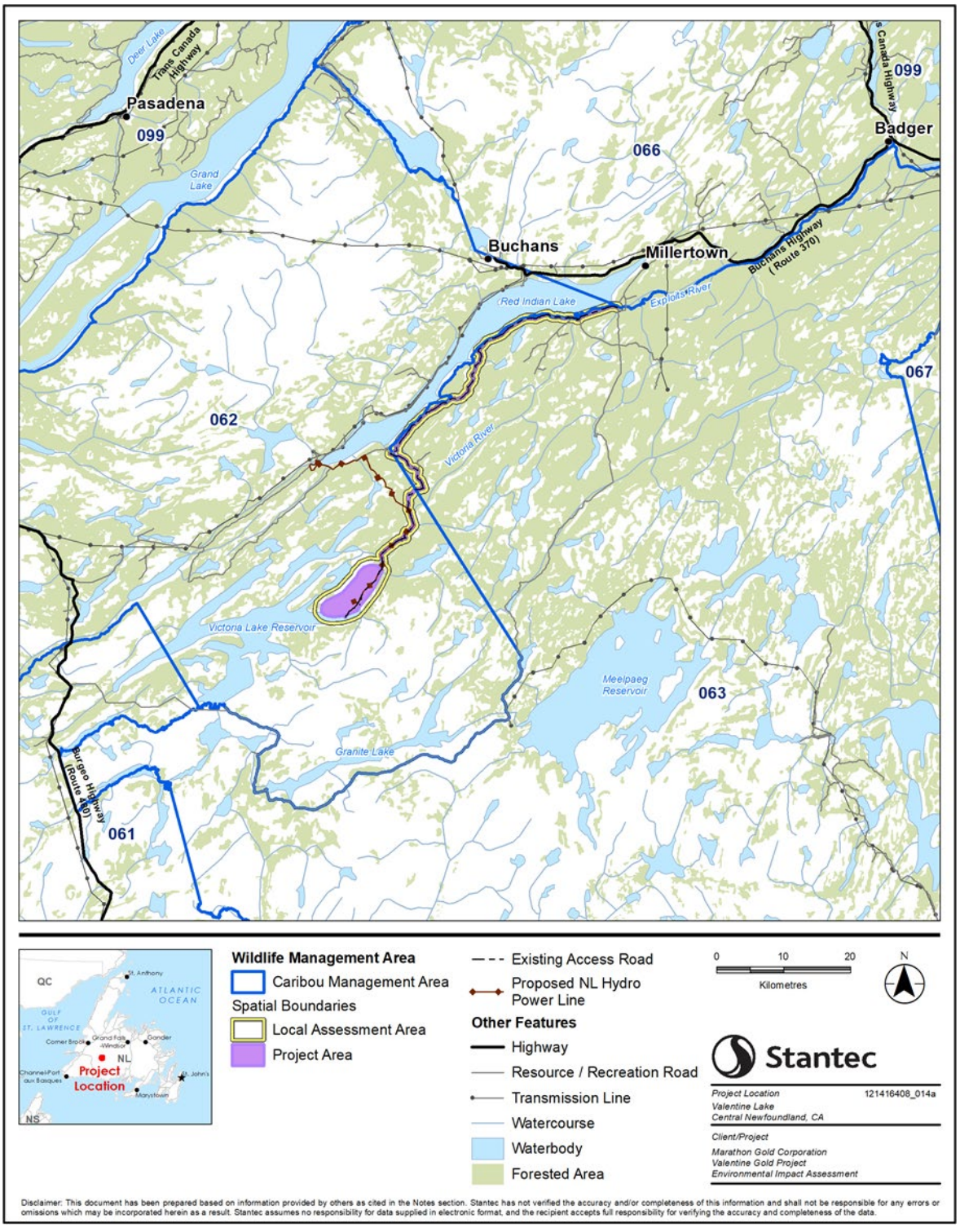

Figure 7-13 Overlap of Project Area with Caribou Management Areas

7.3.2 Habitat Occurrence in the Project Area

Caribou select their habitat based on multiple factors, including reduction of predation risk, access to preferred forage and preferred snow depth. They are generally associated with mature, lichen-rich boreal forest, barrens and bogs and fens.

Habitat types ranked as high value for caribou are Balsam Fir Forest, Black Spruce Forest, Kalmia-Black Spruce Woodland and Open Wetlands (Table 7.8). Caribou select open habitats such as barrens and wetlands (Rettie and Messier 2000; Mahoney and Virgl 2003; Bastille-Rousseau et al. 2015; Schaefer et al. 2016), and forested areas (Chubbs et al. 1993; Rettie and Messier 2000; Mahoney and Virgl 2003; Courtois et al. 2004) as these provide the greatest amount of lichen and other vegetation for forage while also reducing predation risk. Moderate-ranked habitats include Open Water, Wet Coniferous and Mixedwood Forest (Table 7.8). Open Water is ranked as moderate habitat (Rettie and Messier 2000; Ferguson and Elkie 2005) (Table 7.8) as lakes provide aquatic forage (Bergerud 1972), can be used as escape from predators, and shorelines have been selected as calving sites (Metsaranta and Mallory 2007). Additionally, caribou travel across frozen lakes (Leblond et al. 2016) and may select habitat with frozen lakes to provide escape from predators (Ferguson and Elkie 2005). While mixedwood is selected by caribou infrequently (Fortin et al. 2008), it was ranked as moderate habitat for this Project as the caribou migration corridor within the LAA overlaps Mixedwood Forest. Alder Thicket, Riparian Thicket, Regenerating Forest, Exposed Sand / Gravel and Anthropogenic are ranked as low value habitats (Table 7.7).

Based on these relative habitat value rankings, the summary of habitat availability for caribou within the Project Area, LAA and ELCA is presented in Table 7.9. High and moderate ranked habitat for caribou is relatively abundant in the LAA, accounting for 98.9 km^2 or 77.9% of the LAA. Low-ranked habitat covers 6.2 km^2 or 18% of the LAA

Table 7.7 Habitat Value Ranking for Caribou

Habitat Type	Habitat Value Rank
Alder Thicket	Low
Anthropogenic	Low
Balsam Fir Forest	High
Black Spruce Forest	High
Exposed Sand / Gravel Shoreline	Low
Kalmia-Black Spruce Woodland[A]	High
Mixedwood Forest	Moderate
Open Wetlands[B]	High
Open Water	Moderate

Table 7.7 Habitat Value Ranking for Caribou

Habitat Type	Habitat Value Rank
Regenerating Forest	Low
Riparian Thicket	Low
Wet Coniferous Forest	Moderate

Notes:
[A] Includes Kalmia-Black Spruce Forest and Kalmia Heath Ecotypes
[B] Includes Shrub / Graminoid Fen and Shrub Bog Ecotypes
Sources: Schaefer and Pruitt 1991; Chubbs et al. 1993; Rettie and Messier 2000; Mahoney and Virgl 2003; Courtois et al. 2004; Ferguson and Elkie 2005; Brown et al. 2007; Fortin et al. 2008; LeBlond et al. 2011; Alderon 2012; Nalcor 2012; MacNearney 2013; Bastille-Rousseau et al. 2015; Stewart 2016; Bastille-Rousseau et al. 2018; BSA.7, Attachment 7-D

Table 7.8 Amount of Habitat by Ranking for Caribou in the Project Area, LAA and ELCA

Habitat Value Ranking	Area in Project Area[A] (km^2 / %)	Area in LAA[A] (km^2 / %)	Area in ELCA[A] (km^2 / %)
High	18.7 / 53.9	52.5 / 41.3	849.1 / 46.4
Moderate	9.8 / 28.1	46.5 / 36.6	718.5 / 39.2
Low	6.2 / 18.0	28.0 / 22.1	263.0 / 14.4
Total	34.7 / 100.0	127.0 / 100.0	1,830.6 / 100.0

Notes:
[A] Numbers rounded to one decimal place. Areas and percentages may not add up to total amounts due to rounding
Values pertain to the portion of the Project Area and LAA with ELC data

The relative amounts of high, moderate and low value habitat rankings are similar in the Project Area and ELCA. This suggests that the quantity and quality of the caribou habitat in the Project Area are similar to those of the ELCA.

