BW GOLD LTD
a subsidiary company of Artemis Gold Inc

Blackwater Gold Project

Pre-construction Wildlife Baseline 2021

June 2022

Project No.: 0635833

The business of sustainability

ERM

June 2022

Blackwater Gold Project

Pre-construction Wildlife Baseline 2021

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ACRONYMS AND ABBREVIATIONS

Alpine	High-elevation land above the tree-line: alpine vegetation on zonal sites is dominated by low shrubs, herbs, bryophytes, and lichens. Although treeless by definition, patches of stunted (krummholz) trees may occur. Much of the alpine is covered by rock and ice rather than vegetation.
APLIC	Avian Power Line Interaction Committee
Artemis	Artemis Gold Inc.
ARU	Automated Recording Units
BAFA	Boreal Altai Fescue Alpine BEC zone
BC	British Columbia
BC CDC	British Columbia Conservation Data Centre - collects and disseminates information on plants, animals, and ecosystems (ecological communities) at risk at the provincial level, and is tied to Nature Serve, an international, non-profit organization of cooperating Conservation Data Centres and Natural Heritage Programs all using the BGC zone same methodology to gather and exchange information on the threatened elements of biodiversity.
BC MFLNRO	British Columbia Ministry of Forests, Land, and Natural Resource Operations, changed to Ministry of Forests
BC MOF	British Columbia Ministry of Forests, formerly Ministry of Forests, Land, and Natural Resource Operations
BC MOE	British Columbia Ministry of Environment
BC MWLAP	British Columbia Ministry of Water, Land, and Air Protection
BC *Wildlife Act* (1996)	The main provincial law for protecting wildlife, endangered species, and wildlife habitat. The Act has a number of provisions for protecting, managing, and purchasing habitat areas as well as protecting endangered and threatened species. The Act is administered by the Ministry of Environment.
BEC	Biogeoclimatic Ecosystem Classification: a standard, hierarchical classification system for mapping terrestrial ecosystems in British Columbia. Divided into zones and subzones.
Biogeoclimatic zone (BGC zone)	Biogeoclimatic zone; a provincial ecological classification which forms the basis of the BEC system and is defined as “a geographic area having similar patterns of energy flow, vegetation, and soils as a result of a broadly homogenous macroclimate”.
Blue listed	A list of ecological communities, and indigenous species and subspecies of special concern in British Columbia, maintained by the BC Ministry of Environment.
BW Gold	Blackwater Gold LTD.
CEAA	Canadian Environmental Assessment Act
CEA Agency	Canadian Environmental Assessment Agency
CI	Confidence Interval
CMMP	Caribou Mitigation and Management Plan

COSEWIC	Committee on the Status of Endangered Wildlife in Canada: a federal committee of experts that assesses and designates the level of threat to wildlife and vegetation species in Canada.
CWS	Canadian Wildlife Service
DS	Decision Statement
EA	Environmental Assessment
EAC	Environmental Assessment Certificate
EAO	Environmental Assessment Office (BC)
ECCC	Environment and Climate Change Canada
Ecosystem (terrestrial)	A volume of earth-space that is composed of non-living parts (climate, geologic materials, groundwater, and soils) and living or biotic parts, which are all constantly in a state of motion, transformation, and development. No size or scale is inferred.
ESSF	Engelmann Spruce – Subalpine Fir BEC zone
FC	Frequency
Forb	Non-grassy herbaceous plant
FSR	Forest Service Road
GPS	Global Positioning System
ha	Hectare: 10,000 m^2 or 0.01 km^2 or 2.47 acres
Habitat	Land and water surface used by wildlife, which may include biotic and abiotic aspects such as vegetation, exposed bedrock, water, and topography.
Herb	A plant, either annual, biennial or perennial, with stems that die back to the ground at the end of the growing season. Herbaceous species include forbs, graminoids (true grasses, sedges, and rushes), ferns, and fern allies (e.g., horsetails).
HSM	Habitat Suitability Modelling
kHz	Kilohertz
km	Kilometre
kV	Kilovolt
LDN	Lhoosk'uz Dené Nation
LPU	Local Population Unit
LRMP	Land and Resource Management Plan
LSA	Local Study Area, 27,589 ha in size
LWARS	Ministry of Land, Water, and Resource Stewardship
Migration	The regular seasonal or daily movement of animal populations to and from different areas, often considerable distances apart. Migration often occurs in corridors between preferred habitat types.

Migratory Birds Convention Act (1994)	A federal government commitment established in 1917 to protect most migrating birds found in Canada. The Act fulfilled the terms of the Migratory Birds Convention of 1916 between Canada and the United States of America (USA). The Canadian government has the authority to pass and enforce regulations to protect those species of migratory birds which are included in the Convention.
Model	An idealized representation of reality developed to describe, analyze, or understand the behaviour of some aspect of it a mathematical representation of the relationship under study.
MOF	Ministry of Forests
New Gold	New Gold Inc.
Parkland	Subalpine area characterized by forest clumps interspersed with open subalpine meadows and shrub thickets. Vegetation cover may vary in the proportion of treed patches, meadows, and shrub thickets. The term parkland can also be used for lower elevation forest that are open due to restricted moisture availability, such as occurs in the Ponderosa Pine zone.
RIC	Resource Inventory Committee: a body of the BC government that develops survey standards for BC wildlife and ecosystems.
RISC	Resource Information Standards Committee, formerly the Resource Inventory Committee
RSA	Regional Study Area – 274,098 ha in size
SAC	Species Accumulation Curve: a calculation showing the rate of newly detected species with additional sampling, used to estimate the number of species present in a regional community.
SARA	*Species at Risk Act* (2002b): A Canadian federal statute which is designed to meet one of Canada's commitments under the International Convention on Biological Diversity. The goal of the Act is to protect endangered or threatened organisms and their habitats. It also manages species which are not yet threatened, but whose existence or habitat is in jeopardy.
SBS	Sub-Boreal Spruce BEC Zone
TEM	Terrestrial Ecosystem Mapping
The Project	Blackwater Project
TK	Traditional Knowledge
Topography	The configuration of a surface, including its relief and the position of its natural and man-made features.
TSF	Tailings Storage Facility
UFN	Ulkatcho First Nation
Upland Bird	Interior forest breeding birds
USA	United States of America
UWR	Ungulate Winter Range: an area identified by the BC Ministry of Environment as "an area that contains habitat that is necessary to meet the winter habitat requirements of an ungulate species".

VRPC	Variable Radius Point Count
Wetland	Sites dominated by hydrophytic vegetation where soils are water-saturated for a sufficient length of time such that excess water and resulting low soil oxygen levels are principal determinants of vegetation and soil development (MacKenzie and Moran 2004).
WHA	Wildlife Habitat Area
WMMP	Wildlife Mitigation and Monitoring Plan
WMU	Wildlife Management Unit - The BC government divides the province into regions (i.e., WMU) for purposes of managing wildlife harvest.

1. INTRODUCTION

Blackwater Gold LTD. (BW Gold) conducted a series of baseline and pre-construction environmental studies to inform management and monitor impacts on wildlife during construction, operation, closure, and post-closure of the Blackwater Project (the Project) area. A number of desk-based and field inventory studies were undertaken as part of the Environmental Assessment (EA), with wildlife data collected during 2011 to 2013 and 2016 to 2017. The Project received an Environmental Assessment Certificate (EAC) #M19-01 on June 21, 2019 under the 2002 *Environmental Assessment Act* (BC EAO 2019) and a Decision Statement (DS) on April 15, 2019 under the *Canadian Environmental Assessment Act, 2012* (CEA Agency 2019)

Federal DS conditions specify requirements to update wildlife baseline information prior to Project construction. Provincial conditions also require identification of sensitive wildlife features and habitat prior to Project construction. Pre-construction surveys were completed during the summer of 2021 to confirm species presence, inform planning, verify habitat suitability models, and identify areas for mitigation before the start of the Project's construction phase. This report details the 2021 pre-construction baseline surveys and summarizes previous baseline information with an emphasis on species occurrences and known sensitive sites for wildlife. The compiled baseline information will inform the species-specific management and monitoring detailed in the Wildlife Mitigation and Monitoring Plan (WMMP).

Wildlife field studies focused on three wildlife communities:

- The mammal community; moose (*Alces alces*), caribou (*Rangifer tarandus*), grizzly bears (*Ursus arctos horribilis*), furbearers (American marten [*Martes americana*], fisher [*Pekania pennanti*], wolverine [*Gulo gulo*]), and bats;
- The avian community; raptors, waterbirds, and upland breeding birds, with specific focus on species at risk; and
- The amphibian community, with focus on western toads (*Anaxyrus boreas*).

1.1 Objectives

The overall goal of conducting wildlife pre-construction baseline studies in 2021 was to characterize the wildlife community in preparation for Project development. Pre-construction baseline surveys were designed to fulfil federal and provincial commitments, and commitments based on discussion with CWS, ECCC, and MOF during the EA review process (Table 1.1-1). The specific objectives of the wildlife baseline studies were to:

- Characterize occurrence and distribution of focal wildlife species and species at risk;
- Identify sensitive sites, including breeding areas, dens, mineral licks, and wildlife trails which will require mitigation and management in the Project local study area (LSA) and regional study area (RSA);
- Validate and update existing habitat suitability models for American marten, caribou, fisher, grizzly bear, moose, short-eared owl, interior forest breeding (upland) birds, waterfowl, and wolverine.

Table 1.1-1: Wildlife Species for Pre-construction Baseline Studies in 2021

Species	Relevant Commitments	Reason for Study
Moose	DS Conditions 6.14, 8.2, 8.6 EAC Conditions 23c and 23d	■ Update and validate Habitat Suitability Modelling (HSM) within the mine site and transmission line LSAs. ■ Establish a database of known habitat features (mineral licks). ■ Identify moose and moose sheds around Mount Davidson.
Caribou	DS Conditions 8.2 and 8.6 EAC Condition 23c	■ Update and validate HSM within the mine site and transmission line LSAs. ■ Establish a database of known habitat features. ■ Assess habitat and wildlife use in potential caribou offsetting locations (Capoose and Johnny Lake areas).
Grizzly Bear	DS Condition 8.10 EAC Conditions 23c and 23d	■ Update and validate HSM within the mine site and transmission line LSAs. ■ Identify denning habitat.
Furbearers	DS Condition 8.10 EAC Condition 23c	■ Update and validate HSM for American marten and fisher within the mine site and transmission line LSAs. ■ Identify denning habitat.
Bats	DS Conditions 8.14 and 8.15 EAC Condition 23c	■ Identify suitable roosting and hibernating habitat, establish list of roosting and hibernating features. ■ Identify and inventory any bat hibernacula and roosts within the LSA and RSA.
Raptors	DS Condition 8.16	■ Identify suitable breeding habitat for short-eared owl, and conduct surveys in suitable areas. ■ Identify raptor nests in the mine site LSA which may require mitigation and management during construction.
Waterbirds	DS Condition 4.3 and 4.4	■ Update and validate HSM for focal waterbird species. ■ Targeted surveys for species of conservation concern.
Upland Breeding Birds	DS Condition 4.3	■ Validate interior forest habitat suitability model. ■ Survey for species of conservation concern.
Western Toad	DS Condition 8.10	■ Identify breeding habitat and breeding locations.
Multiple Species	DS Condition 8.2	■ Identify wildlife trails and locations which may interact with Project features such as roads.

2. PROJECT DESCRPTION

The Project is a proposed gold and silver open pit mine located in central British Columbia (BC), 160 kilometres (km) southwest of Prince George, BC. The Project is located within the traditional territories of Lhoosk'uz Dené Nation (LDN), Ulkatcho First Nation (UFN), Skin Tyee Nation and Tsilhqot'in Nation. The Kluskus and Kluskus-Ootsa Forest Service Roads (FSRs) and Project transmission line cross the traditional territories of Nadleh Whut'en First Nation, Saik'uz First Nation, and Stellat'en First Nation (collectively, the Carrier Sekani First Nations) as well as the traditional territories of the Nazko First Nation, Nee-Tahi-Buhn Band, Cheslatta Carrier Nation and Yekooche First Nation (BC EAO 2019a, 2019b).

Mineral tenures, assets, and rights for the Project were transferred from New Gold Inc. (New Gold) to Artemis Gold Inc. (Artemis) in August 2020. The Project is currently held by BW Gold Ltd. a wholly-owned subsidiary of Artemis. Project construction is estimated to last 18 to 24 months and includes the establishment of a tailings storage facility (TSF), ore processing facilities, waste rock, overburden, and soil stockpiles, borrow areas and quarries, water management infrastructure, water treatment plants, accommodation camps and ancillary facilities. A 135 km, 230 kilovolt (kV) overland transmission line will supply electrical power to the project from the Glenannan substation BC Hydro grid.

3. STUDY AREAS

Wildlife species were characterized for two study areas: Regional Study Area (RSA) and Local Study Area (LSA; Figure 3-1). The RSA, 274,098 hectare (ha) in size, was delineated to reflect the area anticipated to provide habitat for wildlife species that may come in contact with proposed Project infrastructure during the course of a season or lifetime. Species information, including home range sizes, habitat use, and seasonal movement patterns, were considered when selecting the RSA boundary. Other ecological factors, such as height of land (which can act as a barrier to movement) and watershed boundaries were also considered when delineating study areas.

The RSA extends roughly 15 km from the designated Project area (Figure 3-1). Ecologically, the RSA is composed of primarily coniferous forest, with mixed areas of young forest plantations, mature and old growth forest, and small portions of sub-alpine and alpine mountain. The majority of the RSA is represented by the biogeoclimatic ecosystem classification (BEC) units of Engelmann Spruce – Subalpine Fir (ESSF) and Sub-boreal Spruce (Figure 3-1).

The LSA, 27,589 ha in size, includes a buffer extending at least to the height of land or 1 to 1.5 km around the outer limits of the proposed infrastructure and linear developments (the mine site including the access road, fresh water pipeline, and airstrip, as well as the transmission line). The 2021 pre-construction baseline work focused on the LSA because 1) many objectives were focused on validating existing baseline information, rather than collecting completely new broad-scale baseline data, and 2) data will help inform monitoring and management actions described in the WMMP, requiring fine scale assessments closer to the Project.

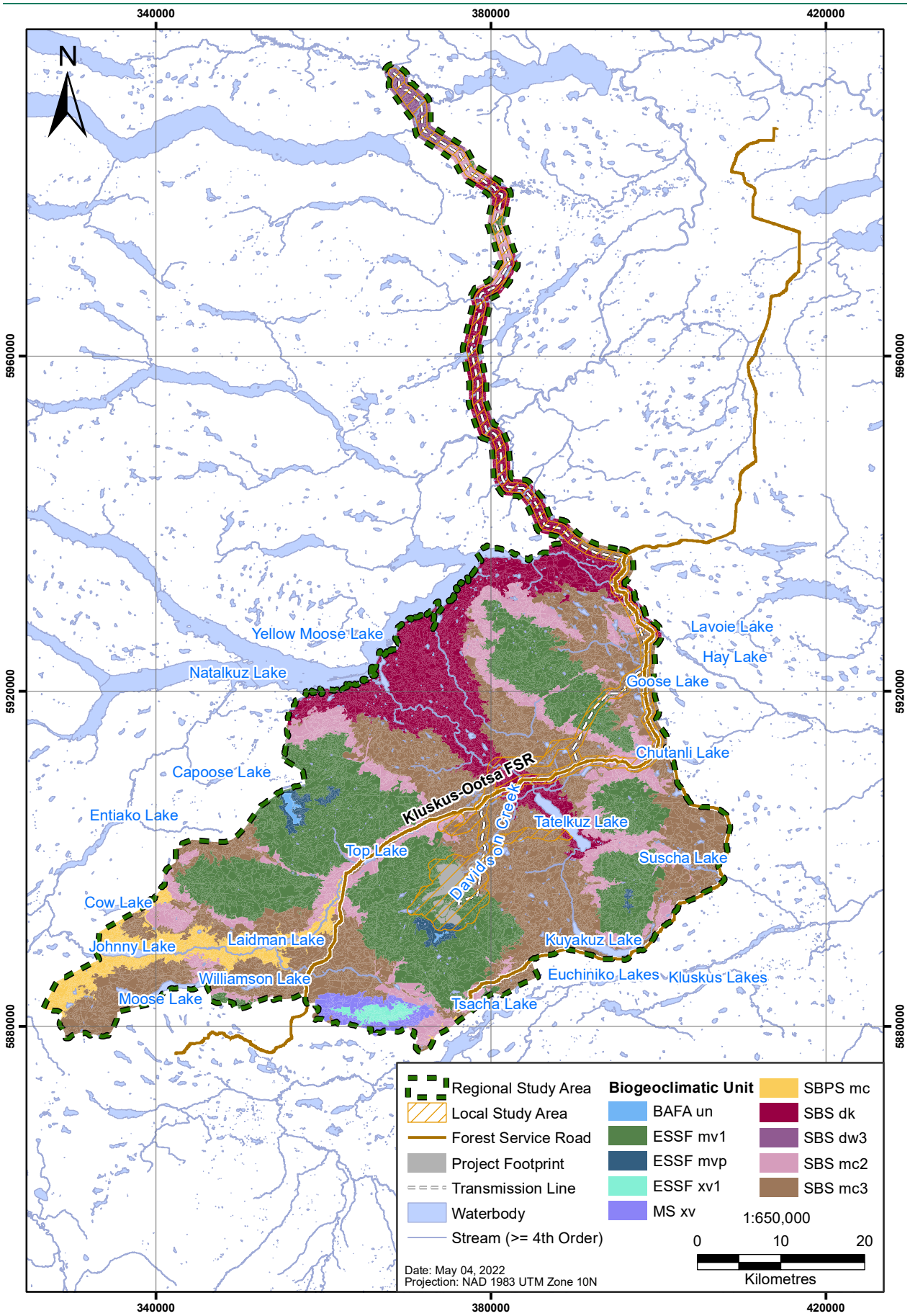

Figure 3-1: Local and Regional Study Areas of the Blackwater Project

4. BACKGROUND INFORMATION

Wildlife management practices are informed by legislation, land and regional management plans, relevant published literature, and existing projects in the region. These sources provide context and guidance for the existing baseline study and are summarized in the following sections.

4.1 Applicable Provincial and Federal Legislation

Applicable legislation for wildlife has been summarized in Table 4.1-1. Land use as it pertains to wildlife is guided in two ways:

1. Wildlife Legislation, which includes the relevant statute laws, such as Acts and associated regulations developed by provincial and federal administration, as well as best management practices; and
2. Land Management Plans, which are guidelines developed by user groups and stakeholders to identify and integrate local resource values with development.

Table 4.1-1: Summary of Relevant Acts or Regulations for Wildlife and Wildlife Habitat

Act or Regulation	Implications for Management
BC *Wildlife Act* (1996)	■ Protects most vertebrate animals from direct harm or harassment except as allowed by regulation (e.g., hunting or trapping). Legal designation provides additional protection for selected Red and Blue listed species and their residences. ■ Section 34 of the Act specifically protects birds and their eggs from possession, molestation, injury, or destruction; the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons, and burrowing owls year-round; and the nests of all other birds when the bird or their eggs are in the nest. ■ Section 9 of the Act specifically protects a beaver or muskrat house, den, or dam from disturbance, molestation, or destruction, except in the case of trappers licensed under the Act. ■ Alteration or removal of a beaver dam is permitted under the *Wildlife Act* “to provide irrigation or drainage under lawful authority for the protection of property” and for drainage purposes with specific restrictions. To remove a beaver dam or muskrat house, the Ministry must be notified at least 45 days in advance of the removal project.
Canada *Migratory Birds Convention Act* (1994)	■ Prohibits the taking or killing of migratory birds, their nests, and eggs, and the deposition of harmful substances in areas frequented by migratory birds. ■ Species protected include waterfowl, cranes, rails and coots, shorebirds including gulls and terns, pigeons and doves, insectivorous songbirds (excluding blackbirds), seabirds, loons, grebes, herons, egrets, and bitterns.
Canada *Species at Risk Act* (2002b)	■ Protects wildlife present on the Schedule 1 “List of Wildlife Species at Risk” on federal lands as well as the critical habitat of those species. ■ Section 137 amends the *Canadian Environmental Assessment Act* (CEAA) to clarify, for greater certainty, that EAs must always consider effects to listed wildlife species, their critical habitat, or the residences of individuals of that species. ■ Section 79(2) states “the person must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans.”

Act or Regulation	Implications for Management
BC *Forest and Range Practices Act* (2002a)	■ Section 149.1 of the Act authorizes the minister responsible for the *Wildlife Act* to establish one or more of the following: ○ an area as an ungulate winter range and objectives for the ungulate winter range; ○ an area as a wildlife habitat area (WHA) and objectives for the WHA; ○ a general wildlife measure (e.g., restriction of activities in a WHA, or protection of wildlife habitat feature(s) in an area); and ○ categories of wildlife for the purposes of subparagraphs above. ■ Section 150.5 of the Act authorizes the establishment of riparian reserve zones, riparian management zones, and riparian management areas for different classes of streams, wetlands, and lakes.
BC *Water Act* (1988)	■ Any proposed works in or about a stream must protect fish and wildlife habitat. ■ The Act applies to the quantity and quality of water on which fish or wildlife depend directly or indirectly to carry out their life processes, spawning grounds, and nursery, rearing, food supply, and migration areas. ■ Under Part 7 of the BC *Water Act Regulation*, works must meet the standards under Section 42 (1) and (2), regardless of the type of work, including: ○ the timing window or the period(s) of time in the year during which the change can proceed without causing harm to fish, wildlife, or habitat; ○ the minimum instream flow or the minimum flow of water that must remain in the stream while the change is made; ○ the removal of material from the stream or stream channel in connection with the change; ○ the addition of substance, sediment, debris, or material to the stream or stream channel in connection with the change; ○ the salvage or protection of fish or wildlife during or after the change is made; ○ the protection of natural materials and vegetation that contribute to habitat or stream channel stability; ○ the restoration of the worksite after the change has been made; and ○ the requirement to obtain an approval from the federal Department of Fisheries and Oceans in connection with the change.
BC Order – Ungulate Winter Range (Caribou) #U-7-012	■ Provincially designated northern caribou winter range polygons and associated management regulations for that area. Polygons and details on measures, including timing restrictions and set back distances for development activities, are described in detail in the Order (BC MOE 2008).

Wildlife and wildlife habitat are protected under provincial and federal legislation, such as the BC *Wildlife Act* (1996), the Canada *Migratory Birds Convention Act* (1994), the Canada *Species at Risk Act* (SARA; 2002b), the BC *Forest and Range Practices Act* (2002a), and the BC *Water Act* (1988). Provincial and federal legislation and regulations, along with best management practice guidelines and standards, help to ensure that developments are designed and carried out in an environmentally responsible manner.

Provincial forests within the RSA are administered by the Ministry of Forests (MOF), with additional oversight from the Ministry of Land, Water, and Resource Stewardship (LWARS). The Project is located in the Northern Interior forest region and Vanderhoof forest district. Forestry is active within the RSA, designated within the Prince George Timber Supply Area. The RSA overlaps two regions, with the transmission line and northern RSA in Omenica Region 7A and the southern portion of the RSA in Cariboo Region 5, within Wildlife Management Units (WMU) 7-11, WMU 7-12, and WMU 5-13. A provincially

designated caribou winter range order (#U-7-012) contains habitat polygons that overlap the western RSA (BC MOE 2008).

4.2 Guidelines and Best Management Practices

In general, standards and best practices are guiding statements that allow development to occur in a way that will avoid, limit, or mitigate effects on aquatic and riparian habitats, water quality and quantity, fish and wildlife species, and public safety and property. Following definitions in the *Standards and Best Practices for Instream Works* (BC MWLAP 2004d), "standard" is a regulatory requirement that must be followed or achieved in the design and completion of developments. "Best practice" is a recommended method or technique that should be followed to ensure the standards are met and effects are mitigated.

Best management practices and guidelines relevant to the Project include the following:

- BC Resources Inventory Standards Committee (RISC); formerly Resource Inventory Committee (RIC). The RISC establishes standards for collecting, interpreting, and reporting natural inventory data. RISC have published standards for surveying key wildlife species and groups in the province (RISC 2007).
- BC Conservation Data Centre (CDC) systematically collects and disseminates information on plants, animals, and ecosystems at risk in BC (BC CDC 2022).
- *Species at Risk Act* (SARA) recovery strategies or management plans, which are sometimes available to guide management and recovery of federally listed species at risk (Government of Canada 2022b).
- *Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia*. This document provides value-specific guidance for BC's North Area (Omineca, Peace, and Skeena Regions) specifically addressing threats to wildlife and mitigations from industrial development activities (BC MFLNRO 2014).
- *Develop with Care, Environmental Guidelines for Urban and Rural Land Development in British Columbia* provides resources for developers and managers to maintain and create environmental functioning for urban and rural development projects (BC MOE 2006). This resource includes two additional documents with narrower wildlife focus:
  - Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia (BC MWLAP 2004b).
  - Best Management Practices for Raptor Conservation during Urban and Rural Land Development in British Columbia (BC MOE 2013).
- *Best Management Practices Guidelines for Bats in British Columbia* describes potential risks and impacts of development projects on BC bats and their habitats, and provides guidelines to minimize them (Holroyd and Craig 2016).
- Environment and Climate Change Canada's (ECCC's) *Avoidance Guidelines* describe federally supported best practices for avoiding harm to migratory birds(ECCC 2021).
- Reducing Avian Collisions with Power Lines (APLIC 2006, 2012).
- Guidelines for wetlands and waterbodies include:
  - Standards and Best Practices for Instream Works (BC MWLAP 2004d).
  - Wetlands EA Guideline (Milko 1998).
  - Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia (WSP 2009).

4.3 Land Management Plans

The project falls within Vanderhoof Land & Resource Management Plan (LRMP) and Access Management Plan (BC ILMB 1997). These plans are developed by a stakeholder-based process that attempts to integrate the various environmental, social, and economic values of the area while providing guidelines for regional resource development. Land & Resource Management Plan are sub-regional, integrated resource plans that establish the framework for land use and resource management objectives and strategies that provide a basis for detailed management planning. Regional plans or LRMPs (sub-regional plans) often result in broad land use zones delineated on a map with resource management objectives, broad strategies for integrating resource use, socio-economic analysis, mechanisms for plan implementation, monitoring, and interpretation.

The Vanderhoof LRMP was created to stabilize resource-based industries, improve tourism, establish six protected areas, and protect wildlife habitats and populations within a 13,800 km^2 area. Land use and resource management activities must follow Crown Land and resource management legislation, policies, and regulations. Recommendations include the management of sensitive species and species at risk, such as moose, grizzly bear, bald eagle (*Haliaeetus leucocephalus*), trumpeter swan (*Cygnus buccinator*), great blue heron (*Ardea herodias*), and American bittern (*Botaurus lentiginosus*).

4.4 Existing Inventories

Baseline inventories were conducted in 2012, 2013 and 2017 to contribute to the EA (ERM 2018). The 2021 pre-construction baseline surveys were conducted to supplement and update existing baseline inventories. Each species monitoring section (within Sections 6 to 8) includes a summary of the existing baseline information, in addition to the updated 2021 pre-construction baseline.

5. SPECIES MONITORED

The 2021 pre-construction baseline monitoring activities aim to update and verify baseline data conducted prior to receipt of the EAC.

5.1 Species of Conservation Concern

Species of conservation concern were a focus of the 2021 pre-construction baseline surveys. The provincial and federal conservation status was determined for those species that have been confirmed or potentially occur in the RSA. No species of international conservation concern are known to occur in the RSA. BC provincial rankings are categorized as either Red (Endangered, Extirpated, or Extinct), Blue (Special Concern), or Yellow (Not at Risk), and the categories used in the federal listing under the *Species at Risk Act* (SARA) are based on assessments conducted by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). For the purposes of this report, species of conservation concern include:

1. Species or populations on the provincial Red and Blue lists and/or provincially ranked as critically imperiled, imperiled, and vulnerable (BC Conservation Data Centre, BC CDC 2022);
2. Species classified by COSEWIC as endangered, threatened, or special concern (Government of Canada 2021); and
3. Species listed on Schedule 1 of SARA (Government of Canada 2022a).

From federal and provincial lists, there are 42 species of conservation concern (1 amphibian, 30 birds, and 11 mammals; Table 5.1-1) that may occur in the region.

Table 5.1-1: Potentially Occurring Vertebrate Species of Conservation Concern

Common Name	Scientific Name	BC Rank*	BC List[1]	COSEWIC[2]	SARA[3]
Amphibians					
Western Toad	*Anaxyrus boreas*	S4	Yellow	SC	SC
Birds					
American Bittern	*Botaurus lentiginosus*	S3B,SNRN	Blue	-	-
American Golden-plover	*Pluvialis dominica*	S3S4B	Blue	-	-
American White Pelican	*Pelecanus erythrorhynchos*	S1B	Red	NAR	-
Band-tailed Pigeon	*Patagioenas fasciata*	S3S4	Blue	SC	SC
Bank Swallow	*Riparia riparia*	S4B	Yellow	T	T
Barn Swallow	*Hirundo rustica*	S3S4B	Blue	T	T
Black Swift	*Cypseloides niger*	S2S3B	Blue	E	E
Bobolink	*Dolichonyx oryzivorus*	S3B	Blue	T	T
Brant[4]	*Branta bernicla*	S3M	Blue	-	-
Broad-winged Hawk	*Buteo platypterus*	S3?B	Blue	-	-
California Gull[4]	*Larus californicus*	S2S3B	Blue	-	-
Common Nighthawk	*Chordeiles minor*	S4B	Yellow	SC	T

Common Name	Scientific Name	BC Rank*	BC List[1]	COSEWIC[2]	SARA[3]
Birds *(cont'd)*					
Eared Grebe	*Podiceps nigricollis*	S3B	Blue	-	-
Great Blue Heron, *herodias* ssp.	*Ardea herodias herodias*	S3?	Blue	-	-
Gyrfalcon	*Falco rusticolus*	S3S4B,SNRN	Blue	NAR	-
Harlequin Duck	*Histrionicus histrionicus*	S4B,S3N	Yellow	-	-
Horned Grebe	*Podiceps auritus*	S4B,SNRN	Yellow	SC	SC
Horned Lark, *merrilli* ssp.	*Eremophila alpestris merrilli*	S3?	Blue	-	-
Long-tailed Duck[4]	*Clangula hyemalis*	S2S3B,S4N	Blue	-	-
Olive-sided Flycatcher	*Contopus cooperi*	S3S4B	Blue	SC	T
Peregrine Falcon, *anatum* ssp.[4]	*Falco peregrinus anatum*	S2?	Red	NAR	SC
Pine Grosbeak, *carlottae* ssp.	*Pinicola enucleator carlottae*	S3	Blue	-	-
Rough-legged Hawk[4]	*Buteo lagopus*	S3N	Blue	NAR	-
Rusty Blackbird	*Euphagus carolinus*	S3S4B	Blue	SC	SC
Sharp-tailed Grouse, *columbianus* ssp.	*Tympanuchus phasianellus columbianus*	S2S3	Blue	-	-
Short-eared Owl	*Asio flammeus*	S3B,S2N	Blue	SC	SC
Surf Scoter[4]	*Melanitta perspicillata*	S3B,S4N	Blue	-	-
Swainson's Hawk	*Buteo swainsoni*	S2B	Red	-	-
Western Grebe	*Aechmophorus occidentalis*	S1B,S2N	Red	SC	SC
Yellow Rail	*Coturnicops noveboracensis*	S2B	Red	SC	SC
Mammals					
American Marten	*Martes americana*	S5?	Yellow	-	-
Bighorn Sheep	*Ovis canadensis*	S3?	Blue	-	-
Caribou (Northern Mountain Population)	*Rangifer tarandus* pop. 15	S2S3	Blue	SC	SC
Caribou (Southern Mountain Population)	*Rangifer tarandus* pop. 1	S1	Red	E	T
Grizzly Bear	*Ursus arctos*	S3?	Blue	SC	SC
Little Brown Myotis	*Myotis lucifugus*	S4	Yellow	E	E
Mountain Goat	*Oreamnos americanus*	S3	Blue	-	-
Northern Myotis	*Myotis septentrionalis*	S3S4	Blue	E	E
Townsend's Big-eared Bat	*Corynorhinus townsendii*	S3S4	Blue	-	-

Common Name	Scientific Name	BC Rank*	BC List[1]	COSEWIC[2]	SARA[3]
Mammals *(cont'd)*					
Western Small-footed Myotis	*Myotis ciliolabrum*	S2S3	Blue	-	-
Wolverine*, luscus* spp.	*Gulo gulo luscus*	S3	Blue	SC	SC

** Question marks indicate inexact or uncertain species rankings, as designated by the BC Species Listing.*

[1] BC List Status: Red = Extirpated, Endangered, or Threatened; Blue = Special Concern; Yellow = Not At Risk (BC CDC 2022).

[2] COSEWIC Ranks: E = Endangered; T = Threatened; SC = Special Concern; NAR = Not At Risk; DD = Data Deficient (Government of Canada 2021).

[3] Species at Risk Act *(SARA) Federal Schedule 1 Rank: E = Endangered; T = Threatened; SC = Special Concern (Government of Canada 2022a).*

[4] Species with migration paths overlapping the RSA but which do not breed or overwinter in the area.

6. MAMMAL COMMUNITY

The following sections summarize mammalian studies conducted in the Project LSA and RSA from 2011 to 2021, including desk-based and field research. This inventory focused on mammal species or groups that may occur in the study area, that were identified as provincial or federal conservation concern, or are of cultural, social, economic, or biological importance within the province according to various sources such as local First Nations and regional management plans developed by provincial agencies (see Section 4).

Mammal baseline studies focused on moose, caribou, grizzly bear, furbearers (American marten and fisher), and bats. Studies were designed to establish baseline information on species presence, distribution, and habitat use, and to identify important habitat areas within the wildlife LSA and RSA. These studies were used to identify the characteristics of occupied habitats, and verify existing habitat suitability mapping (HSM) for these species.

6.1 Moose

Moose (*Alces alces*) occur commonly throughout the forested areas of BC. Although moose are not listed by COSEWIC, SARA or BC CDC, they are important to First Nations, the public, and are managed for hunting purposes. Moose in BC are highly valued for food, social, and ceremonial purposes by First Nations, for recreational and commercial harvest opportunities by licensed hunters, and for wildlife viewing (BC MFLNRO 2011). Moose are protected by the provincial *Wildlife Act* (1996), whereby harvesting activities by non-First Nations hunters are permitted under hunting licenses. There is one designated ungulate winter range (UWR) U-7-012 southwest of the mine site LSA which provides protected habitat for moose(BC MOE 2008).

Moose are browsers, foraging on stems and twigs of woody plants in winter, and the leaves of succulent shoots of shrubs and trees during the rest of the year; seasonal availability of forage influences habitat use (Bowyer, Ballenberghe, and Kie 2003). Individual moose may migrate seasonally, the timing of which is dependent on weather events such as snowfall.

Management recommendations established by the Vanderhoof LRMP for moose are relevant to all areas within the Project LSA and RSA that are deemed suitable moose habitat (BC ILMB 1997). Recommended management for areas with suitable moose habitat includes strategies such as minimizing vegetation management in riparian areas and winter range habitats and establishing a forest buffer around critical seasonal habitats.

Pre-construction field surveys were conducted in 2021 to update moose habitat suitability modelling. Field verification surveys were completed to identify areas of the mine site and transmission line LSAs that needed further assessment for moose suitability; these results were presented in a separate memo to comply with EAC Condition 23d (Appendix A).

6.1.1 Existing Baseline Data

Baseline surveys for moose were conducted in 2011-2013, 2016, and 2018.

Aerial and ground winter tracking surveys were conducted in 2011-2013, along with incidental detections of moose (Figures 6.1-1 and 6.1-2). Across all three years, moose were detected at 18 survey locations in the LSA (n = 10) and RSA (n = 8). Aerial reconnaissance transects were flown on March 16, 2011, along the mine site LSA and in the RSA along the slopes of Mount Davidson. Aerial surveys detected moose at several locations throughout the Project LSA and RSA (Figure 6.1-2). Habitat along the lower riparian areas of Mathews Creek, Laidman Lake, Fawnie Creek, and associated wetlands with well-developed shrub complexes appeared to provide high quality wintering habitat for ungulates.

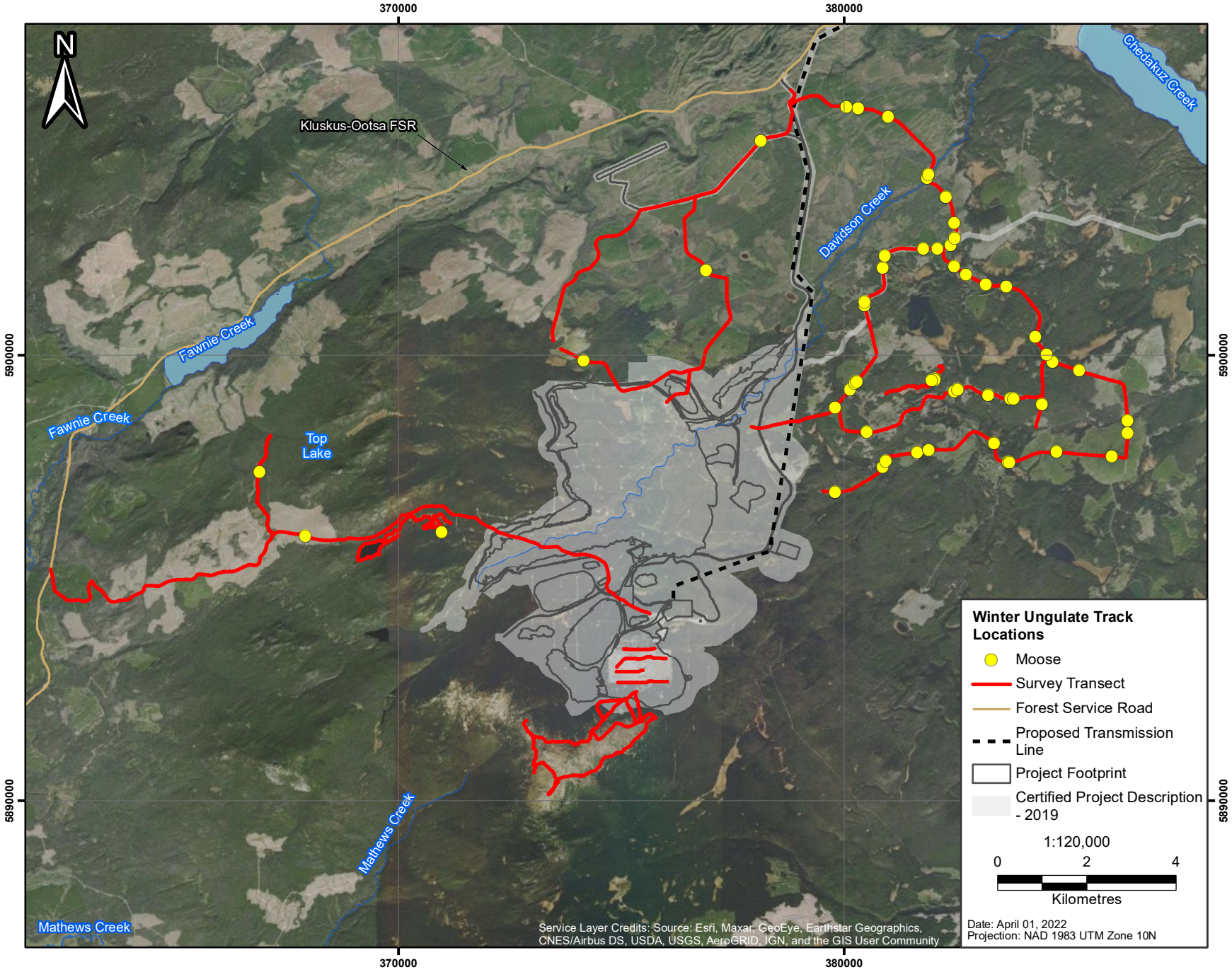

Figure 6.1-1: Ungulate Winter Ground Track Locations, 2011-2013

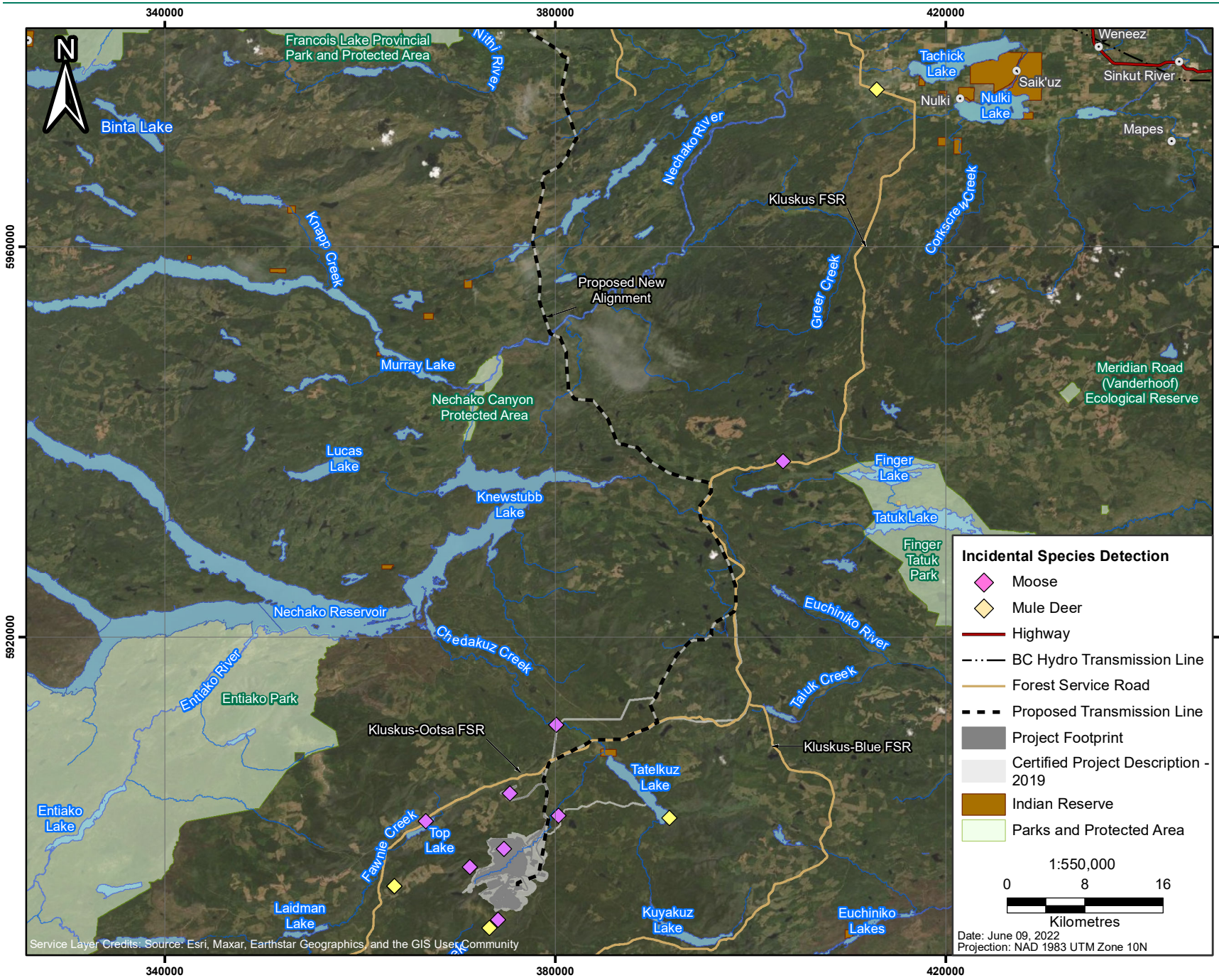

Figure 6.1-2: Ungulate Detections, 2011-2013

Ground winter tracking surveys were completed at 16 transects (97.4 km) from March 12 to 16, 2012, along the mine site LSA and portions of the RSA. The winter track surveys did not detect moose on Mount Davidson. Moose were more commonly detected along the lower Davidson road network rather than at the higher elevation mine site, which had greater snow depths (Figure 6.1-1). The highest use areas for moose were in the lower elevation pine habitats, cutblocks, and along riparian corridors within the RSA. Habitat along the lower riparian areas of Matthews Creek, Laidman Lake, Fawnie Creek, and associated wetlands with well-developed shrub complexes appeared to provide high quality wintering habitat for ungulates.

Moose sign in the form of scat, beds, rub, and browse were recorded during other wildlife surveys throughout the mine site and LSA in the ESSFmvp, SBSmc2, and Sub-Boreal Spruce Zone (SBS) mc3 biogeoclimatic zones. Incidental detections of moose use were recorded in a number of locations along the Davidson Creek corridor (Figure 6.1-2). Both winter and summer browse sign of this ungulate was recorded in 25% of the TEM plots that occurred within the mine site LSA and RSA. A moose lick recorded within the mine site during 2011-2013 surveys was filled in before completion of the baseline EA; no additional details are available, but the lick no longer exists. During 2013 remote camera surveys for bears, moose were detected at three wildlife cameras located within the mine site and LSA (Figure 6.1-2).

Habitat suitability mapping was completed in 2013 for summer (growing) and winter (living) moose habitat in the RSA (Appendix A Figures 3.2-1 and 3.2-2).

BW Gold conducted an aerial survey of the Mount Davidson area on December 19, 2016. This survey was requested by First Nations to determine fall usage of the area by moose. Of the ten moose observed during the 2016 aerial surveys there were two bulls, seven cows, and one calf identified at nine locations (Figure 6.1-3). Observations were primarily of solitary bulls or cows, with the exception of one cow calf pairing. Detections of moose during the 2016 surveys were primarily in and around the southern portion of the mine site LSA with the majority of detections just south of the mine site LSA (n = 6). Two cows were seen within the mine site LSA and the cow calf pairing being observed at the west border of the mine site LSA. An additional aerial survey for moose was completed on February 18, 2018. Of the 12 moose observed during the 2018 aerial surveys there were four bulls, six cows, and two calves identified at nine locations (Figure 6.1-3). Two cow calf pairings and one cow bull pairing was observed, with the remaining observations being solitary bulls or cows. Detections of moose during the 2018 surveys were primarily located north of the mine site LSA scattered around the transmission line LSA, Klusks-Ootsa FSR and Tatelkuz Lake.

6.1.2 Objectives

The specific objectives of the pre-construction 2021 baseline moose study were to:

- Conduct field assessments for moose habitat suitability to update existing habitat suitability models (Appendix A; EAC Condition 23d);
- Conduct an early winter survey for moose and moose sheds around Mount Davidson (DS Condition 6.14); and
- Identify key moose habitat features in the mine site and transmission line LSAs, including mineral licks and wildlife trails that may intersect with Project roads or infrastructure (DS Conditions 8.2 and 8.6, EAC Condition 23c).

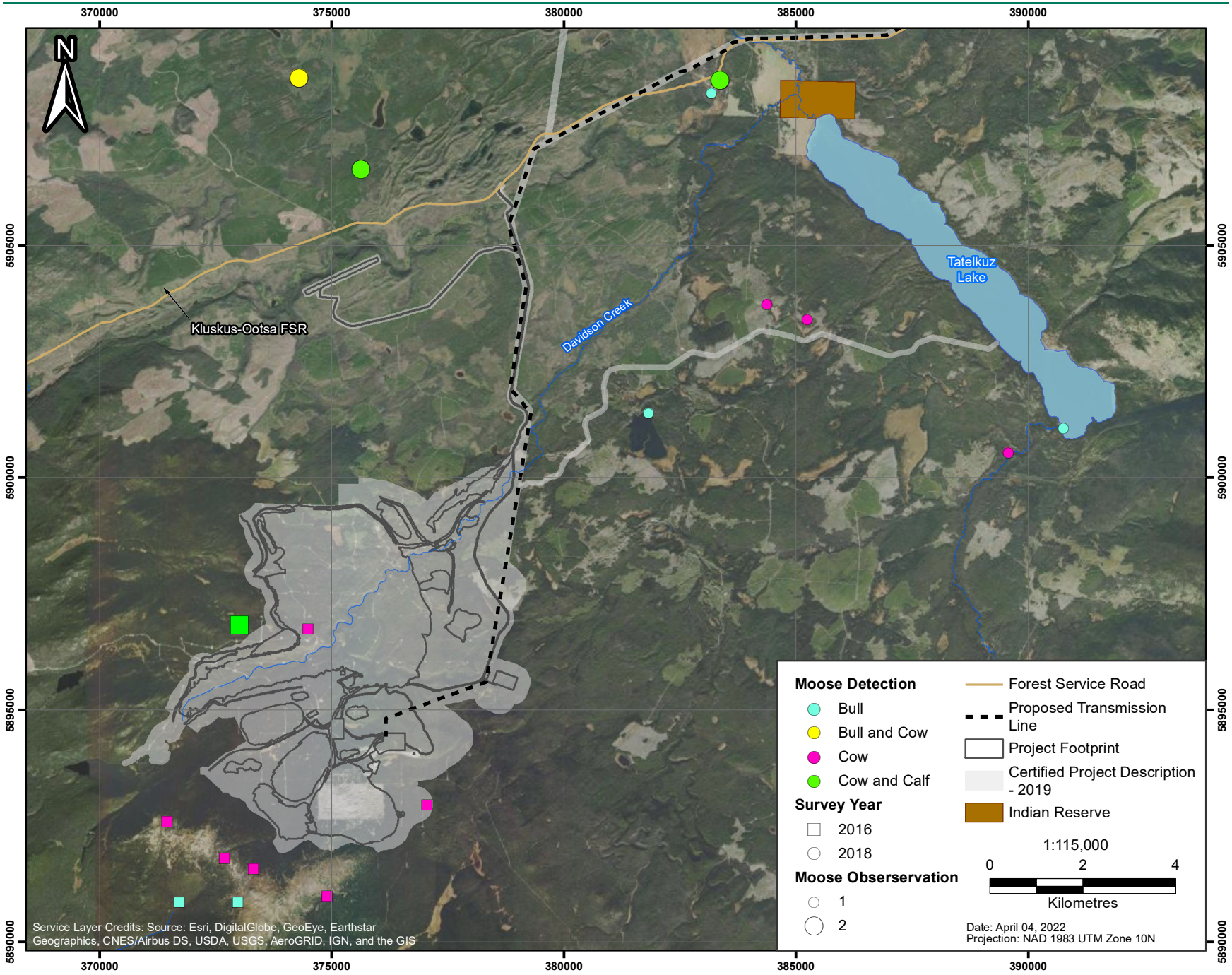

Figure 6.1-3: Moose Detections from Aerial Surveys, 2016 and 2018

6.1.3 Methods

Several types of surveys were undertaken to address objectives, including habitat suitability assessments, aerial surveys, and identification of sensitive features such as mineral licks.

6.1.3.1 Habitat Suitability Modelling

Field surveys for habitat suitability modelling (HSM) verification were completed across the biogeoclimatic units present in the LSA (Appendix A). Surveys were conducted from June 8 to June 19, 2021 along the mine site and transmission line LSAs. Field survey protocols followed the *Wildlife Habitat Rating Standards* (RIC 1999a, EAC condition 23d.ii). Surveys were conducted by a Qualified Professional and a First Nations land user. Survey teams included representatives from Ulkatcho First Nation and Lhoosk'uz Dené Nation.

Survey plots were each assigned habitat ratings that represent habitat quality and effectiveness related to mine infrastructure. Survey locations were assessed for abiotic and biotic ecosystem variables, and rated for moose habitat suitability using a six-class system from nil to very high. The six-class rating system included life requisites for feeding, security, and thermal and were completed across four seasons. See Appendix A for detailed methods.

6.1.3.2 Aerial Survey

Early winter ungulate surveys were completed on December 7, 2021 across the mine site LSA (Mount Davidson) to update baseline data for seasonal presence and distribution of moose. Surveys were in compliance with *Wildlife Act* Permit SM-21 659753, and were completed following the provincial RIC standards: *Aerial-based Inventory Methods for Selected Ungulates: Bison, Mountain Goat, Mountain Sheep, Moose, Elk, Deer and Caribou* (RISC 2002). Any signs of wildlife (e.g., scat, tracks) and incidental observations of non-target species were also recorded to document use of the area.

Counts for moose covering a total area of approximately 200 km in the vicinity of the mine area, around Mount Davidson (Figure 6.1-4). The area was considered a single survey unit. The field crew consisted of a pilot, navigator, and two observers. The aircraft used for the survey was a Bell 206 with rear bubble windows. Flight paths were recorded using a georeferenced map software on a tablet. A hand-held Garmin GPS unit was enabled as backup and paper maps were carried in the event of electronic failure. Observations were marked directly on the georeferenced map and observation details were recorded on electronic data forms. The survey area, start and end times, observers, and weather information (temperature, cloud cover, wind, snowfall, and lighting) were also recorded.

Surveys were completed while maintaining a height between 50 m and 150 m above ground level and fixed-width transects of 300 m to 500 m at speeds ranging between 40 km/hr and 80 km/hr. Speed varied based on sightability, with faster movement over open areas and slower over closed forest. Surveys were conducted when daytime high temperatures were near or below freezing, and visibility was good.

6.1.3.3 Identifying Sensitive Features

Provincial standards or guidelines do not exist for identifying mineral licks and trails. Field surveys for licks were conducted incidentally, in conjunction with other wildlife surveys during summer of 2021. Habitat suitability field surveys included searching for all wildlife signs and sensitive features, such as mineral licks and trails, within a few hundred meters around all plots. Mineral lick and trail locations were recorded when observed incidentally during other surveys in the mine site and transmission line LSAs.

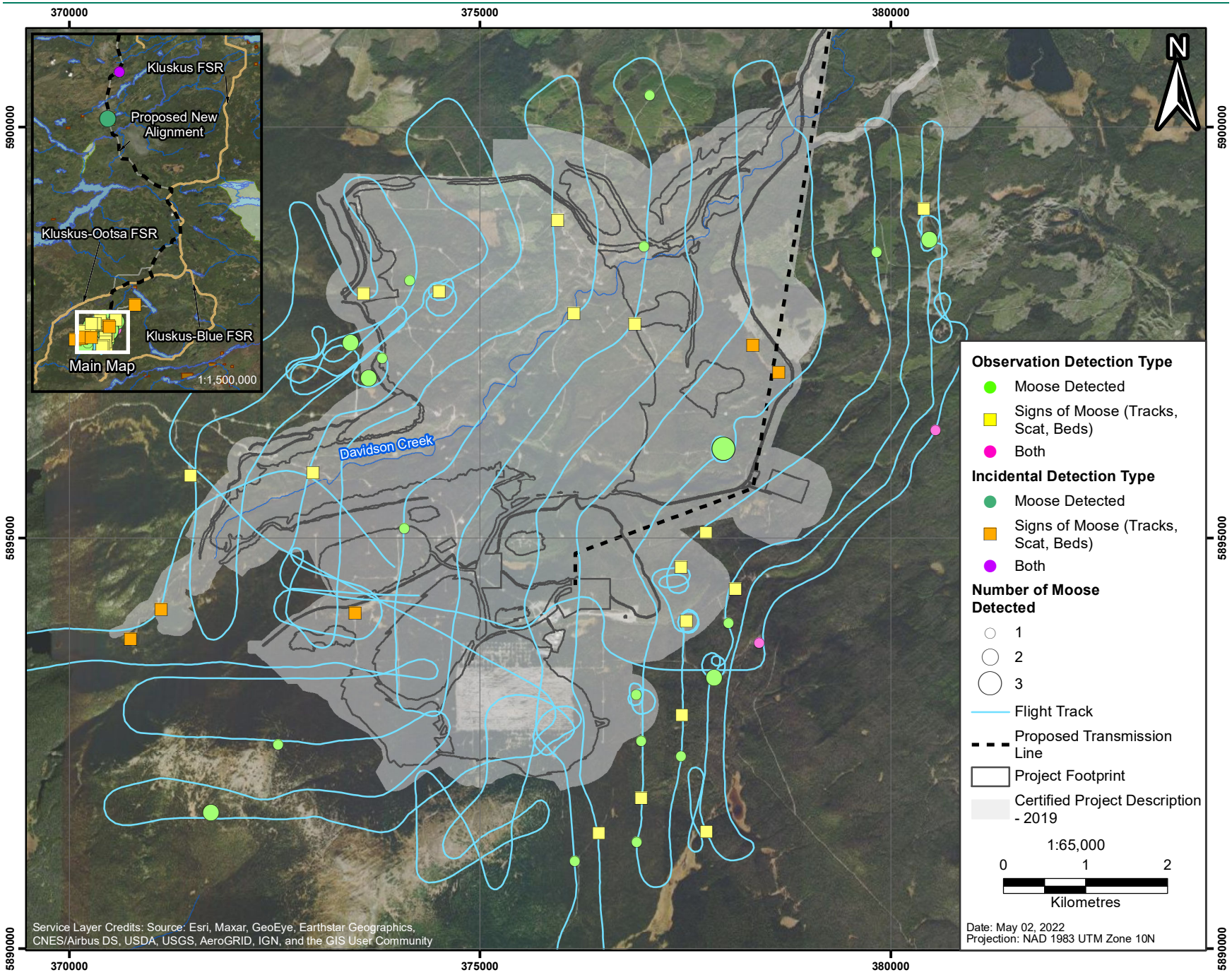

Figure 6.1-4: Moose Survey Flight Tracks, Survey Observations, and Incidental Observations

Remote cameras (Reconyx Hyperfire 2X) were installed at locations within the mine site LSA (n = 5) where wildlife trails were noted near roads or proposed roads and Project infrastructure (Table 6.1-1). Cameras were programmed to a have a medium-high motion sensitivity. When motion was detected cameras take three consecutive pictures one second apart and then there is a delay for one minute before potential triggering by additional motion. Cameras were also programmed to take a picture every eight hours to ensure the camera was functioning and the view was clear. Cameras are powered by 12 Eveready lithium ion AA batteries and photographs were saved on a 32 GB mini SD card.

Table 6.1-1: Wildlife Features and Habitat Associated with Remote Cameras Deployed within the Mine Site LSA

Camera Identification Number	Habitat Description	Wildlife Features
13	Pine forest	Bear den and wildlife trails
14	Bog and wet meadow	Wildlife trails, rut rub, and bull moose smell
15	Wet meadow	Wildlife trails along the edge of wetland
17	Access trail in forest	Moose, bear, and wolf tracks
18	Wet meadow	Bear scat, and moose and wolf tracks

6.1.4 Results

6.1.4.1 Habitat Suitability Modelling

Appendix A summarizes results and analysis of habitat suitability field verification surveys conducted in June 2021. Habitat mapping updates involving TEM will be implemented in 2022, when additional aerial data will be available for the RSA.

6.1.4.2 Aerial Survey

The early winter moose survey was conducted on December 7, 2021 in approximately three and a half hours of flight time (Appendix B). Surveyors recorded 40 signs of moose and 28 moose in the mine site LSA around Mount Davidson (Appendix C). Age class and sex were identified for 54% of moose observations including one bull, nine cows, and five calves (Figure 6.1-4; Table 6.1-2). The remaining observations included nine adults of unknown sex and four unclassified individuals (Figure 6.1-4; Table 6.1-2). Moose were observed in 21 groups with four cow-calf pairings and one calf observed alone. An abundance of moose signs were identified including fresh tracks and beds (Figure 6.1-4).

6.1.4.3 Identifying Sensitive Features

Numerous wildlife trails were identified within the LSA during habitat suitability field verification surveys. Remote cameras were installed along four trails which were located near openings or road access in October 2021 (Figure 6.1-5; Appendix D). No mineral licks were observed in 2021.

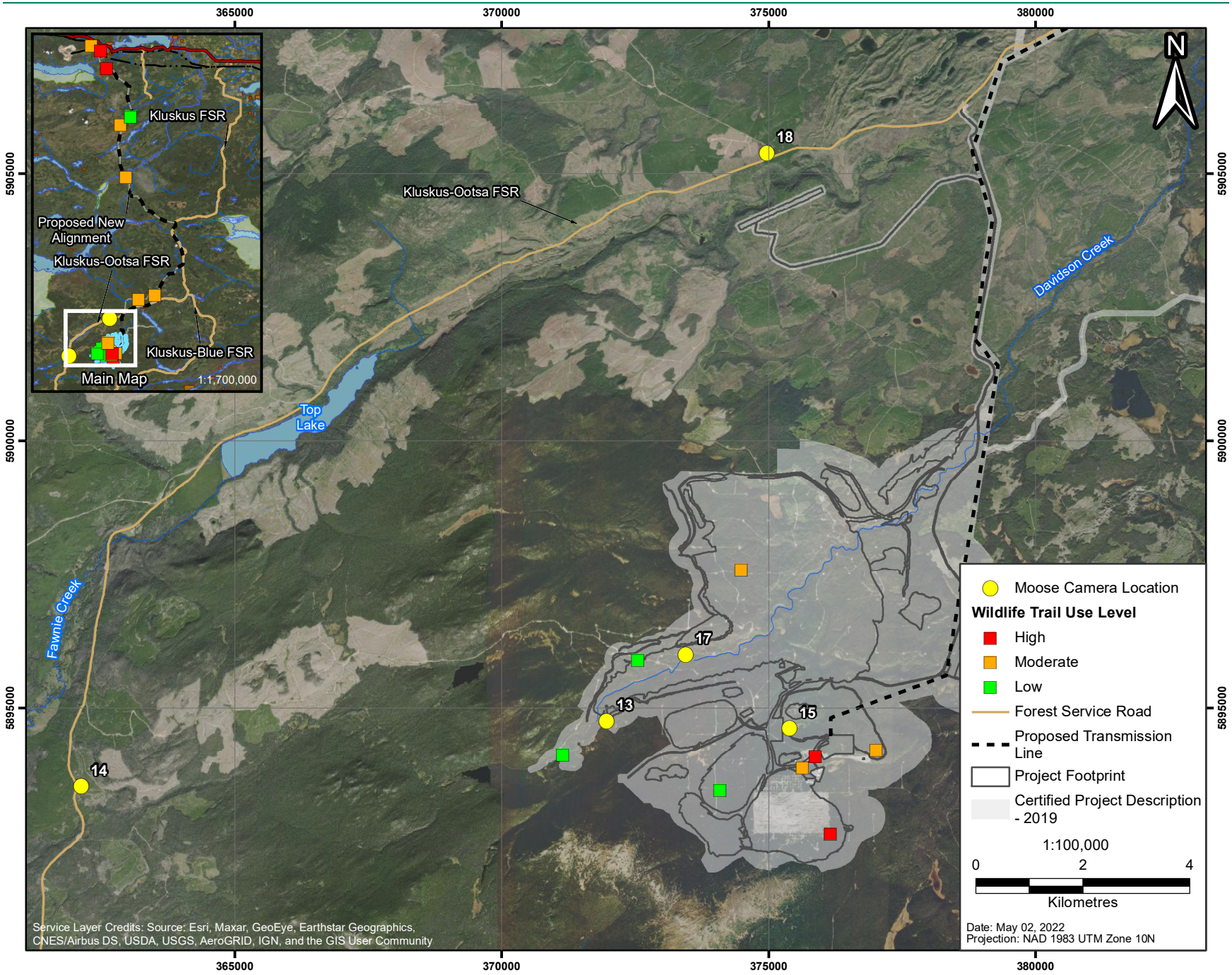

Figure 6.1-5: Wildlife Trails and Remote Camera Locations

Table 6.1-2: Moose Aerial Survey Observations and Signs, 2021

Detection Type	Detections
Observations	
Bulls	1
Cows	9
Unsexed Adults	9
Calves	5
Unclassified	4
Total Observations	**28**
Signs	
Tracks	25
Bedding	5
Unknown	10
Total Signs	**40**

6.1.4.4 Incidental Observations

Incidental observations of moose were recorded during the 2021 field work and will be utilized to better understand habitat use by moose in the mine site and transmission line LSAs, and to help refine updated mapping work. A total of three moose and 17 signs of moose were incidentally recorded during the 2021 surveys (Table 6.1-3; Figure 6.1-4; Photo 6.1-1). One cow-calf pairing was observed feeding the shallows of a lake and one unsexed adult was observed displaying territorial behaviour. The most common signs of moose recorded included pellets, trails, tracks, and bedding (Appendix C).

Table 6.1-3: Moose Incidental Observations, 2021

Detection Type	Detections
Observations	
Cows	2
Calves	1
Total Observations	**3**
Signs	
Tracks	5
Bedding	3
Trails	3
Pellets	3
Tree Rub	1
Feeding	1
Total Signs of Moose	**16**

Photo 6.1-1: Moose Cow and Calf Incidentally Recorded During Shoreline Survey, June 2021

Observations of moose pellets were made in the summer of 2021 during habitat suitability fieldwork and incidentally during other surveys in the mine site LSA. Moose pellets were abundant and observed daily. One cow-calf pairing was observed during waterbird shoreline surveys.

6.1.5 Discussion

Several types of moose surveys were completed during pre-construction baseline surveys in 2021 to update and add to existing baseline information regarding moose distribution and use of the mine site and transmission line LSAs. Moose are not listed as a species of conservation concern in BC or Canada, but are important to First Nations, the public, and are managed for hunting purposes. Current baseline results are consistent with previous baseline work, indicating that moose use habitats throughout the mine site and transmission line LSAs across the annual cycle.

Aerial ungulate surveys completed in early winter 2021 around the mine site LSA and Mount Davidson included 28 moose observations in 21 groups. No mineral licks were identified during 2021 surveys. Numerous wildlife trails were identified within the LSA and four wildlife cameras were installed at trails located near openings or access roads to monitor wildlife use. Field surveys were also conducted to validate HSMs from previous baseline work (Appendix A). Updated habitat suitability maps will be available in 2022 once updated TEM data are available for mapping purposes.

Monitoring and mitigation measures for moose have been developed and are detailed in the WMMP (ERM 2022b).

6.2 Caribou

The Project is on the eastern edge of the Tweedsmuir Local Population Unit (LPU) of southern mountain caribou (*Rangifer tarandus* caribou); with approximately half of the mine site falling inside the LPU. The mine site is within the historic range of the Tweedsmuir caribou based on Traditional Knowledge (TK) from Ulkatcho First Nation (UFN) and Lhoosk'uz Dené Nation (LDN) and includes areas identified as winter caribou habitat. The Project is on the edge of the LPU and collar data does not indicate it is currently a movement corridor, however LDN TK indicates that it was historically a movement corridor. The mine site is outside of the annual range (1980 to 2020) used by collared female caribou, but is still used intermittently by caribou based on aerial surveys, snow track surveys and incidental observations.

The Tweedsmuir caribou herd range is located in central BC, bounded to the north by the Nechako Reservoir and on the west by Whitesail Lake and overlaps Entiako Provincial Park to the east and south. The Tweedsmuir caribou are part of the northern group of Southern Mountain caribou, as defined by Environment and Climate Change Canada (Environment Canada 2014). The most recent estimate for the Tweedsmuir caribou population is between 150 and 200 animals (Cichowski, McNay, and Brumovsky 2020). The province lists the Tweedsmuir-Entiako subpopulation as part of the Northern Mountain caribou population (population 15). Northern Mountain Caribou are Blue listed by the BC Conservation Data Centre (BC CDC 2021).

Approximately half of the mine site LSA lies within the Tweedsmuir caribou herd local population unit (LPU) and is considered by ECCC to be Critical Habitat. As a result, BW Gold proposed a caribou offset which has been in discussion with regulators and First Nations stakeholders since 2018. Details of the proposed offset as of April 2022 are in the Caribou Mitigation and Management Plan (CMMP) which has been undergoing active review and updates through 2021 and into 2022 (ERM 2022a).

Baseline field work to better understand caribou, moose, and predator activity in the proposed caribou offset areas was carried out in late summer and fall 2021. The proposed offset areas as defined in the CMMP included Capoose and the Johnny Lake area.

6.2.1 Existing Baseline Data

As observed for woodland caribou across Canada, the Tweedsmuir herd is in decline as a consequence of range disturbance leading to increases in alternate prey species such as moose, and subsequently predators such as wolves (Cichowski 2015; DeMars and Serrouya 2018). Findings from several studies indicate that the Tweedsmuir population has declined to between 150 and 200 caribou after long term declines started in the 1980s (Cichowski 2015; DeMars and Serrouya 2018; Grant and Roberts 2020)

BW Gold produced habitat mapping for the Tweedsmuir LPU range during review of the EA to estimate potential Project effects on Tweedsmuir caribou habitat. In general, using collar data from 1983 to 2020, the Tweedsmuir herd spends the summer in the western portion of the LPU range in Tweedsmuir Park and centered around Eutsuk Lake (Figure 6.2-1), while female caribou generally uses the eastern portion of the LPU range, including Entiako Park, in the winter (Figure 6.2-2).

