BW GOLD LTD
a subsidiary company of Artemis Gold Inc

Blackwater Gold Project

Wildlife Mitigation and Monitoring Plan

July 2022

CONTENTS

List of Tables

List of Figures

ACRONYMS AND ABBREVIATIONS

Aboriginal Groups or Indigenous nations	Lhoosk'uz Dené Nation, Ulkatcho First Nation, Nadleh Whut'en First Nation, Saik'uz First Nation, Stellat'en First Nation and Nazko First Nation (as defined in the Project's Environmental Assessment Certificate #M19-01)
AEMP	Aquatic Effects Monitoring Program
Agency	Impact Assessment Agency
AQDMP	Air Quality and Fugitive Dust Management Plan
Artemis	Artemis Gold Inc.
ARUs	Autonomous recording units
BC	British Columbia
BC EMP	BC Environmental Mitigation Policy
BEC Zone	Biogeoclimatic Ecosystem Classification Zone
Blackwater or the Project	Blackwater Project or Blackwater Gold Project
BMP	Best management practices
BW Gold	BW Gold LTD.
CCME	Canadian Council of Ministers of the Environment
CDC	Conservation Data Centre
CEMP	Construction Environmental Management Plan
CMSTHP	Chemical and Materials Storage, Transfer and Handling Plan
CM	Construction Manager
CMMP	Caribou Mitigation and Monitoring Plan
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWD	Coarse woody debris
CWHC	Canadian Wildlife Health Cooperative
DS	Decision Statement
EA	Environmental Assessment
EAC	Environmental Assessment Certificate #M19-01
EC	Environment Canada
ECCC	Environment and Climate Change Canada
EAO	Environmental Assessment Office
EM	Environmental Manager
EMC	Environmental Monitoring Committee
EMLI	Ministry of Energy, Mines and Low Carbon Innovation

ERM	Environmental Resources Management
FLNRO	Ministry of Forests, Lands, and Natural Resource Operations
FLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
FMSCP	Fuel Management and Spill Control Plan
FRPA	*Forest and Range Practices Act*
FSR	Forest Service Road
GM	General Manager
Indigenous groups or Aboriginal Peoples	Lhoosk'uz Dené Nation, Ulkatcho First Nation, Nadleh Whut'en First Nation, Saik'uz First Nation, Stellat'en First Nation, Nazko First Nation, Skin Tyee Nation, Tŝilhqot'in Nation, Métis Nation British Columbia and Nee-Tahi-Buhn Band (as defined in the Project's federal Decision Statement).
IPMP	Invasive Plant Management Plan
km	Kilometre
km^2	Squared kilometre
LDN	Lhoosk'uz Dené Nation
LRMP	Land and Resource Management Plan
LSA	Local study area
m	Metre
MOE	Ministry of Environment
MSTCP	Mine Site Traffic Control Plan
MT	Mitigation Table (November 2020)
NTB	Nee-Tahi-Buhn Band
NWFN	Nadleh Whut'en First Nation
Pre-construction surveys	Surveys conducted prior to the construction phase to address federal and provincial information requirements.
Pre-clearing surveys	Surveys conducted immediately prior to vegetation clearing.
Provincial Condition or "EAC" Condition	Environmental Assessment Certificate #M19-01 condition
RCP	Reclamation and Closure Plan
RISC/RIC	Resource Inventory Standards Committee; formerly the Resource Inventory Committee
SARA	*Species at Risk Act*
SEPSCP	Surface Erosion Prevention and Sediment Control Plan
SFN	Saik'uz First Nation
StFN	Stellat'en First Nation
STN	Skin Tyee Nation

TEM	Terrestrial ecosystem mapping
TK	Traditional Knowledge
TNG	Tsilhqot'in Nation
TSF	Tailings storage facility
UFN	Ulkatcho First Nation
UWR	Ungulate winter range
VRPC	Variable radius point counts
VC	Valued component
VMP	Vegetation Management Plan
WMA	Wildlife Management Area
WMMP	Wildlife Mitigation and Management Plan
WMOP	Wetland Management and Offsetting Plan
WPMP	Whitebark Management Plan

1. PROJECT OVERVIEW

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.

The Project is presently accessed via the Kluskus Forest Service Road (FSR), the Kluskus-Ootsa FSR and an exploration access road, which connects to the Kluskus-Ootsa FSR at km 142. The Kluskus FSR joins Highway 16 approximately 10 km west of Vanderhoof. A new, approximately 13.8 km road (Mine Access Road) will be built to replace the existing exploration access road, which will be decommissioned. The new planned access is at km 124.5. Driving time from Vanderhoof to the mine site is about 2.5 hours.

Major mine components include 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. The gold and silver will be recovered into a gold-silver doré product and shipped by air and/or transported by road. Electrical power will be supplied by a new approximately 135 km, 230 kilovolt (kV) overland transmission line that will connect to the BC Hydro grid at the Glenannan substation located near the Endako mine, 65 km west of Vanderhoof.

The Blackwater mine site 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 FSRs and Project transmission line cross the traditional territories of Nadleh Whut'en First Nation (NWFN), Saik'uz First Nation (SFN), and Stellat'en First Nation (StFN; collectively, the Carrier Sekani First Nations) as well as the traditional territories of the Nazko First Nation (NFN), Nee-Tahi-Buhn Band, Cheslatta Carrier Nation and Yekooche First Nation (BC EAO 2019a, 2019b).

Project construction is anticipated to take two years. Mine development will be phased with an initial milling capacity of 15,000 tonnes per day (t/d) or 5.5 million tonnes per annum (Mtpa) for the first five years of operation. After the first five years, the milling capacity will increase to 33,000 t/d (or 12 Mtpa) for the next five-years, and to 55,000 t/d (20 Mtpa) in Year 11 until the end of the 23-year mine life. The Closure phase is 24 to approximately 45 years, ending when the Open Pit has filled and the TSF is allowed to passively discharge to Davidson Creek, and the Post-closure phase is 46+ years.

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. On August 7, 2020, the Certificate was transferred to BW Gold LTD. (BW Gold), a wholly-owned subsidiary of Artemis, under the 2018 *Environmental Assessment Act*. The Impact Assessment Agency of Canada notified BW Gold on September 25, 2020 to verify that written notice had been provided within 30 days of the change of proponent as required in Condition 2.16 of the DS, and that a process had been initiated to amend the DS.

1.1 Purpose and Objectives

The purpose of the Wildlife Mitigation and Monitoring Plan (WMMP) is to manage impacts on wildlife in the Blackwater Project area (mine site and linear components, as authorized by the EAC) during construction, operations, closure and post-closure. The objectives of the WMMP are to:

- Manage impacts of the Project on wildlife and vegetation species and habitat;
- Monitor Project effects on wildlife to test impact predictions from the Application for an Environmental Assessment Certificate / Environmental Impact Statement (Application/EIS; New Gold 2015);

- Monitor mitigation measures to determine their effectiveness; and
- Adaptively manage potential Project effects on wildlife and vegetation.

The WMMP addresses the requirements in Section 9.10 of the Joint Application Information Requirements for *Mines Act* and Permits (EMPR & ENV 2019).

1.2 Roles and Responsibilities

BW Gold has the obligation of ensuring that all commitments are met and that all relevant obligations are made known to mine personnel and site contractors during all phases of the mine life. A clear understanding of the roles, responsibilities, and level of authority that employees and contractors have when working at the mine site is essential to meet Environmental Management System (EMS) objectives.

Table 1.2-1 *Environmental Management Act* provides an overview of general environmental management responsibilities during all phases of the mine life for key positions that will be involved in environmental management. Other positions not specifically listed in Table 1.2-1 b but who will provide supporting roles include independent environmental monitors, an Engineer of Record (EOR) for each tailings storage facility and dam, an Independent Tailings Review Board (ITRB), TSF qualified person, geochemistry qualified professional, and other qualified persons and qualified professionals.

Table 1.2-1: Blackwater Roles and Responsibilities

Position	Responsibility
Chief Executive Officer (CEO)	The CEO is responsible for overall Project governance. Reports to Board.
Chief Operating Officer (COO)	The COO is responsible for engineering and Project development and coordinates with the Mine Manager to ensure overall Project objectives are being managed. Reports to CEO.
Vice President (VP) Environment & Social Responsibility	The VP is responsible for championing the Environmental Policy Statement and EMS, establishing environmental performance targets and overseeing permitting. Reports to COO.
General Manager (GM) Development	The GM is responsible for managing project permitting, the Project's administration services and external entities, and delivering systems and programs that ensure Artemis's values are embraced and supported: Putting People First, Outstanding Corporate Citizenship, High Performance Culture, Rigorous Project Management and Financial Discipline. Reports to COO.
Mine Manager	The Mine Manager, as defined in the *Mines Act*, has overall responsibility for mine operations, including the health and safety of workers and the public, Environmental Management System (EMS) implementation, overall environmental performance and protection, and permit compliance. The Mine Manager may delegate their responsibilities to qualified personnel. Reports to GM.
Construction Manager (CM)	The CM is accountable for ensuring environmental and regulatory commitments/ and obligations are being met during the construction phase. Reports to GM.
Environmental Manager (EM)	The EM is responsible for the day-to-day management of the Project's environmental programs and compliance with environmental permits, updating EMS and MPs. The EM or designate will be responsible for reporting non-compliance to the CM, and Engineering, Procurement and Construction Management (EPCM) contractor, other contractors, the Company and regulatory agencies, where required. Supports the CM and reports to Mine Manager.

Position	Responsibility
Departmental Managers	Departmental Managers are responsible for implementation of the EMS relevant to their areas. Report to Mine Manager.
Indigenous Relations Manager	Indigenous Relations Manager is responsible for Indigenous engagement throughout the life of mine. Also responsible for day-to-day management and communications with Indigenous groups. Reports to VP Environment & Social Responsibility.
Community Relations Advisor	Community Relations Advisor is responsible for managing the Community Liaison Committee and Community Feedback Mechanism. Reports to Indigenous Relations Manager.
Environmental Monitors	Environmental Monitors (includes Environmental Specialists and Technicians) are responsible for tracking and reporting on environmental permit obligations through field-based monitoring programs. Report to EM.
Aboriginal Monitors	Aboriginal Monitors are required under EAC condition 17 and will be responsible for monitoring for potential effects from the Project on the Indigenous interests. Indigenous Monitors will be involved in the adaptive management and follow-up monitoring programs. Report to EM.
Employees and Contractors	Employees are responsible for being aware of permit requirements specific to their roles and responsibilities. Report to Departmental Managers.
Qualified Professional and Qualified Persons	Qualified professionals and qualified persons will be retained to review objectives and conduct various aspects of environmental and social monitoring as specified in EMPs and social MPs.

BW Gold will employ a qualified person as an EM who will ensure that the EMS requirements are established, implemented and maintained, and that environmental performance is reported to management for review and action. The EM is responsible for retaining the services of qualified persons or qualified professionals with specific scientific or engineering expertise to provide direction and management advice in their areas of specialization. The EM will be supported by a staff of Environmental Monitors that will include Environmental Specialists and Technicians and by a consulting team of subject matter experts in the fields of environmental science and engineering.

During the Construction phase, BW Gold will be entering into multiple EPC contracts, likely for the Transmission Line, Process Plant, Tailings and Reclaim System, and 25kV Power Distribution. Each engineer/contractor will have their own CM and there will be a BW Gold responsible PM and/or Superintendent who ultimately reports to the GM Development. Some of the scope, such as the TSF and Water Management Structures will be self-performed by BW Gold, likely using hired equipment. Other smaller scope packages may be in the form of EPCM contracts. The EPCM contractors will report to the CMs who will ultimately be responsible for ensuring that impacts are minimized, and environmental obligations are met during the Construction phase. For non-EPCM contractors, who will perform some of the minor works on site, the same reporting structure, requirements, and responsibilities will be established as outlined above. BW Gold will maintain overall responsibility for management of the construction and operation of the mine site and will therefore be responsible for establishing employment and contract agreements, communicating environmental requirements, and conducting periodic reviews of performance against stated requirements.

The CM is accountable for ensuring that environmental and regulatory commitments/obligations are being met during the construction phase. The EM will be responsible for ensuring that construction activities are proceeding in accordance with the objectives of the EMS and associated MPs. The EM or designate will be responsible for reporting non-compliance to the CM and EPCM contractor, other contractors, and regulatory agencies, where required. The EM or designate will have the authority to stop any construction

activity that is deemed to pose a risk to the environment; work will only proceed when the identified risk and concern have been addressed and rectified.

Environmental management during operation of the Project will be integrated under the direction of the EM, who will liaise closely with departmental managers and will report directly to the Mine Manager. The EM will be supported by the VP of Environment and Social Responsibility in order to provide an effective and integrated approach to environmental management and ensure adherence to corporate environmental standards. The EM will be accountable for implementing the approved MPs and reviewing them periodically for effectiveness. Departmental area managers (e.g., mining, milling, and plant/site services) will be directly responsible for implementation of the EMS and EMPs relevant to their areas. All employees and contractors are responsible for daily implementation of the practices and policies contained in the EMS.

During closure and post-closure staffing levels will be reduced to align with the level of activity associated with these phases. Prior to initiating closure activities, BW Gold will revisit environmental and health and safety roles and responsibilities to ensure the site is adequately resourced to meet permit monitoring and reporting. The Mine Manager will maintain overall responsibility for management of Closure and Post-closure activities.

Pursuant to condition 19 of the Project's EAC #M19-01, BW Gold has established an Environmental Monitoring Committee (EMC) to facilitate information sharing and provide advice on the development and operation of the Project, and the implementation of EAC Conditions, in a coordinated and collaborative manner. Committee members include representatives of the Environmental Assessment Office (EAO), UFN, LDN, NWFN, StFN, SFN, NFN, Ministry of Energy, Mines and Low Carbon Innovation (EMLI), ENV and Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD).

Pursuant to condition 17 of the EAC, Aboriginal Group Monitor and Monitoring Plan, BW Gold will retain or provide funding to retain a monitor for each Aboriginal Group prior to commencing construction and through all phases of the mine life. The general scope of the monitor's activities will be related to monitoring for potential effects from the Project on the Aboriginal Group's Aboriginal interests.

1.3 Compliance Obligations, Guidelines, and Best Management Practices

1.3.1 Legislation and Regulations

Federal legislation applicable to the WMMP includes:

- *Canadian Environmental Protection Act, 1999*;
- *Canadian Environmental Assessment Act, 2012*;
- *Migratory Birds Convention Act, 1994*, and Migratory Birds Regulations;
- *Species at Risk Act* (SARA), 2002; and
- *United Nations Declaration on the Rights of Indigenous Peoples Act,* 2021.

Provincial legislation applicable to the WMMP includes:

- *Declaration on the Rights of Indigenous Peoples Act,* 2019;
- *Environmental Assessment Act,* 2018;
- *Environmental Management Act,* 2003;
- *Mineral Tenure Act,* 1996;
- *Mines Act,* 1996;
- *Wildlife Act*, 1996 and *Wildlife Act* Permit Regulation, 2000;

- *Forest and Range Practices Act*, 2002; and
- *Water Sustainability Act,* 2014.

1.3.2 Environmental Assessment Certificate, Federal Decision Statement Conditions, and Permitting Requirements

The WMMP addresses EAC Condition 23, which requires the development of a WMMP to establish management and mitigation for wildlife value components, as well as vegetation and ecosystems. The plan also addresses DS Conditions 4.1 to 4.5, 8.1 to 8.16, and 8.21 to 8.22. Concordance tables in Appendices A and B identify the location of requirements in the DS and EAC, respectively.

The Ministry of Energy, Mines and Low Carbon Innovation issued *Mines Act* Permit M-246 on June 22, 2021, approving the Blackwater Early Works Program. The permit contains conditions pertinent to wildlife, including erosion and sediment control, vegetation management, and wildlife protection.

Condition 8 (Wildlife Protection) of Permit M-246 requires BW Gold to:

- Incorporate a no hunting and shooting policy in the mine safety program for the areas covered by the permit; and
- Implement a no fishing and hunting policy for all employees and contractors while on company business or while commuting to and from the mine.

These policies and their implementation are covered in Section 2.1, Training and Awareness.

Potential permits relating to wildlife work include exemptions to the *Wildlife Act* (e.g., nest and beaver dam removal) and scientific collection/salvage permits fall under the Permit Regulation, if applicable.

Blackwater is currently proceeding through additional permit reviews and, as appropriate, this plan will be revised to incorporated future requirements resulting from these processes.

1.3.3 Guidelines and Best Management Practices

Federal, provincial, and regional guidance documents and best management practices (BMP) inform the management and monitoring practices in the WMMP. Several of these documents are referenced in the conditions (EAC and federal DS), as well as in this plan. Key guidance documents include:

- British Columbia 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 BC (RISC 2007).
- British Columbia Conservation Data Centre (CDC) systematically collects and disseminates information on plants, animals, and ecosystems at risk in BC (BC CDC 2021).
- *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 2021b).
- *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 2014a).

- *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).
- ECCC's *Avoidance Guidelines* describe federally supported best practices for avoiding harm to migratory birds (ECCC 2021a).

1.4 Adaptive Management Framework

The WMMP will evolve over time in response to the results of the wildlife monitoring program, changing conditions or development at the site, updates to scientific methods, and through consultation and discussions with relevant stakeholders, including Aboriginal and Indigenous groups. This process of improvement with changing conditions is referred to as Adaptive Management.

Condition 2.5 of the federal DS and condition 3 of the EAC require adaptive management to determine the effectiveness of measures to mitigate the Project effects on wildlife. Adaptive management requirements include:

- The monitoring program that will be used including methods, location, frequency, timing and duration of the monitoring;
- The baseline information that will be used, or collected where existing baseline information is insufficient, to support the monitoring program;
- The scope, content and frequency of reporting of the monitoring results;
- Identification of qualitative and quantitative triggers, which, when observed through monitoring will require development of new mitigation measures to avoid, reduce, and/or remediate effects;
- Methods that will be applied to detect when a numeric trigger, or type or level of change occurs;
- Description of the process and timing to alter existing mitigation measures, or develop new mitigation measures to reduce or avoid effects;
- Identification of the new and/or altered mitigation measures;
- The monitoring program that will be used to determine if the altered or new mitigation measures and/or remediation activities are effectively mitigating or remediating the effects and or avoiding potential effects;
- The scope, content and frequency of reporting on the implementation of altered or new mitigation measures; and
- Statement of Qualified Professional.

Figure 1.4-1 identifies the components of the adaptive management framework:

- Plan – The WMMP includes planned mitigation measures and monitoring programs to meet DS and EAC Conditions and is engaging with Aboriginal and Indigenous groups and relevant federal and provincial authorities on these measures and programs.
- Do – Implementing the mitigation measures as described in Section 3 of the WMMP.
- Monitor – The WMMP includes monitoring programs in Section 4 to detect potential effects and test Application/EIS predictions.
- Adjust – The WMMP defines qualitative and quantitative triggers to measure the level of change relative to baseline conditions in order to determine whether mitigation measures need to be altered or additional mitigation measures implemented.

Figure 1.4-1: Adaptive Management Framework

BW Gold will review and update monitoring programs as needed during the life of the Project. This will include:

- A summary of the monitoring program within the annual WMMP report, and a general statement of effectiveness;
- Recommendations provided by a Qualified Professional (QP) for changes to mitigation measures and the monitoring plan, objectives, frequency, methods, or timing;
- Engagement tracking to record input from the EAO and Aboriginal and Indigenous groups; and
- After the first two years of annual monitoring, a statistical analysis will be conducted to assess the ability of monitoring programs to detect changes at set thresholds and triggers:
  - Statistical analyses will be shared with the EAO, FLNRORD, and Aboriginal group for engagement regarding potential updates to monitoring programs; and
  - Program updates will address shortcomings in the data, for example by changing the number or distribution of survey sites, frequency of monitoring, or survey methods.

Additional specific consultation requirements that will contribute to the ongoing evolution of the WMMP include:

- Updates based on input from the Traditional Knowledge/Traditional Land Use (TK/TLU) Committee which will be established to monitor Project development and provide TK/TLU information for the final Project design, construction, operations, closure and post-closure (Mitigation Table (MT) 13-17).
- Annual meetings regarding moose and grizzly bear management, organized by BW Gold, with the Southern Dakelh Nation Alliance, FLNRORD, and other Aboriginal Groups who wish to participate (e.g., after submission of the annual WMMP Report (Section 5.2; EAC 23.f)).
  - These meetings will include discussion of wildlife initiatives established by the Hubulhsooninats'uhoot'alh: Foundation Framework Agreement (July 22, 2018). When relevant, BW Gold will provide a workplan detailing participation in those initiatives; any monitoring or mitigation actions will be incorporated into the WMMP (EAC Condition 23.g).

- BW Gold will inquire with the groups as required by Condition 23 during Q1 of each year to discuss interest in and set a time for the meeting required by EAC 23.fdescribed above.

- Specific consultation is ongoing with Stellat'en First Nation (StFN) and FLNRORD to address any potential access management issues in the Stellako Wildlife Management Area (WMA), including possible monitoring of Project-related effects and offsetting effects if needed (MT 6-30, 9-35). Consultation to date includes:
  - As required by EAC condition 39 BW Gold developed a Phase 1 final transmission line (TL) routing plan in consultation with the StFN and FLNRORD. The draft plan was submitted to EAO on February 17, 2021 and BW Gold began implementation of the plan shortly thereafter.
  - On March 1, 2021, BW Gold sent a letter to StFN requesting feedback on the TL routing options, including at the Stellako River crossing. The letter included a listing of proposed mitigation measures for the TL. BW Gold did not receive any specific feedback on the letter from StFN, although it was communicated earlier to BW Gold that the preferred routing is the Stellako re-route (which was ultimately selected by BW Gold).
  - On March 1, 2021, BW Gold sent a letter to FLNRORD requesting feedback on the TL routing options, including at the Stellako River crossing. The letter included a listing of proposed mitigation measures for the TL. BW Gold received a response on March 24, 2021 where MFLNRORD advised that they prefer the Stellako re-route (which was ultimately selected by BW Gold). FLNRORD communicated that they had no additional concerns with the re-routes, and expressed their understanding that potential impacts and mitigation strategies will be addressed in the planning documents and specific crossing plans for the Stellako and Nechako Rivers. BW Gold responded on April 13, 2021, acknowledging FLNRORD's letter and setting our next steps.
  - In March 2022, BW Gold met with FLNRORD to discuss the Stellako WMA crossing, mitigation planning and permitting.
  - BW Gold has completed Phase 1 of the final transmission line routing plan and has initiated work on the Phase 2 plan. The Phase 2 plan will be developed in consultation with FLNRORD and Aboriginal groups including StFN. BW Gold intends on engaging with the required parties as part of development of the Phase 2 plan.

When the monitoring program is updated, the updated monitoring plan will be provided to Aboriginal and Indigenous groups and relevant federal and provincial authorities based the EAC and DS Condition requirements.