7.3.3 Limiting Factors

The primary predators of caribou on the Island of Newfoundland are black bear (*Ursus americanus*) and coyote (*Canis latrans*). Although adult caribou are preyed upon less frequently compared to calves (Ballard 1994; Lewis and Mahoney 2014; Mahoney and Weir 2009). Predation is the primary cause of caribou calf mortality on the Island of Newfoundland with approximately 90% of calf deaths attributed to predation (Lewis and Mahoney 2014). During the Island-wide population increase between 1979 and 1997, the predation rate on calves was approximately 60%, increasing to 83% between 2003 and 2007 (Mahoney and Weir 2009). While black bear and coyote are the primary predators of caribou calves on the Island of Newfoundland (Mumma et al. 2016, 2019; Bastille-Rousseau et al. 2016), calves are also preyed upon by other predators such as bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*) and Canada lynx (*Lynx canadensis)* (Lewis et al. 2017). The current adult caribou mortality

rate is thought to be similar to historical rates, and the decrease in calf survival since the mid-1990s is due to an increase in predation rate (Government of NL 2015a).

Coyote is a relatively recent predator of caribou on the Island of Newfoundland, as it was not established on the Island of Newfoundland until the 1990s (Blake 2006). Coyote on the Island of Newfoundland consume mostly moose (*Alces alces*), as well as caribou and snowshoe hare (*Lepus americanus*) (Bridger 2006; Mumma et al. 2016). Coyote do contribute to caribou calf mortality (approximately 28% of collared calves) (Lewis and Mahoney 2014); however, data have suggested that calf mortality and resultant poor recruitment is also affected by other predators, including black bear (Mumma et al. 2016; Mahoney and Weir 2009) and Canada lynx (Mahoney and Virgil 2003; Snow and Mahoney 1995; Mahoney et al. 1990). Based on Lewis and Mahoney (2014), black bear accounted for 34% of collared caribou calf mortality, approximately 14% of calves were killed by an unidentified predator, 15% died of non-predation causes (e.g., accident, starvation), and the cause of 14% of mortalities could not be determined.

Gray wolf (*Canis lupus*) is not a major predator of caribou on the Island of Newfoundland, unlike for other caribou populations in parts of Canada. The wolf became extirpated on the Island of Newfoundland in the 1930s; however, wolf and wolf-coyote hybrids have been documented here since 2009 (Government of NL 2012). The natural recolonization of gray wolf on the Island of Newfoundland could increase predation rates on caribou.

Hunting can be an important tool for managing wildlife populations, however harvest rates need to be carefully adjusted to sustain populations. The caribou population on the Island of Newfoundland has decreased by approximately 60% since the 1990s (Government of NL 2015a). Previously, hunter success was 80 to 85% in the 1980s prior to the peak, decreasing to approximately 60% in the 2000s (Weir et al. 2014). In response to the population decline, caribou quotas have been reduced accordingly. Hunter success in 2018 in the Buchans CMA (CMA 62) was approximately 64% (Government of NL 2020c).

Habitat loss or alteration is an important factor affecting caribou populations across North America (Vors and Boyce 2009). Caribou require mature, lichen-rich boreal forest, barrens and bogs and fens. They rely on a mixture of open areas with abundant lichen and older forest habitat, which together provide forage and cover to evade predators. Caribou habitat can be directly affected through loss or alteration, as is the case with disturbances such as agriculture, forestry, forest fires and industrial and residential development. While habitat may remain intact, it may be affected indirectly through mechanisms such as sensory disturbance, which would reduce its suitability for caribou.

Parasites in caribou have been linked to reduced health (Hughes et al. 2009) and changes in behaviour (Government of NL 2010). First introduced to the Island of Newfoundland through imported reindeer in 1907 and 1908 (Government of NL 2010), brain worm (*Elaphostrongylus rangiferi*) in caribou now occurs across the Island of Newfoundland (Ball et al. 2001). Brain worm can cause a debilitating neurologic disease seen primarily in young animals in late winter (Nalcor 2012). Tapeworms (*Taenia hydatigena* and *Taenia krabbei*) and oestrid flies (*Hypoderma tarandii* and *Cephenemyia trompe*) also affect caribou on the Island of Newfoundland. Harassment and infestation by oestrids can affect habitat selection (Skarin et al. 2004) and overall caribou health (Weladji et al. 2003).

Climate change (i.e., global warming) has the potential to affect global caribou populations, including those on the Island of Newfoundland. Warmer temperatures will affect landscape-level plant composition and plant and insect phenology (timing of recurring biological events). As the assemblage of plant species in boreal regions change (Boulanger et al. 2017), the habitats selected by caribou may become less suitable as the abundance and distribution of preferred plants change. Warmer temperatures resulting from climate change may cause plants to undergo spring green-up earlier, however, so far earlier warm temperatures appear not to have affected the timing of calving (Post and Forchhammer 2008) If decoupling does occur, this could lead to misalignment of forage biomass availability and seasonal energetic needs of caribou. For example, as the length of time between green-up and calving increases, there has been an observed increase in calf mortality and a decrease in calf production (Post and Forchhammer 2008).

A warming climate could also alter the timing of insect emergence, as well as winter survival and development rates (Robinet and Roques 2010), which has the potential to increase the amount of insect harassment. Caribou harassed by insects spend less time foraging than those without harassment, which could lead to decreased body condition (Vors and Boyce 2009). Changes in the abundance or diversity of parasites resulting from climate change could also have negative effects on caribou populations (Mallory and Boyce 2018).

In addition to warmer temperatures, climate change is predicted to change the frequency, intensity, duration and timing of weather and climate extremes (Seneviratne et al. 2012), including increased risk and magnitude of forest fires and winter icing events. An increase in the magnitude or spatial extent of forest fires can reduce the amount of old forest available to caribou and alter forest and plant communities (Racey 2005). An icing event is the formation of an ice layer caused by rain on snow or freeze-thaw cycles, which limits or prevents access to underlying forage. An increase in the frequency of icing events can limit the amount of forage available to caribou during the winter period (Mallory and Boyce 2018). Recent research in Labrador found a decrease in caribou survival with a reduction in snowfall and an increase in freezing rain in the fall (Schmelzer et al. 2020).

Caribou can also be affected by existing and future development within their range. There is an existing road system within the range of the assessed herds, which has likely contributed to direct and indirect habitat loss (e.g., habitat fragmentation). Disturbed areas and linear features are avoided by caribou, which can affect mortality risk. Future developments (e.g., mining, hydroelectric development) may cause habitat lost and sensory disturbance, and affect mortality rate. For example, Buchans caribou showed avoidance of Star Lake hydroelectric facility and a delay in the timing of migration following construction of the facility in 1997 to 1998 (Mahoney and Schaefer 2002). Cumulative effects are discussed in detail in Section 20.8 of the EIS.

8.0 OTHER WILDLIFE SAR AND SOCC

This chapter includes a description of baseline conditions for other wildlife SAR and SOCC relative to the LAA. American marten (*Martes americana atrata*) (referred to as marten) is known to occur within the Project Area. Northern long-eared bat (*Myotis septentrionalis)* and little brown bat (*Myotis lucifugus*) have the potential to occur in the Project Area based on the occurrence of mature mixedwood forest in the region.

8.1 STUDY AREA

The general spatial boundary definitions are outlined in Section 3.0. The following spatial boundaries were used to assess the baseline conditions for an assessment of potential Project effects, including residual environmental effects on other wildlife and their habitat in areas surrounding the mine site and access road (Figure 8-1).

Project Area: The Project Area encompasses the immediate area in which Project activities and components occur and is comprised of two distinct areas: the mine site and the access road. The mine site includes the area within which Project infrastructure will be located, and the access road is the existing road to the site, plus a 20 m wide buffer on either side. The Project Area is the anticipated area of direct physical disturbance associated with the construction, operation and decommissioning, rehabilitation and closure of the Project.

LAA: The LAA includes a 1 km buffer surrounding the mine site, and a 500 m buffer around the access road (Figure 8-1). The LAA was established to reflect the area within which wildlife-specific Project effects are most likely to occur including indirect habitat loss due to sensory disturbance (i.e., displacement or avoidance) (e.g., Laurian et al. 2008a; Benitez-Lopez et al. 2010; Eldegard et al. 2012).

RAA: The RAA includes the Project Area, LAA and a 35 km buffer around the Project Area (Figure 8-2) encompassing Victoria River and Red Indian Lake, as well as the communities of Millertown, Buchans and Buchans Junction.

This assessment of baseline conditions also refers to the ELCA, which is the area within which detailed habitat data have been collected (BSA.7, Attachment 7-D). While the extent of the ELC data does not fully cover the Project Area, LAA or RAA (Figure 8-1), the ELCA is used to assess quantitative effects on habitat. In particular, the magnitude of residual effects has been characterized in relationship to the ELCA (i.e., the percentage of the ELCA in which a loss or change will occur). In this context, the ELCA has been used as a surrogate for the RAA, as it is an area sufficiently large enough to provide regional context and is the area for which comparable ecological land classification data is available.