The eastern boundary of the RSA intercepts with the 95% winter use kernel boundary determined from collar data. High and low elevation winter ranges were identified within the LSA and RSA and are defined as areas having demonstrated use by caribou. High Elevation Winter Range is dominated by open alpine areas and parklands downslope from the alpine. High elevation habitats make up approximately 19% of the Tweedsmuir LPU range and do not have high levels of natural disturbance (Cichowski, McNay, and Brumovsky 2020) In contrast, lower elevation forested areas between 60 and 120 years that provide the best lichen forage for caribou often experience more disturbance.

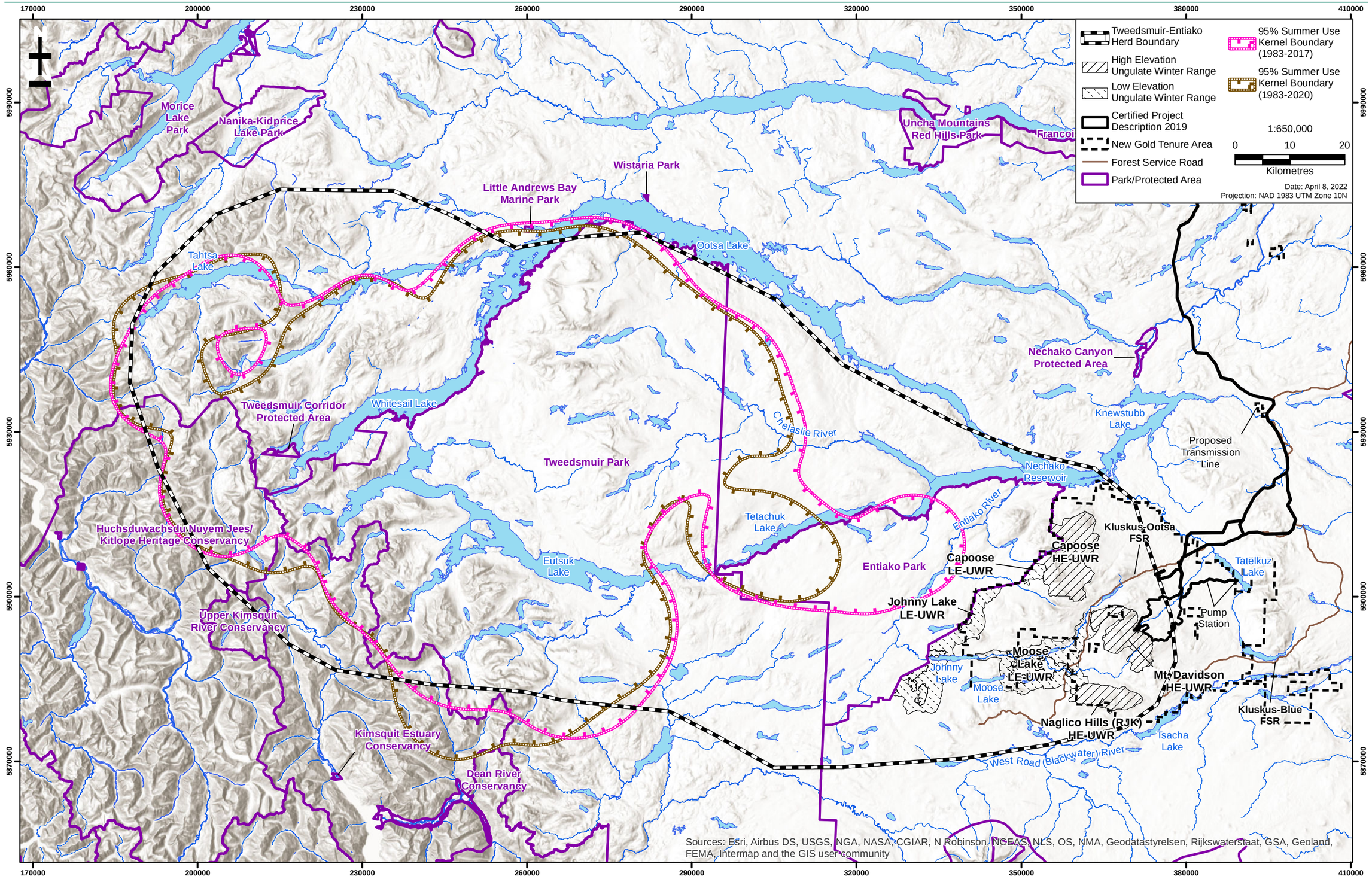

Figure 6.2-1: Range of the Tweedsmuir Caribou Population, Summer 1983-2020

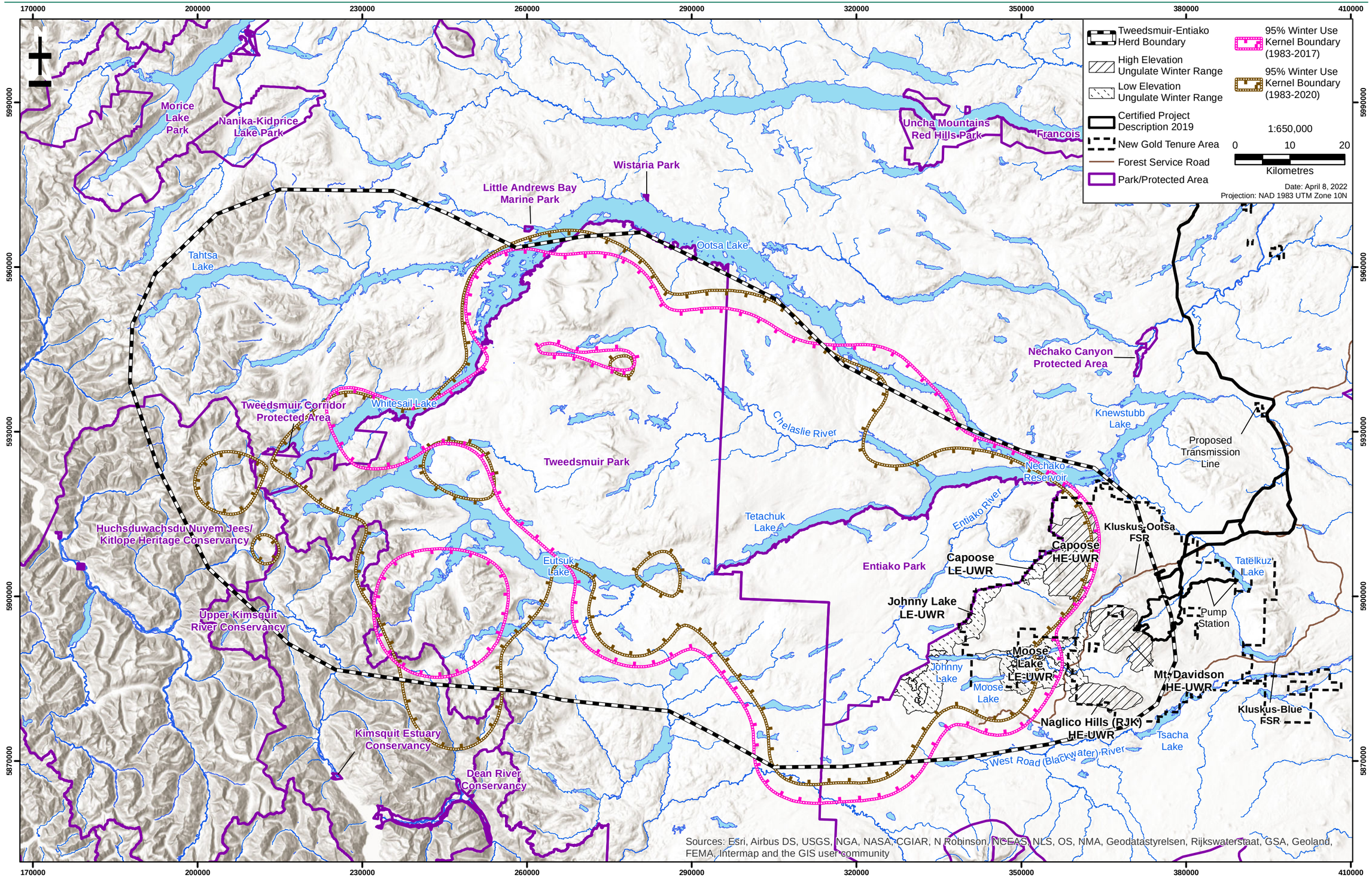

Figure 6.2-2: Range of the Tweedsmuir Caribou Population, Winter 1983-2020

Low elevation winter range occurs at the bottoms of valleys and in lowlands throughout the LPU range. Habitat usage by Tweedsmuir caribou is focused in low elevation winter range, with the herd being considered primarily a low elevation herd during winter (Cichowski 2010). The low elevation winter range is comprised primarily of spruce forest, which has good forestry potential. This habitat across the LPU range has been disturbed primarily by fires, forestry, forestry roads, and pine beetle, resulting in a mosaic of forest stand age and structure. However, disturbed habitat does not always equate to lost habitat. For example, caribou will continue to forage in stands affected by pine beetle outbreak at rates similar to those prior to the outbreak (Cichowski 2010).

Various ground-based and aerial surveys for caribou observations and signs have been completed for the Project in 2011, 2012, 2013, 2015, and 2018. Ground-based surveys for snow tracks (completed in March 2012, covering approximately 100 km transects), aerial reconnaissance winter track surveys (completed in 2011 and 2013), and aerial surveys (completed in December 2015 covering approximately 230 km^2) did not reported any observations or signs of caribou. A total of eight signs of caribou were incidentally detected during wildlife baseline studies completed from 2011 to 2013 (Figure 6.2-3). All incidental detections were of caribou scat. An aerial survey in February 2018 (covering approximately 250 km^2) did not report any caribou, but tracks of a mid-sized ungulate likely belonging to a caribou were incidentally observed on Mount Davidson.

6.2.2 Objectives

The specific objectives of the pre-construction 2021 baseline caribou study were to:

- Conduct field assessments for caribou habitat suitability, to update existing habitat suitability models in the mine site and transmission line LSAs;
- Assess habitat and wildlife use in the potential caribou offsetting locations (Capoose and Johnny Lake areas); and
- Identify key caribou habitat features in the mine site and transmission line LSAs, including mineral licks and wildlife trails that may intersect with Project roads or infrastructure (DS Conditions 8.2 and 8.6, EAC Condition 23c).

6.2.3 Methods

Habitat suitability surveys were conducted in the mine site and transmission line LSAs to update existing models. Surveys in the proposed caribou offset areas (as defined by the CMMP) were conducted for the first time in 2021 and additional surveys will be completed in future years.

6.2.3.1 Habitat Suitability Modelling

Field surveys for HSM verification were completed across the biogeoclimatic units present along the mine site and transmission line LSAs (Appendix A). Surveys were conducted from June 8 to June 19, 2021. Field survey protocols followed the *Wildlife Habitat Rating Standards* (RIC 1999a). Surveys were conducted by a Qualified Professional and a First Nations land user. Survey teams included representatives from Ulkatcho First Nation and Lhoosk'uz Dené Nation.

Survey plots were each assigned habitat ratings that represent habitat quality and potential impacts related to distance from roads or infrastructure. Survey locations were assessed for abiotic and biotic ecosystem variables, and rated for caribou habitat suitability using a six-class system from nil to very high. The six-class rating system included life requisites for feeding, security, and thermal and were completed across six seasons. Detailed methods and survey locations are the same as those conducted for moose and grizzly bear in Appendix A.

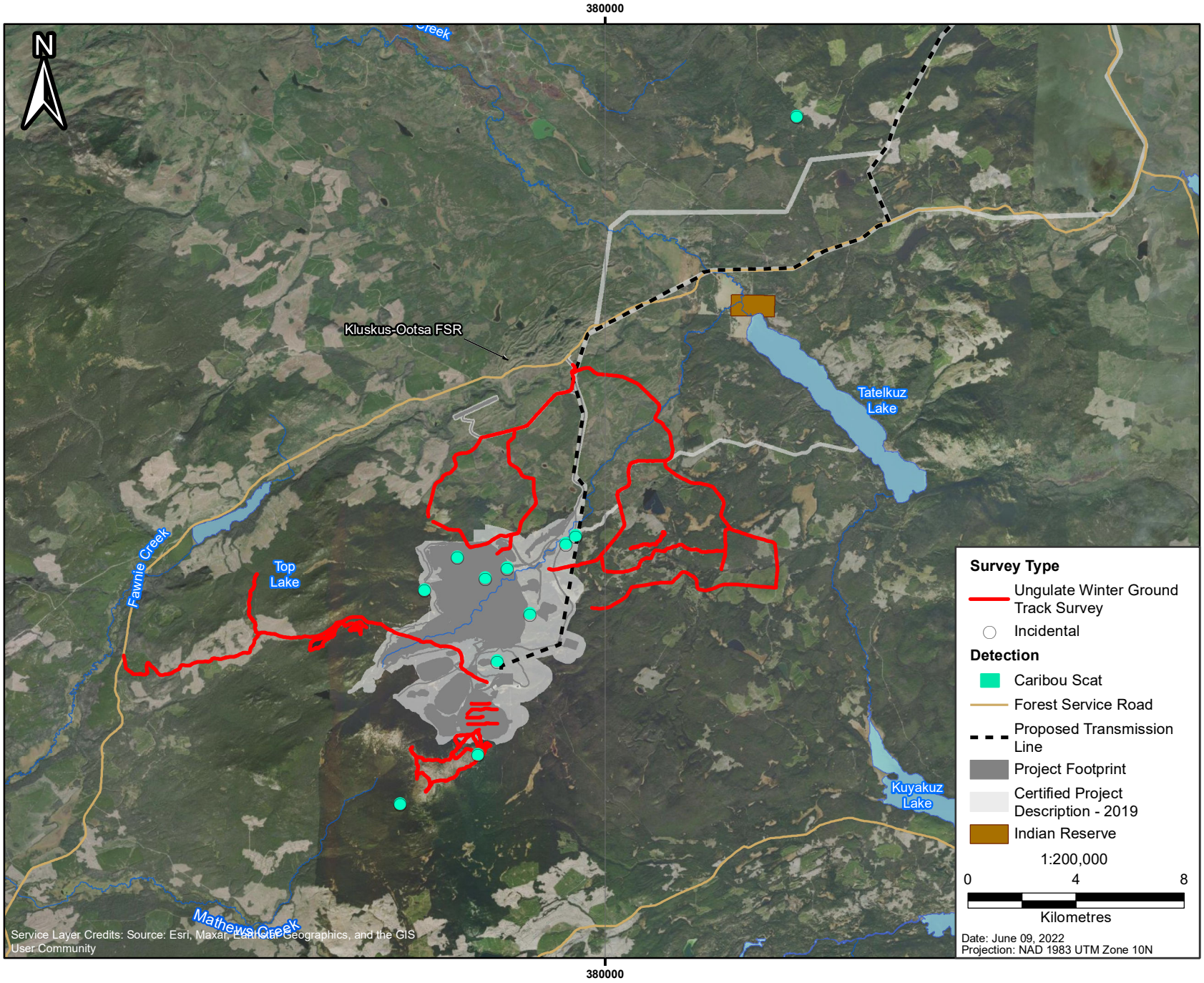

Figure 6.2-3: Caribou Incidental Detections, 2011-2013

Habitat suitability models will be updated and provided in the CMMP in 2022, once updated TEM layers are available for mapping.

6.2.3.2 Identifying Sensitive Features

Sensitive features such as mineral licks and wildlife trails which may be used by caribou were identified during baseline field surveys in 2021; methods are included in Section 6.1.3.3.

6.2.3.3 Caribou Offsetting Area Assessments

Field surveys to assess habitat and wildlife use in the proposed caribou offsetting areas around Johnny Lake and Capoose were conducted from August 16 to August 20, 2021. Remote cameras were also deployed in the proposed offsetting areas in October, 2021. Assessments of vegetation and soils to inform restoration actions (e.g., road decommissioning, sightline blocking, and seeding options) were also conducted, but are not directly related to the current caribou habitat and are therefore not included in this report.

Habitat Suitability Modelling

Habitat suitability field surveys were also conducted in the Johnny Lake and Capoose proposed offsetting areas from August 17 to August 19, 2021 (Figures 6.2-4 and 6.2-5). Surveys assessed habitat suitability for caribou, moose, grizzly bear, and black bear. Methods followed the same methods described for HSM surveys in the mine site and transmission line LSAs. Surveys for TEM plots were conducted in conjunction with habitat suitability assessments and models will be created for finalized offsetting areas to inform measures in the CMMP.

Lichen Transect Surveys

Lichen transect surveys were conducted to assess the amount of lichen available for caribou forage in the offsetting areas, generally following methods from Cichowski, Sutherland, and McNay (2018)). Lichen transects were distributed throughout the offsetting areas at a subset of HSM survey sites. Transects consisted of five plots, spaced roughly 50 m apart for a total transect length of 200 m. Ground photos were taken of each plot at 1.5 m from the ground, to validate estimates of vegetation cover in a 1 m x 1 m square. Percent cover and depth in cm was recorded for shrubs, herbs, bryophytes, lichen, and bare ground. Presence of preferred forage species were also noted, including lichens and/or summer sedges and herbs. Each transect was also assessed for aspect, elevation, slope, forest structural stage, percent canopy closure, and overall percent cover of vegetation types.

Camera Deployment

Fifteen remote cameras (Reconyx Hyperfire 2X) were deployed in the two proposed caribou offsetting areas to record wildlife activity, with sites chosen based on sign and habitat for focal mammals: caribou, moose, bear, and wolf (Table 6.2-1; Figure 6.2-6; Appendix D). The cameras were distributed with a greater number in the Capoose area (n = 9 cameras) because it is larger than the Johnny Lake area (n = 6 cameras). Cameras locations were chosen based on habitat suitability survey site results, at locations where moose and caribou activity were previously recorded, as well as within suitable habitat areas.

Cameras were programmed using the same settings and accessories as described in the methods for moose and wildlife trails in the mine site area (Section 6.1.3.3).

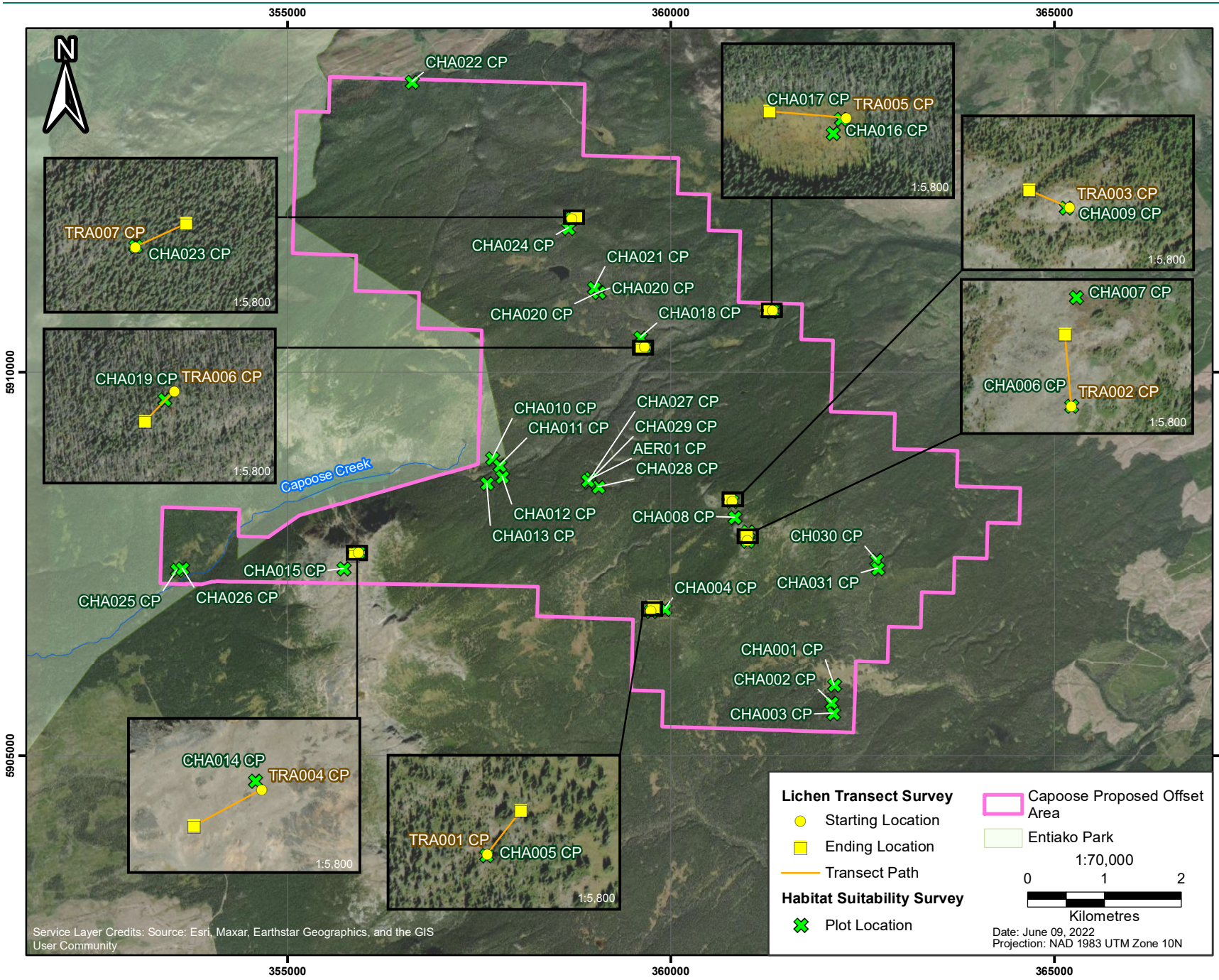

Figure 6.2-4: Locations of Habitat Suitability and Lichen Transect Surveys in the Capoose Proposed Caribou Offset Areas, 2021

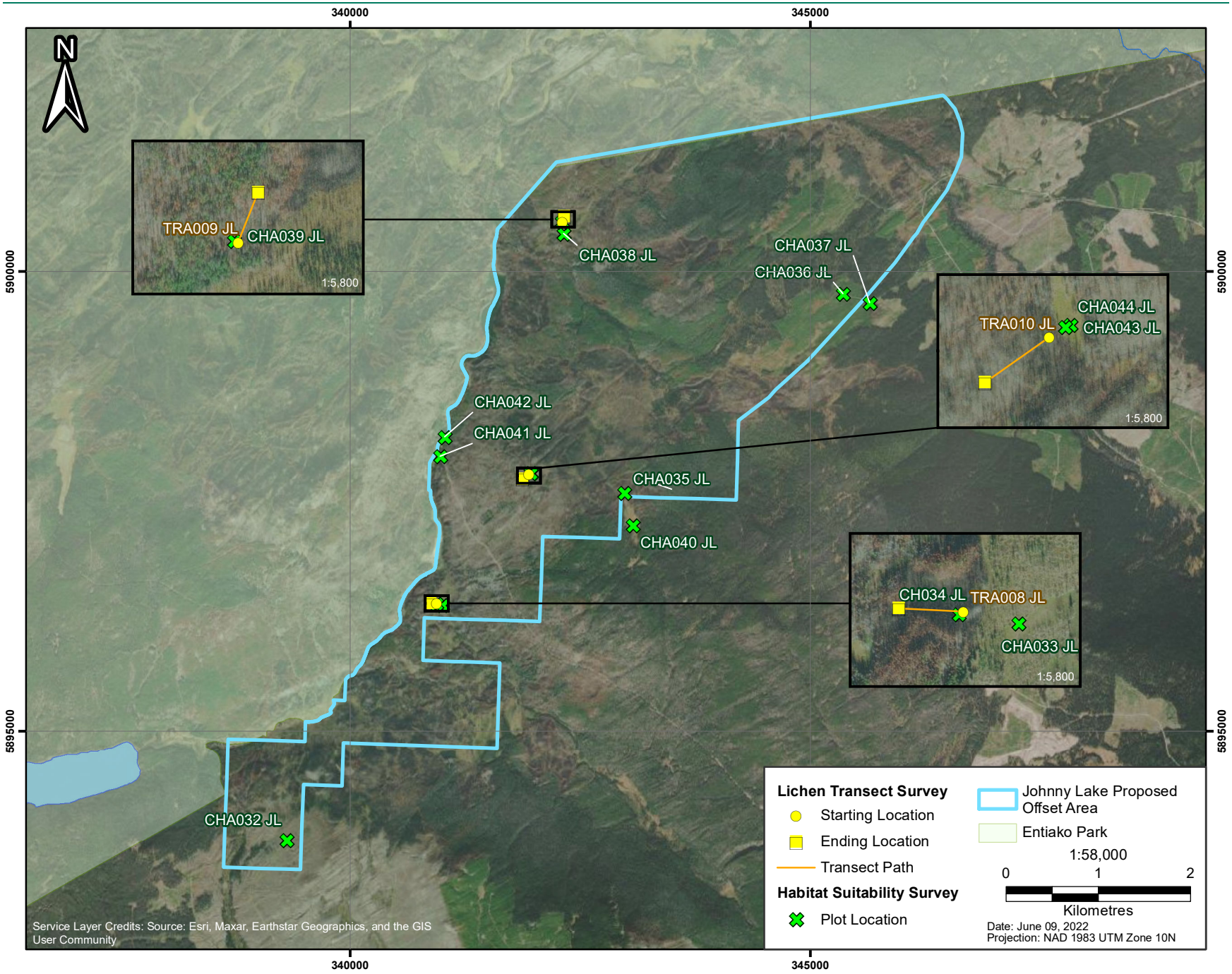

Figure 6.2-5: Locations of Habitat Suitability and Lichen Transect Surveys in the Johnny Lake Proposed Caribou Offset Areas, 2021

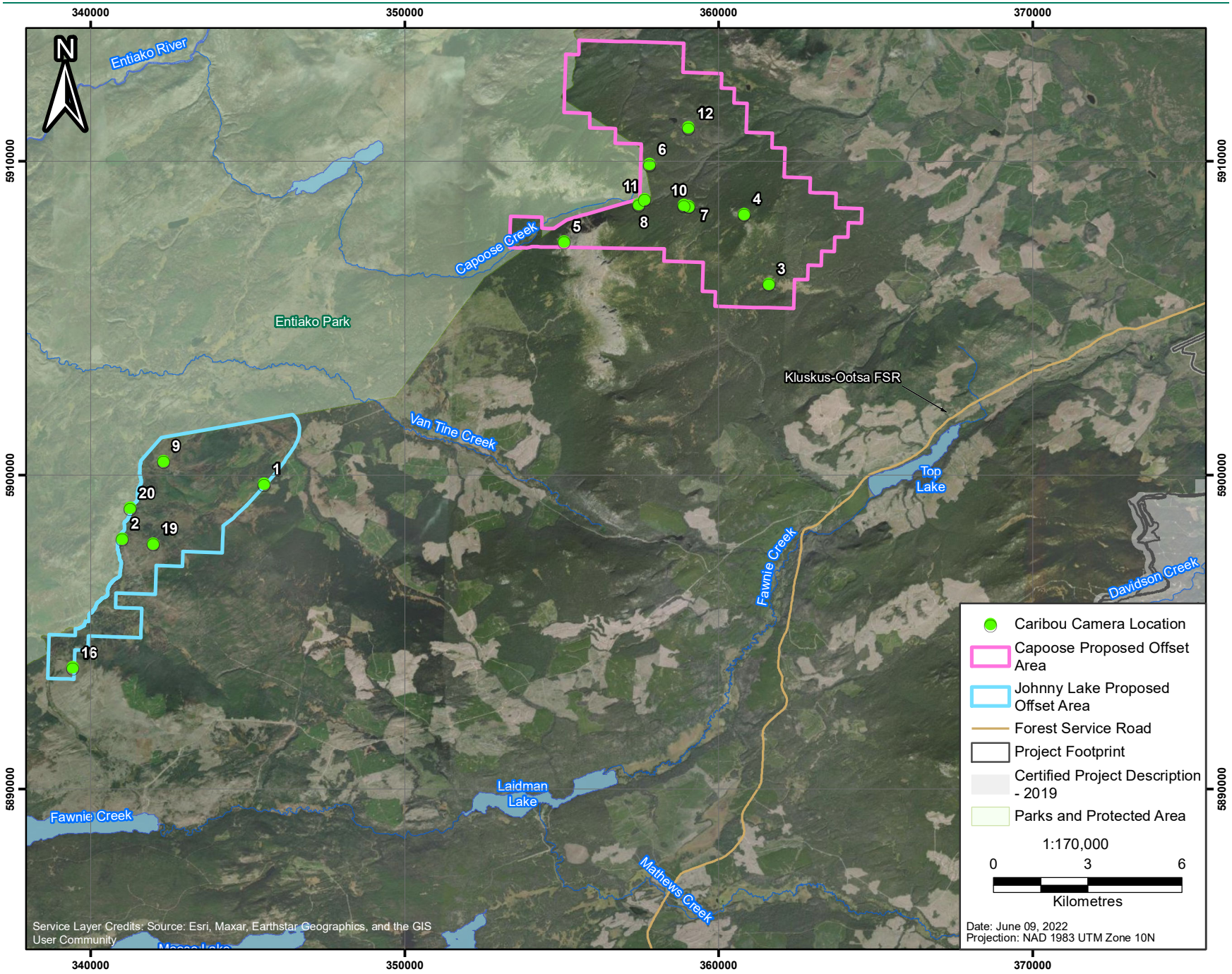

Figure 6.2-6: Locations of Remote Cameras Deployed in the Proposed Caribou Offset Areas, 2021

Table 6.2-1: Wildlife Features and Habitat Associated with Remote Cameras Deployed within Capoose and Johnny Lake Caribou Offsetting areas

Offset Area	Camera Identification Number	Habitat Description	Wildlife Features
Capoose	3	Wet meadow	Wildlife trail and rubbing
	4	Subalpine bench	Wildlife trail and rut rubbing
	5	Subalpine opening near trees and alpine parkland	Goat trails and droppings, moose tracks
	6	Open meadow close to park boundary	Moose and possible caribou trails
	7	Wetland opening	Several wildlife trails
	8	Edge of wetland	Wildlife trail with moose rub and forage signs
	10	Wetland trail in opening	Moose trail
	11	Edge of opening toward creek	Caribou tracks and trail
	12	Wetland edge	Wildlife trail, forage sign, and recent grizzly tracks
Johnny Lake	1	Pine plantation around wildlife access trail	Moose browse, droppings and trail; wolf scat and tracks
	2	Burned forest next to wetland creek	Game trail
	9	Wetland trail	Abundant moose tracks and ruts
	16	Clear cut and burn with early seral cover	Moose and grizzly tracks and scat
	19	Meadow in burn	Moose trail and rut rubbing
	20	Riparian edge of creek	Moose trail

6.2.4 Results

Maps of HSMs for the mine site and transmission line LSAs and the caribou offset areas will be available later in 2022 and incorporated into the CMMP. Remote cameras were installed within Capoose (n = 9 cameras) and the Johnny Lake (n = 6 cameras) offset areas in October 2021 (Figure6.2-6; Appendix D). Sensitive habitat features identified during baseline surveys are included in Section 6.1.4.3. No mineral licks were observed in 2021.

Lichen transect surveys were summarized for basic results; additional baseline surveys in the caribou offset areas are planned for 2022 and detailed analyses and results will be conducted when more data are available. Ten transects were sampled, seven in Capoose offset area and three in Johnny Lake offset area (Figures 6.2-4 and 6.2-5; Photo 6.2-1; Appendix E). Overall estimates of vegetation cover within the transects are summarized in Table 6.2-2. Overall percent cover of lichen was moderate in the Capoose offset area (28%) and extremely low in the Johnny Lake offset area (1.67%).

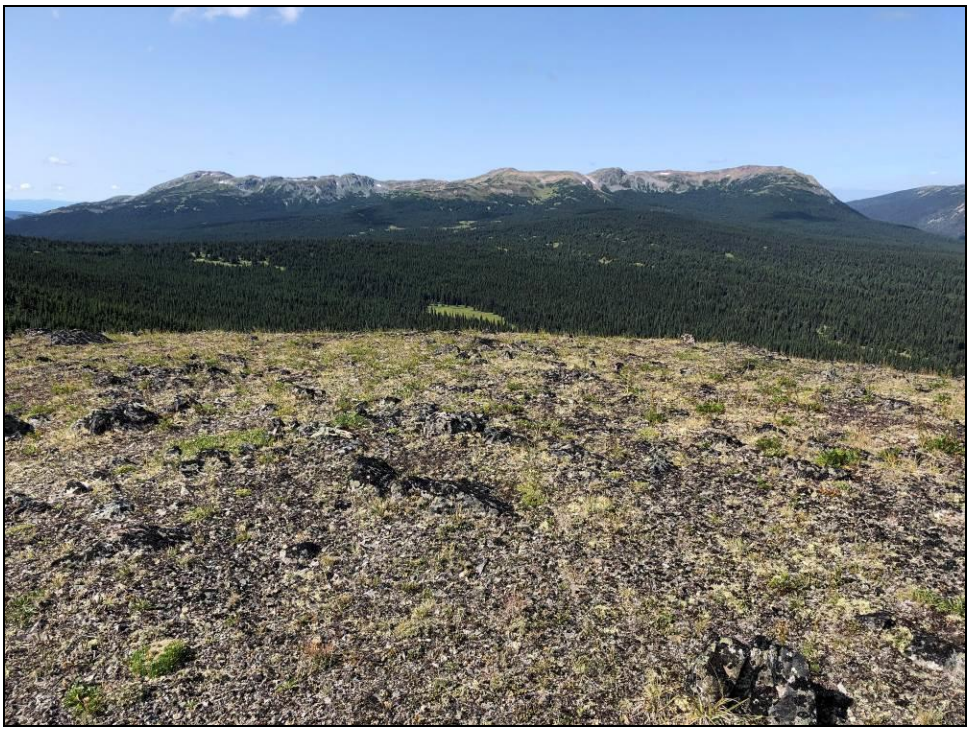

Photo 6.2-1: Lichen cover at Johnny Lake proposed offset area, with Capoose Mountain in background. August 2021.

Table 6.2-2: Lichen Transect Characteristics in the Proposed Caribou Offset Areas

Offset Area	Number of Transects	Overall % Cover				
		Lichen	Bryophytes	Herbs	Shrubs	Canopy
Capoose	7	28	23.1	40.7	7.4	12.1
Johnny Lake	3	1.67	43.3	20	18.3	0

6.2.4.1 Incidental Observations

Observations of caribou sign (pellets and tracks) were made in the summer of 2021 during habitat suitability fieldwork and incidentally during other surveys in the mine site LSA (Figure 6.2-7). Caribou sign was rare compared to moose sign, with approximately 10 observations in total (Figure 6.2-7). One of the observations of caribou pellet groups was recorded during wetland surveys in July, 2021. Signs of caribou high usage, such as winter tracks and beds, were incidentally observed three times during aerial moose surveys across the mine site LSA (Mount Davidson) completed in December 2021.

6.2.5 Discussion

Pre-construction baseline work for caribou included field verification surveys for existing HSMs in the mine site and transmission line LSAs, and field surveys in the proposed caribou offset areas. Habitat suitability models will be updated and provided in the CMMP in 2022, once updated TEM layers are available for mapping. Surveys for TEM plots were conducted in conjunction with habitat suitability assessments and models will be created for finalized offsetting areas to inform measures in the CMMP.

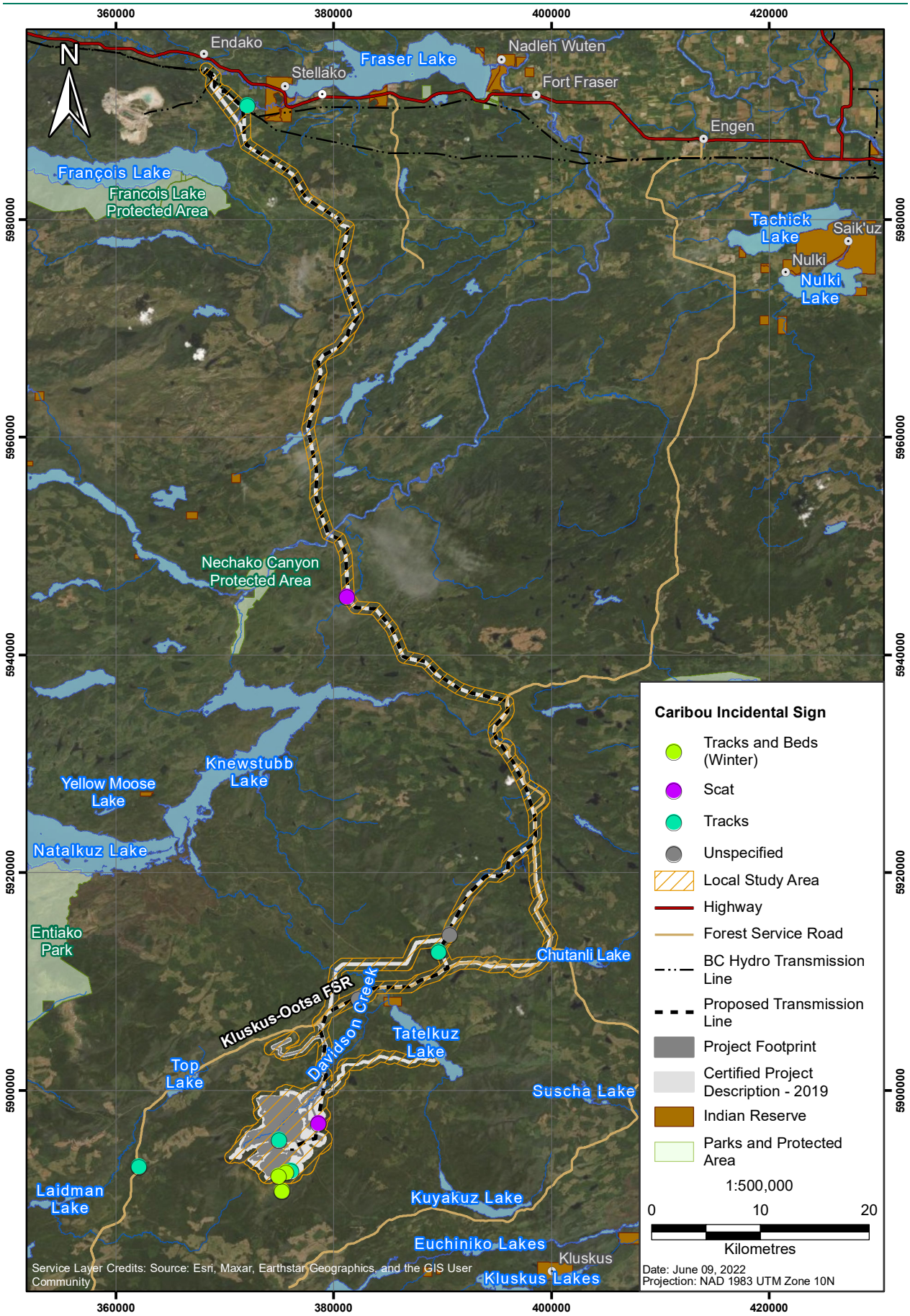

Figure 6.2-7: Caribou Incidental Observations and Signs, 2021

Surveys in the proposed caribou offset areas were conducted for the first time in 2021 and will be added to in future years. Lichen transect surveys were conducted to assess the amount of lichen available for caribou forage in the offsetting areas. Additional baseline surveys in the caribou offset areas is planned for 2022 and detailed analyses and results will be conducted when more data are available. Overall percent cover of lichen was moderate in the Capoose offset area (28%) and extremely low in the Johnny Lake offset area (1.67%). Further data and analysis are needed to assess whether there is sufficient lichen forage available to caribou throughout these two offset areas.

Fifteen remote cameras were also deployed in the fall of 2021 to record wildlife activity, with focus on caribou, moose, bear, and wolf. These data will help inform potential measures to increase caribou use and protection in the offsetting areas. Initial camera data will be retrieved in summer 2022 and provided in the 2022 WMMP Report (see WMMP for reporting details, ERM 2022b).

Management, mitigation, and offsetting measures for caribou are detailed in the CMMP (ERM 2022a).

6.3 Grizzly Bear

Grizzly bears are year-round residents within the Project LSA and RSA, and are dependent on mature and old growth coniferous forests, although deciduous and mixed forests also contribute to their life requisites. Pre-existing habitat loss and fragmentation due to logging and road development has altered the amount of potential grizzly bear habitat within the LSA and RSA. Low to moderate suitable habitat is present within the study areas, with moderate habitat present in the fall. The mine site LSA is located primarily within the Blackwater-West Chilcotin grizzly bear (*Ursus arctos*) population unit in BC, in addition to portions of the western part of the Nulki unit and south central part of the Francois unit (Morgan et al. 2019).

The Vanderhoof LRMP established management recommendations designated to maintain and enhance grizzly bear population and habitat. Recommended management includes strategies such as habitat suitability mapping, avoiding road construction and closure of non-essential roads in critical grizzly bear habitat areas, and management for various habitat types and characteristics.

Baseline field studies completed in 2012-2013 and 2017 were used to create habitat suitability models for grizzly bear. Additional field verification surveys were conducted in 2021 to update grizzly bear habitat suitability modelling. Field verification surveys were completed to identify areas of the mine site and transmission line LSAs that needed further assessment for grizzly bear suitability; these results were presented in a separate memo to comply with EAC Condition 23d (Appendix A).

6.3.1 Existing Baseline Data

Baseline surveys for grizzly bear in 2011-2013 included den surveys, deployment of wildlife cameras, and incidental detections (see Figure 6.4-2). Twenty-nine grizzly bear were detected at 22 sites within the RSA. Baseline surveys for grizzly bears focused on kokanee-bearing streams, where there may be an increase in grizzly bear use during the kokanee spawning season. Wildlife cameras were placed along rivers, creeks, games trails, roads, clearcuts, forest edges, and wetlands from June to September in 2012 and 2013. The majority of grizzly bears were observed outside of the mine site and transmission line LSAs along Davidson Creek at salmon spawning areas where higher suitability summer/fall foraging habitat was mapped. Six grizzly bears were recorded on cameras in these Kokanee spawning areas.

Bear den surveys in 2012 searched 30.6 km of potential bear den habitat, characterized as steep, dry slopes or gullied streams. No active dens were confirmed during denning surveys within the mine site and LSA; however, four potential bear dens were observed within the mine site (n = 1) and LSA (n = 3; see Figure 6.4-2). Potential dens were located within mature lodgepole pine forest on gentle slopes above streams, supported by colluvial deposits.

Abundant bear sign was recorded incidentally along Creek 661 and Chedakuz Creek, including tracks, scat, trampled vegetation, and digging into the river banks (see Figure 6.4-2). One grizzly bear was incidentally observed at the mine site, walking through an open young pine forest near the edge of camp. No grizzlies were observed in the transmission line area. In May 2012, several grizzly bear incidental sightings were reported along the Kluskus FSR between the 100 and 125 km marker (Avison, 2012a).

Habitat suitability mapping was completed in 2013 on model for grizzly bear habitat in the RSA (Appendix A Figure 4.6-1 to Figure 4.6-4).

6.3.2 Objectives

The specific objectives of the pre-construction 2021 baseline grizzly bear study were to:

- Conduct field assessments for grizzly bear habitat suitability to update existing habitat suitability models (Appendix A; EAC Condition 23d); and
- Identify suitable bear denning habitat in the mine site and transmission line LSAs, to inform avoidance and mitigation measures for denning bears (DS Condition 8.10, EAC Condition 23c).

6.3.3 Methods

Habitat suitability assessments and surveys for grizzly bear dens and denning habitat were undertaken to address baseline objectives for grizzly bear.

6.3.3.1 Habitat Suitability Modelling

Field surveys for HSM verification were completed across the biogeoclimatic units present in the Project LSA and RSA (Appendix A). Surveys were conducted from June 8 to June 19, 2021 along the mine site and transmission line LSAs. Field survey protocols followed the *Wildlife Habitat Rating Standards* (RIC 1999a). Surveys were conducted by a Qualified Professional and a First Nations land user. Survey teams included representatives from Ulkatcho First Nation and Lhoosk'uz Dené Nation.

Survey plots were each assigned habitat ratings that represent habitat quality and potential impacts related to distance from roads or infrastructure. Survey locations were assessed for abiotic and biotic ecosystem variables, and rated for grizzly bear habitat suitability using a six-class system from nil to very high. The six-class rating system included life requisites for feeding, security, and thermal and were completed across seasons where relevant (i.e., feeding was not assessed for winter hibernation). See Appendix A for detailed methods.

6.3.3.2 Denning Habitat Surveys

In addition to general habitat suitability assessments (which included ratings for denning habitat), denning habitat surveys were conducted in locations with very high quality habitat or features for dens. Survey locations were identified from baseline work including previous field surveys, habitat suitability mapping, and TK reports. Survey methods included standard HSM data collection as well as recording of any additional relevant data such as evidence of previous den sites.

6.3.4 Results

Appendix A summarizes results and analysis of habitat suitability field verification surveys conducted in June 2021. Habitat mapping updates involving TEM will be implemented in 2022, when additional aerial data are available for the RSA.

One area was identified in the LSA as containing high quality grizzly bear denning habitat, and was the focus of den surveys. A large boulder field to the northwest of Mount Davidson (i.e., southwest of the

mine site) had evidence of previous bear den sites (Photo 6.3-1). These sites were noted in previous baseline work, but are not currently represented on habitat suitability maps, and will be accounted for in updated mapping (Appendix A). A remote camera was deployed at the boulder field denning habitat site in October 2021 to track bear activity in the area (Camera 13 on Figure 6.1-5). Initial camera data will be retrieved in summer 2022 and provided in the 2022 WMMP Report (see WMMP for reporting details).

Photo 6.3-1: Grizzly bear den recorded on the northwest side of Mount Davidson, June 2021

6.3.4.1 Incidental Observations

During wetland surveys in July 2021, tracks belonging to a grizzly bear were incidentally observed once (Appendix G). Additionally, four survey locations had signs of use by an unknown bear species. Tracks belonging to an unknown bear species were incidentally observed three times during aerial moose surveys completed in December 2021.

6.3.5 Discussion

Pre-construction baseline work for grizzly bear included field verification surveys for existing HSMs in the mine site and transmission line areas, and targeted surveys to identify potential denning features in the mine site. Field surveys to validate HSMs are summarized in Appendix A, and updated habitat suitability maps will be available in 2022 once updated TEM data are available for mapping purposes.

A high quality denning area with evidence of previous bear dens in a boulder field southwest of the mine site is notably missing from current habitat suitability mapping. A remote camera was placed at the site in October 2021, and avoidance and mitigation measures for the site are now included in the WMMP. Initial camera data will be retrieved in summer 2022 and provided in the 2022 WMMP Report (see WMMP for reporting details, ERM 2022b).

Monitoring and mitigation measures for grizzly bear have been developed and are detailed in the WMMP (ERM 2022b).

6.4 Furbearers

Furbearers are species frequently harvested for their fur, and include wolverine (*Gulo gulo*), American marten (*Martes americana*), and fisher (*Pekania pennanti*). Furbearer species are most sensitive to disturbance at their dens, when they are raising young through the late winter and spring. Wolverine are Blue listed in BC and federally listed as Special Concern by COSEWIC and on Schedule 1 of SARA (BC CDC 2022; Government of Canada 2022a). Fisher were recently re-assessed in BC and are listed according to different populations; the Columbian Population around the Project LSA and RSA is Red listed(BC CDC 2022).

Furbearers are economic and cultural resources within the LSA and RSA. No specific management actions for furbearers are included in the Vanderhoof LRMP. The province of BC has species-specific furbearer management guidelines published to provide management information and resources to trappers (Province of BC 2022). Distribution of furbearers within BC can be assessed by investigating harvest returns from the provincial Fur Harvest Database (BC MWLAP 2004c, 2004a).

Baseline field studies completed in 2011-2013 inventoried furbearers in the RSA. An HSM for fisher habitat was also created. Additional field verification surveys were conducted in 2021 to identify denning habitat for key furbearer species (American marten, fisher, and wolverine).

6.4.1 Existing Baseline Data

Baseline surveys for furbearers in 2011-2013 included aerial and ground winter tracking surveys, and incidental furbearer detections (Figure 6.4-1; Figure 6.4-2). A total of 18 species (587 individuals) were detected within the LSA (n = 15) and RSA (n = 14; Table 6.4-1). Aerial reconnaissance transects were flown on March 16, 2011, along the mine site LSA and RSA near the proposed mine site along the slopes of Mount Davidson. Winter tracking surveys were completed at 16 transects (97.4 km) from March 12 to 16, 2012, along the mine site LSA and portions of the RSA.

The most frequently detected species were snowshoe hare (n = 175), red squirrel (n = 155), lynx (n = 63), American black bear (n = 58), and coyote (n = 57). Lower elevations had higher detections of furbearers, partially due to the wind-swept conditions during the 2012 survey and the lack of cover in the higher subalpine fir. The majority of furbearer sightings were detected in the lower elevation immature lodgepole pine forest and cutblocks, and along the riparian corridors.

Fourteen detections of American marten were nearly equally split between the ESSFmv1 and SBSmc3 variants. Half of these detections (50%) occurred in mature pine forests, with smaller numbers in mature spruce and subalpine fir forests, and one detection in a young pine forest. In addition, three wolverine were detected during the ground-based winter track surveys in the lower Davidson Creek area, and one fisher was observed crossing the Kluskus FSR. Five beavers or signs of beaver (e.g., lodge, dam) were detected incidentally during other surveys between 2011 and 2013 (Figure 6.4-2). All detections occurred within the SBS zone; four detections were located on lakes within the RSA, and one detection located on Davidson Creek within the mine site. One fisher was incidentally detected in 2013 running across the Kluskus FSR chasing a snowshoe hair. The detection occurred within the SBSdk zone with an old pine forest on one side of the forest and a logged area on the other.

6.4.2 Objectives

The specific objectives of the 2021 pre-construction baseline for furbearers were to:

- Conduct field verification of habitat suitability mapping and identify suitable denning habitat and habitat features in the mine site and transmission line LSAs for key furbearers: American marten, fisher, wolverine (DS Condition 8.10, EAC Condition 23c).

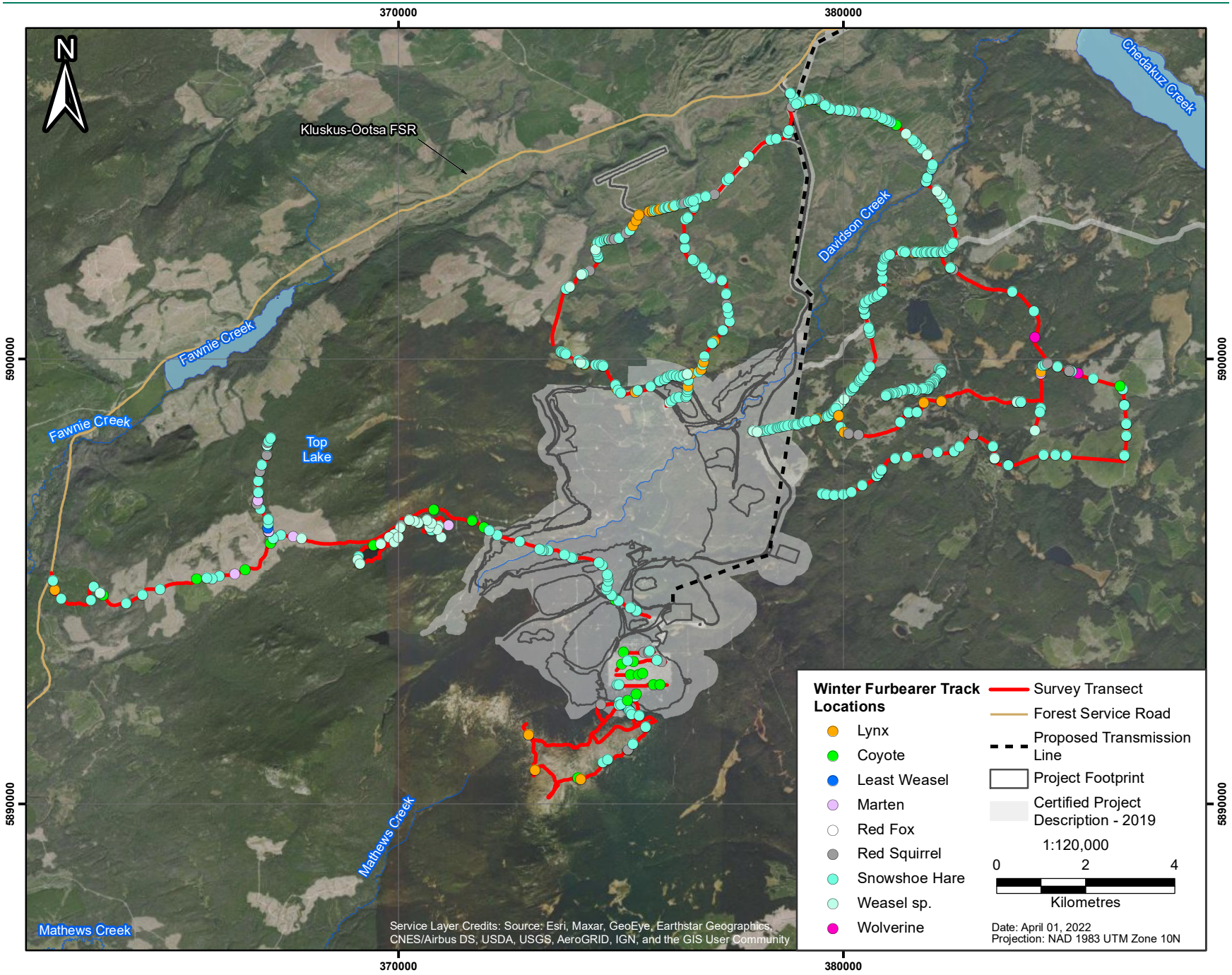

Figure 6.4-1: Furbearers Winter Ground Track Locations, 2011-2013

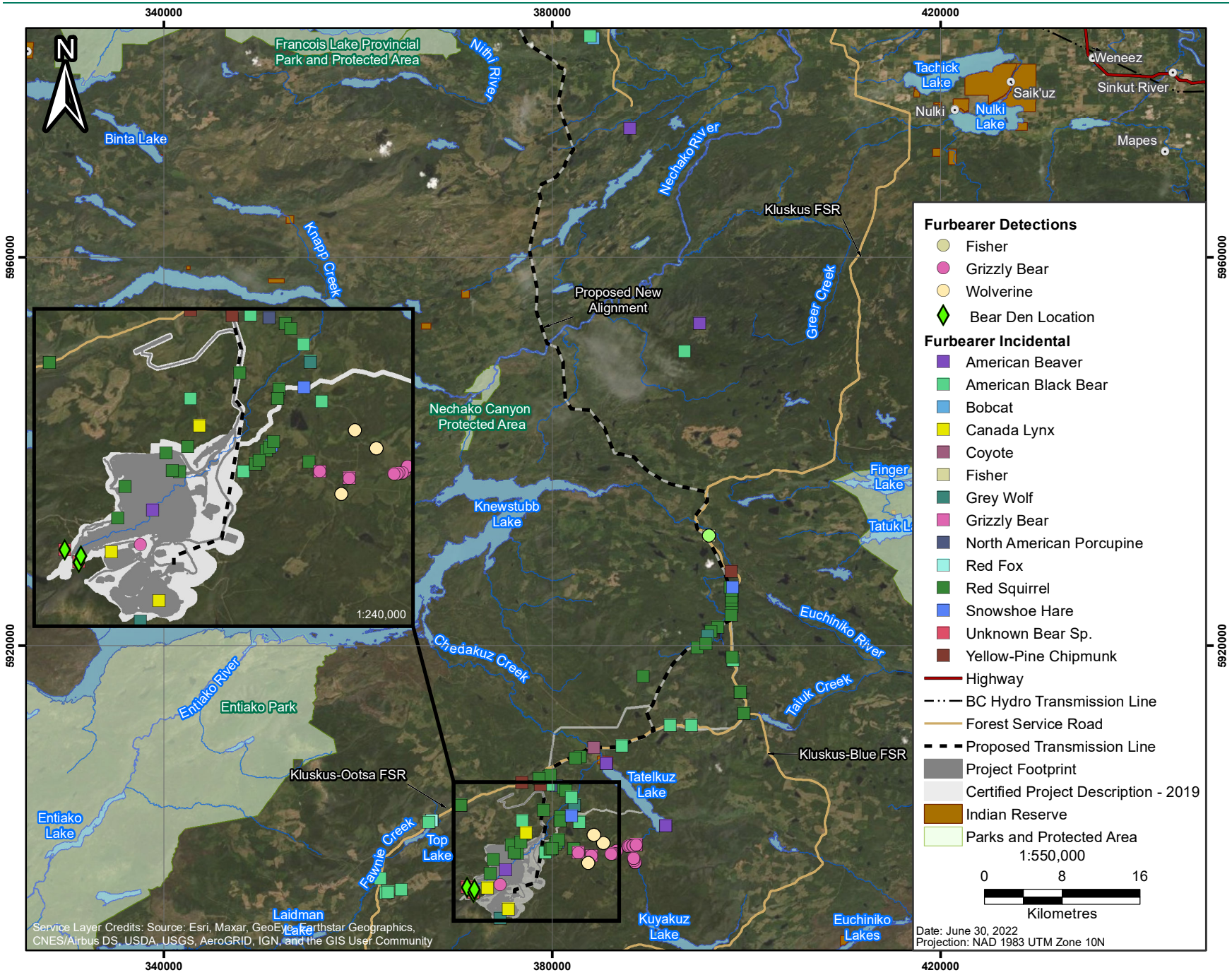

Figure 6.4-2: Furbearers Detections, 2011-2013

Table 6.4-1: Furbearer Detections Within the LSA and RSA, 2011-2013

Species Common Name	Scientific Name	Detections (LSA)	Sites Present (LSA)	Detections (RSA)	Sites Present (RSA)
American beaver	*Castor canadensis*	3	2	3	3
American black bear	*Ursus americanus*	51	18	7	7
American marten	*Martes americana*	-	-	14	14
Bobcat	*Lynx rufus*	3	3	-	-
Canada lynx	*Lynx canadensis*	28	23	35	35
Cougar	*Puma concolor*	3	2	-	-
Coyote	*Canis latrans*	16	16	41	26
Fisher	*Pekania pennanti*	1	1	-	-
Grey wolf	*Canis lupus*	1	1	6	3
Least weasel	*Mustela nivalis*	1	1	1	1
North American porcupine	*Erethizon dorsatum*	-	-	1	1
North American river otter	*Lontra canadensis*	6	1	26	3
Red fox	*Vulpes vulpes*	2	2	1	1
Red squirrel	*Sciurus vulgaris*	80	58	75	72
Snowshoe hare	*Lepus americanus*	150	128	25	25
Striped skunk	*Mephitis mephitis*	1	1	-	-
Wolverine	*Gulo gulo*	-	-	3	3
Yellow-pine chipmunk	*Tamias amoenus*	2	2	1	1

6.4.3 Methods

6.4.3.1 Habitat Suitability Modelling

Field surveys for HSM verification were completed across the biogeoclimatic units present in the Project LSA and RSA (Appendix A). Surveys were conducted from June 8 to June 19, 2021 along the mine site and transmission line LSAs. Field survey protocols followed the *Wildlife Habitat Rating Standards* (RIC 1999a) Surveys were conducted by a Qualified Professional and a First Nations land user. Survey teams included representatives from Ulkatcho First Nation and Lhoosk'uz Dené Nation.

Survey plots were each assigned habitat ratings that represent habitat quality and potential impacts related to distance from roads or infrastructure. Survey locations were assessed for abiotic and biotic ecosystem variables, and rated for furbearer habitat suitability using a six-class system from nil to very high. The six-class rating system included life requisites for feeding, security, and thermal, and were completed for the denning season separately for each furbearer species: American marten, fisher, and wolverine. Detailed methods and survey locations are the same as those conducted for moose and grizzly bear in Appendix A.

Habitat suitability models will be updated and provided in the WMMP in 2022, once updated TEM layers are available for mapping.

6.4.3.2 Identification of Den Sites

Furbearer dens vary depending on species; wolverines typically nest at high elevation, using features such as rock piles, outcrops, or tree decay piles as dens (Krebs and Lewis 2000). American marten and fisher den in mature forest using tree features such as logs, snags, or cavities (BC MOE 2003; Weir and Almuedo 2010).

All habitat suitability surveys included searches for wildlife sign and features. Surveyors also noted incidental observations of potential habitat features such as snags while conducting other baseline surveys in 2021.

6.4.4 Results

Habitat mapping updates involving TEM will be implemented in 2022, when additional aerial data are available for the RSA. No furbearer den features were identified during baseline surveys in 2021. Therefore, HSMs will be the primary data source to identify locations where furbearer management and mitigation will be implemented.

6.4.4.1 Incidental Observations

A total of 3 observations and 2 signs of American beaver were incidentally detected at five wetlands surveyed in July 2021 (Appendix G). Muskrat and red squirrel were both observed once during wetland surveys. Tracks, feces, and signs of high use by black bear were observed at two wetland survey locations (Photo 6.4-1; Figure 6.4-3). Wolf tracks and feces were also observed at one survey location. The tracks of an unknown small mammal were also recorded during wetland surveys.

Photo 6.4-1: Black bear adult and cub tracks incidentally recorded, July 2021.

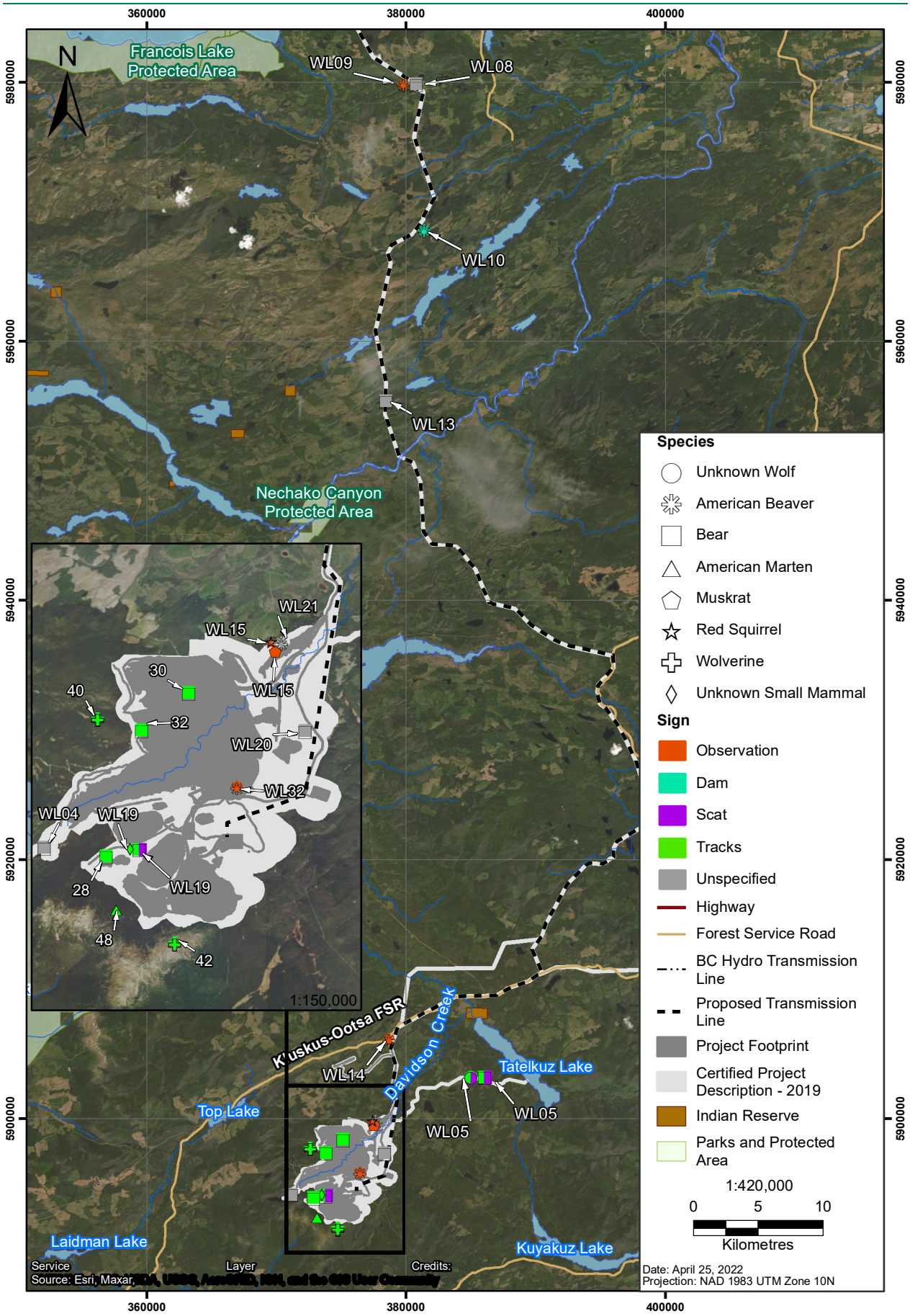

Figure 6.4-3: Furbearer Incidental Observations and Signs, 2021

Wolverine tracks were incidentally observed two times during aerial moose surveys completed in December 2021. Additionally, American marten tracks were incidentally observed once during aerial moose surveys.

6.4.5 Discussion

Pre-construction baseline surveys for furbearers in 2021 were conducted with a focus on furbearer denning habitat in the mine site and transmission line LSAs. Baseline surveys conducted in previous years indicate that furbearer species occur throughout the Project RSA, with American marten being the most commonly observed. Incidental observations across baseline and pre-construction survey years provide limited data on wolverine and fisher occurrence in the RSA. No specific den features were recorded to enable site specific avoidance or mitigation measures for 2021. However, additional pre-clearing surveys will be conducted prior to clearing during the furbearer sensitive denning period, as described in the WMMP.

Monitoring and mitigation measures for furbearers have been developed and are detailed in the WMMP (ERM 2022b).

6.5 Bats

All bat species in BC are insectivorous mammals that fill an ecological role in pest control. Research indicates bats use northern latitudes and cooler mid to high elevation habitats which were previously thought to be unsuitable (Lausen 2006; RTEC 2006, 2008). Bats use a combination of habitat types during the year. They roost within old growth forest and riparian areas in dead or declining trees, or in some cases, within rocky crevices along talus slopes, cliffs, or under boulders (Chruszcz and Barclay 2002; Barclay and Solick 2006; Bachen et al. 2019). Bats also require habitat for hibernating overwinter, which varies depending on species and region but may include caves, cracks, crevices, and rootwads. Hibernacula must maintain temperatures and humidity suitable to bats overwinter, narrowing available features in the Project LSA and RSA to caves and crevices which are larger enough to maintain higher internal temperatures.

Several bat species are of conservation concern in BC, some with limited data on range and habitat use (Craig and Holroyd 2004). Two bat species of conservation concern are known to occur in the Project LSA and RSA: little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*). Both species are federally listed as Endangered on Schedule 1 of SARA (Government of Canada 2022a), largely due to white nose syndrome, a pathogenic fungus passed between bats in hibernacula. Northern myotis is also provincially Blue listed (Special Concern) in BC (BC CDC 2022).

6.5.1 Existing Baseline Data

Call surveys (recording bat echolocation calls) were conducted within the LSA during 2011-2013 baseline studies for the EAC Application. Surveys used Anabat II detectors and followed *Inventory Methods for Bats* (RIC 1998a) methodology. Call surveys were completed at a total of six locations, with five locations across the mine site surveyed in 2011 and 2012. Two locations were re-surveyed in 2013, in a new location (Figure 6.5-1). Nine species of bats were recorded (Table 6.5-1). All bat detections were within the mine site at fens or open water wetlands, surrounded by pine and spruce forest (Figure 6.5-1). Little brown myotis and northern myotis were the most abundant bat species detected (Table 6.5-1).

The majority of little brown myotis detections were within a wetland in the headwaters of Davidson Creek at an elevation just below the mine site and upstream of the proposed tailings storage facility. No bat hibernacula were located within the mine site or LSA. Habitat suitability mapping did not show potential areas of cave formation that contain limestone, marble, or calcareous sedimentary rocks that could support cave hibernacula.