2. SUPPORT

Several types of support will be provided to employees and subcontractors, including training and supporting materials, SOPs and direction on identifying and responding to wildlife incidents and response plans.

The WMMP references requirements from the provincial EAC (referred to as 'EAC'), the federal DS (referred to as 'DS') and BW Gold's Mitigation Table (referred to as 'MT'), submitted to EAO on September 28, 2018) to address EAC Condition 43 and approved by EAO in November 2020.

2.1 Training and Awareness

Mine personnel and subcontractors receive wildlife training during Site Orientation and during annual refreshers (EAC 23j, MT 6-23, 7-12, 8-12, 9-16, 9-20, 10-16, 11-20, 13-12, 14-11). The EM will review wildlife monitoring results and determine if refresher training is required (e.g., if a habituated animal is observed, or following wildlife incidents or interactions).

The training includes the following:

- Wildlife education and awareness topics:
  - Awareness for safety and environmental importance of key wildlife species, specifically addressing beavers, grizzly bear, caribou, moose, and waterbirds (MT 8-32, 9-27, 10-12, 11-10, 11-22, 11-29, 11-34, 13-20, 13-26, 13-30, 14-25);
  - Bear Awareness Program including notification and response procedures (Appendix C);
  - Reporting protocols for wildlife sightings and incidents. This includes reporting of habitat features (e.g., nest, den, mineral lick; MT 9-21, 13-5);
  - Wildlife sensitive locations and reduced risk timing windows (e.g., active den, nest setbacks/ buffers and environmental feature no-work zones); and
  - Avoiding incidental take for migratory bird nests, including content from ECCC's Avoidance Guidelines (ECCC 2021a).
- Road and traffic management mitigation measures related to wildlife, as described in Section 3.6 (Road and Traffic Management).
- Additional policies relevant to wildlife (EAC 23j, DS 6.10, MT 6-23, 7-12, 8-12, 9-16, 9-20, 10-16, 11-20, 13-12, 14-11):
  - Employees and contractors are prohibited from hunting, trapping, fishing and gathering for purposes not associated with the Project. Members of Aboriginal Groups exercising Aboriginal Interests are exempted where safe to do so;
  - Firearms are prohibited on the mine site; and
  - Personnel are prohibited from feeding and harassing wildlife.
- Project personnel will be provided updates on wildlife issues and the opportunity to report wildlife sightings:
  - Notifications to personnel of any areas with increased wildlife activity (e.g., at locations where wildlife trails cross roads);
  - The inclusion of any changes in wildlife activity in daily briefings, through notification signs, and/or by radio; MT 8-30, 10-28, 13-32);

- Notification of wildlife sensitive periods as they occur (e.g., such as seasonal changes in caribou behaviour/presence; MT 8-33); and
- Use of two-way radios on access roads to facilitate immediate notification of animals along roadways (MT 8-24, 8-28, 9-24, 10-15).

- Additional training for environment staff will include:
  - Recognizing and reporting signs of Chytrid disease in amphibians and white nose syndrome in bats (MT 5-24, 6-25, 7-9, DS 8.13); and
  - Whitebark pine identification and how to minimize disturbance to whitebark pine, including fire suppression effort and importance (MT 5-3, 5-22).

2.2 Related Documents

The WMMP annual report will report on wildlife compliance measures undertaken in a calendar year. The report will be compiled during the Construction and Operations phases of the Project as described in Section 5.2.

Monitoring data from the WMMP annual report will inform the Country Foods Monitoring Plan (EAC 41) and the End Land Use Plan (EAC 25) to incorporate details on habitat use and distribution of key wildlife species.

3. MITIGATION AND MANAGEMENT

The WMMP will be implemented during construction, operations, closure, and post-closure. Protocols will be addressed by Project activity rather than Project phase, because many activities will occur through multiple Project phases. Management and mitigation will continue to evolve over time to ensure programs are effective, efficient and serve WMMP objectives.

BW Gold has followed the environmental mitigation hierarchy when designing mitigation and management, including avoid (through design either spatially or temporally), minimize, restore and offset.

Should the Project go into care and maintenance, the WMMP will be reviewed and updated to include mitigation and monitoring based on the status of the Project and potential risks to wildlife.

Table 3-1 provides an overview of the Project phases where each mitigation is applicable; in each Project phase where the applicable activity is occurring and where there is a reasonable potential for interactions with wildlife. This plan will be updated through the life of the Project, as required, and will be updated as the mine plan evolves, results of monitoring such as water quality and wildlife monitoring, and updates provided by TK and scientific reports.

Table 3-1: Overview of Phases Where Mitigation Measures are Applicable

Section	Mitigation	Construction	Operation	Closure	Post
3.1	Infrastructure Design Management	✓	✓	✓	✓
3.2	Preventative Protocols	✓	✓	✓	✓
3.3	Pre-Clearing and Construction Management	✓	✓		
3.3.1	Sensitive Timing Windows	✓	✓		
3.3.2	Habitat Loss and Alteration Management	✓	✓		
3.4	Transmission Line Management	✓	✓	✓	✓
3.5	Waste Management	✓	✓	✓	✓
3.6	Road and Traffic Management	✓	✓	✓	✓
3.6.1	Transportation and Access	✓	✓	✓	
3.6.2	Wildlife Activity on Roadways	✓	✓	✓	
3.6.3	Road Condition Management	✓	✓	✓	
3.7	Aircraft Management	✓	✓	✓	
3.8	Ecosystem and Plant Species Management	✓	✓	✓	
3.9	Restoration Closure Management		✓	✓	✓
3.10	Deterrence of Wildlife	✓	✓	✓	
3.10.1	Deterring Furbearers from Buildings	✓	✓	✓	
3.10.2	Response and Deterring Habituated Bears	✓	✓	✓	
3.10.3	Deterring Migratory Birds and Toad from Ponds		✓	✓	

3.1 Infrastructure Design Management

Project infrastructure has been designed to avoid and minimize the loss of wildlife sensitive habitat. Infrastructure design mitigations can also reduce sensory (noise and light) disturbance, and reduce the attractiveness of the camp for wildlife. Infrastructure design mitigation is part of Avoidance of potential effects and includes:

- The Project footprint has been minimized and avoids clearing old growth forest, mixed wood forest, wetlands, riparian areas, and lichen-rich stands where possible (MT 6-2, 6-4, 6-9, 6-16, 7-1, 7-5, 7-10, 8-14, 9-1, 9-2, 9-10, 9-39, 10-1, 10-10, 10-11, 10-20, 11-6, 11-9, 12-1, 13-7, 13-9, 13-10, 13-27, 14-1, 14-6, 14-15, 14 20, 14-23).
- The Mine Access Road avoids high elevation ungulate winter range (UWR) on Mount Davidson (UWR HE-1-001; MT 8-2).
- Black spruce forest and sedge meadow habitat are maintained, particularly around wetlands, to benefit dragonfly and butterfly populations. Standard engineering mitigations are used to manage Project effects on the hydrological regimes of wetlands near infrastructure, as described in the Wetlands Management and Offsetting Plan (WMOP; MT 12-11, 12-15, 13-8).
- If any recreation trails are made, they will not be located in sensitive habitat, including grizzly bear or caribou habitat (MT 8-19, 9-17, 11-26, 13-18, 14-16). No recreation trails are currently planned.
- No clearing or development planned for berry and kokanee areas (bear habitat; MT 11-4).
- Design includes vegetated buffers around mine site facilities and roads, except for areas that require management for wildlife and human safety (MT 8-29, 10-26, 11-31).

Infrastructure design mitigations for sensory disturbance to wildlife include:

- Noise abatement is considered in the Noise and Vibration Effects Mitigation and Monitoring Plan (NVEMMP) which is required under EAC condition 21.
- Designs limiting use of outside artificial light, with lighting placed only where necessary for safe operation of the Project (EAC 23k, DS 8.1, MT 7-11, 8-23, 9-4, 10-7). Lighting plans and installed lighting to be reviewed by the EM and a wildlife QP and updated as needed once per year. Mitigation for lighting will begin at construction and continue through to the end of operations. Mitigation to reduce disturbance by lighting on wildlife and attraction of birds, includes:
    - The most important step is downward facing, directional, shielded lighting in work areas and camp (www.darksky.org for more information);
    - Light towers (standard trailer with a generator and high-output work lights) used only at active work sites, and for traffic management, and are otherwise turned off;
    - No decorative lighting or flood lights aimed at buildings;
    - Use motion activated lighting in camps and infrastructure where personnel are working intermittently. Use constant lights at full power only in active work zones;
    - Minimum intensity lighting required for safety;
    - Use Light Emitting Diode (LED) lighting which avoids blue light, no more than 3000 Kelvin; and
    - Lights on towers should be blue or green light instead of white or red, to reduce attractiveness to birds – unless specifically required by Transport Canada.

- Sightlines may be limited along new access roads, where allowable for the safe operation of the road, to reduce sightlines for wolves. Sightline reductions may be achieved by curving the road, allowing roadside vegetation to grow up, and limiting the width of the cleared right of way.

Camp buildings and infrastructure will be designed to exclude wildlife both for wildlife safety and Personnel safety in a process known as “camp hardening”. These measures are best practices used by many remote mining camps in BC and include:

- Managing wastes in a manner that does not attract animals (see Waste Management Plan), including:
  - Storing wastes that may be attractants in bear-proof containers; and
  - Designing waste management buildings and yards with hard surfaces that can be cleaned to avoid odors.
- Waste will be removed from collection sites regularly, incinerated in an approved incinerator or stored in wildlife-proof areas and wildlife-proof buildings until incineration.
- All waste which should not be incinerated will be disposed at an approved disposal site as soon as possible.
- Landfills will be used only for disposal of non-wildlife attracting waste.
- Designing waste management buildings, kitchens, store rooms and dormitories with steel doors to exclude bears and furbearers.
- Installing skirting on trailer-style buildings to prevent animals from getting underneath.
- Installing protective screens over vents and other entry points.
- Installing self-closing doors so animals can’t access buildings.
- Regular road and camp cleanups will be conducted to ensure that no hazardous substances, wires, or loose materials are present to endanger wildlife and to ensure proper storage and disposal of hazardous wastes.
- If bears or furbearers have been observed in camp or in buildings, deter these animals (Section 3.11) and:
  - Review waste management procedures;
  - Review whether personnel are following policies on waste management and not feeding wildlife;
  - Review camp hardening measures; and
  - Adaptively manage the issue through additional education, signage, or additional camp hardening procedures.

3.2 Preventative Protocols

Preventative protocols are proposed to protect wildlife against introduced pathogens and invasive species. These protocols primarily apply to cleaning and transport of equipment between sites, which applies for any pre-clearing and construction work in aquatic habitats (for amphibians) and when working around bat roosts and disturbed habitats, such as roadsides (for invasive plants). Any signs of sick/infected animals or invasive species will be reported to supervisory personnel and regulators will be promptly notified.

Chytridiomycosis is an infectious disease in amphibians transmitted by the aquatic-spreading chytrid fungus. Prevention protocols require cleaning and possibly disinfecting equipment brought to the site that might work in wetland areas (MT 5-24, 6-25), including construction and clearing equipment. Cleaning of equipment upon arrival at site will be conducted following Julian et al. (2020), including:

- Removing foreign material and sediment prior to arrival at work areas (i.e., vegetated or wetland sites). Cleaning includes detaching parts and accessories to access all surface areas, and removing interior seats and mats. If hand cleaning is not sufficient, equipment will be pressure washed.
- Equipment arriving from areas where chytrid disease is known to occur (e.g., Alberta and Saskatchewan) will also be disinfected using chemicals such as Bleach (6% NaClO) or Vircon (1% KPMS; see Julian et al. [2020] for protocol details).
- General cleaning protocols for field work around wetlands (i.e., amphibian surveys, salvage, wetlands surveying) following Decontamination Protocol for Field Work with Amphibians and Reptiles in Canada (Canadian Herpetofauna Health Working Group 2017) or BC MOE (2008).

Bat populations are threatened by white nose syndrome, a deadly and rapidly spreading disease caused by a fungus (*Pseudogymnoascus destructans*). Prevention protocols, including reporting and cleaning procedures are described in: *Western Canada White Nose Syndrome Transmission Prevention* (CWHC 2015; FD 8.13, MT 7-9).

The IPMP includes invasive plant prevention plans and detection strategies, and an action protocol to be used if invasive plants are detected (MT 5-24, 6-25, 14-29).

3.3 Pre-clearing and Construction Management

Clearing and construction activities may occur during multiple Project phases and at different spatial scales (e.g., primary site construction or annual brush clearing in localized areas). Clearing is planned to occur outside sensitive timing windows, where possible, with pre-clearing surveys and mitigation if clearing must occur during sensitive timing windows.

3.3.1 Sensitive Timing Windows

Federal Condition 8.9 and EAC Condition 23.h.ii require BW Gold to identify sensitive periods for wildlife, including moose, grizzly bear, furbearers (wolverine, American marten, fisher), bats, birds (waterbirds and forest and grassland birds), amphibians (western toad) and southern mountain caribou. Raptors are discussed separately from other forest and grassland birds because of their earlier nesting period.

Federal Condition 8.9.1 requires BW Gold to identify time periods from the British Columbia's *Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area* (the Compendium, FLNRO 2014b) that compiles sensitive wildlife periods recommended by the Canadian Wildlife Service, FLNRORD and academic sources. Likewise, provincial Condition 23.h.ii).ii requires the Holder to document how it has taken into consideration the Compendium (FLNRO 2014b).

Wildlife sensitive periods and associated mitigation are listed in Table 3.3-1. These periods and mitigation were assembled by first reviewing the Compendium for timing windows and mitigation. The federal DS and provincial EAC were then reviewed and if a specific date or mitigation was listed that replaced those from the compendium, then that date or mitigation was used. The mitigation table was then reviewed and where a more conservative sensitive date or mitigation was listed, that mitigation was used in lieu of the Compendium. Finally, scientific studies were reviewed that provide dates for mitigation. If those dates are more conservative or replace those in the Compendium, the more recent dates were used instead.

The Compendium was then reviewed against the existing mitigation requirements in the DS, EAC and Mitigation Table to identify if there are any additional mitigation measures that were not already addressed. These mitigation measures were then added to the WMMP. Note that in many cases, the Compendium is focused on providing mitigation for forestry activities, so not all of the mitigations are applicable to a mining project.

Table 3.3-1: Wildlife Sensitive Periods and Associated Mitigation

Valued Component	Guideline Period	Season/Habitat for Feature	Summary of Mitigation	Guideline Buffers (m)	References
Amphibians: Western Toad	Apr 1 – Sep 30	Wetlands (breeding sites)	■ If clearing is required during the breeding season, conduct pre-construction surveys to identify breeding sites, and pre-clearing surveys to confirm occupancy ■ Establish buffer zones around breeding sites ■ Amphibian salvage will be conducted if necessary, in consultation with ECCC and Indigenous groups	30 m	MT 6-14, 6-15, DS 8.9, 8.10, 8.11 (BC MOE 2014b; ECCC 2016; MFLNRO 2016)
Bats: Little Brown Myotis and Northern Myotis	Roosts: May 15 – Sep 30 Hibernacula: Oct 1 – May 31	Roosts (summer), Hibernacula (winter)	■ Pre-construction surveys to determine the distribution of little brown myotis and northern myotis ■ Establish buffer zones around active hibernacula and active roosts ■ Contact FLNRORD if Project activities will occur within a roost buffer ■ Monitor buffer zones for ongoing use ■ If surveys identify loss of little brown myotis and northern myotis roosting habitat, implement offsetting through roosting structures maintained until natural roosting habitat is restored	100 m – up to 1 km management zones for blasting near significant roosts/ hibernacula	EAC 23c, DS 8.14, 8.15 (BC MFLNRO 2014; Holroyd and Craig 2016)
Birds: Forest and Grassland Birds, and Waterbirds	Apr 15 – Aug 31 Clark's Nutcracker: Mar 15 – Jul 30	Nests, eggs, and young	■ Pre-construction surveys for habitat of species at risk ■ If clearing required during breeding bird window, conduct pre-clearing surveys for bird nests ■ surveys will include habitat considerations and protocols for species at risk ■ Establish buffer zones around active nests	30 m - 100 m	EAC 23c, MT 9-3, DS 4.1 (ECCC 2017, 2019; Birds Canada 2021)
Raptors	Mar 15 – Aug 15	Nests, eggs, and young	■ If clearing required during raptor breeding window, conduct pre-clearing surveys to identify raptor nests in suitable habitat: mature forest, riparian, or cliff areas ■ Establish buffer zones around active nests ■ Apply for permits to remove or relocate unoccupied nests if necessary	100 m – 500 m	BC *Wildlife Act* (1996) (BC MOE 2013; Birds Canada 2021)

Valued Component	Guideline Period	Season/Habitat for Feature	Summary of Mitigation	Guideline Buffers (m)	References
Caribou	Jan 15 – Jul 15	Ungulate Winter Range	■ Conduct pre-construction surveys for caribou habitat and mineral licks ■ Observations of caribou on the mine site during construction may result in a work stoppage until the caribou moves off. See CMMP for management details. ■ No active deterrence of caribou is permitted unless caribou are in a location that is dangerous. ■ Aircraft minimum altitude 400 m in the UWR	-	EAC 23c, DS 8.6, 8.17 (BC MFLNRO 2014)
Furbearers	Fisher: Mar 15 – Jun 30 American marten: March 1 – Sept 30 Wolverine: Feb 1 – Jun 30 Black and Grizzly Bear: Oct 1 – Apr 15	Dens	■ If clearing required during denning period, conduct pre-construction surveys for denning habitat of: o American marten o Fisher o Grizzly bear o Black bear o Wolverine ■ Establish buffer zones around denning features, including suitable denning habitat for fisher or marten denning, although dens will not be individually identified	60 m (Grizzly and Black Bear) – 500 m (Wolverine)	EAC 23c, DS 8.9, 8.10 (BC MFLNRO 2014)

Federal Condition 8.9.2 requires BW Gold to notify, prior to construction, the Agency and Indigenous groups of these time periods and of the areas within which each of these time periods shall apply. BW Gold will notify the Agency and Indigenous of wildlife sensitive timing periods and areas by sending the WMMP for review.

Federal Condition 8.9.3 requires BW Gold to conduct construction activities outside of sensitive life stages unless not technically feasible. Clearing and construction activities may disturb wildlife and their residences (dens and nests) during specified times of year.

Provincial Condition 23.c requires that pre-construction surveys for wildlife should clearing or construction be required during sensitive periods. Sensitive periods, locations for surveys and survey methods are discussed in Section 4.

When avoidance of sensitive timing periods is not possible, mitigation measures will be implemented to minimize disturbance to wildlife. Mitigation measures, including buffer zones, will be outlined by a QP on a site-specific basis following a risk-based assessment of the species in question, the habitat, and the type of Project activity and its potential to disturb wildlife. Management decisions will be made in consultation with Indigenous groups (DS 4.5, 8.10) and relevant authorities (EAC 23c, 23h, DS 4.1, 8.9, 8.10, 8.11, MT 10-22).

3.3.2 Habitat Loss and Alteration Management

Wildlife habitat loss and alteration is to be avoided or minimized through construction mitigations. These mitigations are primarily detailed in other management plans, as outlined below.

The CEMP details measures for minimizing habitat loss and alteration during construction, with key actions including the following:

- Minimize overall clearing and ground disturbance during construction by:
  - Flagging sensitive habitats to minimize ground and vegetation disturbance in areas adjacent to footprints (MT 5-2, 5-11, 13-3);
  - Flagging designated areas to lay-down tools and machinery;
  - Avoiding grubbing, stripping, and removal of shrubs and herbaceous species in areas requiring clearing, to retain the topsoil and vegetation root mat (MT 5-1);
  - Implementing the VMP, with additional measures to minimize ground disturbance and damage (MT 8-16, 10-25, 11-16, 12-12);
  - Progressively reclaiming roads and infrastructure when no longer in use to encourage the return of functioning habitat, including restoring the existing exploration access road during the Construction phase of the Project (MT 8-27, 9-36);
  - Using existing roads and cleared or disturbed areas rather than disturbing new areas (MT 5-12, 9-11); and
  - Retaining coarse woody debris where appropriate for micro-shelter habitat (MT 6-11, 9-6) Locations of coarse woody debris piles/retention will be directed by a qualified professional on a site-specific basis.
- Mitigate for loss and degradation of adjacent riparian wildlife habitats by:
  - Designating well demarcated no-work zones and management work zones with specific restrictions, e.g., no heavy machinery (MT 6-5, 7-14, 9-9, 10-5, 12-4, 14-2,14-24);
  - For wetlands adjacent to work areas which will be maintained, implement a 30 m vegetation buffer around the wetland (MT 13-14);

  - Employing additional setbacks in accordance with best management practices (BC MFLNRO 2014; MT 6-5, 7-14, 9-9, 10-5, 12-4, 14-2,14-24); and
  - Following Approved Work Practices for Managing Riparian Vegetation (BC Hydro 2003; MT 6-10, 6-17).

- Mitigate for edge effects created from clearing forest by:
  - Clearing as little vegetation as possible to limit the total length of forest edge created, and thereby the total forested area potentially affected by edge effects (MT 9-39);
  - Retaining and enhancing forest edge habitat along road areas (i.e., restoration of forest habitat along edge after clearing activities, where possible for safety considerations) to provide escape or thermal cover for birds (MT 9-5);
  - Assessing new edge areas for windthrow risk, and employing strategies to reduce windthrow where risk is high, including feathering, topping trees, thinning the crowns of trees, and other management strategies described in the *Windthrow Management Manual* (Zielke et al. 2010; MT 5-13, 9-37); and
  - Inspect edges for potential hazard trees that may fall into the mine footprint and may be a danger to personnel or equipment (MT 9-38).

The SEPSCP provides measures for minimizing erosion effects and changes to natural drainages and watercourses (MT 5-7, 6-6, 6-20, 6-21, 12-5, 12-7, 12-8, 13-11, 14-3). These measures will be implemented prior to construction and will be maintained throughout the construction phase and include the following:

- Design and install of culverts to maintain or enhance existing drainages;
- Avoid creating outlets that drain wetlands or constrict the natural outlet during construction;
- Employ measures for proper ditching, reducing slopes, and correct placement of soil salvage piles; and
- Use diversion and runoff collection ditches, silt fences, sediment containment structures, sediment traps, erosion control mats, and flocculants.

EAC Condition 23.e requires BW Gold to describe:

> *e) the means by which the Holder will confirm effects on wildlife and ecosystems in the area flooded in the Davidson Creek watershed upstream of the TSF and the mitigation measures that will be applied to address identified effects;*

The loss of wildlife habitat in the Project footprint, including in the flooded areas of the Davidson Creek watershed is described in detail in Section 4.4.3.1, Habitat Loss Monitoring. This section also includes triggers for adaptive management, and proposed adaptive management measures should these thresholds be exceeded. An important threshold for this analysis is comparing the as-built footprint and area of habitat lost to that predicted for the Project in the EAC Application.