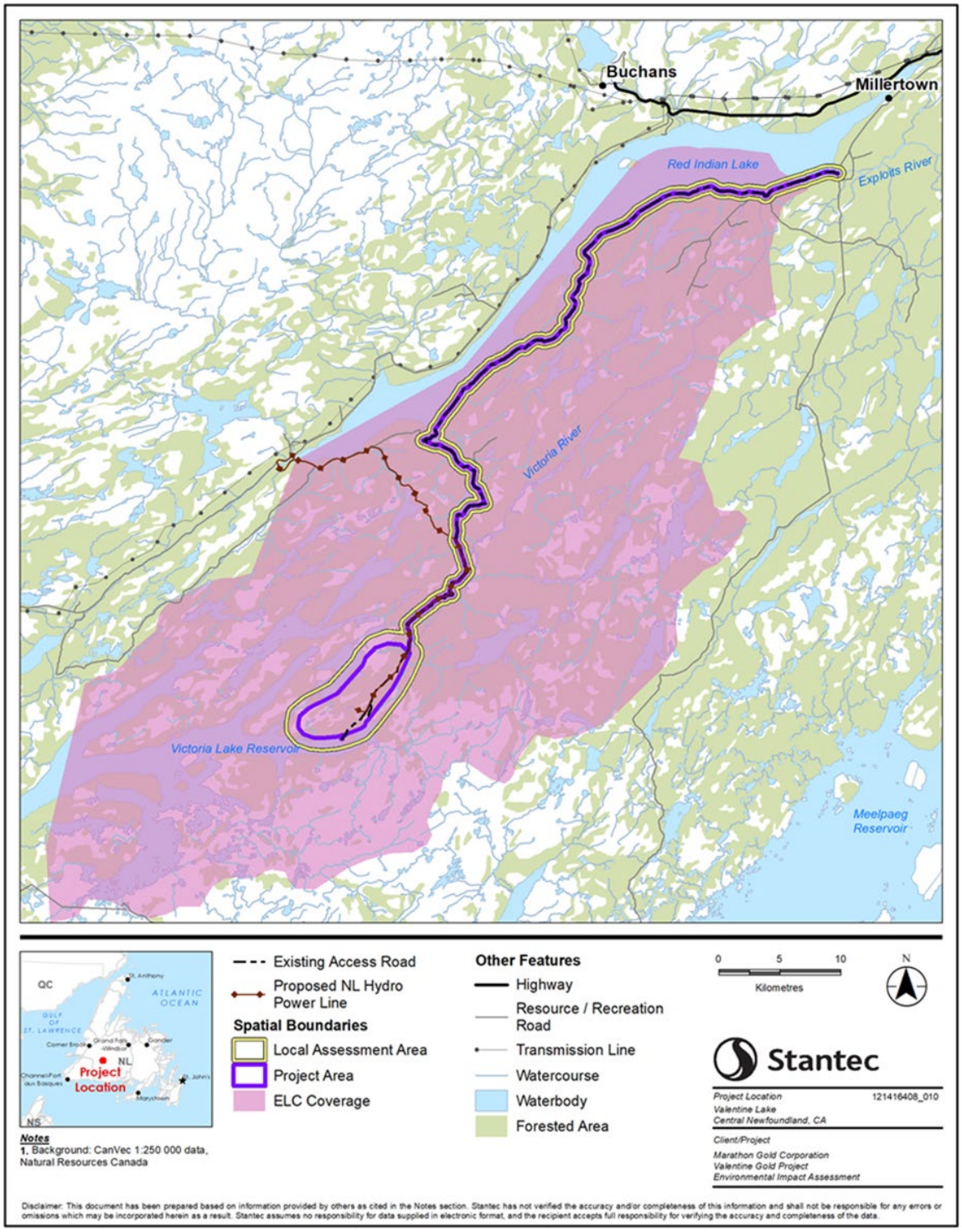

Figure 8-1 Local Assessment Area for Other Wildlife and ELCA

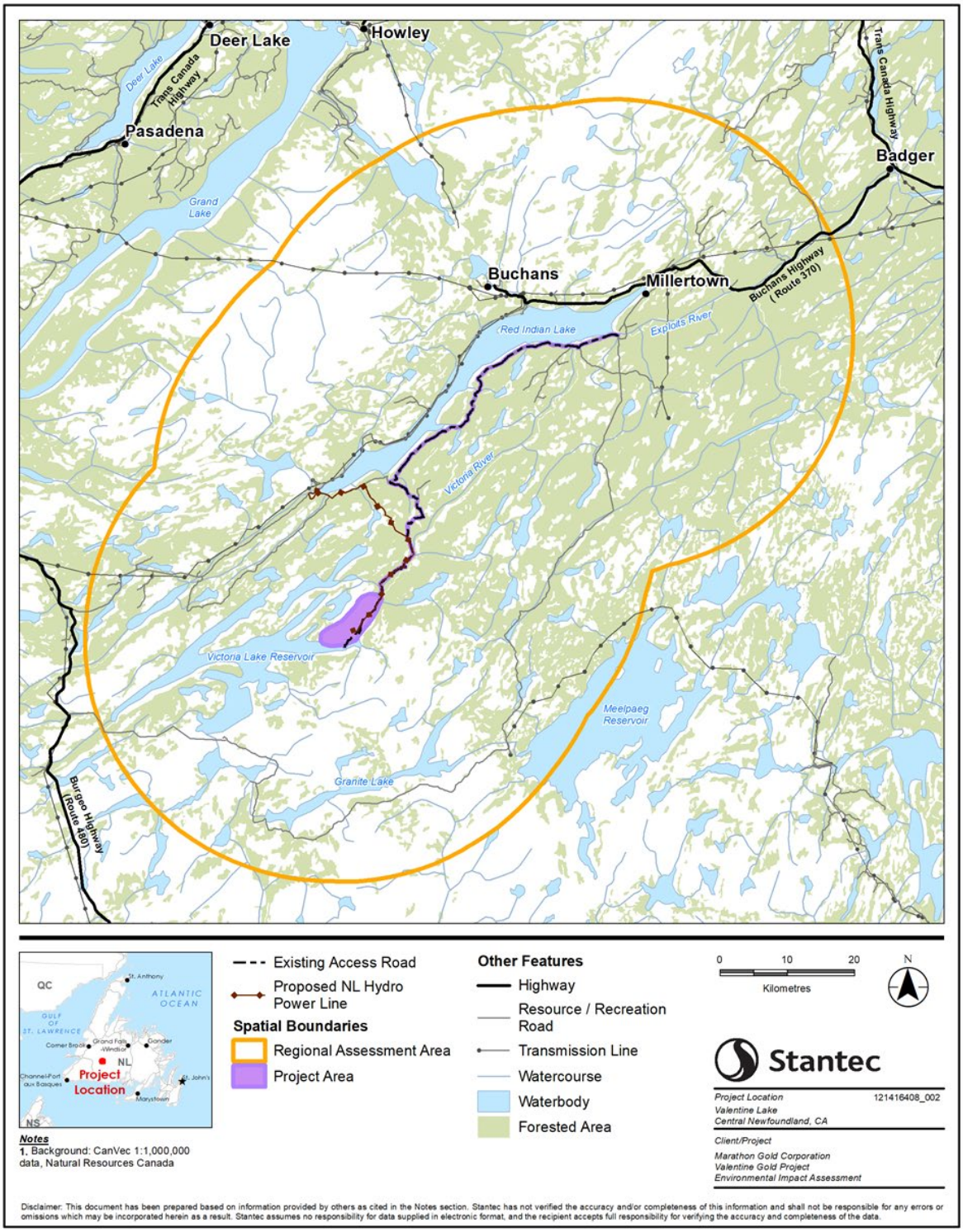

Figure 8-2 Regional Assessment Area for Other Wildlife

8.2 METHODS

The baseline conditions for other wildlife SAR and SOCC and their habitats within the Project Area were compiled from various sources, including a literature review, Project-specific field studies, and a wildlife habitat assessment.