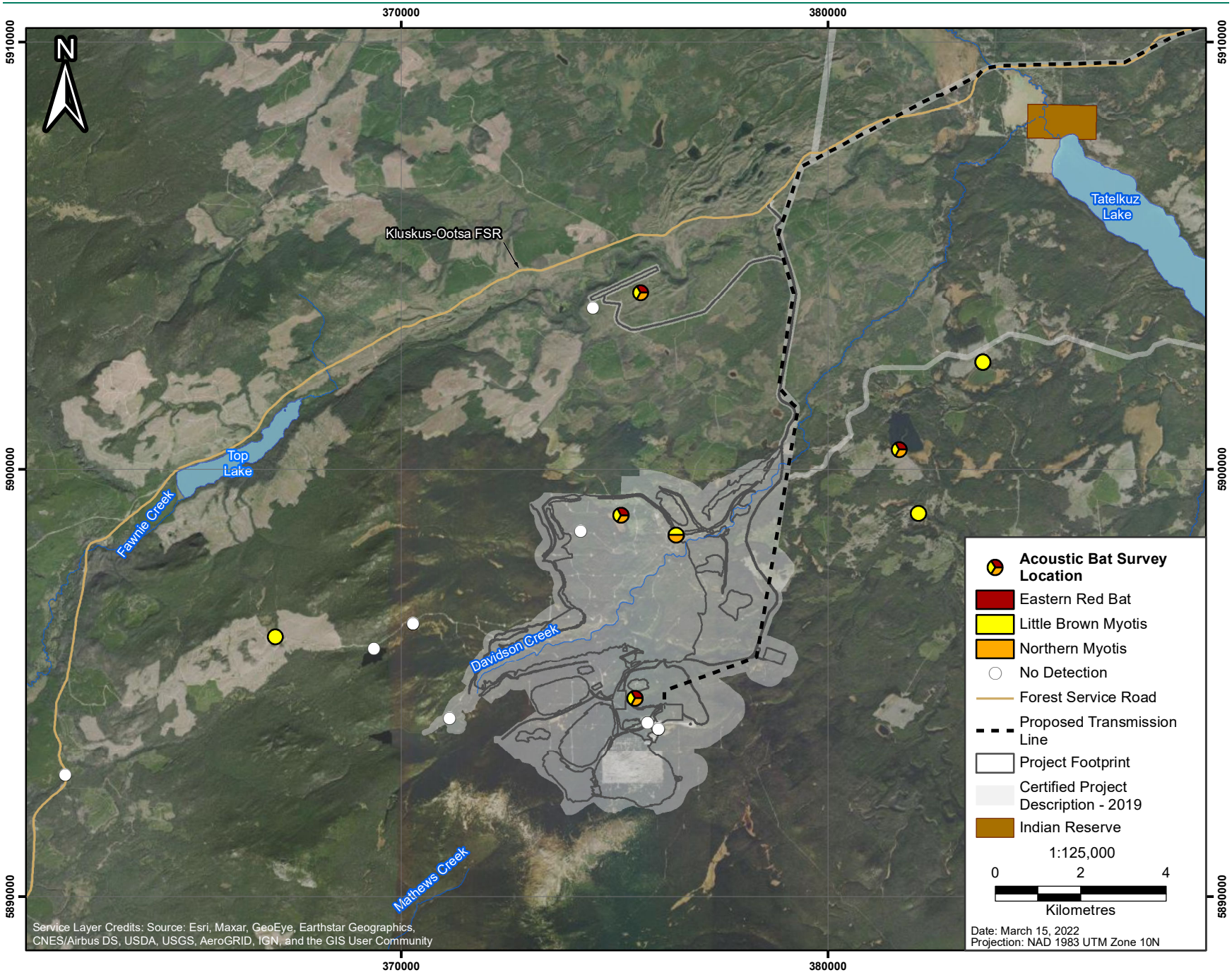

Figure 6.5-1: Acoustic Bat Survey Locations and Species at Risk Detections, 2011-2013

Table 6.5-1: Bat Species Detected during Baseline Surveys, 2011-2013

Species Common Name	Scientific Name	Conservation Listing	Relative Detections (LSA)	Sites Present (LSA)
Big Brown Bat	*Eptesicus fuscus*		9	3
Eastern Red Bat	*Lasiurus borealis*	BC Red Listed	56	5
Hoary Bat	*Lasiurus cinereus*		9	5
Little Brown Myotis	*Myotis lucifugus*	Endangered (SARA)	161	7
Long-legged Myotis	*Myotis volans*		19	2
Northern Long-eared Myotis	*Myotis septentrionalis*	Endangered (SARA), BC Blue Listed	243	5
Silver-haired Bat	*Lasionycteris noctivagans*		15	3
Western Long-eared Myotis	*Myotis evotis*		42	4
Western Small-footed Myotis	*Myotis ciliolabrum*		1	1

6.5.2 Objectives

Pre-construction baseline surveys for bats in 2021 were conducted to:

- Confirm and update suitable little brown myotis and northern myotis roosting habitat in the mine site, to inform mitigation and offsetting work (DS Commitments 8.14 and 8.15); and
- Identify and inventory any bat hibernacula and roosts within the LSA and RSA (EAC Condition 23c).

6.5.3 Methods

Potential bat habitat features such as wildlife trees, snags, and rock/crevice features were recorded incidentally during other field surveys throughout the mine site and transmission line LSAs. Wildlife habitat features and signs of use were recorded at all sites assessed for habitat suitability field surveys (conducted for other target species).

Additional surveys of bat species present in the mine site and transmission line LSAs were also conducted to update and add to existing baseline data. Call surveys were carried out using bat automated recording units (ARUs), with analysis of recorded bat calls to determine species or groups of bats present.

6.5.3.1 Call Surveys

Field Surveys

Call surveys were conducted in June through August 2021 when bats are active on a nightly basis. Call surveys followed RIC protocols (RIC 1998a). Wildlife Acoustics SM3 units and Wildlife Acoustics SM-mini bat recorders were deployed at suitable habitat locations within the mine site and transmission line LSAs. Survey locations were selected based on their potential as foraging habitat, including the presence of open areas or wetlands, which attract flying insects. Survey sites were located next to mature or intermediate forest that may provide suitable roosts during the day or cooler nights.

Call Analysis

Recorded bat calls (sonogram files) were analysed for detection of 12 species known to be present or potentially present in the mine site RSA, based on species ranges and previous baseline work in 2011-2013 (Table 6.5-2). Analysis sonogram files was conducted using the software program Kaleidoscope Pro, version 5.4.2 (Wildlife Acoustics 2019). The call library used was version 5.1.0, and files were processed on the "0 Balanced (Neutral)" setting. Other signal parameters were left at default values. Kaleidoscope has a built-in call library for North American species which runs auto-identification on recorded calls, based on clustering analyses. Auto-ID is a first step of analysis and provides likely occurrences, reducing manual analysis time. While auto-ID is both efficient and generally accurate, variation in recording quality and overlap in species calls requires additional manual review to assess confidence in species presence.

Table 6.5-2: List of Bat Species Potentially Occurring within the Regional Study Area

Likelihood of Occurrence	Common Name	Scientific Name	Characteristic Frequency (Fc)[1]	Call ID Notes[2]
Confirmed (2013 Baseline)	Big Brown Bat	*Eptesicus fuscus*	22-30 kHz	May have sharper incline on call shape and lower Fc
Confirmed (2013 Baseline)	Eastern Red Bat	*Lasiurus borealis*	38-50 kHz	May have a variable Fc within a sequence and a slight uptick at the end
Confirmed (2013 Baseline)	Hoary Bat	*Lasiurus borealis*	18-22 kHz	Fc typically lowest (< 22 kHz), very flat call shape
Confirmed (2013 Baseline)	Little Brown Myotis	*Myotis lucifugus*	40-45 kHz	Typically less steep call shape and lower maximum frequency (typically 70-80 kHz)
Confirmed (2013 Baseline)	Long-legged Myotis	*Myotis volans*	40-45 kHz	Diagnostic hook at top of call, but rarely seen; calls exhibit large variety and overlap with other *Myotis* species
Confirmed (2013 Baseline)	Northern Long-eared Myotis	*Myotis septentrionalis*	40-45 kHz	Calls have large bandwidth range, with maximum frequency often over 90 kHz and on loud calls exceeding 100 kHz; calls are typically quiet
Confirmed (2013 Baseline)	Silver-haired Bat	*Lasionycteris noctivagans*	22-30 kHz	May have longer pulse break and higher Fc (> 26 kHz)
Confirmed (2013 Baseline)	Western Long-eared Myotis	*Myotis evotis*	30-35 kHz	Low Fc distinguishes from other *Myotis*
Possible/ Probable	California Myotis	*Myotis californicus*	44-50 kHz	Higher Fc than most *Myotis,* Steeper call shape than *M. yuma*
Possible/ Probable	Western small-footed myotis	*Myotis ciliolabrum*	40-45 kHz	May have a smooth sweeping curve call shape with a downward ending tail. Lower Fc Then *M. Californicus*
Possible/ Probable	Yuma Myotis	*Myotis yumanansis*	44-50 kHz	Higher Fc than most *Myotis;* Less steep call shape than *M. californicus*
Unlikely	Townsend's big eared bat	*Corynorhinus townsendii*	32-35 kHz	May have a low intensity call with a linear downward sweep

[1] Lausen (2011); Lausen and Livengood (2011); Maxell et al. (2015).

Several challenges are present in identifying bat species by echolocation calls. While foraging, bats emit calls with different frequencies (in kHz) and durations (in milliseconds). These are separated into three phases: search, approach, and feeding buzz (also called terminal phase; Simmons, Fenton, and O'Farrell 1979; Fenton and Bell 1981). Search phase calls tend to be spaced apart from one another, and are relatively consistent within species. Approach phase and feeding buzz calls are emitted progressively closer to one another, as the bat identifies and targets the prey item; however, these calls vary greatly within species and even within individuals, so are not considered a good diagnostic for species identification (Simmons, Fenton, and O'Farrell 1979; Fenton and Bell 1981). Even with clear search phase calls recorded, reliable differentiation between species can be challenging. In particular, several species in the genus *Myotis* have overlapping characteristics of echolocation calls around the 40 kHz frequency range (Table 6.5-2; RIC 1998a; Maxell et al. 2015). Additionally, big brown bats and silver-haired bats have very similar call characteristics and are not always possible to identify to species (Table 6.5-2; Maxell et al. 2015). In situations where a given recording could belong to more than one species, identification was left as a list of two or more possible species.

Calls are not always identifiable to species, depending on the frequency and diagnostic features of the species calls, and the clarity of the recording. Therefore, species are reported according to confidence in occurrence to account for uncertainty in call assessment.

6.5.4 Results

Identification of potential bat hibernacula and roosts were completed alongside other pre-construction surveys in the summer of 2021. Identification of features for roosts (i.e., wildlife trees) and hibernacula (i.e., caves or crevices) was done during habitat suitability surveys for other species in the mine site and transmission line LSAs; observers including Qualified Professionals and First Nations land users searched all habitat suitability plot areas for wildlife signs and features. No potential hibernacula were identified. Wildlife trees which may serve as bat roosts were recorded incidentally, but none were within the planned mine site or transmission line footprints.

6.5.4.1 Call Surveys

Call surveys were conducted at four survey locations within the transmission line LSA and 16 survey locations within the mine site LSA for variable deployment periods from June 18 through August 20, 2021 (Figure 6.5-2; Appendices H and I). Survey sites were all in open wetlands which provide foraging habitat for bats and surrounded by mature forest which may provide roosts for bats during the day. Figure 6.5-2 shows the survey locations, ARU deployment duration in days, and number of bat sonogram files recorded at each site; one file represents a distinct period of activity when a bat flies by the ARU. Erroneous noise files that did not represent bat activity were removed.

Results from the Kaleidoscope sonogram file analysis ranked potential presence of twelve bat species with by level of confidence in detection: High (n = 3), Moderate High (n = 2), Moderate Low (n = 4), and Low (n = 3; Figure 6.5-2). Three bat species were detected with high confidence in 2021: little brown myotis, silver-haired bat, and western long-eared myotis (Table 6.5-3), with relative detections of little brown myotis more than 10 times as high as any other species. Big brown bat and hoary bat were also detected with moderate high confidence. Several species are difficult to diagnostically identify due to overlaps between call frequencies and shapes, including northern myotis versus long-legged myotis, and California myotis versus yuma myotis. Eastern red bat was detected at a relatively high rate during 2011-2013 baseline work, but no diagnostic calls were identifiable from recordings in 2021.

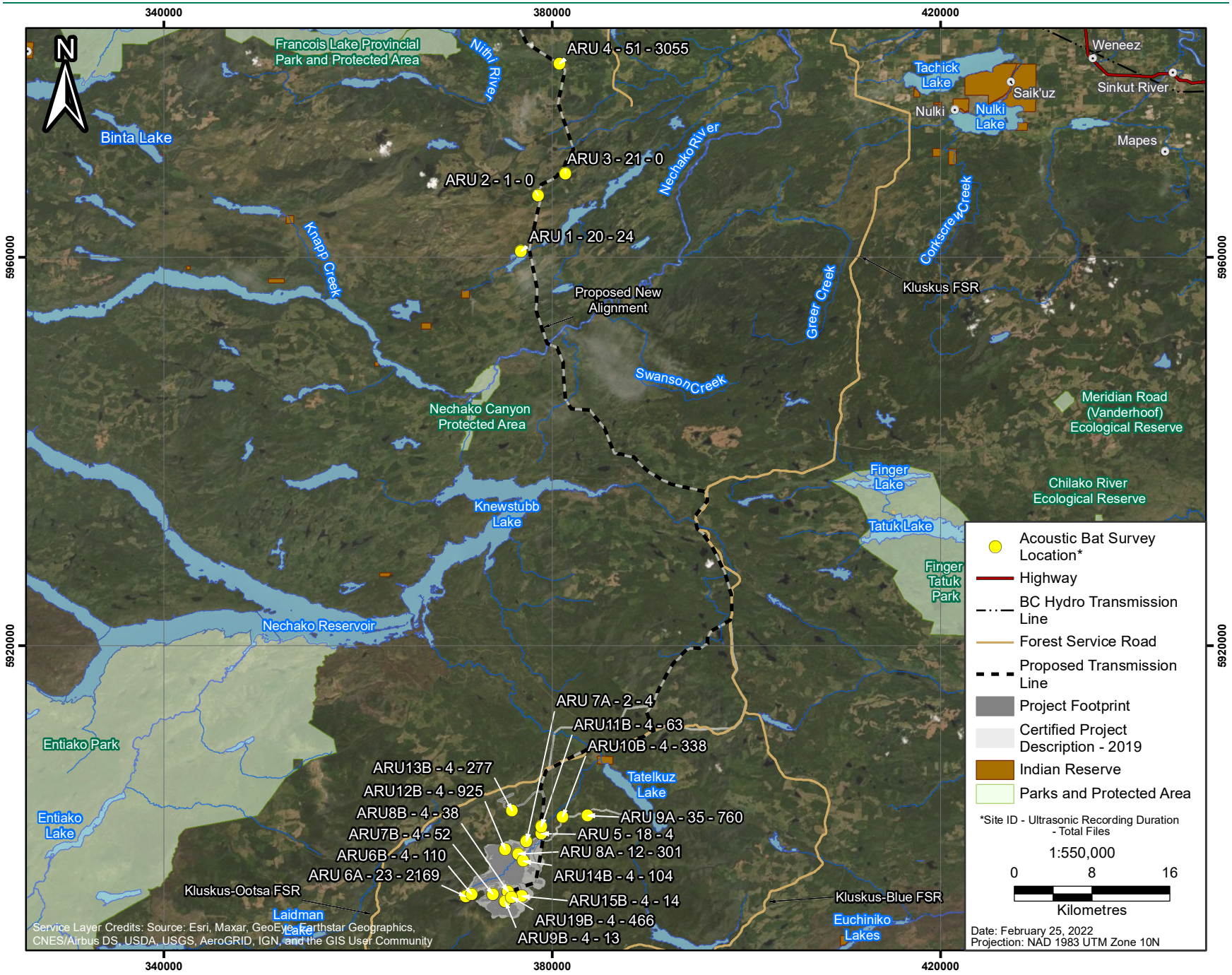

Figure 6.5-2: Acoustic Bat Survey Locations and Relative Activity, 2021

Table 6.5-3: Bat Species Detected by Confidence Level

Confidence in 2021 Detection[1]	Bat Species	Detected in 2011-2013 Baseline?
High	Little Brown Myotis	Yes
	Silver-haired Bat	Yes
	Western Long-eared Myotis	Yes
Moderate High	Big Brown Bat	Yes
	Hoary Bat	Yes
Moderate Low	California Myotis	No
	Long-legged Myotis	Yes
	Northern long-eared Myotis	Yes
	Yuma Myotis	No
Low	Eastern Red Bat	Yes
	Townsend's Big Eared Bat	No
	Western Small-footed Myotis	Yes

[1] Calls are not always identifiable to species, depending on the frequency and diagnostic features of the species calls, and the clarity of the recording. Therefore, current baseline reports species according to confidence in occurrence, to account for uncertainty in call assessment. Results include transmission line and mine site LSAs.

The site with the highest relative bat activity when controlled for deployment duration was ARU 12B, followed by ARU 19B and ARU 6A (Figure 6.5-2). Activity varied throughout all portions of the mine site LSA, and high activity was not grouped in a particular area or corridor (Figure 6.5-2). Bat activity across all data peaked from July through August and was consistent throughout night time hours (10 pm to 4 am).

6.5.5 Discussion

Bat surveys completed in the summer of 2021 included call surveys to update and verify bat species present in the mine site and transmission line LSAs, as well as surveys to identify potential bat habitat features (hibernacula and roosts).

Results from the deployment of ARUs at 20 locations within the transmission line LSA (n = 4) and mine site LSA (n = 16) included assessment of species present based on confidence levels, due to difficulty in identifying all bat call activity to species. Five species were detected with high or moderate high confidence; all species were detected in the mine site during previous baseline call surveys in 2011-2013. Relative detections of little brown myotis, a federally Endangered species (Government of Canada 2021a), were more than 10 times as high as any other species. Two species which were detected during baseline surveys in 2011-2013 had low confidence in detection in 2021: eastern red bat and western small-footed myotis. Eastern red bats are known to occur rarely in BC, with limited records from the eastern Okanagan and Peace regions (Community Bat Programs of BC 2014).

Wildlife trees which can provide larger bat roosts were incidentally recorded in the mine site and transmission line LSAs, but were not located in any planned development areas. No potential hibernacula were identified during pre-construction baseline surveys in 2021. In the absence of caves, some bat species may hibernate within buildings or rock crevices. Bat hibernation in BC has not been studied extensively, but it is suspected that bats in northwest Canada may hibernate singly or in small groups rather than large groups (Jung et al. 2014). In particular, the big brown bat, commonly found hibernating

in caves in the east, has been found utilizing rock crevices as fall and winter roosts in Colorado, Montana, and Alberta (Lausen and Barclay 2006; Neubaum, O'Shea, and Wilson 2006; Bachen et al. 2019). Alternative hibernacula features such as crevices or rootwads must be sufficiently insulated to provide stable temperature and humidity levels for bats throughout the winter.

Monitoring and mitigation measures for bats have been developed and are detailed in the WMMP (ERM 2022b).

7. AVIAN COMMUNITY

Birds were identified as a group requiring baseline surveys in 2021 (Section 5). The following sections summarize avian studies conducted in 2021 for raptors, waterbirds (e.g., waterfowl, shorebirds, gulls), and upland breeding birds. Studies were focused on distribution of birds and identifying important habitat areas within the wildlife LSA, as well as collecting field data to validate existing habitat suitability models. Surveys were also undertaken to target species at risk to inform management and mitigation actions in the WMMP.

7.1 Raptors

Raptors (i.e., falcons, hawks, eagles, and owls) are long-lived top-level predators that require large home ranges, and use a variety of habitats throughout the year. The landscape surrounding the Project has few areas that can support cliff-nesting raptors, making mature forest the primary raptor nesting habitat. Previous baseline work inventoried the raptor community comprehensively; the 2021 pre-construction baseline work focused on locating raptor nests and confirming habitat availability for short-eared owl (*Asio flammeus*) open ground nesting in the RSA. Short-eared owls are Blue listed in BC and on Schedule 1 of the *SARA* as Special Concern (Government of Canada 2022a)

Management recommendations were established by the Vanderhoof LRMP for bald eagles, and include strategies such as identifying distribution of species within the Project LSA and RSA and development of specific management plans.

7.1.1 Existing Baseline Data

Baseline surveys were completed for raptors in 2011-2013 and 2017. Surveys included call playback and roadside surveys, stand watch surveys, and incidental detections from 2011-2013 baseline surveys (Figure 7.1-1). Call playback surveys were completed in 2011, 2012, and 2013, to detect raptors during the breeding season (Figure 7.1-1). Roadside surveys were completed in 2011 and 2012, in conjunction with call playback surveys for diurnal raptors. Stand watch surveys were completed in 2011, 2012 and 2013, to detect nocturnal and diurnal raptors. Surveys were completed following RIC (2001; 2006) methodology, occurring at dawn and dusk to detect nocturnal raptors (targeting short-eared owl), and during the daylight to detect diurnal raptors.

Eighteen species of raptors (144 individuals) were detected within the the LSA (n = 16) and RSA (n = 14; Figure 7.1-1). The majority of raptor observations during baseline surveys were in old-growth pine and pine-spruce stands. The greatest diversity of raptors was found within the SBSmc, followed by the ESSFmv subzones. The most frequently detected raptor was the red-tailed hawk (*Buteo jamaicensis*), followed by the northern goshawk. Red-tailed hawk was observed at five sites in the RSA, primarily within a mix of mature pine and spruce forest with young forest or a recently harvested area nearby (Figure 7.1-1). Detections of red-tailed hawk within the mine site occurred within mature pine forest. Three northern goshawk individuals were observed at three sites in lower elevation mixed wood stands along the northern portion of the mine site associated with the major creek drainages (Ecofor 2012).

The short-eared owl was the only listed raptor species detected during the baseline surveys (n = 2; Figure 7.1-1). One adult short-eared owl was detected during a stand watch in an agricultural field and grassland on the Tatelkuz Ranch next to the Kluskus FSR and Tatelkuz Lake (within the transmission line RSA; Figure 7.1-1). The second short-eared owl was detected along an exploration road at the south end of the mine site. The short-eared owl detected on the Tatelkuz Ranch may have been potentially breeding in the area, given the timing of the observation.

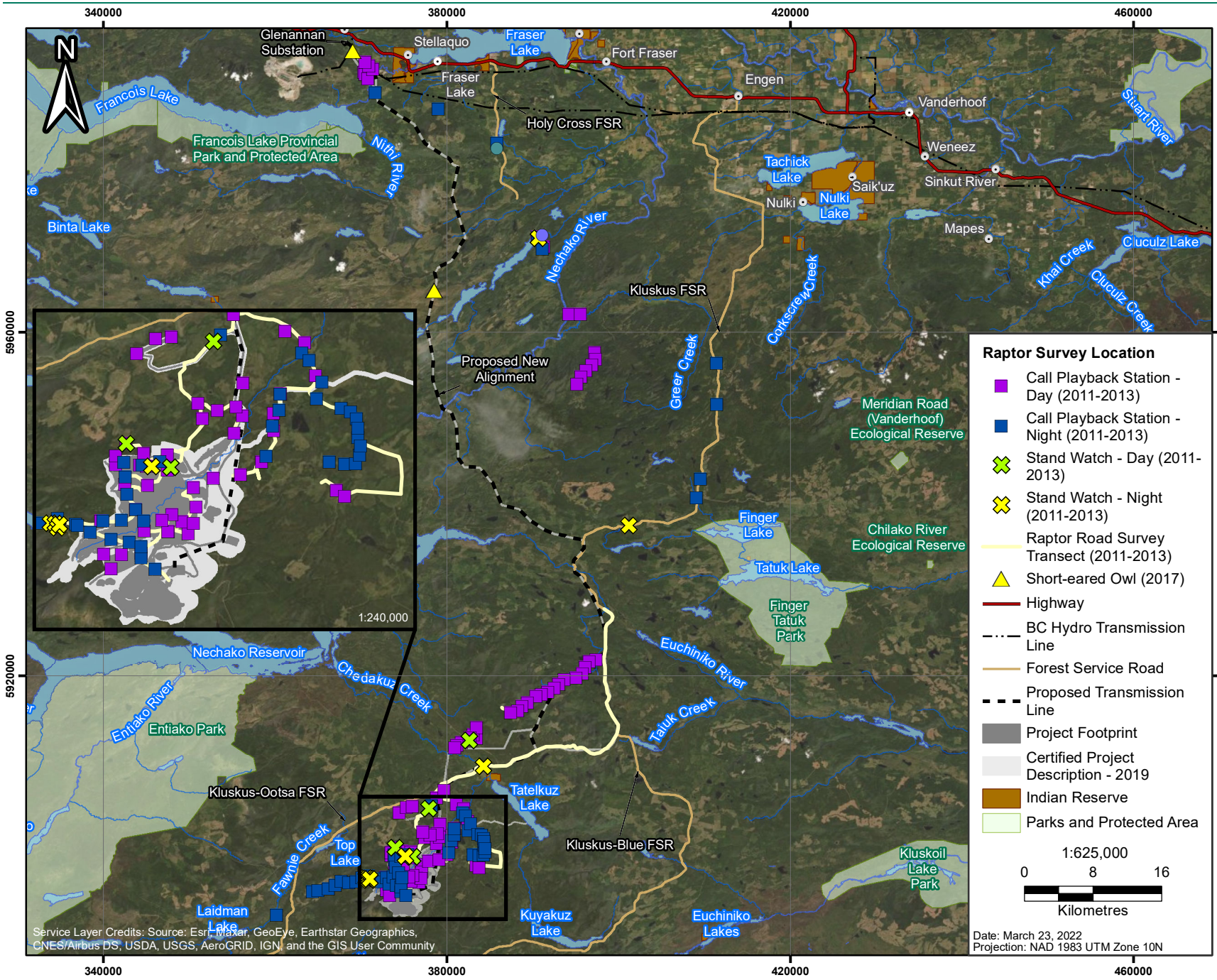

Figure 7.1-1: Raptor Survey Locations , 2011-2013 and 2017

All raptor species detected may potentially nest within the LSA and RSA, except the rough-legged hawk which migrates through the area but nests in the Arctic. Probable nesting locations of raptors were identified through territorial and agitated behaviour; this included sites for sharp-shinned hawk (*Accipiter striatus*) within the mine site LSA. Overall, nest sites were most frequently found within the SBSdk, followed by the SBSdw, and SBSmc subzones. Bald eagle (*Haliaeetus leucocephalus*) nests were most frequently observed in live deciduous trees located in coniferous-dominated stands. Ospreys (*Pandion haliaetus*) were found to nest primarily in dead coniferous trees located in coniferous-dominated stands. No northern goshawk nests were observed.

Aerial and ground surveys for short-eared owl were completed during 2017 baseline surveys (Figure 7.1-1). No short-eared owls or suitable breeding habitat for short-eared owl was identified within the mine site and transmission line LSAs during both ground and aerial surveys. Results from this survey confirmed that suitable habitats for this species are limited in extent and do not interact directly with the mine site or transmission line.

7.1.2 Objectives

The specific objectives of the 2021 pre-construction baseline work for raptors were to:

- Identify high-value nesting and foraging habitat for short-eared owls within the mine site and transmission line LSA;
- Conduct surveys for short-eared owls in high value habitat locations (DS Condition 8.16); and
- Identify raptor nests in the mine site LSA which may require mitigation and management during construction.

7.1.3 Methods

7.1.3.1 Short-eared Owl Surveys

Short-eared owl habitat was assessed within the mine site and transmission line LSA from June 8 to June 19, 2021 following the provincial *Wildlife Habitat Rating Standards* (RIC 1999a). Surveys were conducted by at least one experienced field biologist and a First Nations land user. Survey teams included representatives from Ulkatcho First Nation and Lhoosk'uz Dené Nation.

Survey locations were assessed for abiotic and biotic ecosystem variables and rated for short-eared owl breeding habitat suitability using a six-class system from nil to very high. In addition to overall ratings for suitability, three specific ratings were given for food habitat, security habitat, and thermal habitat suitability. Habitat ratings were further refined in the field based on the plot-in-context, distance to species specific habitat features, and distance to disturbance.

Evening stand-watch surveys were planned for areas identified as at least moderately suitable for short-eared owl foraging or nesting. Survey protocols followed RIC's *Inventory Methods for Owl Surveys* (RIC 2006). However, no suitable short-eared owl habitat was identified within the LSA, so stand-watch surveys were not conducted.

7.1.3.2 Aerial Nest Survey

Aerial surveys were conducted in conjunction with early winter moose surveys to identify raptor stick nests within proposed 2022 clearing areas within the LSA. Surveys were flown in a Bell 206 Jet Ranger helicopter with 2 observers following provincial standards (RIC 1999). Flight tracks, observations and georeferenced photos were recorded on a GPS enabled tablet using pdf Map software. Surveys were

completed while maintaining a height between 50 m and 150 m above ground level and fixed-width transects of 300 m to 500 m, focusing on forested and edge habitats.

7.1.3.3 Incidental Observations

Incidental observations of raptors were collected during several other wildlife baseline surveys in June and July 2021, such as waterbird shoreline surveys and upland bird variable radius point count (VRPC) surveys. These observations were geo-referenced and have been included in this section.

7.1.4 Results

7.1.4.1 Short-eared Owl Surveys

Short-eared owl breeding habitat suitability was assessed at 116 sites in the mine site and transmission line LSAs. Eighty-five percent of sites were rated overall as very low suitability, and the remaining 15% were rated as low (Table 7.1-1). One site was rated moderately low for Security, within the southern transmission line LSA near Tatelkuz ranch. The overall rating for breeding habitat was still low.

Table 7.1-1: Short-eared Owl Breeding Habitat Suitability Ratings, Mine Site and Transmission Line LSAs, 2021

Suitability Rating	Food	Security	Thermal	Overall
Moderately Low (4)	0	1	0	0
Low (5)	17	15	16	17
Very Low (6)	99	100	100	99

No short-eared owl stand watch surveys were conducted because no breeding habitat of at least a moderately suitable rating were found within the LSA. This is consistent with surveys conducted during baseline work in 2011-2013, which found limited suitable breeding habitat in the RSA and none in the LSA.

7.1.4.2 Aerial Nest Survey

Pre-clearing surveys were conducted on December 7, 2021, for the proposed 2022 clearing planned within the mine area. The field crew consisted of a pilot, navigator, and two observers. Visibility was good during the survey; however, gusting winds prevented slowdowns at potential nest locations, necessitating numerous fly-backs and turn-arounds when a nest was suspected.

One stick nest was identified approximately 100 m outside of a proposed clearing area (Table 7.1-2; Figure 7.1-2). The nest was situated on the top of a live, age class 6-7 spruce tree situated on a south-east facing slope. The nest was covered with snow (Photo 7.1-1) so nest condition could not be assessed. The nest site will be monitored in the spring to determine occupancy status.

Table 7.1-2: Stick Nest Location

Species/Status	UTM Zone	UTM Easting	UTM Northing
Unknown - Unoccupied	10 U	376374	5898058

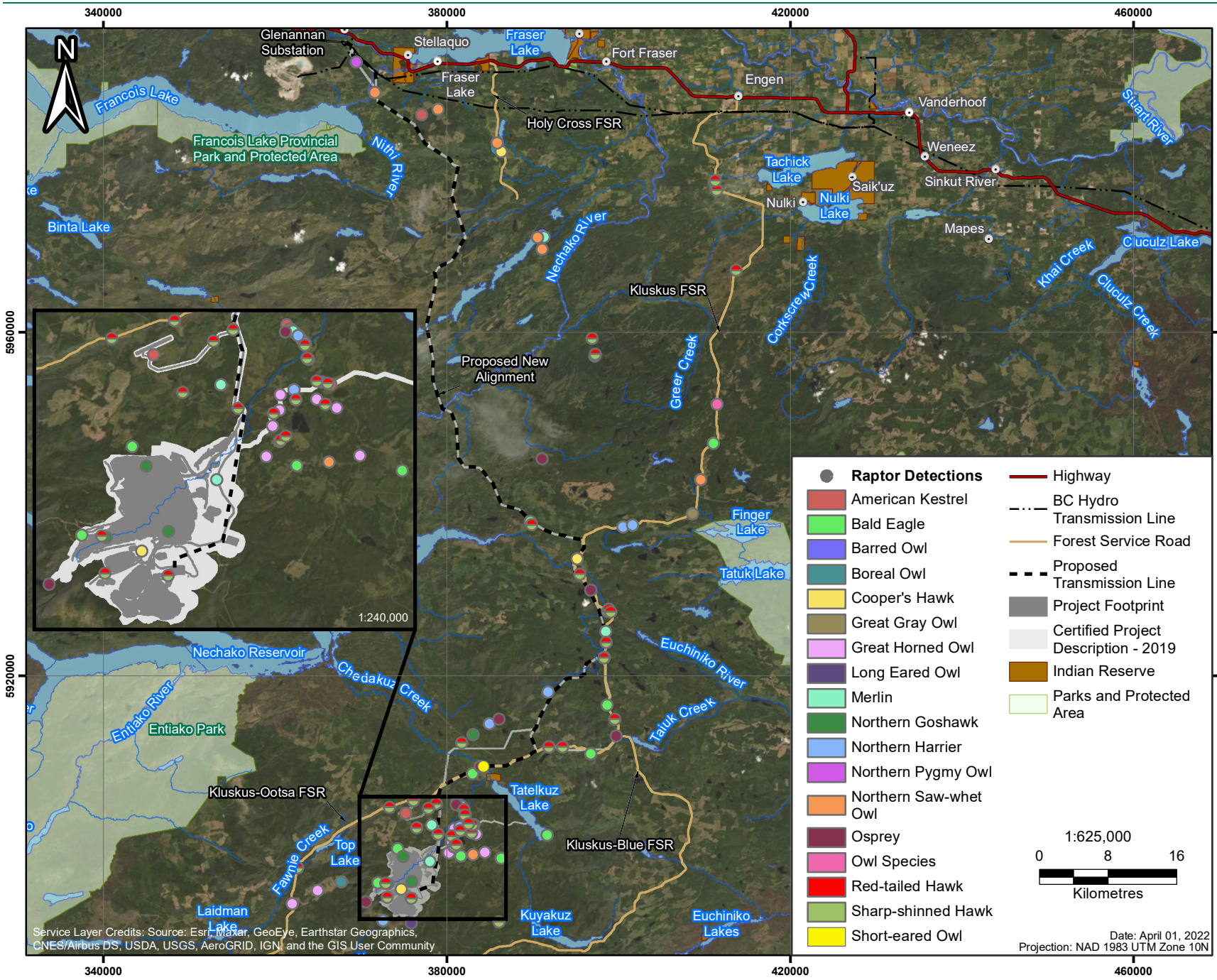

Figure 7.1-2: Raptor Observations, 2011-2013 and 2017

Photo 7.1-1: Identified stick nest December, 2021

7.1.4.3 Incidental Observations

Two raptor species were incidentally recorded during the 2021 wildlife field season (Table 7.1-3; Figure 7.1-3; Appendix J). Northern harrier was observed four times during shoreline surveys, and once during VRPC surveys. Red-tailed hawk was only observed during VRPC surveys.

Table 7.1-3: Incidental Raptor Species Observations in 2021

Species	Shoreline Surveys	Variable Radius Point Count surveys
Northern Harrier	4	1
Red-tailed Hawk	-	2
Total	**4**	**3**

7.1.5 Discussion

Targeted raptor surveys were not conducted in 2021, except an aerial winter survey to identify any existing stick nests in the mine site LSA. One stick nest belonging to an unknown raptor species was observed during the aerial survey in December, 2021. The nest is approximately 100 m from the edge of planned development and may require further management and mitigation; the site will be re-surveyed in the spring of 2022 to determine whether the nest is occupied for the upcoming breeding period and by which species.

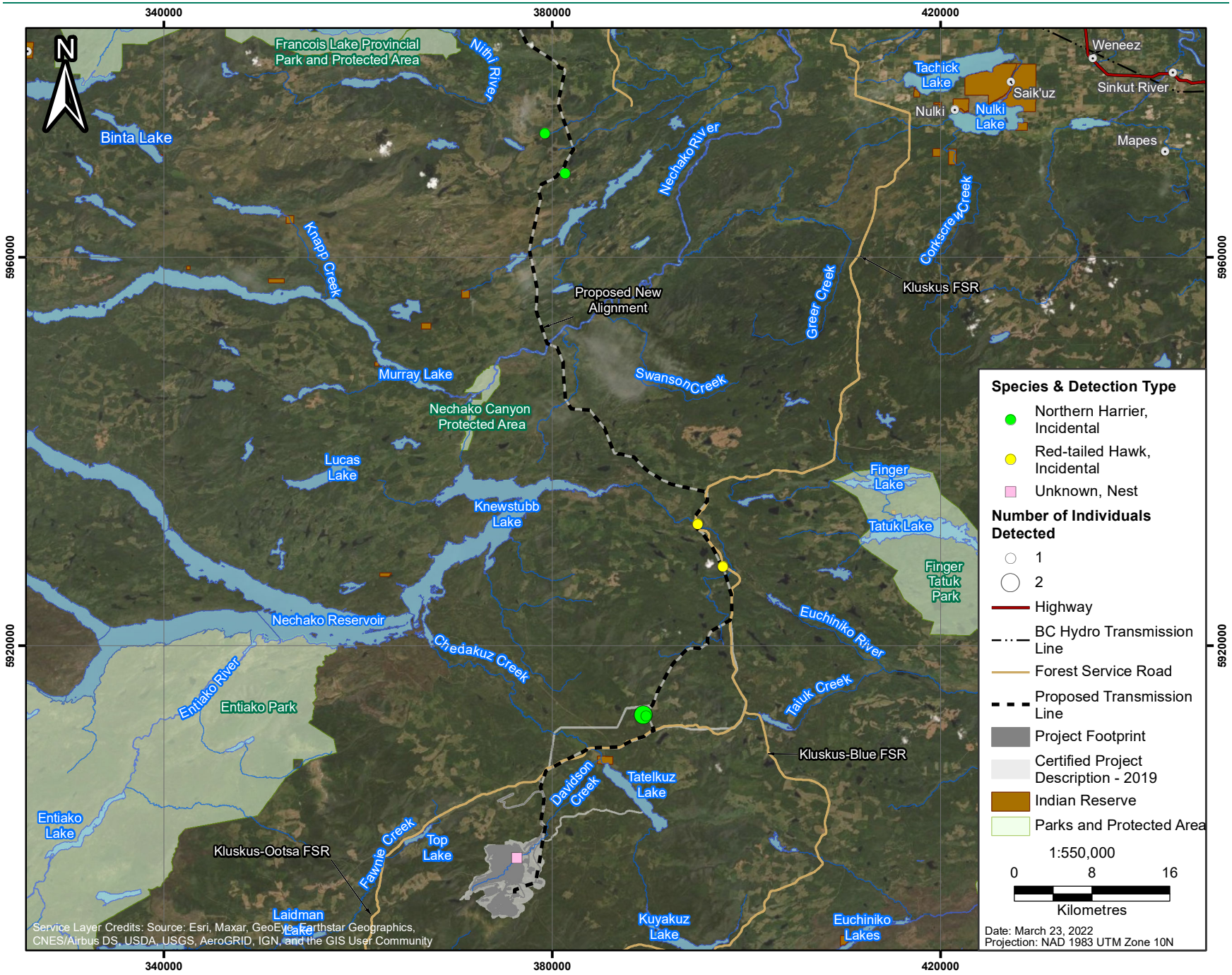

Figure 7.1-3: Stick Nest and Incidental Raptor Observations, 2021

Habitat assessments for short-eared owl breeding habitat were conducted in the mine site and transmission line LSAs, but no suitable short-eared owl habitat was identified. Habitat assessments confirmed work done during previous baseline work indicating limited suitable breeding habitat within the RSA and none within the LSA. No additional monitoring or management are planned for short-eared owls.

Northern harrier and red-tailed hawk were the only raptor species incidentally detected during baseline studies in June and July 2021. Seven individuals were recorded: five northern harrier and two red-tailed hawk. These species are the most conspicuous among the raptor community in the area because they frequently soar over treetops and clearings.

Monitoring and mitigation measures for raptors have been developed and are included as part of the forest birds Valued Component in the WMMP (ERM 2022b).

7.2 Waterbirds

Waterbirds require aquatic habitats for most of their life cycle, including adjacent terrestrial and wetland habitats for nesting and feeding. This includes diving and dabbling ducks, geese and swans, gulls, loons, and shorebirds. Within the RSA, waterbirds may use wetlands (fens, bogs, or swamps), as well as waterbodies such as lakes, rivers, and ponds. Terrestrial habitats not adjacent to water are considered unsuitable waterbird habitat. Subalpine (ESSF and BAFA) wetlands and waterbodies are generally of low value to the majority of the waterbird community because the cold water at high elevations lack abundant aquatic food, e.g., aquatic plants, macro invertebrates, and fish.

Many waterbird species are migratory and depend on available staging habitat in the region en route to suitable breeding and wintering grounds. Migratory waterbirds and their nests are protected under the federal *Migratory Birds Convention Act* (1994). Many species also breed in the region; identifying species of conservation concern during the breeding season helps to meet the obligations of the *Species At Risk Act* (2002b) and the *Wildlife Act* (1996).

Waterbird species of conservation concern confirmed or possibly occurring in the RSA include: great blue heron (*Ardea herodias*), horned grebe (*Podiceps auritus*), and yellow rail (*Coturnicops noveboracensis*). Great blue herons are Blue listed in BC (BC CDC 2022); the species nests in colonies, but not typically within the range of the RSA, and is therefore most likely to be an infrequent non-breeding visitor to wetlands and waterbodies in the area. Horned grebe is listed on Schedule 1 of the *SARA* as Special Concern (Government of Canada 2022a). Horned grebes typically nest in ponds and backchannels with a variety of emergent vegetation. Yellow rail is also listed on Schedule 1 of the *SARA* as Special Concern (Government of Canada 2020), and is provincially Red Listed (BC CDC 2020). While moderately suitable habitat for yellow rail was identified within the RSA during baseline studies in 2011-2013, the species is considered accidental (may occur incidentally) in BC (COSEWIC 2009); the Project is significantly west of the species' nesting range. Additionally, wetland habitats in the RSA lack areas of sedges, true grasses, and rushes with little to no standing water (such as damp fields or meadows) required for yellow rail breeding (COSEWIC 2009), making it unlikely that the yellow rail breeds within the LSA or RSA.

Management recommendations were established by the Vanderhoof LRMP for trumperter swans, American bitterns, and great blue herons. The recommendations include strategies such as identifying distribution of species within the LSA and RSA, and developing specific management plans.

7.2.1 Existing Baseline Data

Baseline surveys for waterbirds were completed in 2011-2013 and 2017. Surveys conducted in 2011-2013 included aerial migration and breeding surveys, yellow rail surveys, and incidental detections (Figure 7.2-1). Waterbird surveys completed in the 2017 baseline included aerial breeding and migration surveys, ground surveys and ARUs for yellow rail, and call playback surveys for horned grebe (Figure 7.2-1).

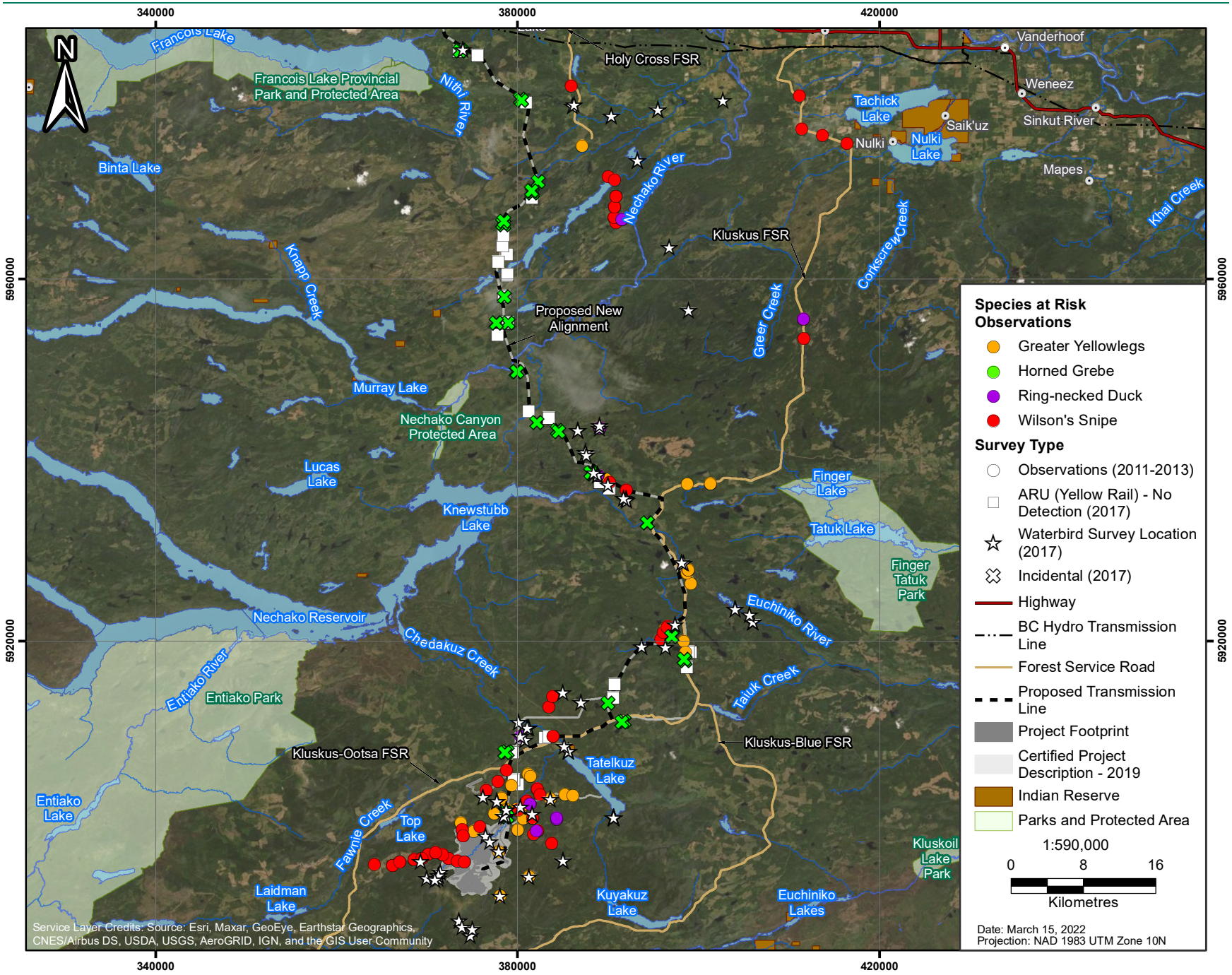

Figure 7.2-1: Waterbird Species at Risk Observations, 2011-2013 and 2017

Aerial breeding waterbird surveys were completed in July of all baseline years 2011 to 2013 , and fall migration waterbird surveys were completed in September, 2013. In 2017, aerial surveys were completed in the transmission line LSA for both the breeding (July) and fall migration (September) period surveys, and ground surveys were completed during the fall migration period. Surveys followed aerial transect protocols in *Inventory Methods for Waterfowl and Allied Species* (RIC 1999c).

A total of 23 species of waterbirds were detected within the RSA. In 2011-2013 surveys, the majority of waterbird detections occurred within the ESSFmv1 and SBSmc BEC subzones. Most waterbodies with waterbird observations were small (<16 ha), and located in areas lower in elevation than the mine site.

Ring-necked ducks (*Aythya collaris*) and Wilson's snipe (*Gallinago gallinago*) were chosen as indicator species for the waterbird community during the 2011-2013 baseline studies. Wilson's snipe was the most commonly detected waterbird across all baseline years 2011-2013. This species requires open areas for nesting, and frequently uses harvested areas as well as wetlands. A large number of the detections during the wildlife surveys were of males displaying from harvested areas, which are widespread across lower elevations of the RSA and transmission line LSA. Ring-necked ducks were also commonly recorded, including one wetland in the transmission line LSA where 21 ring-necked ducks were detected. The observation included a group of at least two broods with a total of 14 young.

The great blue heron was the only waterbird species of conservation concern recorded during 2011-2013 baselines, with one individual being incidentally detected by wildlife camera within the RSA, feeding along Davidson Creek near Tatelkuz Lake.

A total of 21 waterbird species were recorded during aerial surveys in 2017 (breeding n = 17, migration n = 14), and two additional species were recorded during ground surveys. Breeding activity was detected for 11 waterbird species, and breeding areas were well distributed along the surveyed length of the transmission line LSA.

Horned grebe call playback surveys were conducted at 18 locations from June to July, 2017, and aimed to identify presence or not-detected status following RIC methodology (RIC 1999c). No horned grebe were recorded during targeted surveys for this species; however, a horned grebe adult and two brood class II young were incidentally recorded during the July aerial waterbird survey (Figure 7.2-1).

Yellow rail surveys were completed at wetland sites from June 6 to 23, 2013, using ARUs to record territory calls. ARUs were also deployed at 11 locations from June to July, 2017. Surveys for yellow rail followed *Inventory Methods for Marsh Birds (RIC 1998b)* methodology and were used to survey suitable breeding habitat during the breeding season. No yellow rail were detected during any baseline surveys.

7.2.2 Objectives

Pre-construction baseline surveys in 2021 were conducted to:

- Validate waterbird habitat suitability models via field surveys (DS condition 4.3);
- Identify suitable habitat and occurrence of waterbird species at risk (DS condition 4.3) and migratory waterbirds, including greater yellowlegs (DS condition 4.4); and
- Conduct targeted surveys for horned grebe and yellow rails in the LSA (ERM 2017).

7.2.3 Methods

Shoreline surveys were conducted as the primary survey method for waterbirds in the mine site and transmission line LSAs. Results of shoreline surveys focus on identifying waterbird species at risk and greater yellowlegs, a focal waterbird species included for surveying as part of DS condition 4.3. Additional

species-specific playback surveys were conducted for horned grebe and yellow rail (Table 7.2-1). Playback surveys use recordings of a species calling (typically a mate attraction or territorial call) to elicit response from secretive species which may not otherwise be detected. Horned grebe and yellow rail both nest among vegetation, which make them more difficult to detect. Yellow rail are also nocturnal and require surveying after sunset when the birds are most active.

Table 7.2-1: Waterbird Focal Species and Species at Risk and the Associated Survey Method

Species	Survey Method
Greater Yellowlegs (*Tringa melanoleuca*)	■ Shoreline survey at waterbodies 200 m / 20 min, daytime surveys ■ Horned Grebe Playbacks at start of shoreline counts, methods from RIC No. 18 – Waterfowl and Allied Species
Horned Grebe (*Podiceps auritus*)	
Yellow Rail (*Coturnicops noveboracensis*)	■ RIC No. 7 - Marsh Birds: Bitterns and Rails ○ Playback calls with 10 min point counts ○ Evening surveys around sunset ■ ARUs deployed at locations inaccessible for night surveying

7.2.3.1 Shoreline Surveys

Shoreline surveys were completed at waterbodies within the mine site and transmission line LSA during the breeding season (June) to optimise waterbird observation. Environmental variables were recorded for each survey, and surveys were not conducted during high winds (Beaufort scale > 5) or steady rain.

Where applicable, the habitat associated with each waterbody was classified as pond, lake, creek, marsh, swamp, bog, fen, or wetland habitats. At each waterbody, 200 m radius semi-circle of the waterbody and shoreline was surveyed for 20 minutes by at least two observers using binoculars and a spotting scope. Species, number of individuals, sex, and behaviour were recorded for each observation during the survey period. Bird behaviours were also recorded and classified from 21 behaviour types.

7.2.3.2 Horned Grebe

Playback surveys for horned grebe were conducted at the same sites as shoreline surveys. Horned grebe playback surveys were conducted at the beginning of each 20 minute shoreline survey period, and followed RIC protocols from *Inventory Methods for Waterfowl and Allied Species* (RIC 1999b). Playback calls had 20 seconds of the species call followed by 30 seconds of silence, repeated three times for a totally playback time of two and a half minutes.

7.2.3.3 Yellow Rail

Playback surveys for yellow rail were conducted starting at sunset and continuing for two hours after (RIC 1998). Yellow rail playback surveys followed RIC protocols from *Inventory Methods for Marsh Birds: Bitterns and Rails*, with surveys lasting 10 minutes (RIC 1999b). Playback calls were played at the beginning of the survey, using recordings with 20 seconds of yellow rail territorial call followed by 30 seconds of silence, repeated three times (for a totally playback time of two and a half minutes). All yellow rail heard or seen were recorded.

Automated Recording Units

Automated Recording Units (ARUs) were also deployed to detect yellow rails at sites along the transmission line LSA which were not accessible by vehicle. Additional units distributed to inventory bats in the mine site

LSA were also set to record audio data; all sites were open wetlands area which may have some portions of suitable yellow rail habitat. Units were WildlifeAcoustic brand SM-minis, programmed to record from 30 minutes before sunset until 2 am on a schedule of 10 minutes on, 20 minutes off.

ARU data were processed using the WildlifeAcoustic Kaleidoscope program version 5.4.2 (Wildlife Acoustics 2019). Auditory data were run through a cluster analysis, including an advanced classifier trained to separate yellow rail territorial calls. The results were also manually reviewed by a biologist trained in conducting yellow rail surveys.

7.2.3.4 Incidental Observations

Waterbird observations outside of the distance and time limits (i.e., over 200 m away or before/after the survey time) for ground surveys were considered incidental. Waterbirds observed during field surveys for upland breeding birds are included within this section, but were not included in the summary analyses for waterbirds.

7.2.4 Results

Shoreline surveys for waterbirds were conducted on June 9 to 10, June 14 to 19, and June 24 to 26, 2021, at a total of 35 sites within the transmission line (n = 18) and mine site (n = 17) LSAs (Appendix K). A total of 75 waterbirds from 13 species were identified, comprised of six waterbird groups (Table 7.2-2; Figure 7.2-2; Appendix L): dabbling ducks (n = 1), diving and sea ducks (n = 4), gulls (n = 1), loons and grebes (n = 2), riverine birds (n = 1), and shorebirds (n = 4). Four unidentified species were also recorded. The most commonly observed species were bufflehead (*Bucephala albeola),* ring-necked duck (*Aythya collaris*), and Bonaparte's gull (*Chroicocephalus philadelphia*). Greater yellowlegs, a focal waterbird species, were observed during shoreline surveys (n = 8) and incidentally during VRPC surveys (n=9; Table 7.2-2; Photo 7.2-1).

An additional 101 individual waterbirds from 20 species were incidentally observed during 2021 surveys (Table 7.2-2). The majority of observations (69%) were made during upland breeding bird VRPC surveys, while the remaining were during yellow rail surveys and wetland surveys, and outside the time and distance limits at the shoreline survey sites. Eight species that were incidentally recorded were not observed during the shoreline surveys: hooded merganser, lesser scaup, lesser yellowlegs, northern pintail, sandhill crane, sora, trumpeter swan, and ruff (Table 7.2-2). Greater yellowlegs were incidentally observed during wetland surveys nesting at two locations and horned grebe was identified at one location.

Ten waterbird nests were also confirmed during surveys, belonging to gulls (n = 8) and shorebirds (n = 2). Aggressive and territorial behaviour was also noted for an additional four shorebirds and one dabbling duck, indicating possible nest sites in the area.

7.2.4.1 Horned Grebe

A total of 35 playback surveys for horned grebe were conducted from June 9 to 10, June 14 to 19, and June 24 to 26, 2021, within the transmission line (n = 18) and mine site (n = 17) LSAs. Horned grebe were observed at one site along the transmission line LSA (Figure 7.2-1). Response was elicited during playback and one pair with young were confirmed. The site was at a lake with mixed emergent vegetation and a grassy shoreline (Photo 7.2-2).

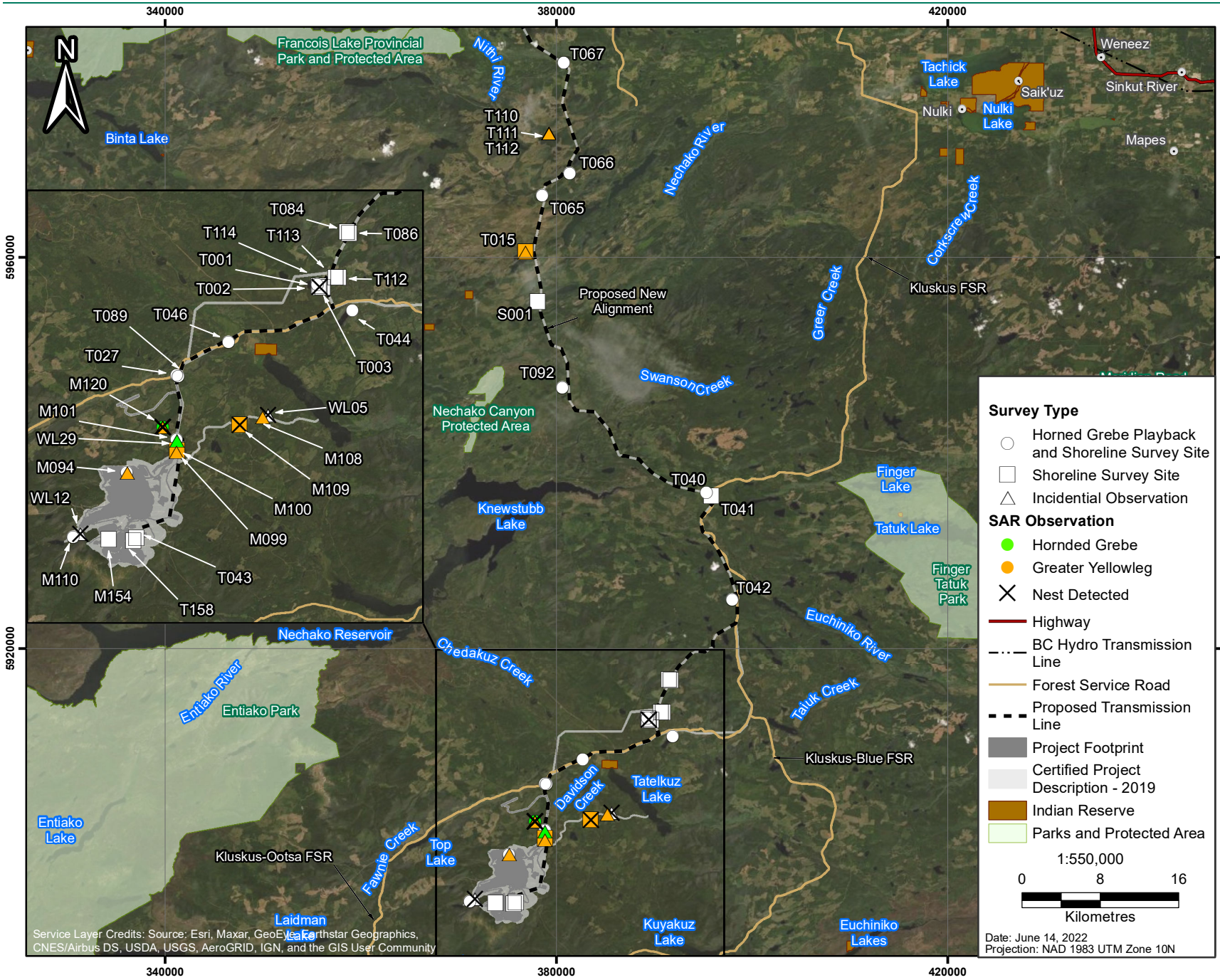

Figure 7.2-2: Waterbird Survey Locations and Species at Risk Distribution, 2021

Table 7.2-2: Total Waterbird Observations During Shoreline Surveys, 2021

Group	Species	Scientific Name	Shoreline Survey	Incidentals[1]			
				Shoreline Surveys	VRPC Surveys	Yellow Rail Surveys	Wetland Surveys
Dabbling Ducks	Mallard	*Anas platyrhynchos*	5	-	5	-	-
	Northern Pintail	*Anas acuta*	-	-	1	-	-
Diving Ducks	Barrow's Goldeneye	*Buchephala islandica*	3	-	-	-	-
	Bufflehead	*Bucephala albeola*	15	-	4	-	4
	Common Goldeneye	*Bucephala clangula*	2	-	-	-	-
	Hooded Merganser	*Lophodytes cucullatus*	-	-	-	-	1
	Lesser Scaup	*Mergus serrator*	-	3	3	-	-
	Ring-necked Duck	*Aythya collaris*	10	-	-	-	2
Geese and Swans	Trumpeter Swan	*Cygnus buccinator*	-	-	1	-	-
Gulls	Bonaparte's Gull	*Chroicocephalus philadelphia*	10	-	10	-	-
Loons and Grebes	Common Loon	*Gavia immer*	5	2	8	1	1
	Horned Grebe*	*Podiceps auritus*	2	-		-	1
Riverine Birds	Belted Kingfisher	*Megaceryle alcyon*	5	-	1	-	-
Shorebirds	Greater Yellowlegs**	*Tringa melanoleuca*	8	-	9	-	3
	Lesser Yellowlegs	*Tringa flavipes*	-	-	-	-	1
	Ruff	*Philomachus pugnax*	-	-	2	-	-
	Solitary Sandpiper	*Tringa solitaria*	5	-	-	-	2
	Spotted Sandpiper	*Actitis macularius*	2	-	6	2	1
	Wilson's snipe	*Gallinago delicata*	3	-	20	-	4

Group	Species	Scientific Name	Shoreline Survey	Incidentals[1]			
				Shoreline Surveys	VRPC Surveys	Yellow Rail Surveys	Wetland Surveys
Other	Sandhill Crane	*Grus canadensis*	-	-	1	-	-
	Sora	*Porzana carolina*	-	-	-	-	1
	Unknown Duck	-	-	-	-	-	2
Total			**75**	**5**	**70**	**3**	**23**

[1] Shoreline survey observations were considered incidental if they are recorded outside of the survey time or radius. Waterbird observations recorded during upland bird Variable Radius Point Count (VRPC) surveys are also reported here as incidental.

** Species of conservation concern*

***Focal upland bird species*

Photo 7.2-1: Territorial greater yellowlegs recorded during shoreline survey, June 2021.

Photo 7.2-2: Horned grebe breeding site in the Transmission Line LSA, June 2021.

7.2.4.2 Yellow Rail

A total of 16 playback surveys for yellow rail were conducted from June 24 to 26, 2021, within the transmission line (n = 6) and mine site (n = 10) LSAs (Figure 7.2-3; Appendix M). No yellow rails were recorded during playback surveys.

Automated Recording Units

Five ARUs were deployed along the transmission line to detect yellow rail in areas inaccessible for night time playback surveys from June 16 to August 7, 2021 (Table 7.2-3; Appendix H). Additional units deployed for bat detections collected audio data which were also analyzed for yellow rail territorial calls (Table 7.2-3). No yellow rail were detected at any sites.

Table 7.2-3: Yellow Rail ARU Deployment, 2021

Survey Target	ARU Site	Dates Active	Total Nights Active
Transmission Line LSA	ARU 1	06/18 - 07/09	20
	ARU 2	07/10 - 07/11*	2*
	ARU 3	06/18 - 07/08	19
	ARU 4	06/18 - 08/07	51
	ARU 5	06/19 - 07/08	18
Mine Site LSA	ARU 6(A)	07/08 - 08/01	23
	ARU 7(A)	07/09 - 07/10*	2*
	ARU 8(A)	7/10 - 7/22	12
	ARU 9(A)	07/11 - 08/15	35

** Units were deployed for longer duration, however programming/unit error occurred.*

7.2.5 Discussion

Waterbird surveys were conducted in June 2021 using multiple methods to inventory the general community as well as to target species of conservation concern. Horned grebe was the only waterbird species of conservation concern identified, with one breeding pair and young confirmed at a lake in the transmission line LSA. Targeted surveys and ARU deployments for yellow rail did not result in any detections. Yellow rail have never been detected in the LSA or RSA, and the RSA is far west of the known breeding range for this species. No additional monitoring for yellow rail is planned. Greater yellowlegs, a focal species identified by DS condition 4.4, was recorded at eight shoreline surveys and nine upland bird VRPC survey sites, including one confirmed nest.

A total of 18 species and 150 individual waterbirds were identified through targeted surveys and incidental observations. The most commonly observed species were bufflehead, ring-necked duck, and Bonaparte's gull. Shoreline survey data and survey locations will be used alongside existing baseline data from 2011-2013 and 2017 to inform management and monitoring plans included in the WMMP. Survey locations where species of conservation concern and focal species were detected will be including in the ongoing monitoring program for waterbirds. Baseline data will also provide information regarding changes in species occurrence or distribution during Project construction and operations.

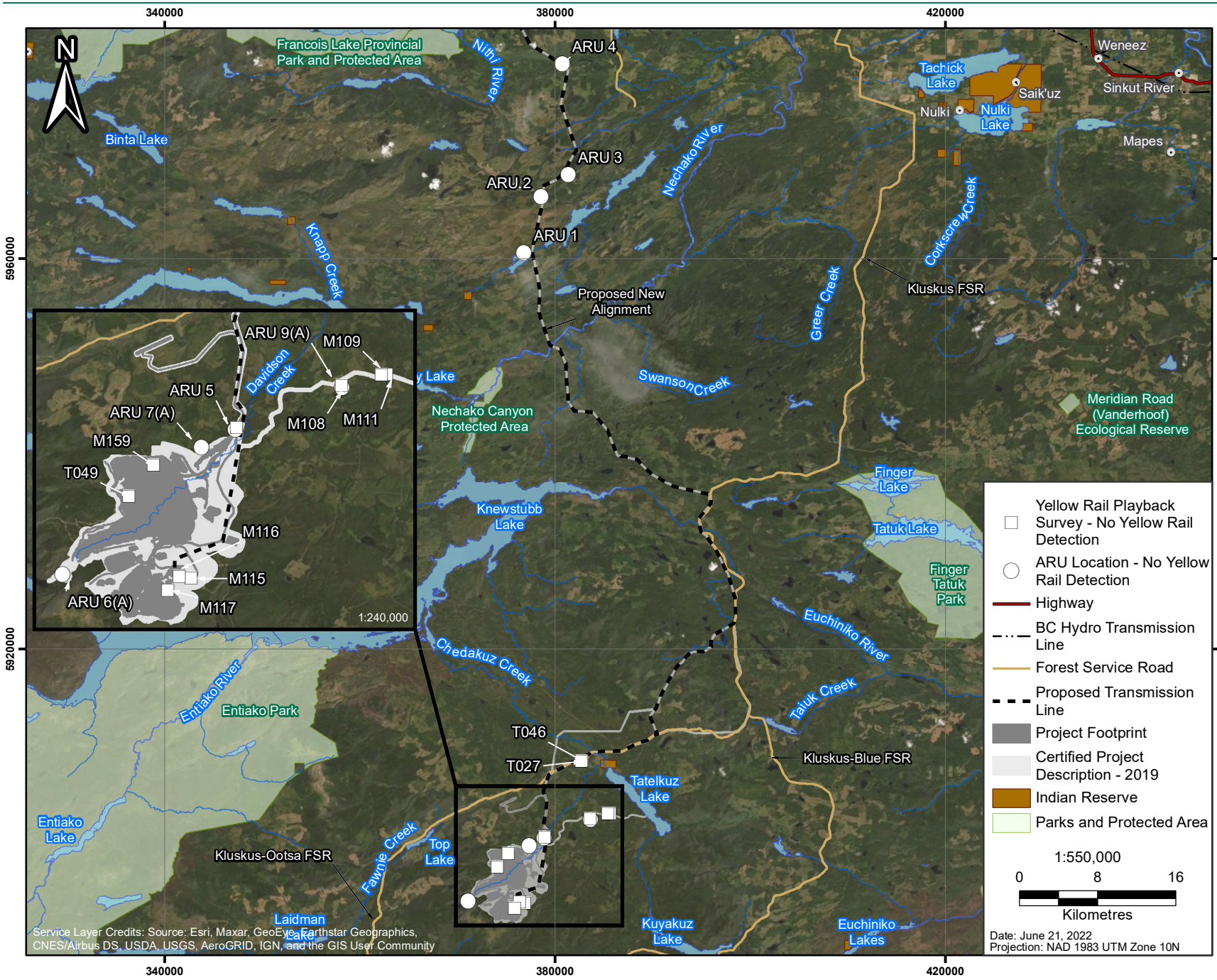

Figure 7.2-3: Yellow Rail Evening Survey and ARU Locations, 2021

Shoreline survey data will also be used to validate existing habitat suitability mapping for waterbirds (Wilson's snipe and greater yellowlegs; DS condition 4.3). Habitat suitability mapping work will be completed once up to date aerial geographical data are available in 2022.