Loss of vegetation follows the same procedure as wildlife habitat loss, using a GIS-based approach to compare predicted loss to actual loss, and is discussed in the VMP, Section 9, Monitoring.

Loss of wetland area also follows the same procedure as measuring wildlife habitat loss, using a GIS-based approach and is discussed in the draft WMOP, Section 11.3, Monitoring Loss of Wetlands in the Project footprint during All Phases.

3.4 Transmission Line Management

Management for wildlife in relation to the transmission line focuses on potential risks to wildlife, including habitat loss and disturbance and bird mortality from collision or electrocution. These risks are mitigated through design elements, construction management, and active habitat management. Monitoring programs will also be implemented to assess potential ongoing effects of the transmission line on birds (Section 4.7).

The transmission line alignment is located in disturbed areas while avoiding wetlands and other areas of high bird activity (MT 6-1, 7-4, 8-5, 9-12, 9-31, 10-2, 11-1, 12-2, 13-1).

Construction management for the transmission line is detailed in the CEMP, including:

- Implementation of best management practices from BC Hydro's *Integrated Vegetation Management Plan* (BC Hydro 2016; MT 5-14);
- Use of existing roads, linear disturbances, and cleared areas to support transmission line construction. New roads or trails will be temporary and located within the transmission line right-of-way, to limit the creation of additional early seral habitat (MT 6-3, 8-6, 8-37, 9-13, 9-34, 10-3, 11-2, 12-3, 12-10, 13-2, 13-31, 14-12);
- Establishment of the timing and means by which all newly created access roads will be decommissioned and revegetated after they are no longer needed (EAC 23I(iii));
- Establishment of the timing and means by which all newly created access roads will be decommissioned and revegetated after they are no longer needed (EAC 23I(iii));
    - Details on the timing and means of road decommissioning and revegetation after they are no longer needed for Construction, the circumstances under which access may be re-established for maintenance and/or repairs of the transmission line, and the means by which roads re-opened for maintenance or repair activity will be decommissioned and revegetated following the maintenance and/or repair activities will be documented in the Vegetation and Access Management Plan for the Transmission Line, which will be provided 30 days prior to the commencement of construction of the transmission line.
    - The methods for road removal will be site-dependent, but will include removal/regrading the road surface, surface preparation for planting, planting of native vegetation, and access control through mounding, placing rocks or logs across the road route.
- Deployment of markers on the shield wires of transmission lines and phase conductors of distribution lines, to improve visibility of the lines for birds (MT 9-32, 14-18);
- Inspection of forest edges for potential hazard trees that may fall into the transmission line right-of-way (MT 9-38); and
- Use of helicopters to support transmission line construction in steep areas (MT 10-4, 11-3).

Habitat management around the transmission line will help restore functional habitat post-construction. Approaches for habitat management include:

- Deploying berms, woody debris, and/or other visual barriers in appropriate locations along the transmission line to facilitate cover and movement for furbearers. Woody debris will also be deposited along upland slopes, between rocks, and parallel and perpendicular to slopes (EAC 23.I, DS 8.8, MT 10-6);

- Maintaining vegetation under the transmission line right-of-way to a minimum height of 1 metre from the ground, except where not feasible for safety reasons (e.g., at the location of the tower bases, guy anchor points and along the transmission line access roads; EAC 23I, DS 8.7):
  - BW Gold will inform vegetation management contractors that after vegetation has grown to 1 m of height or more, vegetation is required to be maintained at least at 1 m above ground, and will inspect the resulting work in the right of way during and following completion of vegetation management activities.
  - Contractors will have the option to decide on how implement this requirement, but it is suggested that: 1) hand fellers have a 1 m marking rod to ensure vegetation is cut at least 1 m above ground, and 2) summer machine-based clearing be conducted with a device that can clear above the ground surface, with a measuring device or other mechanism to ensure at least 1 m cut height, and 3) in the case of winter-based vegetation clearing when snow is present, a process is developed to ensure vegetation is cut at least 1 m from the ground (which may include requirements for snow depth measurements).
- Allowing vegetation growth to reach ½ meter height within 5 years (MT 13-28, 14-7);
- Adaptively managing reclamation sites to minimize use by predators (e.g., wolves), by establishing visual barriers, as directed by a qualified professional, to reduce sight lines for predators (EAC 23.I(ii));
- Assessing the transmission line to identify areas of potentially higher bird mortality risk, so that markers can be deployed for better visibility to birds (MT 9-32, 14-18). Mitigation effectiveness will be confirmed via a follow-up monitoring program (Section 4.7); and
- Addressing any potential access management issues in the Stellako Wildlife Management Area (WMA), including possible monitoring of Project-related effects and offsetting effects if needed, as determined in consultation with the Stellat'en First Nation and FLNRORD (MT 6-30, 9-35).

3.5 Waste Management

Waste management mitigation measures are implemented during all phases of the Project to manage risks to wildlife from attraction, entrapment, toxic exposure, and habitat loss or alteration. Waste management includes waste water, effluents, mine tailings, food waste, and human waste. The Waste Management Plan describes mitigation measures will detail relevant mitigations, including (MT 8-31, 10-27, 11-33, 13-35):

- Implementing practices that minimize odours from human-generated wastes:
  - Incinerate or back-haul wastes from the site to reduce odours that may attract wildlife; and
  - Wastes that may contain food residue despite best efforts at rinsing will be stored indoors;
- Implementing a bear awareness program (Appendix C);
- Scheduling timely and appropriate waste disposal;
- In addition, waste management includes:
  - Storing wastes in wildlife-proof containers, including trash cans and dumpsters with a bear-resistant design and considerations to contain odours; and
  - Waste containers will be repaired and maintained regularly.

Two additional management plans incorporate mitigations for waste management:

- The CMSTHP outlines the use and disposal hazardous materials, including explosives (MT 6-22).

- The FMSCP and AEMP include measures to mitigate impacts to amphibians and invertebrates, including:
  - Proper handling of hydrocarbons in the FMSCP (MT 12-9); and
  - Methods to ensure discharge effluent meets guidelines for the protection of aquatic life and/or agreed to site-specific water quality objectives in the AEMP (MT 6-8, 12-6).

3.6 Road and Traffic Management

Roads can pose a risk to wildlife through disturbance and habitat alteration (e.g., noise, dust, altered vegetation along the roadside) as well as increased mortality risk (e.g., collisions, increased access for hunting and predators). Effective management of these risks involves minimizing road traffic and access, as well as implementing safe speed limits, signage to protect wildlife, and managing the condition of the road to reduce wildlife hazards.

3.6.1 Transportation and Access

Road access is controlled via the Mine Site Traffic Control Plan (MSTCP; MT 8-34, 8-35, 9-14, 10-21). Measures detailed in this plan include:

- Project roads are closed to the public (EAC 23j, MT 6-23, 7-12, 7-13, 8-7, 8-12, 8-13, 8-21, 9-16, 9-19, 9-20, 10-16, 10-17, 11-15, 11-20, 11-23, 11-24, 12-13, 13-12, 13-15, 13-22, 14-8, 14-11, 14-13 and 14-21);
- Restriction of Project vehicles to designated roads and trails, and prohibition of Project vehicles for recreational purposes (MT 6-18);
- Limiting the use of private vehicle access for authorized personnel only (MT 6-18);
- Using buses to transport workers to the mine site during Operations, and by bus and airplane during construction to reduce emissions and minimize traffic along the Kluskus and Kluskus-Otsa Forest Service Roads (FSR; EAC 37);
- Notifying other commercial users of Kluskus FSR regarding relevant wildlife safety provisions along roadways through signage and participation in the industrial road users group, with relevant measures incorporated into road use agreements (MT 10-24);
- Participation by BW Gold in the Kluskus FSR industrial road users group and safety groups throughout the Construction and Operations phases (MT 13-29, 13-36);
- Access road use and haulage operating protocols:
  - When transiting to/from camp on the Kluskus Forest Service Road (FSR) – check in with main office in Vanderhoof or at the camp before leaving, and when arriving at camp,
  - Radio positions along the FSR,
  - No speeding on the FSR,
  - Report any wildlife sightings, incidents or accidents on the FSR, and
  - Additional details are included in the Journey Management Package given to all Personnel;
- Speed limits on all Project roads are set at a maximum of 50 km/h. Speed limits are clearly marked through signage and enforced through periodic checks using a radar speed gun. Personnel caught speeding will face disciplinary measures (EAC 23, DS 6.2, MT 7-3, 8-8).

3.6.2 Wildlife Activity on Roadways

Wildlife interactions along roadways are mitigated, including consideration of areas that may be frequented or used by caribou, moose, grizzly bear, birds, and amphibians (MT 7-13, 8-7, 8-13, 8-21, 9-19, 10-17, 11-15, 11-23, 11-24, 12-13, 13-15, 13-22, 14-8, 14-13, 14-21). Measures include:

- 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 (MT 8-24, 8-28, 9-24, 10-15, 11-27, 13-23).
- All wildlife sightings, interactions, and incidents will be recorded and reported to mine environmental and other relevant personnel as soon as safe to do so.
- Staff will be made aware of any locations of high animal activity on access roads and the appropriate actions to be taken, including seasonal changes in wildlife behaviour or presence (Section 2.1; MT 8-30, 8-33, 11-32, 13-32).
- Wildlife will be given the right of way along all Project-controlled roads, and site orientation will include measures for avoidance of vehicle/wildlife encounters (Section 2.1; MT 6-24, 8-33, 9-20, 11-19).
- Wildlife crossing signs will be posted where identified wildlife corridors intersect project access roads, as identified through pre-construction surveys. This includes identification of amphibian crossings, such as near potential toad breeding sites (EAC 23.m(ii), EAC 23k, DS 8.2, MT 6-27, 6-28):
  - Wildlife crossings have been identified during pre-construction habitat surveys conducted during summer of 2021 (Section 4.1);
  - If crossings are identified on the Kluskus and Kluskus-Ootsa FSRs, BW Gold will identify the crossings to FLRNORD and offer to install and maintain wildlife crossing signs (EAC 23.m(ii)):
    - Crossings will be identified to FLNRORD in writing (either via memo or email) by providing a location (GPS point), describing how the crossing was identified (incidental vs. monitoring program), any camera or other monitoring data available, and any other evidence on what species are using the trail/crossing, and sensitive seasons for those species,
  - Signage will be maintained and adaptively managed through all phases of the Project (DS 8.2);
  - Signs will be posted along Project access roads to identify caribou sensitive areas, including migration routes and seasonal feeding areas (MT 8-8); and
  - Cameras may be used to monitor trails where they cross the road, or at locations where breaks have been plowed to allow crossing by moose (MT14-17).
- Wildlife incidents or mortalities will be addressed with adaptive management measures as outlined in Section 1.4 (MT 6-27, 6-28).
- If amphibian mortality on roadways is identified along project roads, adaptive management measures will be implemented under the direction of a QP to determine the appropriate additional mitigation, e.g., warning signage, drift fencing to guide amphibians away from the road, assisted crossing, tunnel and fence systems, or limitations on timing of traffic movement in that area (MT 6-28). See also Section 4.1 on for toad monitoring and adaptive management responses.

3.6.3 Road Condition Management

Project roads include the Mine Access Road, mine site roads, airstrip road and transmission line access roads (DS 1.31). Mitigations on Project roads to reduce wildlife attraction to roads and potential collision or predation hazards include:

- Roadsides will be revegetated with native species that avoid attraction of wildlife (i.e., no clover or other highly palatable species), as detailed in the VMP (MT 6-26, 8-11, 10-14, 11-13, 14-10, 8-10, 9-18, 10-18, 11-12, 13-16, 14-9).
- Road salts will not be used for de-icing, unless other methods for de-icing and traction control do not meet safety requirements (DS 8.3, MT 8-10, 9-18, 10-18, 11-12, 13-16, 14-9).
- Carrion will be removed from roads promptly once reported (ideally within 24 hrs). Carrion management methods will be established in consultation with relevant authorities, and Aboriginal and Indigenous groups:
  - The EAC specifies relocating carrion to nearby areas to serve as a food source for wildlife, unless FLNRORD is not able to authorize removal and relocation (EAC 23.m, DS 8.4, 8-10, 9-18, 10-18, 11-12, 13-16, 14-9).
  - The EM will decide on the appropriate management response to deal with carrion on a case by case basis, with the following guidelines.
    - Industry best-practice is to remove carrion from the road to prevent scavengers from being attracted to the road. Therefore, any small carrion (e.g., squirrels, rabbits) will be moved ~50 m away from the road and large carrion (e.g., deer) will be moved ~500 m away from the road. This will satisfy the condition of the EAC of leaving the carrion “nearby” for scavengers but protect scavengers from possible vehicle collisions on the road.
    - For any on-site carrion, it will be removed from the mine site or incinerated to reduce the chance of attracting scavengers to the mine site, where they may be at risk of vehicle collisions and to keep Project personnel safe.
  - FLNRORD will be notified via email within 72 hours of carrion resulting from road collisions (EAC 23m(iii)) as described in Section 5.2.4.
- Dust suppression measures will be implemented to allow good line of sight, as defined in the AQDMP (MT 8-9, 8-33, 9-15, 10-13, 11-11, 13-25, 14-14).
- Manage snow bank heights using blading or other clearing techniques, and escape pathways will be maintained at wildlife corridors along roadways to keep banks and pathways within heights decided in consultation with regulators, and Aboriginal and Indigenous groups once the road is constructed, monitored and reported in the annual WMMP Report (DS 8.5, MT 10-23, 11-30).
- Breaks in snowbanks will be monitored using trail cameras (MT 14-17).

3.7 Aircraft Management

Aircraft will be managed to reduce the risk of disturbing wildlife as follows (8-18, 8-26):

- Educate pilots on the importance of limiting helicopter landings near identified sensitive habitat features, e.g., active dens, roosts, hibernacula (BC MFLNRO 2014).
- Ensuring runways and landing areas are clear of wildlife prior to take-off/ landing. Deter birds if they congregate at landing areas (Section 3.11).

- Maintaining sufficient height above ground, when safe, to minimize disturbance to caribou. This includes 400 m (1,300 ft) altitude above the UWR (MT 8-26 and FLNRO 2014).

3.8 Ecosystem and Plant Species Management

EAC 23a requires "the means by which the mitigation measures identified in the mitigations tables [for] Ecosystem Composition and Plant species and Ecosystems at Risk will be implemented", which are described in the following plans:

- The Vegetation Management Plan (VMP) includes plant management relevant to wildlife and includes limitations of herbicide use (compliance with the StFN [and NWFN] herbicide use policy (MT 5-25).
- Mitigation measures for plants and ecosystems are included in the Invasive Plant Management Plan (IPMP), which address the prevention and detection of invasive plants (Section 3.2; MT 3-6, 14-29).
- The Wetlands Offsetting and Management Plan (WOMP) includes management of wetlands such as setbacks, as well as an offsetting program to replace lost wetlands due to construction.
- The Whitebark Pine Management Plan (WPMP) includes a monitoring program and management plan for fire suppression. Measures to mitigate impacts on WPMP include (DS 8.20, MT 5-5, 5-15, 5-16):
  - Cone collection and seedling propagation, and potentially enhancing stands on the mine site to improve conditions for whitebark pine survival and recruitment;
  - Measures to manage blister rust and mountain pine beetle, including rust screening trials of seedlings to identify rust resistance, and application of verbenone for rust resistant trees if a mountain pine beetle outbreak occurs (MT 5-18, 5-23); and
  - Adaptive management actions if Clark's nutcracker are not sufficiently propagating whitebark pine cones (as determined through monitoring of Clark's nutcracker).

3.9 Restoration Closure Management

Restoration measures are intended to reduce the net habitat loss and improve habitat quality for wildlife at closure. The Reclamation and Closure Plan and the End Land Use plan describe the wildlife habitat goals for the Project site, and the reclamation and restoration required to meet these goals. For example, construction access areas will be reclaimed and restored back to their natural vegetative state once they are no longer in use (as detailed in the CEMP; MT 11-14, 5-10, 9-36, 8-27, 5-9).

Additional comprehensive reclamation and restoration measures will be implemented upon mine closure. Habitat restoration upon mine closure will assess appropriate habitats capable of supporting caribou, moose, grizzly bear, forest and grassland birds, and waterbirds. Reclamation measures will include consideration of caribou habitat restoration measures in *Recovery Strategy for the Woodland Caribou, Southern Mountain Population* (EC 2014; MT 8-22, 10-9, 13-21, 14-5, 11-8).

3.10 Deterrence of Wildlife

Wildlife may be deterred from Project facilities in some circumstances:

- When deterrence is for their own protection (MT 9-23, 10-19, 11-21, 11-28, 13-24, 14-22);
- The plan for deterring wildlife in the WMMP (this section) is reviewed and pre-approved by the provincial Conservation Officer Service (MT 9-23, 10-19, 11-21, 11-28, 13-24, 14-22);
- Deter migratory birds from using or frequenting the tailings storage facility, reclamation wetlands, pit lake and sediment control ponds until such time that water quality in these structures meets

legislative requirements and water quality objectives identified with an ecological risk-based approach (DS 4.2); and

- Deter western toads from tailings storage facility, reclamation wetlands, pit lake, sediment control ponds, and environmental control dam until such time that water meets British Columbia's Water Quality Guidelines for the Protection of Wildlife and from project roads during construction, operation and decommissioning (DS 8.12).

3.10.1 Deterring Furbearers from Buildings

Furbearers, such as American marten and fisher, can be attracted by food or waste and may enter unsecured buildings looking for food. Furbearers entering camp buildings is an issue at most mining camps in rural BC, where they can become injured, cause property damage, or pose a health and safety risk for Project personnel.

Mitigation to exclude furbearers from buildings (camp hardening) is discussed in Section 3.1, Infrastructure Design Management, and includes secure skirting on trailer-style buildings, metal screens over vents, metal door sills, and practices such as keeping doors shut.

If a furbearer has gained access to a building, Project personnel should report observations to the EM. The EM will review and adaptively manage the furbearer, which may include:

- Review of how the animal entered the building;
- Repairs/additions to the building to exclude the furbearer – e.g., additional skirting, screens, or covers on wooden parts of buildings; and
- Trapping and translocation of the furbearer after consultation with the UFN/LDN and BC Conservation Officer Service.

3.10.2 Response and Deterring Habituated Bears

Grizzly and black bears can become habituated to camps if they can access food or are attracted by the smells from food or waste. If a bear has received a food reward or looses its innate fear of humans, the animal can become a safety risk to Project personnel and should be deterred for its own safety.

The following management options are meant to ensure the safety of personnel, and dissuade habituated or aggressive bears from visiting the site. Ideally, this list of options would be followed sequentially as a situation develops, but in some circumstances some of the management responses are not feasible and managers may choose to escalate the actions taken in response to an aggressive, predatory, or injured animal as described in Table 3.10-1:

- Monitoring: Report and record incidental wildlife sightings and signs;
- Post warnings: Provide accurate and current information of all potentially dangerous wildlife in the area;
- Area closures: Restrict worker access to areas with problem wildlife, pending suitable controls;
- Adverse conditioning (AVCD): Apply AVCD activities to problem wildlife to prevent or reverse habituation; and
- Destruction: Following consultation with UFN/LDN and the BC Conservation Officer Service, the Service may choose destruction for the bear if the animal is considered to pose an unacceptable hazard to human safety.

Table 3.10-1: Management Responses to Human-Animal Interactions

Type of Human-Animal Interaction	Management Response Options				
	Monitor	Post Warning	Area Closure	AVCD	Destroy
1. Animal sighting or sign reported	X	X			
2. Animal showing normal feeding behaviour and avoids people	X	X			
3. Animal reacting defensively following surprise or provoked encounter (defensive aggression)	X	X	X		
4. Animal tolerates people but ignores them and their facilities (no threat present)	X	X	X	X	
5. Animal shows repeated interest in people and/or human facilities, which will likely result in food-conditioning or close approaches (habituated)	X	X	X	X	
6. Animal receives minimal or low-level reinforcement to unnatural food sources (mildly food-conditioned)	X	X	X	X	
7. Animal is heavily habituated to people and has repeatedly obtained unnatural foods (food-conditioned)	X	X	X	X	
8. Animal has previously been relocated and is unlikely to change its behaviour		X	X	X	X
9. Animal displays aggressive, offensive, or predatory behaviour and is an imminent threat to human safety		X	X	X	X

Repeated observations of bears in camp or at a remote work site will trigger adaptive management. The EM will review whether there is a reason why the animal has been observed, and will review waste management, whether food or wastes have been left out, whether personnel have been feeding bears, and search for other attractants. The EM will adaptively manage the situation to remove the attractants, which may include:

- Refresher training for Project personnel on policies related to wildlife attractants, feeding, and waste management;
- Posting signage or updates in daily safety briefings to remind workers of their training and responsibilities;
- Update the waste management plan; and/or
- Update the waste management facilities where there are deficiencies, such as stronger doors, cleaning the site, etc.

The EM will record observations of bears, will communicate with UFN/LDN before management response if time allows, and will report to the UFN/LDN and CO after any management is taken. Records will be reported in the WMMP report at the end of the year.

3.10.3 Deterring Migratory Birds, Toads and Furbearers from Project Ponds

Specific management and mitigation actions will be implemented for the TSF and other facility waterbodies to deter migratory birds and amphibians (EAC 23k, DS 4.2, 8.12). The Mine Site Water and Discharge Monitoring and Management Plan (Appendix 9-E) describes the mine site water sampling program.

Monitoring for toads in project ponds is located in Section 4.1.3.4 (Facility Waterbody Monitoring) which indicates that surveys will occur annually. Monitoring for waterbirds and furbearers in project ponds is located in Section 4.7.3.9 (Facility Waterbody Monitoring) which indicates that surveys will occur continuously using wildlife cameras and be analysed yearly.