8.2.1 Literature Review

The information on baseline conditions was compiled from several sources including peer-reviewed published literature, field studies within the Project Area, federal and provincial databases, publications and data sources from not-for-profit organizations, and communications with the NLDFFA-Wildlife Division. The following key public resources were used during background reviews to assist in establishing the baseline conditions for other wildlife and their habitats:

- Provincial Moose Management Plan (Government of Newfoundland and Labrador [NL] 2015b)
- Provincial 2019-20 Hunting and Trapping Guide (Government of NL 2019b)
- Provincial Recovery Plans for SAR (The Newfoundland Marten Recovery Team 2010)
- COSEWIC Assessment and Status Update Reports (COSEWIC 2007, 2013b)
- SARA Public Registry – Residence Descriptions (Government of Canada 2007)
- SARA Recovery Strategy Series: Recovery Strategy for Little Brown Myotis *(Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), and Tri-colored Bat (*Perimyotis subflavus*) in Canada (Environment Canada [now Environment and Climate Change Canada (ECCC)] 2015)
- AC CDC – observation data on SAR / SOCC in Atlantic Canada
- Labrador-Island Transmission Link Environmental Impact Statement (Nalcor 2012)
- Labrador-Island Transmission Link Furbearer and Small Mammal Component Study (Stantec 2010)
- ELC and Wildlife Species Habitat Analysis, Alderon Iron Ore Corp (Alderon 2012)

8.2.2 Field Studies

Stantec completed several field studies on wildlife in the Project Area and surrounding areas between 2011 and 2018, including a winter wildlife survey (BSA.7, Attachment 7-A), marten hair snagging surveys (BSA.7, Attachments 7-A, 7-G), and an ELC (BSA.7, Attachment 7-D) (Table 1.1 and 8.1). Further detail on these studies is available in the BSA.7: Avifauna, Other Wildlife and Their Habitats.

Table 8.1 Wildlife Field Studies for the Valentine Gold Project

Study	Date	Summary
Winter Wildlife Survey (BSA.7, Attachment 7-A)	February 28 – March 29, 2013	Aerial track survey, ground based track survey, and deployment of three marten hair snag traps and deoxyribonucleic acid (DNA) analysis.
Ecosystem Classification and Mapping of the Marathon Gold Corporation Valentine Lake Project, Central Newfoundland (BSA.7, Attachment 7-D)	2013 – 2014	Ecosystem classification based on: classification of remotely sensed data; accompanying field program including terrain and soil surveys, and vegetation

Table 8.1 Wildlife Field Studies for the Valentine Gold Project

Study	Date	Summary
		surveys; and documentation of wildlife observations.
Valentine Lake Project: Newfoundland Marten Baseline Study (BSA.7, Attachment 7-G)	February 26 – March 27, 2018	Deployment of three marten hair snag traps and DNA analysis of captured hair.
2011 Forest Songbird Surveys at the Valentine Lake Prospect (BSA.7, Attachment 7-B)	June 14 and 18, 2011	Forty-five 10-minute point count surveys were completed. Incidental wildlife observations recorded.
2011 Baseline Waterfowl and Waterfowl Habitat Study, Valentine Lake Project (BSA.7, Attachment 7-C)	Breeding waterfowl survey: May 16, 2011 Brood survey: July 7, 2011	Aerial surveys to assess waterfowl utilization, and nesting, breeding, and brood rearing habitat preferences. Incidental wildlife observations recorded.
Valentine Lake Project: Waterfowl Baselines Study (BSA.7, Attachment 7-E)	Spring Breeding: June 6, 2017 Fall Staging: September 27, 2017	Aerial transect surveys overflown, waterfowl species identified and counted, and densities determined.
Valentine Gold Project: 2019 Avifauna Baseline Study (BSA.7, Attachment 7-H)	June 26 – 28, 2019	Fifty-two 10-minute point count surveys were completed, in addition to eight passive point surveys for common night-hawk. Incidental wildlife observations recorded.

8.2.3 Other Wildlife Habitat Assessment

The habitat types surrounding the Project Area were determined by an ELC (BSA.7, Attachment 7-D). The ELC included the desktop analysis of satellite imagery, supported by field surveys for soils and vegetation. Eleven separate satellite images of the ELCA were processed and adjusted with ortho-corrected aerial images. Ecotypes were classified based on various characteristics including terrain, soils, moisture and nutrient regime, and plant species richness.

Discussion of habitat type availability in this chapter refers to the ELCA. The ELCA covers more than 99% of the Project Area and 97% of the LAA (Figure 8-1). The area of the Project Area and LAA outside the ELCA is restricted to a small portion of the site access road at its northern-most extent (i.e., furthest from the mine site) and is negligible in the context of assessing potential Project effects on the VC. An analysis of the remaining portion of the LAA was completed although could not be combined with the ELCA as the methods are not comparable. A detailed explanation of this analysis is provided in Section 9.2.1.1 of the EIS.

Habitat quality was assessed for the representative wildlife species identified for this VC. The habitat requirements for the representative species were determined, and each habitat type evaluated based on literature reviews, available information and discussion with experts. Each habitat type present in the Project Area and LAA was evaluated and considered features such as the presence of structural and compositional elements, and prey or forage availability. Year-round habitat requirements were considered to account for seasonal habitat requirements such as breeding, denning, and hunting or foraging.

Three ranks of habitat value were assigned to the habitat types within the Project Area and LAA: high, moderate and low. High value habitat provides forage, protection, and nesting and resting habitat; moderate habitat provides an abundance of one or more (or marginal amounts of all) of the critical elements (e.g., foraging, protection and resting); and low value habitat provides marginal foraging, protection, or resting opportunities, or may be used only during transit. The evaluation of habitat suitability for the representative other wildlife species in this chapter provides an overview of the potential for portions of the Project Area and LAA to support these species.

8.3 RESULTS

8.3.1 SAR

SAR and/or SOCC may occur in or near the Project Area. SAR includes species listed under Schedule 1 of the federal SARA or listed in the Endangered Species List Regulations under the NL ESA. SOCC includes species that are listed as S1 or S2 by the AC CDC, or species not listed under Schedule 1 although designated as At Risk, May be at Risk, or Sensitive by either NLDFFA or by COSEWIC. Wildlife SAR with potential to occur near the Project Area include the American marten and two bat species (Table 8.2). The Newfoundland population of marten is listed as Threatened and is protected by the federal SARA (COSEWIC 2007) and provincial NL ESA, while bat species northern long-eared bat and little brown bat are designated as Endangered under SARA (COSEWIC 2013b).

Table 8.2 Other Wildlife SAR and SOCC that Occur or have the Potential to Occur in or near the Project Area

Species	NL ESA Status	Federal Status		AC CDC
		SARA Listing	COSEWIC Assessment	
American marten (*Martes americana atrata*)	Threatened	Threatened (Schedule 1)	Threatened	S3
Northern long-eared bat (*Myotis septentrionalis)*	-	Endangered (Schedule 1)	Endangered	S2S3
Little brown bat (*Myotis lucifugus*)	-	Endangered (Schedule 1)	Endangered	S3S4

SAR: Unhighlighted cells

S1: Critically Imperiled in Newfoundland

S2: Imperiled in Newfoundland

S3: Vulnerable in Newfoundland.

S4: Apparently Secure - Uncommon but not rare in Newfoundland.

SU: Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

SNA: conservation status rank is not applicable because the species is not a suitable target for conservation activities in Newfoundland.

B: Breeding - Conservation status refers to the breeding population of the species in the province.

M: Migrant - Conservation status refers to the aggregating transient population of the species in the province.

8.3.1.1 Bats

Life History, Distribution, and Density

Two species of bats, the little brown bat and northern long-eared bat, have historically been abundant on the Island of Newfoundland. However, in 2014 both of these species were emergency listed as Endangered under SARA, due to sudden population declines as a result of white-nose syndrome. A recovery strategy for these species was released in 2015 (ECCC 2015). Neither species of bat is currently listed under the NL ESA.

The little brown and northern long-eared bats are both in the genus *Myotis* (mouse-eared bats) in the family *Vespertilionidae*, which is made up of relatively small, insectivorous bats. Little brown and northern long-eared bats are similar in appearance, with brown fur, and black ears and wings. The weight of an adult bat generally ranges from five to nine grams (van Zyll de Jong 1985; ECCC 2015). The two species are most easily distinguished from each other by the shape of the tragus (a pointed portion of the external ear, located in front of the ear canal), which is longer and pointier for the northern long-eared bat. Both species are long-lived, and records exist of little brown bats living for over 30 years (Davis and Hitchcock 1995). Little brown and northern long-eared bats are year-round residents on the Island of Newfoundland.

Both species of bats are nocturnal and use echolocation to hunt. Their diets are made up of a variety of insects, including moths, beetles and spiders (Moosman et al. 2012, Clare et al. 2014). Foraging habits vary by species. Little brown bats typically forage in open areas and are aerial hawkers, meaning that they catch their prey during flight. Feeding over open water is common, and as such their diet commonly includes aquatic insects such as mayflies and caddisflies. Little brown bats will also glean prey from foliage in forested areas (i.e., swoop in and pluck it off the foliage). Northern long-eared bats primarily feed on terrestrial insects. They typically glean prey in forested areas, although they can also catch prey in flight (Ratcliffe and Dawson 2003). They have also been observed foraging along forest-covered creeks and forested road corridors (Owen et al. 2003; Henderson and Broders 2008).