Monitoring and mitigation measures for waterbirds have been developed and are detailed in the WMMP (ERM 2022b).

7.3 Upland Breeding Birds

Upland breeding birds represent an abundant and diverse group that can be surveyed with relative ease (Hutto 1998). From a practical standpoint, upland breeding birds are all birds that are not raptors or waterbirds. In the LSA and RSA, the upland breeding bird community is primarily forest-dwelling species including corvids, grouse, songbirds, and woodpeckers. Upland breeding birds and their nests are protected by the *Migratory Bird Convention Act* (1994) and the provincial *Wildlife Act* (1996), with additional conservation measures for species of conservation concern under the federal *Species at Risk Act* (2002b).

Several upland breeding bird species at risk are known to occur in the RSA. These species and their statuses are listed in Table 7.3-1. Clark's nutcracker is not a species of conservation concern, but it has an obligate mutualist relationship with whitebark pine (provincially Red listed), by dispersing the seeds over long distances through caching.

Table 7.3-1: Upland Breeding Bird Species at Risk

Common Name	Scientific Name	BC Status[1]	SARA Status[2]
Bank Swallow	(*Riparia riparia*)	Yellow	Threatened
Barn Swallow	*(Hirundo rustica)*	Blue	Threatened
Black Swift	(*Cypseloides niger*)	Blue	Endangered
Common Nighthawk	(*Chordeiles minor*)	Blue	Threatened
Olive-sided Flycatcher	(*Contopus cooperi*)	Blue	Threatened
Rusty Blackbird	(*Euphagus carolinus*)	Blue	Special Concern
Sharp-tailed Grouse	*(Tympanuchus phasianellus)*	Blue	-

[1] BC List: Yellow (Least Risk), Blue (Special Concern), Red (Threatened, Endangered, or Extirpated); BC CDC (2021)
[2] Schedule 1 of SARA: Special Concern, Threatened, Endangered, or Extirpated; Government of Canada (2021a)

7.3.1 Existing Baseline Data

Baseline surveys were completed for upland birds in 2011-2013 and 2017 (referred to as "forest and grassland birds" in the EA Application). Baseline surveys from 2011-2013 included point counts, Clark's nutcracker surveys, common nighthawk surveys and sharp-tailed grouse lek surveys (Figure 7.3-1).
A total of 82 species (3,720 individuals) were detected within the LSA (n = 75) and RSA (n = 60). Ground surveys and ARUs for common nighthawk and point count surveys for swallows and swifts were completed during 2017 baseline surveys.

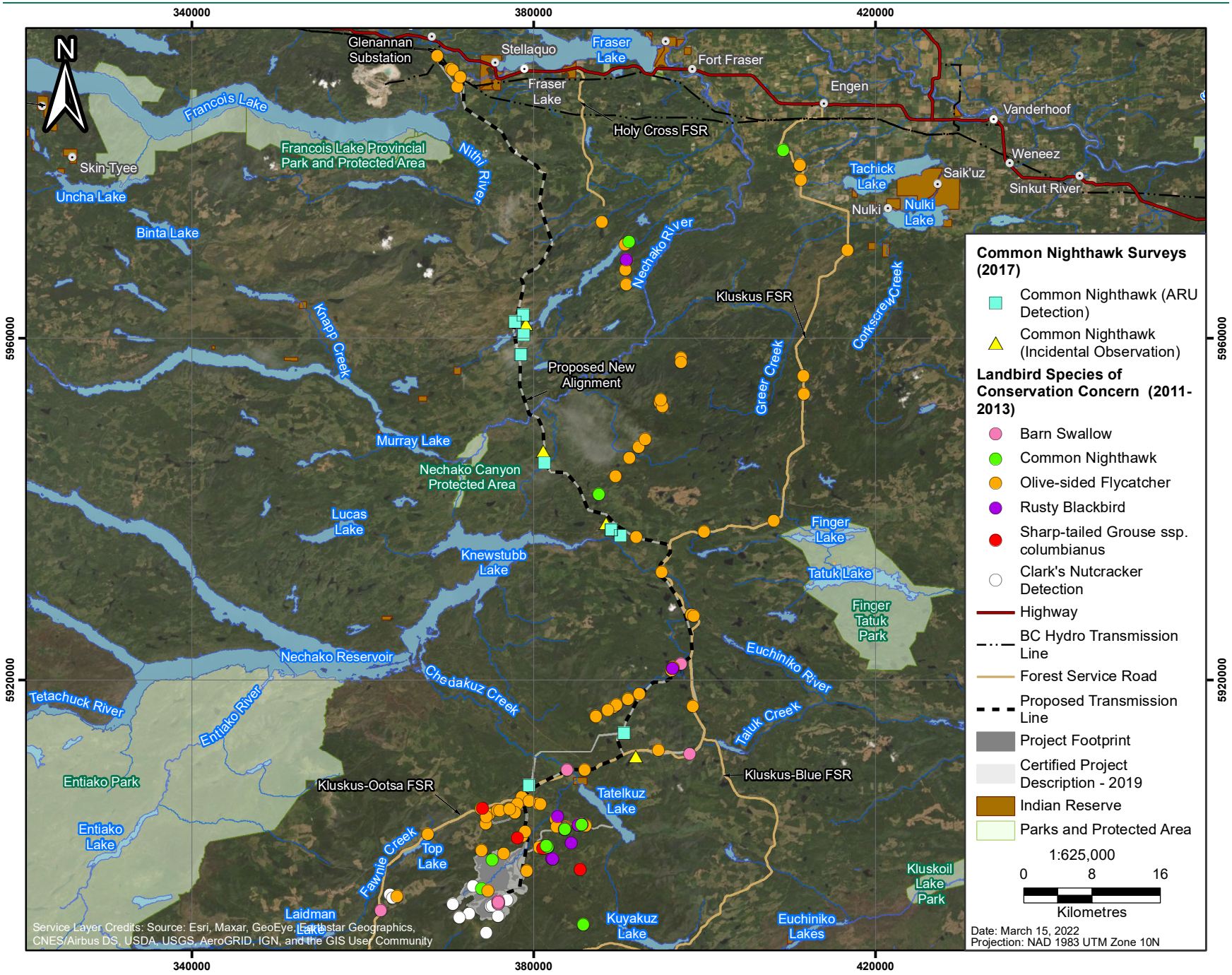

Figure 7.3-1: Upland Breeding Bird Species at Risk Observations, 2011-2013 and 2017

Ground surveys for common night hawk followed *Inventory Methods for Nighthawks and Poorwills* (RIC 1998c) methodology and were used to survey suitable breeding habitat during the breeding season. Three common nighthawks were observed (all incidentally) during the 2011-2013 baseline. Detections were made in clearcuts and wetland openings of young pine-dominated forests in the ESSFmv zones. One of the records included a territorial display, but no nests were confirmed. ARUs were deployed at 14 locations with suitable common nighthawk breeding habitat from June to July, 2017, to detect common nighthawk calls. Common nighthawks were detected on ARU recordings at a total of nine locations (Figure 7.3-1). There were several incidental observations of common nighthawk recorded during other 2017 wildlife baseline studies, and in most cases, these incidental observations were recorded in close proximity to areas where detections were recorded through ARU recordings.

Clark's nutcracker surveys were completed in 2012 and 2013 within the mine site, following transect survey methodology descried by Tomback (2005) and recommended by BC MFLNRO. Clark's nutcracker was only detected during the 2013 surveys at various transects around Mount Davidson, including several within whitebark pine stands. These detections included an individual nutcracker on Mount Davidson in early June, and a group of seven recorded in late July flying towards Mount Davidson (Figure7.3-1). Five nutcrackers were also noted on the north slope of Mount Davidson in the last week of July 2013, and single birds were noted in early and mid-September 2103.

Sharp-tailed grouse lek surveys were completed in May and June 2012, and May 2013 following RIC methodology (RIC 1997). No leks were detected during targeted surveys; however, sharp-tailed grouse are present in the RSA. Potential lek habitat at the Project LSA and RSA includes large (>25 ha) open areas, which typically were fairly young cutblocks with regeneration not having full canopy closure. One individual was detected incidentally in a large clearcut south of Snake Lake during surveys in 2011 and five other individuals were detected in 2012 (Figure 7.3-1).

Point count surveys were completed from June 19 to July 20, 2011, June 18 to July 11, 2012, and June 7 to 26, 2013, to determine presence/non-detection using following Inventory Methods for Forest and Grassland Songbirds and *Inventory methods for swallows and swifts* (RIC 1999b; 1998d) methodology. Five species at risk were observed during 2011-2013 surveys: barn swallow (*Hirundo rustica),* common nighthawk (*Chordeiles minor*), olive-sided flycatcher, rusty blackbird (*Euphagus carolinus*), and sharp-tailed grouse *(Tympanuchus phasianellus;* Figure7.3-1). The most diverse forest and grassland bird sites were within 250 m of a wetland and included mature forest, typically consisting of lodgepole pine and subalpine fir.

Olive-sided flycatchers were the most frequently detected listed species observed during baseline surveys, with 90 detections during surveys or incidentally across the RSA (Figure 7.3-1). Most detections (n = 63) were in or adjacent (<100 m) to harvested areas, and the remaining observations were located in forest adjacent to wetlands. The majority of the detections were located in lodgepole pine forest within the SBS zone.

Barn swallows were detected in all baseline survey years, strongly associated with infrastructure, including the mine exploration camp. From 2011-2013, barn swallows were recorded at 7 sites with a total of 29 individuals; three nesting sites were confirmed (Figure 7.3-1). Nests were confirmed on camp buildings in 2012 and 2013. Bank swallow has low potential as a possible breeder within the LSA but may breed within the RSA. Cliffs adjacent to the proposed transmission line crossing at the Nechako River represent potential nesting habitat, but they did not contain nesting bank swallows in 2013. A total of 102 independent point count surveys for swallows and swifts were completed at 24 locations in June and July, 2017, and followed RIC methodology targeting barn swallow, bank swallow, and black swift (RIC 1998e). There were no swifts or swallows detected during targeted surveys, but a barn swallow breeding area was incidentally observed at a logging camp at km 102 of the Kluskus FSR. Approximately 10 individuals were seen flying between the Kluskus logging camp and a nearby wetland.

Rusty blackbirds were detected at nine locations within the RSA, in proximity of Snake Lake (Figure 7.3-1). Two sites were within the transmission line LSA, and three were within the water pipeline LSA. Birds were detected at wetlands or within 300 m of a wetland, commonly surrounded by a mixture of old forest and recently harvested areas in either the SBSmc or SBSdk subzones. All of the birds detected in or adjacent to wetlands were potentially breeding; this included one bird observed carrying food at the north end of Snake Lake.

7.3.2 Objectives

Upland breeding bird surveys were conducted during the 2021 pre-construction baseline to fulfil requirements of DS condition 4.3:

- Collect field data to validate habitat suitability models for migratory birds (DS condition 4.3); and
- Update field data for migratory birds that are listed as species at risk.

7.3.3 Methods

The majority of upland breeding bird species were surveyed using general point count methods; however, where necessary additional specialized survey methods were used to target species at risk (Table 7.3-2).

Table 7.3-2: Upland Bird Species at Risk and the Associated Survey Method

Species	Methods Section	Survey Method
Bank Swallow (*Riparia riparia*)	7.3.3.3	■ RIC No. 16- Swallows and Swifts ■ Unlimited radius point count, 400 m between sites ■ Targeted within suitable habitat for each species
Barn Swallow (*Hirundo rustica*)		
Black Swift (*Cypseloides niger*)		
Common Nighthawk (*Chordeiles minor*)	7.3.3.2	■ Canadian Nightjar Survey Protocol (WildResearch, Bird Studies Canada, and ECCC 2018) ■ 6 min point count, 1.6 km between sites ■ ARUs deployed where no road access
Olive-sided Flycatcher (*Contopus cooperi*)	7.3.3.1	■ RIC No. 15 – Forest and Grassland Songbirds ■ Variable Radius (100m), 5 min point count
Rusty Blackbird (*Euphagus carolinus*)		

7.3.3.1 Point Count Surveys

The forest bird community is relatively easily surveyed compared to other wildlife, because territorial male birds frequently sing to defend their territories. In some species, both members of breeding pairs use sound to mark territory boundaries (e.g., drumming by woodpeckers). Trained observers can identify bird species according to the unique songs, calls, and other territorial sounds each species makes.
The majority of upland breeding birds are detectable by point count surveys, including Clark's nutcracker and two upland bird species at risk: olive-sided flycatcher and rusty blackbird.

The Variable Range Point Count (VRPC) is a common survey technique used to estimate species richness and relative abundance of forest birds (Ralph, Droege, and Sauer 1995). Observers stand quietly at survey stations (point counts) for five minutes and identify all bird species seen and heard. Bird

detections are estimated according to distance from the observer. VRPC surveys are conducted when birds are the most active and easily identifiable, in the early morning (first four hours after sunrise) during the nesting period in June (RISC 1999).

Point count surveys followed RIC protocols, with stations spaced at least 200 m apart (RIC 1999b). Surveys were not conducted when wind speeds exceeded approximately 30 km/h (5 on the Beaufort scale) or during or steady rain. Survey transect locations were accessed by helicopter along the transmission line LSA or truck for the mine site LSA, at a distance that minimized flushing birds (> 100 m). Point count surveys were conducted in short transects typically of 2 to 3 point count stations spaced 200 m to 300 m apart.

Observers allowed one to two minute settling time after arriving at point count stations, followed by five minutes recording all birds seen and heard. A standard point count radius of 100 m was used, and bird observations were assigned to a 50 m radii interval (i.e., 0 to 50 m, 50 to 100 m). Incidental detections, such as birds flying over the point count station and not landing or those detected beyond 100 m, were not included in analyses. Observers recorded species, the number of birds, the cues by which birds were detected (e.g., singing male, calling, visual, drumming), and any observations of breeding behaviour (e.g., carrying food or nesting material, nests observed, distraction displays, copulation). Habitat descriptions, BEC zone, and weather were also recorded at each point count.

7.3.3.2 Common Nighthawk

Common nighthawk surveys were conducted in 2021 following the *Canadian Nightjar Survey Protocol* (WildResearch, Bird Studies Canada, and ECCC 2018; Table 7.3-2). Survey sites were chosen based on suitable nighthawk breeding or foraging habitat, including natural clearings, cutblocks, wetlands, and gravel pits. Surveys were conducted in late June, 2021 to correspond to the beginning of the nighthawk breeding period when individuals are most likely to be calling and males performing territorial displays (noted by distinct “boom” sounds made with their tail feathers). Surveys were conducted in the evening, starting thirty minutes before sunset and continuing until 90 minutes after sunset.

Sites were accessed by vehicle, with a two-minute quiet period upon arrival (i.e., with the engine and all lights off). Each site was surveyed for six minutes, with observers recording all common nighthawks and their associated behaviour (e.g., calling, boom display, foraging). Surveys were not completed in adverse weather conditions such as wind (Beaufort scale > 3) or steady rain (WildResearch, Bird Studies Canada, and ECCC 2018).

Automated Recording Units

Automated Recording Units (ARUs) were also deployed to detect common nighthawk at sites along the transmission line LSA which were not accessible by vehicle. Additional units distributed to inventory bats in the mine site LSA were also set to record audio data; all sites were open wetlands area which would also be suitable for common nighthawk foraging. Units were WildlifeAcoustic brand SM-minis, programmed to record from 30 minutes before sunset until 2 am on a schedule of 10 minutes on, 20 minutes off.

ARU data were processed using the WildlifeAcoustic Kaleidoscope program version 5.4.2 (Wildlife Acoustics 2019). Auditory data were run through a cluster analysis, including an advanced classifier trained to separate common nighthawk calls and boom sounds. The results were also manually reviewed by a biologist trained in conducting nighthawk surveys. Results include accuracy of the automatic classifier checked via manual review.

7.3.3.3 Swallow and Swifts

Point count surveys for swift and swallows were conducted in suitable habitat areas in mid-June, 2021. These areas included infrastructure or buildings suitable for barn swallow nesting, open grasslands habitat or exposed banks for bank swallows, and waterfall, canyon, or cliff features for black swifts.

Survey methods followed RIC standards *Inventory Methods for Swallows and Swifts* (RIC 1998e). Unlimited radius point counts were conducted for three minutes per site during daytime hours (10 am to 3 pm). Surveys were conducted in low wind conditions (< 10 km/hr) and with no precipitation, corresponding to ideal conditions for swallows and swifts to actively forage for insects. Survey sites were spaced at least 400 m apart, and all individuals seen during the survey time were recorded. Locations of nest sites and statuses of nests (e.g. occupied, incubating) were also recorded.

7.3.3.4 Data Analysis and Habitat Association

Point count survey results were quantified according to relative abundance (all individuals recorded during surveys) and species richness. To determine whether survey effort was sufficient to describe the upland breeding bird community, rarefaction was used to generate a Species Accumulation Curve (SAC), which estimates the rate of new species detections with additional sampling sites (using the vegan package in R v. 4.0.3, R Core Team 2020). The shape of the SAC curve levels out as most species in the community have been detected and additional surveys therefore do not detect many new species. The shape of the curve can be assessed as an indication of whether additional sampling is likely to detect many new species. Additionally, an estimate of species richness was calculated using a Chao Estimator (Chao et al. 2009). The estimated species richness can be compared to total species richness as a measure of whether the current sampling has captured most of the species likely to be present.

7.3.3.5 Incidental observations

Upland breeding bird observations outside the time and distance limits for VRPC surveys were considered incidental. Upland birds observed during shoreline surveys for waterbirds are also included within this section. Incidental observations were not included in the data analyses for upland birds and are reported separately.

7.3.4 Results

7.3.4.1 Point Count Surveys

Variable radius point counts were conducted at 139 sites between June 9 to 16 and June 24 to 27, 2021 (Appendix N). During point count surveys, a total of 760 individual upland birds were recorded across 60 species (Table 7.3-3; Appendix O). The most commonly observed species were: dark eyed junco (n=148; *Junco hyemalis)*, yellow−rumped warbler (n=110; *Setophaga coronate),* American robin (n=51; *Turdus migratorius*), and Swainson's thrush (n=50; *Catharus ustulatus*; Table 7.3-3).

Table 7.3-3: Upland Bird Species Recorded during Variable Radius Point Count Surveys, 2021

Species	Scientific Name	No. Individuals	Incidental Detections			
			VRPC Surveys	Shoreline Surveys	Yellow Rail Surveys	Wetland Surveys
Alder Flycatcher	*Empidonax alnorum*	10	1	1	-	-
American Crow	*Corvus brachyrhynchos*	3	-	2	-	-
American Goldfinch	*Spinus tristis*	-	-	1	-	-
American Redstart	*Setophaga ruticilla*	36	3	5	-	-
American Robin	*Turdus migratorius*	51	4	14	2	1
American Three-toed Woodpecker	*Picoides dorsalis*	11	2	3	-	-

Species	Scientific Name	No. Individuals	Incidental Detections			
			VRPC Surveys	Shoreline Surveys	Yellow Rail Surveys	Wetland Surveys
Bay-breasted Warbler	*Setophaga castanea*	1	-	-	-	-
Black-backed Woodpecker	*Picoides arcticus*	-	-	1	-	-
Black-capped Chickadee	*Poecile atricapillus*	2	-	-	-	1
Blackburnian Warbler	*Dendroica fusca*	-	-	3	-	-
Blackpoll Warbler	*Setophaga striata*	-	2	1	-	-
Boreal Chickadee	*Poecile hudsonicus*	4	-	-	-	-
Brewer's Blackbird	*Euphagus cyanocephalus*	8	-	-	-	-
Brown-headed Cowbird	*Molothrus ater*	3	-	-	-	-
Canada Jay	*Perisoreus canadensis*	22	5	17	-	1
Cedar Waxwing	*Bombycilla cedrorum*	8	9	1	-	-
Chipping Sparrow	*Spizella passerina*	23	4	4	2	1
Clark's Nutcracker**	*Nucifraga columbiana*	1	-	2	-	-
Common Nighthawk*	*Chordeiles minor*	1	2	-	-	3
Common Raven	*Corvus corax*	-	-	1	-	-
Common Yellowthroat	*Geothlypis trichas*	6	5	3	-	-
Cordilleran Flycatcher	*Empidonax occidentalis*	1	-	-	-	-
Dark-eyed Junco	*Junco hyemalis*	148	14	12	3	3
Dusky Flycatcher	*Empidonax oberholseri*	5	-	3	-	-
Unknown Flycatcher	-	-	-	-	-	1
Fox Sparrow	*Passerella iliaca*	-	-	1	-	-
Golden-crowned Kinglet	*Regulus satrapa*	26	2	2	-	-
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*	-	-	1	-	-
Hairy Woodpecker	*Leuconotopicus villosus*	1	-	-	-	-
Hermit Thrush	*Catharus guttatus*	1	1	2	1	-
Lincoln's Sparrow	*Melospiza lincolnii*	10	1	3	-	-
MacGillivray's Warbler	*Oporornis tolmiei*	5	-	-	-	-
Marsh Wren	*Cistothorus palustris*	4	-	1	-	-
Mountain Chickadee	*Poecile gambeli*	11	1	3	-	-
Northern Flicker	*Colaptes auratus*	6	1	1	-	-
Northern Waterthrush	*Seiurus noveboracensis*	2	4	2	-	2
Olive-sided Flycatcher*	*Contopus cooperi*	10	5	5	-	1

Species	Scientific Name	No. Individuals	Incidental Detections			
			VRPC Surveys	Shoreline Surveys	Yellow Rail Surveys	Wetland Surveys
Orange-crowned Warbler	*Oreothlypis celata*	6	1	4	-	-
Pacific-slope Flycatcher	*Empidonax difficilis*	1	-	-	-	-
Pacific Wren	*Troglodytes pacificus*	28	2	3	-	-
Pine Siskin	*Carduelis pinus*	6	-	23	-	-
Ptarmigan	*Lagopus muta*	-	-	-	-	1
Purple Finch	*Haemorhous purpureus*	1	-	1	-	-
Red-breasted Nuthatch	*Sitta canadensis*	8	1	6	-	-
Red-Breasted Sapsucker	*Sphyrapicus ruber*	3	-	2	-	-
Red-Naped Sapsucker	*Sphyrapicus nuchalis*	-	-	-	-	1
Red-winged Blackbird	*Agelaius phoeniceus*	2	1	-	-	2
Red Crossbill	*Loxia curvirostra*	2	24	3	-	-
Ruby-crowned Kinglet	*Regulus calendula*	3	-	2	-	-
Ruffed Grouse	*Bonasa umbellus*	2	-	3	-	-
Rufous Hummingbird	*Selasphorus rufus*	-	1	-	-	-
Savannah Sparrow	*Passerculus sandwichensis*	1	-	-	-	-
Song Sparrow	*Melospiza melodia*	30	12	1	2	4
Spruce Grouse	*Falcipennis canadensis*	3	1	-	-	-
Steller's Jay	*Cyanocitta stelleri*	-	-	-	-	1
Swainson's Thrush	*Catharus ustulatus*	50	7	18	2	1
Swamp Sparrow	*Melospiza georgiana*	1	-		-	-
Tennessee Warbler	*Leiothlypis peregrina*	-	1	-	2	-
Townsend's Solitaire	*Myadestes townsendi*	2	-	-	-	-
Townsend's Warbler	*Dendroica townsendi*	5	-	4	-	-
Tree Swallow	*Tachycineta bicolor*	1	-	1	-	-
Unknown Woodpecker	-	2	-	6	-	-
Varied Thrush	*Ixoreus naevius*	14	4	11	-	1
Warbling Vireo	*Vireo gilvus*	12	1	2	-	-
Western Tanager	*Piranga ludoviciana*	1	-	-	-	-
Western Wood-Pewee	*Contopus sordidulus*	2	-	-	-	-
White-throated Sparrow	*Zonotrichia albicollis*	18	2	2	-	-
Willow Flycatcher	*Empidonax traillii*	3	2	-	-	-
Wilson's Warbler	*Cardellina pusilla*	11	-	2	-	1

Species	Scientific Name	No. Individuals	Incidental Detections			
			VRPC Surveys	Shoreline Surveys	Yellow Rail Surveys	Wetland Surveys
Yellow-bellied Sapsucker	*Sphyrapicus varius*	1	-	-	-	-
Yellow-rumped Warbler	*Setophaga coronata*	110	2	20	-	-
Yellow Warbler	*Setophaga petechia*	11	1	1	-	2
Total		760	129	210	14	28

[1] VRPC survey observations were considered incidental if they are recorded outside of the survey time or radius. Upland bird observations recorded during waterbird shoreline surveys are also reported here as incidental.

** Species of conservation concern*

*** Focal upland bird species*

Olive-sided flycatcher (n=10) and common nighthawk (n=1) were the only upland bird species at risk recorded during point count surveys. Both species were also recorded incidentally during VRPC and shoreline surveys. Olive-sided flycatchers were recorded at seven point count sites, and incidentally at five point count sites, with one site having both a survey and incidental detection. Additionally, olive-sided flycatchers were recorded at four shoreline sites (Figure 7.3-2; Table 7.3-3). One common nighthawk was detected during VRPC surveys, and two were recorded incidentally. One Clark's nutcracker was recorded during VRPC surveys, and two Clark's nutcracker were incidentally observed (Figure 7.3-2; Table 7.3-3). Additionally, during wetland surveys completed in July 2021 common nighthawk were incidentally observed nesting at one location and their calls were heard at two additional locations. Olive-sided flycatcher was observed at one survey location.

An additional 367 individual upland birds from 54 species were incidentally observed during 2021 bird surveys (Table 7.3-3). Of the 58 species incidentally observed, 12 species were not recorded during upland bird field surveys: American goldfinch, blackpoll warbler, black-backed woodpecker, blackburnian warbler, blackpoll warbler, common raven, fox sparrow, gray-crowned rosy-finch, ptarmigan, red-naped sapsucker, rufous hummingbird, Steller's jay, and Tennessee warbler. Shoreline surveys recorded 129 individuals from 34 species, with red crossbill (n=24) being the most commonly recorded upland bird. During VRPC field surveys, 210 individuals from 47 species were incidentally observed. The most common incidentally recorded species associated with VRPC surveys were yellow-rumped warbler and pine siskin. Twenty-four species were only incidentally recorded during either shoreline (n=6) or VRPC surveys (n=17).

A Species Accumulation Curve (SAC) was generated to assess whether sampling effort was sufficient to describe the upland breeding bird community (Figure 7.3-3). The SAC shows the number of new species detected with each additional sampling sites, and the curve flattens out as most species have been detected. The generated SAC flattens as it approaches this study's maximum sampling (139 sites; Figure 7.3-3), indicating that the majority of species have been detected. Additionally, an estimate of the total species richness for the upland bird community was generated using a Chao Estimator.
The estimated species richness is 68 species (range 62 to 90 species 95% Confidence Interval (CI). Therefore, the 60 species detected is slightly under the 95% probability of total species in the community.

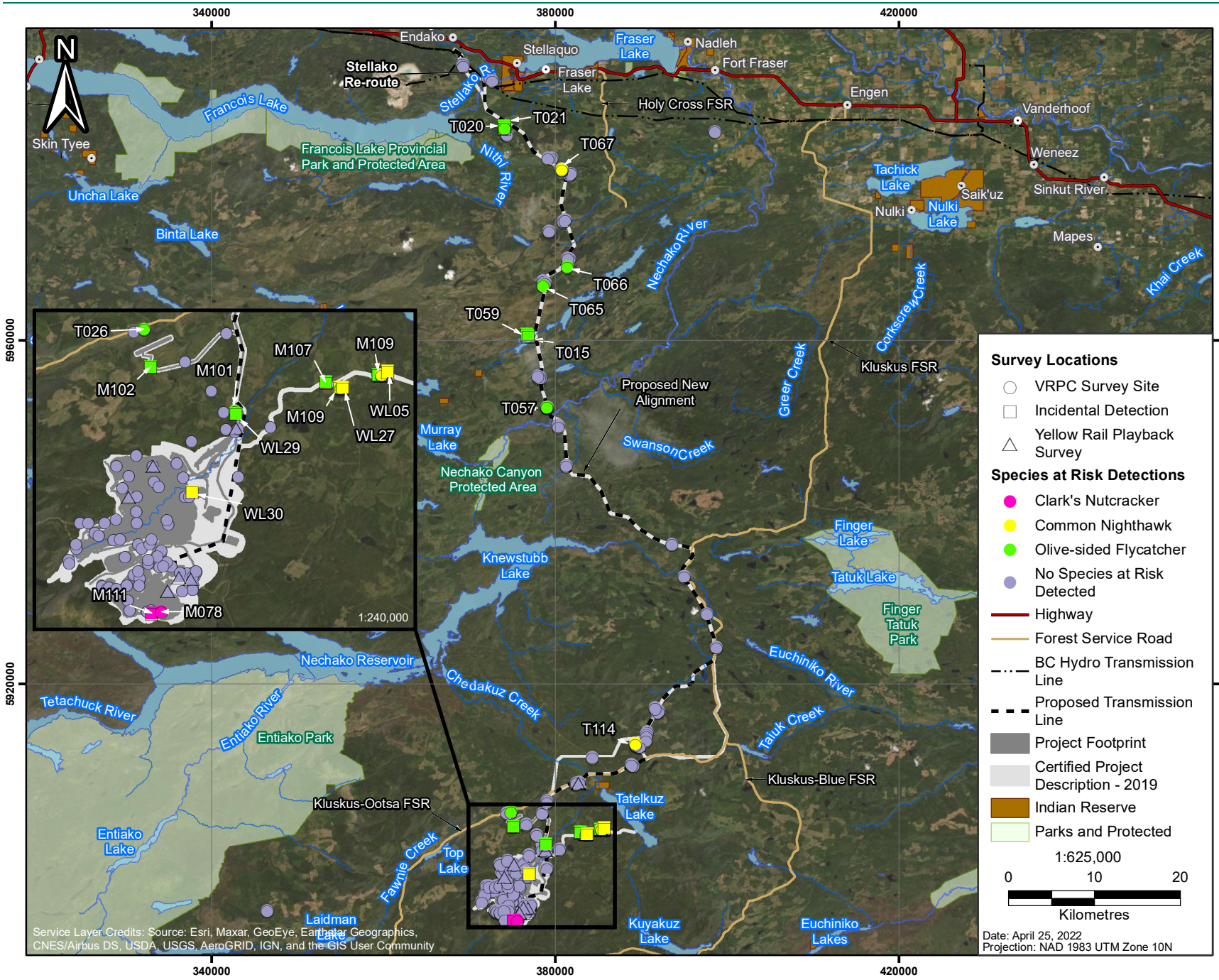

Figure 7.3-2: VRPC Survey Locations and Upland Breeding Bird Species at Risk Observations, 2021

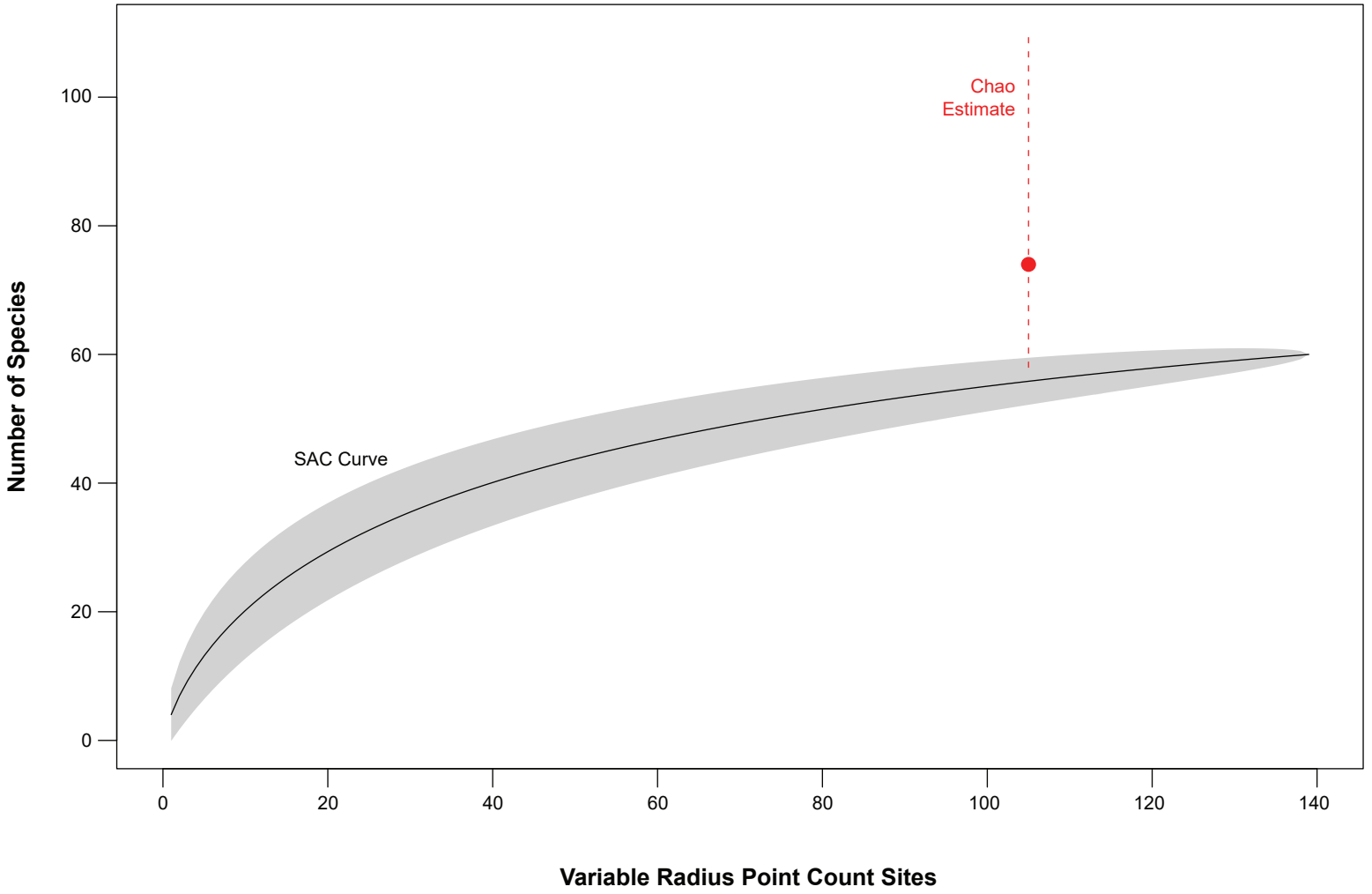

Figure 7.3-3: Estimated Upland Bird Species Richness, Species Accumulation Curve (SAC) and Chao Estimator, 2021

7.3.4.2 Swallows and Swifts

No habitat for bank swallow or black swift was identified in the RSA. Therefore, no specific surveys were conducted for these two species. One colony of nesting bank swallows were incidentally identified during aerial scoping of the transmission line corridor along Knewstubb Lake, south of Nechako River; the colony is located outside the western edge of the RSA and therefore was not formally surveyed (Figure 7.3-4). An estimate of 30 to 40 holes were recorded along the exposed banks of the lake during an aerial pass-over, with roughly 20 adult bank swallows actively flying in the area (Figure 7.3-4; Photo 7.3-1). The nearby Nechako River was noted in 2013 as potential habitat for bank swallows, but no colony was seen at that time. The river banks in 2021 did not appear large enough to support bank swallow nesting.

Photo 7.3-1: Bank swallow colony holes on Knewstubb lake, June 2021

Barn swallows were surveyed around the mine site infrastructure on June 10, 2021 (Figure 7.3-4; Appendix P). No other suitable nesting buildings were found in the LSA. Three pairs of barn swallows were confirmed actively nesting on camp site buildings; additional activity was recorded along buildings with vaulted roof covers supported by wooden beams, however nest counts could not be confirmed due to the building design (Photo 7.3-2). The total estimated count of barn swallow nesting pairs around the mine site camp buildings was 10 to 12, with several additional inactive nests noted. One violet-green swallow was observed at the mine site as well.

7.3.4.3 Common Nighthawk

Common nighthawk count surveys were conducted at 11 sites in the mine site and LSA from June 17 to 19, 2021. Common nighthawk individuals were observed at two of the survey locations (Figure 7.3-5).

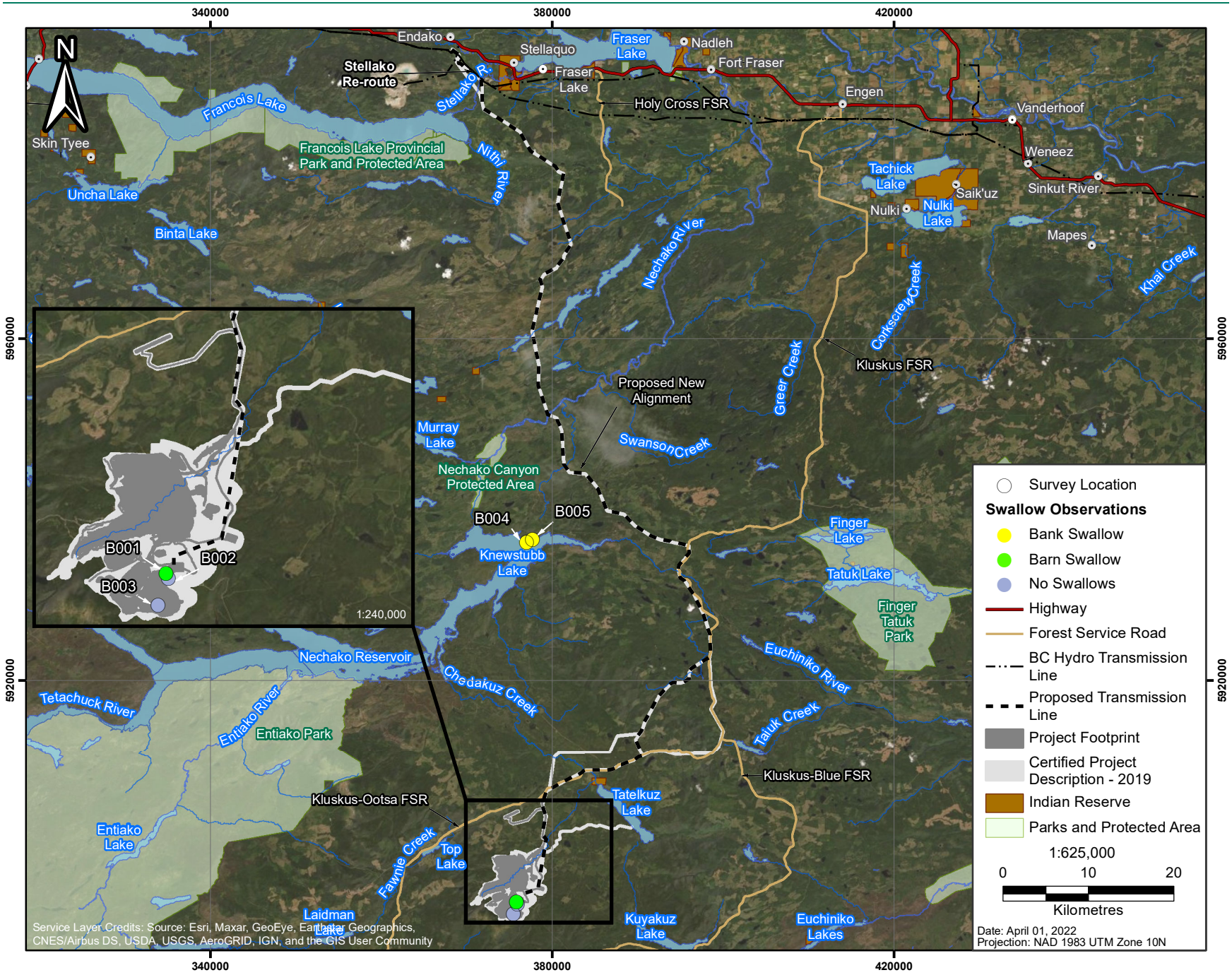

Figure 7.3-4: Bank Swallow and Barn Swallow Observations, 2021

Photo 7.3-2: Barn swallows nesting at Blackwater camp, June 2021.

Automated Recording Units

Five ARUs were deployed to detect common nighthawk along portions of the transmission line LSA which were not accessible for count surveys. Units were deployed for a variable number of nights between June 18 and August 7, 2021 (Table 7.3-4; Appendix H). An additional four ARUs deployed in the mine site LSA to target the bat community between July 8 and August 15, 2021 recorded audio data which were also analyzed for common nighthawk calls (Table 7.3-4; Appendix H). All sites were open wetlands considered suitable for common nighthawk foraging. Some data are considered incidental for these additional recorders because they were deployed after the recommended survey window for common nighthawk (WildResearch, Bird Studies Canada, and ECCC 2018).

From the 3,603 audio detections recorded by ARUs, 223 were confirmed as common nighthawk detections after cluster analysis by the Kaleidoscope program and manual vetting by a trained listener (Appendix I). Ninety six percent of ARU common nighthawk detections were from ARU 1, while the remaining detections were from ARUs 2 and 3 (Table 7.3-4; Figure 7.3-5). Sites ARU 1 and ARU 2 had boom sounds recorded and are therefore considered to be potential breeding locations (Figure 7.3-5). Detections were classified using Kaleidoscope and were then manually confirmed. Kaleidoscope accurately classified 165 call (69.9%), 2 boom (6.1%), and 3 call and boom together (3.1%) detections (Table 7.3-5).

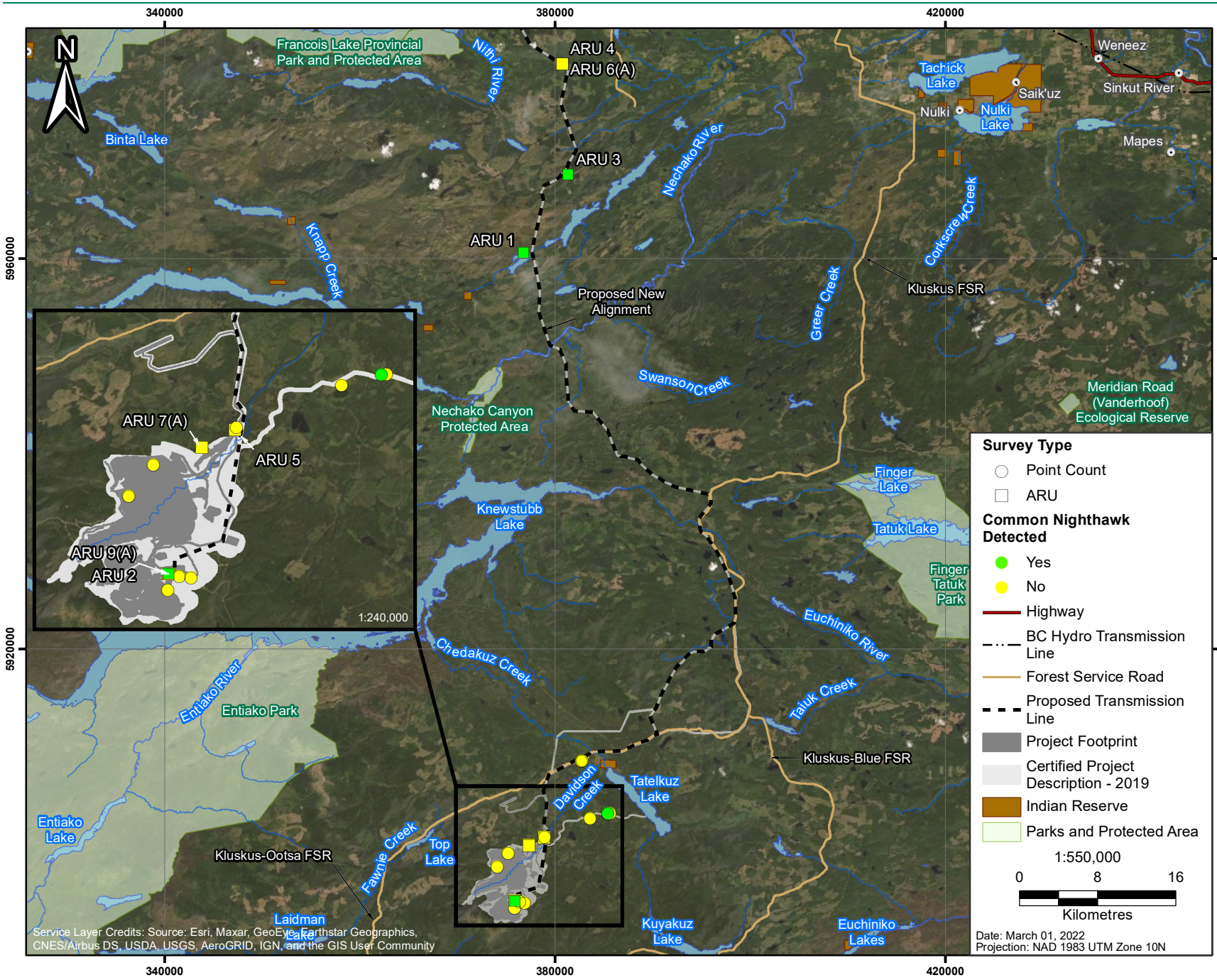

Figure 7.3-5: Common Nighthawk Count Survey and ARU Locations and Detections, 2021

Table 7.3-4: Common Nighthawk ARU Detections, 2021

Survey Target	ARU Site	Dates Active	Total Nights Active	Nights with Detections	Call Detections	Boom Detection	Total**
Transmission Line LSA	ARU 1	06/18 – 07/09	20	12	215	3	215
	ARU 2	07/10 - 07/11*	2*	1	-	3	3
	ARU 3	06/18 - 07/08	19	2	5	-	5
	ARU 4	06/18 - 08/07	51	-	-	-	-
	ARU 5	06/19 - 07/08	18	-	-	-	-
Mine Site LSA	ARU 6(A)	07/08 - 08/01	23	-	-	-	-
	ARU 7(A)	07/09 - 07/10*	2*	-	-	-	-
	ARU 8(A)	7/10 - 7/22	12	-	-	-	-
	ARU 9(A)	07/11 - 08/15	35	-	-	-	-
Total**				**13**	**220**	**6**	**223**

** Units were deployed for longer duration, however programming/unit error occurred.*

*** Some detections included both calls and booms, therefore call and boom detections do not directly add together.*

Table 7.3-5: Kaleidoscope Common Nighthawk Classification Accuracy, 2021

Kaleidoscope Classified	Total	Correct Detections	False Positive Detections	False Negative Detections
Call Detections	236	165	71	52
Boom Detections	33	2	31	1
Call and Boom Detections	97	3	94	0

7.3.5 Discussion

Upland bird surveys were conducted in June, 2021 using multiple methods to inventory the general community as well as to target species of conservation concern. Barn swallow, common nighthawk, and olive-sided flycatchers were the only upland bird species of conservation concern detected. Clark's nutcracker, a focal species monitored because of its mutualistic relationship with white-bark pine (Red listed in BC; BC CDC [2022]), was also detected in the mine site LSA. Species at risk sightings will be compiled into a database as part of the WMMP requirements, to track changes in observations over time. Sites with previous records of species at risk or Clark's nutcracker will also be prioritized for monitoring programs implemented for the bird community.

During point count surveys, a total of 760 individual birds were detected across 60 species at 139 point count survey locations. Twenty olive-sided flycatchers, three common nighthawk, and three Clark's nutcrackers were detected during point count surveys. A Species Accumulation Curve (SAC) and a Chao Estimator were used to estimate expected species richness in the LSA and assess whether sampling effort was sufficient to describe the upland breeding bird community. The shape of the SAC curve and the 95% CI around the Chao Estimator indicated that the overall species richness detected during the study incorporates the majority of species likely to be present in the area. Baseline data in 2021 will be also be combined with previous years of sampling to form a broader baseline dataset for the upland breeding bird community, which can be used to measure potential effects of the Project after the onset of construction.

Barn swallows were detected nesting on buildings throughout the mine site camp. Barn swallows typically use buildings around mine sites for nesting and are well adjusted to human and vehicle activity. Management for barn swallow nests at site will be updated in the WMMP, including specifying that nest removal is prohibited and to reduce disturbance near active nests (e.g., building work or renovations). Clark's nutcracker were detected during point count surveys in 2021; this species will be monitored during Project construction and operations as part of a follow-up program for upland birds and white-bark pine, described in the WMMP. Sites with previous records of Clark's nutcracker will be included as monitoring stations.

Common nighthawk were detected during targeted evening surveys, on ARU audio recordings, and incidentally during point count surveys. Common nighthawk are ground nesters and prefer open sites for nesting; they are also primarily nocturnal aerial insectivores and use wetlands and openings to forage for insects. Two ARU sites along the transmission line LSA recorded territorial common nighthawk boom sounds, indicating potential breeding locations in the area. These sites will be re-assessed for nighthawk activity and potential management and mitigation actions prior to transmission line clearing and construction.

Point count survey data will also be used to validate existing habitat suitability mapping for forest interior birds, based off of the fisher habitat suitability mapping (DS condition 4.3). Habitat suitability mapping work will be completed once up to date aerial geographical data are available later in 2022.

Monitoring and mitigation measures for upland birds have been developed and are detailed in the WMMP (ERM 2022b).

8. AMPHIBIAN COMMUNITY

Low lying wetlands and drainage systems through the RSA provide suitable habitat for amphibians. Western toads are the only amphibian species at risk, Blue listed in BC and listed on Schedule 1 of SARA as Special Concern (BC CDC 2022; Government of Canada 2022a). Baseline studies focused on western toad, however other amphibian species utilize similar wetland habitats.

8.1 Western Toad

Western toads are most sensitive to disturbance at breeding waterbodies and wetlands, which may be used from spring thaw until fall (April 1 to September 30 in the Project LSA and RSA,/ERM, 2022 #6964}. Western toad breeding habitat is variable, and includes open water wetlands, the shallow margins of lakes, and seasonal pools such as ditches (Provincial Western Toad Working Group 2014). They breed more frequently in areas with habitat characteristics which promote higher water temperatures, such as shallow and/or muddy margins, low water flow, and open forest canopy. They can utilize temporary ponds, including large puddles and roadside ditches, because they typically provide warm water with some movement and emergent vegetation (Pyare et al. 2005; Stevens, Paszkowski, and Stringer 2006).

Adult toads are capable of travelling over five km to breeding sites in the spring, and occasional excursions of up to seven km have been noted (Provincial Western Toad Working Group 2014). Migrations typically span several days, with a significant proportion of the local population travelling to breeding sites within a few hours of each other (COSEWIC 2002). Toadlets (recently metamorphosed toads) also migrate but do not appear to move more than 300 m from their natal site within the first year (Pyare 2005). Metamorphosing tadpoles and toadlets will form post-metamorphic aggregations at the edge of natal waterbodies by midsummer (COSEWIC 2002). Complete metamorphosis from egg to toadlet takes approximately three months, at which point toadlets disperse to terrestrial habitats (ECCC 2016).

Chytridiomycosis (chytrid disease) is an amphibian skin disease caused by the fungus *Batrachochytrium dendrobatidis* which has been responsible for declines in hundreds of amphibian species worldwide (Scheele et al. 2019). While chytrid fungus poses an ongoing threat to hundreds of amphibian species globally, infection in BC populations are largely unknown (Deguise and Richardson 2009). Chytrid disease screening has not been conducted during amphibian surveys for the Project, but the WMMP includes management and mitigation measures to prevent the spread of chytrid disease.

Pre-construction surveys were conducted during the summer of 2021 throughout the mine site and transmission line LSAs to identify western toad breeding areas. The other amphibian species that potentially occur within the study area select similar habitat for breeding and foraging, but are not listed as species of conservation concern.

8.1.1 Existing Baseline Data

Habitat suitability mapping was conducted for western toads as part of the EA Application. This mapping identified suitable toad breeding habitat in the LSA and RSA which included ditches, ephemeral ponds, lake margins, and wetlands as potential breeding habitat in the LSA (Figure 8.1-1). The majority of available potential breeding habitat for all amphibians was found in anthropogenic water bodies such as ephemeral pools. Many of the natural waterbodies within the study area do not provide suitable breeding habitat, likely due to cold-water temperatures.

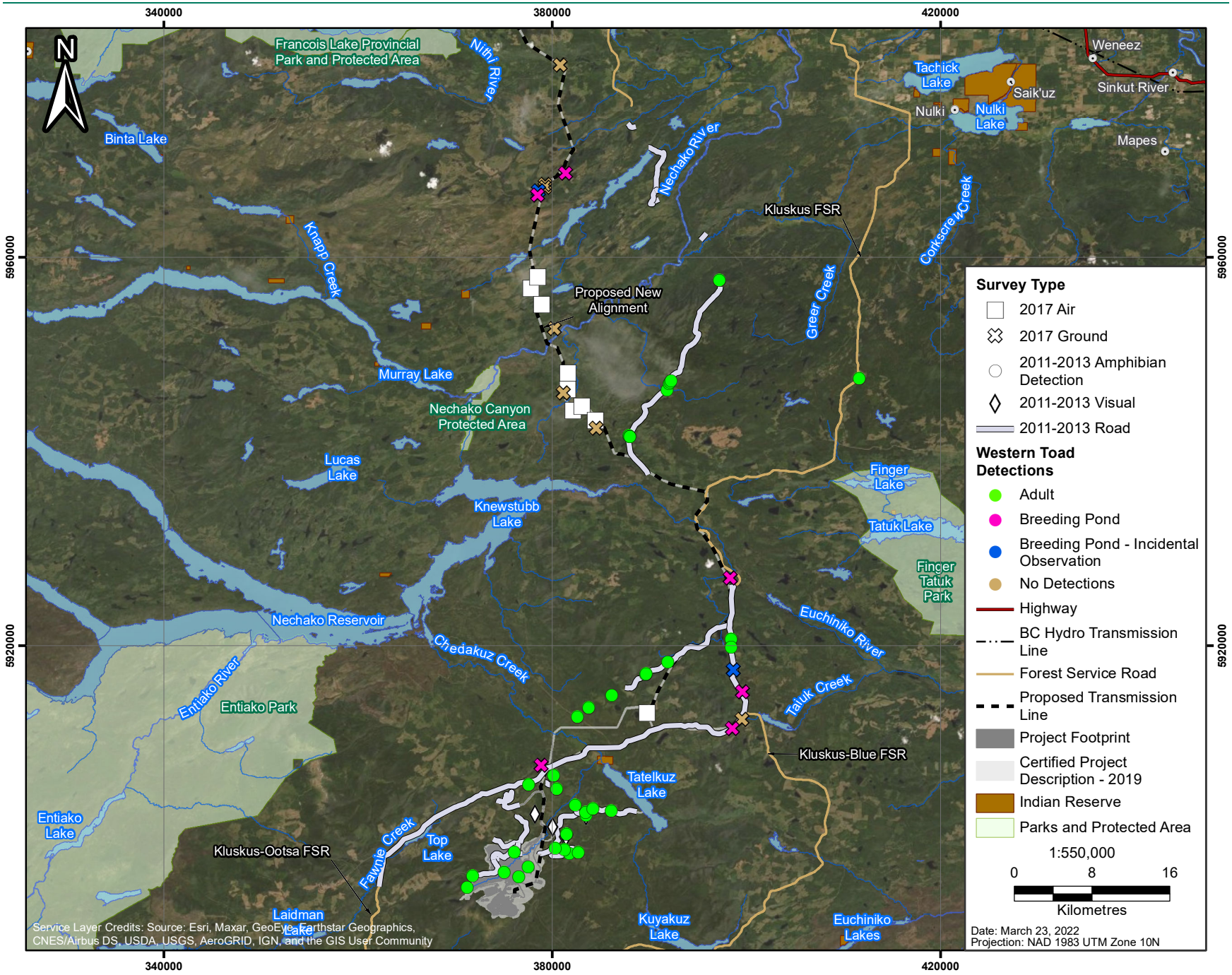

Figure 8.1-1: Western Toad Detections, 2011-2013 and 2017

Baseline surveys were completed for western toads in 2011-2013 and 2017. A total of 106 sites were surveyed for western toads throughout the LSA and RSA using roadside and visual encounter surveys in June and July 2011-2013 (Figure 8.1-1). Aerial habitat surveys and additional ground surveys for western toad were also completed in July 2017 (Figure 8.1-1). All ground survey methods followed *Inventory Methods for Pond-Breeding Amphibians and Painted Turtle (RIC 1998d)*.

Visual encounter surveys were completed at five sites from June 18 to 23, 2011 and July 18 to 23, 2011. A preliminary surveying approach was used followed by road surveys which were completed along much of the existing road infrastructure from June 12 to 17, 2012, and June 8, 2013. Four amphibian species were detected across all baseline surveys within the study area: western toad, Columbia spotted frog, wood frog, and long-toed salamander. Road and visual encounter surveys completed in 2011-2013 detected western toad adults at 22 sites and juveniles at 19 sites throughout the LSA and RSA (Figure 8.1-1). The habitat surrounding these areas was typically a mix of forest, open meadow/shrubs, and permanent water. In the mine site and LSA, western toad were detected at six sites within lodgepole pine leading forest with 40 to 60% crown closure. In 2013, the largest number of tadpoles was detected at Snake Lake, where thousands of tadpoles were observed within the shallow sedge edges of the western shore.

Aerial surveys completed in July 2017 assessed an additional nine wetlands for western toad suitability. These wetlands had poor suitability for western toad breeding and were therefore not included in ground surveys. Ground surveys in 2017 were completed at 13 sites. Four amphibian species were identified within the study area during ground surveys: western toad, Columbia spotted frog, and wood frog. Western toads were detected at eight ground survey sites and incidentally at one site, with seven of these sites having confirmed breeding (Figure 8.1-1). Western toads were detected at eight ground survey sites and incidentally at one site, with seven of these sites having confirmed breeding.

8.1.2 Objectives

Amphibian surveys were conducted for the 2021 pre-construction baseline to identify western toad breeding habitats and confirmed breeding sites in the LSA to inform management and mitigation actions, in concordance with DS condition 8.10.

8.1.3 Methods

Surveys for western toad breeding sites and habitat were conducted in July 2021. Survey timing corresponded to the period when tadpoles and toadlets are easily detected as aggregate groups along margins of water bodies (COSEWIC 2002).

Field assessments followed RISC standard time-limited visual encounter survey protocols described in *Inventory Methods for Pond-Breeding Amphibians and Painted Turtle (RIC 1998d)*. Time-constrained visual surveys were conducted with two or three observers, with surveyors visually examining aquatic habitats for evidence of breeding (i.e., tadpoles and emerging toadlets), and the adjacent terrestrial habitat for adults. Amphibians were classified by age class including breeding (egg, tadpole, metamorph, and toadlet) or adult.

Habitat characteristics were recorded for all sites and included water temperature, pH, depth and aquatic habitat type.

8.1.4 Results

Ground surveys were conducted at 41 sites distributed across the mine site and transmission line LSAs from July 7 to 12, 2021 (Figure 8.1-2; Appendix Q).

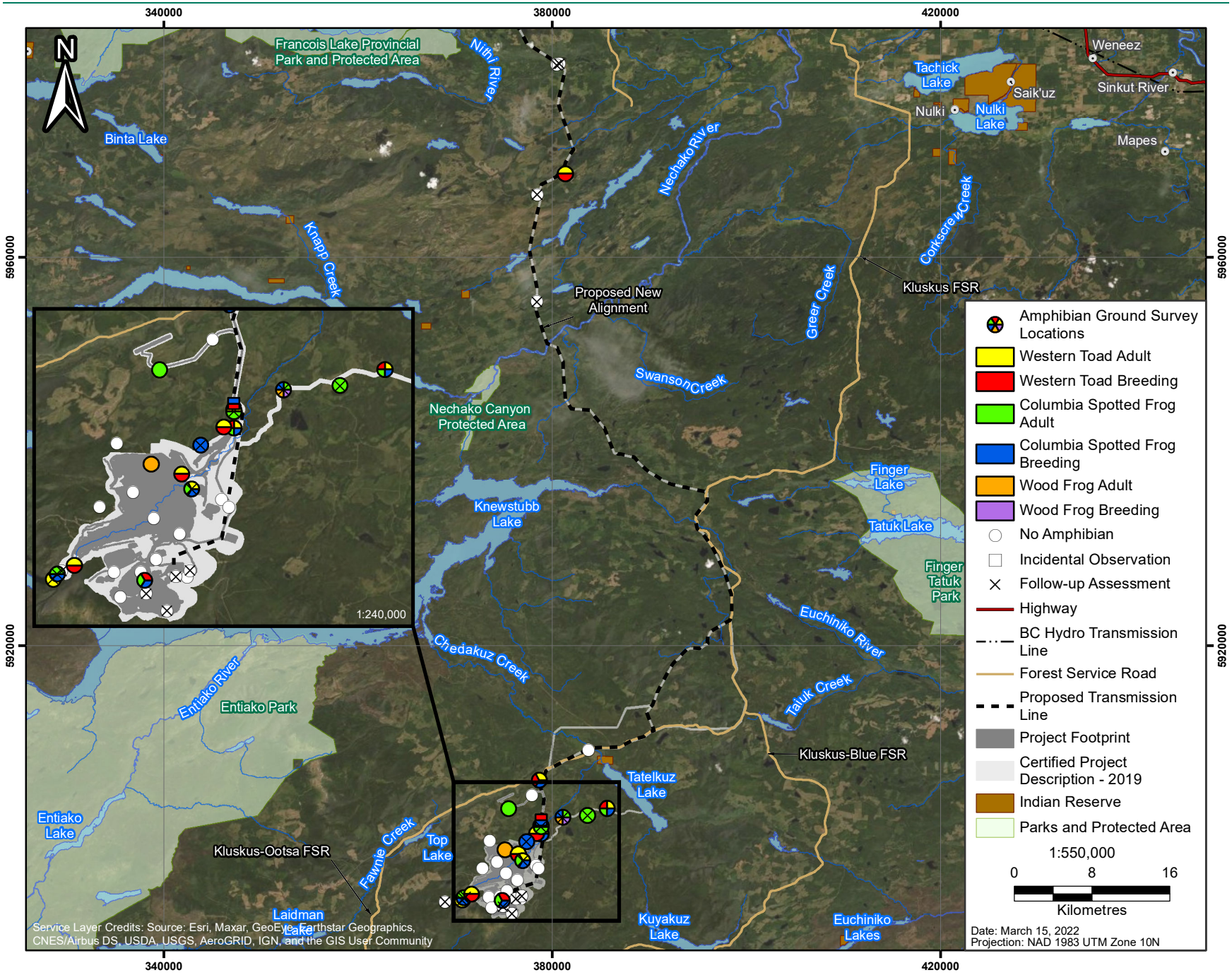

Figure 8.1-2: Amphibian Ground Survey Locations and Confirmed Western Toad Breeding Sites, 2021

In total, 12 amphibian breeding sites were identified within the LSA (Figure 8.1-1; Photo 8.1-1). Breeding was observed at eight sites for both western toad and Columbia spotted frog, and at one site for wood frog (Figure 8.1-2; Photo 8.1-1). Adult western toads were recorded at 10 sites, adult Columbia spotted frogs were recorded at 9 sites, and adult wood frogs were recorded at 2 sites, with most observations occurring at breeding sites (Table 8.1-1; Appendix Q and R).

Photo 8.1-1: Western toad toadlet, June 2021.

Table 8.1-1: Amphibian Breeding Sites Detected during Ground Surveys, July 2021

Species	Total Sites	Breeding Sites	Sites with Adults
Western Toad	11	8	10
Columbia Spotted Frog	11	8	9
Wood Frog	2	1	2

There were four life stages that classified as signs of breeding: eggs, tadpole, metamorph, and toadlet. Five of the eight western toad breeding sites had just tadpoles, one site had just toadlets, and two sites had toadlets, metamorphs and tadpoles (Table 8.1-2; Appendix R). Six western toad breeding sites were in the SBS zone (SBSmc3 and SBSdk), and one was in the ESSFmv1 (Table 8.1-2; Appendix Q). Most sites had sluggish to mobile waterflow; only one breeding site had a dynamic flow (Table 8.1-2). Wetland type varied between marsh, fen, swamp, and shallow open water (Table 8.1-2).

Additional surveys will need to be completed at 17 sites that had suitable habitats western toads but were unconfirmed western toad breeding, and for one site with unidentified tadpole species (Figure 8.1-2; Appendix Q). Surveys are planned to be completed in the summer of 2022.

Table 8.1-2: Western Toad Breeding Habitat Site Characteristics, 2021

Survey Date	Site Name	Breeding Stage	Water Temperature (˚C)	Hydrodynamic Index	Biogeo-climatic Zone	Wetland Type
July 7 2021	WL05	Tadpole	21.3	Sluggish	SBSmc3	Marsh
July 7 2021	WL06	Tadpole	21.5	Sluggish	SBSmc3	Fen/ Shallow Open Water
July 7 2021	WL07	Toadlet, Metamorph, Tadpole	20	Sluggish	SBSmc3	Fen/ Shallow Open Water
July 8 2021	WL10	Tadpole	18.2	Mobile	SBSdk	Swamp/ Marsh/ Shallow Open Water
July 8 2021	WL12	Tadpole	24.5	Sluggish /Stagnant	ESSFmv1	Fen/ Wet Meadow
July 9 2021	WL14	Toadlet	-	Mobile /Dynamic	SBSmc3	Swamp
July 10 2021	WL22	Toadlet, Metamorph, Tadpole	-	Sluggish /Mobile	SBSmc3	Marsh/ Shallow Open Water
July 12 2021	WL38	Tadpole	18.7	-	-	-

8.1.5 Discussion

Locating suitable habitat and presence of western toad breeding sites informs necessary avoidance and mitigation options. Western toad is a species of conservation concern listed provincially and federally (BC CDC 2022; Government of Canada 2022a). Maintaining breeding habitat and connectivity at a regional scale is important for supporting populations, given that this migratory amphibian can travel up to 7 km from its natal pond, and is potentially vulnerable to human disturbance (Carr and Fahrig 2001).

Western toads prefer wetlands with open canopy, muddy banks, and low water flow characteristics. Toads breed more frequently in shallow open water wetlands with characteristics that correlate with higher water temperatures, such as: earlier snowmelt, shallow and muddy margins, low water flow, and open forest canopy. Water temperature affects larval growth and differentiation rates, and strongly determines developmental time to metamorphosis, as well as metamorph (toadlet) body size (Smith-Gill and Berven 1979; Ultsch, Bradford, and Freda 1999).

Ground surveys were completed for 41 sites within the mine site and transmission line LSA, with eight sites confirmed as western toad breeding sites. Adult western toads were seen at all but one breeding site and at three additional sites. Tadpoles were the most commonly observed sign of western toad breeding. Breeding sites primarily had low rates of water flow, and were in the SBS zone, with only one breeding site in the ESSF. In addition to the western toad, baseline surveys confirmed Columbia spotted frog breeding in eight ponds and wood frog in one pond in the LSA.

Monitoring and mitigation measures for western toad have been developed and are detailed in the WMMP (ERM 2022b).

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APPENDIX A BLACKWATER GRIZZLY BEAR AND MOOSE HABITAT SUITABILITY MODELLING ASSESSMENT REPORT

BW GOLD LTD
a subsidiary company of Artemis Gold Inc

Blackwater Gold Project

Blackwater Grizzly Bear and Moose Habitat Suitability Modelling Assessment Report

December 2021

Project No.: 0575928

The business of sustainability

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December 2021

Blackwater Gold Project

Blackwater Grizzly Bear and Moose Habitat Suitability Modelling Assessment Report

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LAYPERSON SUMMARY

The Blackwater Gold Project is a gold and silver mine held by Artemis Gold Inc., southwest of Vanderhoof British Columbia (BC). The Project has an Environmental Assessment Certificate but has not yet begun construction. Field studies to assess potential impacts to wildlife were conducted during the Environmental Assessment (EA) in 2012-2013 and 2017. As part of the EA, habitat suitability maps were made to understand the habitat quality on and surrounding the mine site. Field surveys were conducted in 2021 to test the accuracy of these models; surveys included field plots using standardized provincial survey methods.

Generally, the ratings from the field were not similar for the subset of the model ratings from the EA. Differences in ratings were noticed for grizzly bear denning habitat in a western portion of the mine site, which has high quality grizzly bear denning sites that were not indicated on suitability maps. For moose, the original models did not differentiate between spring, summer and fall and rated cumulatively for the growing season; updated models for these seasons need to be created, with the anticipation that most areas are low to moderate suitability. Additionally, wetlands throughout the Project Site require updates to improve accuracy of wetland types and extents.