The need for wildlife deterrence will be informed by ecological risk assessment based on water quality monitoring data for each pond and the Conceptual Site Model (CSM report), which describes water quality guidelines applicable to wildlife (collectively referred to as WQG-WL) considering:

- BC approved or working water quality guidelines for the protection of wildlife or livestock (BC ENV 2019a, 2021).
- Canadian Council of Ministers of the Environment water quality guidelines for the protection of livestock (CCME 2021d).
- BC *Contaminated Sites Regulation* (Schedule 3.2 generic numerical standards for livestock use).
- The results of this risk assessment may indicate that wildlife deterrence is only required for certain water features or for certain seasons. If deterrence is required:
    - Deterrence methods will be employed to prevent wildlife use of the TSF, Pit Lake, sediment control ponds, and environmental control dam until water quality parameter permit limits.
- Several types of effective deterrence methods may be used. The choice of which method to use will depend on what types of species are present, experience on site, and the results of mitigation – which may require cycling different methods, including:
    - Sound deterrents (e.g., air cannons) provide a cost effective primary deterrent option, but are not appropriate for all areas as the sound can disturb other wildlife;
    - Visual deterrents (e.g., representations of predators or humans), which may be used in conjunction with sound deterrents to improve effectiveness if needed; and
    - Physical deterrents (e.g., nets or flotation balls to prevent water access) are most effective in smaller waterbodies such as sediment control ponds.
- Success of deterrence methods will be monitored by remote cameras and through the incidental wildlife reporting program (MT 14-17; Section 4.7). Water quality monitoring will be ongoing to inform adaptive management needs. Adaptive management will be addressed under the following triggers (MT 6-13, 9-22, 14-7, 14-19):
    - If monitoring indicates birds, amphibians or other wildlife such as furbearers are frequenting project waterbodies, additional deterrence methods will be added (e.g., adding visual or physical deterrents);
    - If water quality objectives are met, deterrence methods can be lifted; and
    - If water quality drops below objectives, deterrence methods will be re-implemented.

4. SPECIES-SPECIFIC MITIGATION, MONITORING, AND ADAPTIVE MANAGEMENT

Monitoring programs have been designed for specific wildlife species and to evaluate mitigation measures, which may affect several species groups. Monitoring is also supported by the wildlife sightings, interactions, and incidents reporting program in which all on site personnel are expected to report wildlife sightings and encounters, including habitat features (e.g., nest, den, mineral lick) encountered during the course of work activities. The wildlife sightings log will also provide information on potential changes in use of areas over time (MT 9-21, 9-25).

EAC condition 23.H and I require sub-component plans for moose, grizzly bears, bats, amphibians, birds and furbearers. These sub-component plans are listed in Sections 4.1 to 4.9.

The monitoring program may be updated from time to time based on monitoring results, changes to Project design, new Traditional Knowledge (TK), or following updates in the scientific understanding of the species group. If these monitoring programs indicate that there is no observable effect or a low effect on the species group due to the Project, the program may be discontinued following consultation with the EAO, FLNRORD, Aboriginal and Indigenous groups, or the EMC.

After the first two years of annual monitoring, data from all monitoring programs will be statistically assessed for power of detections and evaluated for the effectiveness of the program.

The majority of mitigation measures apply to all or several wildlife species and are discussed in Section 3. Certain species-specific mitigations are discussed in this section, where required by federal or provincial authorizations or following commitments made by BW Gold.

The wildlife monitoring programs include ‘adaptive management’ as required by EAC Condition 3 and address DS requirements for follow-up programs for migratory birds and wildlife and species at risk. In accordance with EAC Condition 17, BW Gold will engage Aboriginal monitors to monitor potential effects of the Project on an Aboriginal Groups’ Aboriginal Interests. In Condition 1.19 in the DS, “follow-up program” is defined as a program for “a) verifying the accuracy of the environmental assessment of a designated project; and b) determining the effectiveness of any mitigation measures, as defined in subsection 2(1) of the *Canadian Environmental Assessment Act, 2012*.”

For each species, the following topics are discussed:

1. Baseline and pre-construction surveys;
2. Mitigation specific to the species group;
3. Monitoring programs for predicted effects and to determine the effectiveness of mitigation measures; and
4. Adaptive management thresholds and options for adaptive management.

Note that both the DS and EAC Conditions use the term “pre-construction” surveys for two types of surveys which are discussed separately and defined as:

- “Pre-construction surveys” – Surveys conducted prior to the construction phase to confirm species presence, inform planning, test habitat suitability models, identify trails for mitigation, etc. These surveys were conducted during the summer of 2021 and will be reported in a 2021 baseline wildlife report. In some cases, additional pre-construction surveys are planned for 2022, prior to construction occurring in an area that would disturb the species or its habitat.
- “Pre-clearing surveys” – Vegetation clearing is designed to occur outside of sensitive seasons for wildlife. However, if vegetation clearing must occur during the sensitive season for a particular species, pre-clearing surveys will be conducted prior to the planned timing of the clearing occurrence,

to confirm a species is not present. If a residence (den or nest) is present, mitigations are triggered, such as setback buffers. Pre-clearing surveys are typically conducted several days to weeks prior to vegetation clearing.

4.1 Amphibians

Western toads (*Anaxyrus boreas*) and other amphibians that are likely to occur in the Project area are most sensitive to disturbance at and surrounding breeding sites (BC MFLNRO 2014). Western toads are federally listed on Schedule 1 of SARA as Special Concern (Government of Canada 2021a). Western toads congregate to breed in ponds and slow moving water, such as back channels of rivers and old beaver dams when ice melts (April – May) each year. The adults then leave the ponds and the eggs develop into tadpoles during June, and into metamorphs and toadlets in July. Some research indicates adults hibernate near their breeding wetlands, while other studies indicate they hibernate further afield in upland areas.

Mitigation for amphibians will follow the mitigation hierarchy, avoiding clearing of vegetation in sensitive areas (suitable breeding habitat) during sensitive periods. Pre-construction surveys will identify breeding ponds to be avoided. If clearing outside of this period is unfeasible, then pre-clearing surveys will be conducted in suitable breeding habitat, and occupied breeding sites will be identified for amphibian salvage (MT 6-14, 6-15). A follow-up program and adaptive management are planned for construction and operations.

DS Condition 8.9 requires BW Gold to identify the sensitive time periods for western toad, referencing FLNRO (2014). The *Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area* (MFLNRO 2014) identifies sensitive periods for western toad as winter (near breeding ponds where adults are hibernating) and spring (where adults are breeding). Cautionary periods occur in summer (around known breeding ponds of juvenile dispersal). In MT 6-15, the identified sensitive period for all terrestrial amphibians is April 1 – September 30.

MFLNRO (2014) indicates that toads hibernate at breeding ponds, which is true for frogs and salamanders. However, the ECCC (2016) report on western toads indicates that toads use upland areas within 500 m to 2 km of ponds. Research using backpack transmitters in Alaska reports that toads hibernate in upland areas away from breeding ponds (Pyare 2005). This indicates that breeding ponds are not typically used by toads in winter, and therefore summer breeding should be considered the sensitive season for toads at ponds.

Federal and Provincial Conditions

DS Conditions addressed include: 2.1, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 8.9, 8.10, 8.11, 8.12, and 8.21.

EAC Conditions addressed include: 2, 3, 4, and 23.

DS Condition 8.21 requires a follow-up program for western toad to verify the accuracy of the Application/EIS and to determine the effectiveness of mitigation measures for toads, from construction through decommissioning. EAC Condition 23h requires a subcomponent plan for amphibians.

4.1.1 Baseline and Pre-construction Surveys

Federal Condition 8.10 requires that if construction cannot be planned to avoid the sensitive periods identified in Condition 8.9, then pre-construction surveys will be conducted to identify western toad breeding habitat. These pre-construction baseline surveys were conducted in 2021 to add to baseline survey data from the EA Application (2011-2013 and 2017). Detailed pre-construction baseline results will be available in a separate report in early 2022.

Baseline Data (2011-2013, 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 4.1-1). Aerial habitat surveys and additional ground surveys for western toad were also completed in July 2017 (Figure 4.1-1). All ground survey methods followed *Inventory Methods for Pond-Breeding Amphibians and Painted Turtle* (RIC 1998c).

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 4.1-1). 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. Western toads were detected at eight ground survey sites and incidentally at one site, with seven of these sites having confirmed breeding (Figure 4.1-1).

Pre-construction Surveys (2021)

Field surveys during the baseline program (2011-2013, and 2017) identified several breeding ponds for western toad inside the planned Project footprint. Pre-construction surveys were conducted from July 7-12, 2021, following standard time-limited visual encounter survey protocols as described in *Inventory Methods for Pond-Breeding Amphibians and Painted Turtle* (RIC 1998c). A total of 41 ponds and wetlands were surveyed for adult, tadpole, and metamorph amphibians (Figure 4.1-2).

Pre-construction surveys detected western toads at 11 sites, with eight confirmed western toad breeding sites. Additional surveys will be required at 17 sites that had suitable habitats western toads but were unconfirmed western toad breeding, and for one site with unidentified tadpole species (Figure 4.1-2).

4.1.2 Mitigation for Amphibians

The majority of mitigation measures for amphibians are shared with other wildlife species, as described in Section 3. Mitigations specific to western toad are listed below.

Sensitive periods for western toads are identified in Section 3.3.1. Mitigation for amphibians will include avoidance of breeding ponds identified through baseline and pre-construction surveys during sensitive periods. As described in DS Condition 8.10, avoidance will include no-work buffers surrounding known breeding ponds and taking into account BC *Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia* (BC MOE 2014b), which recommends a 30-150 m buffer zone. The site-specific buffer zone will be determined by a QP based on a risk assessment of the location, planned activities at the site, and mitigation (e.g., altering activities).

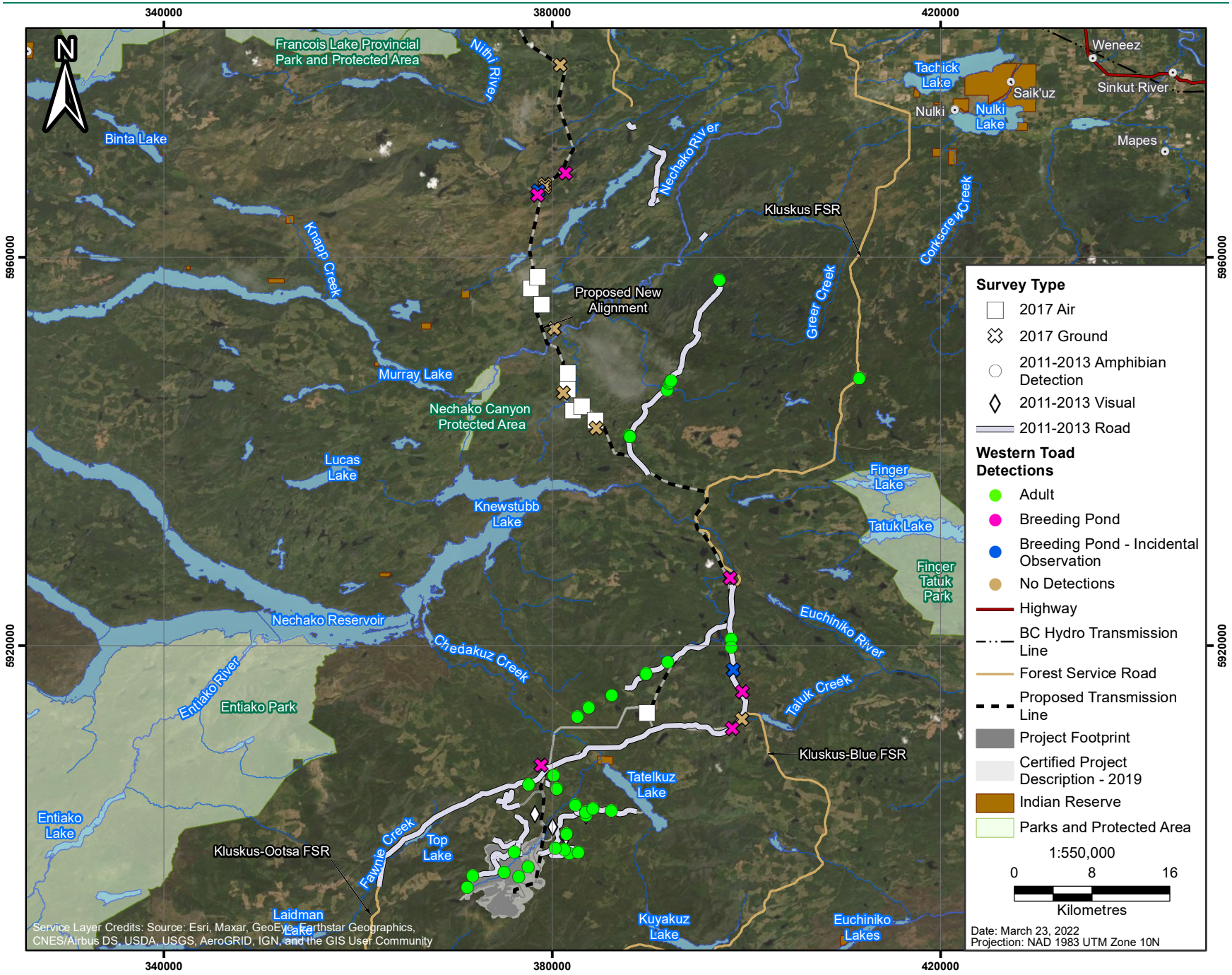


Figure 4.1-1: Western Toad Detections, 2011-2013 and 2017

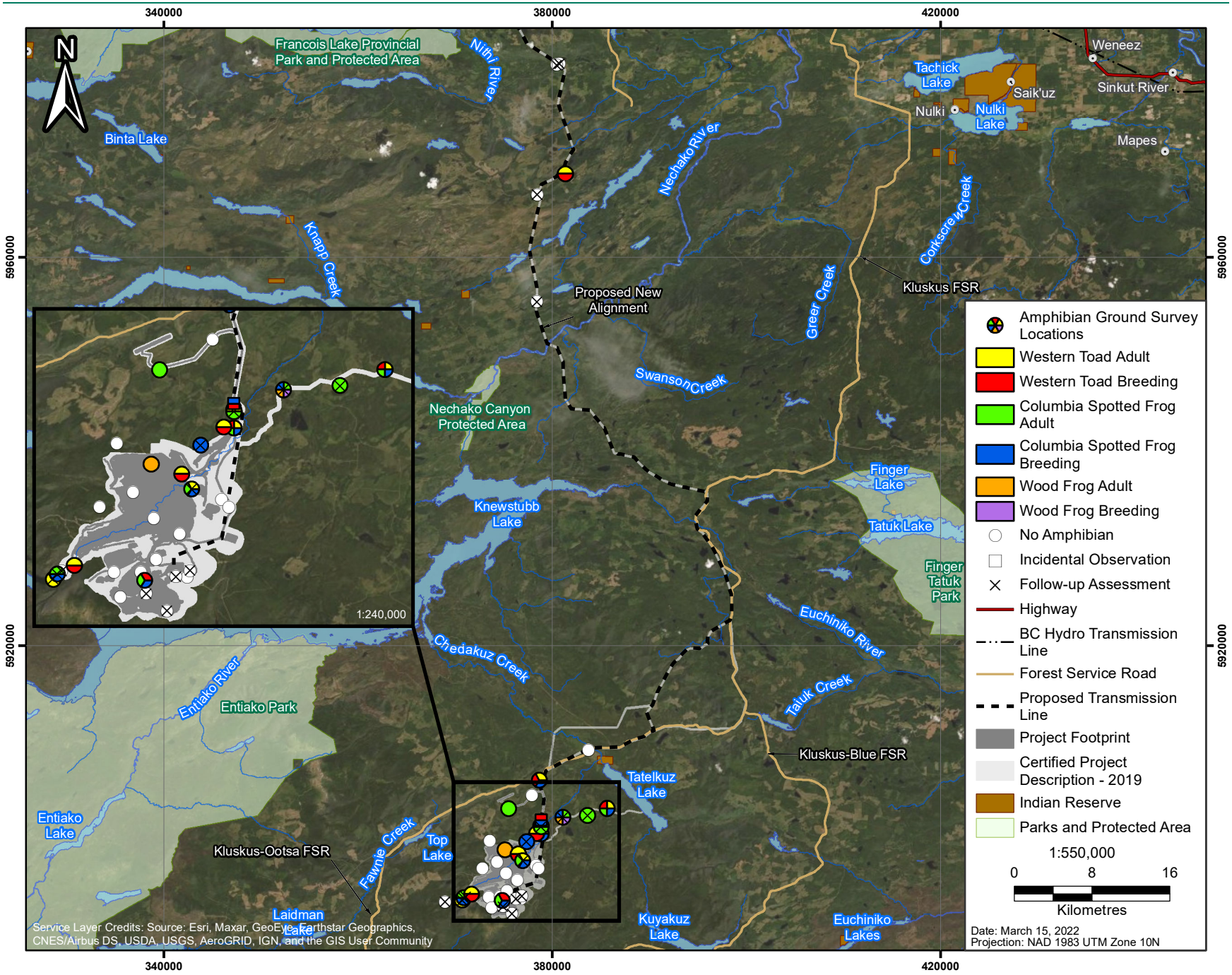


Figure 4.1-2: Amphibian Ground Survey Locations and Confirmed Western Toad Breeding Sites, 2021

As described in DS Condition 8.11 and the MT (2020), if avoidance is not possible and salvage is required, it will be conducted following *Best Management Practices for Amphibian and Reptile Salvages in British Columbia* (MFLNRO 2016; MT 6-14, 6-15):

- Obtain a salvage permit under the *Wildlife Act*;
- Conduct a baseline inventory and assessment, including a comprehensive risk assessment;
- Consider habitat type when determining capture techniques, inventory and salvage timing, and capture effort;
- Conduct salvage during the time of year when the least number of species and life stages will be affected; and
- Where possible, create a compensation site (e.g., construct or restore a wetland) instead of using naturally occurring habitat for release.

Prior to an amphibian salvage, a salvage SOP will be produced that includes:

- Permits for salvage;
- Identification of breeding ponds in construction areas;
- Methods for identifying relocation areas; and
- Methods for capture and transport of toads, tadpoles and toadlets.

If occupied breeding wetlands are identified along Project roads during pre-construction surveys, road crossing locations will be selected for monitoring potential mortality of western toads (as described in Section 3.6.2; MT 6-27, 6-28). Adaptive management triggers and additional mitigation options are identified in Section 3.6.2 (Wildlife Activity on Roadways).

DS Condition 8.12 indicates toads shall be deterred from the TSF, reclamation wetlands, Pit Lake, sediment control ponds, and environmental control dam until such time that water meets BC's *Water Quality Guidelines for the Protection of Wildlife* and from project roads during construction, operation and decommissioning.

Monitoring is discussed below in Section 4.1.3.

4.1.3 Monitoring of Predicted Effects and Mitigation Effectiveness

Objectives

The western toad follow-up and monitoring program is intended to verify the accuracy of the environmental assessment and determine the effectiveness of the mitigation measures as it pertains to the effects of changes caused by the Project on western toad. Monitoring is focussed on the three potential project effects that were assessed in the Application/EIS:

1. Habitat loss and alteration from Project activities;
2. Western toad mortalities along roads; and
3. Change in amphibian distribution.

In addition, DS Condition 8.21 specifies that, as part of the western toad follow-up program, BW Gold must:

1. Conduct western toad surveys annually in breeding habitat identified pursuant to Condition 8.10 from the start of construction until the end of decommissioning;

2. Monitor western toad in relocation areas for western toad salvage conducted pursuant to condition 8.11; and
3. Monitor western toad mortality on project roads from the start of construction until the end of decommissioning.

Performance Indicators, Triggers, or Thresholds

The monitoring objectives for western toad are listed in Table 4.1-1 along with performance indicators, the associated triggers or thresholds, and reference to the applicable monitoring program.

Table 4.1-1: Follow-up Monitoring for Western Toad

Objective		Performance Indicator	Triggers / Thresholds	Methods for Monitoring
1	To determine habitat loss and alteration from Project activities	Area of each habitat type in the LSA and annual and cumulative habitat loss by type	Measurable habitat loss beyond that predicted in the EA.	Remotely sensed imagery and GIS analysis
2	To determine western toad mortalities on roads	Annual and cumulative totals of western toad mortalities on roads	Road related mortalities associated with Project activities.	Searches of Project roads for amphibian mortality.
3	To detect change in western toad distribution	Number and location of breeding ponds.	Number and location of breeding ponds.	Pond searches for western toad breeding and adults.
4	To document western toad breeding areas			
5	To record western toad distribution salvage relocation areas			
6	To detect western toad presence at facility waterbodies	Presence of amphibians in facility waterbodies	Any amphibians in or around facility waterbodies	Visual surveys of facility waterbodies

4.1.3.1 Habitat Loss Monitoring

Habitat for western toads will be lost within the Project footprint during construction and operations, and some areas will be recovered during closure and reclamation.

The amount of habitat lost will be evaluated each year that construction occurs by comparing the as-built Project footprint with the results of pre-construction surveys for suitable breeding sites. The total area of suitable breeding wetlands will be reported in the annual WMMP report. See Section 4.4.3.1 (Habitat Loss Monitoring for moose) for addition details on habitat loss monitoring methods.

4.1.3.2 Monitoring Toad Mortality on Roads

The Application/EIS predicted that toad mortality may occur due to collisions with vehicles on project roads if a breeding pond is located adjacent to the road. If breeding ponds are identified adjacent to Project roads during pre-construction surveys, then subsequent mortality monitoring would be triggered.

Objectives

The objective is to meet monitoring objective #2 in Table 4.1-1:

- To determine western toad mortalities on roads near identified breeding ponds.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The survey study area will include the mine site and project roads, plus a 100 m buffer.

If a breeding pond is identified within 100 m of a project road, then the survey area will include a 500 m section along the road adjacent to the breeding pond.

Data Collection – Survey Methods

- Mortality monitoring will include road-based surveys in the 500 m section of the road adjacent to the breeding pond.
- Surveys will occur twice per year, during spring when adults move to breeding ponds and during July when toadlets are dispersing from breeding ponds.
- The survey crew will consist of a wildlife biologist with experience conducting amphibian surveys and a field assistant.
- Ground searches will be conducted during the day to identify dead toads or toadlets. Methods will include having the survey walk the road section looking for any toad or toadlet mortalities.
- Monitoring of mortality on roads will occur each year the Project is active during construction, operations, and closure when there is a known breeding site within 100 m of a Project road.

Analysis

- Data will be presented as the number of amphibian mortalities per 500 m length of road, across years; and
- Data analysis will include a time series analysis to look for trends in mortality rate.

Reporting

Data will be reported in the annual WMMP report, which will include:

- Number of sites monitored;
- Number of amphibian mortalities;
- Trends through time; and
- Any adaptive management actions taken and their outcome.

Schedule

- Surveys will occur each year the Project is active (construction, operations, and closure) when there is a known western toad breeding site within 100 m of a Project road.

Triggers or Thresholds

- Reports of any toad mortality; and
- Repeated reports of toad mortality after mitigation measures have been implemented.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for western toad mortalities on roads will be determined by the EM with input from a QP and may include:

- Installation of drift fencing to guide toads away from the roads and into the forest;
- Installation of toad tunnels under roads to guide toads under roads;
- Refresher trainings for employees and contractors driving on Project roads; and
- Updates to signage and/or reduction in speed limits in areas designated to pose an ongoing risk of toad mortality.

4.1.3.3 Monitoring Toad Breeding Ponds

Western toad breeding sites will be monitored to fulfill Objectives 3 through 5 in Table 4.1-1 (and listed below). Surveys were conducted during summer 2021 on the mine site and southern portion of the transmission line. These data will be reported in the 2021 baseline wildlife report.