Little brown and northern long-eared bats mate in the fall during an activity called swarming. During swarming, bats congregate at the entrances to underground sites. Swarming may not only be for breeding purposes, however, also to stopover during migration, to assess sites for hibernation (called hibernacula), or to engage in information transfer or other social purposes (ECCC 2015). Many swarming sites are also used as hibernacula; however, it is not known what percentage of bats swarming at a location will also hibernate there (Johnson et al. 2015). After swarming is complete, bats enter into hibernation in the fall, where they remain until spring. Females store sperm during this time, and do not become pregnant until they have emerged in the spring, which typically occurs in April (Government of NL n.d.). After emergence, females roost together in maternity colonies, whereas males tend to roost alone or in small groups. Habitat preferences for each species during this time are discussed below in detail. Gestation is approximately 50 to 60 days, after which females give birth to a single pup.

The little brown bat is the most widely distributed and common bat species in Canada. The range of the northern long-eared bat is slightly more restricted, although it still has a wide distribution in Canada. Both species are found in every province and territory in Canada, except Nunavut. Both species have patchy

distribution across the Island of Newfoundland (Park and Broders 2012). While it was previously thought that northern long-eared bats were only found in the southwestern portion of the Island of Newfoundland, a 2012 study recorded this species further north and east on the Island than previously observed (Park and Broders 2012). Northern long-eared bats were found as far north as River of Ponds on the Northern Peninsula, and as far east as Port Rexton (Park and Broders 2012).

Habitat Occurrence in the Project Area

The habitat needs for little brown and northern long-eared bats vary by season. These species spend their winters hibernating at underground sites, including caves and abandoned mines. Appropriate hibernacula require a specific microclimate, which typically includes a temperature ranging between 2 degrees Celsius (ºC) and 10ºC, and humidity levels over 80% (Fenton 1970; Anderson and Robert 1971; ECCC 2015). Little brown and northern long-eared bats hibernate together at the same sites. Hibernacula are used for overwintering, as well as for swarming in the fall. Little is known regarding the location of hibernacula and swarming sites on the Island of Newfoundland. There is one known hibernaculum in the RAA, located approximately 12.2 km from the Project Area. Hibernation counts have occurred at this site over the past 11 years, with a maximum count of 38 individuals. This site has tested positive for white-nose syndrome (Government of NL 2020f). On the Island of Newfoundland, it is thought that bats may use unconventional hibernation sites, including sinkholes and fissures. Although there are no known sinkholes in the Project Area, it is possible that small, unknown hibernation sites may occur.

During the spring and summer, habitat requirements vary somewhat between the two species. Northern long-eared bats are generally more forest dependent, forming maternity colonies in trees, where females give birth to and raise their young. Colony size can vary from several to tens of individuals. In one study, the results of emergence counts from maternity colonies ranged from 1 to 28 individuals, with mean group sizes of nine for lactating females, and 7.6 for non-lactating females (Park and Broders 2012). Northern long-eared bat maternity colonies are typically found in trees that are larger than average in the surrounding habitat (Park and Broders 2012). Both living trees and dead trees (snags) may be used as roosts, and bats roost in cavities or under loose bark. In NL, tree species used for roosting by northern long-eared bats include balsam fir and white birch and, to a lesser extent, black spruce. Approximately one-third of roost trees observed were in an advanced stage of decay (Park and Broders 2012). Roosts are selected for specific microclimatic conditions, which may vary based upon reproductive status (Garroway and Broders 2008). Bats may switch roost sites frequently. Male northern long-eared bats tend to roost alone or in small groups, and likely use the same species of trees as those used for maternity colonies. However, they are less restricted in roost choice than are maternity colonies.

Little brown bats typically form maternity colonies in human structures such as barns, attics, or sheds. These maternity roosts may house hundreds of female bats and their pups. Less commonly, little brown bats may also form maternity colonies in live or decaying trees, or snags that are typically found in mature forest stands (Grindal 1999). In addition to microscale characteristics, such as microclimate and the presence of suitable crevices and cavities, roosts are likely chosen based on landscape scale characteristics, such as proximity to water and foraging sites, canopy cover, and degree of forest fragmentation (Henderson and Broders 2008; Fabianek et al. 2011). As with northern long-eared bats,

male little brown bats typically roost alone or in small groups and may roost in human structures or in trees.

Habitat rankings and mapping were completed for the northern long-eared bat. This species was chosen based on its heavy reliance on forest habitats, in comparison to the more generalist little brown bat. Habitat rankings are based on spring and summer habitat and are provided in Table 8.3. Not enough is known about the presence of hibernation sites in NL to include these in the habitat analysis.

Table 8.3 Habitat Value Ranking for SAR / SOCC

Habitat Type	Habitat Value Ranking	
	Northern Long-eared Bat	Marten
Alder Thicket	Low	Low
Anthropogenic	Low	Low
Balsam Fir Forest	High	High
Black Spruce Forest	High	High
Exposed Sand / Gravel Shoreline	Low	Low
Kalmia-Black Spruce Woodland[A]	Moderate	Moderate
Mixedwood Forest	High	Moderate
Open Wetlands[B]	Low	Low
Open Water	Moderate	Low
Regenerating Forest	Low	Low
Riparian Thicket	Low	Low
Wet Coniferous Forest	Moderate	High
Sources	Sasse and Perkins 1996; Henderson and Broders 2008; Park and Broders 2012	Thompson and Curran 1995; Bowman and Robitaille 1997; Forsey and Baggs 2001; Potvin et al 2002; Smith and Schaefer 2002; Gosse et al. 2005; Alderon 2012; Nalcor 2012
Notes: [A] – Includes Kalmia-Black Spruce Forest and Kalmia Health Ecotypes [B] – Includes Shrub / Graminoid Fen and Shrub Bog Ecotypes		

Three habitat types are ranked as high for the northern long-eared bat, including Balsam Fir Forest, Black Spruce Forest and Mixedwood Forest (Table 8.3). The northern long-eared bat is a forest dependent species that depends on mature forest stands. Kalmia-Black Spruce Woodland and Wet Coniferous Forest are ranked as moderate because these forest types tend to have smaller trees, which may be less suitable as roost sites. Open Water is also ranked as moderate, as northern-long eared bat may use watercourses for foraging or for travel corridors. The remaining habitat types are ranked as low-quality habitat. Based on these rankings, an analysis of habitat availability in the Project Area, LAA and ELCA was completed. These results are shown in Table 8.4.

Table 8.4 Amount of Habitat by Habitat Value Ranking for SAR / SOCC in the Assessment Areas

Habitat Value Ranking	Northern Long-Eared Bat Habitat			Marten Habitat		
	Area in Project Area[A] (km² / %)	Area in LAA[A] (km² / %)	Area in ELCA[A] (km² / %)	Area in Project Area[A] (km² / %)	Area in LAA[A] (km² / %)	Area in ELCA[A] (km² / %)
High	16.6 / 47.7	51.6 / 40.7	539.3 / 29.5	13.0 / 37.5	38.4 / 30.3	490.7 / 26.8
Moderate	7.3 / 21.1	36.1 / 28.5	748.0 / 40.9	9.6 / 27.6	27.6 / 21.7	388.0 / 21.2
Low	10.8 / 31.2	39.2 / 30.9	543.3 / 29.7	12.1 / 34.9	61.0 / 48.0	951.9 / 52.0
Total	34.7 / 100.0	127.0 / 100.0	1,830.6 / 100.0	34.7 / 100.0	127.0 / 100.0	1,830.6 / 100.0

Notes:
[A] Numbers rounded to one decimal place. Areas and percentages may not add up to total amounts due to rounding
Values pertain to the portion of the Project Area and LAA with ELC data

Large amounts of high-quality habitat exists for the northern long-eared bat in the Project Area and the LAA. The ELCA is composed mostly of moderate quality habitat. There are 51.6 km^2 of high-quality habitat (40.7%) in the LAA and 539.3 km² (29.5%) in the ELCA. Moderate habitat accounts for 36.1 km^2, or 28.5% of habitat in the LAA and 748.0 km² (40.9%) in the ELCA. In total, this indicates that the northern long-eared bat could occur throughout the majority (69% and 70%, respectively) of the LAA and the ELCA. This species is likely not limited by summer roosting habitat in this area. High, moderate and low-*quality* habitat is present in the Project Area at similar proportions as in the LAA. However, the proportion of habitat in the ELCA that is classed as high quality is lower than in either the Project Area or LAA. This indicates that overall habitat suitability in the Project Area and LAA is somewhat higher than in the surrounding environment (ELCA).