For both moose and grizzly bear, the comparisons of field and modelling data were also used to assess the existing mitigations from the Wildlife Mitigation and Monitoring Plan (WMMP) and the Master Mitigation Table (Appendix A). The grizzly bear denning area, identified from Traditional Knowledge and field studies in the west of the mine site (northwest side of Mt. Davidson) will be avoided during the denning period and monitored by remote camera to detect wildlife activity during the construction period. The area will either be maintained in its current state (avoidance), or will be cleared outside of the sensitive denning period and restored and reclaimed at the end of the mine life. Mitigation updates for details of the bear denning area will be included in the next draft of the WMMP in early 2022 and provided to Environment and Climate Change Canada, The Agency, and Aboriginal Groups prior to the beginning of Project construction.

The habitat suitability maps will be updated during spring 2022 to include more accurate wetlands mapping and moose spring and fall suitability will be used to target locations where mitigations will be applied. Applicable areas (with a moderately high suitability rating or higher) will be noted for avoidance during sensitive seasons, i.e. clearing and construction work will be avoided in these areas and time periods. If work is required, pre-clearing surveys are conducted for sensitive features such as bear dens, and employee training and awareness programs include notices for using caution when working in these areas to avoid human-wildlife interactions.

The updated habitat suitability maps and details for implementing these mitigations will be incorporated into the Wildlife Mitigation and Monitoring Plan (WMMP) and provided to stakeholders prior to the start of Project construction during Q1 of 2022.

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Photo 3.1-4: Detail of Grizzly bear den recorded on the northwest side of Mt. Davidson, 2021. 3-8

1. INTRODUCTION

The Blackwater Gold Project (the Project) is a gold and silver open pit mine located in central British Columbia (BC), approximately 112 kilometres (km) southwest of Vanderhoof, 160 km southwest of Prince George, and 446 km northeast of Vancouver. New Gold Inc. (New Gold) received Environmental Assessment Certificate (EAC) #M19-01 on June 21, 2019 under the 2002 *Environmental Assessment Act* (BC EAO 2019c) and a Decision Statement (DS) on April 15, 2019 under the *Canadian Environmental Assessment Act, 2012* (CEA Agency 2019). In August 2020, Artemis Gold Inc. (Artemis) acquired the mineral tenures, assets and rights in the Blackwater Project that were previously held by New Gold Inc.

Baseline field studies prior to the EAC were conducted in 2012-2013 and 2017. Habitat suitability models (HSM) for moose and grizzly bear were created and included in the Environmental Impact Statement (EIS)/Application. These models developed habitat ratings across the Project Site for each species by season, based on ecosystem abiotic and biotic attributes and background information on grizzly bear and moose populations. Applying these maps in the EIS/Application provided identification of suitable locations for wildlife and insight to how species populations may be affected by habitat loss or altercation. Models were created following the Resources Information Standard Committee (RISC) defined *Wildlife Habitat Rating Standards* (RISC 1999).

Additional wildlife field studies were conducted in 2021 to fulfil provincial condition 23.d to the existing moose and grizzly bear habitat suitability models, update those models and propose new mitigations if warranted.

1.1 Project Condition

The EAC condition 23.d specifies requirements for updates of moose and grizzly bear information within the Wildlife Mitigation and Monitoring Plan (WMMP), and developed as a report showing:

EAC Condition	Concordance
"23.d) the means by which information from the habitat suitability mapping for the Project Site will be confirmed or updated for the use of the Project Site by grizzly bears and moose prior to Construction at the Project Site, and in consultation with Aboriginal Groups. This must include:	This report evaluates the habitat suitability for moose and bears and describes next steps to update the mapping and mitigation measures.
i. consideration of habitat identified through the Terrestrial Ecosystem Mapping of the Project Site contained in the Application and identification of the habitat types requiring further assessment;	Sections 2.1 and 2.2
ii. identification of methods to be used to acquire the information, including consideration of applicable Resources Information Standards Committee guidance documents and other information made available to the Holder;	Section 2.1
iii. the role of Aboriginal Group monitors or members of Aboriginal Groups in gathering the information;	Section 2.1
iv. after the information is gathered, an assessment of the adequacy of the mitigation measures proposed in the Mitigations Table required under Condition 43 in addressing the effects of the Project, in light of the new information gathered;	Sections 3.1.2 and 3.2.2
v. if the assessment indicates that additional mitigation is required, the development of new or additional mitigations in a manner consistent with the BC EMP, and documentation of how the BC EMP was applied;	Section 4

EAC Condition	Concordance
vi. how the effectiveness of the mitigation measures identified in paragraphs iv) and v) will be monitored; and	Section 4
vii. the development of a technical report and a report for a lay audience that documents the activities and outcomes required under paragraphs d) i) to vi). The report must be provided to Aboriginal Groups at least 60 days prior to the start of Construction at the Project Site"	This report

The information in this report is considered part of the 2021 pre-construction baseline study, and will provide mitigation and management recommendations to be incorporated into the WMMP prior to construction.

1.2 Objectives

The objectives for the moose and bear habitat suitability report are:

- Identify portions of the Project Site with moose and grizzly bear habitat which are not adequately captured by HSMs developed during the EA;
- Describe the necessary updates to better account for suitable moose and grizzly bear habitat in the Project Site, to be incorporated in the WMMP; and
- Assess and update mitigation measures for grizzly bear and moose, to be incorporated in the WMMP.

2. METHODS

Field verification surveys were conducted to identify areas of the Project Site (mine site, mine access roads, freshwater supply pipeline, and airstrip, as defined in the EAC) in need of further assessment for moose and grizzly bear suitability. These data were then used to assess gaps in the existing habitat suitability models using ArcMap spatial analysis and geoprocessing extensions to overlay and compare 2015 model results with 2021 field data.

2.1 Field Surveys

Survey locations were stratified across the Biogeoclimatic units in the Project Site (Figure 2.1-1). Terrestrial Ecosystem Mapping (TEM) was conducted for the EIS/Application and is being updated in 2021 and 2022. Field surveys for TEM were conducted on the mine site in summer 2021 following standard provincial field survey methods. Aerial photography was taken in August, September, and October 2021, but was hampered by thick smoke from forest fires and low cloud. Aerial imagery is scheduled to be flown again in spring 2022.

The Project Site falls within the Engelmann Spruce Subalpine Fir (ESSF) and Sub-boreal Spruce (SBS) Biogeoclimatic units (Figure 2.1-1). The majority of the mine site falls within the ESSF mv1 unit, with areas of parkland at higher elevation in ESSF mvp and ESSF xvp1. The SBS units occur across lower elevation portions of the Project Site such as the access road, including mostly SBS mc3, with less SBS mc2 and SBS dk (Figure 2.1-1).

Field verification surveys for habitat suitability were conducted from June 8 – June 19, 2021 along the Project Site and transmission line areas. Field survey protocols followed the *Wildlife Habitat Rating Standards* (RISC 1999; EAC condition 23d.ii). Surveys were conducted by a Qualified Professional and an Indigenous land user. Survey teams included representatives from Ulkatcho First Nation and Lhoosk'uz Dené Nation.

Survey locations were assessed for abiotic and biotic ecosystem variables, and rated for moose and grizzly bear habitat suitability using a six-class system from nil to very high. Habitat ratings were further refined in the field based on the plot-in-context, distance to species specific habitat features, and distance to disturbance.

Both species were rated on four season models (spring, summer, fall, winter). Wildlife sign was also recorded at each site to document relative level of use of the site.

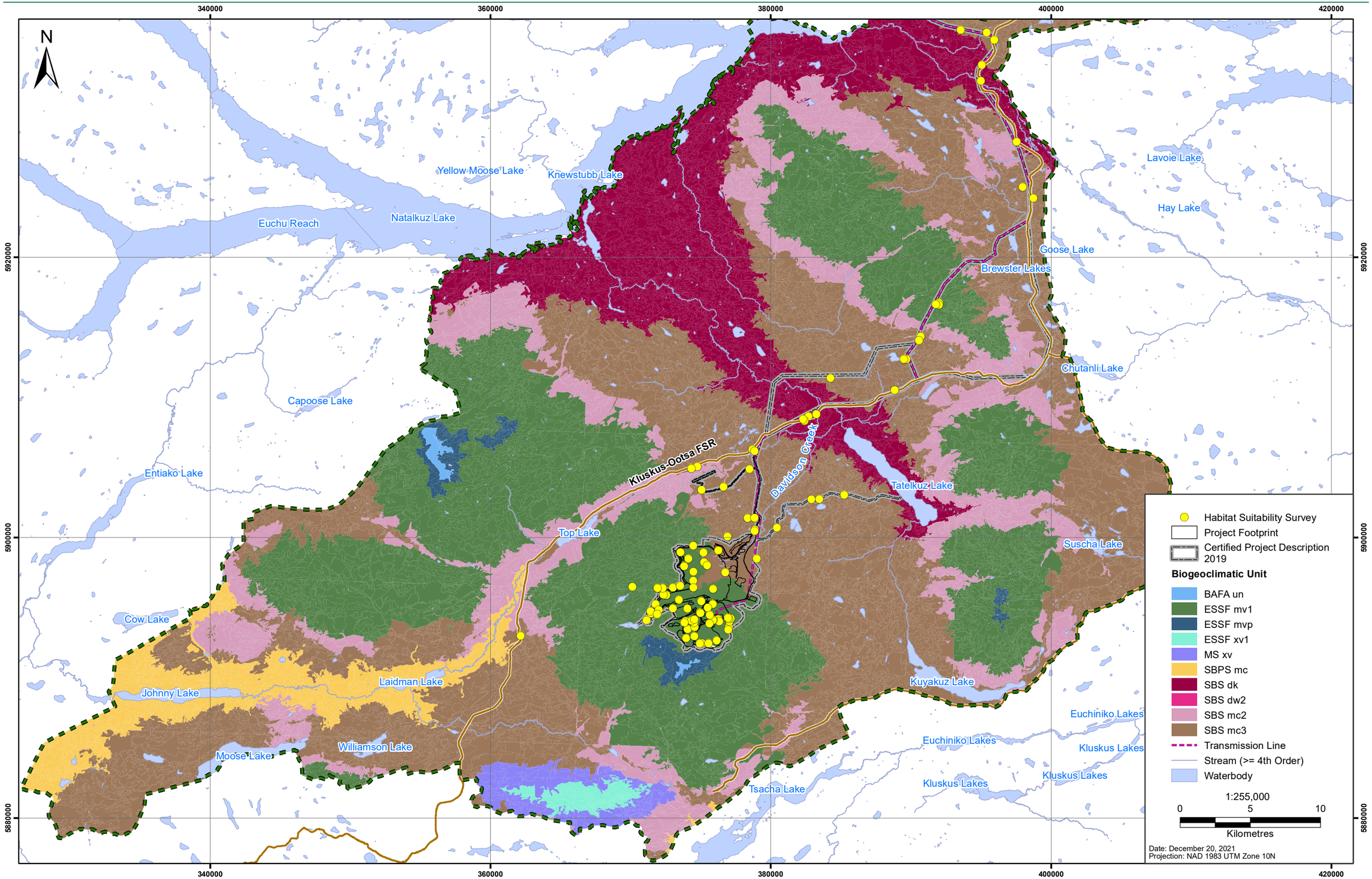

Figure 2.1-1: Habitat Suitability Field Survey Locations (2021) across Biogeoclimatic Units in the Project Site

2.2 Model Assessment

Spatial inventories of wildlife habitat are developed through the interpretation of data derived from ecosystem maps, other biophysical information considered important for grizzly bears and moose, such as slope, aspect, and distance to disturbance. Mapping wildlife habitat identifies areas that contain suitable habitat, provides a basis to evaluate the effects of development on wildlife habitat, and allows for the potential loss or alteration of these habitats to be placed into a local and regional context.

The current models for grizzly bear and moose were assessed compared to field surveys conducted in 2021 to determine the adequacy of the maps. For grizzly bear, Food (FD) habitat rating was assessed in Fall, and Security Habitat (SH) and Thermal Habitat (TH) suitability were assessed in Winter. For moose, FD, SH and TH plot types were assessed in the winter season. These are very important habitats for these species and were the most comparable of the two data-sets.

The 2021 field mapping results were extracted from an excel database and reformatted to match the 2015 data attributes. This database was imported into ArcMap. Model polygons that contained the 2021 plots were extracted and both the 2015 and 2021 data sets were attributed to the polygon subset. The attributes were exported to excel and analysed. The comparable data was then summarized and the differences in ratings calculated.

3. RESULTS

3.1 Grizzly Bear

3.1.1 Bear Habitat Models

The EIS/Application baseline studies did not directly survey the grizzly bear population due to low grizzly bear densities in the Project and regional areas of the grizzly bear population units. Instead, reconnaissance surveys for dens and signs, wildlife cameras and incidental detections across the Project area were used to determine baseline presence and distribution of grizzly bears. Documentation of important habitat within the Local Study Area (LSA) was done using TEM surveys, and validation of developed habitat suitability ratings for grizzly bears were done in the Regional Study Area (RSA) using Predictive Ecosystem Mapping (PEM).

Through the TEM and PEM a variety of ecosystem types were identified and were each assigned habitat ratings that represent habitat quality and effectiveness related to mine infrastructure. The quantitative rating of the of the identified ecosystem types were based on current habitat values across life history stages and season for grizzly bears that are consistent with similar models that have been used, tested, and assessed across BC through population estimates and research.

Habitat ratings were assigned in a six-class system in four seasons (spring, summer, late summer/fall, and winter denning) with life requisites for feeding, security, and thermal habitats.

3.1.1.1 Spring

Grizzly bear spring habitat is rated moderate to very low in the Project Site (Figure 3.1-1). Portions of moderately high suitability are located north of the mine access road (intersecting the proposed transmission line route), between Chedakuz and Davidson creeks and on the west end of Tatelkuz lake. The most suitable areas are typically wetlands or avalanches tracts which provide early-sprouting spring vegetation or bulbs for grizzly bears to forage after emerging from hibernation.

3.1.1.2 Summer

Summer habitat for grizzly bear is rated primarily as moderate throughout the Project Site, with smaller portions of habitat rated from very low to moderately high (Figure 3.1-2). The airstrip is the only Project Site components which intersect moderately high rated summer habitat areas, though the RSA contains moderately high rated habitat along waterbodies and waterways, and mid-elevation slopes.

3.1.1.3 Fall

Grizzly bear fall habitat suitability is rated as moderate throughout the majority of the Project Site (Figure 3.1-3). The mine site, airstrip, and access road intersect with portions of moderately high rated fall habitat; these occur primarily along mid to higher elevation slopes and wetland habitats, including a small portion in the northwest of the mine site. The RSA includes a greater amount of moderate to moderately high rated grizzly bear habitat compared to other seasons, with moderately high rated habitat in mid to higher elevation sections throughout the RSA.

3.1.1.4 Winter Denning

Habitat suitability for grizzly bear winter denning varies from nil to moderately high in the Project Site (Figure 3.1-4). The mine site is primarily rated moderate to moderately high, but falls to very low suitability along the northeast portion of the mine site and through the fresh water pipeline, the airstrip, and the access road. Suitable grizzly bear denning habitat is associated with well drained slopes along higher elevation alpine, subalpine, and montane habitats.

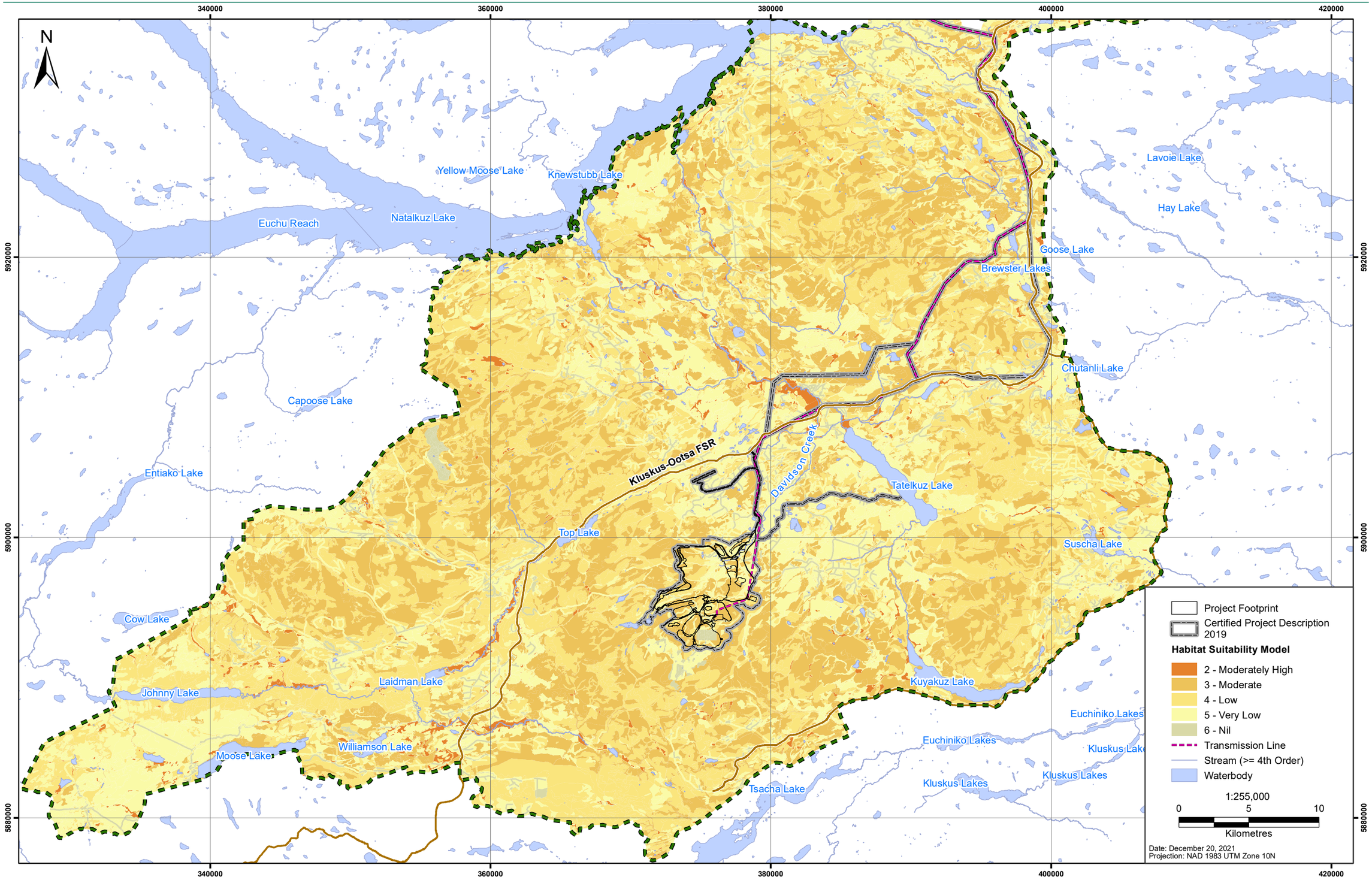

Figure 3.1-1: Grizzly Bear Spring Habitat Suitability Rating (EA)

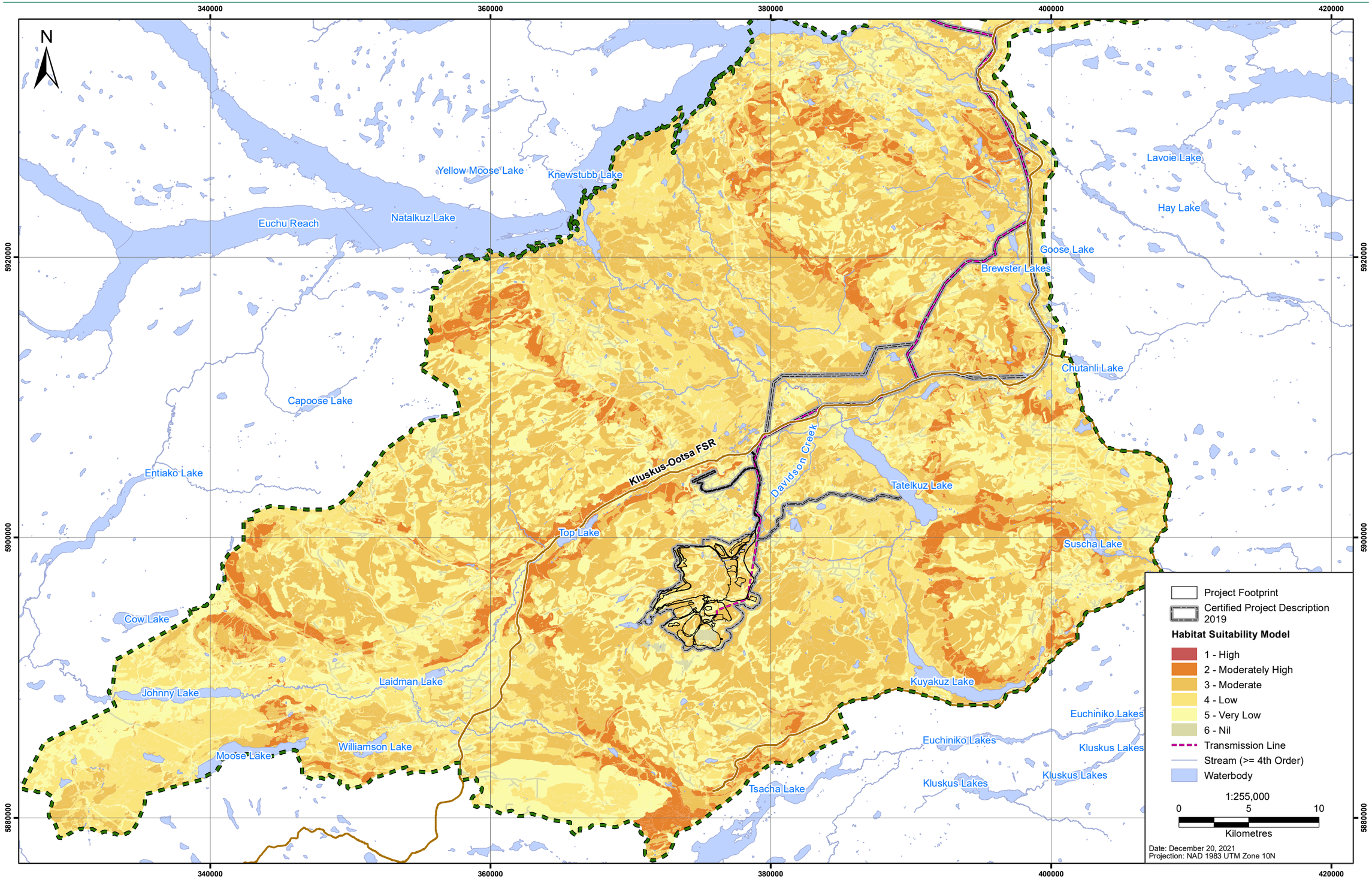

Figure 3.1-2: Grizzly Bear Summer Habitat Suitability Rating (EA)

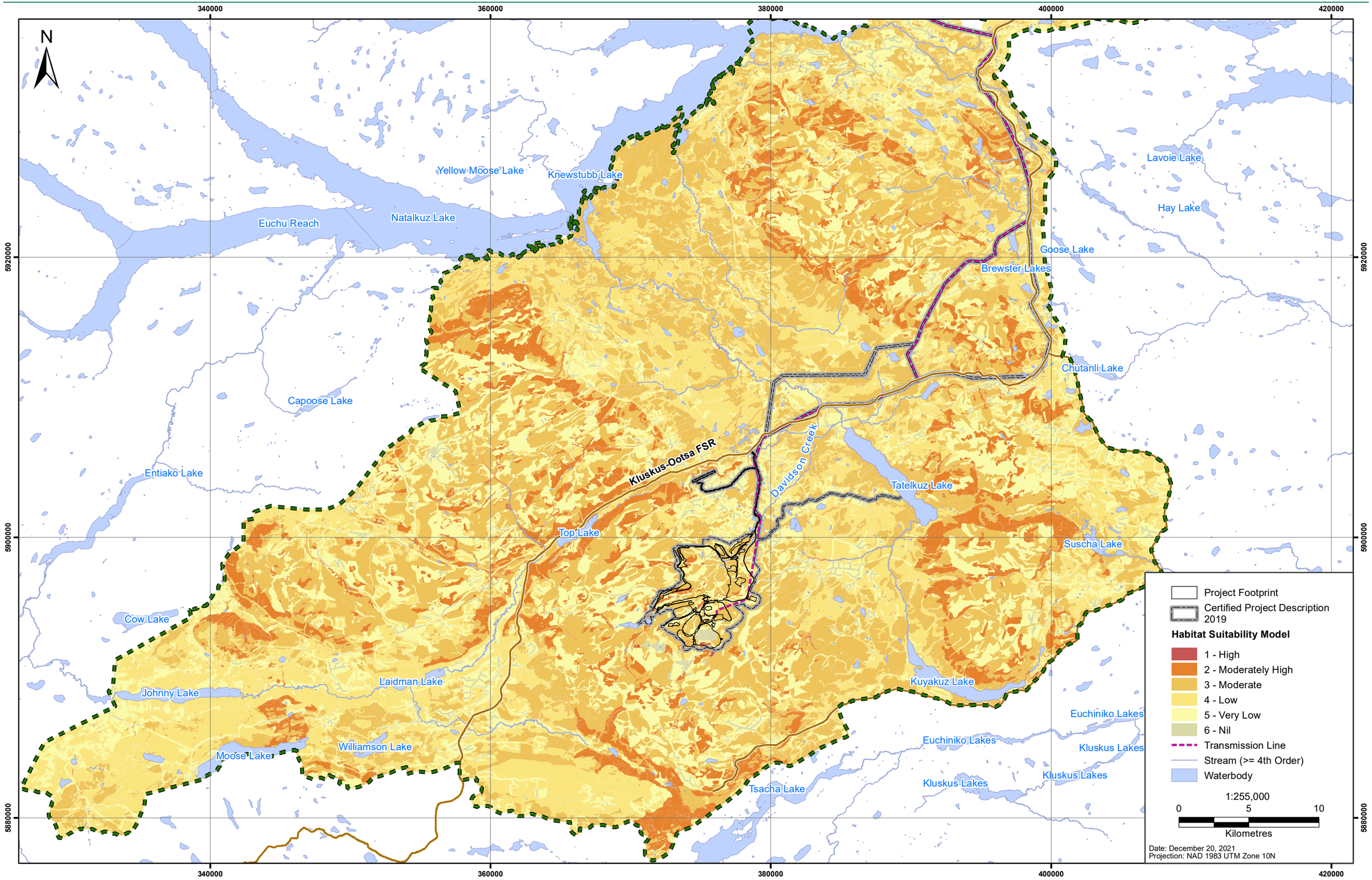

Figure 3.1-3: Grizzly Bear Fall Habitat Suitability Rating (EA)

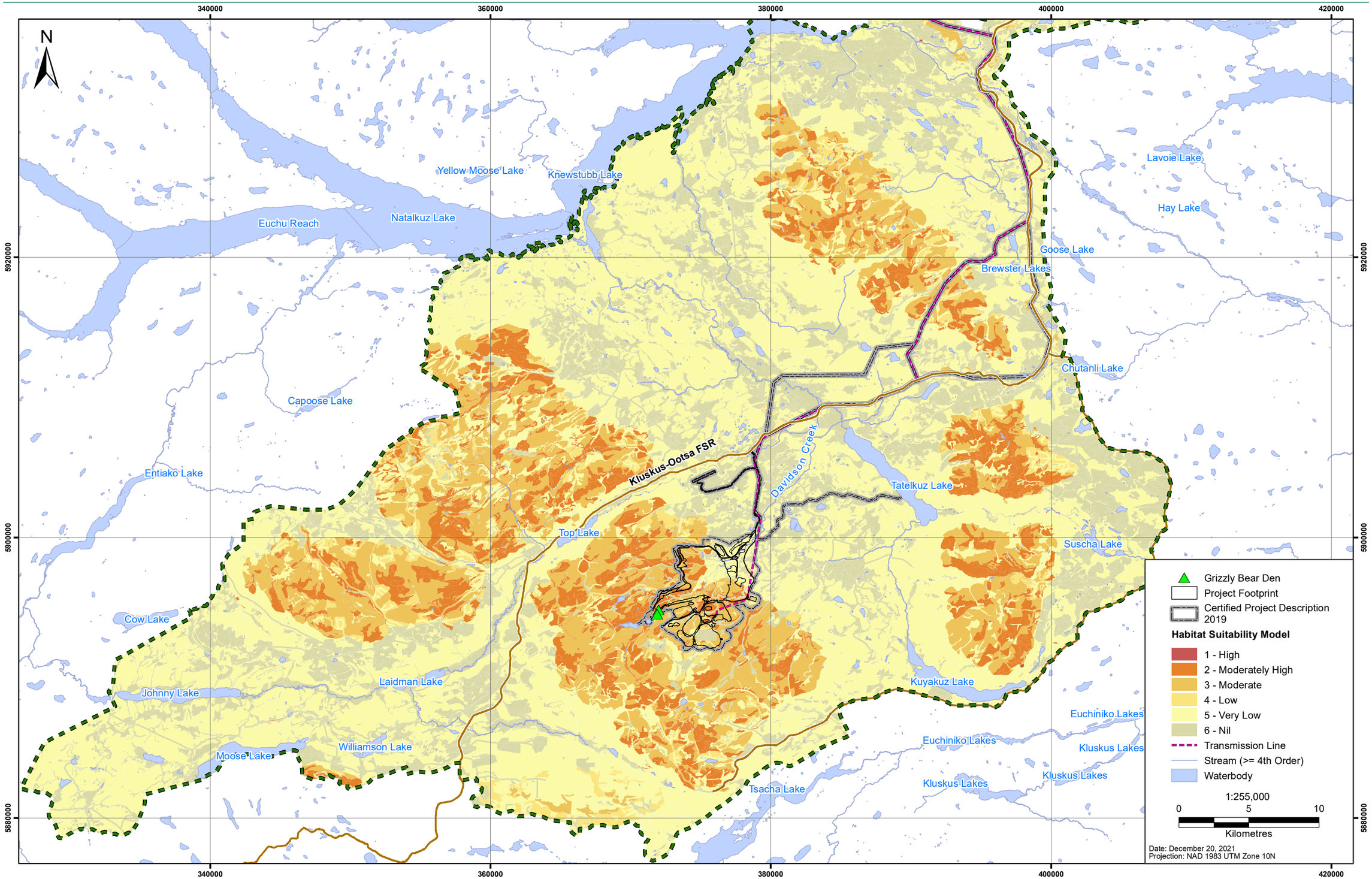

Figure 3.1-4: Grizzly Bear Winter Denning Habitat Suitability Rating (EA)

3.1.2 Assessment of the Bear Habitat Models

The assessment of grizzly bear habitat models found two inconsistencies:

- Habitat values in the mapping were generally both over-rated and under-rated compared to 2021 field values; and
- Field surveys reported an area of very high quality bear denning habitat that was not captured in the HSM.

3.1.2.1 Habitat Ratings

The grizzly bear habitat model accuracy assessments found that more than half of the modelled polygons were assessed lower in value and almost 25% were assessed as higher in value than the 2021 field assessment results. Twelve of the 97 polygons assessed were valued equally (Table 3.1-1).

These results are likely due to the ecosystem mapping that provided the base for the suitability mapping and not the model itself. The habitat models are based on TEM and PEM, and other factors derived from digital elevation models, trim and current infrastructure mapping. PEM in particular does not accurately map many habitat features that indicate habitat suitability, such as terrain. The 2021 field plots were all ground based and because of this the results are more accurate.

Table 3.1-1: 2015 and 2021 Habitat Ratings Comparison for Grizzly Bear

Plot Type_Season	SH_W	TH_W	FD_F
Total Number plots where 2015 HSR = 2021 HSR	**12**	**12**	**12**
2015 HSR 1 value point less than 2021	13	13	13
2015 HSR 2 value points less than 2021	14	14	14
2015 HSR 3 value points less than 2021	15	15	15
2015 HSR 4 value points less than 2021	16	16	16
Total Number plots where HSR for 2015 is lower than 2021	**58**	**58**	**58**
2015 HSR 1 value point more than 2021	18	18	18
2015 HSR 2 value points more than 2021	2	2	2
2015 HSR 3 value points more than 2021	3	3	3
2015 HSR 4 value points more than 2021	4	4	4
Total Number plots where HSR for is higher than 2021	**27**	**27**	**27**
Total Number of plots	**97**	**97**	**97**

SH: Security Habitat, TH: Thermal Habitat, FD: Food; W: Winter Season, F: Fall Season

3.1.2.2 Bear Denning Area

The EAC/Application included Traditional Knowledge (TK) about grizzly bear denning that was not captured in the habitat suitability models for winter/denning:

> *"According to Lhoosk'uz Dene representatives, grizzly bears may use the hillsides of Mount Davidson for denning, particularly the western sides (Lhoosk'z Dene trapline holder pers. comm., 2013)."*

Field surveys in 2012 reported two grizzly bear dens in an area on the northwest side of Mt. Davidson in a boulder field (Photo 3.1-1).

Photo 3.1-1: Grizzly bear den recorded on the north-west side of Mt. Davidson, 2012.

Likewise, field surveys in 2021 identified two additional grizzly bear dens in the same area, in the boulder field to the northwest of Mt. Davidson (Photos 3.1-2 to 3.1-4).

This boulder field, identified by TK, supports 100% of the grizzly bear dens that have been reported during field studies. However, the boulder field is not represented on terrestrial maps or habitat maps for the winter/denning period.

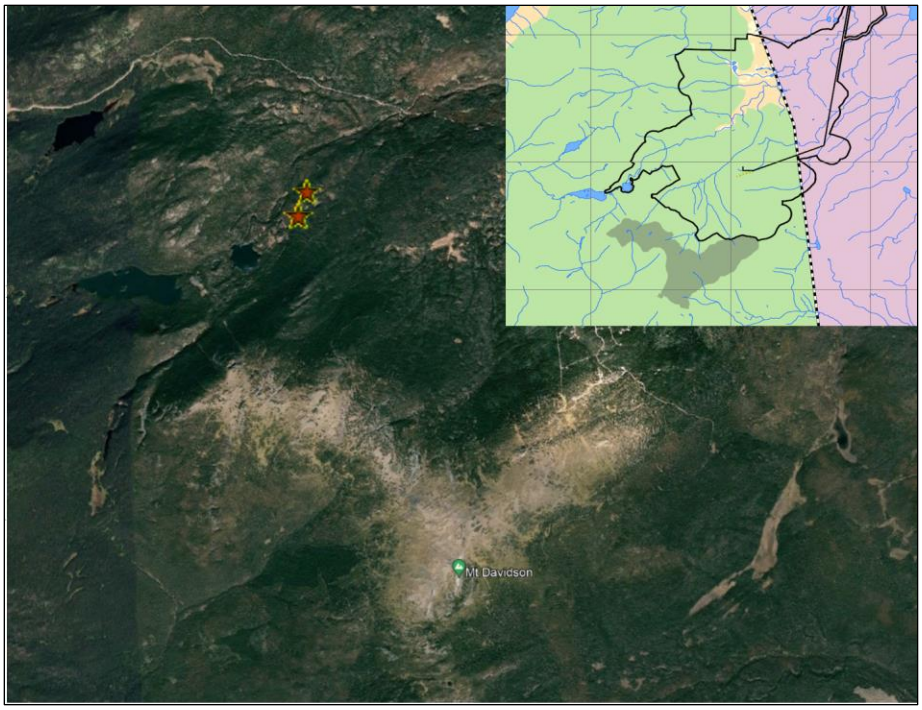

Photo 3.1-2: Field map of grizzly bear dens recorded on the northwest side of Mt. Davidson, 2021. Inset is project footprint.

Photo 3.1-3: Grizzly bear den recorded on the northwest side of Mt. Davidson, 2021.

Photo 3.1-4: Detail of Grizzly bear den recorded on the northwest side of Mt. Davidson, 2021.

3.1.3 Mitigation Assessment

The EIS/Application used habitat suitability information to assess the potential Project impacts on grizzly bears; a quantitative approach was used to determine potential habitat loss and alteration within the regional study area and a qualitative approach was used to assess increase in mortality risk within the grizzly bear population unit. Road densities and the cumulative impacts from mountain pine beetle, forestry, and wildfires were assessed as qualitative measures of mortality rate and population changes. The EIS/Application predicted potential Project effects for habitat loss and mortality (vehicle collisions).

Mitigations for grizzly bear are described in the Wildlife Mitigation and Monitoring Plan (WMMP) and incorporate all measures all measures listed in BW Gold's Mitigation Table, which addresses EAC Condition 43 and was approved by the EAO in November 2020 (Appendix A). The majority of mitigation measures for grizzly bears are shared with other wildlife species through minimization of Project effects, such as implementing employee training and awareness programs, establishing a wildlife sightings reporting system, maintaining conservative speed limits on Project roads and establishing right of way protocols to protect wildlife near roads, waste management protocols to reduce potential wildlife attraction, and protocols for avoiding or reclaiming sensitive habitat features. The full list of mitigation measures for grizzly bear are defined in the WMMP.

Key mitigations specific to grizzly bear are listed in the WMMP (Section 3) including:

- Avoid construction during the sensitive period from October 1 – March 31 (WMMP Section 3.3, MFLNRO 2014).
    - If construction cannot be avoided during the sensitive period, pre-construction surveys will be conducted for grizzly bear denning habitat. All probable denning sites will be marked with an appropriate buffer, determined by a Qualified Professional based on the activity taking place and site-specific characteristics.
- Use caution and where possible avoid work in highly suitable grizzly bear habitats according to the corresponding season (e.g., avoid salmon-spawning streams in fall) (WMMP Section 4.6.2).
    - Maintain sufficient distance from bears so as not to disrupt their activities (MFLNRO 2014) (WMMP Section 4.6.2).
- Monitor key grizzly bear areas with wildlife cameras to confirm effectiveness of mitigation measures: kokanee salmon spawning streams, and known bear denning areas and den sites found during pre-clearing surveys (WMMP Section 4.6.3).
- In addition to general employee training regarding wildlife, implement a Bear Awareness Program, including notification and response procedures.

These mitigations generally incorporate the entire Project Site and all work areas, but habitat suitability modelling can help guide areas requiring heightened caution or avoidance according to each season.

Field verification of grizzly bear HSMs indicated that the models underestimate the denning habitat in the project area, with more than half of the verification assessment polygons rated lower than the field verification assessments for this life requisite (EAC Condition 23d.iv). Both Traditional Knowledge and field surveys identified an area on the northwest face of Mt. Davidson where grizzly bears preferentially den. This large boulder field is not represented on terrestrial mapping or habitat suitability mapping for winter/denning. This area of grizzly bear denning is on the southwest edge of the project footprint.

To address this denning area, the terrestrial mapping and habitat mapping will be updated and the boulder field/denning area will be added to the next version of the WMMP in Q1 2022 prior to Project construction. Specific mitigation will also be added to the WMMP for this area. The area will either be

maintained in its current state (avoidance), or will be cleared outside of the sensitive denning period (minimization) and restored and reclaimed at the end of the mine life, following the BC *Environmental Mitigation Procedures* (BC MOE 2014; EAC Condition 23d.v).

3.2 Moose

3.2.1 Moose Habitat Models

Development of moose HSMs for the EIS/Application were very similar to methods for grizzly bear; documentation of important habitat were done using a combination of TEM and PEM data. Ecosystem types were assigned habitat ratings that represent habitat quality and effectiveness related to mine infrastructure. Additionally, winter ungulate surveys across the project area were used to determine baseline presence and distribution of moose. The quantitative rating of the of the identified TEM and PEM ecosystem types were based on habitat values across life history stages and season for moose that are consistent with similar models that have been used, tested, and assessed across BC through population estimates and research.

Habitat suitability modelling was completed for the growing and winter season, with a six-class rating system including life requisites for feeding, security, and thermal. The growing season is less limiting for moose when compared to the winter season, with more availability of high quality feeding habitats and lower stress on appropriate thermal cover compared to winter.

3.2.1.1 Spring

Existing habitat suitability modelling from the EIS/Application includes a two-season model for moose, rather than a four-season model, and therefore does not include moose spring habitat. Spring moose habitat suitability mapping will be added as part of pre-construction baseline study during Q1 2022.

Highly suitable moose spring habitat includes wetland habitats and areas with early growing sedges/forbes and deciduous growth such as willows and alders. The majority of the Project Site is in higher elevations which do not host many of these productive spring wetlands. Suitability for moose spring habitat is therefore anticipated to be low or moderate throughout most of the Project Site.

3.2.1.2 Summer

Moose summer habitat is rated primarily as moderate throughout the mine site, but is low to very low throughout the other portions of the Project Site (waterline, airstrip, and access road; Figure 3.2-1). Portions of habitat rated moderately high are scattered in the RSA, surrounding larger wetlands and waterways such as Fawnie Creek and Chedakuz Creek.

3.2.1.3 Fall

Existing habitat suitability modelling from the EIS/Application includes a two-season model for moose, rather than a four-season model, and therefore does not include moose fall habitat. Fall moose habitat suitability mapping will be added as part of pre-construction baseline study.

Highly suitable moose fall habitat includes forested areas bordering openings with abundant deciduous vegetation such as willows and alder. Given the higher elevations across the Project Site, suitability for moose fall habitat is anticipated to be moderate throughout most of the area.

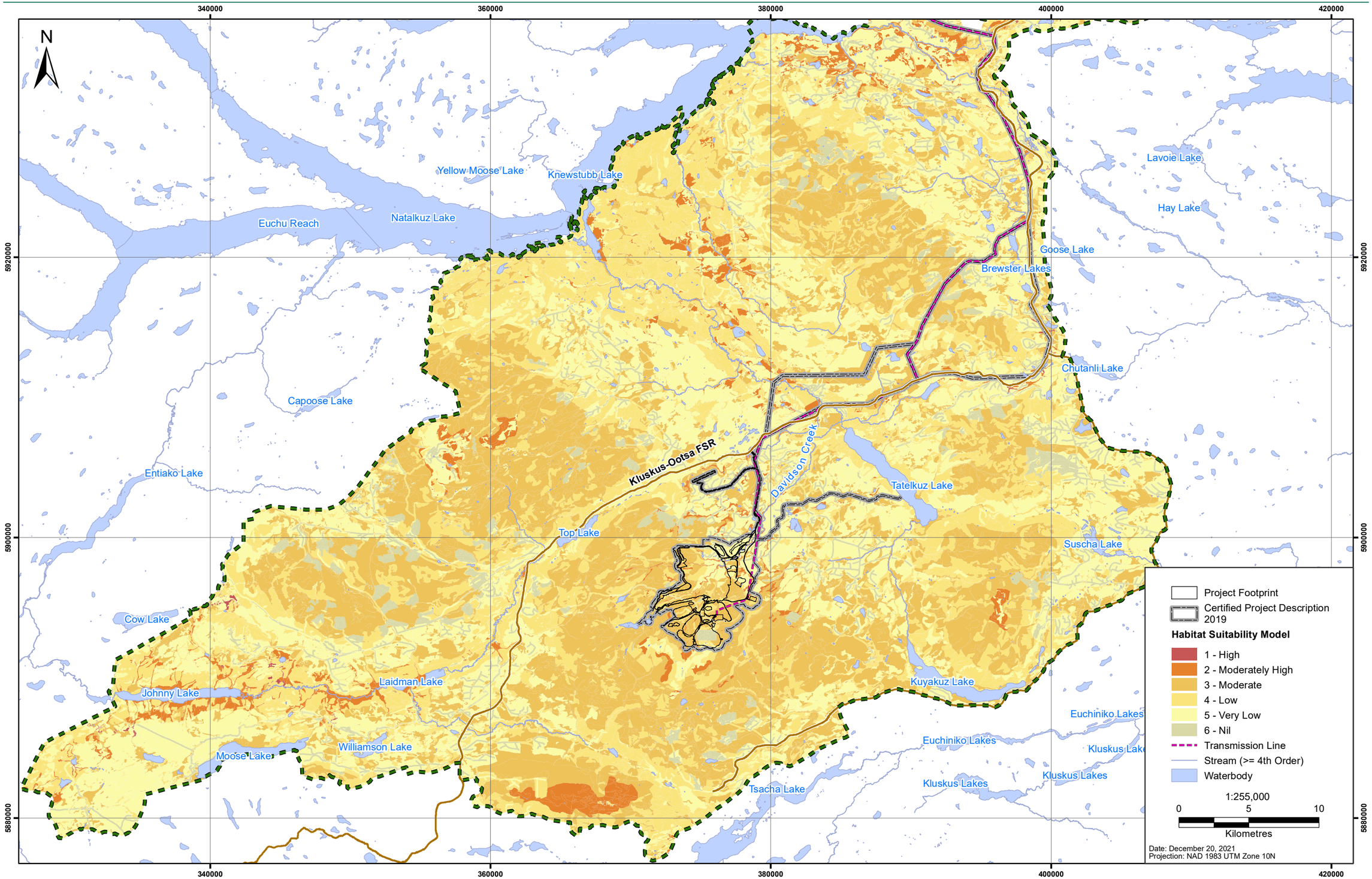

Figure 3.2-1: Moose Growing Season (Summer) Habitat Suitability Rating (EA)

3.2.1.4 Winter

The Project Site mostly encompasses low to moderate rated winter habitat for moose; the access road, airstrip, and waterline cover low or very low rated habitat, while the mine site is a mix of low to moderate (Figure 3.2-2). One portion in the north of the mine site and near the access road is rated moderately high for winter moose. The RSA is overall low suitability for winter moose habitat, with small portions of moderately high habitat, including just east of the mine site and in the north and west at Fawnie and Chedakuz creeks.

3.2.2 Assessment of Moose Habitat Models

The assessment of the moose habitat models found two inconsistencies:

- The moose models in the EIS/Application used two seasons (winter and growing). Moose habitat requirements are well known in BC, making the four season approach (spring, summer, fall and winter) standard. Four season models therefore allow data to be compared across the province; and
- The TEM generally over-reports the area of wetlands, and therefore of high quality growing season values.

3.2.2.1 Habitat Ratings

The moose habitat model accuracy assessments found that more than half of the modelled polygons compared were assessed higher in value and almost 25% were assessed as lower in value than the 2021 field assessment results. Ten of the 105 polygons assessed were valued equally (Table 3.2-1).

These results are likely due to the ecosystem mapping (TEM and PEM) that provided the base for the suitability mapping and not the model itself. Additionally, the wetlands were overestimated for the area and in turn increased the suitability of habitat for moose. The 2021 field plots were all ground based and because of this the results are more accurate.

Table 3.2-1: 2015 and 2021 Habitat Ratings Comparison for Moose

Plot Type_Season	FD_W	SH_W	TH_W
Total Number plots where 2015 HSR = 2021 HSR	**10**	**10**	**10**
2015 HSR 1 value point less than 2021	11	11	11
2015 HSR 2 value points less than 2021	1	1	1
2015 HSR 3 value points less than 2021	1	1	1
2015 HSR 4 value points less than 2021	14	14	14
Total Number plots where HSR for 2015 is lower than 2021	**27**	**27**	**27**
2015 HSR 1 value point more than 2021	14	14	14
2015 HSR 2 value points more than 2021	17	17	17
2015 HSR 3 value points more than 2021	18	18	18
2015 HSR 4 value points more than 2021	19	19	19
Total Number plots where HSR for is higher than 2021	**68**	**68**	**68**
Total Number of plots	**105**	**105**	**105**

SH: Security Habitat, TH: Thermal Habitat, FD: Food; W: Winter Season

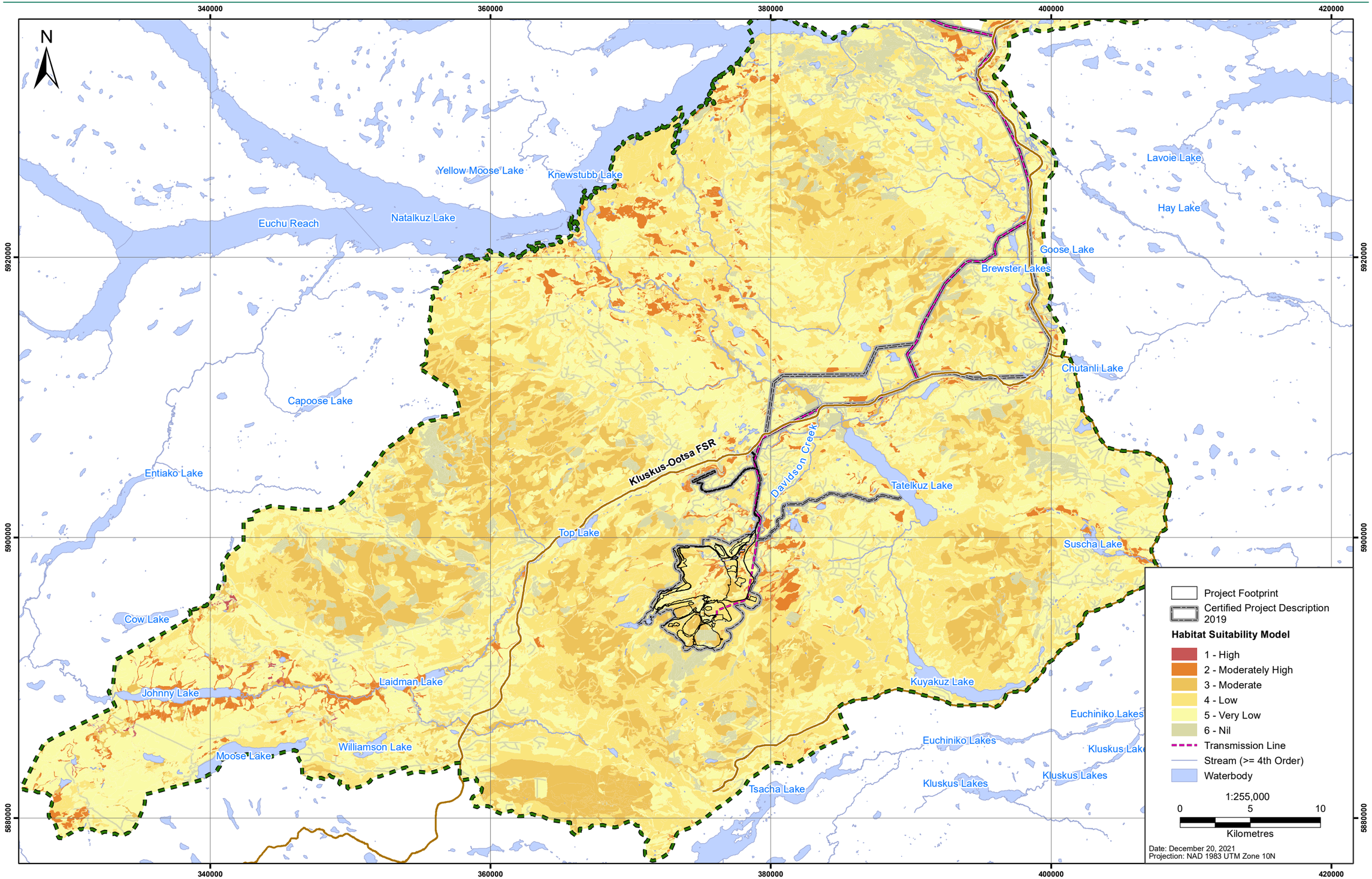

Figure 3.2-2: Moose Winter Season Habitat Suitability Rating (EA)

3.2.2.2 Two Season Models

The moose models in the EIS/Application used only two seasons (winter and growing). Moose habitat requirements are well known in BC, therefore a four season approach (spring, summer, fall and winter) is typically applied. To better represent moose use of the mine site and RSA, the models should be updated to a four season approach.

3.2.2.3 Wetland Mapping

The EIS/Application used TEM to identify wetlands in the mine site. This type of mapping can include up to three habitat types in each habitat polygon. The percent cover of each habitat type is given as a “decile” from 1 to 10 (10% to 100%) of the polygon.

When mapping the growing season (spring, summer, and fall) for moose, higher quality habitat included whether wetlands were present or not in a polygon. This likely over-estimated the amount of high quality habitat for moose during the growing season.

3.2.3 Mitigation Assessment

The EIS/Application used habitat suitability information to assess the potential project impacts on moose; a quantitative approach was used to determine potential habitat loss and alteration within the regional study area and a qualitative approach was used to assess increase in mortality risk, changes in movement patterns, and changes in population dynamics. The EIS/Application predicted potential Project effects for habitat loss, change in movement patterns, and mortality (vehicle collisions).

Mitigations for moose are described in the Wildlife Mitigation and Monitoring Plan (WMMP) and incorporate all measures listed in BW Gold’s Mitigation Table, which addresses EAC Condition 43 (Appendix A). The majority of mitigation measures for moose are shared with other wildlife species through minimization of Project effects, such as implementing employee training and awareness programs, a wildlife sightings reporting system, conservative speed limits on Project roads, right of way protocols to protect wildlife near roads, and a no hunting policy. The key mitigations which are specific to moose include (WMMP Section 4.4.2):

- Avoiding specific moose habitat features, such as salt licks. This is enacted through documenting known salt licks (via field surveys and observations from Qualified Professionals, and the employee incidental sightings reporting program) and implementing buffers to functionally retain salt licks for moose and other ungulates (WMMP Section 4.4.2);
- Minimizing new access for harvesters and wolves along roads by limiting sightlines along new access roads (e.g., curving the road, allowing roadside vegetation to grow up, and limiting the width of the cleared right of way), where allowable for the safe operation of the road (WMMP Section 4.4.2);
- Minimizing the potential for moose-vehicle collisions through management of traffic and vehicle access, management of wildlife activity on and near roads, and management of road conditions to prevent wildlife attraction (WMMP Section 3.6); and
- Monitoring the moose population via winter surveys, in order to detect potential changes in distribution or population levels (WMMP Section 4.4.3).

These mitigations generally incorporate the entire Project Site and all work areas, but habitat suitability modelling can help guide areas requiring heightened caution or avoidance according to each season, and prioritize areas for reclamation. Adding spring, summer and fall HSMs for moose will help refine the guidance for these areas across the year. Field verification of moose HSMs indicated that habitat for this species is likely over estimated for the growing season in wetland habitats, and the cumulative season

approach may underestimate important seasonal habitats used for food, security, and thermal requisites (EAC condition 23d.iv).

The Construction Environmental Management Plan (CEMP) should include the updated areas of wetlands so that clearing mitigations can be focused in those areas. The employee awareness program will include notice of these higher suitability areas during the appropriate season, and areas near roadways or other work sites will have signage posted.

4. NEXT STEPS

The analysis in this document concludes that the existing habitat suitability models could be improved for moose and grizzly bear on the Project Site.

Updated habitat mapping is planned for the mine site based on new TEM data collected in 2021-2022. This will include:

- Updating the wetland mapping on the mine site in the TEM;
- Updating the grizzly bear mapping to include the boulder field/denning area on the north-west side of Mt. Davidson;
- Updating the moose models to include four seasons; and
- Updating the moose models to include the updated wetland mapping.

The Wildlife Mitigation and Monitoring Plan (WMMP) will be updated in Q1 2022 to include:

- The maps of the boulder field/denning area on the north-west side of Mt. Davidson;
- Specific mitigation for the boulder field/denning area in Q1 2022, including:
  - Physical avoidance, if possible.
  - Temporal avoidance during the denning period.
  - Mitigation to reduce disturbance during the denning period (i.e., established buffer zones, employee training/awareness).
  - Monitoring using cameras of identified den locations.
- Maps of wetland areas to highlight the mitigation for both grizzly bear and moose in these high quality habitats.

Mapping updates involving TEM will be implemented in spring 2022, when additional aerial data are available for the RSA. Mitigation updates for details of the bear denning area will be included in the next draft of the WMMP in early 2022 and provided to Environment and Climate Change Canada, The Agency, and Aboriginal Groups prior to the beginning of Project construction.

5. REFERENCES

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APPENDIX A MASTER MITIGATION TABLE FOR GRIZZLY BEAR AND MOOSE, NOVEMBER 2020

Appendix A: Master Mitigation Table for Grizzly Bear and Moose, November 2020

Grizzly Bear	
1	Locate the transmission line in disturbed areas, as will be described in the CEMP.
2	Use existing roads and follow existing linear disturbances to support transmission line construction, as will be described in the CEMP.
3	Use helicopters to support transmission line construction in steep areas, as will be described in the CEMP.
4	Avoid clearing and development of berry and kokanee areas, as will be described in the CEMP.
5	Monitor Kokanee spawning streams.
6	Minimize the mine site footprint and avoid large scale clearing of old-growth and mixed wood forest and riparian areas, as will be described in the CEMP.
7	Minimize sensory disturbance due to noise and light in areas adjacent to the mine site and airstrip, including the use of noise abatement technology, equipment placement, regular equipment maintenance, and enforcement of speed limits.
8	Restore disturbed habitats at mine closure or develop habitats capable of supporting grizzly bears as described in the RCP (Section 2.6 of the Application/EIS) and WMMP (draft plan provided in Section 12.2.1.18.4.6 of the Application/EIS) and avoid using species that attract bears.
9	Avoid riparian areas and old growth forests, as will be described in the CEMP.
10	Implement the WMMP (Section 12.2.1.18.4.6), including wildlife awareness information in regular mine safety and environmental inductions, including a Bear Awareness Program.
11	Implement best management practices for road surface maintenance to allow good vehicle line of sight and control to reduce potential collisions with grizzly bears.
12	Minimize attraction of wildlife to roadsides using adaptive management measures, including avoiding the use of road salts, removing carrion, and selection of appropriate revegetation species along Project-controlled access roads, pursuant to the WMMP (draft plan provided in Section 12.2.1.18.4.6 of the Application/EIS).
13	Select re-vegetation species that minimize attraction of wildlife to roadsides to reduce potential for vehicle collisions and predation as described in the WMMP (draft plan provided in Section 12.2.1.18.4.6 of the Application/EIS).
14	During the early years of Operations, deactivate and decommission access roads that are constructed to support transmission line construction to limit predator movements and vision along the line.
15	An access management plan will be developed for the project, with consideration of grizzly bear predator activity.
16	Implement a LSVMRP (draft plan provided in Section 12.2.1.18.4.4 of the Application/EIS), including minimizing ground disturbance and damage to vegetation.
17	Follow BC's mitigation hierarchy when developing the mitigation plan for Grizzly Bear.

Grizzly Bear *(cont'd)*	
18	Implement a RCP (draft plan provided in Section 2.6 of the Application/EIS), including seeding and progressive reclamation of exposed slopes to improve slope stability.
19	Wildlife will be given the right-of-way by mine vehicles along all roads associated with the mine, and site orientation will include measures for avoidance of vehicle/wildlife encounters.
20	Include wildlife awareness information in regular mine safety and environmental orientations. Topics may include: ■ Access road use and haulage operating protocols; ■ Restricted access recreation proscription rules; ■ No hunting / no fishing policy; ■ Wildlife observation and interaction reporting procedures; ■ Bear awareness program; ■ Waste management procedures; and ■ Wildlife sensitive locations/timing as applicable.
21	Wildlife interactions (e.g., traffic accidents) and nuisance or problem animals will be reported to supervisory personnel as soon as safe to do so. Reporting procedures will be developed before construction of the mine begins.
22	Implement the WMMP (Section 12.2.1.18.4.6), including a Bear Awareness Program.
23	Implement the TAMP (draft plan provided in Section 12.2.1.18.4.14).
24	Restrict and control road access to the mine site, as described in the TAMP (draft plan provided in Section 12.2.1.18.4.14).
25	Use buses or alternatives to personal transportation to transport workers to the mine site during Construction and Operations to reduce potential for traffic accidents, as will be described in the 'Community Effects Monitoring and Management Plan'.
26	No recreation trails will be allowed in sensitive habitat, including grizzly bear or caribou habitat.
27	All mine vehicles and mobile equipment, including authorized private vehicles, will be equipped with or escorted by vehicles with two-way radios when travelling along Project-controlled roads. All encounters with wildlife will be recorded and reported to mine environmental and other relevant personnel as soon as safe to do so. This includes any encounters that result in injury or mortality to wildlife. Reports of wildlife frequenting Project-controlled roads will be provided to monitoring committees in accordance with agreed to terms of reference and protocols for follow-up and review of mitigation measure effectiveness.
28	Habituated animals will be deterred for their own safety following a plan provided to the provincial Conservation Officer Service.
29	Implement the WMMP (Section 12.2.1.18.4.6), including a Bear Awareness Program.
30	Manage snow bank height and create and maintain escape pathways in snow banks at wildlife corridors that intersect Project-controlled roads, as will be described in the Wildlife Monitoring and Management Plan.
31	Maintain vegetated buffers adjacent to mine facilities and roads. Exceptions will include areas that will be managed for wildlife and human safety. This will be described in the CEMP.
32	Staff will be made aware of any locations of high animal activity on access roads and the appropriate actions to be taken.

Grizzly Bear *(cont'd)*	
33	New Gold will implement an Industrial and Domestic Waste Management Plan (draft plan provided in Section 12.2.1.18.4.11), including the following measures: ■ Using practices that minimize odours from human-generated wastes; ■ Implementing a bear awareness program; ■ Scheduling timely and appropriate waste disposal; ■ Incinerating putrescible waste as soon as practical, or otherwise not allowing it to accumulate except where in appropriate containers; ■ Storing wastes in wildlife-proof containers, including trash cans and dumpsters with a bear-resistant design and considerations to contain odours. Waste containers will be repaired and maintained regularly; and ■ Using fencing or other means to exclude terrestrial wildlife from waste storage areas.
34	Include wildlife awareness information in regular safety and environmental inductions performed by the mine. Awareness to specifically cover beavers, grizzly bear, caribou, moose, and waterbirds.
Moose	
1	Locate the transmission line in existing disturbed areas, as will be described in the Final Transmission Line Routing Plan.
2	Use existing roads and follow existing linear disturbances to support transmission line construction, as will be described in the CEMP.
3	Minimize ground disturbance and damage to vegetation in areas adjacent to footprints by flagging sensitive habitats, as will be described in the CEMP.
4	Minimize sensory disturbance due to noise and light, including directional lighting and lighting that is activated by motion detectors, noise abatement technology, equipment placement, regular equipment maintenance, and enforcement of speed limits.
5	Reporting any habitat feature (e.g., nest, den, mineral lick) encountered during the course of work activities by mine personnel or contractors to mine environmental staff immediately for follow-up actions as required as will be described in the WMMP.
6	Conducting winter moose and caribou surveys at a suitable scale to monitor the local population for distribution and abundance prior to construction. Survey design will be developed during the permitting phase in consultation with provincial agencies and First Nations communities. Wolf observations will be noted. The surveys will be repeated every 5 years during mine operations to monitor trends. Areas to be surveyed to include the Mine Site, transmission line portion of the RSA (i.e., corresponding to the area used in the habitat loss and alteration analysis) and the Mine Access Road.
7	Design linear features to avoid wetlands to the, as will be described in the CEMP.
8	Minimize clearance of black spruce forest and maintaining hydrological regimes of wetlands near infrastructure, as will be described in the CEMP.
9	Avoid riparian areas and old growth forests, as will be described in the CEMP.
10	Minimize the mine site footprint and avoid large scale clearing of old-growth and mixed wood forest and riparian areas, as will be described in the CEMP.
11	Maintain or enhance existing drainage connections when designing and installing culverts for cross drainage, and avoid creating outlets that either drain wetlands or constrict the natural outlet during construction, as will be described in the CEMP.

Moose *(cont'd)*	
12	Include wildlife awareness information in regular mine safety and environmental orientations. Topics may include: ■ Access road use and haulage operating protocols; ■ Restricted access recreation proscription rules; ■ No hunting / no fishing policy; ■ Wildlife observation and interaction reporting procedures; ■ Bear awareness program; ■ Waste management procedures; and ■ Wildlife sensitive locations/timing as applicable.
13	Use vegetation and coarse woody debris and other approaches to form visual barriers on cut lines, trails, or other linear features to reduce changes in predator-prey dynamics as will be described in the WMMP.
14	A 30-metre vegetation buffer will be used to protect wetland functions, as will be described in the CEMP.
15	An access management plan will be developed for the project, with consideration of moose predator activity.
16	Minimize attraction of wildlife to roadsides using adaptive management measures, including avoiding the use of road salts, removing carrion, and selection of appropriate revegetation species along Project-controlled access roads, pursuant to the WMMP (draft plan provided in Section 12.2.1.18.4.6 of the Application/EIS).
17	Establish a Traditional Knowledge/ Traditional Land Use (TK/TLU) Committee to monitor project development and provide TK/TLU information to incorporate during final project design, construction, operations, closure and post-closure.
18	No recreation trails will be allowed in sensitive habitat, as will be described in the CEMP.
19	Conduct moose aerial surveys prior to the commencement of construction, and subsequently every five years until the end of mine operations.
20	Include wildlife awareness information in regular mine safety and environmental orientations.
21	Restore disturbed habitats at mine closure or develop habitats capable of supporting moose pursuant to the RCP (Section 2.6 of the Application/EIS).
22	Restrict and control road access to the mine site, as described in the TAMP (draft plan provided in Section 12.2.1.18.4.14).
23	All mine vehicles and mobile equipment, including authorized private vehicles, will be equipped with or escorted by vehicles with two-way radios when travelling along Project-controlled roads. All encounters with wildlife will be recorded and reported to mine environmental and other relevant personnel as soon as safe to do so. This includes any encounters that result in injury or mortality to wildlife. Reports of wildlife frequenting Project-controlled roads will be provided to monitoring committees in accordance with agreed to terms of reference and protocols for follow-up and review of mitigation measure effectiveness.
24	Habituated animals will be deterred for their own safety following a pre-approved plan, reviewed by the provincial Conservation officer Service. The plan will be included as part of the Wildlife Monitoring and Management Plan.
25	Implement best management practices for road surface maintenance to allow good vehicle line of sight and control to reduce potential collisions with moose.
26	Include wildlife awareness information in regular mine safety and environmental inductions.

Moose *(cont'd)*	
27	Minimize the mine site footprint and avoid large scale clearing of old-growth forest and riparian areas, as will be described in the CEMP.
28	Implement adaptive management to manage alternate prey habitat, wolf access or other similar measures, as described in the WMMP (draft plan provided in Section 12.2.1.4.18.6 of the Application/EIS).
29	Participate in the Kluskus FSR industrial road users group over the mine life (all indicators).
30	Include wildlife awareness information in regular safety and environmental inductions performed by the mine. Awareness to specifically cover beavers, grizzly bear, caribou, moose, and waterbirds.
31	Use existing roads and follow existing linear disturbances to support transmission line construction, as will be described by the CEMP.
32	Staff will be made aware of any locations of high animal activity on access roads and the appropriate actions to be taken.
33	Conduct winter moose and caribou surveys prior to construction. The survey design will be developed during permitting in consultation with the Ministry of Forests, Lands and Natural Resource Operations and First Nation communities. The surveys will be repeated every five years to monitor trends during operations. Survey results could be incorporated by the province into regional initiatives.
34	Conduct additional fall surveys for moose activity and moose sheds in the Mt. Davidson area.
35	New Gold will implement an Industrial and Domestic Waste Management Plan (draft plan provided in Section 12.2.1.18.4.11), including the following measures: ■ Using practices that minimize odours from human-generated wastes; ■ Implementing a bear awareness program; ■ Scheduling timely and appropriate waste disposal; ■ Incinerating putrescible waste as soon as practical, or otherwise not allowing it to accumulate except where in appropriate containers; ■ Storing wastes in wildlife-proof containers, including trash cans and dumpsters with a bear-resistant design and considerations to contain odours. Waste containers will be repaired and maintained regularly; and ■ Using fencing or other means to exclude terrestrial wildlife from waste storage areas.
36	Participate in road safety groups for the use of the Kluskus FSR [Forest Service Road] as hosted by the road owner or primary licence holder.