Objectives

Objectives 3 through 5 in Table 4.1-1 relate to monitoring of ponds for toad breeding:

- To detect change in amphibian distribution;
- To document western toad breeding areas; and
- To record western toad distribution salvage relocation areas.

Performance Indicators

- Number and location of breeding ponds.

Methods for Monitoring and Evaluation

Study Area

The study area for surveys will include the mine site and a 10 km buffer surrounding the mine site. This large buffer will include the salvage relocation areas.

Data Collection – Survey Methods

- Western toad breeding areas will be documented in the mine site and within a 500 m buffer surrounding the mine site.
- To document western toad breeding areas and potential changes in distribution (Objectives 3 and 4):
  - Surveys were conducted in the summer of 2021 in breeding areas, and are being compiled into a baseline report that will include the 2013 and 2021 survey results.
  - Surveys will be repeated in the area within 500 m of the mine site, and within the mine site annually until construction removes any ponds in the footprint.
  - Surveys will be conducted at known breeding ponds within 500 m of the Project footprint during construction, operations, and closure.
- To record western toad distribution salvage relocation areas (Objective 5): Surveys will be conducted at salvage relocation areas within 10 km of the mine site.

- Monitoring toad breeding ponds will occur every year from the start of construction to the end of decommissioning (DS Condition 8.21).
- Surveys will follow standard survey methods used during pre-construction surveys, referencing *Inventory Methods for Pond-Breeding Amphibians and Painted Turtle* (RIC 1998).
- The survey crew will consist of a wildlife biologist with experience surveying for amphibians plus an assistant.

Analysis

- Baseline distribution of toad breeding ponds (Objective 4) within the mine footprint and in the local area (within 500 m surrounding the mine site) will be reported for surveys in 2013 and 2021, and any subsequent surveys prior to construction.
- Continued toad presence and breeding in buffer areas (Objective 3) and at relocation sites (Objective 5) will be summarized through time, and analyzed using a time series analysis. This analysis will examine trends through time.

Reporting

Data will be reported in the annual WMMP report, which will include:

- Summaries of surveys conducted and data collected;
- Amphibian detections by species and life stage at each survey location; and
- Results of time series analysis.

Schedule

- Surveys of breeding ponds will occur annually during construction, operations, and closure (DS Condition 8.21).

Triggers or Thresholds

- Discovery of breeding sites in the mine footprint (Objective 4) will trigger relocation of toads and tadpoles to relocation sites; and
- For breeding ponds near the Project (Objective 3) and in relocation sites (Objective 5) a 50% decline over 5 years will trigger adaptive management.

Adaptive Management Response

If it is identified that the number of western toad breeding sites is declining near the mine or in relocation sites, a QP will conduct an investigation for the cause of the decline and determine appropriate adaptive management actions as directed by the EM, which may include:

- Investigate changes in hydrology flow; determine possible causes and implement mitigations to improve pond hydrology if possible;
- Review water quality results, and/or conduct additional water testing. Salvage and deter toads from areas that do not meet water quality guidelines, and implement methods to improve water quality if possible; and
- Review nearby roads, paths, and work areas to assess possibility of interactions or incidents with toads:
  - Install drift fencing to prevent toads from entering problematic areas; and
  - Widen no-work buffers surrounding breeding ponds.

4.1.3.4 Facility Waterbody Monitoring

Objectives

Objective 6 in Table 4.1-1 relates to monitoring of ponds for toad breeding:

- To detect amphibian presence at facility waterbodies.

Performance Indicators

- Presence of amphibians in facility waterbodies.

Methods for Monitoring and Evaluation

Study Area

- Facility waterbodies, including the TSF, pit lake, and other facility waterbodies with deterrents implemented.

Data Collection – Survey Methods

- Visual surveys will be conducted in facility waterbodies.
- Monitoring will occur every year from the start of construction to the end of decommissioning (DS Condition 8.21).
- Surveys will follow standard survey methods used during pre-construction surveys, referencing *Inventory Methods for Pond-Breeding Amphibians and Painted Turtle* (RIC 1998).
- The survey crew will consist of a wildlife biologist with experience surveying for amphibians plus an assistant.

Analysis

- Records of amphibians in facility waterbodies will be summarized by location and through time.

Reporting

Data will be reported in the annual WMMP report, which will include:

- Summaries of surveys conducted and data collected;
- Amphibian detections by species and life stage at each facility waterbody; and
- Adaptive management actions taken.

Schedule

- Surveys of facility waterbodies will occur annually during construction, operations, and closure.

Triggers or Thresholds

- Any observations of amphibians in facility waterbodies.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for western toad in facility waterbodies will be directed by the EM in consultation with a QP and may include:

- Relocating amphibians to suitable salvage sites; and
- Reviewing existing mitigation for excluding amphibians from facility waterbodies, and identification of additional measures to prevent access.

4.2 Bats

Bats have two types of residences: hibernacula and roosting trees. Management for bats is focused on these features.

- Hibernacula are used October 1 – May 31 for hibernation. In northern areas, such as the Project location, hibernacula typically occur in caves located in karst (limestone) formations which are deep enough to maintain a constant temperature above freezing. No limestone formations are located in the Project site. Some bat species hibernate in habitat such as root-wads, crevices, and tree bark, however these features are not likely to be suitable for hibernation in the Project area due to lack of insulation from extremely cold winter temperatures, of regularly -20 to -30 degrees Celsius.
- Roosting trees, where females gather in groups with pups are used May 15th to September 30th. Roosting trees are typically large snags (dead trees) with cavities or spaces behind the bark used by bats. Snags are typically found in old forests, which have been confirmed on the Project site.

Two bat species of conservation concern occur in the Project area: little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*), both of which are federally listed as Endangered on Schedule 1 of SARA (Government of Canada 2021a), 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 2021). All bat species in BC are insectivorous mammals that fill an ecological role in pest control.

Surveys and work undertaken in bat habitat must follow protocols in the *Western Canada White Nose Syndrome Transmission Prevention* (CWHC 2015; MT 7-9, FD 8.13) to prevent introduction of the fungus, as described in the MT (7-9) and DS 8.13.

Management and mitigations for bats include avoidance of sensitive periods, pre-construction surveys, pre-clearing and setback buffer mitigations, and a follow-up monitoring program.

Federal condition 8.15 and provincial condition 23, Table 1 direct BW Gold to install “roosting structures” or “alternative roosts” if roosts are being removed by vegetation clearing during construction.

> Federal condition 8.15 states: “If the pre-construction surveys referred to in condition 8.14 identify the loss of little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*) roosting habitat, the Proponent shall install, prior to construction, and maintain, during construction operation, and decommissioning, roosting structures to offset any loss of little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*) roosting habitat.”
>
> Provincial condition 23, Table 1 states: “If the results of the pre-Construction surveys indicate bat roosts or hibernacula are in the Project Area, avoid disturbance. If avoidance is not possible, install alternative roosts within the vicinity of the observed roost, as well as other mitigation measures as determined by a Qualified Professional. The Holder must demonstrate how the Best Management Practices Guidelines for Bats in British Columbia (ENV February 2016, or as updated or replaced from time to time) were applied. In addition to the pre-Construction survey,

> the Holder must maintain an inventory of features that may function as potential roosts and hibernacula and must conduct surveys to confirm whether these features are used and by which species. If the features are being used by bats, avoid disturbance or apply appropriate mitigation measures if avoidance is not possible, as determined by a Qualified Professional."

On February 2, 2022, BW Gold provided a draft plan to ECCC for installing roosting structures to meet these conditions. This plan included a research program to identify what types of roosting structures would be best to install at the Project site. ECCC provided a response (February 28, 2022, Appendix E) that indicated that ECCC is aware of the two conditions requiring roosting structures, but does not support the use of bat boxes as roosting structures because:

- Bat boxes were not designed to replace natural habitat;
- Bat houses may be ecological traps, a habitat resource where bat fitness is lower than in other available habitats;
- Potential for over-heating;
- Potential for increased predation risk;
- Potential for changes in roosting behaviour, ecology; and
- Potential for competitive exclusion and change in community structure.

In lieu of installing roosting structures, ECCC recommended 6 mitigation and monitoring programs that follows the mitigation hierarchy:

1. Retain trees or stands that may support bat roosts;
2. Retain key bat habitat resources where possible;
3. Restore disturbed habitat;
4. Where protected and/or restoration habitat areas for other wildlife (e.g., caribou, migratory birds, western toads) have been identified as offsets, implement measures within these areas (e.g., Capoose HE-UWR, caribou and wetland restoration areas) that are beneficial to bats;
5. Financial contribution to monitor a NABAT grid cell in the area; and
6. Open to discussing other potential bat studies.

BW Gold met with representatives of ECCC and FLNRORD on March 7, 2022 to discuss these comments, where the representative from FLNRORD suggested that Vegetation Resource Inventory (VRI) data for the Project area indicates there are approximately 100 snags per ha in forested areas. As such, snags and habitats for roosting may not be a limiting resource on the landscape. Therefore, to meet recommendation #4, BW Gold FLNRORD should focus on augmenting other types of habitat important for bats, through existing programs for wetland augmentation being conducted through the wetlands offsetting plan, and augmentation of wetlands through restoration of forestry roads and re-connecting hydrology as described in the CMMP. Therefore, offsetting of habitat would occur through augmenting wetlands instead of offsetting roosting habitat.

On March 9, 2022, BW Gold met with representatives from the Impact Assessment Agency of Canada (IAAC) and ECCC to discuss these comments and that by following the recommendations of ECCC, BW Gold could be perceived as contravening DS condition 8.15. The IAAC representative indicated that the IAAC would defer to expert advice from ECCC on the best mitigation for bats to meet the spirit of the federal condition.

As such, installation of bat boxes has been removed from the WMMP. Recommendations 1 through 4 from ECCC are discussed in the mitigation section for bats (Section 4.2.2), and the two monitoring programs are discussed under monitoring (Section 4.2.3).

Federal and Provincial Conditions

DS Conditions addressed include: 2.1, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 8.9, 8.13, 8.14, and 8.15.

EAC conditions addressed include: 2, 3, 4, and 23.

4.2.1 Baseline and Pre-construction Surveys

Both Federal and EAC Conditions require pre-construction surveys to be conducted to determine where hibernacula and roosting habitat occurs, and distributions of known roosts or hibernacula (EAC 23c, DS 8.14, 8.15). These pre-construction baseline surveys were conducted in 2021 to add to baseline survey data from the EA Application (2011-2013 and 2017) and are summarized below. Detailed pre-construction baseline results will be available in a separate report in early 2022.

In accordance with EAC Condition 23c Table 1, features that may function as hibernacula and roosts have been inventoried (i.e., stored in a spatial database). If it is not possible to conduct clearing outside of the sensitive season for bats, then pre-clearing surveys will be conducted at these features to determine bat occupancy, and mitigation applied including setback buffers.

Baseline Data (2011-2013)

Call surveys (recording bat echolocation calls) were conducted during 2011-2013 baseline studies in the LSA. Surveys used an 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, and two of these previously surveyed locations and one additional location surveyed in 2013 (Figure 4.2-1). Data were assessed against a possible list of 12 bat species which have potential to occur in the region. Nine species of bats were recorded in the Project area (Table 4.2-1). All bat detections were within the mine site at fens or open water wetlands, surrounded by pine and spruce forest (Figure 4.2-1). Little brown myotis and northern myotis were the most abundant bat species observed within the mine site LSA (Table 4.2-1).

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; the consistency of detections may potentially indicate a nearby nursery colony. 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.

Pre-construction Surveys (2021)

Call surveys and identification of potential bat hibernacula and roosts during the completion of other pre-construction surveys was conducted during the summer of 2021. Identification of roost (wildlife tree) and hibernacula (cave or crevice) features was done during habitat suitability surveys for other species in the mine site and transmission line LSAs; observers including QPs and Indigenous assistants 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 mine site or transmission line planned footprints.

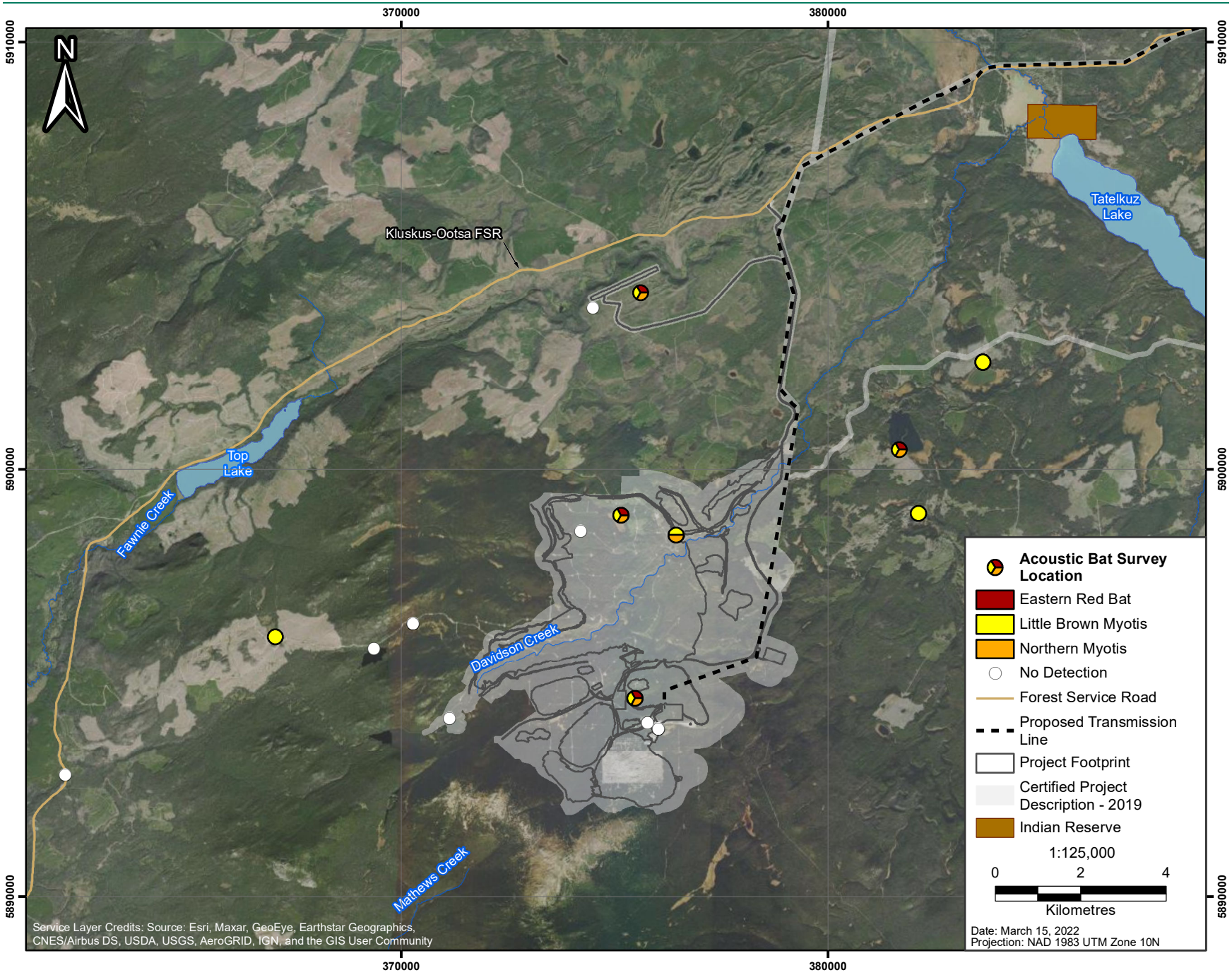


Figure 4.2-1: Acoustic Bat Survey Locations and Species at Risk Detections, 2011-2013

Table 4.2-1: Bat Species Detected during Baseline Surveys, 2011-2013 and 2021

Species Common Name	Scientific Name	Conservation Listing	2011-2013		2021
			Relative Detections (LSA)	Sites Present (LSA)	Relative Confidence in Detection[1]
Big Brown Bat	*Eptesicus fuscus*		9	3	Moderate High
California Myotis	*Myotis californicus*		0	0	Moderate Low
Eastern Red Bat	*Lasiurus borealis*	BC Red Listed	56	5	Low
Hoary Bat	*Lasiurus cinereus*		9	5	Moderate High
Little Brown Myotis	*Myotis lucifugus*	Endangered (SARA)	161	7	High
Long-legged Myotis	*Myotis volans*		19	2	Moderate Low
Northern Myotis	*Myotis septentrionalis*	Endangered (SARA), BC Blue Listed	243	5	Moderate Low
Townsend's Big Eared Bat	*Corynorhinus townsendii*	BC Blue Listed	0	0	Low
Silver-haired Bat	*Lasionycteris noctivagans*		15	3	High
Western Long-eared Myotis	*Myotis evotis*		42	4	High
Western Small-footed Myotis	*Myotis ciliolabrum*		1	1	Low
Yuma Myotis	*Myotis yumanensis*		0	0	Moderate Low

[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.

Call surveys (recording bat echolocation calls) were conducted at four survey locations within the transmission line LSA and 16 locations within the mine site LSA for variable deployment periods from June 18 through August 20, 2021 (Figure 4.2-2). 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. Analysis of recorded bat calls was conducted in Kaleidoscope Pro (software program), using the auto-identification feature followed by manual verification of species calls. 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.

Three bat species were detected with high confidence in 2021: little brown myotis, silver-haired bat, and western long-eared myotis (Table 4.2-1), 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.

The site with the highest relative bat activity when controlled for deployment duration was ARU 12B, followed by ARU 19B and ARU 6A (Figure 4.2-2). Activity varied throughout all portions of the mine site LSA, and high activity was not grouped in a particular area or corridor (Figure 4.2-2). Bat activity across all data peaked from July through August, and was consistent throughout night time hours (10 pm to 4 am).

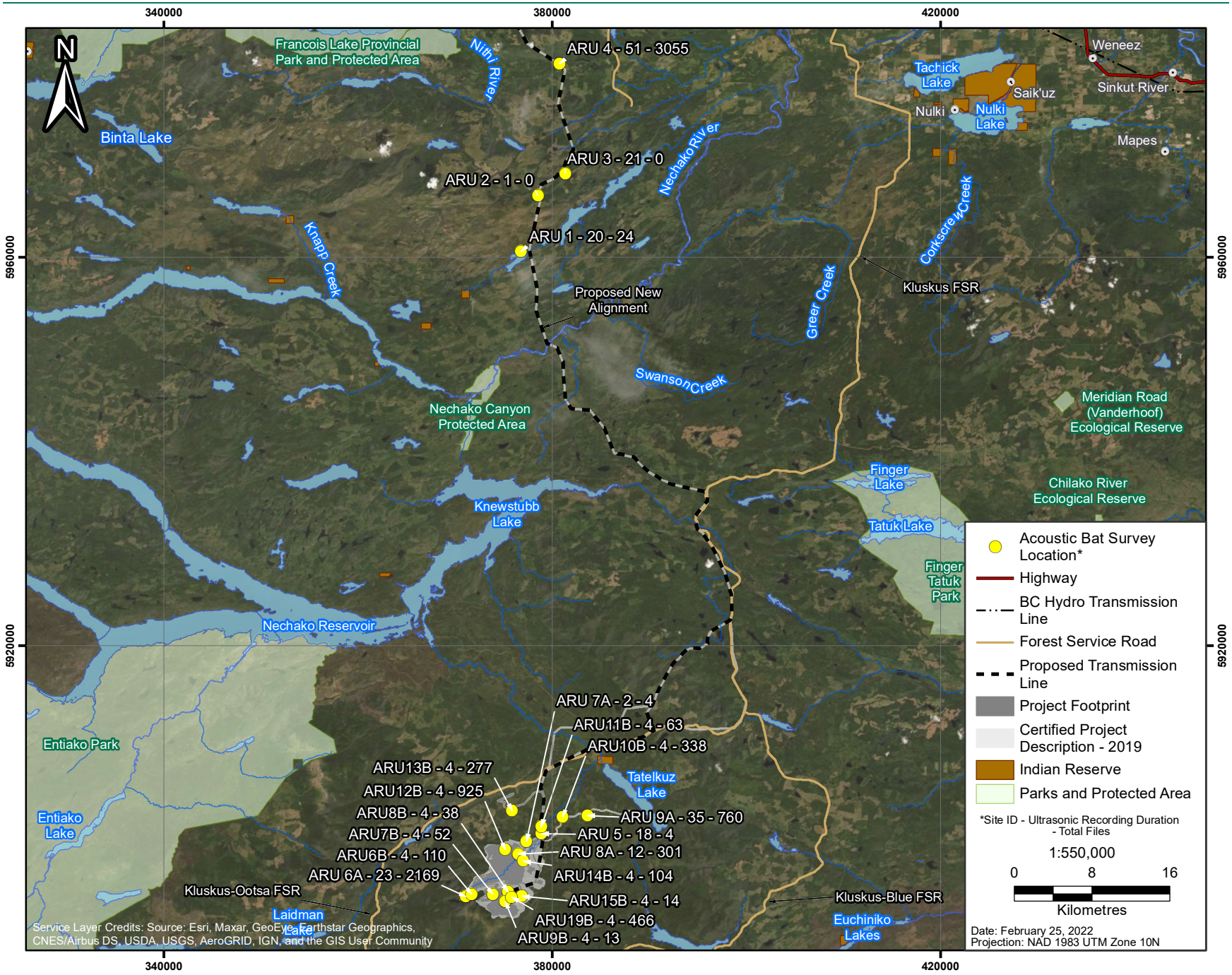


Figure 4.2-2: Acoustic Bat Survey Locations and Relative Activity, 2021

4.2.2 Mitigation for Bats

Mitigation for bats follows the mitigation hierarchy and includes commitments made during the review of the EAC Application, federal and provincial conditions and advice from ECCC on February 28, 2022. ECCC recommended the following mitigation to avoid effects on bat habitat and restore habitat, following the mitigation hierarchy:

- Retain trees or stands that may support bat roosts; and
- Retain key bat habitat resources where possible;
- Restore disturbed habitat - restoration will be addressed through the Reclamation and Closure Plan.
- ECCC also recommended augmenting habitat.
- Where protected and/or restoration habitat areas for other wildlife (e.g., caribou, migratory birds, western toads) have been identified as offsets, implement measures within these areas (e.g., Capoose HE-UWR, caribou and wetland restoration areas) that are beneficial to bats.
- Install roosting structures and study their effectiveness.

In both their February 28, 2022 letter and a subsequent letter on May 2, 2022 ECCC indicated that they preferred the use of Brandenbark as a roosting structure and did not support the use of bat boxes.