Limiting Factors

The largest threat to both little brown and northern long-eared bats in North America is white-nose syndrome, a fungal pathogen that was first detected in the state of New York in 2006. White-nose syndrome is caused by the dermatophyte fungus *Pseudogymnoascus destructans*, which grows on the skin of bats during hibernation. This fungus grows in the same microclimate as occurs in hibernation sites used by little brown and northern-long eared bats. Other hibernating species are also affected, where they occur. *P. destructans* results in physiological changes, including chronic respiratory acidosis and hyperkalemia (Verant et al. 2014), as well as skin lesions, and appears to be associated with increased evaporative water loss (and subsequent dehydration), and more frequent arousals during hibernation (Verant et al. 2014; Cryan et al. 2010; ECCC 2015). Ultimately, the combination of an increased metabolic rate and more frequent arousal from torpor results in a depletion of fat reserves, and death by starvation and/or dehydration (Verant et al. 2014; Frank et al. 2014; Cryan et al. 2010).

Since its discovery in 2006, white-nose syndrome has spread southwest throughout the US, and north into Canada. The first Canadian confirmations of the pathogen occurred in 2010 in Ontario and Quebec, and it has since spread to all provinces except Saskatchewan, Alberta and British Columbia. White-nose syndrome was confirmed on the Island of Newfoundland in the winter of 2016/2017 (US Fish and Wildlife

Service 2019). In areas affected by white-nose syndrome, mortality rates are typically high. Populations of little brown and northern long-eared bats at known hibernacula in eastern Canada have declined by 94% since the arrival of white-nose syndrome (COSEWIC 2013b).

8.3.1.2 Marten

Life History, Distribution and Density

The American marten is a mustelid species native to the Island of Newfoundland. Associated primarily with mature forests, marten is distributed through much of Canada (including Nunavut, the Northwest Territories and Yukon) and Alaska. While technically classified as carnivores (Order Carnivora), marten are omnivorous and have a varied diet. They hunt small prey and also consume berries, bird eggs, insects and carrion (Cumberland et al. 2001; Wilk and Raphael 2017) and will also consume vegetation (Thompson and Colgan 1990; Wilk and Raphael 2017). In NL, the marten diet includes meadow and red-backed vole, shrew, hare and red squirrel as well as insects, berries, carrion and eggs when available (Gosse and Hearn 2005; Government of NL 2019c).

On the Island of Newfoundland, marten are considered Threatened under SARA (COSEWIC 2007) and the NL ESA (AC CDC 2020d), and the AC CDC ranks marten as S3 (or Vulnerable) (AC CDC 2020d).

The mainland population of marten is genetically similar across its range, however, genetically distinct from the Island population (Kyle and Strobeck 2003). Historically, marten were distributed throughout much of the central portion of the Island of Newfoundland in the most productive forests (Bergerud 1969). Currently, there are three main areas on the Island where breeding populations of marten remain: Main River, Terra Nova National Park and west-central Newfoundland (The Newfoundland Marten Recovery Team 2010). The west-central Newfoundland population includes three separate core areas: Little Grand Lake / Red Indian Lake, Sandy Lake and Crabbes River (Nalcor 2012). Of these, the Little Grand Lake / Red Indian Lake core area, including critical habitat, overlaps the Project Area. The marten population in the Little Grand Lake / Red Indian Lake core area is estimated to be between 237 and 481 individuals (Schmelzer 2008 in Nalcor 2012).

As part of the NL ESA, critical habitat for endangered species must be defined and protected. The Recovery Plan for marten on the Island of Newfoundland identified an area of critical habitat of approximately 6,200 km^2, based on marten occurrences and habitat suitability (The Newfoundland Marten Recovery Team 2010), of which a portion overlaps the Project Area (Figure 8-3). There is 6.3 km^2 of provincially proposed critical habitat that overlaps the Project Area, and 41.8 km^2 in the LAA. This critical habitat was identified in the provincial recovery plan although has not been formally protected (The Newfoundland Marten Recovery Team 2010). In support of marten conservation efforts, the provincial government established the Pine Marten Study Area in 1973 (Snyder and Bisonette 1987). The study area (2,078 km^2 [Hearn et al. 2006]) is overlapped by a system of provincial reserves (Glover Island Public Reserve, Little Grand Lake Provisional Ecological Reserve and the Little Grand Like Wild Life Reserve) that have varying levels of restrictions on forestry harvest and development, and snaring (Government of NL 2019b; The Newfoundland Marten Recovery Team 2010).

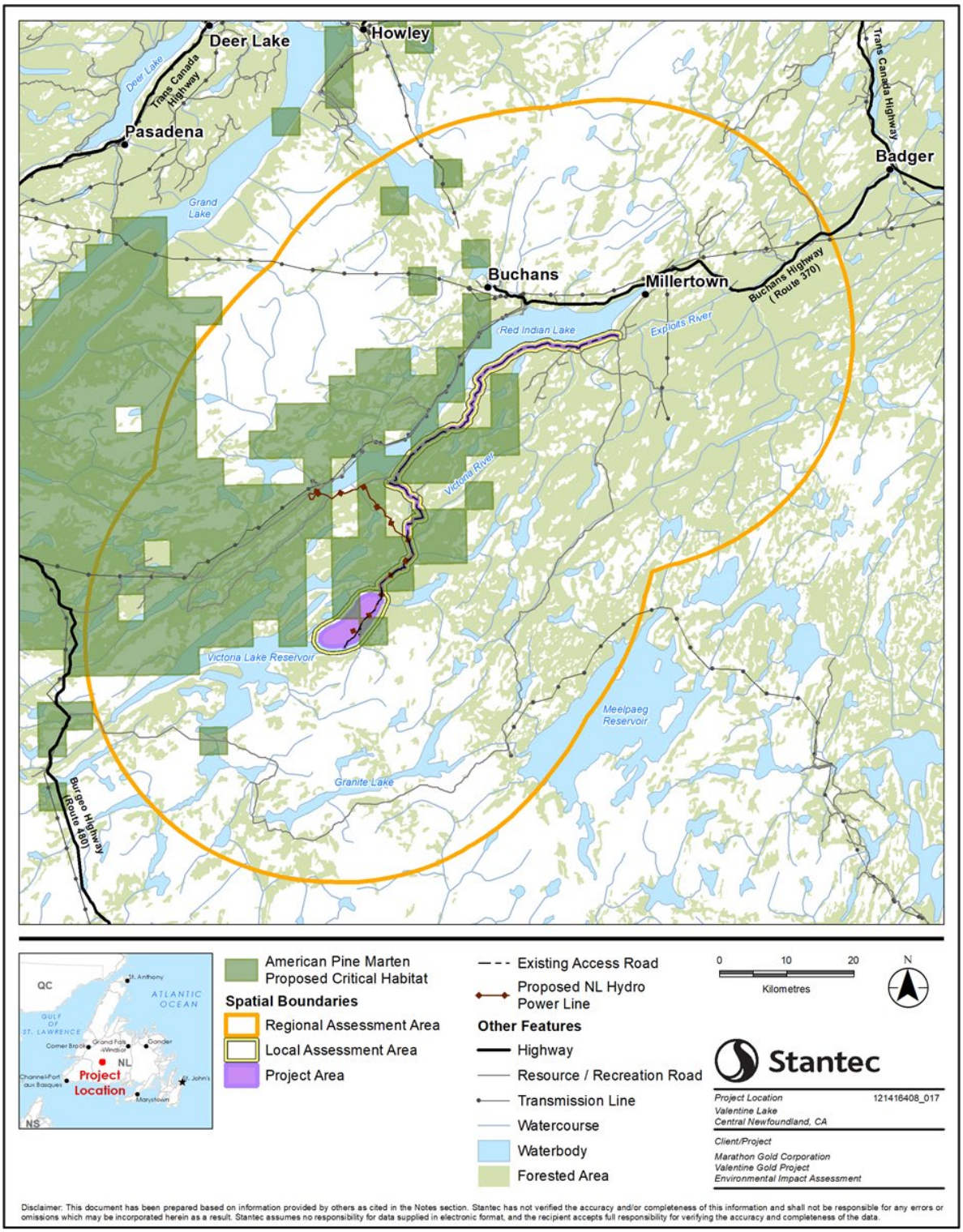

Figure 8-3 Proposed Critical Habitat for Marten in the Project Area and LAA

Marten are usually solitary. Although marten may reach sexual maturity between one to two years of age, the first litter is generally not born until about three years (Banfield 1987). Though mating occurs in July, marten have delayed implantation and the young are born the following spring. Females establish dens in holes in trees (e.g., hollow trees, woodpecker holes), or on the ground in rock piles, squirrel middens, or openings at the bases of trees (Government of Canada 2007). Females use two types of dens: a natal den, where the kits are born, and a series of up to ten maternal dens, where the young are reared (Ruggiero et al. 1998).