APPENDIX B MOOSE SURVEY SITE DATA, 2021

Appendix B: Moose Survey Site Data, 2021

Date	Survey Unit	Start Time	End Time	Pilot	Navigator	Observers	Temp (°C)	% Cloud Cover	Wind
7-Dec-21	Mine Area LSA	8:52	12:33	Blake - Yellowhead Helicopters	Lis Rach	Judy Gregg (UFN); Tony Baptiste (LDN)	1	100 VH	0-1

APPENDIX C MOOSE OBSERVATIONS AND SIGNS, 2021

Appendix C: Moose Observations and Signs, 2021

Date	WPT #	UTM		Observation or Sign	Group Composition					Total Individuals	Number of Signs	Signs	Habitat Type	Comments
		Easting	Northing		Adult Male	Adult Female	Unsexed Adult	Calf	Unknown Sex/Age					
7-Dec-21	1	378398	5893716	Both	0	0	1	0	0	1	1	Tracks	Clearcut with forested patches	
	2	380546	5896305	Both	0	0	1	0	0	1	1	Tracks	Clearcut with forested patches	
	3	380404	5899003	Sign	0	0	0	0	0	0	1	Tracks	Clearcut with forested patches	
	4	380471	5898627	Observation	0	1	0	0	1	2	0		Clearcut with forested patches	
	5	377755	5891418	Sign	0	0	0	0	0	0	2	Bedding, Tracks	Clearcut with forested patches	High Use
	6	377849	5893288	Observation	0	0	0	0	2	2	0		Clearcut with forested patches	
	7	378026	5893961	Observation	0	1	0	0	0	1	0		Clearcut with forested patches	
	8	378110	5894376	Sign	0	0	0	0	0	0	4	Tracks	Clearcut with forested patches	High Use
	9	379832	5898472	Observation	0	0	1	0	0	1	0		Clearcut with forested patches	
	10	377753	5895056	Sign	0	0	0	0	0	0	4	Tracks	Road	High Use. TW on road
	11	377450	5894637	Sign	0	0	0	0	0	0	4	Bedding, Tracks	Clearcut with forested patches	
	11	377516	5893984	Sign	0	0	0	0	0	0	4	Bedding, Tracks	Clearcut with forested patches	
	12	377460	5892839	Sign	0	0	0	0	0	0	1	Tracks	Clearcut with forested patches	
	13	377446	5892337	Observation	0	1	0	0	0	1	0		Clearcut with forested patches	
	14	376911	5891294	Observation	1	0	0	0	0	1	0		Clearcut with forested patches	
	15	376961	5891825	Sign	0	0	0	0	0	0	4	Tracks	Clearcut with forested patches	High Use
	17	376965	5892525	Observation	0	1	0	0	0	1	0		Clearcut with forested patches	
	18	376905	5893086	Observation	0	0	1	0	0	1	0		Clearcut with forested patches	
	19	377967	5896080	Observation	0	1	1	1	0	3	0		Clearcut with forested patches	
	20	376447	5891402	Sign	0	0	0	0	0	0	1	Tracks	Road	TW on road
	21	376155	5891060	Observation	0	0	1	0	0	1	0	Bedding	Clearcut with forested patches	
	22	377066	5900384	Observation	0	0	0	1	0	1	0	Bedding	Clearcut with forested patches	
	23	376997	5898538	Observation	0	0	1	0	0	1	0		Clearcut with forested patches	
	24	376885	5897600	Sign	0	0	0	0	0	0	1	Tracks	Clearcut with forested patches	TW on edge of cc
	25	374079	5895113	Observation	0	0	0	0	1	1	0		F Open	High Use
	26	376144	5897725	Sign	0	0	0	0	0	0	2		F Open	High Use
	27	375945	5898865	Sign	0	0	0	0	0	0	2		F Open	High Use
	29	372968	5895787	Sign	0	0	0	0	0	0	2	Tracks	F Open	TW Observed 2 times on road
	31	374504	5897993	Sign	0	0	0	0	0	0	2		F Open	High Use
	33	371478	5895754	Sign	0	0	0	0	0	0	2		F Open	High Use
	34	373643	5896943	Observation	0	1	0	1	0	2	0		F Open	Very High Use
	36	373811	5897183	Observation	0	0	1	0	0	1	0		F Open	Very High Use
	37	373426	5897367	Observation	0	1	0	1	0	2	0		F Open	
	38	374146	5898126	Observation	0	1	0	0	0	1	0		F Open	
	39	373586	5897969	Sign	0	0	0	0	0	0	2		F Open	High Use
	47	371722	5891655	Observation	0	1	0	1	0	2	0		F Subalpine	
	49	372546	5892479	Observation	0	0	1	0	0	1	0		F Open	

Incidental Observations and Signs

Date	Site Name	UTM		Survey Type	Group Composition			Total Individuals	Signs						Comments
		Easting	Northing		Adult Female	Unsexed Adult	Calf		Tracks	Bedding	Tree Rubs	Trails	Pellets	Feeding	
9-Jun-21	S001	378082	5955469	Shoreline Survey	1		1	2	-	-	-	-	-	-	Cow and Calf feeding in shallows of lake
7-Jul-21	WL01	368964	5893572	Wetland/Amphibian				-	X	X	X	X	X		High Use. Potential for mineral lick in the area. Numerous all season trails
	WL02	370746	5893763	Wetland/Amphibian				-	X			X		X	Moderate Use
	WL04	371117	5894128	Wetland/Amphibian				-							
	WL05	385659	5903193	Wetland/Amphibian				-							High Use
8-Jul-21	WL10	381363	5968554	Wetland/Amphibian		1		1					X		Unsexed Adult displaying territorial behavior, Very High Use
9-Jul-21	WL13	378409	5955397	Wetland/Amphibian				-							High Use
10-Jul-21	WL19	373482	5894083	Wetland/Amphibian				-	X						
	WL20	378321	5897341	Wetland/Amphibian				-	X	X		X			High Use
	WL21	378637	5897007	Wetland/Amphibian				-	X	X			X		

APPENDIX D WILDLIFE CAMERA LOCATIONS, 2021

Appendix D: Wildlife Camera Locations, 2021

Survey Area	Camera Number	UTM		Habitat	Associated Wildlife Feature
		Easting	Northing		
Mine Site	13	371965	5894743	Pine forest	Bear den and trails
	14	362122	5893527	Bog / wet meadow	Trails, rut rub, and bull moose smell
	15	375387	5894611	Wet meadow	Trails along edge of wetland
	17	373443	5895986	Access trail in forest	Moose, bear, and wolf tracks
	18	374964	5905382	Wet meadow	Moose and wolf tracks, bear scat
Capoose	3	361594	5906082	Wet meadow	Trail and rubbing
	4	360805	5908313	Subalpine bench	Trail and rut rubbing
	5	355064	5907440	Subalpine opening near trees and alpine parkland	Goat trails and droppings, moose tracks
	6	357794	5909891	Open meadow close to park boundary	Moose and possible caribou trails
	7	359048	5908550	Wetland opening	Several trails
	8	357444	5908620	Edge of wetland	Trail with moose rub and forage sign
	10	358886	5908588	Wetland trail in opening	Moose trail
	11	357629	5908781	Edge of opening toward creek	Caribou tracks and trail
	12	359032	5911056	Wetland edge	Trail, forage sign, and recent grizzly tracks
Johnny Lake	1	345512	5899706	Pine plantation around access trail (only easy movement area for wildlife)	Moose browse, droppings and trail; wolf scat and tracks
	2	341000	5897964	Burned forest next to wetland creek	Game trail
	9	342317	5900435	Wetland trail	Abundant moose tracks and rut activity
	16	339419	5893856	Clear cut / burn with early seral cover	Moose and grizzly tracks and scat near trail
	19	341983	5897811	Meadow in burn	Moose trail and rut rubbing
	20	341254	5898945	Riparian edge of creek	Moose trail

APPENDIX E CARIBOU LICHEN TRANSECTS SURVEY SITE DATA, 2021

Appendix E: Caribou Lichen Transects Survey Site Data, 2021

Unique Name	Transect Name	Date	Survey Area	UTM		Recorder	Observers	Forest Structural Stage	Canopy Closure (%)	% Shrubs	% Herbs	% Bryophytes	% Lichens	Temp (°C)	% Cloud Cover	Wind Speed (km/hr)	Wind Direction	Light	Precipitation	Aspect	Elevation	Slope	Comments
				Easting	Northing																		
TRA001_20210817	TRA001 CP	17-Aug-21	Capoose	359736	5906891	HV	SS, GC	6	5	10	40	10	40	12	0	5	S	Bright	Nil	SW	1669	5	Parkland ridge with some trees and open areas. Crowberry and vaccinium forage.
TRA002_20210817	TRA002 CP	17-Aug-21	Capoose	360992	5907809	HV	SS, GC	1	0	3	20	2	70	12	0	25	W	Bright	Nil	S	1770	15	Mix of rangifer and non preferred lichen half half. Open top of mountain.
TRA003_20210817	TRA003 CP	17-Aug-21	Capoose	360798	5908324	HV	SS, GC	3	10	10	30	45	15	15	0	5	W	Bright	Nil	SW	1687	10	Dry open patch near forest.
TRA004_20210817	TRA004 CP	17-Aug-21	Capoose	355927	5907651	HV	SS, GC	1	0	0	40	0	60	15	0	30	N	Bright	Nil	S	1889	10	Caribou browse throughout, cratering visible.
TRA005_20210818	TRA005 CP	18-Aug-21	Capoose	361323	5910810	HV	SS, GC	1	0	15	45	40	0	8	100	10	S	Overcast	Rain-Light	N	1346	1	Open meadow with summer forage.
TRA006_20210818	TRA006 CP	18-Aug-21	Capoose	359652	5910338	HV	SS, GC	5	20	5	70	15	10	10	100	10	S	Overcast	Nil	S	1420	10	Good food options but likely too snowy in winter. Arboreal lichen present but not preferred spp.
TRA007_20210818	TRA007 CP	18-Aug-21	Capoose	358708	5912010	HV	SS, GC	6	50	9	40	50	1	12	100	10	S	Bright	Rain-Light	N	1470	5	Moss sp. is inedible, herb is edible but not preferred. Very little lichen.
TRA008_20210819	TRA008 JL	19-Aug-21	Johnny Lake	340940	5896387	HV	SS, GC	2	0	20	20	60	0	12	100	2	S	Overcast	Nil	N	1048	2	Pine stand coming in, 5 yr old and 6000 per hectare density, area burned few years ago.
TRA009_20210819	TRA009 JL	19-Aug-21	Johnny Lake	342304	5900535	HV	SS, GC	2	0	15	20	20	5	15	100	2	S	Clear	Nil	N	1111	10	Burn with lots of deadfall, 2 yr pine coming in.
TRA010_20210819	TRA010 JL	19-Aug-21	Johnny Lake	341942	5897792	HV	SS, GC	2	0	20	20	50	0	15	85	2	S	Bright	Nil	N	1243	1	Burn with 4 yr old pine regen at 8000 per hectare.

APPENDIX F CARIBOU INCIDENTAL OBSERVATIONS AND SIGNS, 2021

Appendix F: Caribou Incidental Observations and Signs, 2021

Date	Site Name	UTM		Survey Type	Signs			
		Easting	Northing		Pellets	Tracks	Tracks and Beds (Winter)	Unspecified
10-Jul-21	WL21	378637	5897007	Wetland/Amphibian	1	-	-	-
7-Dec-21	41	375296	5890817	Moose Aerial Survey	-	-	4	-
7-Dec-21	44	375670	5892492	Moose Aerial Survey	-	-	4	-
7-Dec-21	45	374994	5892160	Moose Aerial Survey	-	-	4	-
9-Jun-21	T054	381279	5945359	Habitat Suitability	2	-	-	-
11-Jun-21	T022	372113	5990504	Habitat Suitability	-	1	-	-
8-Jun-21	M003	362171	5892978	Habitat Suitability	-	1	-	-
9-Jun-21	T003	389699	5912711	Habitat Suitability	-	1	-	-
15-Jun-21	M044	375051	5895441	Habitat Suitability	-	1	-	-
19-Jun-21	M156	376155	5892633	Habitat Suitability	-	1	-	-
9-Jun-21	T051	390698	5914328	Habitat Suitability	-	-	-	1
13-Jun-21	T033	382314	5908433	Habitat Suitability	-	-	-	1

APPENDIX G GRIZZLY BEAR AND FURBEARERS INCIDENTAL OBSERVATIONS AND SIGNS, 2021

Appendix G: Grizzly Bear and Furbearers Incidental Observations and Signs, 2021

Date	Site Name	Species Common Name	UTM		Survey Type	Individuals Observed	Signs						
			Easting	Northing			Trail	Tracks	Den	Pellets	High Use	Unspecified	Comments
7-Jul-21	WL04	Unknown Bear	371117	5894128	Wetland/Amphibian	-						X	
7-Jul-21	WL05	Unknown Bear	385659	5903193	Wetland/Amphibian	-	X			X	X		
7-Jul-21	WL05	Unknown Deer	385659	5903193	Wetland/Amphibian	-	X				X		
7-Jul-21	WL05	Unknown Wolf	385659	5903193	Wetland/Amphibian	-	X			X	X		
8-Jul-21	WL08	Unknown Bear	380758	5979869	Wetland/Amphibian	-					X		Moderate to High use
8-Jul-21	WL08	Unknown Ungulates	380758	5979869	Wetland/Amphibian	-					X		Moderate to High use
8-Jul-21	WL09	American Beaver	380464	5979756	Wetland/Amphibian	1							
8-Jul-21	WL10	American Beaver	381363	5968554	Wetland/Amphibian	-			X				
8-Jul-21	WL10	Grizzly Bear	381363	5968554	Wetland/Amphibian	-	X						
9-Jul-21	WL13	American Black Bear	378409	5955397	Wetland/Amphibian	-					X		
9-Jul-21	WL14	American Beaver	378680	5906097	Wetland/Amphibian	1							
9-Jul-21	WL15	American Beaver	377370	5899787	Wetland/Amphibian	-						X	Old Signs
9-Jul-21	WL15	Muskrat	377370	5899787	Wetland/Amphibian	1							
10-Jul-21	WL19	American Black Bear	373482	5894083	Wetland/Amphibian	-	X			X			
10-Jul-21	WL19	Small Mammal	373482	5894083	Wetland/Amphibian	-		X					
10-Jul-21	WL20	Unknown Bear	378321	5897341	Wetland/Amphibian	-					X		
10-Jul-21	WL21	Red Squirrel	378637	5897007	Wetland/Amphibian	1							
11-Jul-21	WL32	American Beaver	376436	5895798	Wetland/Amphibian	1							
7-Dec-21	48	American Marten	373104	5892417	Moose Aerial Survey	-						X	
7-Dec-21	28	Unknown Bear	372824	5893884	Moose Aerial Survey	-						X	
7-Dec-21	30	Unknown Bear	375104	5898401	Moose Aerial Survey	-						X	
7-Dec-21	32	Unknown Bear	373804	5897369	Moose Aerial Survey	-						X	
7-Dec-21	40	Wolverine	372602	5897676	Moose Aerial Survey	-						X	
7-Dec-21	42	Wolverine	374716	5891489	Moose Aerial Survey	-						X	

APPENDIX H AUTOMATED RECORDING UNIT SURVEY SITE DATA, 2021

Appendix H: Automated Recording Unit Survey Site Data, 2021

Site Name	Start Date	Start Time	End Date	Days Deployed	UTM		Recorder	Additional Crew	Audio Recording		Ultrasonic Recording		Target Species	Comments
					Easting	Northing			Dates	Duration	Dates	Duration		
T064 ARU 1	18-Jun-21	09:35	9-Jul-21	20	376814	5960566	LR	DC, TW	all	20	all	20	YERA,CONI,HOGR	Rocky outcropping to the east, burn with pl regen. Wet area is sedge meadow with scrub birch and willow. Confirmed WISN, TRSW, NOFL, ALFL, SOSP, WTSP, DUFL, AM RE nesting. Caution on landing and walking around. ARU is on dead sx in a willow.
T065 ARU 2	18-Jun-21	10:41	11-Jul-21	22	378569	5966313	LR	DC, TW	Jul 10-11	1	Jul 10-11	1	YERA,CONI,HOGR	Wetland is surrounded by a narrow old sx/pl forest ~20m, then young pl stand (cutblock). This is a shallow/ open water/sedge marsh. Aquatic submergents.
T066 ARU 3	18-Jun-21	11:52	10-Jul-21	21	381365	5968552	LR	DC, TW	Jun 18-Jul 8	19	all	21	YERA,CONI,HOGR	Multiple basins with a 20m buffer of old forest then cutblock. Willow sedge swamp/bog. Very high moose use all seasons. Abundance of song/water birds.
T067 ARU 4	18-Jun-21	13:04	16-Aug-21	60	380747	5979897	LR	DC, TW	Jun 18-Aug 7	51	Jun 18-Aug 7	51	YERA,CONI,HOGR	*Salix, alnus*
M100 ARU 5	19-Jun-21	13:32	8-Jul-21	18	378876	5900570	JT	LR, GC	all	18	all	18	YERA,CONI,HOGR	Wetland is a marsh with emergent vagetation surrounded by 3-8m border of sedges. CAREAQU, CAREUTR ~CALACAN.
ARU 6A	8-Jul-21	-	15-Aug-21	37	371140	5894115	HV	-	Jul 8-Aug 1	23	Jul 8-Aug 1	23	Bats	Manually entered by HV.
ARU 7A	9-Jul-21	-	16-Aug-21	37	377370	5899787	HV	-	Jul 9-10	2	Jul 9-10	2	Bats	Manually entered by HV.
ARU 8A	10-Jul-21	-	16-Aug-21	36	376517	5898498	HV	-	Jul 10-22	12	Jul 10-22	12	Bats	Manually entered by HV.
ARU 9A	11-Jul-21	-	15-Aug-21	35	383638	5902472	HV	-	all	35	all	35	Bats	Manually entered by HV.
ARU 6B	15-Aug-21	09:29	19-Aug-21	4	371739	5894361	HV	GC	NA	NA	all	4	Bats	Wetland with meadow.
ARU 7B	15-Aug-21	10:11	19-Aug-21	4	373925	5894345	HV	GC, SS	NA	NA	all	4	Bats	Wetland open complex with forest.
ARU 8B	15-Aug-21	10:22	19-Aug-21	4	375469	5894619	HV	GC, SS	NA	NA	all	4	Bats	Field wetland butnot very wet, surrounded by forest and dirt road nearby.
ARU 9B	15-Aug-21	10:38	19-Aug-21	4	375168	5893607	HV	SS	NA	NA	all	4	Bats	Unused old road running near mine clearing, some puddles but not much wetland.
ARU 10B	15-Aug-21	10:59	19-Aug-21	4	381097	5902314	HV	SS	NA	NA	all	4	Bats	Small wetland and some forest near road.
ARU 11B	15-Aug-21	11:06	19-Aug-21	4	378873	5901324	HV	SS	NA	NA	all	4	Bats	Pond wetland with forest.
ARU 12B	15-Aug-21	12:20	19-Aug-21	4	375166	5898948	HV	SS	NA	NA	all	4	Bats	Large open area surrounded by forest.
ARU 13B	15-Aug-21	12:41	19-Aug-21	4	375890	5902946	HV	SS	NA	NA	all	4	Bats	Series of open wetlands fields with forest.
ARU 14B	15-Aug-21	14:02	19-Aug-21	4	377016	5897772	HV	GC	NA	NA	all	4	Bats	Small wetland near cutblock and forest.
ARU 15B	15-Aug-21	14:27	19-Aug-21	4	376886	5894170	HV	GC	NA	NA	all	4	Bats	Forest near mine site with dirt road and small pond.
ARU 16B	16-Aug-21	19:15	20-Aug-21	4	375860	5894067	HV	SS	none	0	none	0	Bats	Unit did not get card change. No hab notes see photos.
ARU 17B	16-Aug-21	19:18	20-Aug-21	4	375830	5894077	HV	SS	none	0	none	0	Bats	Unit did not get card change. Alpine opening.
ARU 18B	16-Aug-21	19:21	20-Aug-21	4	375828	5894081	HV	SS	none	0	none	0	Bats	Unit did not get card change. Alpine wetland.
ARU 19B	16-Aug-21	19:25	20-Aug-21	4	375827	5894083	HV	SS	all	4	all	4	Bats	This unit had a fresh card. Pond above the mine.
ARU 20B	16-Aug-21	19:30	20-Aug-21	4	375827	5894083	HV	SS	none	0	none	0	Bats	Unit did not get card change. No habitat notes, see photos.

APPENDIX I AUTOMATED RECORDING UNIT SURVEY DATA, 2021

Appendix I: Automated Recording Unit Survey Data, 2021

Site Name	Bats		Common Nighthawk					
	Auto Identifications	Manually Confirmed	Call		Boom		Call and Boom	
			Auto Identification	Manually Confirmed	Auto Identification	Manually Confirmed	Auto Identification	Manually Confirmed
T064 ARU 1	166	40	162	212	0	0	56	3
T065 ARU 2	21	12	1	0	2	3	0	0
T066 ARU 3	181	0	64	5	1	0	5	0
T067 ARU 4	3820	3549	3	0	20	0	17	0
M100 ARU 5	187	25	0	0	1	0	2	0
ARU 6A	2420	2204	0	0	4	0	1	0
ARU 7A	25	16	0	0	0	0	0	0
ARU 8A	548	436	0	0	0	0	0	0
ARU 9A	1433	1118	6	0	5	0	16	0
ARU 6B	116	116	-	-	-	-	-	-
ARU 7B	55	55	-	-	-	-	-	-
ARU 8B	39	39	-	-	-	-	-	-
ARU 9B	15	15	-	-	-	-	-	-
ARU 10B	344	344	-	-	-	-	-	-
ARU 11B	65	65	-	-	-	-	-	-
ARU 12B	964	964	-	-	-	-	-	-
ARU 13B	279	279	-	-	-	-	-	-
ARU 14B	114	114	-	-	-	-	-	-
ARU 15B	15	15	-	-	-	-	-	-
ARU 16B	0	0	-	-	-	-	-	-
ARU 17B	0	0	-	-	-	-	-	-
ARU 18B	0	0	-	-	-	-	-	-
ARU 19B	597	552	-	-	-	-	-	-
ARU 20B	0	0	-	-	-	-	-	-

APPENDIX J RAPTOR OBSERVATIONS, 2021

Appendix J: Raptor Observations, 2021

Survey	Incidental	Date	UTM		Species	# Individuals	# Nests	Comments
			Easting	Northing				
Raptor Nest Survey	No	7-Dec-21	376374	5898058	Unknown	-	1	
Waterbird Shoreline Survey	Yes	9-Jun-21	389418	5912812	Northern Harrier	2	-	Site information from upland bird VRPC site T001_2021_T1
Waterbird Shoreline Survey	Yes	9-Jun-21	389703	5912710	Northern Harrier	1	-	Site information from upland bird VRPC site T003_2021_T1
Waterbird Shoreline Survey	Yes	18-Jun-21	381357	5968558	Northern Harrier	1	-	
Upland Bird VRPC Survey	Yes	27-Jun-21	379246	5972655	Northern Harrier	1	-	
Upland Bird VRPC Survey	Yes	16-Jun-21	397609	5928106	Red-tailed Hawk	1	-	
Upland Bird VRPC Survey	Yes	16-Jun-21	394996	5932449	Red-tailed Hawk	1	-	

APPENDIX K WATERBIRD SURVEY SITE DATA, 2021

Appendix K: Waterbird Survey Site Data, 2021

Unique Observation ID	Site ID	Survey Date	Time		Observer	Recorder	UTM		Air Temp (°C)	Cloud Cover (%)	Wind Speed (km/hr)	Wind Direction	Playback Completed?	For What Species?	Comments
			Start	End			Easting	Northing							
T015_20210610_T1	T015	10-Jun-21	06:38	06:58	SS	HV	376831	5960496	4	40	4	E	No	-	Aavenza
S001_20210609_T1	S001	9-Jun-21	10:25	10:45	SS	HV	378082	5955469	8	80	8	E	No	-	Lake with hily conifer forest right to shoreline. Some liliez growing on edgesand grass on eastern shores.
M101_20210614_T1	M101	14-Jun-21	10:52	11:21	HV	HV	378854	5901405	14	15	4	NW	Yes	HOGR, YERA	Played YERA because location is inaccessible at night. Come here for bats and amphibs.
M100_20210614_T1	M100	14-Jun-21	10:11	10:31	HV	HV	378867	5900570	12	10	5	N	Yes	HOGR	Photos for M100 from WHA.
M109_20210615_T1	M109	15-Jun-21	09:59	10:19	HV	HV	383566	5902434	12	15	3	NW	Yes	HOGR	Surveh ended early due tp nesting birds. 10 min conducted.
T040_20210616_T1	T040	16-Jun-21	09:31	09:57	TW	TW	395352	5935953	10	30	11	NE	Yes	HOGR	Wind gusts were interfering with detecting bird vocalizations on the NE side. Wetland area consists of 8 m of sedge and 4 m of open water with larger areas of open water in the N and E. rest of area is bog.
T041_20210616_T1	T041	16-Jun-21	10:52	11:24	TW	TW	395850	5935582	11	70	8	NE	No	-	Greater yellowlegs were disruptively noisy - hard to hear anything else. Bog bordered by road and a juvenile Pl stand.
T042_20210616_T1	T042	16-Jun-21	13:19	13:50	TW	TW	397972	5924985	14.7	70	10	SW	Yes	HOGR	Lake with a 3 m edge of wetland vegetion (sedges) next to open water. 10 m of riparian along edge. 50 m buffer of mature fores, next to a cutblock.
T027_20210617_T1	T027	17-Jun-21	11:13	11:37	TW	TW	378846	5906159	21	30	3	S	Yes	HOGR	Wetland complex with a channel of 4 m wide moving water. Followed by 5-10 m of sedges then 5 to 10 m of willow. No riparian area. Steep upland banks on southern and northern edges. See point count for additional bird species.
T044_20210617_T1	T044	17-Jun-21	12:46	13:17	TW	TW	391907	5911000	22	10	3	W	Yes	HOGR	Large lake with extensive bog and a small area of fen east of lake. Small stream flows into the lake, approximately 1 m in width.
T046_20210617_T1	T046	17-Jun-21	15:02	15:33	TW	TW	382715	5908664	22	75	5	W	Yes	HOGR	Large wetland with extensive willow cover some open water on south edge running west and east. 5 m of sedge. No riparian area.
T065_20210618_T1	T065	18-Jun-21	10:21	10:47	TW	TW	378566	5966318	14	75	5	NW	Yes	HOGR	Wetland with a medium sized pond with a 3 meter edge of sedges. Is surrounded by a small ring of mature trees , 20 m buffer next to juvenile Pl stands.
T066_20210618_T1	T066	18-Jun-21	11:43	12:14	TW	TW	381357	5968558	16	80	3	W	Yes	HOGR	Classified as Bw. Beaver dam and lodge present.
T067_20210618_T1	T067	18-Jun-21	13:02	13:29	TW	TW	380748	5979882	19	75	3	SW	Yes	HOGR	Wetland with a 3 m border of sedges. Some lily pads present on the west side.
T158_20210619_T1	T158	19-Jun-21	13:57	14:17	TW	TW	375627	5893877	15	50	2	SW	No	-	Open area with sedges, grasses and scrub birch. Small areas of open water. Small stream runs south to north.
M110_20210617_T1	M110	17-Jun-21	11:05	11:25	JT	Lis	371144	5894110	16	0	1	N	Yes	HOGR	Moderate size lk with wetland hab at east end. Lk is surrounded by a sx forest and is located at the foot of a mountain. Numerous fish (lk trt) 5 cm to 40 cm long - jumping.
M154_20210618_T1	M154	18-Jun-21	13:35	13:55	JT	JA	373791	5893970	14	50	4	NW	No	-	Dominated by willow and scrub birch sedges, 95%, Sb 5%no open water wet - equi throughout forest walking in, small slow moving water throughout forest - vernal pools. Not horned grebe habitat therefore did not do playback.
U001_20210624_T2	U001	24-Jun-21	7:00	7:20	LS	SS	-	-	-	-	-	-	Yes	HOGR	Shoreline watch at the point count location and 2 call playbacks. No response to playback.
U010_20210624_T2	U010	24-Jun-21	11:30	11:50	LS	SS	-	-	-	-	-	-	Yes	HOGR	Shoreline watch and call playback at the middle fish lake site. No response.
M109_20210625_T2	M109	25-Jun-21	-	-	LS	SS	383528	5902479	-	-	-	-	Yes	HOGR	Shoreline watch and call playback over 20 min period. No response.
T084_20210625_T2	T084	25-Jun-21	6:05	6:10	LS	SS	391526	5916802	-	-	-	-	No	-	Point count site shoreline watch at edge of pine clearcut 0605-0610.
T086_20210625_T2	T086	25-Jun-21	6:20	6:25	LS	SS	391689	5916753	-	-	-	-	No	-	Point count other side of cut 0620-0625.
T112_20210625_T2	T112	25-Jun-21	6:45	6:50	LS	SS	390897	5913418	-	-	-	-	No	-	Point count creek at end of cutblock 0645-0650.
T113_20210625_T2	T113	25-Jun-21	6:55	7:00	LS	SS	390670	5913458	-	-	-	-	No	-	Point count 0655-0700.
T114_20210625_T2	T114	25-Jun-21	7:30	7:45	LS	SS	389305	5912918	-	-	-	-	Yes	HOGR	Lake watch and call playback 0730-0745. No response.
T089_20210625_T2	T089	25-Jun-21	8:10	8:30	LS	SS	378981	5906122	-	-	-	-	Yes	HOGR	Creek and willow swamp waterbird watch and call playback. 0810-0830.No response, no waterbirds.
M100_20210625_T2	M100	25-Jun-21	-	-	LS	SS	379001	5900627	-	-	-	-	Yes	HOGR	Call playback x 4 - no response over 10 minutes.
T092_20210626_T2	T092	26-Jun-21	-	-	LS	SS	380607	5946696	-	-	-	-	Yes	HOGR	Call playback no response.
M094_20210626_T2	M094	26-Jun-21	-	-	LS	SS	375164	5898977	-	-	-	-	Yes	HOGR	Call playback and lakewatch. No response or water birds observed.
M120_20210626_T2	M120	26-Jun-21	-	-	LS	SS	377817	5902317	-	-	-	-	Yes	HOGR	Call playback and lakewatch. Horned grebe responded and 1 pair observed.
T001_20210616_T1	T001	16-Jun-21	-	-	HV	-	389418	5912812	2	0	0	-	No	-	Site information taken from upland breeding bird VRPC surveys, Conifer stand - spruce/pine open.
T002_20210616_T1	T002	16-Jun-21	-	-	SS	-	389485	5912715	2	0	0	-	No	-	Site information taken from upland breeding bird VRPC surveys, Clear cut forestry service road.
T003_20210616_T1	T003	16-Jun-21	-	-	SS	-	389703	5912710	3	0	0	-	No	-	Site information taken from upland breeding bird VRPC surveys, Road with pine forest, decommisioned forestry road.
T043_20210617_T1	T043	17-Jun-21	-	-	TW	JA	375872	5894081	-	-	-	-	No	-	Site information taken from Habitat Suitability survey. No environmental variables available.

APPENDIX L WATERBIRD SHORELINE SURVEY OBSERVATIONS DATA, 2021

Appendix L: Waterbird Shoreline Survey Observations Data, 2021

Unique Observation ID	Site ID	Species Code	Species Common Name	Incidential	# Male	# Female	# Unknown	# Young	# Total
-	-	BUFF	Bufflehead	No	0	1	0	0	1
M100_20210614_T1	M100	GRYE	Greater Yellowlegs	No	0	0	1	0	1
M100_20210614_T1	M100	RNDU	Ring-necked Duck	No	1	0	0	0	1
M100_20210614_T1	M100	AMRE	American Redstart	No	2	0	0	0	2
M100_20210614_T1	M100	GCKI	Golden-crowned Kinglet	No	1	0	0	0	1
M100_20210614_T1	M100	DEJU	Dark-eyed Junco	No	2	0	0	0	2
M100_20210614_T1	M100	SWTH	Swainson's Thrush	No	1	0	0	0	1
M101_20210614_T1	M101	OSFL	Olive-sided Flycatcher	No	1	0	0	0	1
M101_20210614_T1	M101	BAGO	Barrow's Goldeneye	No	1	2	0	0	3
M101_20210614_T1	M101	CSFR	Columbia Spotted Frog	No	0	0	10	0	10
M109_20210615_T1	M109	BOGU	Bonaparte's Gull	No	1	1	6	0	8
M109_20210615_T1	M109	GRYE	Greater Yellowlegs	No	1	1	0	0	2
M109_20210615_T1	M109	OSFL	Olive-sided Flycatcher	No	1	0	0	0	1
M109_20210625_T2	M109	GRYE	Greater Yellowlegs	No	0	0	1	0	1
M109_20210625_T2	M109	COLO	Common Loon	No	0	0	1	0	1
M109_20210625_T2	M109	BOGU	Bonaparte's Gull	No	0	0	1	0	1
M110_20210617_T1	M110	MALL	Mallard	No	1	0	0	0	1
M154_20210618_T1	M154	SOSA	Solitary Sandpiper	No	-1	0	2	1	2
M154_20210618_T1	M154	CHSP	Chipping Sparrow	No	1	0	0	0	1
S001_20210609_T1	S001	COLO	Common Loon	No	0	0	1	0	1
S001_20210609_T1	S001	COGO	Common Goldeneye	No	1	1	0	0	2
T001_20210616_T1	T001	LISP	Lincoln's Sparrow	No	1	0	0	0	1
T001_20210616_T1	T001	NOHA	Northern Harrier	No	1	1	0	0	2
T001_20210616_T1	T001	NOWA	Northern Waterthrush	No	1	0	0	0	1
T001_20210616_T1	T001	SOSP	Song Sparrow	No	1	0	0	0	1
T001_20210616_T1	T001	COYE	Common Yellowthroat	No	2	0	0	0	2
T001_20210616_T1	T001	MOCH	Mountain Chickadee	No	0	0	1	0	1
T001_20210616_T1	T001	WIFL	Willow Flycatcher	No	2	0	0	0	2
T001_20210616_T1	T001	MALL	Mallard	No	0	0	0	2	2
T002_20210616_T1	T002	GRYE	Greater Yellowlegs	No	1	1	0	0	2
T002_20210616_T1	T002	DEJU	Dark-eyed Junco	No	1	0	0	0	1
T003_20210616_T1	T003	BUFF	Bufflehead	No	0	3	0	8	11
T003_20210616_T1	T003	NOHA	Northern Harrier	No	1	0	0	0	1
T003_20210616_T1	T003	DEJU	Dark-eyed Junco	No	0	1	0	0	1
T003_20210616_T1	T003	AMRO	American Robin	No	0	1	0	0	1
T003_20210616_T1	T003	RNDU	Ring-necked Duck	No	1	0	0	0	1
T015_20210610_T1	T015	WISN	Wilson's Snipe	No	0	0	2	0	2
T015_20210610_T1	T015	GRYE	Greater Yellowlegs	No	0	0	1	0	1
T015_20210610_T1	T015	DEJU	Dark-eyed Junco	No	0	2	0	0	2
T015_20210610_T1	T015	BEKI	Belted Kingfisher	No	0	0	1	0	1
T043_20210617_T1	T043	BEKI	Belted Kingfisher	No	1	0	0	0	1
T043_20210617_T1	T043	NOWA	Northern Waterthrush	No	1	0	0	0	1
T043_20210617_T1	T043	COYE	Common Yellowthroat	No	2	0	0	0	2
T043_20210617_T1	T043	SOSP	Song Sparrow	No	0	1	0	0	1
T044_20210617_T1	T044	COLO	Common Loon	No	0	0	1	0	1
T044_20210617_T1	T044	COYE	Common Yellowthroat	No	1	0	0	0	1
T046_20210617_T1	T046	TEWA	Tennessee Warbler	No	1	0	0	0	1
T046_20210617_T1	T046	SOSP	Song Sparrow	No	0	0	1	0	1
T046_20210617_T1	T046	ALFL	Alder Flycatcher	No	1	0	0	0	1
T065_20210618_T1	T065	BUFF	Bufflehead	No	0	2	0	0	2
T065_20210618_T1	T065	RNDU	Ring-necked Duck	No	5	0	3	0	8
T065_20210618_T1	T065	DEJU	Dark-eyed Junco	No	1	0	0	0	1
T065_20210618_T1	T065	BEKI	Belted Kingfisher	No	1	0	0	0	1
T065_20210618_T1	T065	RECR	Red Crossbill	No	0	0	24	0	24
T065_20210618_T1	T065	SOSP	Song Sparrow	No	1	0	0	0	1
T065_20210618_T1	T065	OSFL	Olive-sided Flycatcher	No	0	0	1	0	1
T066_20210618_T1	T066	MALL	Mallard	No	0	2	0	0	2
T066_20210618_T1	T066	SOSA	Solitary Sandpiper	No	1	1	0	0	2
T066_20210618_T1	T066	SOSP	Song Sparrow	No	1	0	0	0	1
T066_20210618_T1	T066	NOHA	Northern Harrier	No	1	0	0	0	1
T066_20210618_T1	T066	NOWA	Northern Waterthrush	No	1	1	0	0	2
T066_20210618_T1	T066	CEDW	Cedar Waxwing	No	3	0	3	0	6
T066_20210618_T1	T066	BLPW	Blackpoll Warbler	No	1	0	0	0	1
T066_20210618_T1	T066	RWBL	Red-winged Blackbird	No	1	0	0	0	1
T066_20210618_T1	T066	OSFL	Olive-sided Flycatcher	No	1	0	0	0	1
T066_20210618_T1	T066	AMRE	American Redstart	No	1	0	0	0	1
T067_20210618_T1	T067	SOSP	Song Sparrow	No	1	1	0	0	2
T067_20210618_T1	T067	SWTH	Swainson's Thrush	No	1	0	0	0	1
T067_20210618_T1	T067	YRWA	Yellow-rumped Warbler	No	1	0	0	0	1
T067_20210618_T1	T067	BUFF	Bufflehead	No	0	1	0	0	1
T067_20210618_T1	T067	SOSA	Solitary Sandpiper	No	0	0	1	0	1
T067_20210618_T1	T067	CEDW	Cedar Waxwing	No	0	0	2	0	2
T067_20210618_T1	T067	OSFL	Olive-sided Flycatcher	No	1	0	0	0	1
T067_20210618_T1	T067	OCWA	Orange-crowned Warbler	No	1	0	0	0	1
T067_20210618_T1	T067	CONI	Common Nighthawk	No	1	0	0	0	1
T084_20210625_T2	T084	CHSP	Chipping Sparrow	No	0	0	1	0	1
T084_20210625_T2	T084	SWTH	Swainson's Thrush	No	0	0	1	0	1
T084_20210625_T2	T084	WTSP	White-throated Sparrow	No	0	0	1	0	1
T084_20210625_T2	T084	DEJU	Dark-eyed Junco	No	0	0	1	0	1
T084_20210625_T2	T084	VATH	Varied Thrush	No	0	0	1	0	1
T086_20210625_T2	T086	WISN	Wilson's Snipe	No	0	0	1	0	1
T086_20210625_T2	T086	VATH	Varied Thrush	No	0	0	2	0	2
T086_20210625_T2	T086	CHSP	Chipping Sparrow	No	0	0	2	0	2
T089_20210625_T2	T089	YEWA	Yellow Warbler	No	0	0	1	0	1
T089_20210625_T2	T089	SWTH	Swainson's Thrush	No	0	0	1	0	1
T089_20210625_T2	T089	SOSP	Song Sparrow	No	0	0	1	0	1

Appendix L: Waterbird Shoreline Survey Observations Data, 2021

Unique Observation ID	Site ID	Species Code	Species Common Name	Incidential	# Male	# Female	# Unknown	# Young	# Total
T089_20210625_T2	T089	HETH	Hermit Thrush	No	0	0	1	0	1
T089_20210625_T2	T089	RUHU	Rufous Hummingbird	No	0	0	1	0	1
T089_20210625_T2	T089	WIWR	Winter Wren	No	0	0	1	0	1
T089_20210625_T2	T089	CEDW	Cedar Waxwing	No	0	0	1	0	1
T158_20210619_T1	T158	VATH	Varied Thrush	No	1	0	0	0	1
T158_20210619_T1	T158	GCKI	Golden-crowned Kinglet	No	1	0	0	0	1
T158_20210619_T1	T158	BLPW	Blackpoll Warbler	No	1	0	0	0	1
T112_20210625_T2	T112	DEJU	Dark-eyed Junco	No	0	0	0	0	0
T112_20210625_T2	T112	AMRO	American Robin	No	0	0	1	0	1
T112_20210625_T2	T112	SWTH	Swainson's Thrush	No	0	0	1	0	1
T112_20210625_T2	T112	WIWR	Winter Wren	No	0	0	1	0	1
T112_20210625_T2	T112	YRWA	Yellow-rumped Warbler	No	0	0	1	0	1
T113_20210625_T2	T113	DEJU	Dark-eyed Junco	No	0	0	4	0	4
T113_20210625_T2	T113	AMRO	American Robin	No	0	0	1	0	1
T113_20210625_T2	T113	ATTW	American Three-toed Woodpecker	No	0	0	1	0	1
T114_20210625_T2	T114	CONI	Common Nighthawk	No	0	0	1	0	1
T114_20210625_T2	T114	SPSA	Spotted Sandpiper	No	0	0	2	0	2
T114_20210625_T2	T114	RBNU	Red-breasted Nuthatch	No	0	0	1	0	1
T114_20210625_T2	T114	DEJU	Dark-eyed Junco	No	0	0	1	0	1
T114_20210625_T2	T114	SWTH	Swainson's Thrush	No	0	0	1	0	1
T114_20210625_T2	T114	ATTW	American Three-toed Woodpecker	No	0	0	1	0	1
T114_20210625_T2	T114	GRJA	Gray Jay	No	0	0	5	0	5
U001_20210624_T2	U001	COLO	Common Loon	No	0	0	1	0	1
U001_20210624_T2	U001	BEKI	Belted Kingfisher	No	0	0	1	0	1
U001_20210624_T2	U001	NOFL	Northern Flicker	No	0	0	1	0	1
U001_20210624_T2	U001	SWTH	Swainson's Thrush	No	0	0	1	0	1
U001_20210624_T2	U001	WTSP	White-throated Sparrow	No	0	0	1	0	1
U001_20210624_T2	U001	WAVI	Warbling Vireo	No	0	0	1	0	1
U001_20210624_T2	U001	BEKI	Belted Kingfisher	No	0	0	1	0	1
U001_20210624_T2	U001	DEJU	Dark-eyed Junco	No	0	0	1	0	1
U001_20210624_T2	U001	AMRO	American Robin	No	0	0	1	0	1
U001_20210624_T2	U001	SOSP	Song Sparrow	No	0	0	1	0	1
M120_20210626_T2	M120	HOGR	Horned Grebe	No	1	1	0	0	2
U010_20210624_T2	U010	GRYE	Greater Yellowlegs	No	0	0	1	0	1
U010_20210624_T2	U010	BOGU	Bonaparte's Gull	No	0	0	1	0	1
U010_20210624_T2	U010	COLO	Common Loon	No	0	0	1	0	1
-	-	BEAV	American Beaver	Yes	0	0	0	0	0
M101_20210614_T1	M101	WTSA	Western Tiger Salamander	Yes	0	0	0	1	1
M101_20210614_T1	M101	WETO	Western Toad	Yes	0	0	0	10	10
M110_20210617_T1	M110	COLO	Common Loon	Yes	1	0	1	0	2
M154_20210618_T1	M154	SPGR	Spruce Grouse	Yes	0	0	1	0	1
S001_20210609_T1	S001	MOOS	Moose	Yes	0	1	0	1	2
S001_20210609_T1	S001	SOSP	Song Sparrow	Yes	1	1	0	0	2
S001_20210609_T1	S001	LESC	Lesser Scaup	Yes	2	1	0	0	3

Appendix L: Waterbird Shoreline Survey Observations Data, 2021

Incidental Observations

Date	Site ID	UTM		Survey Type	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Notes
		Easting	Northing									
9-Jun-21	T057	379007	5952152	VRPC	WISN	Wilson's Snipe	0	0	1	0	1	
	T057	379007	5952152	VRPC	WISN	Wilson's Snipe	0	0	1	0	1	
	T053	390560	5913895	VRPC	WISN	Wilson's Snipe	0	0	1	0	1	
10-Jun-21	T015	376829	5960496	VRPC	GRYE	Greater Yellowlegs	0	0	1	0	1	
	T060	381650	5969462	VRPC	SPSA	Spotted Sandpiper	0	0	1	0	1	
	T060	381650	5969462	VRPC	TRUS	Trumpeter Swan	0	0	1	0	1	
	T060	381650	5969462	VRPC	WISN	Wilson's Snipe	0	0	1	0	1	
	T009	378520	5966839	VRPC	SPSA	Spotted Sandpiper	0	0	0	0	0	
	T009	378520	5966839	VRPC	SPSA	Spotted Sandpiper	0	0	2	0	2	
	T016	380905	5973820	VRPC	WISN	Wilson's Snipe	1	0	0	0	1	
	T059	376652	5960695	VRPC	WISN	Wilson's Snipe	0	0	2	0	2	
	T015	376829	5960496	VRPC	WISN	Wilson's Snipe	0	0	2	0	2	
	T014	378125	5955657	VRPC	WISN	Wilson's Snipe	2	0	0	0	2	
11-Jun-21	T021	374004	8984892	VRPC	COLO	Common Loon	0	0	0	0	0	
	T020	374077	5984675	VRPC	WISN	Wilson's Snipe	0	0	1	0	1	
	T017	381098	5973976	VRPC	WISN	Wilson's Snipe	1	0	0	0	1	
14-Jun-21	M099	378847	5900447	VRPC	GRYE	Greater Yellowlegs	0	0	1	0	1	
	M096	376276	5899063	VRPC	WISN	Wilson's Snipe	1	0	0	0	1	
	M094	375200	5898941	VRPC	GRYE	Greater Yellowlegs	1	0	0	0	1	
	M094	375200	5898941	VRPC	WISN	Wilson's Snipe	1	0	0	0	1	
	M092	373568	5898941	VRPC	KILL	Killdeer	0	0	2	0	2	
	T033	382421	5908402	VRPC	RUFF	Ruff	0	0	1	0	1	
	T032	378971	5906363	VRPC	RUFF	Ruff	0	0	1	0	1	
	T032	378971	5906363	VRPC	MALL	Mallard	0	0	2	0	2	
	T026	374792	5905083	VRPC	MALL	Mallard	0	0	1	0	1	
	T026	374792	5905083	VRPC	COLO	Common Loon	0	0	1	0	1	
	T030	374341	5904938	VRPC	NOPI	Northern Pintail	0	0	1	0	1	
	T030	374341	5904938	VRPC	COLO	Common Loon	1	0	0	0	1	
	T030	374341	5904938	VRPC	SPSA	Spotted Sandpiper	0	0	1	0	1	
15-Jun-21	M075	371448	5894583	VRPC	COLO	Common Loon	0	0	0	0	0	
	M108	385243	5903049	VRPC	WISN	Wilson's Snipe	0	0	1	0	1	
	M108	385243	5903049	VRPC	GRYE	Greater Yellowlegs	0	0	1	0	1	
16-Jun-21	T151	384282	5911379	VRPC	SACR	Sandhill Crane	0	0	1	0	1	
17-Jun-21	M111	385632	5903053	Yellow Rail	SPSA	Spotted Sandpiper	1	1	0	0	2	Nesting spotted sandpipers in wetland
	M108	383621	5902568	Yellow Rail	COLO	Common Loon	1	0	0	0	1	
24-Jun-21	T058	376817	5960567	VRPC	WISN	Wilson's Snipe	1	0	1	1	3	
	U001	-	-	VRPC	COLO	Common Loon	1	0	0	0	1	
	U002	-	-	VRPC	LESC	Lesser Scaup	1	0	0	0	1	
	U002	-	-	VRPC	COLO	Common Loon	1	0	0	0	1	
	U002	-	-	VRPC	COLO	Common Loon	1	1	0	0	2	
	U002	-	-	VRPC	LESC	Lesser Scaup	1	1	0	0	2	
	T009	378608	5966818	VRPC	SPSA	Spotted Sandpiper	0	0	2	0	2	
25-Jun-21	M109	383528	5902479	VRPC	GRYE	Greater Yellowlegs	0	0	1	0	1	
	M109	383528	5902479	VRPC	BOGU	Bonaparte's Gull	0	0	5	0	5	
	M109	383528	5902479	VRPC	COLO	Common Loon	0	0	2	0	2	
	M109	383528	5902479	VRPC	MALL	Mallard	0	0	2	0	2	
26-Jun-21	M120	377817	5902317	VRPC	GRYE	Greater Yellowlegs	0	0	1	0	1	
	M120	377817	5902317	VRPC	BOGU	Bonaparte's Gull	0	0	1	0	1	
	M121	378470	5900592	VRPC	BOGU	Bonaparte's Gull	0	0	1	0	1	
27-Jun-21	T109	380655	5979836	VRPC	BUFF	Bufflehead	1	1	0	2	4	
	T107	374180	5984765	VRPC	WISN	Wilson's Snipe	1	0	0	0	1	
	T110	379246	5972655	VRPC	GRYE	Greater Yellowlegs	1	0	0	0	1	
	T110	379246	5972655	VRPC	WISN	Wilson's Snipe	0	0	0	0	0	
	T110	379246	5972655	VRPC	SACR	Sandhill Crane	0	0	0	0	0	
	T110	379246	5972655	VRPC	BOGU	Bonaparte's Gull	1	0	0	0	1	
	T110	379246	5972655	VRPC	WISN	Wilson's Snipe	0	0	0	0	0	
	T110	379246	5972655	VRPC	GRYE	Greater Yellowlegs	1	0	0	0	1	
	T110	379246	5972655	VRPC	GRYE	Greater Yellowlegs	1	0	0	0	1	
	T110	379246	5972655	VRPC	BOGU	Bonaparte's Gull	2	0	0	0	2	
7-Jul-21	WL01	368964	5893572	Wetland/Amphibian	SOSA	Solitary Sandpiper	0	0	1	0	0	
	WL01	368964	5893572	Wetland/Amphibian	RNDU	Ring-necked Duck	0	0	1	0	0	
	WL04	371117	5894128	Wetland/Amphibian	COLO	Common Loon	0	0	1	0	0	
	WL05	385659	5903193	Wetland/Amphibian	GRYE	Greater Yellowlegs	0	0	1	0	0	Nesting
	WL05	385659	5903193	Wetland/Amphibian	SPSA	Spotted Sandpiper	0	0	1	0	0	Nesting
	WL05	385659	5903193	Wetland/Amphibian	SOSA	Solitary Sandpiper	0	0	1	0	0	Nesting
	WL05	385659	5903193	Wetland/Amphibian	SORA	Sora	0	0	1	0	0	Nesting
	WL07	378418	5900601	Wetland/Amphibian	Duck	Unknown Ducks and Ducklings	0	0	1	1	0	Duck and ducklings observed
8-Jul-21	WL08	380758	5979869	Wetland/Amphibian	BUFF	Bufflehead	0	0	1	1	0	With young
	WL08	380758	5979869	Wetland/Amphibian	HOME	Hooded Merganser	0	0	1	0	0	
	WL09	380464	5979756	Wetland/Amphibian	RNDU	Ring-necked Duck	0	0	0	1	0	
	WL11	378484	5966385	Wetland/Amphibian	BUFF	Bufflehead	0	0	1	1	0	With young
	WL12	371694	5894382	Wetland/Amphibian	GRYE	Greater Yellowlegs	0	0	1	1	0	Nesting with chicks on nest
11-Jul-21	WL27	383638	5902472	Wetland/Amphibian	WISN	Wilson's Snipe	0	0	1	0	0	Nesting
	WL27	383638	5902472	Wetland/Amphibian	WISN	Wilson's Snipe	0	0	1	0	0	Nesting
	WL29	378870	5901304	Wetland/Amphibian	HOGR	Horned Grebe	0	0	1	0	0	
	WL30	376964	5897818	Wetland/Amphibian	WISN	Wilson's Snipe	0	0	1	0	0	Nesting
	WL30	376964	5897818	Wetland/Amphibian	WISN	Wilson's Snipe	0	0	1	0	0	Nesting
	WL32	376436	5895798	Wetland/Amphibian	LEYE	Lesser Yellowlegs	0	0	1	0	0	Nesting

APPENDIX M YELLOW RAIL PLAYBACK SURVEY DATA, 2021

Appendix M: Yellow Rail Playback Survey Data, 2021

Unique Observation ID	Site ID	Survey Date	Start Time	End Time	Waypoint	Easting	Northing	Yellow Rail Detections (Y/N)	Observer	Recorder	Temperature	Cloud (%)	Wind Speed (km/hr)	Noise	Comments
T046_YERA,CONI_20210618	T046	17-Jun-21	21:25	21:36	T046	382793	5908495	No	JT	TW	16	95	0		Large wetland with 95% cover of willow. Did play back for 3 min. One min and 30 sec with 30 sec silence in between
T027_CONI,YERA_20210617	T027	17-Jun-21	21:42	21:57	T027	382730	5908471	No	TW	TW	17	90	0	None	Wetland with willow, open channel of water and 5 to 10 m width of live sedge. No CONI detected
T048_CONI,YERA_20210618	T048	18-Jun-21	21:23	21:40	T048	378938	5900680	No	TW	TW	16	70	0		Open water 3 m, sedges 50 m then a border of willow at 10 m. Good location for an ARU. No CONI detected and no other birds singing.
T049_CONI,YERA_20210618	T049	18-Jun-21	22:38	22:45	T049	374117	5897601	No	TW	TW	14	70	0		Not a good site for YERA. Assessed for CONI. No birds detected
M111_CONI,YERA_20210619	M111	17-Jun-21	21:25	21:40	M111	385632	5903053	No	JT	LR	12	90	0	None	Nesting spotted sandpipers in wetland
M109_YERA,CONI_20210619	M109	17-Jun-21	21:43	21:55	M109	385414	5903040	No	JT	LR	12	90	0	None	
M108_CONI,YERA_20210619	M108	17-Jun-21	22:14	22:25	M108	383621	5902568	No	JT	LR	10	90	2	None	
M115_CONI,YERA_20210619	M115	18-Jun-21	20:45	20:46	M115	376889	5893943	No	LR	JT		60	0	None	This is a small flowing stream with 100% cover, stream is <1mwide and willows cover ~3m wide. No birds.
M116_YERA,CONI_20210619	M116	18-Jun-21	21:25	21:36	M116	376361	5894006	No	LR	JT		60	0	None	
M117_CONI,YERA_20210619	M117	18-Jun-21	22:20	22:41	M117	375854	5893410	No	LR	JT	10	85		Slight	
M159_YERA,CONI_20210619	M159	19-Jun-21	21:41	21:57	M159	375213	5899009	No	JT	JA	10	0	0	None	Passive listened to CONI for 6 minutes after playbacks.

APPENDIX N UPLAND BIRD VARIABLE RADIUS POINT COUNT SURVEY SITE DATA, 2021

Appendix N: Upland Bird Variable Radius Point Count Survey Site Data, 2021

Unique Observation ID	Site ID	Survey Date	Observer	Easting	Northing	Noise	Temperature (°C)	Wind	Time Start	Comment
M004_2021_T1	M004	12-Jun-21	HV	376990	5893619	Slight (1)	6	0	5:59 AM	Spruce/pine open canopy, high elevation creek on NE edge of plot.
M005_2021_T1	M005	12-Jun-21	HV	376980	5893414	Slight (1)	7	0	6:20 AM	Pine/spruce open canopy, no understory - just moss + cwd.
M006_2021_T1	M006	12-Jun-21	HV	375104	5892477	None (0)	6	0	7:05 AM	Mixed are, open stand, not much cwd or shrubs - moss, lichen, pine, spruce.
M007_2021_T1	M007	12-Jun-21	HV	374945	5892448	None (0)	6	0	7:30 AM	Spruce/fir, open mixed age. Moss but no understory and low cwd. Snow patches visible.
M008_2021_T1	M008	12-Jun-21	HV	377062	5894033	Slight (1)	7	0	8:13 AM	Dead pine, lots of blowdown, open understory - just moss/lichen bed.
M009_2021_T1	M009	12-Jun-21	HV	377140	5894221	Slight (1)	7.5	0	8:41 AM	Dead pine forest, lots of blowdown, minimal understory.
M010_2021_T1	M010	12-Jun-21	HV	377009	5894202	Slight (1)	7.5	0	8:59 AM	Dead pine, some spruce, rhododendron, moss/lichen, lots of blow down.
M015_2021_T1	M015	13-Jun-21	JA	376017	5894448	Moderate (2)	4	2	5:16 AM	PL with BL regen.
M016_2021_T1	M016	13-Jun-21	TW	375828	5894632	Moderate (2)	4	0	5:02 AM	Sx, Bl, Pl stand.
M017_2021_T1	M017	13-Jun-21	JA	375488	5894438	Moderate (2)	4	0	5:48 AM	BL regen with PL.
M018_2021_T1	M018	13-Jun-21	TW	375660	5894456	Slight (1)	5	0	5:42 AM	SAME SITE AS WHA M014.
M019_2021_T1	M019	13-Jun-21	JA	375570	5895145	Slight (1)	5	0	6:24 AM	PL, BL with regen.
M020_2021_T1	M020	13-Jun-21	TW	375390	5894908	Moderate (2)	5	2	6:16 AM	PL stand. SAME SITE AS WHA M012.
M021_2021_T1	M021	13-Jun-21	JA	374987	5894587	Moderate (2)	5	0	6:52 AM	Small Wetland in W, PL+BL otherwise.
M022_2021_T1	M022	13-Jun-21	TW	374982	5894756	Slight (1)	5	1	6:52 AM	-
M023_2021_T1	M023	13-Jun-21	JA	374543	5895447	Slight (1)	-	0	7:23 AM	PL+BL (with BL regen).
M024_2021_T1	M024	13-Jun-21	TW	374706	5895266	Slight (1)	7	5	7:17 AM	Aborted due to wind.
M025_2021_T1	M025	13-Jun-21	JA	373448	5895645	None (0)	8	0	7:52 AM	BL dominated with some PL.
M026_2021_T1	M026	13-Jun-21	TW	373729	5895673	Slight (1)	8	1	7:48 AM	PL, BL, Sx stand. Some dead PL. Wetter area stream on West end.
M027_2021_T1	M027	13-Jun-21	JA	372602	5895969	None (0)	8	0	8:18 AM	BL, PL with some SX.
M028_2021_T1	M028	13-Jun-21	TW	372762	5895846	-	10	2	8:15 AM	BL, Sx, PL, some dead BL + PL.
M030_2021_T1	M030	13-Jun-21	TW	371933	5896407	None (0)	11	1	8:55 AM	-
M040_2021_T1	M040	15-Jun-21	JA	374103	5695032	None (0)	4	2	5:11 AM	BL dom w/ PL, no birds.
M041_2021_T1	M041	15-Jun-21	TW	373944	5894857	None (0)	5	3	5:14 AM	-
M042_2021_T1	M042	15-Jun-21	JA	371776	5895241	None (0)	5	0	6:22 AM	BL (many dead).
M043_2021_T1	M043	15-Jun-21	TW	371438	5894738	None (0)	4	1	5:54 AM	-
M044_2021_T1	M044	15-Jun-21	JA	375052	5895445	None (0)	5	3	7:01 AM	-
M045_2021_T1	M045	15-Jun-21	TW	371746	5895448	None (0)	5	1	6:25 AM	-
M046_2021_T1	M046	15-Jun-21	JA	375884	5896331	Slight (1)	-6	0	7:46 AM	PL, stream down slope.
M047_2021_T1	M047	15-Jun-21	TW	375122	5895657	None (0)	6	1	7:09 AM	Many PL dead, PL + Sx.
M048_2021_T1	M048	15-Jun-21	JA	376636	5897564	None (0)	7	0	8:29 AM	PL with small drainage.
M049_2021_T1	M049	15-Jun-21	TW	375824	5896538	Moderate (2)	6	2	7:44 AM	No birds except incidental. Pl stand, even age 20 cm dbh.
M063_2021_T1	M063	11-Jun-21	TW	372936	5893554	None (0)	0.5	0	5:55 AM	-
M064_2021_T1	M064	11-Jun-21	LR	374078	5892923	Slight (1)	3	0	7:07 AM	Sub-alpine forest.
M065_2021_T1	M065	11-Jun-21	TW	373136	5893436	None (0)	0.5	0	6:25 AM	-
M066_2021_T1	M066	11-Jun-21	LR	393962	2892640	None (0)	2.5	0	6:45 AM	Old Sub-alpine forest.
M067_2021_T1	M067	11-Jun-21	TW	373243	5893527	Slight (1)	0.7	0	6:48 AM	-
M068_2021_T1	M068	11-Jun-21	LR	373588	5893218	None (0)	5	0	7:35 AM	Sub-alpine forest.
M069_2021_T1	M069	11-Jun-21	TW	373563	5893469	Slight (1)	2	0	7:27 AM	No birds but incidental. SE corner has a stream flowing N.
M070_2021_T1	M070	11-Jun-21	LR	374343	5983885	None (0)	10	0	8:25 AM	Old/Mature Forest.
M071_2021_T1	M071	11-Jun-21	TW	374338	5894077	Slight (1)	3.3	0	8:23 AM	No birds but incidental. SE corner has a stream flowing N.
M072_2021_T1	M072	11-Jun-21	LR	374593	5893899	None (0)	15	0	8:45 AM	Old Wet Forest (7).
M073_2021_T1	M073	11-Jun-21	TW	374541	5894257	Slight (1)	-	1	8:55 AM	BL (SX).
M074_2021_T1	M074	11-Jun-21	LR	374570	5893610	-	6	0	9:15 AM	Old BL/Sx forest.
M075_2021_T1	M075	15-Jun-21	JA	371448	5894583	None (0)	4	0	5:54 AM	SE w/ BL.
M076_2021_T1	M076	12-Jun-21	TW	376503	5893359	None (0)	1.3	0	6:00 AM	-
M077_2021_T1	M077	12-Jun-21	TW	346432	5893554	Moderate (2)	7	0	6:23 AM	-
M078_2021_T1	M078	12-Jun-21	TW	375550	5892446	None (0)	4.9	1	7:06 AM	Open BL and PA stand, dead mature Pa trees.
M079_2021_T1	M079	12-Jun-21	TW	375153	5892391	-	5	1	7:30 AM	No birds, except incidentals.
M081_2021_T1	M081	13-Jun-21	TW	376743	5894153	Moderate (2)	8	1	8:26 AM	No birds.
M083_2021_T1	M083	13-Jun-21	HV	372298	5896401	-	4.5	5	5:09 AM	Fir forest, lots of small cwd but little understory veg. Access road 30m south.
M084_2021_T1	M084	13-Jun-21	HV	373030	5896419	None (0)	5.6	0	5:30 AM	Lots of dead beetle killed conifer, mixed cwd decay and some shrubs.
M085_2021_T1	M085	13-Jun-21	HV	373539	5896552	None (0)	6	0	5:54 AM	Mixed are open conifer w/ some beetle kill. Some shrubs and cwd but small diameter.
M086_2021_T1	M086	13-Jun-21	HV	374481	5896410	Slight (1)	6	0	6:18 AM	Pine w/ beetle kill and some decid. Shrub understory.
M087_2021_T1	M087	13-Jun-21	HV	374463	5896902	Moderate (2)	6.5	0	6:47 AM	No birds, had to move away due to bear call at 3.5 min.
M088_2021_T1	M088	13-Jun-21	HV	373832	5897963	None (0)	7	0	7:11 AM	Old trees, mostly dead but new structure growing, cwd of med diameter.
M089_2021_T1	M089	13-Jun-21	HV	374484	5897574	Slight (1)	7	0	7:40 AM	Young, dead pine. Willow bog/marsh to south, small ~30m, rest is upland.
M090_2021_T1	M090	13-Jun-21	HV	374118	5898495	Slight (1)	9	1	8:19 AM	Dead pine - med age, lots of blowdown and patches of younger trees growing up.
M091_2021_T1	M091	13-Jun-21	HV	375252	5898232	Slight (1)	9	2	8:46 AM	Dead med. Age pine lots of blowdown, little understory.
M092_2021_T1	M092	14-Jun-21	HV	373568	5898941	None (0)	6	0	5:15 AM	Beetle kill pine forest, cover of low shrub/dec. understory.
M093_2021_T1	M093	14-Jun-21	HV	375456	5898020	Moderate (2)	7	0	5:49 AM	Riparian shrubs, creek mixed w/ conifer - mostly dead pine surrounding.
M094_2021_T1	M094	14-Jun-21	HV	375200	5898941	Slight (1)	8	0	6:35 AM	Open marsh w/ water ~ 100m away, conifer border mostly dead trees and wet.
M095_2021_T1	M095	14-Jun-21	HV	374465	5899409	None (0)	8	0	7:19 AM	Young, dense, dead pine. Low understory cover, minimal CWD, small wetlands nearby ~200-500m.
M096_2021_T1	M096	14-Jun-21	HV	376276	5899063	None (0)	8.5	0	7:45 AM	Very dead thick pines (young/med) next to planted young pine to the NW ~50-100m.
M097_2021_T1	M097	14-Jun-21	HV	376917	5900068	Slight (1)	9	0	8:07 AM	Dead pine, thick, some old cwd decay.
M098_2021_T1	M098	14-Jun-21	HV	378367	5901378	Slight (1)	0	0	8:35 AM	Dead young pine to West, wetland w/ older forest to East.
M099_2021_T1	M099	14-Jun-21	HV	378847	5900447	None (0)	10	0	9:13 AM	Med/old conifers mixed w/ shrubs, along slope near cutblock + wetlands (200-500m).
M100_2021_T2	M100	25-Jun-21	SS	379001	5900627	-	20	1	-	Precipitation: None, Cloud Cover: 0% Call playback for Horned Grebe & Yellow Rail - No response. RALU Tads in Water, Dragonflies.
M102_2021_T1	M102	15-Jun-21	HV	375060	5903396	None (0)	5	0	5:26 AM	Older forest in small patch, surrounded by planted pine.
M103_2021_T1	M103	15-Jun-21	HV	376637	5903597	None (0)	5	0	5:48 AM	Pine - planted ~15 yrs old, some understory veg (decid + juniper).
M104_2021_T1	M104	15-Jun-21	HV	378486	5904879	None (0)	5	0	6:10 AM	Older conifer w/ pine stand planted w/in 100m.
M105_2021_T1	M105	15-Jun-21	HV	380461	5900673	None (0)	5.5	0	6:57 AM	Thin, med age pine stand w/ lots of blowdown, surrounded by planted pine (young, thick).
M106_2021_T1	M106	15-Jun-21	HV	379012	5898474	Slight (1)	6	0	7:22 AM	Spot on edge of wetland, small pool or open water w/ sedges/marsh ~0.5 h surrounded by conifer.
M107_2021_T1	M107	15-Jun-21	HV	382917	5902715	Slight (1)	7	0	8:00 AM	Aspen + conifers, mature but w/ lots of deadfall. Open canopy lots of decid. Understory.
M108_2021_T1	M108	15-Jun-21	HV	385243	5903049	Moderate (2)	7	0	8:36 AM	Conifers among wetland complex. Sedge wetland mixed with decid. Willow wetland.
M109_2021_T2	M109	25-Jun-21	LR	383528	5902479	-	9	0	5:13 AM	BB - Session 2, Water Pipeline No precipitation, Call playback for HOGR and YEAR - no response. Sx/At, Mixed forest, Mod understory.
M111_2021_T2	M111	26-Jun-21	LR	375132	5892386	-	18	0	6:48 AM	BB Session 2 - LSA Mine Area. Sunrise: 4:45 No precipitation, Temp: >30-35 days, Very warm, Ceiling "H.' Sub-alpine, Stunted trees, High understory Bl.
M113_2021_T2	M113	26-Jun-21	LR	374023	5893594	-	25	0	7:25 AM	BB Session 2 - LSA Mine Area. Sunrise: 4:45 No precipitation, Temp: >30-35 days, Very warm, Ceiling "H'. o/m forest, Sx/Pl/Bl (arrow down), High understory cover Bl.
M116_2021_T2	M116	26-Jun-21	LR	374147	5892486	-	17	0	7:56 AM	BB Session 2 - LSA Mine Area Ceiling "H", Cloud Cover: 0 %, Wind: 0-1, No precipitation, Temp: 17-25. Old Bl (Sx) stand, big trees, moderate understory. Last point count of the day, approaching upper 20s in open areas.
M117_2021_T2	M117	26-Jun-21	LR	376977	5894018	-	22	1	8:16 AM	BB Session 2, LSA - Mine Area Ceiling "H", Cloud Cover: 0 %, Wind: 0-1, No precipitation, Temp: 17-25. Mid aged forest (30 yrs?) pine. Sparse understory, dry slope. Last point count of the day, approaching upper 20s in open areas.
M118_2021_T2	M118	26-Jun-21	SS	377118	5894226	-	22	0	8:27 AM	-
M120_2021_T2	M120	26-Jun-21	SS	377817	5902317	-	-	-	-	Wetland off C-trail, Permanent. RNGR pr call playback, Dragonflies.
M121_2021_T2	M121	26-Jun-21	SS	378470	5900592	-	-	-	-	-
M122_2021_T2	M122	26-Jun-21	SS	376544	5898441	-	-	-	-	ANBO Call playback.
M150_2021_T1	M150	15-Jun-21	TW	376812	5897560	Slight (1)	9	1	8:29 AM	very mature sx stand. Stream flowing S to N, cutblock East.
T001_2021_T1	T001	9-Jun-21	HV	389418	5912812	None (0)	2	0	5:00 AM	Conifer stand - spruce/pine open.
T002_2021_T1	T002	9-Jun-21	SS	389485	5912715	None (0)	2	0	5:42 AM	Clear cut forestry service road.
T003_2021_T1	T003	9-Jun-21	SS	389703	5912710	Slight (1)	3	0	5:58 AM	Road with pine forest, decommisioned forestry road.
T004_2021_T1	T004	9-Jun-21	HV	391788	5916622	None (0)	2	0	6:31 AM	spruce/pine mid elevation near wetland. Trees marked for cutting.
T006_2021_T1	T006	9-Jun-21	HV	392022	5916747	None (0)	5	0	7:49 AM	Trees marked for cutting.
T007_2021_T1	T007	9-Jun-21	HV	380326	5950070	Slight (1)	7	0	8:52 AM	Open cutblock. 10 yr burn area, rain starting at end of count.
T008_2021_T1	T008	9-Jun-21	HV	380311	5949908	None (0)	8	0	9:15 AM	Small clearing among conifer forest.
T009_2021_T1	T009	10-Jun-21	TW	378520	5966839	None (0)	5	0	6:33 AM	Edge of gravel pits, next to shallow mineral wetland, E area 40 yr old PL.
T009_2021_T2	T009	24-Jun-21	LR	378608	5966818	-	-	1	6:21 AM	LSA - Mid TL No precipitation, CC: 80%. Mat PL/Sx, Mod understory.
T009B_2021_T1	T009B	10-Jun-21	TW	378815	5966632	None (0)	6	0	6:57 AM	-
T012_2021_T1	T012	10-Jun-21	HV	378117	5955500	None (0)	4.4	0	5:15 AM	Open conifer. Cutblock on N end, Lake on S.
T013_2021_T1	T013	10-Jun-21	HV	378283	5955592	None (0)	3.6	0	5:33 AM	Open conifer. Cutblock to W, forest/wetlands to W.
T014_2021_T1	T014	10-Jun-21	HV	378125	5955657	None (0)	4	0	6:15 AM	Cutblock, near conifers.
T015_2021_T1	T015	10-Jun-21	SS	376829	5960496	None (0)	5	4	6:35 AM	Fire burn area, site is up on bluff overlooking lake.
T016_2021_T1	T016	10-Jun-21	HV	380905	5973820	Slight (1)	5	0	7:57 AM	Pine, alder with understory. Old FSR near North end of plot. Thicked decid. Understory.