New roosting structures (Brandenbark) will be installed in the vicinity of the lost roosting structures. Through discussions with ECCC on May 20, 2022 the wetland offsetting location at Matthew's Creek Ranch was identified as a good location in the local vicinity for installation of the roosting structures. As the wetland quality improves and is likely able to support a wider suite of invertebrate species, the habitat quality for bats will likely increase making the roosting structures well placed to house any bats moving in to the area.

Augmenting habitat for bats will be conducted by restoring wetland habitat that provide the majority of the insect food for bats, through wetland offsetting in the Wetland Mitigation and Offsetting Plan (WMOP) and removal of forestry roads as part of caribou offsetting in the CMMP. Removal of roads will re-connect streams and repair hydrologic connections, therefore augmenting wetlands.

In addition, provincial and federal conditions indicate that clearing should occur outside of bat sensitive periods, and if clearing must occur during those periods that pre-construction surveys be conducted and any roosts or hibernacula buffered:

- Efforts will be made to plan clearing work outside of the sensitive periods for bats (May 15 to September 30 for roosting habitat and October 1 to May 31 for hibernacula; Section 3.3).
- If clearing must occur during the sensitive period for bats, then the inventory of potential hibernacula and roost features identified during pre-construction surveys will be surveyed (pre-clearing survey) prior to disturbance to determine whether bats are using the area (EAC 23c).
- Buffer zones will be established around active hibernacula and active roosts, in consultation with Aboriginal and Indigenous groups and relevant authorities (EAC 23c, DS 8.14), and considering recommendations in the *Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area* (MFLNRO 2014, Section 2.4.1).
- Site-specific buffer distances will be recommended by a QP and depend on the species present and intensity level of activity (BC MFLNRO 2014; Holroyd and Craig 2016).
- Pre-construction surveys were conducted during summer 2021 to identify potential roosting habitats (e.g., snags and wildlife trees) and bat recorders were used to identify whether sites were occupied.

Additional mitigation measures may be recommended by a qualified professional. BW Gold will document how the *Best Management Practices Guidelines for Bats in British* Columbia (Holroyd and Craig 2016) were applied.

4.2.3 Monitoring of Predicted Effects and Mitigation Effectiveness

Objectives

A follow-up monitoring program for little brown myotis and northern myotis will be implemented during construction, operations and closure to comply with DS Condition 8.22 and to address EAC Condition 23h (requirement of a subcomponent plan for bats) and recommendations from ECCC made on February 28, 2022, to determine:

1. Distribution and identity of bat species within the study area, including use of areas surrounding identified hibernacula and roosts (EAC 23h, DS 8.22); and
2. Monitor bats in the area surrounding the Project area using the NABAT program; and
3. Conduct a study on bat habitat use that will be designed during 2022.

The program may be updated over time to account for adaptive management actions and input from Aboriginal and Indigenous groups and regulators (DS 8.14).

Performance Indicators, Triggers or Thresholds

The monitoring objectives for bats are listed in Table 4.2-2 along with their specific performance indicators, associated triggers or thresholds, and reference for the applicable monitoring program.

Table 4.2-2: Follow-up Monitoring for Bats

Objective		Performance Indicator	Triggers / Thresholds	Methods for Monitoring
1	To determine use of setback buffer areas surrounding known hibernacula and roosts	Distribution of bat species in the study area, including use of areas around buffered roosts and hibernacula	Measurable change in diversity or distribution over time (e.g., reduction in number of species or sites with bats)	Call surveys (ARUs)
2	To monitor bat species composition through time	N/A	N/A	NABAT Protocols
3	Study to be determined with ECCC	TBD	TBD	TBD

4.2.3.1 Buffer Zone Monitoring

Objectives

1. To determine species and use of buffer zones surrounding known hibernacula and roosts.

Performance Indicators

- Detected presence of bat species in the study area.
- Distribution of bat species in the study area, including use of areas around buffered roosts and hibernacula.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The study area for surveys during construction and operation includes the mine footprint and a 5 km buffer surrounding the mine. Locations will be determined following assessment of 2021 field results.

Data Collection – Survey Methods

- Call surveys (recording bat echolocation calls) will be conducted with Autonomous Recording Units (ARUs).
- ARUs will be deployed:
  - Within the buffer areas surrounding hibernacula and roost areas in the mine footprint.
- Recording units will be deployed for a 10 to 14 day period in late July and early August each year.
- Survey methods will include standard provincial methods as described in *Inventory Methods for Bats* (RIC 1998a).

Analysis

- Analysis of recorded bat calls (sonogram files) will be conducted using the software program Kaleidoscope Pro (Wildlife Acoustics 2019).
- Data will be presented as the relative bat activity and bat species diversity, by site and area (bat boxes, buffer sites, and control sites).
- Data analysis will include trends over time and differences between buffer sites and control sites for relative activity and species diversity.

Reporting

Data will be reported in the annual WMMP report, which will include:

- Summaries of data collected;
- Bat detections by species at each survey location; and
- Summary of annual results and trends among years.

Schedule

- Surveys will be conducted annually in late July / early August.

Triggers or Thresholds

- Measurable decline in species diversity over time.
- Measurable change in distribution (e.g., reduction in the number of sites with bats) over time.
  - Natural variability of bat distribution will be determined based on data at control areas.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for bats will be determined by the EM in consultation with a QP, and may include:

- Increasing the size of the buffer surrounding hibernacula, roosts or bat boxes; and
- Altering project work near the buffer to reduce disturbance.

4.2.3.2 NABAT Monitoring

On February 28, 2022, ECCC recommended that BW Gold make a financial contribution to annual surveys of the Project area using the NABAT program methodology. BW Gold will coordinate with ECCC to design and implement the program.

Objectives

1. To monitor bat species richness and abundance using the NABAT program methodology for the first 5 years of the mine life.

Performance Indicators

- NABAT program methods have been successfully followed.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The study area for NABAT surveys will be within the NABAT grid system surrounding the project. Exact distribution of sampling will be determined in collaboration with ECCC.

Data Collection – Survey Methods

Methods will follow the NABAT program standard methods: https://www.nabatmonitoring.org/.

Analysis

Analysis will follow the NABAT program standard methods: https://www.nabatmonitoring.org/.

Reporting

Data will be reported in the annual WMMP report and delivered to ECCC and NABAT.

Schedule

- Surveys will be conducted annually for the first 5 years of operations.

Triggers and Adaptive Management

- This purpose of this monitoring program is to contribute regional data to the NABAT monitoring program and it not intended for adaptive management of the Project.

4.2.3.3 ECCC Bat Study

ECCC recommendation 6 on February 2022, included interest in collaborating on a study to examine bats in the Blackwater project area. BW Gold will engage with ECCC and UNBC to discuss and plan a study during 2022, such that a study could be initiated in 2023.

4.3 Caribou

Please refer to the Caribou Mitigation and Monitoring Plan (CMMP); provided in Annex A.

4.4 Moose

Moose (*Alces alces*) are provincially yellow-listed (not at risk, BC CDC 2021) and are afforded protection as wildlife under the *Wildlife Act*. Moose are of cultural value to Indigenous groups and regionally important for game hunting.

No specific sensitive timing windows or pre-clearing surveys are required for moose. Annual meetings regarding moose management will be organized by BW Gold with FLNRORD, the Southern Dakelh Nation Alliance, and any other Aboriginal and Indigenous groups who wish to participate (see Section 1.4).

Federal and Provincial Conditions

DS Conditions addressed include: 2.1, 2.3, 2.4, 2.5, 2.6, 2.9, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 6.14, 8.2, 8.5, 8.6, and 8.9.

Provincial conditions addressed include: 2, 3, 4, and 23.

EAC Condition 23h requires a sub-component plan for moose.

4.4.1 Baseline and Pre-construction Surveys

EAC Condition 23d requires pre-construction surveys to confirm or update the habitat suitability mapping for moose:

> *"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."*

Condition 23c of the EAC and DS Condition 8.6 require BW Gold to conduct pre-construction surveys for habitat features for moose, including mineral licks. DS Condition 8.2 also requires that the locations where wildlife corridors cross Project roads be identified and wildlife crossing signs be installed prior to construction. DS Condition 6.14 and the Mitigation Table 13-34 require aerial moose surveys prior to construction.

Pre-construction field surveys for moose were undertaken in 2021 with a variety of methods. Summer surveys were conducted for habitat suitability field validation for several key species, including moose, in the mine site and transmission line LSAs. Habitat assessments were completed for a four season model for moose.

Summer surveys included searching for wildlife features and recording observations of wildlife trails and mineral licks, as well as installation of wildlife cameras along identified trails in the mine site. A winter aerial survey around Mt. Davidson was also flown. These results are summarized below. Additional detailed pre-construction baseline results will be available in a separate report in early 2022.

Terrestrial Ecosystem Mapping (TEM) field surveys were also conducted in 2021. Aerial imaging was flown in August to October 2021, however data collection was disrupted due to extensive wildlife smoke. Habitat mapping updates involving TEM will be implemented in spring 2022, when additional aerial data are available for the RSA.

Existing habitat suitability mapping for moose was assessed along with potential need for updates to mitigations as part of EAC Condition 23d, and is included as Appendix D.

Baseline Data (2011-2013)

Baseline surveys for moose in 2011-2013 included aerial and ground winter tracking surveys, and incidental moose detections (Figures 4.4-1 and 4.4-2). Moose were detected at 18 survey locations in the LSA (n = 10) and RSA (n = 8). Aerial reconnaissance transects were flown on March 16, 2021, along the mine site LSA and RSA along the slopes of Mount Davidson. Aerial surveys detected moose at several locations throughout the Project area (Figure 4.4-2). 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.

Winter tracking surveys were completed at 16 transects (97.4 km) from March 12-16, 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 4.4-1). The highest use areas for moose were in the lower elevation pine habitats, cutblocks, and along riparian corridors within the RSA.

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 SBSmc3 biogeoclimatic zones. Incidental detections of moose use were recorded in a number of locations along the Davidson Creek corridor (Figure 4.4-2). 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 was filled in and 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 4.4-2).

Habitat suitability mapping was completed in 2013 for summer (growing) and winter (living) moose habitat in the RSA (Appendix D 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 Aboriginal Groups 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 (Figure 4.4-3). Observations were primarily of solitary bulls or cows, with the exception of one cow calf pairing.

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 (Figure 4.4-3). Two cow calf pairings and one cow bull pairing was observed, with the remaining observations being solitary bulls or cows.

Pre-construction Surveys (2021)

Pre-construction baseline field surveys were conducted for moose and grizzly bear habitat suitability in 2021, prior to construction and establishment of the Aboriginal Group Monitor position. A wildlife biologist with experience conducting habitat suitability field plots and modeling worked with Aboriginal technicians in the field. Aboriginal technicians and the wildlife biologist collected data on Biogeoclimatic Ecosystem Classification (BEC) subzone, vegetation species and stand structure and rated habitat values for forage and cover for a variety of wildlife species including moose and grizzly bear. Aboriginal technicians provided land user information on wildlife use, interpreted wildlife sign in the field, and recorded data on wildlife habitat quality. Additional information on the types of data collected by Aboriginal technicians is available in Appendix D, the Blackwater Grizzly Bear and Moose Habitat Suitability Modelling Assessment Report (submitted with the WMMP to the BC EAO on December 30, 2021). These surveys will be repeated in 2022 and BW Gold will continue to provide opportunities for collaboration between Aboriginal technicians and wildlife biologists in the field.

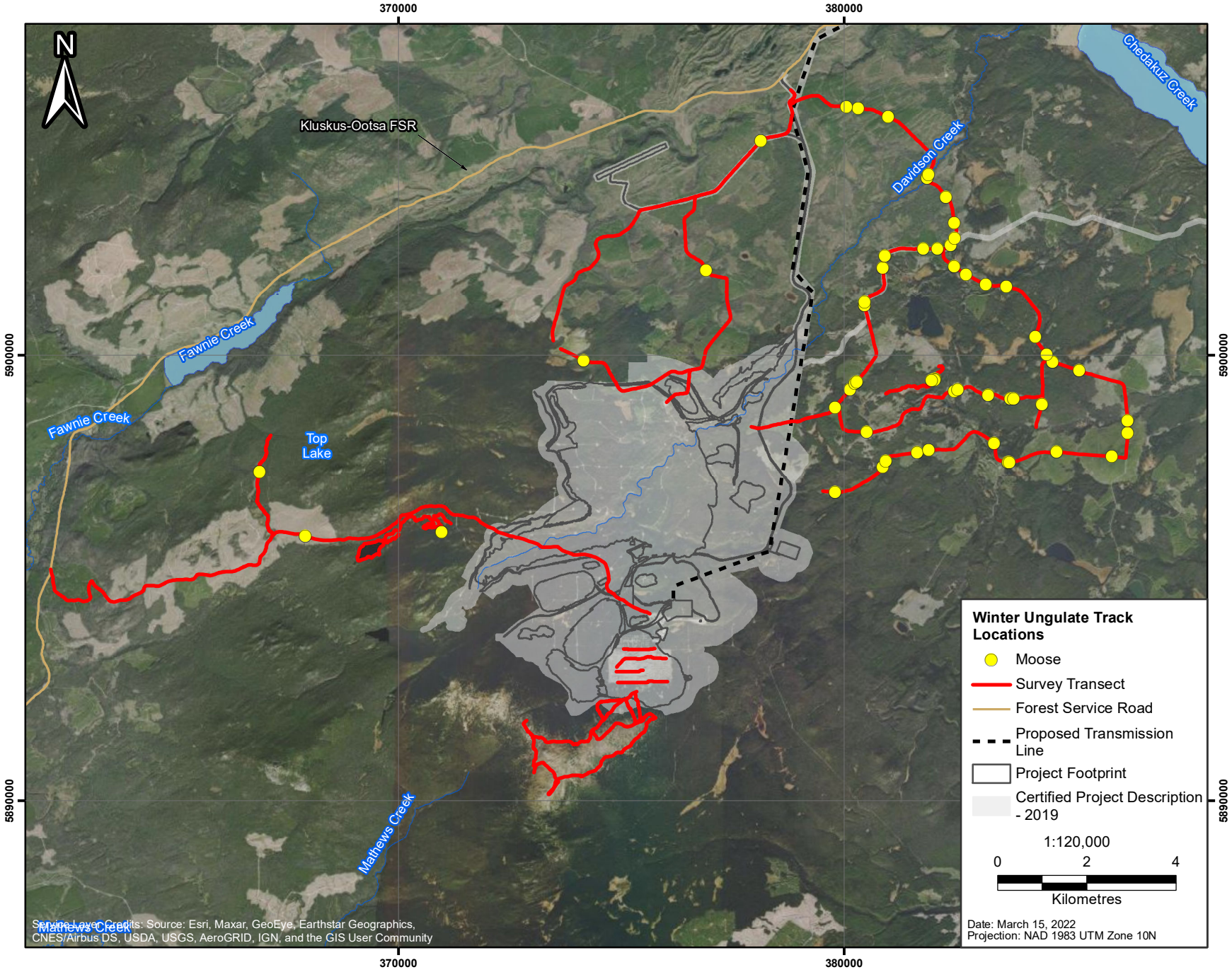


Figure 4.4-1: Ungulate Winter Ground Track Locations, 2011-2013

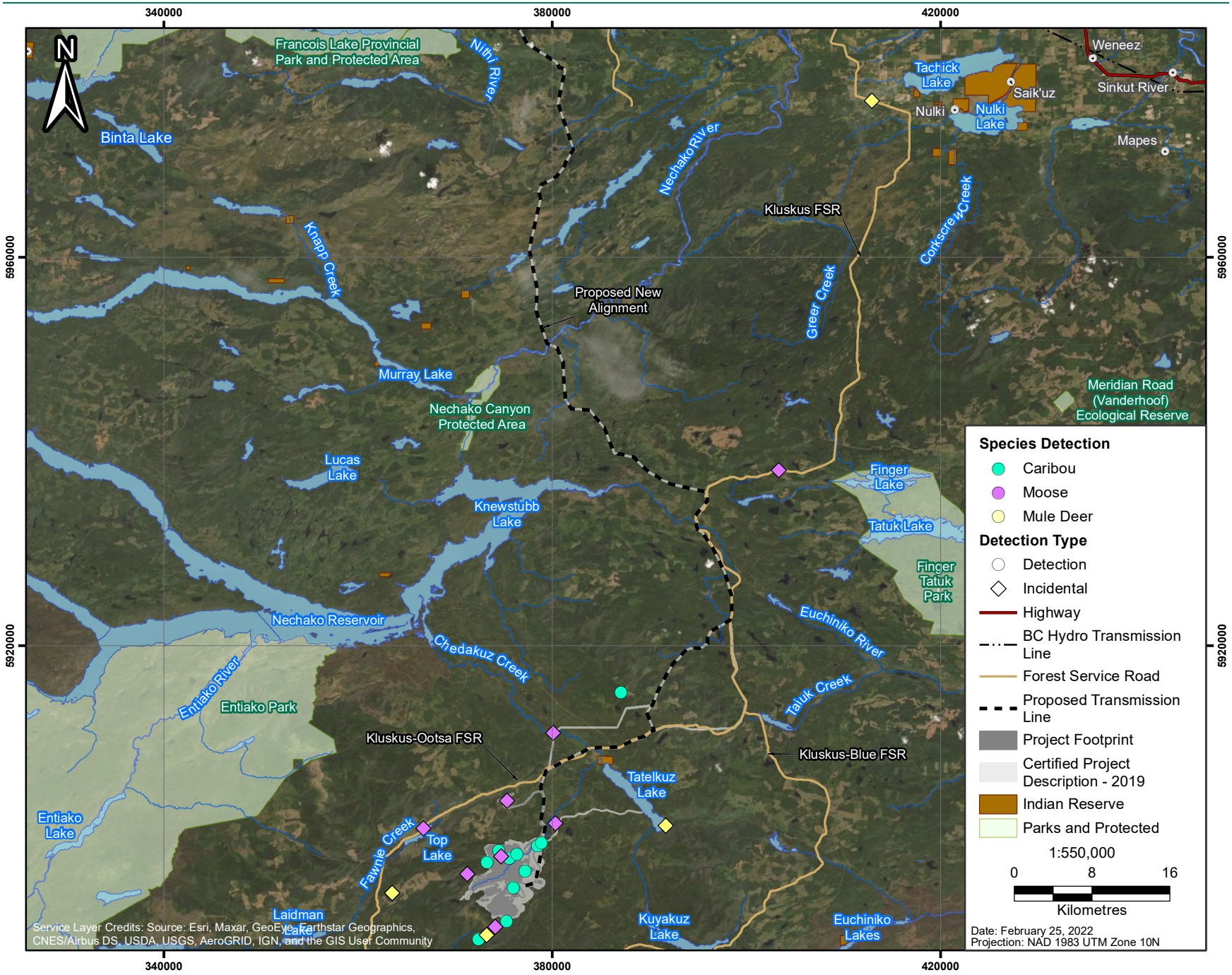


Figure 4.4-2: Ungulate Detections, 2011-2013

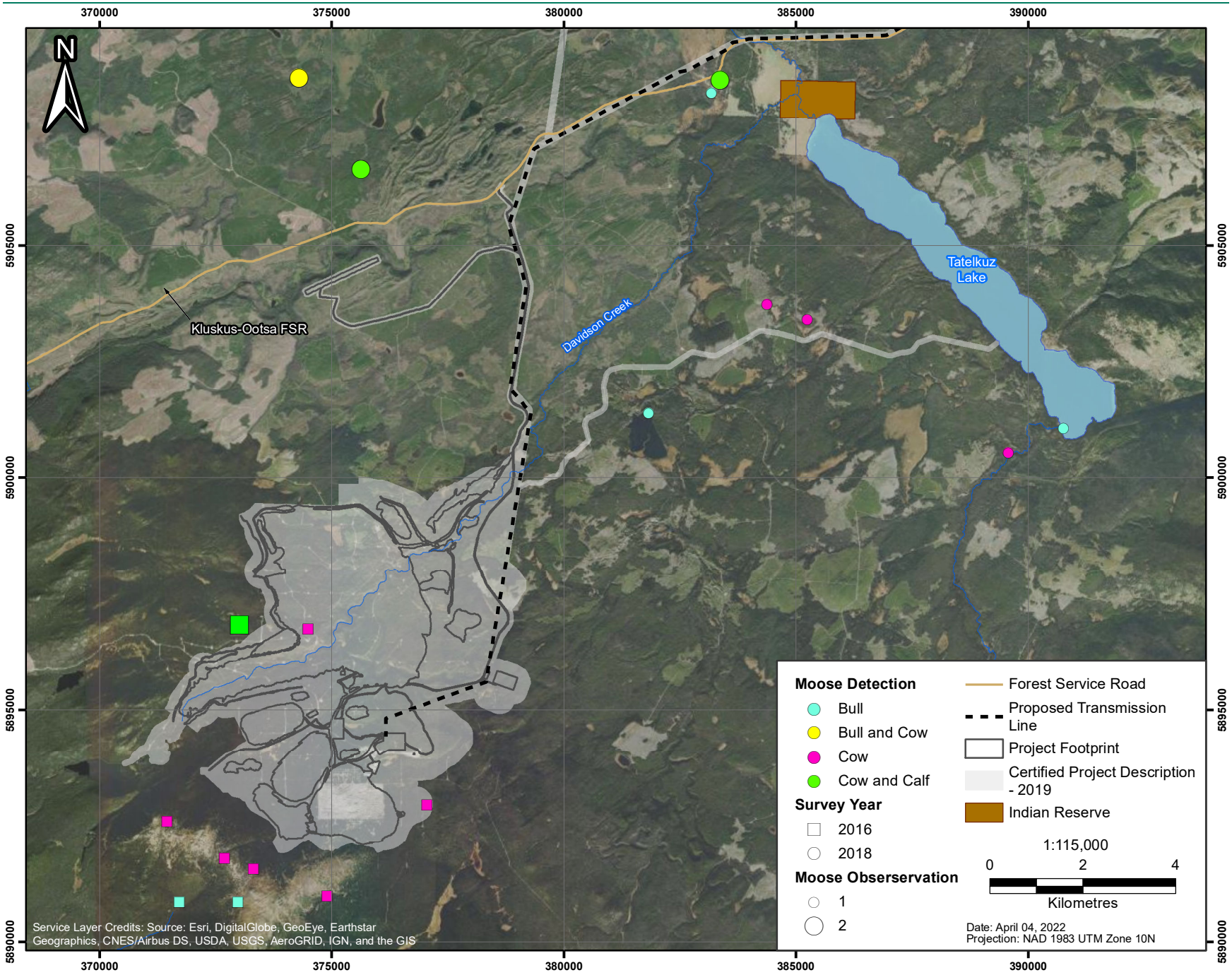


Figure 4.4-3: Moose Detections from Aerial Surveys, 2016 and 2018

The field data were used to assess existing suitability mapping for moose, and to identify potential need for updates to mitigations as part of EAC Condition 23.d; field surveys and the assessment are included as Appendix D. Habitat mapping updates involving TEM will be implemented in 2022, when additional aerial data are available for the RSA.