Trapping of marten has been prohibited on the Island of Newfoundland since 1934; however, trapping of other furbearer species is permitted. Therefore, Best Management Practices have been developed by the provincial government to reduce the non-targeted marten mortality that occurs during legal trapping (Government of NL 2019b). Several areas have been established that have restrictions on the types of trapping techniques that can be employed. The Project Area is within the boundaries of the Red Indian Lake Modified Snare and Trapping Area, a Category 2 trapping area (Government of NL 2019b). Trapping for other furbearers is permitted in this area, only using legal snare wire (i.e., 22-gauge brass wire or 6-strand picture cord) as it is more effective at releasing accidentally snared marten (Fisher and Twitchell 2004 in Government of NL 2019b). Land-based traps are prohibited in this area (Government of NL 2019b).

Marten have been confirmed in the LAA through observation (BSA.7, Attachment 7-H) and hair snag traps (BSA.7, Attachments 7-A, 7-G) (Figure 8-4) and have also have been observed within the Project Area (BSA.2, Attachments 2-A and 2-B; BSA.7, Attachment 7-H, unpublished data). Five individual marten confirmed in the LAA through deoxyribonucleic acid (DNA) analysis of hair collected from the snagging traps in 2018 (BSA.7, Attachment 7-G) had not been previously identified in the provincial database of individual marten genomic markers, and were subsequently added (BSA.7, Attachment 7-G).

The AC CDC provided information on marten sightings within five km of the LAA (Figure 8-5). Between 1973 and 2013, 308 marten sightings were recorded in the area, although the number of individuals cannot be determined from this data set. Most observations were recorded along the south side of Red Indian Lake. Within the LAA, most of the sightings occurred along the access road portion, with one sighting recorded from within the mine site.

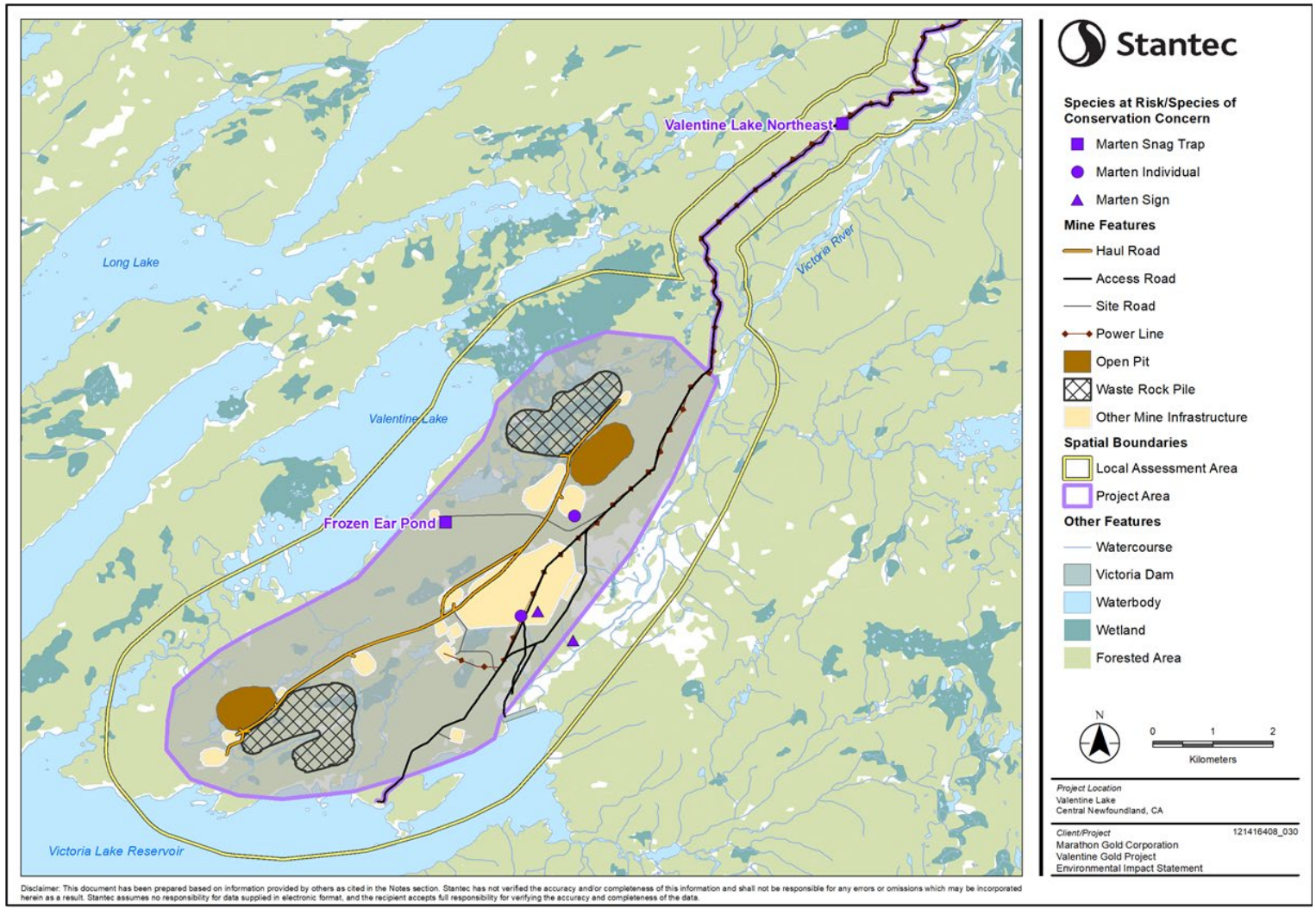

Figure 8-4 Marten Observations from Field Studies in Project Area, 2011-2019

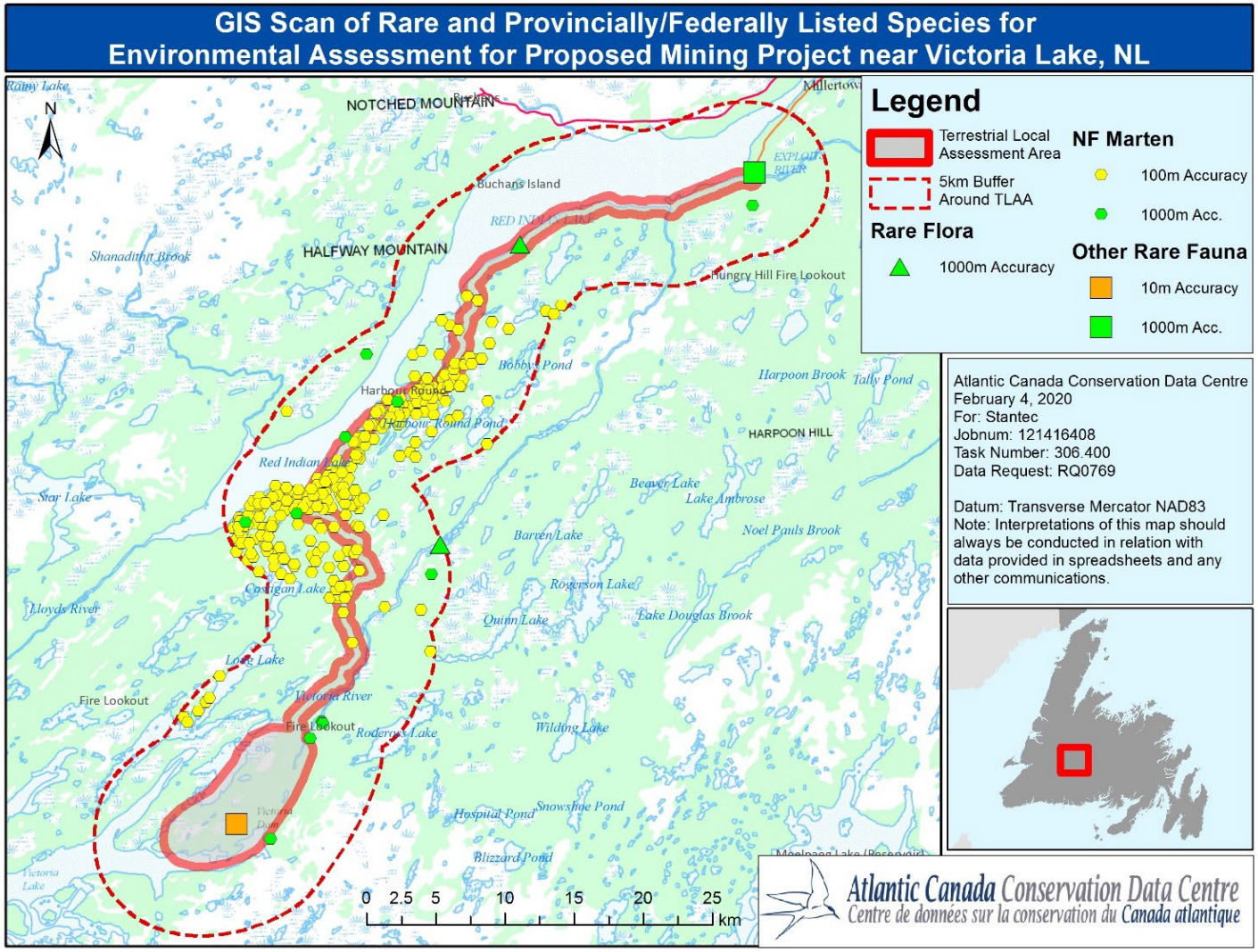

Figure 8-5 Marten Sightings within 5 km of LAA (Source AC CDC)