Appendix N: Upland Bird Variable Radius Point Count Survey Site Data, 2021

Unique Observation ID	Site ID	Survey Date	Observer	Easting	Northing	Noise	Temperature (°C)	Wind	Time Start	Comment
T017_2021_T1	T017	11-Jun-21	HV	381098	5973976	None (0)	6	0	8:31 AM	Decid. Alder + berry + willow edge near road, rest is pine.
T018_2021_T1	T018	11-Jun-21	HV	379591	5981181	None (0)	2	0	5:22 AM	Aspen, dead pine, fir mixed on south slope. Lots of brush veg cover, open but canopy closes down hill.
T019_2021_T1	T019	11-Jun-21	HV	379075	5981179	Moderate (2)	2	0	5:37 AM	Mixed wood/riparian near clearing. Creek is med size w/ riparian veg, clearing has lots of brush veg.
T020_2021_T1	T020	11-Jun-21	HV	374077	5984675	Slight (1)	4	0	6:15 AM	Forestry clearing w/ brush, fireweed, shrubs, one lone aspen on edge of forest remnants.
T021_2021_T1	T021	11-Jun-21	HV	374004	8984892	Moderate (2)	5	-	6:50 AM	Very old aspen interspersed with spruce.
T021_2021_T2	T021	27-Jun-21	LR	374038	5984907	-	-	0	6:16 AM	BB Session 2, LSA - North end of TL Ceiling "H", Cloud Cover: 0%, Precipitation: None, Temp 23-29.
T022_2021_T1	T022	11-Jun-21	HV	372112	5990518	Moderate (2)	6	0	7:33 AM	Conifers on edge of gravel pit, river on other side.
T023_2021_T1	T023	11-Jun-21	HV	372353	5990591	Slight (1)	6.5	0	7:59 AM	Mixed spruce and aspen. HSR should be same as T022.
T024_2021_T1	T024	11-Jun-21	HV	369302	5992153	Moderate (2)	7	0	8:26 AM	Spruce stand, remnants of dead pine.
T025_2021_T1	T025	11-Jun-21	HV	369166	5992159	Slight (1)	7	0	8:44 AM	Spruce, aspen, birch- mostly spruce w/ understory veg - devils club + shrubs.
T026_2021_T1	T026	14-Jun-21	TW	374792	5905083	Slight (1)	7.8	0	5:37 AM	Bank edge w/ At, PL, willow down bank. Young PL on west side.
T028_2021_T1	T028	14-Jun-21	JA	382383	5908287	Slight (1)	8	0	7:01 AM	PL-Open stand. Range cattle nearby, lots of mooing.
T030_2021_T1	T030	14-Jun-21	JA	374341	5904938	Moderate (2)	6	0	5:33 AM	-
T032_2021_T1	T032	14-Jun-21	TW	378971	5906363	Moderate (2)	8	0	6:26 AM	Regen stand E + S, wetland N/W, + S western edge mature trees.
T033_2021_T1	T033	14-Jun-21	TW	382421	5908402	Slight (1)	8	0	6:57 AM	Sx, BL, PL (mature, dead). Vehicle disturbance at 2.5 min, added 1 min total.
T034_2021_T1	T034	14-Jun-21	TW	389062	5910435	-	12	0	7:40 AM	PL, Sx stand opening w/ a wet willow area in centre (5x5m).
T035_2021_T1	T035	14-Jun-21	JA	388848	5910519	None (0)	8	0	7:39 AM	PL
T036_2021_T1	T036	14-Jun-21	TW	398597	5984242	Moderate (2)	13	1	8:44 AM	-
T037_2021_T1	T037	14-Jun-21	JA	398736	5924211	Slight (1)	9	1	8:39 AM	Burn - interface between logged area and unlogged area, small stream.
T038_2021_T1	T038	16-Jun-21	TW	394996	5932449	Moderate (2)	7.6	4	7:15 AM	Plains (1/2 of plot), Willows (1/2 of plot).
T039_2021_T1	T039	16-Jun-21	TW	397609	5928106	None (0)	6	1	6:32 AM	-
T051_2021_T1	T051	9-Jun-21	TW	390697	5914336	None (0)	3	0	5:47 AM	-
T052_2021_T1	T052	9-Jun-21	TW	390585	5914059	None (0)	3	0	6:27 AM	Juv PL stand 10-12 yrs. Ended survey at 4 min due to helicopter.
T053_2021_T1	T053	9-Jun-21	TW	390560	5913895	None (0)	4	0	6:42 AM	Mature Sx + dead PL stand. Next to Juv PL stand + live and dead BL.
T054_2021_T1	T054	9-Jun-21	TW	381277	5945358	None (0)	6	1	7:44 AM	-
T056_2021_T1	T056	9-Jun-21	TW	379094	5952122	None (0)	7	0	8:50 AM	-
T057_2021_T1	T057	9-Jun-21	TW	379007	5952152	None (0)	10	1	9:16 AM	-
T057_2021_T2	T057	24-Jun-21	LR	379015	5952161	-	17	-	8:43 AM	BB - Session 2, TL No precipitation, Wind: 0-2, CC:85%. Sx/At, Mixed forest, Mod understory.
T058_2021_T2	T058	24-Jun-21	LR	376817	5960567	-	16	2	-	BB Session 2, LSA - Mid TL. Ceiling "H", Cloud CoverL 0%, Precipitation: None. Site Descr. ARU #1 LOC T-058.
T059_2021_T1	T059	10-Jun-21	SS	376652	5960695	None (0)	4	5	6:49 AM	Bluff top down to heli drop site, marsh + fire burned conifers nearby. Lake shore w/ hill of conifers to lake.
T060_2021_T1	T060	10-Jun-21	TW	381650	5969462	None (0)	5.7	0	7:55 AM	Edge of lake w/ mature trees of Sx, PL on edge.
T061_2021_T1	T061	10-Jun-21	TW	381430	5969489	-	7	2	8:15 AM	Dried dras S end of plot. Sw + PL stand w/ mature At. Stems in N area by plot centre.
T062_2021_T1	T062	10-Jun-21	TW	381588	5979221	-	10	1	8:58 AM	Juv PL stand w/ some Att Ep mature stems in S end of plot.
T063_2021_T1	T063	10-Jun-21	TW	381794	5979386	-	10	2	9:21 AM	Med age PL + Sw w/ Ep stems almost half height of conifers.
T080_2021_T1	T080	12-Jun-21	TW	376418	5894199	Moderate (2)	8.4	1	8:10 AM	-
T081_2021_T2	T081	24-Jun-21	LR	378768	5966635	-	-	1	5:56 AM	LSA - Mid TL. No precipitation, CC: 80%. Mat PL/Sx, Mod understory.
T082_2021_T2	T082	24-Jun-21	LR	377944	5955844	-	16	2	-	LSA - Mid TL; Mix forest edge 6 cutblock - wet draw. No precipitation, Ceiling "H", Wind "2 gusts".
T083_2021_T2	T083	25-Jun-21	LR	391597	5917134	-	14	-	6:11 AM	Sunrise: 4:45. No precipitation, Wind: 0-1, CC:O%. High Cloud? New clear cut mountain top, mature forest, Moderate "H" understory, Bl/Sx. [Rest of comments cut off..] "<2m" ">4m".
T087_2021_T2	T087	25-Jun-21	LR	390532	5913340	-	15	0	6:45 AM	Sunrise: 4:45. No precipitation, CC:O%. Forested buffer on large wetland. Old Sx/Pl; Moderate understory. Adjacent to Rich Site; PL Plantation.
T088_2021_T2	T088	25-Jun-21	LR	389779	5912613	-	16	0	7:23 AM	BB - Session 2, LSA - S end of TL, Same location as T003. No precipitation, CC: 0%, Ceiling "H", Wind 0-1.
T089_2021_T2	T089	25-Jun-21	LR	378981	5906122	-	16	1	8:10 AM	BB - Session 2, LSA - S end of TL. No precipitation, CC: 0%, Ceiling "H". High M-ALAM use.
T104_2021_T2	T104	27-Jun-21	SS	369255	5991865	-	-	0	5:25 AM	Mature aspen with mature spruce, near agricultural.
T106_2021_T2	T106	27-Jun-21	SS	372644	5990195	-	-	0	5:50 AM	Riverside, mature spruce, some aspen.
T107_2021_T2	T107	27-Jun-21	SS	374180	5984765	-	-	-	6:15 AM	Clearcut - spruce edge.
T108_2021_T2	T108	27-Jun-21	LR	380668	5979496	-	23	0	6:46 AM	BB Session 2, LSA - North end of TL. Ceiling "H", Cloud Cover: 0%, Precipitation: None, Temp 23-29. Young Pl Plantain (10 yrs?), adjacent to old forest.
T109_2021_T2	T109	27-Jun-21	SS	380655	5979836	-	-	-	6:50 AM	Clearcut remenant - spruce on side, AR4 - pond. Playback from 6:55-7:00.
T110_2021_T2	T110	27-Jun-21	SS	379246	5972655	-	-	-	7:30 AM	Wetland sedge~ 400 m. Call playback 7:35-7:40, No responses.
T151_2021_T1	T151	16-Jun-21	TW	380753	5979897	None (0)	4	1	5:11 AM	Pine stand with 5x serral depression on N side of plot. Sedges and LEDU GK.
T152_2021_T1	T152	16-Jun-21	TW	384282	5911379	None (0)	8	2	7:57 AM	Wind gusted to 5 at 2 min mark. Large ? Of sx at canopy.
U001_2021_T2	U001	24-Jun-21	SS	393552	5936215	-	16	1	7:05 AM	BB Session 2, Bluff look-up over lake. Both playbacks grebe+ rail? And shoreline width. Ceiling "H", Cloud Cover: 0%, Wind 0-2, Precipitation: None.
U002_2021_T2	U002	24-Jun-21	SS	-	-	-	16	1	7:50 AM	BB Session 2, Bluff look-up over lake. Both playbacks grebe+ rail? And shoreline width. Ceiling "H", Cloud Cover: 0%, Wind 0-2, Precipitation: None.

APPENDIX O UPLAND BIRD VARIABLE RADIUS POINT COUNT SURVEY OBSERVATION DATA, 2021

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Unique Observation ID	Site ID	Incidental	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Behaviour	Distance	Timing (0-3/3-5min)
M004_2021_T1	M004	Yes	DEJU	Dark-eyed Junco	0	0	0	0	0	-	-	-
M004_2021_T1	M004	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	3-5
M004_2021_T1	M004	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
M004_2021_T1	M004	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M004_2021_T1	M004	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	3-5
M004_2021_T1	M004	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M005_2021_T1	M005	Yes	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	-	-
M005_2021_T1	M005	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	0-3
M005_2021_T1	M005	No	DEJU	Dark-eyed Junco	0	0	1	0	1	Calling	0-50	0-3
M005_2021_T1	M005	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
M005_2021_T1	M005	No	GRJA	Gray Jay	0	0	1	0	1	-	50-100	3-5
M006_2021_T1	M006	Yes	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	-	-
M006_2021_T1	M006	Yes	UNWO	Unknown Woodpecker	0	0	0	0	0	-	-	-
M006_2021_T1	M006	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	-
M006_2021_T1	M006	No	VATH	Varied Thrush	2	0	0	0	2	Singing	50-100	0-3
M006_2021_T1	M006	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	0-50	0-3
M006_2021_T1	M006	No	VATH	Varied Thrush	1	0	0	0	1	Singing	0-50	0-3
M006_2021_T1	M006	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
M006_2021_T1	M006	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M006_2021_T1	M006	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	-
M006_2021_T1	M006	No	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	0-50	-
M007_2021_T1	M007	Yes	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	>100	3-5
M007_2021_T1	M007	Yes	VATH	Varied Thrush	1	0	0	0	1	Singing	>100	3-5
M007_2021_T1	M007	Yes	RUGR	Ruffed Grouse	0	0	0	0	0	-	-	-
M007_2021_T1	M007	No	GRJA	Gray Jay	1	0	0	0	1	Singing	50-100	0-3
M007_2021_T1	M007	No	GCKI	Golden-crowned Kinglet	0	0	1	0	1	Flying/Fly-over	0-50	0-3
M007_2021_T1	M007	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	0-50	0-3
M007_2021_T1	M007	No	VATH	Varied Thrush	1	0	0	0	1	Singing	50-100	0-3
M008_2021_T1	M008	Yes	UNKN	Unknown Bird	0	0	1	0	1	-	-	-
M008_2021_T1	M008	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M008_2021_T1	M008	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M008_2021_T1	M008	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
M008_2021_T1	M008	No	TOWA	Townsend's Warbler	0	0	1	0	1	Calling	50-100	3-5
M008_2021_T1	M008	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	3-5
M008_2021_T1	M008	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	-
M009_2021_T1	M009	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M009_2021_T1	M009	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M009_2021_T1	M009	No	TOSO	Townsend's Solitaire	0	0	1	0	1	Calling	0-50	0-3
M010_2021_T1	M010	No	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	50-100	0-3
M010_2021_T1	M010	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	3-5
M010_2021_T1	M010	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M010_2021_T1	M010	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
M015_2021_T1	M015	Yes	VATH	Varied Thrush	1	0	0	0	1	Singing	>100	0-3
M015_2021_T1	M015	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M015_2021_T1	M015	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M016_2021_T1	M016	Yes	SWTH	Swainson's Thrush	0	0	1	0	1	-	>100	-
M016_2021_T1	M016	Yes	VATH	Varied Thrush	0	0	1	0	1	-	>100	-
M016_2021_T1	M016	No	RBNU	Red-breasted Nuthatch	2	0	0	0	2	Singing	50-100	0-3
M016_2021_T1	M016	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M016_2021_T1	M016	No	SPGR	Spruce Grouse	2	0	0	0	2	Flying/Fly-over	0-50	0-3
M017_2021_T1	M017	Yes	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	>100	3-5
M017_2021_T1	M017	Yes	GRJA	Gray Jay	0	0	0	0	0	Flying/Fly-over	>100	-
M017_2021_T1	M017	No	YRWA	Yellow-rumped Warbler	2	0	0	0	2	Singing	50-100	0-3
M017_2021_T1	M017	No	VATH	Varied Thrush	1	0	0	0	1	Singing	0-50	0-3
M017_2021_T1	M017	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
M018_2021_T1	M018	Yes	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	>100	-
M018_2021_T1	M018	Yes	SWTH	Swainson's Thrush	0	0	1	0	1	-	>100	-
M018_2021_T1	M018	No	VATH	Varied Thrush	2	0	0	0	2	Singing	50-100	0-3
M018_2021_T1	M018	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M018_2021_T1	M018	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	0-50	0-3
M019_2021_T1	M019	Yes	DEJU	Dark-eyed Junco	0	0	0	0	0	-	-	-
M019_2021_T1	M019	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M019_2021_T1	M019	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M019_2021_T1	M019	No	RBNU	Red-breasted Nuthatch	1	0	0	0	1	Singing	50-100	3-5
M019_2021_T1	M019	No	DEJU	Dark-eyed Junco	2	0	0	0	2	Singing	50-100	3-5
M020_2021_T1	M020	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	3-5
M021_2021_T1	M021	Yes	VATH	Varied Thrush	1	0	0	0	1	Singing	>100	0-3
M021_2021_T1	M021	No	COYE	Common Yellowthroat	1	0	0	0	1	Singing	50-100	3-5
M021_2021_T1	M021	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M021_2021_T1	M021	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Calling	0-50	0-3
M021_2021_T1	M021	No	LISP	Lincoln's Sparrow	1	0	0	0	1	Singing	50-100	0-3
M022_2021_T1	M022	Yes	BLBW	Blackburnian Warbler	0	0	2	0	2	-	-	-
M022_2021_T1	M022	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M022_2021_T1	M022	No	MAWR	Marsh Wren	1	0	0	0	1	Singing	50-100	3-5
M023_2021_T1	M023	Yes	GRJA	Gray Jay	1	0	0	0	1	Singing	-	-
M023_2021_T1	M023	Yes	GRJA	Gray Jay	0	0	1	0	1	Flying/Fly-over	-	-
M023_2021_T1	M023	No	DEJU	Dark-eyed Junco	2	0	0	0	2	Singing	50-100	0-3
M023_2021_T1	M023	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M023_2021_T1	M023	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M023_2021_T1	M023	No	RBNU	Red-breasted Nuthatch	1	0	0	0	1	Singing	50-100	3-5
M025_2021_T1	M025	Yes	DEJU	Dark-eyed Junco	0	0	1	0	1	Singing	-	-
M025_2021_T1	M025	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M025_2021_T1	M025	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Unique Observation ID	Site ID	Incidental	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Behaviour	Distance	Timing (0-3/3-5min)
M025_2021_T1	M025	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M025_2021_T1	M025	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M025_2021_T1	M025	No	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	50-100	3-5
M026_2021_T1	M026	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M026_2021_T1	M026	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
M026_2021_T1	M026	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	3-5
M027_2021_T1	M027	Yes	AMRO	American Robin	1	0	0	0	1	Singing	>100	3-5
M027_2021_T1	M027	Yes	GRJA	Gray Jay	0	0	0	0	0	-	-	-
M027_2021_T1	M027	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M027_2021_T1	M027	No	YRWA	Yellow-rumped Warbler	2	0	0	0	2	Singing	0-50	0-3
M028_2021_T1	M028	Yes	PISI	Pine Siskin	0	0	1	0	1	Flying/Fly-over	0-50	0-3
M028_2021_T1	M028	No	GRJA	Gray Jay	0	0	1	0	1	Calling	50-100	0-3
M030_2021_T1	M030	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M030_2021_T1	M030	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
M030_2021_T1	M030	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
M041_2021_T1	M041	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M042_2021_T1	M042	Yes	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	>100	3-5
M042_2021_T1	M042	Yes	UNWO	Unknown Woodpecker	0	0	1	0	1	-	-	-
M042_2021_T1	M042	No	GRJA	Gray Jay	2	0	0	0	2	Flying/Fly-over	0-50	0-3
M042_2021_T1	M042	No	GRJA	Gray Jay	1	0	0	0	1	Calling	0-50	3-5
M042_2021_T1	M042	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M042_2021_T1	M042	No	MAWR	Marsh Wren	1	0	0	0	1	Singing	50-100	0-3
M043_2021_T1	M043	Yes	VATH	Varied Thrush	0	0	1	0	1	-	>100	-
M043_2021_T1	M043	Yes	RCKI	Ruby-crowned Kinglet	0	0	1	0	1	-	>100	-
M043_2021_T1	M043	Yes	LISP	Lincoln's Sparrow	0	0	1	0	1	-	>100	-
M043_2021_T1	M043	No	MAWR	Marsh Wren	1	0	0	0	1	Singing	50-100	0-3
M043_2021_T1	M043	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M043_2021_T1	M043	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	3-5
M043_2021_T1	M043	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	3-5
M044_2021_T1	M044	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
M044_2021_T1	M044	No	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	-	-
M045_2021_T1	M045	Yes	SWTH	Swainson's Thrush	0	0	1	0	1	-	>100	-
M045_2021_T1	M045	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
M045_2021_T1	M045	No	YRWA	Yellow-rumped Warbler	0	0	1	0	1	Calling	0-50	0-3
M045_2021_T1	M045	No	GRJA	Gray Jay	0	0	1	0	1	Calling	50-100	0-3
M046_2021_T1	M046	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	3-5
M046_2021_T1	M046	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	0-3
M046_2021_T1	M046	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M046_2021_T1	M046	No	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	50-100	0-3
M046_2021_T1	M046	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	3-5
M047_2021_T1	M047	Yes	MAWR	Marsh Wren	0	0	1	0	1	-	>100	-
M047_2021_T1	M047	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M048_2021_T1	M048	No	DEJU	Dark-eyed Junco	0	0	1	0	1	Calling	50-100	3-5
M048_2021_T1	M048	No	GRJA	Gray Jay	1	0	0	0	1	Singing	-	-
M048_2021_T1	M048	No	GCKI	Golden-crowned Kinglet	0	0	1	0	1	-	-	-
M049_2021_T1	M049	Yes	AMRE	American Redstart	0	0	1	0	1	-	>100	-
M063_2021_T1	M063	Yes	TOWA	Townsend's Warbler	0	0	1	0	1	-	>100	-
M063_2021_T1	M063	Yes	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	-	-
M063_2021_T1	M063	No	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	0-50	0-3
M063_2021_T1	M063	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M064_2021_T1	M064	No	VATH	Varied Thrush	2	0	0	0	2	Singing	50-100	0-3
M064_2021_T1	M064	No	GRJA	Gray Jay	0	0	1	0	1	Calling	0-50	3-5
M064_2021_T1	M064	No	WIWR	Winter Wren	1	0	0	0	1	Singing	0-50	0-3
M064_2021_T1	M064	No	MGWA	MacGillivray's Warbler	1	0	0	0	1	Singing	0-50	3-5
M064_2021_T1	M064	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
M065_2021_T1	M065	Yes	RBNU	Red-breasted Nuthatch	0	0	1	0	1	-	>100	-
M065_2021_T1	M065	Yes	PISI	Pine Siskin	0	0	1	0	1	Flying/Fly-over	0-50	0-3
M065_2021_T1	M065	Yes	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	>100	-
M065_2021_T1	M065	Yes	FOSP	Fox Sparrow	0	0	1	0	1	-	>100	-
M065_2021_T1	M065	Yes	BKPW	Blackpoll Warbler	0	0	1	0	1	-	-	-
M065_2021_T1	M065	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	3-5
M065_2021_T1	M065	No	DEJU	Dark-eyed Junco	1	0	0	0	1	SI	50-100	0-3
M066_2021_T1	M066	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
M066_2021_T1	M066	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	3-5
M066_2021_T1	M066	No	VATH	Varied Thrush	2	0	0	0	2	Singing	50-100	0-3
M067_2021_T1	M067	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M067_2021_T1	M067	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
M068_2021_T1	M068	Yes	GRJA	Gray Jay	0	0	1	0	1	-	-	-
M068_2021_T1	M068	No	VATH	Varied Thrush	1	0	0	0	1	Singing	50-100	0-3
M068_2021_T1	M068	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
M068_2021_T1	M068	No	DEJU	Dark-eyed Junco	2	0	0	0	2	Singing	0-50	0-3
M068_2021_T1	M068	No	MGWA	MacGillivray's Warbler	1	0	0	0	1	Singing	50-100	3-5
M069_2021_T1	M069	Yes	GCRF	Gray-crowned Rosy-Finch	0	0	1	0	1	-	>100	-
M069_2021_T1	M069	Yes	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	>100	-
M070_2021_T1	M070	No	MOCH	Mountain Chickadee	1	0	0	0	1	Singing	0-50	0-3
M071_2021_T1	M071	Yes	DEJU	Dark-eyed Junco	0	0	1	0	1	-	>100	-
M071_2021_T1	M071	Yes	TOWA	Townsend's Warbler	0	0	1	0	1	-	>100	-
M072_2021_T1	M072	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M072_2021_T1	M072	No	PUFI	Purple Finch	1	0	0	0	1	Singing	50-100	3-5
M072_2021_T1	M072	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
M072_2021_T1	M072	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	50-100	3-5
M072_2021_T1	M072	No	ATTW	American Three-toed Woodpecker	0	0	1	0	1	-	50-100	0-3
M072_2021_T1	M072	No	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	50-100	3-5

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Unique Observation ID	Site ID	Incidental	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Behaviour	Distance	Timing (0-3/3-5min)
M073_2021_T1	M073	Yes	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	>100	-
M073_2021_T1	M073	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M074_2021_T1	M074	No	RUGR	Ruffed Grouse	0	0	1	0	1	-	50-100	0-3
M074_2021_T1	M074	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M074_2021_T1	M074	No	RCKI	Ruby-crowned Kinglet	1	0	0	0	1	Singing	0-50	3-5
M074_2021_T1	M074	No	YRWA	Yellow-rumped Warbler	2	0	0	0	2	Singing	0-50	3-5
M075_2021_T1	M075	Yes	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	>100	-
M075_2021_T1	M075	Yes	COLO	Common Loon	0	0	0	0	0	Flying/Fly-over	-	-
M075_2021_T1	M075	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	3-5
M075_2021_T1	M075	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M076_2021_T1	M076	Yes	LISP	Lincoln's Sparrow	0	0	1	0	1	-	>100	-
M076_2021_T1	M076	Yes	VATH	Varied Thrush	0	0	1	0	1	-	-	-
M076_2021_T1	M076	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M076_2021_T1	M076	No	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	0-50	0-3
M076_2021_T1	M076	No	LISP	Lincoln's Sparrow	1	0	0	0	1	Singing	50-100	0-3
M077_2021_T1	M077	Yes	PISI	Pine Siskin	0	0	1	0	1	Calling	0-50	0-3
M077_2021_T1	M077	No	YRWA	Yellow-rumped Warbler	0	0	1	0	1	Calling	0-50	3-5
M077_2021_T1	M077	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	3-5
M078_2021_T1	M078	Yes	VATH	Varied Thrush	0	0	1	0	1	-	>100	-
M078_2021_T1	M078	Yes	CLNU	Clark's Nutcracker	0	0	2	0	2	-	-	-
M078_2021_T1	M078	Yes	BLBW	Blackburnian Warbler	0	0	1	0	1	-	-	-
M078_2021_T1	M078	No	AMRO	American Robin	0	0	1	0	1	Calling	50-100	0-3
M078_2021_T1	M078	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	3-5
M078_2021_T1	M078	No	YRWA	Yellow-rumped Warbler	0	0	1	0	1	Calling	50-100	0-3
M078_2021_T1	M078	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	3-5
M078_2021_T1	M078	No	YRWA	Yellow-rumped Warbler	0	0	1	0	1	Calling	0-50	0-3
M078_2021_T1	M078	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	3-5
M079_2021_T1	M079	Yes	LISP	Lincoln's Sparrow	0	0	1	0	1	-	>100	-
M079_2021_T1	M079	Yes	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	>100	-
M079_2021_T1	M079	Yes	VATH	Varied Thrush	0	0	1	0	1	-	>100	-
M083_2021_T1	M083	Yes	VATH	Varied Thrush	1	0	0	0	1	Singing	>100	0-3
M083_2021_T1	M083	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	3-5
M083_2021_T1	M083	No	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	0-50	3-5
M083_2021_T1	M083	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
M083_2021_T1	M083	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	3-5
M083_2021_T1	M083	No	ATTW	American Three-toed Woodpecker	0	0	1	0	1	-	>100	0-3
M084_2021_T1	M084	Yes	TOWA	Townsend's Warbler	1	0	0	0	1	Singing	>100	3-5
M084_2021_T1	M084	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	3-5
M084_2021_T1	M084	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M084_2021_T1	M084	No	YRWA	Yellow-rumped Warbler	2	0	0	0	2	Singing	50-100	0-3
M084_2021_T1	M084	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
M084_2021_T1	M084	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M085_2021_T1	M085	Yes	PIWO	Pileated Woodpecker	0	0	0	0	0	-	>100	3-5
M085_2021_T1	M085	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M085_2021_T1	M085	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	3-5
M085_2021_T1	M085	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M085_2021_T1	M085	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M085_2021_T1	M085	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
M086_2021_T1	M086	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	-
M086_2021_T1	M086	No	YRWA	Yellow-rumped Warbler	2	0	0	0	2	Singing	0-50	-
M086_2021_T1	M086	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	-
M086_2021_T1	M086	No	MAWR	Marsh Wren	1	0	0	0	1	Singing	0-50	-
M087_2021_T1	M087	Yes	GRJA	Gray Jay	0	0	3	0	3	-	-	-
M088_2021_T1	M088	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
M088_2021_T1	M088	No	TOWA	Townsend's Warbler	1	0	0	0	1	Singing	50-100	3-5
M088_2021_T1	M088	No	MOCH	Mountain Chickadee	1	0	0	0	1	Singing	50-100	0-3
M088_2021_T1	M088	No	DEJU	Dark-eyed Junco	2	0	0	0	2	Singing	50-100	3-5
M088_2021_T1	M088	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	3-5
M088_2021_T1	M088	No	GRJA	Gray Jay	0	0	1	0	1	Calling	0-50	3-5
M088_2021_T1	M088	No	ATTW	American Three-toed Woodpecker	0	0	1	0	1	Calling	50-100	-
M089_2021_T1	M089	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	0-3
M089_2021_T1	M089	No	GCKI	Golden-crowned Kinglet	0	0	1	0	1	Calling	50-100	3-5
M089_2021_T1	M089	No	MOCH	Mountain Chickadee	2	0	0	0	2	Singing	0-50	0-3
M089_2021_T1	M089	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
M089_2021_T1	M089	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
M089_2021_T1	M089	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M090_2021_T1	M090	Yes	CORA	Common Raven	0	0	1	0	1	Calling	>100	3-5
M090_2021_T1	M090	No	GRJA	Gray Jay	0	0	1	0	1	Calling	50-100	3-5
M090_2021_T1	M090	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M090_2021_T1	M090	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
M090_2021_T1	M090	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M090_2021_T1	M090	No	DEJU	Dark-eyed Junco	0	0	0	0	0	Flying/Fly-over	0-50	-
M091_2021_T1	M091	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M091_2021_T1	M091	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
M091_2021_T1	M091	No	RBNU	Red-breasted Nuthatch	1	0	0	0	1	Singing	0-50	3-5
M091_2021_T1	M091	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	-
M091_2021_T1	M091	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	-
M092_2021_T1	M092	Yes	AMRE	American Redstart	0	0	0	0	0	-	-	-
M092_2021_T1	M092	Yes	KILL	Killdeer	0	0	2	0	2	-	-	-
M092_2021_T1	M092	Yes	UNKN	Unknown Bird	0	0	1	0	1	-	-	-
M092_2021_T1	M092	No	ATTW	American Three-toed Woodpecker	0	0	1	0	1	-	50-100	0-3
M092_2021_T1	M092	No	DEJU	Dark-eyed Junco	2	0	0	0	2	Singing	50-100	0-3
M092_2021_T1	M092	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
M092_2021_T1	M092	No	LISP	Lincoln's Sparrow	1	0	0	0	1	Singing	0-50	0-3
M092_2021_T1	M092	No	GCKI	Golden-crowned Kinglet	0	0	1	0	1	Calling	0-50	0-3

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Unique Observation ID	Site ID	Incidental	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Behaviour	Distance	Timing (0-3/3-5min)
M093_2021_T1	M093	Yes	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	-	-
M093_2021_T1	M093	No	ALFL	Alder Flycatcher	0	0	1	0	1	-	50-100	-
M093_2021_T1	M093	No	GRJA	Gray Jay	1	0	0	0	1	Singing	0-50	-
M093_2021_T1	M093	No	NOFL	Northern Flicker	0	0	1	0	1	Calling	50-100	-
M093_2021_T1	M093	No	GRJA	Gray Jay	0	0	1	0	1	-	50-100	-
M093_2021_T1	M093	No	DEJU	Dark-eyed Junco	0	0	2	0	2	-	-	-
M094_2021_T1	M094	Yes	COYE	Common Yellowthroat	0	0	0	0	0	-	-	-
M094_2021_T1	M094	Yes	RWBL	Red-winged Blackbird	0	0	0	0	0	-	-	-
M094_2021_T1	M094	Yes	SWTH	Swainson's Thrush	0	0	0	0	0	-	-	-
M094_2021_T1	M094	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M094_2021_T1	M094	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
M094_2021_T1	M094	No	GRYE	Greater Yellowlegs	1	0	0	0	1	Singing	50-100	0-3
M094_2021_T1	M094	No	GRJA	Gray Jay	0	0	1	0	1	Flying/Fly-over	0-50	3-5
M094_2021_T1	M094	No	GRJA	Gray Jay	1	0	0	0	1	Singing	0-50	0-3
M094_2021_T1	M094	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M094_2021_T1	M094	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	3-5
M094_2021_T1	M094	No	WISN	Wilson's Snipe	1	0	0	0	1	Singing	0-50	0-3
M094_2021_T1	M094	No	RWBL	Red-winged Blackbird	0	0	1	0	1	-	0-50	0-3
M095_2021_T1	M095	Yes	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	>100	0-3
M095_2021_T1	M095	Yes	TOWA	Townsend's Warbler	1	0	0	0	1	Singing	>100	-
M095_2021_T1	M095	Yes	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	>100	3-5
M095_2021_T1	M095	Yes	AMRO	American Robin	1	0	0	0	1	Singing	>100	3-5
M095_2021_T1	M095	Yes	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	>100	0-3
M096_2021_T1	M096	Yes	RBNU	Red-breasted Nuthatch	1	0	0	0	1	Singing	>100	-
M096_2021_T1	M096	Yes	WISN	Wilson's Snipe	1	0	0	0	1	Singing	>100	-
M096_2021_T1	M096	No	DEJU	Dark-eyed Junco	2	0	0	0	2	Singing	50-100	0-3
M096_2021_T1	M096	No	UNWO	Unknown Woodpecker	0	0	1	0	1	-	50-100	0-3
M096_2021_T1	M096	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
M096_2021_T1	M096	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
M096_2021_T1	M096	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M097_2021_T1	M097	Yes	AMRO	American Robin	1	0	0	0	1	Singing	>100	0-3
M097_2021_T1	M097	No	HETH	Hermit Thrush	1	0	0	0	1	Singing	50-100	0-3
M097_2021_T1	M097	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
M097_2021_T1	M097	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
M098_2021_T1	M098	Yes	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	>100	3-5
M098_2021_T1	M098	No	MOCH	Mountain Chickadee	0	0	1	0	1	Calling	0-50	3-5
M098_2021_T1	M098	No	MOCH	Mountain Chickadee	0	0	1	0	1	-	0-50	3-5
M098_2021_T1	M098	No	TOWA	Townsend's Warbler	1	0	0	0	1	Singing	0-50	0-3
M098_2021_T1	M098	No	AMRO	American Robin	0	0	1	0	1	Calling	50-100	-
M098_2021_T1	M098	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M098_2021_T1	M098	No	RUGR	Ruffed Grouse	1	0	0	0	1	-	50-100	0-3
M098_2021_T1	M098	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M098_2021_T1	M098	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	0-50	3-5
M098_2021_T1	M098	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
M098_2021_T1	M098	No	OCWA	Orange-crowned Warbler	1	0	0	0	1	Singing	0-50	0-3
M099_2021_T1	M099	Yes	GRYE	Greater Yellowlegs	0	0	1	0	1	-	>100	0-3
M099_2021_T1	M099	Yes	COYE	Common Yellowthroat	1	0	0	0	1	Singing	>100	3-5
M099_2021_T1	M099	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M099_2021_T1	M099	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M099_2021_T1	M099	No	AMRE	American Redstart	2	0	0	0	2	Singing	50-100	0-3
M099_2021_T1	M099	No	UNWO	Unknown Woodpecker	0	0	1	0	1	-	50-100	3-5
M099_2021_T1	M099	No	MGWA	MacGillivray's Warbler	1	0	0	0	1	Singing	50-100	0-3
M099_2021_T1	M099	No	UNKN	Unknown Bird	0	0	0	0	0	Calling	0-50	0-3
M099_2021_T1	M099	No	CHSP	Chipping Sparrow	2	0	0	0	2	Singing	50-100	0-3
M099_2021_T1	M099	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	3-5
M100_2021_T2	M100	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	-
M100_2021_T2	M100	No	GRJA	Gray Jay	0	0	1	0	1	-	0-50	-
M102_2021_T1	M102	Yes	GRJA	Gray Jay	0	0	1	0	1	Flying/Fly-over	50-100	3-5
M102_2021_T1	M102	Yes	AMRE	American Redstart	0	0	0	0	0	-	-	-
M102_2021_T1	M102	No	ATTW	American Three-toed Woodpecker	1	0	0	0	1	Singing	50-100	0-3
M102_2021_T1	M102	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
M102_2021_T1	M102	No	MGWA	MacGillivray's Warbler	1	0	0	0	1	Singing	0-50	0-3
M102_2021_T1	M102	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	0-50	0-3
M102_2021_T1	M102	No	OSFL	Olive-sided Flycatcher	1	0	0	0	1	Singing	50-100	0-3
M102_2021_T1	M102	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M103_2021_T1	M103	Yes	RBNU	Red-breasted Nuthatch	1	0	0	0	1	Singing	>100	3-5
M103_2021_T1	M103	Yes	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	>100	3-5
M103_2021_T1	M103	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
M103_2021_T1	M103	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M103_2021_T1	M103	No	SPGR	Spruce Grouse	1	0	0	0	1	Calling	0-50	0-3
M103_2021_T1	M103	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M103_2021_T1	M103	No	NOFL	Northern Flicker	1	0	0	0	1	Singing	50-100	0-3
M104_2021_T1	M104	No	DEJU	Dark-eyed Junco	2	0	0	0	2	Singing	50-100	0-3
M104_2021_T1	M104	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M104_2021_T1	M104	No	SWTH	Swainson's Thrush	2	0	0	0	2	Singing	50-100	0-3
M104_2021_T1	M104	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	0-50	0-3
M104_2021_T1	M104	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	3-5
M104_2021_T1	M104	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M104_2021_T1	M104	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
M105_2021_T1	M105	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
M105_2021_T1	M105	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
M105_2021_T1	M105	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
M105_2021_T1	M105	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Unique Observation ID	Site ID	Incidental	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Behaviour	Distance	Timing (0-3/3-5min)
M105_2021_T1	M105	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	3-5
M105_2021_T1	M105	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
M106_2021_T1	M106	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	3-5
M106_2021_T1	M106	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	3-5
M106_2021_T1	M106	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	50-100	0-3
M106_2021_T1	M106	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
M107_2021_T1	M107	Yes	ALFL	Alder Flycatcher	1	0	0	0	1	Singing	>100	3-5
M107_2021_T1	M107	Yes	RUGR	Ruffed Grouse	0	0	1	0	1	-	-	-
M107_2021_T1	M107	Yes	GCKI	Golden-crowned Kinglet	0	0	1	0	1	-	-	-
M107_2021_T1	M107	Yes	UNWO	Unknown Woodpecker	0	0	1	0	1	-	-	-
M107_2021_T1	M107	No	OSFL	Olive-sided Flycatcher	1	0	0	0	1	Singing	50-100	0-3
M107_2021_T1	M107	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
M107_2021_T1	M107	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	0-3
M107_2021_T1	M107	No	GRJA	Gray Jay	1	0	0	0	1	Singing	-	-
M107_2021_T1	M107	No	AMRO	American Robin	1	0	0	0	1	Singing	0-50	3-5
M107_2021_T1	M107	No	OCWA	Orange-crowned Warbler	1	0	0	0	1	Singing	0-50	0-3
M107_2021_T1	M107	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	3-5
M107_2021_T1	M107	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
M107_2021_T1	M107	No	BBWA	Bay-breasted Warbler	1	0	0	0	1	Singing	50-100	0-3
M107_2021_T1	M107	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M107_2021_T1	M107	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	3-5
M108_2021_T1	M108	Yes	WISN	Wilson's Snipe	0	0	1	0	1	Calling	>100	-
M108_2021_T1	M108	Yes	GRJA	Gray Jay	2	0	0	0	2	Flying/Fly-over	50-100	3-5
M108_2021_T1	M108	Yes	GRJA	Gray Jay	2	0	0	0	2	Flying/Fly-over	0-50	0-3
M108_2021_T1	M108	No	GRYE	Greater Yellowlegs	0	0	1	0	1	Calling	50-100	0-3
M108_2021_T1	M108	No	OSFL	Olive-sided Flycatcher	1	0	0	0	1	Singing	50-100	3-5
M108_2021_T1	M108	No	MOCH	Mountain Chickadee	1	0	0	0	1	Singing	50-100	3-5
M108_2021_T1	M108	No	AMRO	American Robin	0	0	1	0	1	Calling	0-50	3-5
M108_2021_T1	M108	No	LISP	Lincoln's Sparrow	1	0	0	0	1	Singing	0-50	0-3
M108_2021_T1	M108	No	ALFL	Alder Flycatcher	1	0	0	0	1	Singing	50-100	0-3
M109_2021_T2	M109	Yes	DEJU	Dark-eyed Junco	0	0	0	0	0	Nest Found	>100	-
M109_2021_T2	M109	No	DEJU	Dark-eyed Junco	0	0	1	0	1	-	0-50	0-3
M109_2021_T2	M109	No	GRYE	Greater Yellowlegs	0	0	1	0	1	Resting	0-50	0-3
M109_2021_T2	M109	No	BOGU	Bonaparte's Gull	0	0	5	0	5	-	0-50	0-3
M109_2021_T2	M109	No	AMCR	American Crow	0	0	1	0	1	Calling	50-100	3-5
M109_2021_T2	M109	No	COLO	Common Loon	0	0	2	0	2	-	50-100	0-3
M109_2021_T2	M109	No	CONI	Common Nighthawk	0	0	1	0	1	Calling	0-50	0-3
M109_2021_T2	M109	No	MALL	Mallard	0	0	2	0	2	Flying/Fly-over	0-50	0-3
M111_2021_T2	M111	Yes	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	>100	3-5
M111_2021_T2	M111	No	CLNU	Clark's Nutcracker	0	0	1	0	1	Calling	0-50	-
M111_2021_T2	M111	No	YEWA	Yellow Warbler	1	0	0	0	1	Flying/Fly-over	0-50	0-3
M111_2021_T2	M111	No	MOCH	Mountain Chickadee	3	0	0	0	3	Singing	0-50	0-3
M111_2021_T2	M111	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M111_2021_T2	M111	No	YEWA	Yellow Warbler	1	0	0	0	1	Singing	0-50	0-3
M113_2021_T2	M113	No	OCWA	Orange-crowned Warbler	1	0	0	0	1	Singing	50-100	3-5
M113_2021_T2	M113	No	MOCH	Mountain Chickadee	1	0	0	0	1	Singing	0-50	0-3
M113_2021_T2	M113	No	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	50-100	0-3
M113_2021_T2	M113	No	YEWA	Yellow Warbler	1	0	0	0	1	Singing	50-100	0-3
M113_2021_T2	M113	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	3-5
M113_2021_T2	M113	No	SWTH	Swainson's Thrush	2	0	0	0	2	Singing	50-100	3-5
M116_2021_T2	M116	No	GCKI	Golden-crowned Kinglet	0	0	1	0	1	-	0-50	3-5
M116_2021_T2	M116	No	PAWR	Pacific Wren	0	0	2	0	2	Flying/Fly-over	0-50	0-3
M116_2021_T2	M116	No	PAWR	Pacific Wren	2	0	0	0	2	Singing	0-50	0-3
M117_2021_T2	M117	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
M117_2021_T2	M117	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	0-50	0-3
M117_2021_T2	M117	No	AMRO	American Robin	1	0	0	0	1	Singing	0-50	3-5
M117_2021_T2	M117	No	AMRO	American Robin	1	0	0	0	1	Singing	0-50	0-3
M117_2021_T2	M117	No	CHSP	Chipping Sparrow	0	0	1	0	1	-	0-50	3-5
M117_2021_T2	M117	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	3-5
M117_2021_T2	M117	No	ATTW	American Three-toed Woodpecker	0	0	0	0	0	Calling	50-100	3-5
M117_2021_T2	M117	No	TOWA	Townsend's Warbler	0	0	0	0	0	Singing	0-50	3-5
M118_2021_T2	M118	No	DEJU	Dark-eyed Junco	0	0	2	0	2	-	50-100	0-3
M118_2021_T2	M118	No	CHSP	Chipping Sparrow	0	0	1	0	1	-	0-50	0-3
M118_2021_T2	M118	No	ATTW	American Three-toed Woodpecker	0	0	1	0	1	Calling	50-100	0-3
M118_2021_T2	M118	No	GRJA	Gray Jay	1	1	0	1	3	-	0-50	0-3
M118_2021_T2	M118	No	UNKN	Unknown Bird	0	0	1	0	1	-	50-100	-
M120_2021_T2	M120	No	GRYE	Greater Yellowlegs	0	0	1	0	1	Other	-	-
M120_2021_T2	M120	No	BOGU	Bonaparte's Gull	0	0	1	0	1	Other	-	-
M121_2021_T2	M121	Yes	OTHER	Other	0	0	1	0	1	-	-	-
M121_2021_T2	M121	No	SWSP	Swamp Sparrow	0	0	1	0	1	-	-	-
M121_2021_T2	M121	No	BOGU	Bonaparte's Gull	0	0	1	0	1	-	-	-
M150_2021_T1	M150	No	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	50-100	-
T001_2021_T1	T001	Yes	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	>100	0-3
T001_2021_T1	T001	Yes	DEJU	Dark-eyed Junco	0	0	1	0	1	-	-	-
T001_2021_T1	T001	Yes	AMRO	American Robin	0	0	1	0	1	-	-	-
T001_2021_T1	T001	Yes	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	-	-
T001_2021_T1	T001	Yes	UNWO	Unknown Woodpecker	0	0	0	0	0	-	-	-
T001_2021_T1	T001	No	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	50-100	0-3
T001_2021_T1	T001	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
T001_2021_T1	T001	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	3-5
T001_2021_T1	T001	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
T001_2021_T1	T001	No	RBNU	Red-breasted Nuthatch	0	0	1	0	1	-	>100	-
T002_2021_T1	T002	Yes	VATH	Varied Thrush	0	0	1	0	1	-	>100	-

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Unique Observation ID	Site ID	Incidental	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Behaviour	Distance	Timing (0-3/3-5min)
T002_2021_T1	T002	Yes	AMRO	American Robin	0	0	1	0	1	-	-	-
T002_2021_T1	T002	Yes	WAVI	Warbling Vireo	0	0	1	0	1	-	-	-
T002_2021_T1	T002	Yes	BEKI	Belted Kingfisher	0	0	1	0	1	-	-	-
T002_2021_T1	T002	Yes	UNKN	Unknown Bird	0	0	1	0	1	-	-	-
T002_2021_T1	T002	No	PAWR	Pacific Wren	0	0	1	0	1	-	50-100	-
T002_2021_T1	T002	No	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	50-100	3-5
T002_2021_T1	T002	No	DEJU	Dark-eyed Junco	0	0	1	0	1	-	50-100	-
T002_2021_T1	T002	No	GCKI	Golden-crowned Kinglet	0	0	1	0	1	-	50-100	3-5
T002_2021_T1	T002	No	DEJU	Dark-eyed Junco	0	0	1	0	1	-	0-50	3-5
T002_2021_T1	T002	No	SWTH	Swainson's Thrush	0	0	1	0	1	-	50-100	3-5
T003_2021_T1	T003	Yes	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	>100	0-3
T003_2021_T1	T003	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
T003_2021_T1	T003	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T003_2021_T1	T003	No	PISI	Pine Siskin	0	0	2	0	2	Calling	50-100	3-5
T004_2021_T1	T004	Yes	PAWR	Pacific Wren	1	0	0	0	1	Singing	>100	3-5
T004_2021_T1	T004	Yes	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	>100	0-3
T004_2021_T1	T004	Yes	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	-	-
T004_2021_T1	T004	Yes	UNWO	Unknown Woodpecker	0	0	0	0	0	-	-	-
T004_2021_T1	T004	Yes	RBNU	Red-breasted Nuthatch	0	0	0	0	0	Calling	-	-
T004_2021_T1	T004	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
T004_2021_T1	T004	No	GCKI	Golden-crowned Kinglet	0	0	1	0	1	Calling	50-100	0-3
T004_2021_T1	T004	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
T006_2021_T1	T006	Yes	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	>100	-
T006_2021_T1	T006	Yes	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	>100	-
T006_2021_T1	T006	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	-
T006_2021_T1	T006	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	-
T006_2021_T1	T006	No	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	0-50	-
T006_2021_T1	T006	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	-
T006_2021_T1	T006	No	VATH	Varied Thrush	0	0	1	0	1	-	-	-
T007_2021_T1	T007	Yes	AMRE	American Redstart	1	0	0	0	1	Singing	>100	0-3
T007_2021_T1	T007	Yes	PAWR	Pacific Wren	1	0	0	0	1	Singing	>100	0-3
T007_2021_T1	T007	Yes	MGWA	MacGillivray's Warbler	0	0	0	0	0	-	-	-
T007_2021_T1	T007	Yes	GRJA	Gray Jay	1	1	0	0	2	-	-	-
T007_2021_T1	T007	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
T007_2021_T1	T007	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T007_2021_T1	T007	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T007_2021_T1	T007	No	DEJU	Dark-eyed Junco	0	0	1	0	1	-	50-100	3-5
T007_2021_T1	T007	No	AMRO	American Robin	0	0	1	0	1	Calling	50-100	3-5
T007_2021_T1	T007	No	NOFL	Northern Flicker	1	1	0	0	2	Courting Display	50-100	-
T007_2021_T1	T007	No	AMRO	American Robin	1	1	0	0	2	-	50-100	3-5
T008_2021_T1	T008	Yes	AMRE	American Redstart	1	0	0	0	1	Singing	>100	3-5
T008_2021_T1	T008	Yes	COYE	Common Yellowthroat	1	0	0	0	1	Singing	>100	3-5
T008_2021_T1	T008	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
T008_2021_T1	T008	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
T008_2021_T1	T008	No	SWTH	Swainson's Thrush	0	0	1	0	1	-	50-100	0-3
T008_2021_T1	T008	No	GCKI	Golden-crowned Kinglet	0	0	1	0	1	-	50-100	0-3
T009_2021_T1	T009	Yes	YRWA	Yellow-rumped Warbler	0	0	1	0	1	Flying/Fly-over	0-50	-
T009_2021_T1	T009	Yes	SPSA	Spotted Sandpiper	0	0	2	0	2	Flying/Fly-over	-	-
T009_2021_T1	T009	Yes	DUFL	Dusky Flycatcher	0	0	1	0	1	-	-	-
T009_2021_T1	T009	Yes	COYE	Common Yellowthroat	0	0	1	0	1	-	-	-
T009_2021_T1	T009	Yes	RUGR	Ruffed Grouse	0	0	0	0	0	Flushed	-	-
T009_2021_T2	T009	No	WAVI	Warbling Vireo	1	0	0	0	1	Singing	0-50	0-3
T009_2021_T2	T009	No	YEWA	Yellow Warbler	1	0	0	0	1	Singing	0-50	0-3
T009_2021_T2	T009	No	YEWA	Yellow Warbler	1	0	0	0	1	Singing	0-50	3-5
T009_2021_T2	T009	No	SPSA	Spotted Sandpiper	0	0	2	0	2	Calling	50-100	3-5
T009_2021_T2	T009	No	WIWA	Wilson's Warbler	1	0	0	0	1	Singing	0-50	0-3
T009_2021_T2	T009	No	RWBL	Red-winged Blackbird	1	0	0	0	1	Singing	50-100	3-5
T009_2021_T2	T009	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	3-5
T009_2021_T2	T009	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
T009_2021_T2	T009	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
T009_2021_T1	T009	No	DUFL	Dusky Flycatcher	1	0	0	0	1	Singing	50-100	0-3
T009_2021_T1	T009	No	YRWA	Yellow-rumped Warbler	2	0	0	0	2	Calling	0-50	0-3
T009_2021_T1	T009	No	WAVI	Warbling Vireo	0	0	1	0	1	Singing	0-50	0-3
T009_2021_T1	T009	No	WAVI	Warbling Vireo	0	0	1	0	1	-	0-50	3-5
T009_2021_T1	T009	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T009_2021_T1	T009	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
T009_2021_T1	T009	No	SPSA	Spotted Sandpiper	0	0	0	0	0	-	0-50	0-3
T009_2021_T1	T009	No	DEJU	Dark-eyed Junco	1	0	0	0	1	-	0-50	0-3
T009_2021_T1	T009	No	WAVI	Warbling Vireo	1	0	0	0	1	Singing	0-50	0-3
T009_2021_T1	T009	No	NOWA	Northern Waterthrush	1	0	0	0	1	Singing	0-50	0-3
T009_2021_T1	T009	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
T009_2021_T1	T009	No	MGWA	MacGillivray's Warbler	1	0	0	0	1	Singing	0-50	0-3
T009B_2021_T1	T009B	Yes	RBNU	Red-breasted Nuthatch	0	0	1	0	1	-	>100	-
T009B_2021_T1	T009B	Yes	PISI	Pine Siskin	0	0	2	0	2	Flying/Fly-over	0-50	0-3
T009B_2021_T1	T009B	Yes	SWTH	Swainson's Thrush	0	0	1	0	1	-	>100	-
T009B_2021_T1	T009B	Yes	OCWA	Orange-crowned Warbler	0	0	1	0	1	-	>100	-
T009B_2021_T1	T009B	Yes	DUFL	Dusky Flycatcher	0	0	1	0	1	-	>100	-
T009B_2021_T1	T009B	Yes	MOCH	Mountain Chickadee	0	0	1	0	1	-	-	-
T009B_2021_T1	T009B	Yes	DEJU	Dark-eyed Junco	0	0	1	0	1	-	>100	-
T009B_2021_T1	T009B	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T012_2021_T1	T012	Yes	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	>100	-
T012_2021_T1	T012	Yes	AMRO	American Robin	1	0	0	0	1	Singing	>100	-
T012_2021_T1	T012	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	0-3

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Unique Observation ID	Site ID	Incidental	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Behaviour	Distance	Timing (0-3/3-5min)
T012_2021_T1	T012	No	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	50-100	0-3
T012_2021_T1	T012	No	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	0-50	-
T012_2021_T1	T012	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
T012_2021_T1	T012	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	0-3
T012_2021_T1	T012	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
T012_2021_T1	T012	No	SOSP	Song Sparrow	0	0	1	0	1	Calling	50-100	0-3
T012_2021_T1	T012	No	BCCH	Black-capped Chickadee	1	0	0	0	1	Singing	50-100	3-5
T013_2021_T1	T013	Yes	RBNU	Red-breasted Nuthatch	0	0	0	0	0	-	-	-
T013_2021_T1	T013	Yes	DEJU	Dark-eyed Junco	0	0	0	0	0	-	-	-
T013_2021_T1	T013	No	AMRE	American Redstart	2	0	0	0	2	Singing	50-100	0-3
T013_2021_T1	T013	No	AMRO	American Robin	1	0	0	0	1	Singing	0-50	0-3
T013_2021_T1	T013	No	HAWO	Hairy Woodpecker	0	0	1	0	1	-	0-50	3-5
T013_2021_T1	T013	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
T013_2021_T1	T013	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T013_2021_T1	T013	No	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	0-50	3-5
T013_2021_T1	T013	No	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	0-50	0-3
T013_2021_T1	T013	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	3-5
T014_2021_T1	T014	Yes	AMRE	American Redstart	1	0	0	0	1	Singing	>100	0-3
T014_2021_T1	T014	Yes	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	>100	0-3
T014_2021_T1	T014	Yes	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	>100	0-3
T014_2021_T1	T014	Yes	PISI	Pine Siskin	0	0	7	0	7	-	>100	-
T014_2021_T1	T014	Yes	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	>100	3-5
T014_2021_T1	T014	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
T014_2021_T1	T014	No	WISN	Wilson's Snipe	2	0	0	0	2	Singing	50-100	0-3
T014_2021_T1	T014	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
T015_2021_T1	T015	No	SOSP	Song Sparrow	0	0	1	0	1	-	50-100	-
T015_2021_T1	T015	No	OSFL	Olive-sided Flycatcher	0	0	2	0	2	-	50-100	-
T015_2021_T1	T015	No	WTSP	White-throated Sparrow	0	0	1	0	1	-	0-50	-
T015_2021_T1	T015	No	WISN	Wilson's Snipe	0	0	2	0	2	-	50-100	-
T015_2021_T1	T015	No	WTSP	White-throated Sparrow	0	0	2	0	2	-	50-100	-
T015_2021_T1	T015	No	DEJU	Dark-eyed Junco	0	0	5	0	5	-	0-50	-
T015_2021_T1	T015	No	COYE	Common Yellowthroat	0	0	2	0	2	-	50-100	-
T015_2021_T1	T015	No	NOFL	Northern Flicker	0	0	1	0	1	-	50-100	-
T015_2021_T1	T015	No	GRYE	Greater Yellowlegs	0	0	1	0	1	-	50-100	-
T016_2021_T1	T016	No	NOFL	Northern Flicker	0	0	0	0	0	Calling	50-100	-
T016_2021_T1	T016	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
T016_2021_T1	T016	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	3-5
T016_2021_T1	T016	No	WAVI	Warbling Vireo	1	0	0	0	1	Singing	50-100	0-3
T016_2021_T1	T016	No	PISI	Pine Siskin	0	0	2	0	2	Calling	0-50	3-5
T016_2021_T1	T016	No	SOSP	Song Sparrow	0	0	1	0	1	Calling	0-50	0-3
T016_2021_T1	T016	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
T016_2021_T1	T016	No	DEJU	Dark-eyed Junco	0	0	1	0	1	-	50-100	3-5
T016_2021_T1	T016	No	WISN	Wilson's Snipe	1	0	0	0	1	Singing	50-100	0-3
T017_2021_T1	T017	No	WISN	Wilson's Snipe	1	0	0	0	1	Singing	50-100	3-5
T017_2021_T1	T017	No	WAVI	Warbling Vireo	1	0	0	0	1	Singing	50-100	0-3
T017_2021_T1	T017	No	BOCH	Boreal Chickadee	0	0	1	0	1	-	0-50	0-3
T017_2021_T1	T017	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
T017_2021_T1	T017	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	3-5
T017_2021_T1	T017	No	WIFL	Willow Flycatcher	0	0	1	0	1	-	50-100	0-3
T018_2021_T1	T018	Yes	RUGR	Ruffed Grouse	0	0	0	0	0	-	>100	0-3
T018_2021_T1	T018	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
T018_2021_T1	T018	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	-
T018_2021_T1	T018	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
T018_2021_T1	T018	No	WTSP	White-throated Sparrow	1	0	0	0	1	Singing	0-50	0-3
T018_2021_T1	T018	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
T018_2021_T1	T018	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	3-5
T018_2021_T1	T018	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
T018_2021_T1	T018	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	3-5
T018_2021_T1	T018	No	PAWR	Pacific Wren	0	0	1	0	1	-	50-100	-
T018_2021_T1	T018	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	3-5
T019_2021_T1	T019	Yes	WTSP	White-throated Sparrow	0	0	0	0	0	-	-	-
T019_2021_T1	T019	Yes	NOFL	Northern Flicker	0	0	0	0	0	-	-	-
T019_2021_T1	T019	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	0-50	0-3
T019_2021_T1	T019	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	0-3
T019_2021_T1	T019	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
T019_2021_T1	T019	No	AMRO	American Robin	1	0	0	0	1	Singing	0-50	0-3
T019_2021_T1	T019	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	50-100	3-5
T019_2021_T1	T019	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
T019_2021_T1	T019	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	3-5
T020_2021_T1	T020	Yes	WISN	Wilson's Snipe	0	0	1	0	1	Flying/Fly-over	>100	-
T020_2021_T1	T020	Yes	UNWO	Unknown Woodpecker	0	0	1	0	1	Calling	-	-
T020_2021_T1	T020	Yes	OSFL	Olive-sided Flycatcher	1	1	0	0	2	Nest Building Activity	-	-
T020_2021_T1	T020	No	SWTH	Swainson's Thrush	2	0	0	0	2	Singing	50-100	3-5
T020_2021_T1	T020	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	50-100	0-3
T020_2021_T1	T020	No	OSFL	Olive-sided Flycatcher	1	0	0	0	1	Singing	50-100	0-3
T020_2021_T1	T020	No	WIWA	Wilson's Warbler	1	0	0	0	1	Singing	50-100	-
T020_2021_T1	T020	No	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	0-50	0-3
T020_2021_T1	T020	No	ALFL	Alder Flycatcher	1	0	0	0	1	Singing	50-100	-
T020_2021_T1	T020	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	0-50	0-3
T020_2021_T1	T020	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
T020_2021_T1	T020	No	LISP	Lincoln's Sparrow	1	0	0	0	1	Singing	50-100	0-3
T020_2021_T1	T020	No	OCWA	Orange-crowned Warbler	1	0	0	0	1	Singing	50-100	0-3
T020_2021_T1	T020	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	50-100	0-3
T021_2021_T1	T021	Yes	COLO	Common Loon	0	0	0	0	0	Flying/Fly-over	-	-
T021_2021_T1	T021	Yes	BEKI	Belted Kingfisher	0	0	0	0	0	Calling	-	-

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Unique Observation ID	Site ID	Incidental	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Behaviour	Distance	Timing (0-3/3-5min)
T021_2021_T1	T021	Yes	RBSA	Red-Breasted Sapsucker	0	0	1	0	1	FL	-	-
T021_2021_T2	T021	No	OSFL	Olive-sided Flycatcher	1	0	0	0	1	Singing	0-50	0-3
T021_2021_T2	T021	No	OSFL	Olive-sided Flycatcher	1	0	0	0	1	Singing	0-50	3-5
T021_2021_T2	T021	No	DEJU	Dark-eyed Junco	0	0	2	0	2	-	0-50	-
T021_2021_T2	T021	No	AMRE	American Redstart	0	0	1	0	1	-	0-50	-
T021_2021_T2	T021	No	WIWA	Wilson's Warbler	1	0	0	0	1	Singing	0-50	0-3
T021_2021_T2	T021	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	3-5
T021_2021_T2	T021	No	OCWA	Orange-crowned Warbler	0	0	1	0	1	-	0-50	-
T021_2021_T2	T021	No	LISP	Lincoln's Sparrow	0	0	1	0	1	-	0-50	0-3
T021_2021_T2	T021	No	LISP	Lincoln's Sparrow	0	0	1	0	1	-	50-100	0-3
T021_2021_T1	T021	No	WTSP	White-throated Sparrow	1	0	0	0	1	Singing	50-100	0-3
T021_2021_T1	T021	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
T021_2021_T1	T021	No	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	0-50	0-3
T021_2021_T1	T021	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T021_2021_T1	T021	No	OSFL	Olive-sided Flycatcher	1	0	0	0	1	Singing	0-50	0-3
T021_2021_T1	T021	No	BCCH	Black-capped Chickadee	1	0	0	0	1	Singing	50-100	0-3
T021_2021_T1	T021	No	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	50-100	0-3
T021_2021_T1	T021	No	AMRE	American Redstart	2	0	0	0	2	Singing	0-50	0-3
T022_2021_T1	T022	Yes	PISI	Pine Siskin	0	0	8	0	8	-	-	-
T022_2021_T1	T022	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T022_2021_T1	T022	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
T022_2021_T1	T022	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
T022_2021_T1	T022	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	3-5
T022_2021_T1	T022	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
T022_2021_T1	T022	No	AMRO	American Robin	1	0	0	0	1	Singing	0-50	3-5
T022_2021_T1	T022	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	0-50	0-3
T022_2021_T1	T022	No	WIWA	Wilson's Warbler	1	0	0	0	1	Singing	50-100	0-3
T023_2021_T1	T023	Yes	YEWA	Yellow Warbler	1	0	0	0	1	Singing	>100	-
T023_2021_T1	T023	Yes	RUHU	Rufous Hummingbird	0	0	0	0	0	-	-	-
T023_2021_T1	T023	No	AMRO	American Robin	0	0	1	0	1	Calling	50-100	3-5
T023_2021_T1	T023	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
T023_2021_T1	T023	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	3-5
T023_2021_T1	T023	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
T023_2021_T1	T023	No	WIWA	Wilson's Warbler	1	0	0	0	1	Singing	50-100	0-3
T023_2021_T1	T023	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
T023_2021_T1	T023	No	AMRO	American Robin	0	0	1	0	1	Calling	50-100	0-3
T023_2021_T1	T023	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
T023_2021_T1	T023	No	YEWA	Yellow Warbler	0	0	1	0	1	Calling	0-50	0-3
T024_2021_T1	T024	Yes	RBNU	Red-breasted Nuthatch	1	0	0	0	1	Singing	>100	-
T024_2021_T1	T024	Yes	UNWO	Unknown Woodpecker	0	0	2	0	2	-	-	-
T024_2021_T1	T024	No	SWTH	Swainson's Thrush	2	0	0	0	2	Singing	50-100	3-5
T024_2021_T1	T024	No	VATH	Varied Thrush	0	0	1	0	1	Calling	0-50	0-3
T024_2021_T1	T024	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
T024_2021_T1	T024	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T024_2021_T1	T024	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
T024_2021_T1	T024	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
T024_2021_T1	T024	No	GCKI	Golden-crowned Kinglet	2	0	0	0	2	Singing	50-100	0-3
T024_2021_T1	T024	No	PSFL	Pacific-slope Flycatcher	1	0	0	0	1	-	50-100	0-3
T025_2021_T1	T025	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
T025_2021_T1	T025	No	YRWA	Yellow-rumped Warbler	2	0	0	0	2	Singing	50-100	0-3
T025_2021_T1	T025	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
T025_2021_T1	T025	No	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	50-100	0-3
T025_2021_T1	T025	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	3-5
T025_2021_T1	T025	No	GCKI	Golden-crowned Kinglet	0	0	1	0	1	-	50-100	-
T025_2021_T1	T025	No	RBNU	Red-breasted Nuthatch	1	0	0	0	1	SI	50-100	0-3
T026_2021_T1	T026	Yes	SWTH	Swainson's Thrush	0	0	1	0	1	-	>100	-
T026_2021_T1	T026	Yes	MALL	Mallard	0	0	1	0	1	-	>100	-
T026_2021_T1	T026	Yes	OSFL	Olive-sided Flycatcher	0	0	1	0	1	-	>100	-
T026_2021_T1	T026	Yes	YRWA	Yellow-rumped Warbler	0	0	0	0	0	Flying/Fly-over	0-50	-
T026_2021_T1	T026	Yes	MOCH	Mountain Chickadee	0	0	1	0	1	-	-	-
T026_2021_T1	T026	Yes	COLO	Common Loon	0	0	1	0	1	-	-	-
T026_2021_T1	T026	No	YRWA	Yellow-rumped Warbler	0	0	1	0	1	Calling	0-50	0-3
T026_2021_T1	T026	No	TOSO	Townsend's Solitaire	0	0	1	0	1	Calling	50-100	0-3
T026_2021_T1	T026	No	WIFL	Willow Flycatcher	1	0	0	0	1	Singing	50-100	0-3
T026_2021_T1	T026	No	DEJU	Dark-eyed Junco	0	0	1	0	1	Calling	0-50	3-5
T026_2021_T1	T026	No	WWPE	Western Wood-Pewee	1	0	0	0	1	Singing	50-100	0-3
T026_2021_T1	T026	No	PISI	Pine Siskin	0	0	2	0	2	Calling	0-50	-
T026_2021_T1	T026	No	CEDW	Cedar Waxwing	2	0	0	0	2	Singing	0-50	0-3
T026_2021_T1	T026	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
T026_2021_T1	T026	No	WAVI	Warbling Vireo	0	0	1	0	1	-	50-100	3-5
T028_2021_T1	T028	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
T028_2021_T1	T028	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T028_2021_T1	T028	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	3-5
T030_2021_T1	T030	Yes	RUGR	Ruffed Grouse	0	0	1	0	1	Calling	>100	0-3
T030_2021_T1	T030	Yes	BBWO	Black-backed Woodpecker	0	0	1	0	1	Calling	>100	-
T030_2021_T1	T030	Yes	GRJA	Gray Jay	0	0	0	0	0	Flying/Fly-over	50-100	-
T030_2021_T1	T030	Yes	DUFL	Dusky Flycatcher	1	0	0	0	1	Singing	-	-
T030_2021_T1	T030	Yes	COLO	Common Loon	1	0	0	0	1	Singing	-	-
T030_2021_T1	T030	No	DEJU	Dark-eyed Junco	2	0	0	0	2	Singing	50-100	0-3
T030_2021_T1	T030	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	3-5
T030_2021_T1	T030	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	3-5
T030_2021_T1	T030	No	NOPI	Northern Pintail	0	0	1	0	1	Calling	0-50	0-3
T030_2021_T1	T030	No	SPSA	Spotted Sandpiper	0	0	1	0	1	-	-	-