Based on the results of the updated habitat suitability mapping for moose and grizzly bear to be conducted in 2022, BW Gold will:

- Conduct an assessment of the adequacy of the mitigation measures proposed in the Mitigations Table in light of the new information gathered; and
- If the assessment indicates that additional mitigation is required, the development of new or additional mitigations in a manner consistent with the British Columbia Environmental Mitigation Policy (BC EMP), and documentation of how the BC EMP was applied.

There are no RISC-standard survey methods for finding mineral licks, so searches have been performed from helicopter and following the intuitive wander approach to searching sites to find licks and finding licks by following trails. Field surveys for mineral licks and wildlife trails were conducted during summer of 2021 in the mine site and transmission line LSAs during other surveys (habitat suitability mapping, birds, and amphibians) with incidental reporting of features whenever they were observed. Methods involved searches for signs of mineral licks, as described *in Wildlife Habitat Features Field Guide (Kootenay Boundary Region)* (ECCS, 2018). No mineral licks were observed in 2021; several wildlife trails were identified around the mine site LSA, and those near openings or access roads had cameras installed in fall 2021 (Figure 4.4-4).

A survey for moose around Mt. Davidson was also conducted on December 7, 2021. Moose observations included five cows, four cow/calf pairs, six unknown sex adults, and an abundance of fresh tracks and beds (Figure 4.4-5).

4.4.2 Mitigation for Moose

The majority of mitigation applies to all wildlife species and is described in Section 3. Mitigation for moose focuses on:

- Avoiding moose habitat, such as salt licks and wetlands, where possible (Section 3.3).
- If a salt lick is identified during pre-construction surveys or during operations both DS 8.6 and EAC 23.C, Table 1 indicates that BW Gold will “will be identify measures to maintain the mineral licks in their natural state”. BW Gold will follow the mitigation hierarchy of avoidance, mitigate and restore:
  - Avoid: If a mineral lick is identified, the lick will be avoided if possible.
  - Mitigate: If a mineral lick is identified, mitigation will include:
    - Vegetation management to retain vegetation cover surrounding the lick.
    - A biologist will survey the area to identify movement corridors and trails to the lick.
    - Cameras will be placed on any mineral licks and trails to monitor use of the lick and trails.
    - If any trails to mineral licks cross project roads, mitigation will include road signage and training for staff that indicates the species using the lick, location of the trail, and times of year when animals using the trail and crossing the road are more likely.
  - Restore: If vegetation has already been cleared in the area of the lick, but it is outside of the Project footprint, then the site will be restored by replanting with native vegetation.

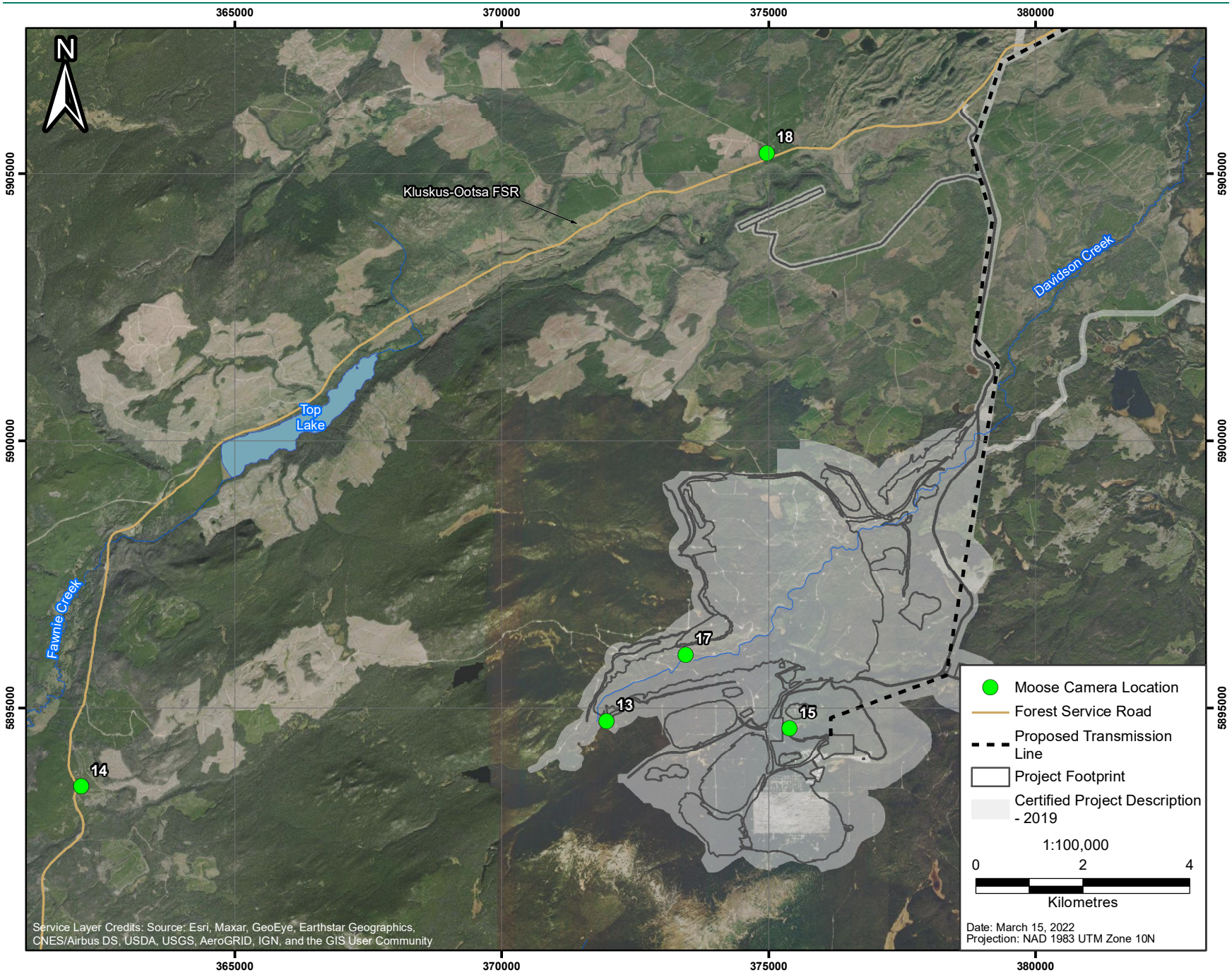


Figure 4.4-4: Wildlife Trail Camera Locations, 2021

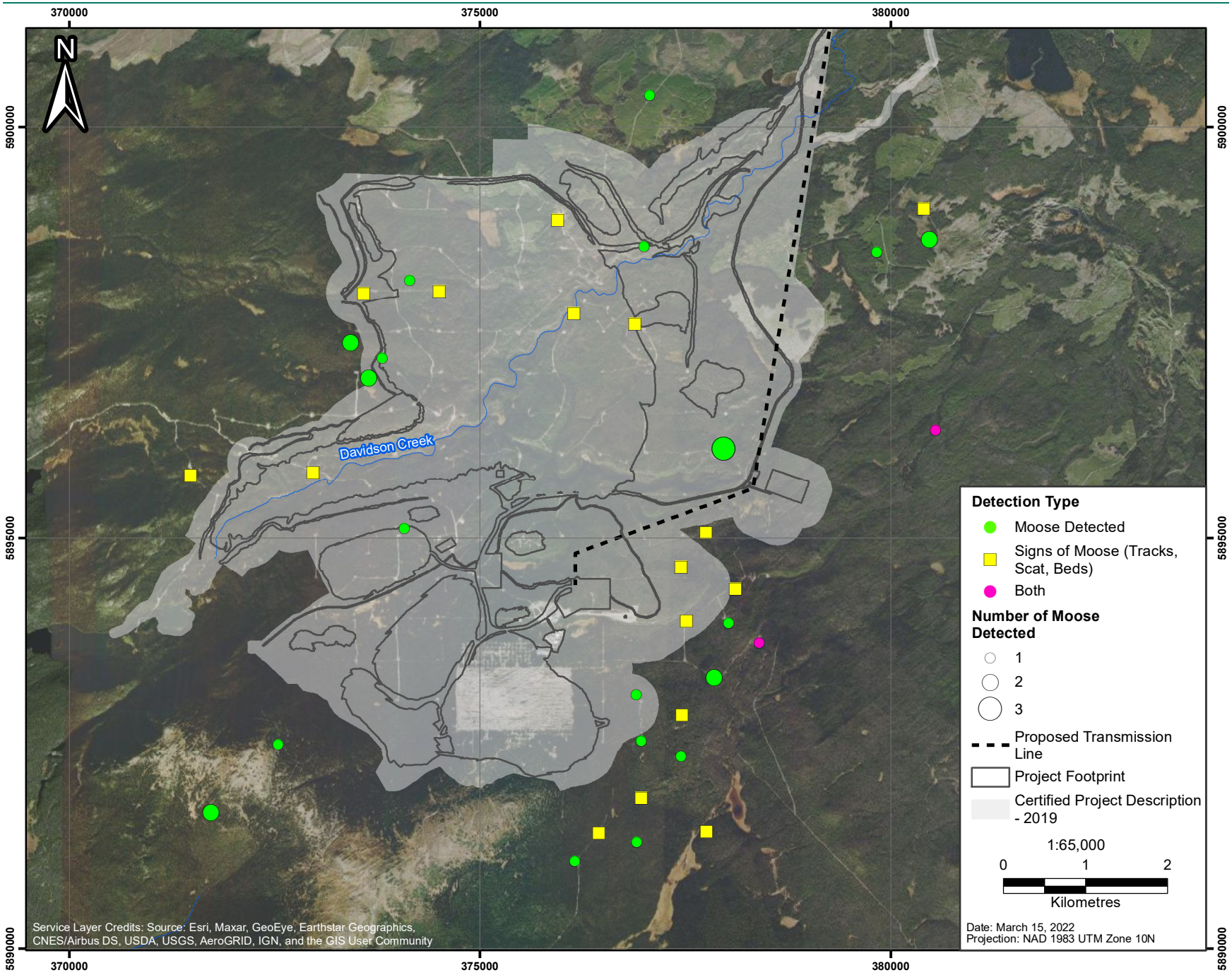


Figure 4.4-5: Moose Observations from Aerial Survey, December 2021

  - Note that if the mineral lick is inside the project footprint, is due to be removed for installation of infrastructure, and if that infrastructure can not be re-designed to preserve the mineral lick, then the mineral lick may be required to be removed. This would be reported in the annual WMMP Report along with a clear rationale for this exemption and identification of alternative measures that can be applied, if any.

- Minimizing new access for harvesters and wolves along roads through the measures outlined in Section 3.6.1:
  - Limiting sightlines along new access roads (e.g., by 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.
- Minimizing the potential for moose-vehicle collisions through the measures outlined in Section 3.6.2.
- Managing noise and disturbances to moose through the measures outlined in Section 3.7 and 3.8.
- Reclamation and restoration of the site at closure (Section 3.10).

4.4.3 Monitoring of Predicted Effects and Mitigation Effectiveness

DS Condition 6.14 requires a follow-up program for moose to verify the accuracy of the predictions of effects on moose in the EA, and to determine the effectiveness of mitigation measures. The condition specifies that aerial survey for winter distribution and density be conducted prior to construction and during construction through decommissioning.

The effectiveness of mitigation measures will be evaluated together by evaluating moose response to the Project. The EAC Application indicated that moose may avoid the project site and be hit by vehicles. The majority of mitigation measures are designed to reduce habitat and direct (noise, light) disturbance to moose to reduce their avoidance of the project and to keep moose safe when crossing the road. Therefore, the effectiveness of mitigation measures is evaluated by measuring mortality from moose-vehicle collisions and the distribution of moose relative to the project.

Objectives

Monitoring the three predicted Project effects on moose identified in the Application/EIS assessment:

1. To determine habitat loss and alteration from Project activities;
2. To monitor mortality from moose-vehicle collisions; and
3. To determine the winter distribution and minimum count density estimate of moose within the offset areas and the buffered Project area.

Performance Indicators, Triggers or Thresholds

The monitoring objectives for moose are listed in Table 4.4-1 along with performance indicators, associated triggers or thresholds, and reference for the applicable monitoring program.

Table 4.4-1: Follow-up Monitoring for Moose

Objectives		Performance Indicator	Triggers / Thresholds	Methods for Monitoring
1	To determine habitat loss and alteration from Project activities	Area of each habitat type in the LSA and annual and cumulative habitat loss by type	Measurable habitat loss beyond that predicted in the EA	Remotely sensed imagery and GIS analysis
2	To monitor mortality from moose-vehicle collisions	Annual and cumulative totals of moose mortalities from moose-vehicle collisions and other Project related incidents	Any mortality associated with Project activities	Incident reporting (Section 5.1.1)
3	To determine the winter distribution and minimum count density estimate of moose within the offset areas and the buffered Project area, and to determine the late fall distribution of moose during the rut relative to Mount Davidson	The current winter distribution and density estimate of moose within the offset areas and the Project area; and changes through time	▪ Change in the extent of moose winter distribution in the buffered Project area ▪ Changes in moose use of offset areas and observed abundance ▪ Changes in moose use and observed abundance in the area surrounding the mine site and its linear features	Pellet Counts and Snow Track Surveys (See the CMMP)

4.4.3.1 Habitat Loss Monitoring

Habitat for moose will be lost within the Project footprint during construction and operations and some habitat may be recovered during closure and reclamation.

Objectives

- To determine moose habitat loss from Project activities.
- To measure the amount of habitat recovery at the site at closure.

Performance Indicators

- Area of each habitat type in the LSA and annual and cumulative habitat loss by type.
- Area of each habitat type in the LSA and annual and cumulative habitat recovery by type.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution (moose and caribou)

The study area will be the extent of the LSA.

Data Collection – Survey Methods

- Engineering as-built reports will be used to acquire the actual Project footprint during each year where construction occurs.

Analyses

- The current year's project footprint will be compared with both the previous year's Project footprint and pre-Project habitat suitability maps of the LSA. Differences in the amounts of each habitat type between successive years and between the current year and the pre-project state will be summarized to represent the annual and cumulative habitat loss from the Project.
- Natural habitat recovery will be similarly quantified to document annual and cumulative recovery of habitat.

Reporting

- A summary of annual and cumulative habitat losses will be reported in the annual WMMP.

Schedule

- Habitat loss will be calculated annually.

Trigger or Thresholds

- Measurable habitat loss beyond that predicted in the EA.
- Measurable habitat recovery more than predicted in the closure plan.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for moose habitat will be determined by the EM in consultation with a QP as described in Table 4.4-2.

Table 4.4-2: Triggers and Management Responses for Direct Habitat Loss

Level	Trigger	Management Response
None	■ <80% of predicted habitat loss (2,343 ha)	■ No management change. ■ Continue monitoring.
Low	■ >80% of predicted habitat loss (2,343 ha)	■ Review if any mine plan changes may result in future exceedance of predicted habitat loss. ■ Continue monitoring.
Medium	■ >90% of predicted habitat loss (2,343 ha)	■ Review if additional permitting or changes to the project certificate are required to address planned area of habitat loss. ■ Continue monitoring.
High	■ >100% of predicted habitat loss (2,343 ha)	■ Report exceedance to BC EAO. ■ Conduct permitting or changes to the project certificate to address area of habitat loss. ■ Continue monitoring.

4.4.3.2 Moose-Vehicle Collision Monitoring

Wildlife awareness training and road regulations (Section 2.1) are integral to wildlife safety at the Project. The Application/EIS predicted that moose mortality may occur due to collisions with vehicles on the access roads. The magnitude was classified Low (1 moose killed during the life of the Project), medium (<5 moose) or high (>5 moose).

Objective

- To monitor moose-vehicle collisions and mortalities.

Performance Indicators

- Any moose-vehicle collisions or mortalities.

Monitoring Methods, Analyses, Reporting, Schedule

- All wildlife incidents including vehicle collisions and mortalities from human-wildlife interactions require that a formal incident report be completed (Section 5.1.1).
- All occurrences of moose-vehicle collisions will be included in the WMMP annual report.
- Where wildlife incidents, mitigations, or adaptive management require support or input from regulators and/or Aboriginal and Indigenous groups, reporting will be conducted in timelines appropriate to the action required.
- Any non-compliances associated with wildlife incidents will be reported according to procedures outlined in Section 6.1.1. All relevant communication, incidents, and outcomes will still be included in the WMMP report.

Trigger and Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for moose-vehicle collision will be determined by the EM in consultation with a QP, and may include:

- All moose-vehicle collisions will be evaluated relative to road mitigations, and staff training and awareness to determine the appropriate mitigation response.
- Mitigation response may include refresher trainings for employees and contractors driving on Project roads, updates to signage, and/or reduction in speed limits in areas designated to pose an ongoing risk of wildlife collisions.

4.4.3.3 Moose Distribution Monitoring

During the review of the EAC Application, the plan for long-term effects monitoring for moose and caribou was to use aerial surveys (ERM 2018). Regulatory commitments therefore reflect this understanding:

- DS 8.18 “a description of the follow-up program the Proponent shall implement to determine the effectiveness of the mitigation measures included in the compensation plan. As part of the development of the follow-up program, the Proponent shall determine, in consultation with Indigenous groups, the methods, timing and frequency for conducting winter surveys for caribou abundance and distribution within the Designated Project area…”
- DS 6.14 “…as part of the implementation of the follow-up program, the Proponent shall conduct winter distribution and density surveys for moose (*Alces alces*) starting prior to construction and until the end of operation…”
- EAC 22.c “the type, timing and frequency for undertaking caribou surveys prior to commencement of Construction, as well as during Operations, and how that information will inform development and implementation of monitoring and mitigation measures during Construction and Operations.”

BW Gold also made commitments during the review of the EAC Application:

- MT 8.36 and 13.33 – 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.
- MT 13.18 – Conduct moose aerial surveys prior to the commencement of construction, and subsequently every five years until the end of mine operations.

Earlier versions (August and December 2021) of the CMMP included aerial surveys for caribou and moose to determine whether these animals were avoiding the mine. Both FLNRORD and UFN/LDN provided formal comments during their review of the CMMP (Version 2 and 3, August and December 2021) that aerial surveys are not the best method to determine if caribou and moose are avoiding the mine.

BW Gold met with FLNRORD, ECCC and UFN/LDN on January 26th, 2022 to discuss the monitoring program. At that time, FLNRORD indicated that the province is already doing aerial surveys for moose population and composition estimates and caribou population estimates, caribou herd composition, and caribou calf survival estimates in the Tweedsmuir area and would prefer that BW Gold:

1. contact the BC FLNRORD in September each year to discuss data sharing of provincial data; and
2. conduct pellet counts and/or snow track surveys to measure relative distribution of caribou and moose in lieu of aerial surveys.

The parties on the call agreed that this is the preferred approach, including ECCC, FLNRORD and UFN/LDN.

As such, based on this feedback and direction, BW Gold is not proposing any aerial surveys for caribou or moose as part of the monitoring program. Assessment of any moose and caribou avoidance of the mine will be measured by monitoring pellet counts (CMMP, Section 6.2.2.1) and snow track surveys (CMMP, Section 6.2.2.2) and use of Provincial telemetry and survey data where appropriate.

Potential causes of disturbance to moose and caribou will be monitored through other monitoring programs and will be referred to in the annual WMMP report, including:

- Noise monitoring in the Noise and Vibration Effect Mitigation and Monitoring Plan (NVEMMP);
- Air quality monitoring in the Air Quality and Dust Management Plan (AQDMP);
- Dust monitoring in the Country Foods Management Plan (CFMP); and
- Soil, vegetation and berry monitoring in the CFMP.

Note that avoidance behaviours have been reported for moose, but the causes are largely unknown. Some potential causes, such as human presence, smell, altered predation risk or subtle interactions between effects may not be quantifiable by this monitoring program.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for moose avoidance of the project site will be determined by the EM in consultation with a QP, and may include:

- Changes in winter distribution of moose will trigger additional monitoring to better understand distributional changes and a qualitative examination of likely causes of the change in use.
    - If likely causes include project effects, then BW Gold will review mitigation measures with intent to identify additional mitigations, management, or compensation efforts in consultation with Aboriginal and Indigenous groups and governments.

4.5 Furbearers

Furbearers are species frequently harvested for their fur, and include wolverine (*Gulo gulo*), American marten (*Martes americana*), and fisher (*Pekania pennanti*). These furbearer species are most sensitive to disturbance at their dens, when they are raising young through the late winter and spring (Table 4.5-1). Note that bears are addressed separately in Section 4.6.

Table 4.5-1: Furbearer Species Conservation Statuses and Denning Habitat

Species	Conservation Status (BC[1], SARA[2])	Habitat	Sensitive Periods
Wolverine (*Gulo gulo*)	BC Blue, Special Concern	High elevation small-scale forest openings; tree decay piles or rock outcrops typically provide snow cover for dens (Krebs and Lewis 2000)	■ Low risk: August 2 – January 31 ■ Caution: June 30 – August 1 ■ Critical: February 1 – June 29 (includes natal denning and early rearing/late winter)
American marten (*Martes Americana*)	BC Yellow	Dens commonly in trees, snags, or logs, typically found in late-successional forest (BC MOE 2003)	■ Low risk: October 1 – February 28 ■ Caution: March 1 – September 30 (includes natal denning and early rearing) ■ Critical: None
Fisher (*Pekania pennant*)	BC Red (Columbian Population)	Late successional forest with closed canopy; dens in standing tree cavities (Weir and Almuedo 2010)	■ Low risk: August 2 – March 14 ■ Caution: June 30 – August 1 ■ Critical: March 15 – June 30 (includes natal and early rearing or late winter)

[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)

Pre-construction monitoring and mitigation effectiveness monitoring are described below in concordance with EAC Condition 23h (subcomponent plan for furbearers). Other monitoring for furbearers throughout the Project area will occur via the incidental wildlife sightings, interactions, and incidents reporting program.

Federal and Provincial Conditions

DS Conditions addressed include: 2.1, 2.3, 2.4, 2.5, 2.6, 2.9, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 8.5, 8.9, and 8.10.

The federal DS does not require a follow-up program for furbearers.

EAC Conditions addressed include: 2, 3, 4, and 23.

4.5.1 Baseline and Pre-construction Surveys

Pre-construction baseline surveys were undertaken in 2021 to conduct field verification of habitat suitability mapping and identify suitable habitat for key species, including denning habitat for furbearers (American marten, fisher, wolverine) in compliance with DS Condition 8.10. Survey methods are summarized below. Surveys were conducted in conjunction with habitat suitability surveys for other species, with methods details and maps of survey locations in Appendix D.

Terrestrial Ecosystem Mapping (TEM) field surveys were also conducted in 2021. Aerial imaging was flown in August – October 2021, however data collection was disrupted due to extensive wildlife smoke. Habitat mapping updates involving TEM will be implemented in spring 2022, when additional aerial data are available for the RSA.