Habitat Occurrence in the Project Area

Marten generally select mature, dense canopy forest patches within a matrix of bogs and scrub (Smith and Schaefer 2002; Payer and Harrison 2003; Poole et al. 2004; Gosse et al. 2005; Hearn et al. 2010). Their habitat selection may be driven by the structural features of old-growth forest, such as multi-layered overstory, large-diameter trees, standing and fallen deadwood, coarse woody debris, and a dense understory. These attributes are important to marten as they offer increased prey availability and foraging efficiency (Andruskiw et al. 2008; Godbout and Ouellet 2010), warmer winter resting sites (Zalewski 1997), and protection from predators (Storch et al. 1990; Drew 1995; Godbout and Ouellet 2010). Defoliation, such as that caused by spruce bud worm, can increase coarse woody debris creating habitat selected by marten (Drew 1995).

Balsam Fir and Black Spruce Forests, and Wet Coniferous Forest are ranked as high value habitat types for marten in the Project Area and LAA (Table 8.3). The mixture of large-diameter mature trees, somewhat open shrub layer, and plentiful coarse woody debris are important to marten as they provide cover and protection, as well as prey availability (Thompson and Curran 1995; Godbout and Ouellet 2010; Hearn et al. 2010; Caryl et al. 2012). The amount of high value marten habitat in the Project Area, the LAA and the ELCA is 13.0 km^2 (37.5%), 38.4 km^2 (30.3%) and 490.7 km^2 (26.8%), respectively (Table 8.4).

Moderate ranked habitat types for marten include Kalmia-Black Spruce Woodland and Mixedwood Forest (Table 8.3). These habitats do not provide the complex structural features important to marten (Government of Canada 2007). Marten select habitats with a high percentage of tall spruce or fir trees, canopy closure, and woody debris (Bowman and Robitaille 1997), features which are not prevalent in Kalmia-Black Spruce Woodland or Mixedwood Forest Habitats. There are 9.6 km^2 (27.6%) of moderate ranked marten habitat in the Project Area, 27.6 km^2 (21.7%) within the LAA, and 388.0 km^2 (21.2%) within the ELCA (Table 8.4).

Regenerating Forest, Alder and Riparian Thickets, Open Wetlands, Open Water, Exposed Sand / Gravel Shoreline, and Anthropogenic habitats are ranked as low value for marten based on the amounts of foraging, protection and resting opportunities they offer (Table 8.3). Marten avoid regenerating forests (Potvin et al. 2002; Fuller and Harrison 2005; Hearn et al. 2010), riparian areas (Forsey and Baggs 2001), and open areas such as scrub forests, bogs and fens (Smith and Schaefer 2002; Gosse et al. 2005; Hearn et al. 2010). The area of low-ranked habitat was 12.1 km^2 (34.9%) in the Project Area, 61 km^2 (48%) within in the LAA, and 951.9 km^2 (52.0%) within the ELCA (Table 8.4).

The Project Area has a higher proportion of high and moderate -ranked habitat than the LAA and the ELCA (Table 8.4).

Limiting Factors

There are many factors that can limit marten populations. Sources of mortality for marten include predation by lynx, great horned owls, hawk owls and fox (Government of NL 2019d), and other marten

(Bull and Heater 2001). On the Island of Newfoundland, disease in marten (encephalitis) has caused considerable mortality in a population south of Corner Brook (Fredrickson 1990).

Habitat loss or alteration, and mortality from trapping and snaring may be the most important factors affecting marten populations (The Newfoundland Marten Recovery Team 2010). Habitat could be altered or made less suitable to marten through human activities including forest harvesting, agricultural development, mining operation, hydroelectric projects, and the construction of roads and power lines, or from natural disturbance (e.g., forest fire, insect infestation). Altered habitat may reduce availability of resting or denning sites, breeding habitat, or prey availability (Fuller and Harrison 2005; Godbout and Ouellet 2010), which could affect marten survival (Snyder and Bissonette 1987). Commercial forestry is the primary cause of habitat loss and fragmentation in marten habitat on the Island of Newfoundland (The Newfoundland Marten Recovery Team 2010).

Trapping and snaring are the other important sources of mortality for marten. Research in the Little Grand Lake / Red Indian Lake area reported that trapping and snaring accounted for nearly 50% of marten mortalities (Hearn 2007).

9.0 SUMMARY

Table 9.1 outlines SAR and SOCC that occur or have the potential to occur in or near the Project Area.

Table 9.1 All SAR and SOCC that Occur or have the Potential to Occur in or near the Project Area

Species	NL ESA Status	Federal Status		AC CDC
		SARA Listing	COSEWIC Assessment	
Short-scale sedge (*Carex deweyana*)	-	-	-	S2
Nodding water nymph (*Najas flexilis*)	-	-	-	S2
Perennial bentgrass (*Agrostis perennans*)	-	-	-	S2
Olive-sided Flycatcher (*Contopus cooperi*)	Threatened	Threatened (Schedule 1)	Special Concern	S3B, SUM
Common Nighthawk (*Chordeiles minor*)	Threatened	Threatened (Schedule 1)	Special Concern	SNA
Rusty Blackbird (*Euphagus carolinus*)	Vulnerable	Special Concern (Schedule 1)	Special Concern	S2S3B, SUM
Bank Swallow (*Riparia riparia*)	-	Threatened (Schedule 1)	Threatened	S1S2B, SUM
Grey-cheeked Thrush (*Catharus minimus*)	Threatened	-	-	S2B, SUM
Evening Grosbeak (*Coccothraustes vespertinus*)	-	Special Concern (Schedule 1)	Special Concern	S4
Red Crossbill (*Loxia curvirostra*)	Endangered	Threatened (Schedule 1)	Threatened	S1S2
Caspian tern (*Hydroprogne caspia*)	-	-	-	S2B
Nashville warbler (*Leiothlypis ruficapilla*)	-	-	-	S2B
Bay-breasted warbler (*Setophaga castanea*)	-	-	-	S2B
Harlequin Duck, Eastern pop. (*Histrionicus histrionicus* pop. 1)	Vulnerable	Special Concern	Special Concern	S3B, S2N, SUM
Barrow's Goldeneye (*Bucephala islandica*)	Threatened	Special Concern	Special Concern	S1N, SUM
Ivory Gull (*Pagophila eburnea*)	Endangered	Endangered	Endangered	S1N, SUM

Table 9.1 All SAR and SOCC that Occur or have the Potential to Occur in or near the Project Area

Species	NL ESA Status	Federal Status		AC CDC
		SARA Listing	COSEWIC Assessment	
Short-eared Owl (*Asio flammeus*)	Vulnerable	Special Concern	Special Concern	S3B, SUM
Chimney Swift (*Chaetura pelagica*)	Threatened	Threatened	Threatened	SNR
Barn Swallow (*Hirundo rustica*)	-	-	Threatened	S2B, SUM
Bobolink (*Dolichonyx oryzivorus*)	-	-	Threatened	S1B, SUM
American eel (*Anguilla rostrata*)	Vulnerable (2007)	Threatened	Threatened	S3
Woodland Caribou (*Rangifer tarandus*)	-	-	Special Concern	-
American marten (*Martes americana atrata*)	Threatened	Threatened (Schedule 1)	Threatened	S3
Northern long-eared bat (*Myotis septentrionalis)*	-	Endangered (Schedule 1)	Endangered	S2S3
Little brown bat (*Myotis lucifugus*)	-	Endangered (Schedule 1)	Endangered	S3S4

SAR: Unhighlighted cells; SOCC: Grey highlighted cells

S1: Critically imperiled in Newfoundland

S2: Imperiled in Newfoundland

S3: Vulnerable in Newfoundland.

S4: Apparently Secure - Uncommon but not rare in Newfoundland.

SU: Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

SNA: conservation status rank is not applicable because the species is not a suitable target for conservation activities in Newfoundland.

SNR: Unranked - Provincial conservation status not yet assessed

B: Breeding - Conservation status refers to the breeding population of the species in the province.

N: Nonbreeding - Conservation status refers to the non-breeding population of the species in the province

M: Migrant - Conservation status refers to the aggregating transient population of the species in the province.

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