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Unique Observation ID	Site ID	Incidental	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Behaviour	Distance	Timing (0-3/3-5min)
T032_2021_T1	T032	Yes	RUFF	Ruff	0	0	1	0	1	-	>100	-
T032_2021_T1	T032	No	CEDW	Cedar Waxwing	0	0	3	0	3	-	0-50	0-3
T032_2021_T1	T032	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	0-50	0-3
T032_2021_T1	T032	No	ALFL	Alder Flycatcher	1	0	0	0	1	Singing	50-100	0-3
T032_2021_T1	T032	No	DEJU	Dark-eyed Junco	2	0	0	0	2	Singing	50-100	0-3
T032_2021_T1	T032	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	50-100	3-5
T032_2021_T1	T032	No	CEDW	Cedar Waxwing	0	0	2	0	2	Calling	0-50	0-3
T032_2021_T1	T032	No	WIFL	Willow Flycatcher	0	0	1	0	1	-	0-50	0-3
T032_2021_T1	T032	No	COYE	Common Yellowthroat	1	0	0	0	1	Singing	50-100	0-3
T032_2021_T1	T032	No	ALFL	Alder Flycatcher	1	0	0	0	1	Singing	50-100	0-3
T032_2021_T1	T032	No	MALL	Mallard	0	0	2	0	2	Flying/Fly-over	-	-
T033_2021_T1	T033	Yes	CEDW	Cedar Waxwing	0	0	0	0	0	-	-	-
T033_2021_T1	T033	No	RUFF	Ruff	0	0	1	0	1	-	50-100	0-3
T034_2021_T1	T034	Yes	ATTW	American Three-toed Woodpecker	0	0	1	0	1	-	>100	-
T034_2021_T1	T034	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
T034_2021_T1	T034	No	RBNU	Red-breasted Nuthatch	1	0	0	0	1	Singing	50-100	0-3
T034_2021_T1	T034	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T034_2021_T1	T034	No	ATTW	American Three-toed Woodpecker	0	0	1	0	1	Calling	50-100	3-5
T034_2021_T1	T034	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
T034_2021_T1	T034	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	3-5
T035_2021_T1	T035	Yes	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	-	-
T035_2021_T1	T035	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
T035_2021_T1	T035	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
T036_2021_T1	T036	Yes	AMRO	American Robin	0	0	1	0	1	-	>100	-
T036_2021_T1	T036	Yes	WTSP	White-throated Sparrow	0	0	1	0	1	-	>100	-
T036_2021_T1	T036	Yes	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	>100	-
T036_2021_T1	T036	No	YRWA	Yellow-rumped Warbler	0	0	1	0	1	Calling	0-50	3-5
T036_2021_T1	T036	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
T037_2021_T1	T037	Yes	UNWO	Unknown Woodpecker	0	0	1	0	1	Flying/Fly-over	50-100	3-5
T037_2021_T1	T037	Yes	OCWA	Orange-crowned Warbler	1	0	0	0	1	Singing	-	-
T037_2021_T1	T037	Yes	NOWA	Northern Waterthrush	1	0	0	0	1	Singing	>100	0-3
T037_2021_T1	T037	Yes	TRES	Tree Swallow	0	0	1	0	1	Flying/Fly-over	-	-
T037_2021_T1	T037	No	CHSP	Chipping Sparrow	3	0	0	0	3	Singing	50-100	0-3
T037_2021_T1	T037	No	WTSP	White-throated Sparrow	1	0	0	0	1	Singing	0-50	3-5
T037_2021_T1	T037	No	COYE	Common Yellowthroat	1	0	0	0	1	Singing	50-100	3-5
T037_2021_T1	T037	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	3-5
T037_2021_T1	T037	No	LISP	Lincoln's Sparrow	1	0	0	0	1	Singing	0-50	0-3
T037_2021_T1	T037	No	LISP	Lincoln's Sparrow	1	0	0	0	1	Singing	50-100	0-3
T037_2021_T1	T037	No	WWPE	Western Wood-Pewee	1	0	0	0	1	Singing	50-100	0-3
T037_2021_T1	T037	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	-
T037_2021_T1	T037	No	WIWA	Wilson's Warbler	1	0	0	0	1	Singing	50-100	3-5
T038_2021_T1	T038	Yes	AMRE	American Redstart	0	0	1	0	1	-	>100	-
T038_2021_T1	T038	Yes	WIWA	Wilson's Warbler	0	0	1	0	1	-	>100	-
T038_2021_T1	T038	Yes	SWTH	Swainson's Thrush	0	0	1	0	1	-	>100	-
T038_2021_T1	T038	Yes	GRJA	Gray Jay	0	0	1	0	1	-	-	-
T038_2021_T1	T038	Yes	PISI	Pine Siskin	0	0	1	0	1	-	-	-
T038_2021_T1	T038	Yes	RTHA	Red-tailed Hawk	0	0	1	0	1	-	-	-
T038_2021_T1	T038	Yes	AMRO	American Robin	0	0	1	0	1	-	-	-
T038_2021_T1	T038	Yes	CEDW	Cedar Waxwing	0	0	1	0	1	-	-	-
T038_2021_T1	T038	No	NOWA	Northern Waterthrush	1	0	0	0	1	Singing	50-100	3-5
T038_2021_T1	T038	No	YEWA	Yellow Warbler	0	0	1	0	1	-	50-100	3-5
T038_2021_T1	T038	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	0-50	0-3
T038_2021_T1	T038	No	WAVI	Warbling Vireo	1	0	0	0	1	Singing	0-50	0-3
T038_2021_T1	T038	No	WIWA	Wilson's Warbler	1	0	0	0	1	Singing	50-100	0-3
T038_2021_T1	T038	No	WIWA	Wilson's Warbler	1	0	0	0	1	Singing	0-50	0-3
T038_2021_T1	T038	No	OCWA	Orange-crowned Warbler	1	0	0	0	1	Singing	0-50	0-3
T038_2021_T1	T038	No	OCWA	Orange-crowned Warbler	1	0	0	0	1	Singing	0-50	0-3
T038_2021_T1	T038	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	0-3
T038_2021_T1	T038	No	COYE	Common Yellowthroat	1	0	0	0	1	Singing	0-50	0-3
T038_2021_T1	T038	No	RCKI	Ruby-crowned Kinglet	1	0	0	0	1	Singing	0-50	3-5
T038_2021_T1	T038	No	WAVI	Warbling Vireo	1	0	0	0	1	Singing	50-100	3-5
T039_2021_T1	T039	Yes	RTHA	Red-tailed Hawk	0	0	1	0	1	-	>100	-
T039_2021_T1	T039	Yes	OCWA	Orange-crowned Warbler	0	0	1	0	1	-	>100	-
T039_2021_T1	T039	Yes	PAWR	Pacific Wren	0	0	1	0	1	-	-	-
T039_2021_T1	T039	Yes	PISI	Pine Siskin	0	0	1	0	1	Flying/Fly-over	-	-
T039_2021_T1	T039	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T039_2021_T1	T039	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
T039_2021_T1	T039	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
T039_2021_T1	T039	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	0-3
T039_2021_T1	T039	No	RCKI	Ruby-crowned Kinglet	1	0	0	0	1	Singing	0-50	0-3
T051_2021_T1	T051	Yes	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	>100	-
T051_2021_T1	T051	Yes	RBNU	Red-breasted Nuthatch	0	0	1	0	1	-	>100	-
T051_2021_T1	T051	Yes	NOFL	Northern Flicker	0	0	1	0	1	-	>100	-
T051_2021_T1	T051	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
T052_2021_T1	T052	Yes	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	>100	-
T052_2021_T1	T052	Yes	SWTH	Swainson's Thrush	0	0	1	0	1	-	>100	-
T052_2021_T1	T052	Yes	AMRO	American Robin	0	0	1	0	1	-	>100	-
T052_2021_T1	T052	No	CHSP	Chipping Sparrow	2	0	0	0	2	Singing	50-100	0-3
T052_2021_T1	T052	No	DUFL	Dusky Flycatcher	1	0	0	0	1	Singing	50-100	3-5
T052_2021_T1	T052	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
T053_2021_T1	T053	Yes	SWTH	Swainson's Thrush	0	0	1	0	1	-	>100	-
T053_2021_T1	T053	Yes	HETH	Hermit Thrush	0	0	1	0	1	-	>100	-
T053_2021_T1	T053	Yes	RUGR	Ruffed Grouse	0	0	1	0	1	-	>100	-
T053_2021_T1	T053	Yes	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	>100	0-3

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Unique Observation ID	Site ID	Incidental	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Behaviour	Distance	Timing (0-3/3-5min)
T053_2021_T1	T053	Yes	WISN	Wilson's Snipe	0	0	1	0	1	-	>100	-
T053_2021_T1	T053	Yes	GRJA	Gray Jay	0	0	3	0	3	-	-	-
T053_2021_T1	T053	Yes	AMRO	American Robin	0	0	1	0	1	-	-	-
T053_2021_T1	T053	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
T053_2021_T1	T053	No	ATTW	American Three-toed Woodpecker	0	0	1	0	1	-	50-100	3-5
T053_2021_T1	T053	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T054_2021_T1	T054	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
T054_2021_T1	T054	No	DUFL	Dusky Flycatcher	1	0	0	0	1	Singing	0-50	0-3
T056_2021_T1	T056	Yes	RECR	Red Crossbill	0	0	3	0	3	Flying/Fly-over	50-100	0-3
T056_2021_T1	T056	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T056_2021_T1	T056	No	BHCO	Brown-headed Cowbird	0	0	1	0	1	Calling	0-50	0-3
T056_2021_T1	T056	No	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	0-50	0-3
T056_2021_T1	T056	No	WTSP	White-throated Sparrow	1	0	0	0	1	Singing	50-100	3-5
T057_2021_T2	T057	Yes	OTHER	Other	1	0	0	0	1	Other	>100	-
T057_2021_T2	T057	Yes	RBSA	Red-Breasted Sapsucker	0	0	1	0	1	Calling	>100	-
T057_2021_T2	T057	Yes	OSFL	Olive-sided Flycatcher	1	0	0	0	1	Singing	>100	-
T057_2021_T2	T057	Yes	AMGO	American Goldfinch	1	0	0	0	1	Singing	>100	-
T057_2021_T1	T057	Yes	AMRO	American Robin	0	0	1	0	1	-	>100	-
T057_2021_T1	T057	Yes	WISN	Wilson's Snipe	0	0	1	0	1	-	>100	-
T057_2021_T1	T057	Yes	WISN	Wilson's Snipe	0	0	1	0	1	Calling	0-50	0-3
T057_2021_T2	T057	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
T057_2021_T2	T057	No	RBSA	Red-Breasted Sapsucker	0	0	1	0	1	Calling	50-100	0-3
T057_2021_T2	T057	No	ALFL	Alder Flycatcher	1	0	0	0	1	Singing	0-50	-
T057_2021_T2	T057	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
T057_2021_T2	T057	No	ALFL	Alder Flycatcher	1	0	0	0	1	Singing	0-50	-
T057_2021_T2	T057	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	0-3
T057_2021_T2	T057	No	ATTW	American Three-toed Woodpecker	0	0	1	0	1	Calling	50-100	0-3
T057_2021_T2	T057	No	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	0-50	-
T057_2021_T2	T057	No	WIWR	Winter Wren	1	0	0	0	1	Singing	0-50	0-3
T057_2021_T2	T057	No	ALFL	Alder Flycatcher	1	0	0	0	1	Singing	0-50	0-3
T057_2021_T1	T057	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T057_2021_T1	T057	No	GCKI	Golden-crowned Kinglet	0	0	1	0	1	Calling	0-50	0-3
T057_2021_T1	T057	No	SWTH	Swainson's Thrush	0	0	1	0	1	Calling	0-50	0-3
T058_2021_T2	T058	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	50-100	3-5
T058_2021_T2	T058	No	WTSP	White-throated Sparrow	1	0	0	0	1	Singing	0-50	0-3
T058_2021_T2	T058	No	WTSP	White-throated Sparrow	1	0	0	0	1	Singing	50-100	0-3
T058_2021_T2	T058	No	AMRO	American Robin	1	0	0	0	1	Singing	0-50	0-3
T058_2021_T2	T058	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
T058_2021_T2	T058	No	YEWA	Yellow Warbler	1	0	0	0	1	Singing	0-50	0-3
T058_2021_T2	T058	No	WTSP	White-throated Sparrow	0	0	2	0	2	Calling	50-100	3-5
T058_2021_T2	T058	No	TRES	Tree Swallow	0	0	1	0	1	Flying/Fly-over	50-100	0-3
T058_2021_T2	T058	No	DEJU	Dark-eyed Junco	0	0	1	0	1	Other	0-50	3-5
T058_2021_T2	T058	No	WISN	Wilson's Snipe	1	0	1	1	3	-	50-100	0-3
T059_2021_T1	T059	No	OSFL	Olive-sided Flycatcher	0	0	1	0	1	-	50-100	-
T059_2021_T1	T059	No	SOSP	Song Sparrow	0	0	2	0	2	-	50-100	-
T059_2021_T1	T059	No	ALFL	Alder Flycatcher	0	0	2	0	2	-	50-100	-
T059_2021_T1	T059	No	WTSP	White-throated Sparrow	0	0	1	0	1	-	0-50	-
T059_2021_T1	T059	No	AMCR	American Crow	0	0	1	0	1	-	50-100	-
T059_2021_T1	T059	No	SWTH	Swainson's Thrush	0	0	2	0	2	-	50-100	-
T059_2021_T1	T059	No	WISN	Wilson's Snipe	0	0	2	0	2	Nest Found	0-50	-
T059_2021_T1	T059	No	DEJU	Dark-eyed Junco	0	0	4	0	4	-	0-50	-
T060_2021_T1	T060	Yes	RCKI	Ruby-crowned Kinglet	0	0	1	0	1	-	>100	-
T060_2021_T1	T060	Yes	NOWA	Northern Waterthrush	0	0	1	0	1	-	>100	-
T060_2021_T1	T060	Yes	WTSP	White-throated Sparrow	0	0	1	0	1	-	>100	-
T060_2021_T1	T060	Yes	SOSP	Song Sparrow	0	0	1	0	1	-	-	-
T060_2021_T1	T060	Yes	TRUS	Trumpeter Swan	0	0	1	0	1	-	-	-
T060_2021_T1	T060	Yes	MOCH	Mountain Chickadee	0	0	1	0	1	-	-	-
T060_2021_T1	T060	Yes	WISN	Wilson's Snipe	0	0	1	0	1	Flying/Fly-over	-	-
T060_2021_T1	T060	No	SWTH	Swainson's Thrush	0	0	1	0	1	Calling	0-50	3-5
T060_2021_T1	T060	No	RECR	Red Crossbill	0	0	2	0	2	Calling	50-100	0-3
T060_2021_T1	T060	No	SWTH	Swainson's Thrush	0	0	1	0	1	Calling	0-50	0-3
T060_2021_T1	T060	No	SPSA	Spotted Sandpiper	0	0	1	0	1	Calling	0-50	0-3
T061_2021_T1	T061	Yes	SWTH	Swainson's Thrush	0	0	1	0	1	-	-	-
T061_2021_T1	T061	No	TOWA	Townsend's Warbler	1	0	0	0	1	Singing	50-100	0-3
T061_2021_T1	T061	No	WAVI	Warbling Vireo	1	0	0	0	1	Singing	50-100	0-3
T061_2021_T1	T061	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	0-3
T062_2021_T1	T062	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T062_2021_T1	T062	No	DEJU	Dark-eyed Junco	0	0	1	0	1	Calling	0-50	3-5
T062_2021_T1	T062	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
T062_2021_T1	T062	No	AMRO	American Robin	1	0	1	0	2	Singing	50-100	0-3
T063_2021_T1	T063	Yes	AMRO	American Robin	0	0	1	0	1	-	>100	-
T063_2021_T1	T063	Yes	SWTH	Swainson's Thrush	0	0	1	0	1	-	>100	-
T063_2021_T1	T063	Yes	PISI	Pine Siskin	0	0	0	0	0	-	>100	-
T063_2021_T1	T063	Yes	WAVI	Warbling Vireo	0	0	1	0	1	-	-	-
T063_2021_T1	T063	Yes	AMRO	American Robin	0	0	1	0	1	-	-	-
T063_2021_T1	T063	Yes	PUFI	Purple Finch	0	0	1	0	1	-	-	-
T063_2021_T1	T063	Yes	PISI	Pine Siskin	0	0	1	0	1	Flying/Fly-over	-	-
T063_2021_T1	T063	No	RBSA	Red-Breasted Sapsucker	0	0	1	0	1	-	0-50	0-3
T080_2021_T1	T080	No	GRJA	Gray Jay	0	0	1	0	1	Calling	50-100	-
T080_2021_T1	T080	No	YRWA	Yellow-rumped Warbler	0	0	1	0	1	Calling	0-50	0-3
T081_2021_T2	T081	No	WTSP	White-throated Sparrow	1	0	0	0	1	Singing	50-100	3-5
T081_2021_T2	T081	No	BOCH	Boreal Chickadee	2	0	0	0	2	Singing	0-50	0-3
T081_2021_T2	T081	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
T081_2021_T2	T081	No	WIWA	Wilson's Warbler	1	0	0	0	1	Singing	50-100	0-3
T082_2021_T2	T082	No	DEJU	Dark-eyed Junco	0	0	1	0	1	Other	0-50	0-3

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Unique Observation ID	Site ID	Incidental	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Behaviour	Distance	Timing (0-3/3-5min)
T082_2021_T2	T082	No	YEWA	Yellow Warbler	0	0	1	0	1	-	0-50	0-3
T082_2021_T2	T082	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
T082_2021_T2	T082	No	SOSP	Song Sparrow	0	0	1	0	1	-	0-50	-
T082_2021_T2	T082	No	AMCR	American Crow	0	0	1	0	1	Flying/Fly-over	0-50	3-5
T083_2021_T2	T083	Yes	VATH	Varied Thrush	1	0	0	0	1	Singing	>100	3-5
T083_2021_T2	T083	No	DEJU	Dark-eyed Junco	2	0	0	0	2	Singing	0-50	0-3
T083_2021_T2	T083	No	BOCH	Boreal Chickadee	1	0	0	0	1	Singing	0-50	0-3
T083_2021_T2	T083	No	PAWR	Pacific Wren	1	0	0	0	1	Singing	50-100	0-3
T087_2021_T2	T087	Yes	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	>100	3-5
T087_2021_T2	T087	Yes	ATTW	American Three-toed Woodpecker	0	0	1	0	1	Other	>100	3-5
T087_2021_T2	T087	No	AMRO	American Robin	1	0	0	0	1	Singing	0-50	3-5
T087_2021_T2	T087	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	0-3
T087_2021_T2	T087	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
T087_2021_T2	T087	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	0-50	0-3
T087_2021_T2	T087	No	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	50-100	0-3
T087_2021_T2	T087	No	SOSP	Song Sparrow	0	0	1	0	1	-	0-50	-
T087_2021_T2	T087	No	LISP	Lincoln's Sparrow	0	0	1	0	1	-	0-50	-
T087_2021_T2	T087	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
T087_2021_T2	T087	No	TOWA	Townsend's Warbler	1	0	0	0	1	Singing	50-100	0-3
T087_2021_T2	T087	No	SOSP	Song Sparrow	0	0	1	0	1	Calling	0-50	0-3
T087_2021_T2	T087	No	SOSP	Song Sparrow	0	0	1	0	1	Calling	50-100	0-3
T088_2021_T2	T088	Yes	ATTW	American Three-toed Woodpecker	0	0	1	0	1	Other	>100	-
T088_2021_T2	T088	No	DEJU	Dark-eyed Junco	2	0	0	0	2	Singing	0-50	-
T088_2021_T2	T088	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Other	0-50	-
T089_2021_T2	T089	No	DEJU	Dark-eyed Junco	0	0	1	0	1	-	0-50	0-3
T089_2021_T2	T089	No	WIWA	Wilson's Warbler	0	0	1	0	1	-	0-50	-
T089_2021_T2	T089	No	CEDW	Cedar Waxwing	0	0	1	0	1	Flying/Fly-over	0-50	-
T089_2021_T2	T089	No	WAVI	Warbling Vireo	0	0	1	0	1	-	0-50	-
T089_2021_T2	T089	No	WIWA	Wilson's Warbler	1	0	0	0	1	Singing	0-50	3-5
T089_2021_T2	T089	No	GCKI	Golden-crowned Kinglet	0	0	1	0	1	-	50-100	3-5
T089_2021_T2	T089	No	AMRO	American Robin	1	0	0	0	1	Singing	0-50	0-3
T089_2021_T2	T089	No	ATTW	American Three-toed Woodpecker	0	0	1	0	1	Calling	0-50	-
T089_2021_T2	T089	No	YRWA	Yellow-rumped Warbler	0	0	2	0	2	Calling	0-50	0-3
T089_2021_T2	T089	No	CEDW	Cedar Waxwing	0	0	0	0	0	Nest Found	0-50	-
T089_2021_T2	T089	No	BEKI	Belted Kingfisher	0	0	1	0	1	Visual	0-50	0-3
T104_2021_T2	T104	Yes	AMCR	American Crow	1	0	0	0	1	Singing	>100	-
T104_2021_T2	T104	No	SWTH	Swainson's Thrush	0	0	2	0	2	Calling	0-50	-
T104_2021_T2	T104	No	DEJU	Dark-eyed Junco	0	0	1	0	1	Nest Found	0-50	-
T104_2021_T2	T104	No	YRWA	Yellow-rumped Warbler	0	0	0	0	0	Nest Found	0-50	-
T104_2021_T2	T104	No	DUFL	Dusky Flycatcher	1	0	0	0	1	Singing	50-100	-
T104_2021_T2	T104	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	3-5
T104_2021_T2	T104	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	-
T104_2021_T2	T104	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	-
T104_2021_T2	T104	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	-
T104_2021_T2	T104	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	-
T106_2021_T2	T106	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	0-50	-
T106_2021_T2	T106	No	AMRE	American Redstart	1	0	0	0	1	Singing	0-50	-
T106_2021_T2	T106	No	WTSP	White-throated Sparrow	0	0	2	0	2	Calling	50-100	-
T106_2021_T2	T106	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	0-50	-
T106_2021_T2	T106	No	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	50-100	-
T106_2021_T2	T106	No	YEWA	Yellow Warbler	1	0	0	0	1	Singing	50-100	-
T106_2021_T2	T106	No	DUFL	Dusky Flycatcher	1	0	0	0	1	Singing	50-100	-
T106_2021_T2	T106	No	RBSA	Red-Breasted Sapsucker	1	0	0	0	1	Singing	0-50	-
T106_2021_T2	T106	No	SOSP	Song Sparrow	0	0	2	0	2	Calling	50-100	3-5
T106_2021_T2	T106	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	-
T106_2021_T2	T106	No	WTSP	White-throated Sparrow	1	0	0	0	1	Singing	50-100	-
T107_2021_T2	T107	Yes	WISN	Wilson's Snipe	1	0	0	0	1	Singing	>100	3-5
T107_2021_T2	T107	No	AMRE	American Redstart	1	0	0	0	1	Singing	50-100	3-5
T107_2021_T2	T107	No	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	0-50	-
T107_2021_T2	T107	No	CHSP	Chipping Sparrow	2	0	0	0	2	Singing	50-100	-
T107_2021_T2	T107	No	SAVS	Savannah Sparrow	0	0	1	0	1	Singing	50-100	-
T107_2021_T2	T107	No	SOSP	Song Sparrow	0	0	2	0	2	Calling	0-50	-
T107_2021_T2	T107	No	AMRO	American Robin	1	0	0	0	1	Singing	50-100	-
T107_2021_T2	T107	No	ALFL	Alder Flycatcher	1	0	0	0	1	Singing	0-50	0-3
T107_2021_T2	T107	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	50-100	-
T108_2021_T2	T108	No	DEJU	Dark-eyed Junco	0	0	2	0	2	-	0-50	0-3
T108_2021_T2	T108	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
T108_2021_T2	T108	No	DEJU	Dark-eyed Junco	0	0	1	0	1	Calling	0-50	-
T108_2021_T2	T108	No	CHSP	Chipping Sparrow	0	0	1	0	1	-	0-50	3-5
T108_2021_T2	T108	No	SWTH	Swainson's Thrush	0	0	1	0	1	-	0-50	3-5
T108_2021_T2	T108	No	GRJA	Gray Jay	0	0	1	0	1	Flying/Fly-over	0-50	0-3
T108_2021_T2	T108	No	ATTW	American Three-toed Woodpecker	0	0	1	0	1	Calling	50-100	0-3
T109_2021_T2	T109	Yes	HETH	Hermit Thrush	1	0	0	0	1	Singing	>100	-
T109_2021_T2	T109	No	BRBL	Brewer's Blackbird	7	0	0	0	7	Singing	50-100	-
T109_2021_T2	T109	No	SOSP	Song Sparrow	2	0	0	0	2	Singing	50-100	-
T109_2021_T2	T109	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	-
T109_2021_T2	T109	No	BUFF	Bufflehead	1	1	0	2	4	Singing	0-50	-
T109_2021_T2	T109	No	YEWA	Yellow Warbler	1	0	0	0	1	Singing	50-100	-
T109_2021_T2	T109	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	-
T109_2021_T2	T109	No	COFL	Cordilleran Flycatcher	1	0	0	0	1	Singing	50-100	-
T110_2021_T2	T110	Yes	SACR	Sandhill Crane	0	0	0	0	0	Nest Found	>100	-
T110_2021_T2	T110	Yes	NOHA	Northern Harrier	1	0	0	0	1	Singing	>100	3-5
T110_2021_T2	T110	No	GRYE	Greater Yellowlegs	1	0	0	0	1	Singing	0-50	0-3

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Unique Observation ID	Site ID	Incidental	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Behaviour	Distance	Timing (0-3/3-5min)
T110_2021_T2	T110	No	WISN	Wilson's Snipe	0	0	0	0	0	Nest Found	50-100	-
T110_2021_T2	T110	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	50-100	-
T110_2021_T2	T110	No	BRBL	Brewer's Blackbird	1	0	0	0	1	Singing	50-100	0-3
T110_2021_T2	T110	No	BOGU	Bonaparte's Gull	1	0	0	0	1	Singing	0-50	0-3
T110_2021_T2	T110	No	BHCO	Brown-headed Cowbird	0	0	2	0	2	Singing	50-100	-
T110_2021_T2	T110	No	SWSP	Swamp Sparrow	0	0	0	0	0	Nest Found	0-50	-
T110_2021_T2	T110	No	WISN	Wilson's Snipe	0	0	0	0	0	Nest Found	50-100	-
T110_2021_T2	T110	No	GRYE	Greater Yellowlegs	1	0	0	0	1	Singing	0-50	0-3
T110_2021_T2	T110	No	GRYE	Greater Yellowlegs	1	0	0	0	1	Singing	0-50	3-5
T110_2021_T2	T110	No	BOGU	Bonaparte's Gull	2	0	0	0	2	Singing	50-100	0-3
T151_2021_T1	T151	Yes	CHSP	Chipping Sparrow	0	0	1	0	1	-	>100	-
T151_2021_T1	T151	Yes	DEJU	Dark-eyed Junco	0	0	1	0	1	-	>100	-
T151_2021_T1	T151	Yes	AMRO	American Robin	0	0	1	0	1	-	-	-
T151_2021_T1	T151	Yes	YRWA	Yellow-rumped Warbler	0	0	1	0	1	-	-	-
T151_2021_T1	T151	Yes	SACR	Sandhill Crane	0	0	1	0	1	-	-	-
T151_2021_T1	T151	No	AMRO	American Robin	1	1	0	0	2	Calling	50-100	0-3
T151_2021_T1	T151	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
T151_2021_T1	T151	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	3-5
T151_2021_T1	T151	No	YRWA	Yellow-rumped Warbler	1	0	0	0	1	Singing	50-100	0-3
T152_2021_T1	T152	Yes	OCWA	Orange-crowned Warbler	0	0	1	0	1	-	-	-
T152_2021_T1	T152	Yes	WIWA	Wilson's Warbler	0	0	1	0	1	-	-	-
T152_2021_T1	T152	No	DEJU	Dark-eyed Junco	0	0	1	0	1	-	50-100	0-3
T152_2021_T1	T152	No	WETA	Western Tanager	1	0	0	0	1	Singing	0-50	0-3
T152_2021_T1	T152	No	YBSA	Yellow-bellied Sapsucker	1	0	0	0	1	Singing	0-50	0-3
U001_2021_T2	U001	Yes	OSFL	Olive-sided Flycatcher	1	0	0	0	1	Singing	>100	-
U001_2021_T2	U001	No	AMRO	American Robin	1	0	0	0	1	Singing	0-50	-
U001_2021_T2	U001	No	DEJU	Dark-eyed Junco	0	0	2	0	2	-	0-50	-
U001_2021_T2	U001	No	BEKI	Belted Kingfisher	1	0	0	0	1	Singing	50-100	-
U001_2021_T2	U001	No	COLO	Common Loon	1	0	0	0	1	Singing	50-100	-
U001_2021_T2	U001	No	NOFL	Northern Flicker	1	0	0	0	1	Singing	50-100	-
U001_2021_T2	U001	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	0-50	-
U001_2021_T2	U001	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	50-100	-
U001_2021_T2	U001	No	WTSP	White-throated Sparrow	1	0	0	0	1	Singing	50-100	-
U001_2021_T2	U001	No	SWTH	Swainson's Thrush	1	0	0	0	1	Singing	50-100	-
U002_2021_T2	U002	Yes	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	>100	3-5
U002_2021_T2	U002	Yes	AMCR	American Crow	1	0	0	0	1	Singing	>100	3-5
U002_2021_T2	U002	Yes	LESC	Lesser Scaup	1	0	0	0	1	Singing	>100	0-3
U002_2021_T2	U002	Yes	COLO	Common Loon	1	0	0	0	1	Singing	>100	0-3
U002_2021_T2	U002	Yes	COLO	Common Loon	1	1	0	0	2	-	>100	-
U002_2021_T2	U002	Yes	LESC	Lesser Scaup	1	1	0	0	2	-	>100	-
U002_2021_T2	U002	No	DEJU	Dark-eyed Junco	1	0	0	0	1	Singing	0-50	0-3
U002_2021_T2	U002	No	SOSP	Song Sparrow	1	0	0	0	1	Singing	50-100	0-3
U002_2021_T2	U002	No	GCKI	Golden-crowned Kinglet	1	0	0	0	1	Singing	50-100	0-3
U002_2021_T2	U002	No	WAVI	Warbling Vireo	1	0	0	0	1	Singing	50-100	0-3
U002_2021_T2	U002	No	WTSP	White-throated Sparrow	1	0	0	0	1	Singing	50-100	0-3
U002_2021_T2	U002	No	CHSP	Chipping Sparrow	1	0	0	0	1	Singing	50-100	3-5

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Incidental Observations and Signs

Date	Site ID	UTM		Survey Type	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Notes
		Easting	Northing									
14-Jun-21	M100	378867	5900570	Shoreline Survey	AMRE	American Redstart	2	0	0	0	2	
14-Jun-21	M100	378867	5900570	Shoreline Survey	DEJU	Dark-eyed Junco	2	0	0	0	2	
14-Jun-21	M100	378867	5900570	Shoreline Survey	GCKI	Golden-crowned Kinglet	1	0	0	0	1	
14-Jun-21	M100	378867	5900570	Shoreline Survey	SWTH	Swainson's Thrush	1	0	0	0	1	
14-Jun-21	M101	378854	5901405	Shoreline Survey	OSFL	Olive-sided Flycatcher	1	0	0	0	1	
17-Jun-21	M109	385414	5903040	Yellow Rail	CONI	Common Nighthawk					0	
17-Jun-21	M109	385414	5903040	Yellow Rail	CONI	Common Nighthawk					0	
15-Jun-21	M109	383566	5902434	Shoreline Survey	OSFL	Olive-sided Flycatcher	1	0	0	0	1	
18-Jun-21	M115	376889	5893943	Yellow Rail	ATTW	American Three-toed Woodpecker					0	This is a small flowing stream with 100% cover, stream is <1mwide and willows cover ~3m wide. No birds.
18-Jun-21	M116	376361	5894006	Yellow Rail	AMRO	American Robin	1				1	
18-Jun-21	M117	375854	5893410	Yellow Rail	AMRO	American Robin	1				1	
18-Jun-21	M154	373791	5893970	Shoreline Survey	CHSP	Chipping Sparrow	1	0	0	0	1	
18-Jun-21	M154	373791	5893970	Shoreline Survey	SPGR	Spruce Grouse	0	0	1	0	1	Flushed from tree to tree while walking from wetland back to truck
19-Jun-21	M159	375213	5899009	Yellow Rail	SWTH	Swainson's Thrush	1				1	Passive listened to CONI for 6 minutes after playbacks
19-Jun-21	M159	375213	5899009	Yellow Rail	HETH	Hermit Thrush	1				1	Passive listened to CONI for 6 minutes after playbacks
19-Jun-21	M159	375213	5899009	Yellow Rail	CHSP	Chipping Sparrow	2				2	Passive listened to CONI for 6 minutes after playbacks
9-Jun-21	S001	378082	5955469	Shoreline Survey	SOSP	Song Sparrow	1	1	0	0	2	
16-Jun-21	T001	389418	5912812	Shoreline Survey	COYE	Common Yellowthroat	2	0	0	0	2	
16-Jun-21	T001	389418	5912812	Shoreline Survey	LISP	Lincoln's Sparrow	1	0	0	0	1	
16-Jun-21	T001	389418	5912812	Shoreline Survey	MOCH	Mountain Chickadee	0	0	1	0	1	
16-Jun-21	T001	389418	5912812	Shoreline Survey	NOWA	Northern Waterthrush	1	0	0	0	1	
16-Jun-21	T001	389418	5912812	Shoreline Survey	SOSP	Song Sparrow	1	1	0	0	2	
16-Jun-21	T001	389418	5912812	Shoreline Survey	WIFL	Willow Flycatcher	2	0	0	0	2	
16-Jun-21	T002	389485	5912715	Shoreline Survey	DEJU	Dark-eyed Junco	1	0	0	0	1	
16-Jun-21	T003	389703	5912710	Shoreline Survey	AMRO	American Robin	0	1	0	0	1	
16-Jun-21	T003	389703	5912710	Shoreline Survey	DEJU	Dark-eyed Junco	0	1	0	0	1	Flushed off nest
10-Jun-21	T015	376831	5960496	Shoreline Survey	DEJU	Dark-eyed Junco	0	2	0	0	2	
17-Jun-21	T027	382730	5908471	Yellow Rail	SOSP	Song Sparrow		1			1	Wetland with willow, open channel of water and 5 to 10 m width of live sedge. No CONI detected
17-Jun-21	T027	382730	5908471	Yellow Rail	SWTH	Swainson's Thrush	1				1	Wetland with willow, open channel of water and 5 to 10 m width of live sedge. No CONI detected
17-Jun-21	T043	375872	5894081	Shoreline Survey	COYE	Common Yellowthroat	2	0	0	0	2	
17-Jun-21	T043	375872	5894081	Shoreline Survey	NOWA	Northern Waterthrush	1	0	0	0	1	
17-Jun-21	T043	375872	5894081	Shoreline Survey	SOSP	Song Sparrow	0	1	0	0	1	Nesting in the area
17-Jun-21	T044	391907	5911000	Shoreline Survey	COYE	Common Yellowthroat	1	0	0	0	1	
17-Jun-21	T046	382793	5908495	Yellow Rail	SOSP	Song Sparrow		1			1	Large wetland with 95% cover of willow. Did play back for 3 min. One min and 30 sec with 30 sec silence in between
17-Jun-21	T046	382793	5908495	Yellow Rail	TEWA	Tennessee Warbler	2				2	Large wetland with 95% cover of willow. Did play back for 3 min. One min and 30 sec with 30 sec silence in between
17-Jun-21	T046	382715	5908664	Shoreline Survey	ALFL	Alder Flycatcher	1	0	0	0	1	
17-Jun-21	T046	382715	5908664	Shoreline Survey	SOSP	Song Sparrow	0	0	1	0	1	
17-Jun-21	T046	382715	5908664	Shoreline Survey	TEWA	Tennessee Warbler	1	0	0	0	1	
18-Jun-21	T048	378938	5900680	Yellow Rail	DEJU	Dark-eyed Junco	2		1		3	Open water 3 m, sedges 50 m then a border of willow at 10 m. Good location for an ARU. No CONI detected and no other birds singing.
18-Jun-21	T049	374117	5897601	Yellow Rail	AMRO	American Robin					0	Not a good site for YERA. Assessed for CONI. No birds detected
18-Jun-21	T065	378566	5966318	Shoreline Survey	DEJU	Dark-eyed Junco	1	0	0	0	1	
18-Jun-21	T065	378566	5966318	Shoreline Survey	OSFL	Olive-sided Flycatcher	0	0	1	0	1	
18-Jun-21	T065	378566	5966318	Shoreline Survey	RECR	Red Crossbill	0	0	24	0	24	
18-Jun-21	T065	378566	5966318	Shoreline Survey	SOSP	Song Sparrow	1	0	0	0	1	
18-Jun-21	T066	381357	5968558	Shoreline Survey	AMRE	American Redstart	1	0	0	0	1	
18-Jun-21	T066	381357	5968558	Shoreline Survey	BLPW	Blackpoll Warbler	1	0	0	0	1	Nest in the area
18-Jun-21	T066	381357	5968558	Shoreline Survey	CEDW	Cedar Waxwing	3	0	3	0	6	
18-Jun-21	T066	381357	5968558	Shoreline Survey	NOWA	Northern Waterthrush	1	1	0	0	2	Nest in the area
18-Jun-21	T066	381357	5968558	Shoreline Survey	OSFL	Olive-sided Flycatcher	1	0	0	0	1	
18-Jun-21	T066	381357	5968558	Shoreline Survey	RWBL	Red-winged Blackbird	1	0	0	0	1	
18-Jun-21	T066	381357	5968558	Shoreline Survey	SOSP	Song Sparrow	1	0	0	0	1	
18-Jun-21	T067	380748	5979882	Shoreline Survey	CEDW	Cedar Waxwing	0	0	2	0	2	
18-Jun-21	T067	380748	5979882	Shoreline Survey	CONI	Common Nighthawk	1	0	0	0	1	Bird was detected after Survey time on the walk back to the helicopter
18-Jun-21	T067	380748	5979882	Shoreline Survey	OSFL	Olive-sided Flycatcher	1	0	0	0	1	
18-Jun-21	T067	380748	5979882	Shoreline Survey	OCWA	Orange-crowned Warbler	1	0	0	0	1	
18-Jun-21	T067	380748	5979882	Shoreline Survey	SOSP	Song Sparrow	1	1	0	0	2	Pair with a nest
18-Jun-21	T067	380748	5979882	Shoreline Survey	SWTH	Swainson's Thrush	1	0	0	0	1	
18-Jun-21	T067	380748	5979882	Shoreline Survey	YRWA	Yellow-rumped Warbler	1	0	0	0	1	
25-Jun-21	T084	391526	5916802	Shoreline Survey	WTSP	White-throated Sparrow	0	0	1	0	1	
25-Jun-21	T084	391526	5916802	Shoreline Survey	CHSP	Chipping Sparrow	0	0	1	0	1	
25-Jun-21	T084	391526	5916802	Shoreline Survey	DEJU	Dark-eyed Junco	0	0	1	0	1	
25-Jun-21	T084	391526	5916802	Shoreline Survey	SWTH	Swainson's Thrush	0	0	1	0	1	
25-Jun-21	T084	391526	5916802	Shoreline Survey	VATH	Varied Thrush	0	0	1	0	1	
25-Jun-21	T086	391689	5916753	Shoreline Survey	CHSP	Chipping Sparrow	0	0	2	0	2	
25-Jun-21	T086	391689	5916753	Shoreline Survey	VATH	Varied Thrush	0	0	2	0	2	
25-Jun-21	T089	378981	5906122	Shoreline Survey	CEDW	Cedar Waxwing	0	0	1	0	1	
25-Jun-21	T089	378981	5906122	Shoreline Survey	HETH	Hermit Thrush	0	0	1	0	1	
25-Jun-21	T089	378981	5906122	Shoreline Survey	RUHU	Rufous Hummingbird	0	0	1	0	1	
25-Jun-21	T089	378981	5906122	Shoreline Survey	SOSP	Song Sparrow	0	0	1	0	1	
25-Jun-21	T089	378981	5906122	Shoreline Survey	SWTH	Swainson's Thrush	0	0	1	0	1	
25-Jun-21	T089	378981	5906122	Shoreline Survey	WIWR	Winter Wren	0	0	1	0	1	

Appendix O: Upland Bird Variable Radius Point Count Survey Observation Data, 2021

Incidental Observations and Signs

Date	Site ID	UTM		Survey Type	Species Code	Species Common Name	# Male	# Female	# Unknown	# Young	# Total	Notes
		Easting	Northing									
25-Jun-21	T089	378981	5906122	Shoreline Survey	YEWA	Yellow Warbler	0	0	1	0	1	
25-Jun-21	T112	390897	5913418	Shoreline Survey	AMRO	American Robin	0	0	1	0	1	
25-Jun-21	T112	390897	5913418	Shoreline Survey	DEJU	Dark-eyed Junco	0	0	0	0	0	Nest only
25-Jun-21	T112	390897	5913418	Shoreline Survey	SWTH	Swainson's Thrush	0	0	1	0	1	
25-Jun-21	T112	390897	5913418	Shoreline Survey	WIWR	Winter Wren	0	0	1	0	1	
25-Jun-21	T112	390897	5913418	Shoreline Survey	YRWA	Yellow-rumped Warbler	0	0	1	0	1	
25-Jun-21	T113	390670	5913458	Shoreline Survey	AMRO	American Robin	0	0	1	0	1	
25-Jun-21	T113	390670	5913458	Shoreline Survey	ATTW	American Three-toed Woodpecker	0	0	1	0	1	
25-Jun-21	T113	390670	5913458	Shoreline Survey	DEJU	Dark-eyed Junco	0	0	4	0	4	
25-Jun-21	T114	389305	5912918	Shoreline Survey	ATTW	American Three-toed Woodpecker	0	0	1	0	1	
25-Jun-21	T114	389305	5912918	Shoreline Survey	CONI	Common Nighthawk	0	0	1	0	1	
25-Jun-21	T114	389305	5912918	Shoreline Survey	DEJU	Dark-eyed Junco	0	0	1	0	1	
25-Jun-21	T114	389305	5912918	Shoreline Survey	GRJA	Gray Jay	0	0	5	0	5	
25-Jun-21	T114	389305	5912918	Shoreline Survey	RBNU	Red-breasted Nuthatch	0	0	1	0	1	
25-Jun-21	T114	389305	5912918	Shoreline Survey	SWTH	Swainson's Thrush	0	0	1	0	1	
19-Jun-21	T158	375627	5893877	Shoreline Survey	BLPW	Blackpoll Warbler	1	0	0	0	1	
19-Jun-21	T158	375627	5893877	Shoreline Survey	GCKI	Golden-crowned Kinglet	1	0	0	0	1	
19-Jun-21	T158	375627	5893877	Shoreline Survey	VATH	Varied Thrush	1	0	0	0	1	
24-Jun-21	U001			Shoreline Survey	WTSP	White-throated Sparrow	0	0	1	0	1	
24-Jun-21	U001			Shoreline Survey	AMRO	American Robin	0	0	1	0	1	
24-Jun-21	U001			Shoreline Survey	DEJU	Dark-eyed Junco	0	0	1	0	1	
24-Jun-21	U001			Shoreline Survey	NOFL	Northern Flicker	0	0	1	0	1	
24-Jun-21	U001			Shoreline Survey	SOSP	Song Sparrow	0	0	1	0	1	
24-Jun-21	U001			Shoreline Survey	SWTH	Swainson's Thrush	0	0	1	0	1	
24-Jun-21	U001			Shoreline Survey	WAVI	Warbling Vireo	0	0	1	0	1	
7-Jul-21	WL04	371117	5894128	Wetland/Amphibian	STJA	Steller's Jay			1			
7-Jul-21	WL04	371117	5894128	Wetland/Amphibian	CAJA	Canada Jay			1			
7-Jul-21	WL04	371117	5894128	Wetland/Amphibian	YEWA	Yellow Warbler			1			
7-Jul-21	WL05	385659	5903193	Wetland/Amphibian	RWBB	red-winged blackbird			1			Nesting
7-Jul-21	WL05	385659	5903193	Wetland/Amphibian	CONI	Common Nighthawk			1			Nesting
8-Jul-21	WL08	380758	5979869	Wetland/Amphibian	RWBB	red-winged blackbird			1			
8-Jul-21	WL10	381363	5968554	Wetland/Amphibian	NOWA	Northern Waterthrush			1			
8-Jul-21	WL10	381363	5968554	Wetland/Amphibian	WIWA	Wilson's Warbler			1			
8-Jul-21	WL10	381363	5968554	Wetland/Amphibian	RNSA	Red-naped Sapsucker			1			
8-Jul-21	WL10	381363	5968554	Wetland/Amphibian	YEWA	Yellow Warbler			1			
8-Jul-21	WL10	381363	5968554	Wetland/Amphibian	AMRO	American Robin			1			
8-Jul-21	WL11	378484	5966385	Wetland/Amphibian	SOSP	Song Sparrow			1			
8-Jul-21	WL11	378484	5966385	Wetland/Amphibian	CHSP	Chipping Sparrow			1			
8-Jul-21	WL12	371694	5894382	Wetland/Amphibian	DEJU	Dark-eyed Junco			1			Nesting
9-Jul-21	WL13	378409	5955397	Wetland/Amphibian	NOWA	Northern Waterthrush			1			
9-Jul-21	WL13	378409	5955397	Wetland/Amphibian	SWTH	Swainson's Thrush			1			
9-Jul-21	WL13	378409	5955397	Wetland/Amphibian	VATH	Varied Thrush			1			
9-Jul-21	WL13	378409	5955397	Wetland/Amphibian	SOSP	Song Sparrow			1			
9-Jul-21	WL13	378409	5955397	Wetland/Amphibian	UNFLY	Unknown Flycatcher			1			
9-Jul-21	WL14	378680	5906097	Wetland/Amphibian	SOSP	Song Sparrow			1			
9-Jul-21	WL14	378680	5906097	Wetland/Amphibian	DEJU	Dark-eyed Junco			1			
9-Jul-21	WL14	378680	5906097	Wetland/Amphibian	BCCH	Black-capped Chickadee			1			
9-Jul-21	WL16	375150	5898938	Wetland/Amphibian	DEJU	Dark-eyed Junco			1			
9-Jul-21	WL16	375150	5898938	Wetland/Amphibian	SOSP	Song Sparrow			1			
10-Jul-21	WL19	373482	5894083	Wetland/Amphibian	Ptarmigan	Ptarmigan			1			Pellets
11-Jul-21	WL27	383638	5902472	Wetland/Amphibian	CONI	Common Nighthawk			1			Calling
11-Jul-21	WL29	378870	5901304	Wetland/Amphibian	OSFL	Olive-sided Flycatcher			1			
11-Jul-21	WL30	376964	5897818	Wetland/Amphibian	CONI	Common Nighthawk			1			Calling

APPENDIX P SWALLOW AND SWIFT SURVEY OBSERVATION DATA, 2021

Appendix P: Swallow and Swift Survey Observation Data, 2021

Site Name	Date	Easting	Northing	Species	Observations or Signs	Comments
B004	10-Jun-21	376802	5936178	Bank Swallow	10 to 20 birds and 40 to 60 holes	Bank Swallow - W end of colony
B005	10-Jun-21	377464	5936161	Bank Swallow	Same as B004	Bank swallows - E end of colony
B001	10-Jun-21	375701	5893910	Barn Swallow	10 to 12 breeding pairs	Main camp
B001	10-Jun-21	375701	5893910	Violet-green Swallow	1 Individual	Main camp
B002	10-Jun-21	375701	5893910	None	old nests	Core shacks and geology (not in active use)
B003	10-Jun-21	375672	5892797	None	-	No barn swallow detected

APPENDIX Q TOAD GROUND SURVEY SITE DATA, 2021

Appendix Q: Toad Ground Survey Site Data, 2021

Site Name	Surveyors	Date	Easting	Northing	Survey Area	Location	Biogeoclimatic Zone
WL01	LR, GC, VM	7-Jul-21	368964	5893572	Mine LSA	W Mine area below SiteC dam - western waterbody between 2 lrg lakes; Part of a series of wetlands, ponds and	ESSFmv1
WL02	LR, GC, VM	7-Jul-21	368964	5893572	Mine LSA	W Mine area below SiteC dam - western pond between 2 lrg lakes; Part of a series of wetlands, ponds and lakes	ESSFmv1
WL03	LR, GC, VM	7-Jul-21	370924	5893994	Mine LSA	W Mine area below SiteC dam -eastern pond between 2 lrg lakes; Part of a series of wetlands, ponds and lakes	ESSFmv1
WL04	LR, GC, VM	7-Jul-21	371117	5894128	Mine LSA	W Mine area below SiteC dam - Lake (ID: 01682LNRS)1 of 2 lrg lakes; Part of a series of wetlands, ponds and lakes	ESSFmv1
WL05	LR, GC, VM	7-Jul-21	385659	5903193	Mine LSA - proposed water pipeline	Midway along proposed water pipeline	SBSmc3
WL06	LR, GC, VM	7-Jul-21	378866	5900565	Mine LSA	Junction of mine access road and C BRRW	SBSmc3
WL07	LR, GC, VM	7-Jul-21	378418	5900601	Mine LSA	NE Mine area west of WL06 - both flow into WL29	SBSmc3
WL08	LR, GC, VM	8-Jul-21	380758	5979869	TL LSA	Grouping of potholes - kettled	SBSdk
WL09	LR, GC, VM	8-Jul-21	380464	5979756	TL LSA	Group of potholes n cutblocks	SBSdk
WL10	LR, GC, VM	8-Jul-21	381363	5968554	TL LSA	Large wetland complex	SBSdk
WL11	LR, GC, VM	8-Jul-21	378484	5966385	TL LSA	N TL	SBSdk
WL12	LR, GC, VM	8-Jul-21	371694	5894382	Mine LSA		ESSFmv1
WL13	LR, GC, VM	9-Jul-21	378409	5955397	TL LSA	Site is on TL crossing	SBSdk
WL14	LR, GC, VM	9-Jul-21	378680	5906097	Mine LSA	Slow stream crossing Davidson FSR near Kluskus FSR, where mine access road meets Kluskus	SBSmc3
WL15	LR, GC, VM	9-Jul-21	377370	5899787	Mine LSA		SBSmc3
WL16	LR, GC, VM	9-Jul-21	375150	5898938	Mine LSA		SBSmc3
WL17	LR, GC, VM	9-Jul-21	373603	5899856	Mine LSA		SBSmc3
WL18	LR, GC, VM	10-Jul-21	372842	5897003	Mine LSA	NW boundary of Mine LSA	ESSFmv1
WL19	LR, GC, VM	10-Jul-21	373482	5894083	Mine LSA	N edge of S Dump near the prop pit and ore stockpile	ESSFmv1
WL20	LR, GC, VM	10-Jul-21	378321	5897341	Mine LSA	Within the Mine Area LSA	SBSmc3
WL21	LR, GC, VM	10-Jul-21	378637	5897007	Mine LSA	Proposed TL runs over top	SBSmc3
WL22	LR, GC, VM	10-Jul-21	376517	5898498	Mine LSA	Proposed TL runs over top	SBSmc3
WL23	SS, GC, VM	11-Jul-21	375262	5896481			
WL24	SS, GC, VM	11-Jul-21	383730	5909202	TL LSA	Blackwater Ranch area - riparian sedge meadow	
WL25	SS, GC, VM	11-Jul-21	377916	5904537	Mine LSA - airstrip	airstrip access	
WL26	SS, GC, VM	11-Jul-21	375529	5903180	Mine LSA - airstrip	Airstrip pond	
WL27	SS, GC, VM	11-Jul-21	383638	5902472	Mine LSA - proposed water pipeline	Lake	
WL28	SS, GC, VM	11-Jul-21	381100	5902284	Mine LSA - proposed water pipeline	Lake	
WL29	SS, GC, VM	11-Jul-21	378870	5901304	Mine LSA	Lake	
WL30	SS, GC, VM	11-Jul-21	376964	5897818	Mine LSA	Lake	
WL31	SS, GC, VM	11-Jul-21	374345	5897663	Mine LSA		
WL32	SS, GC, VM	11-Jul-21	376436	5895798	Mine LSA		
WL33	SS, GC, VM	12-Jul-21	373777	5892963	Mine LSA		
WL34	SS, GC, VM	12-Jul-21	376782	5893861	Mine LSA		
WL35	SS, GC, VM	12-Jul-21	375859	5892349	Mine LSA		
WL36	SS, GC, VM	12-Jul-21	374676	5894100	Mine LSA		
WL37	SS, GC, VM	12-Jul-21	374919	5893106	Mine LSA		
WL38	SS, GC, VM	12-Jul-21	374856	5893714	Mine LSA	Pothole settling ponds above camp	
WL39	SS, GC, VM	12-Jul-21	375364	5894665	Mine LSA	Near camp	
WL40	SS, GC, VM	12-Jul-21	376273	5893879	Mine LSA	Below camp	
WL41	SS, GC, VM	12-Jul-21	376900	5894150	Mine LSA	Near weather station at camp	

Appendix Q: Toad Ground Survey Site Data, 2021

Site Name	Wetland Type	Wetland Comments	Riparian Upland	Wetland Vegetation
WL01	Marsh/Shallow Open Water		Old Sx Forest	90% Carex (aqu/utr), scattered forbes
WL02	Fen/Shallow Open Water	Not positive for Wf05 - should do full assessment	Sx/Bs, Bl, Rosaaci, Heramax	Carex aqu
WL03	Bog/PD	Not classed to SA	Carex, Betunan, Sb/Sx, Bl, Ledugro	Carex
WL04	Lake/Fen/Bog	Not classed to SA	Carex, Betunan, Sb/Sx, Bl, Ledugro	Carex sp
WL05	Marsh	Palustrine - wet draw/depression; Source not determined; wetland is split by road with s side is not likely permanent; larger portion on the other side of the road is	cutblock	Carex utr, carex aqu
WL06	Fen/Shallow Open Water	Adjacent to WL07; Outflow goes to WL29	Carex, Betunan, Salix sp, Calacan	Floating veg mat - carex sp, salix, betunan
WL07	Fen/Shallow Open Water		Carex, Betunan, Salix sp, Calacan	Floating veg mat - carex sp, salix, betunan
WL08	Marsh/Shallow Open Water			Carex utr, Nuphar sp; Emergents: Lemna sp, Menyanthus sp, pond weeds
WL09	Marsh/Shallow Open Water		Young plantation with forested buffer on wetland	
WL10	Swamp/Marsh/ Shallow Open Water		Pine plantation, Ledugro; old Sx forested buffer on wetland; Salix, carex, grasses in riparian	Aquatic mosses and buckbean
WL11	Femn/Marsh/ Shallow Open water		Old forested buffer - young plantation upland; Riparian: Carex aqu, carex utr, Alnus sp, Rushes	Aquatic mosses, pondweeds and lilies; Emergents: Carex sp and rushes
WL12	Fen/Wet Meadow			Cotton grass (erioang) and sedges
WL13	Swamp/Wet Meadow	Not positive for Wf01	Athyfil, Loniinv, Alnus on strm side; old forest buffer within young plantation	Calcan, Caeros (utr), nettles
WL14	Swamp			Salix, Carex aqu, carex utr, calacan
WL15	Bog/Fen	Wetland complex - plot completed at the pond		Careutr, Careaqu, ~betunan - very hummocky - low shrub in bog (Sb)
WL16	Fen	Classification from previous mapping confirmed		
WL17	Fen	Previously mapped as ESSFmv1 but likely SBSmc3; Very unique wetland - resurvey to poroperly classify soils		Scirhud, Scorrev, Campste, Betunan, Carex aqu,
WL18	Swamp	Resurvey to include a soils assessment	Sb, Sx, (Pl) in upland	Sparse hummocks; Carec aqu, rushes, rubus, bog flower, Equistum Sp, brown
WL19	Bog/Swamp	Previously mapped as Wb10	Dry lichen islands/ridges between wetland areas	Erioang, rushes, sphag mosses, careutr, sang sp, ubus, betunan, bog flower, Sx-<1m tall / Pl <5m tall
WL20	Bog			Strng hummocks - Betunan, Ledugro, Sb, Carex, Sphag mosses
WL21	Bog			
WL22	Marsh/Shallow Open Water			
WL23				
WL24		Sedge meadow	Salix sp, PlSx	
WL25	Bog		Salix sp, PlSx	Crex, Ledugro
WL26			Salix, Pl	Carex utr
WL27			Sx, Salix, Equisetum	Carex, mosses
WL28			Sx, Salix, Equisetum	Carex, mosses
WL29			Sx/pl, Salix, Equisetum	Carex,Nuphar, Rushes
WL30			Sx/pl, Salix,Carex	Carex
WL31		Dry ephemeral wetland	Salix, Equisetum	Carex
WL32			Salix sp, Carex, PlSx	Carex
WL33			Sx, Salix, Equisetum	Peat
WL34			Sx, Salix, Equisetum	Carex
WL35			Bl/Sx, Salix, Equisetum	Carex
WL36	wet Meadow		Sx/Bl, Salix, Betunan	Equisetum
WL37			Pl/Sx, Carex Epilobium	
WL38			Pl/Sx, Carex, Epilobium, Salix	
WL39		Sedge meadow	Pl/Sx, Carex, Epilobium, Salix	Carex
WL40		Beaver channel in sedge meadow	Pl, Carex	Carex
WL41		Pond	None	None

Appendix Q: Toad Ground Survey Site Data, 2021

Site Name	Water			Primary Soil	Secondary Soil	Hydrodynamic Index	Soil Moisture Regime	Soil Nutrient Regime	Amphib Habitat Present
	Depth	Temperature	pH						
WL01	0.3-1.0	14.6	6.7	Org/Min	1m organic on top of mineral	SI/MO	VW	C/D	Yes
WL02	0.25-2.0	12.8	7.1	Mineral	Rocky with woody debris	SI	VW	D	Yes
WL03	0.20-2.0	20	7.3	Mineral	Rocky/mineral covered in thin layer of detritus	SI	VW	D	Yes
WL04	0.35-2.0	21.4	7.3	Mineral	Rocky/mineral covered in thin layer of detritus	SI	VW	C	Suitable in shallow fen areas
WL05	0.15-1.0	21.3	6.8-7.2	Org/Min	Silty	SI	VW	C/D	Yes
WL06	0.5-2.0	21.5	7.5	Peat		SI	VW	D	Yes
WL07	0.4-20	20	7.2	Peat		SI	VW	C/D	Yes
WL08	0.15-2.0	20.9	7.5	Mineral	Organic veneer over mineral	SI	VW	D	Yes
WL09	0.25-2.0	21.4	8	Mineral	Organic veneer over mineral	SI	VW	D	Yes
WL10	0.05-1.0	18.2	7.6	Mineral	Organic veneer over mineral	Mo	W/VW	D/E	Yes
WL11	0.05-2.0	18.6	6.8	Org/Min	Thick peat layer (>40cm)	SI (Mo)	VW	C	Yes
WL12	<2.0	24.5	7.4	Peat		SI/St	VW	C	Yes
WL13	0.05-0.40	19.4	7.3	Mineral		Mo/Dy	VW/VM	D	Yes
WL14	0.30-1.0			Mineral	Thin organic veneer over mineral	Mo/Dy	VW	D	Yes
WL15		18.1	7.4	Org/Min	Thick org layer (50cm) over mineral	St/(Mo)	VW		Yes
WL16									Yes
WL17									
WL18	0-0.01	14.1	6.15	Peat	Thick organic layer (80cm)	SI	W	B	
WL19	0.10-1.0	11.6	6.7	Peat	80cm deep	SI	W	B	
WL20			6	Peat	Deep peat with strong hummocks	SI	W	B	
WL21		13.8	6.4	Mineral	clay and muck				
WL22	0.05-1.0			Mineral	Mineral with peat hummocks	SI/Mo			Yes
WL23									
WL24	0.25	10.1	7.2	Peat					
WL25			6.5	Peat					
WL26				Org/Min		St	VW		Yes
WL27	2	19.1	7	Org/Min	Floating veg mat				Yes
WL28	0.2	17.8	7.8	Org/Min	Floating veg mat				Yes
WL29	0.5	24.8	7.8	Mineral					Yes
WL30	1.5	21.1	7.6	Org/Min					Yes
WL31				Org/Min					
WL32				Org/Min					
WL33	0.05	5	6.7	Org/Min	Wet meadow				
WL34				Org/Min	Dry ephemeral wetland meadow				
WL35	0.75	15.2	7.2	Mineral	Pothole pond above deposit				
WL36				Org/Min	Meadow wetland on creek with no open water				
WL37	0.5	12	7.4	Org/Min	Complex of pothole ponds above camp on flowing creek				
WL38	0.2	18.7	7.4	Org/Min	Settling ponds in mine area				Yes
WL39				Org/Min					No
WL40	0.5	12	7.4	Org/Min					Yes
WL41	0.25	15	7.3	Mineral					Yes

Appendix Q: Toad Ground Survey Site Data, 2021

Site Name	Re-Assessment Required	Comments
WL01	Yes - with permit	Need permit to survey for western toad (none observed through visual methods but habitatis are suitable); Aquatic birds using the wetland for nesting and high moose use in riparian, potential for mineal lick in area
WL02	Yes - for breeding confirmation	Assume amphib breeding or re-assess with survey permit
WL03	Yes-for breeding species confirmation	Will require pre-construction assessment and potential salvage
WL04	Yes - with permit	Will equire pre-construction assessment for amphibians and salvage potential for amphibians and fish
WL05	No, breeding confirmed	The existing cutblock access road is a high use travel corridor for wildlife; mitigate to mainitain water flow across the proposed water pipeline
WL06	No, breeding confirmed	Mitigation will be required due to location in C-BRRW
WL07	No, breeding confirmed	Mitigation may be required as it is <180m from proposed Borrow Pit
WL08	Yes, with survey permit to determine if western toad is present	Likely can leave undisturbed due to the formation and size of the basin. Potential for lines from proposed TL can go over top or beside with placement of stations outside wetland??
WL09	Yes, with survey permit to determine if western toad is present	
WL10	No, breeding confirmed	Recommend to maintain this wetland complex (high wildlife value within a highly disturbed landscape). Situate poles and access road away from complex.
WL11	Yes, with survey permit to determine if western toad is present	Proposed TL may run close - maintain a wetland buffer.
WL12	No, breeding confirmed	The wet meadow /pond is located at the toe of the mountain slope adjacent to a fish strm. Stream connects as series of wetlands and lakes.
WL13	Yes - with permit to determine if western toad is present	Try to avoid removal of cover (top trees on the slope only if too tall rather than removal); this is a wildlife refuge among highly disturbed cutblocks and palntation - an important feature in the landscape (Aerial photo explains)
WL14	No, breeding confirmed	
WL15	Yes, with survey permit to determine if western toad is present	
WL16	No, not western toad habitat	
WL17		Visual - need to return for wetland assessment. TEM and wetland class need confirmation
WL18	No, habitat is low for western toad	
WL19	No, habitat is low for western toad	
WL20	No, habitat is low for western toad	TL runs through the middle of this wetland. Expect that TL stantions can be strategically placed for minimal disturbance. This wetland is situated within highly disturbed landscape and is an important feature for the wildlife in the
WL21		
WL22	No, breeding confirmed	
WL23		
WL24		
WL25		
WL26	No	
WL27	Yes, with permit to determine if western toad is present	
WL28	Yes, with permit to determine if western toad is present	
WL29	Yes, with permit to determine if western toad is breeding here	
WL30	Yes, with permit to determine if western toad is breeding here	
WL31		
WL32	No	
WL33	No	
WL34		
WL35	Yes, prior to disturbance to determine if western toad are breeding in pond	
WL36	No	
WL37	Yes, prior to disturbance to determine id western toad are breeding	
WL38	No, western toad breeding is confirmed	
WL39		
WL40	Yes, with permit to determine if western toad are breeding	
WL41	Yes, with permit to determine if western toad are breeding	

APPENDIX R TOAD GROUND SURVEY OBSERVATIONS DATA, 2021

Appendix R: Toad Ground Survey Observations Data, 2021

Site Name	Species Name	Amphibians Age Class
WL01	-	-
WL02	Western Toad	Adult
WL03	Columbia Spotted Frog	Tadpole, Adult
WL04	-	-
WL05	Western Toad	Tadpole, Adult
WL05	Columbia Spotted Frog	Tadpole, Adult
WL06	Western Toad	Tadpole, Adult
WL06	Columbia Spotted Frog	Tadpole, Adult
WL07	Western Toad	Tadpole, Metamorph, Toadlet, Adult
WL08	-	-
WL09	-	-
WL10	Western Toad	Tadpole, Adult
WL11	-	-
WL12	Western Toad	Tadpole, Adult
WL13	-	-
WL14	Western Toad	Toadlet, Adult
WL14	Columbia Spotted Frog	Toadlet
WL15	Columbia Spotted Frog	Toadlet
WL16	Wood Frog	Adult
WL17	-	-
WL18	-	-
WL19	-	-
WL20	-	-
WL21	-	-
WL22	Western Toad	Tadpole, Metamorph, Toadlet, Adult
WL23	-	-
WL24	-	-
WL25	-	-
WL26	Columbia Spotted Frog	Adult
WL27	Columbia Spotted Frog	Adult
WL28	Columbia Spotted Frog	Egg, Adult
WL28	Wood Frog	Toadlet, Adult
WL29	Western Toad	Adult
WL29	Columbia Spotted Frog	Adult
WL30	Western Toad	Adult
WL30	Columbia Spotted Frog	Tadpole, Adult
WL31	-	-
WL32	-	-
WL33	-	-
WL34	-	-
WL35	-	-
WL36	-	-
WL37	-	-
WL38	Western Toad	Tadpole
WL38	Columbia Spotted Frog	Tadpole, Adult
WL39	-	-
WL40	-	-
WL41	-	-

Western Toad Incidental Observations

Site Name	Date	Survey Type	Easting UTM	Northing UTM	Age Class	Number of Individuals
M101	14-Jun-21	Shoreline Survey	378854	5901405	Tadpoles	10