In accordance with EAC Condition 23c Table 1 and DS Condition 8.10, the updated furbearer denning habitat suitability information will inform management if vegetation clearing must occur during the sensitive denning period (Section 3.3). Pre-clearing surveys will be conducted and are described in Section 4.5.3 below, followed by mitigations such as setback buffers a potential denning features.

Baseline Data (2011-2013)

Baseline surveys for furbearers in 2011-2013 included aerial and ground winter tracking surveys, and incidental furbearer detections (Figure 4.5-1; Figure 4.5-2). A total of 18 species (587 individuals) were detected within the LSA (n = 15) and RSA (n = 14; Table 4.5-2). 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.

Table 4.5-2: Furbearer Detections within the LSA and RSA, 2011-2013

Species Common Name	Scientific Name	LSA		RSA	
		Detections	Sites Present	Detections	Sites Present
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

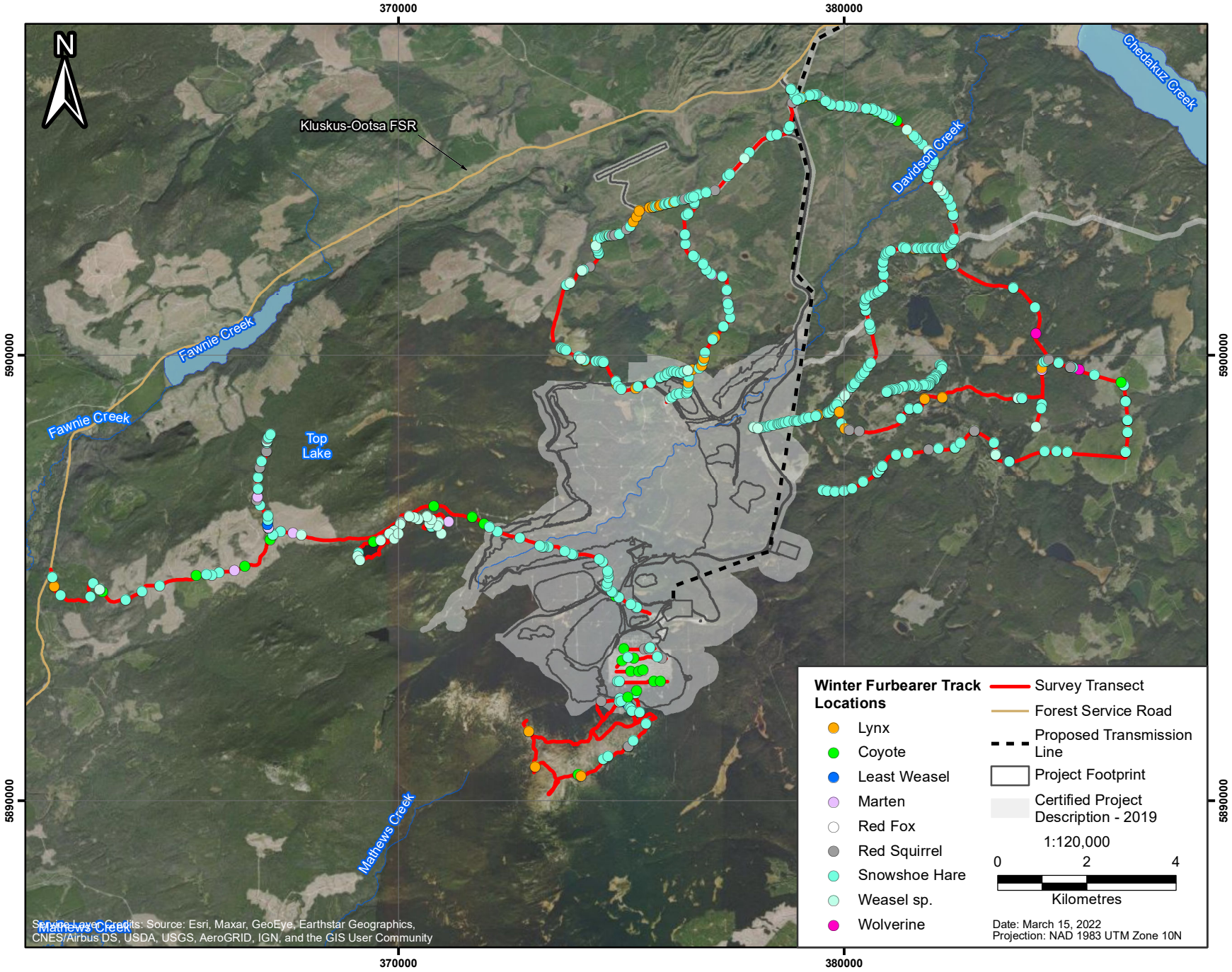


Figure 4.5-1: Furbearers Winter Ground Track Locations, 2011-2013

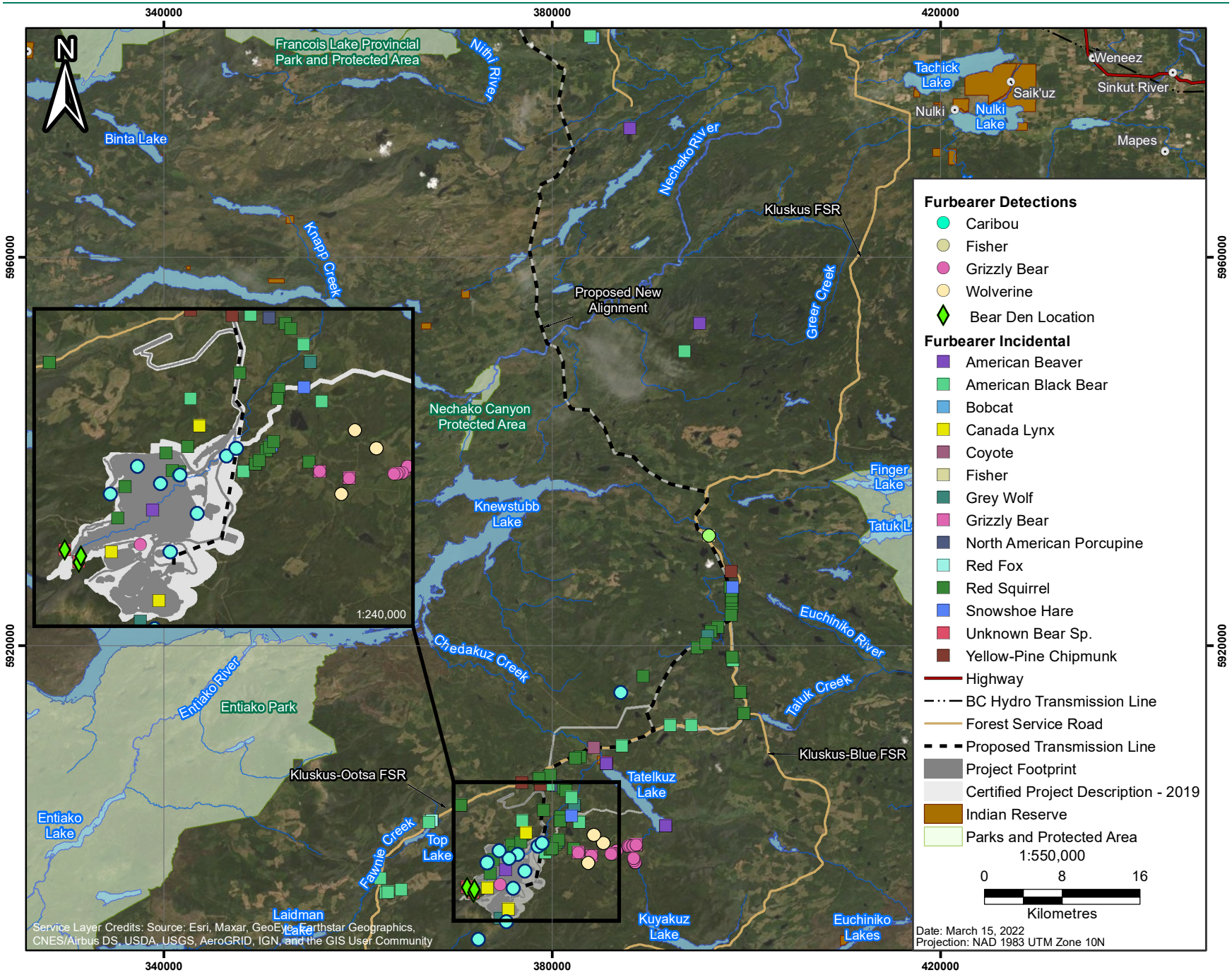


Figure 4.5-2: Furbearers Detections, 2011-2013

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 (federally listed as Special Concern by COSEWIC and on Schedule 1 of SARA) 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 4.5-2). 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.

Pre-construction Surveys (2021)

Field surveys for furbearer denning habitat suitability (American marten, fisher, and wolverine) were conducted from June 8 to June 19, 2021 in 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 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 each species denning 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. Wildlife sign was also recorded at each site to document relative level of use of the site. Maps of survey locations and additional field methods details are included in Appendix D.

4.5.2 Mitigation for Furbearers

The majority of mitigation measures for furbearers are shared with other wildlife species through minimization of Project effects, as described in Section 3. Mitigations specific to furbearers are listed below.

DS Condition 8.9 requires identification of time periods during which construction activities should avoid sensitive wildlife seasons for American marten, fisher, and wolverine, referencing MFLNRO (2014). Construction activities will be planned outside of this period unless not technically feasible (DS 8.9). *The Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area* (MFLNRO 2014) identifies multiple sensitive periods for furbearers (Table 4.5-1). The critical sensitive period for wolverines (February 1 to June 30) incorporates the critical period for fisher and will be used as the overall furbearer sensitive period (Table 3.3-1).

DS Condition 8.10 requires that if sensitive time periods for furbearers cannot be avoided, no work buffer zones will be established taking into account MFLNRO (2014) and dens identified during pre-construction surveys; recommended buffer zones vary according to species and activity (Section 3.3). EAC Condition 23c, Table 1 indicates that minimum buffer zones of 50 m will be used surrounding identified dens. This Condition also provides direction should a buffer zone not be possible:

> *"Should the survey or assessment determine that there is furbearer denning habitat within the Project Area, the plan must identify mitigation measures to be applied during the denning period, as determined by a Qualified Professional, if avoidance is not possible, and in consideration of BC Environmental Mitigation Policy, including Procedures for Mitigating Impacts on Environmental Values (BC EMP)."*

Should buffer zones not be possible around suitable habitat, mitigation measures would be determined by a QP based on site-specific characteristics including the size of the feature, the species involved, and the intensity level of planned activities. These may include restrictions on specific activities based on noise and visual disturbance levels, or rescheduling of work.

4.5.2.1 Pre-clearing Surveys for Furbearers

If construction is scheduled during sensitive time periods, pre-construction surveys will be conducted to identify American marten, fisher, and wolverine denning habitat (Table 4.5-1; DS 8.9, 8.10). Planning for surveys and adaptive management for probable active dens will be in consultation with FLNRORD and Aboriginal and Indigenous groups. Surveys will generally follow *Inventory Methods for Medium-Sized Territorial Carnivores – Coyote, Red Fox, Lynx, Bobcat, Fisher, and Badger, Version 2.0* (RIC 1999c). Ground-based surveys, stratified by habitat suitability, will be conducted in winter prior to any clearing or construction in the sensitive period.

Objectives

- To protect probable active natal or maternal furbearer dens in areas scheduled for clearing or construction activities.

Performance Indicators

- Comprehensive pre-clearing survey of areas scheduled for construction, plus a 200 m buffer.
- Identification of any probable natal or maternal den and establishment of appropriate setback buffer around each site.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The study area will be re-defined annually based on scheduled clearing and construction activity area. A 200 m buffer will be added to define the appropriate survey area for the pre-construction survey.

Data Collection – Survey Methods

Survey methods for the pre-construction survey will broadly follow RIC (1999c) recommendations for snow-tracking surveys. These include:

- Referencing available vegetation and habitat suitability mapping for wolverine, American marten, and fisher to identify habitat areas for ground surveys;
- Review of historic incidental observations will also be included as suitable habitat areas;
- In a GIS database, transects will be plotted in suitable habitat with 100 m spacing;
- In open forests and higher elevation, snow track surveys can be conducted by helicopter for wolverine;
- In forested habitats, field crews will walk the transect lines searching for denning habitat features, including suitable trees, snags, or coarse woody debris piles;
- Tracks of wolverine, fisher, and American marten will be recorded;
- All probable dens will be marked and a setback buffer established;
- Track files of survey routes will be maintained along with waypoints and photographs of all probable den sites; and

- The survey crew will consist of a wildlife biologist with experience conducting den surveys and a field assistant.

Analysis

- There are no analyses associated with this survey.

Reporting

Data will be reported in the annual WMMP report, which will include:

- Summaries of survey methods and data collected;
- A map for the area to be cleared with planned and actual survey transects; and
- Management actions taken (e.g., size of buffer established).

Schedule

- Surveys will be completed during the winter prior to February 1, or during the sensitive season.

Trigger and Adaptive Management Response

- If a suspected den is discovered, implement an appropriate buffer, as determined by a QP, with no clearing or construction activities within the buffer.
- Buffers may need to be increased or re-assessed, depending on the activities taking place and potential level of disturbance (e.g., larger buffers for noisier activities).
- Any sightings of furbearers or sign in areas which are not buffered require immediate notification to the Environmental Manager and re-assessment of the area prior to work continuing.

4.5.2.2 Monitoring of Project Ponds for Furbearers

The Mitigation Table indicates that BW Gold will implement adaptive management measures to deter furbearers from the TSF and pit lake.

- Monitoring of facility waterbodies will be conducted using trail cameras for birds and other wildlife such as furbearers, and is described in Section 4.7.3.9.
- Deterrence of toads, waterbirds and furbearers from project ponds is described in Section 3.10.3.

4.5.3 Monitoring of Mitigation Effectiveness

Objectives

- To verify that setbacks around probable dens sites have been maintained.

Performance Indicators

- Absence of construction or human intrusion within established buffers around probable active dens.

Methods for Monitoring and Evaluation

- Visual check of area to be conducted weekly when construction activity is within 250 m of the identified site, or
- Set up a wildlife camera on the suspected den.

Reporting

Data will be reported in the annual WMMP report, which will include:

- Locations of surveys, dates of inspection, and observations at each location.

Schedule

- Monitoring will be using a wildlife camera, which will be checked at the end of the sensitive period.

Trigger and Adaptive Management Response

The adaptive management approach is described in Section 1.4.

Any incursions into buffer areas or other signs of disturbance at den sites will be reported to the Environmental Manager and will trigger adaptive management action and will be directed by the EM. Adaptive management for disturbance to furbearer dens will be determined by the EM in consultation with a QP, and may include:

- Re-flag the setback buffer area and inform work crews of the location;
- If there is sign of disturbance at the den, work will be halted until the area is assessed by a QP for recommendation (e.g., increase buffer size, delay work);
- Should any furbearer mortality be observed on the road, an investigation should be conducted to determine:
  - Effectiveness of road management actions;
  - Potential interaction with moose if any observations or mortalities were reported nearby; and
  - Suitable furbearer habitat in the vicinity, including potential wildlife trails or denning habitat, which may indicate the need for additional monitoring and management in that portion of road; and
- Should furbearers such as marten be observed in camp buildings, then review the camp hardening management such as skirting, screens on windows and vents, and door seals.

4.6 Grizzly Bear

The grizzly bear (*Ursus arctos horribilis*) is a large, wide-ranging omnivore inhabiting many habitat types throughout BC. Like other North American bears, grizzly bears are most sensitive to disturbance in their dens during winter hibernation and cub birthing. The grizzly bear is blue-listed (Special Concern) in BC (BC CDC 2021), and federally listed as Special Concern on Schedule 1 of SARA (Government of Canada 2021a).

Annual meetings regarding grizzly bear management will be organized by BW Gold with FLNRORD, the Southern Dakelh Nation Alliance, and other Aboriginal and Indigenous groups who wish to participate (EAC 23f).

Federal and Provincial Conditions

DS Conditions addressed include: 2.1, 2.3, 2.4, 2.5, 2.6, 2.9, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 8.9, and 8.10.

EAC Conditions addressed include: 2, 3, 4, and 23.

The MT requires monitoring of kokanee salmon spawning streams, which are an important source of food for grizzly bears in the fall (MT 11-5; Section 4.6.3.3).

4.6.1 Baseline and Pre-construction Surveys

EAC Condition 23d requires pre-construction surveys to confirm or update the habitat suitability mapping for grizzly bear:

> *"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."*

DS Condition 8.10 and EAC Condition 23c also require identification of grizzly bear denning habitat to implement avoidance and mitigation measures during the sensitive denning period.

Pre-construction baseline surveys were undertaken in 2021 to conduct field verification of habitat suitability mapping and identify suitable habitat for key species, including for grizzly bears. Habitat assessments were completed for a four season model for grizzly bear, and additional surveys focused on identifying suitable denning habitat in the mine site. These field data were summarized and used to assess existing habitat suitability mapping and mitigations (Appendix D). Additional detailed pre-construction baseline results will be available in a separate report in early 2022.

Terrestrial Ecosystem Mapping (TEM) field surveys were also conducted in 2021, and aerial imaging was flown in August – October 2021, however data collection was disrupted due to extensive wildlife smoke. Habitat mapping updates involving TEM will be implemented in spring 2022, when additional aerial data are available for the RSA.

Baseline Data (2011-2013)

Baseline surveys for grizzly bear in 2011-2013 included den surveys, deployment of wildlife cameras, and incidental detections (see Figure 4.5-2). 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 LSA 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^2 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; Figure 4.5-2). 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 (Figure 4.5-2). 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.

Habitat suitability mapping was completed in 2013 on model for grizzly bear habitat in the RSA (Appendix D Figures 4.6-1 through 4.6-4).

Pre-construction Surveys (2021)

Pre-construction baseline field surveys for grizzly bear have been summarized as part of Appendix D.

4.6.2 Mitigation for Grizzly Bears

The majority of mitigation measures for grizzly bears are shared with other wildlife species through minimization of Project effects, as described in Section 3. Mitigation for grizzly bear focuses on:

- Training and Awareness (Section 2.1 and Appendix C);
- Waste management practices to reduce attractiveness to bears, including measures for food preparation and storage, and waste storage and disposal (Section 3.5);
- Minimizing the potential for bear-vehicle collisions through speed limits, signage, communication and training (Section 3.6.2);
- Reclamation and restoration of the site at closure (Section 3.9).

DS Condition 8.9 requires identification of time periods during which construction activities should avoid sensitive wildlife seasons for grizzly bear, referencing MFLNRO (2014). Construction activities will be planned outside of this period unless not technically feasible (DS 8.9). The *Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area* (MFLNRO 2014) identifies sensitive periods for grizzly bear (Table 4.6-1). A sensitive denning period of October 1 to March 31 will be used for grizzly bear (Section 3.3).

Table 4.6-1: Sensitive Seasons and Habitats for Grizzly Bear

Season	Dates	Habitat and Best Practices
Low Risk	None	None
Caution	Early spring foraging: April to mid-June.	■ Avoid working in wetlands, avalanche tracts or low-lying skunk cabbage forests where bears consume early vegetation upon emergence from winter dens. ■ Avoid work in proximity to calving ungulates.
	Summer foraging: High-elevation feeding (interior eco-regions), June through August	■ Use caution and, where possible, avoid activities in high-value forage areas. ■ Maintain sufficient distance from bears so as not to disrupt their activities.
	Fall foraging: Caution – Salmonid feeding aggregations, mid-August through October	■ Do not operate in or adjacent to stream or river systems while they host spawning salmonids.
	Berry feeding: July through October	■ Where possible, avoid activities in and adjacent to habitat with high concentrations of berries when fruits are mature. Consult a qualified professional biologist to assist in identifying location and site-specific timing. ■ Maintain sufficient distance from feeding bears so as not to disrupt their activities.
Critical	Winter denning: October through the end of winter conditions (March to May). Birthing: January through March	■ Do not operate in well-drained, high-elevation slopes during the critical period. ■ Do not cut large trees potentially housing denning bears.

Note: Sensitive Seasons quoted from MFLNRO (2014)

Grizzly bears den during the winter, in habitats most likely associated with well-drained, high-elevation slopes with alpine, subalpine, or montane environments. Most of these areas are outside of the Project

footprint, which is largely at intermediate elevations (or low elevations along the transmission line RoW). However, one section of high value grizzly bear denning habitat has been identified from Traditional Knowledge and during field surveys in 2012 and 2021. Traditional Knowledge included in the EA Application states:

> *"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)."*

A boulder field within mature forest was located during field surveys at the southwest corner of the mine site (northwest corner of Mt. Davidson) which has high suitability for grizzly bear denning and two dens from previous years (see Figure 4.5-2, and Appendix D Photos 3.1-1 to 3.1-4). A wildlife camera was also placed at these sites in October, 2021 (see Figure 4.4-5, Camera 13). The den site in the boulder field will be avoided with a buffer of 200 m during the denning season. The 200 m buffer distance is larger than the MFLNRO (2014) recommended minimum of 60 m because there are several features at the site which may serve as dens, and a large buffer will ensure the habitat remains functional and minimize the risk of disturbance to bears. If avoidance is not possible during the denning season, additional monitoring may be done to determine occupancy, such as reviewing the wildlife camera footage and using a Forward Looking Infrared (FLIR) camera. Methods for pre-clearing surveys are described in more detail below. The buffer distance may be adjusted for the season based on results of pre-clearing surveys, or removed for the season if the site is unoccupied.

Any grizzly bear dens identified during Project construction or operations will have a buffer zone established, following MFLNRO (2014) and in compliance with DS Condition 8.10 and EAC Condition 23c. The minimum specified buffer distance in MFLNRO (2014) is 60 m for grizzly bear dens. Buffers will be determined based on site-specific characteristics including the intensity level of planned activities, and may exceed 60 m. If activities must occur within the buffer zone of a potential den, additional monitoring may be conducted to determine occupancy, in consultation with FLNRORD and Aboriginal and Indigenous groups.

4.6.2.1 Pre-clearing Surveys for Grizzly Bears

DS Condition 8.10 and EAC Condition 23c indicate that if construction cannot be avoided during the sensitive periods for bears, that pre-construction surveys will be conducted for grizzly bear denning habitat.

Objectives

- To protect potential grizzly bear dens in areas scheduled for clearing or construction activities during the sensitive denning period of October 1 to March 31.

Performance Indicators

- Comprehensive pre-clearing survey conducted in areas scheduled for construction plus a 200 m buffer.
- Identification of any probable den and establishment of setback around each site.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The study area will be re-defined annually based on scheduled clearing and construction activity area. A 200 m buffer will be added to define the appropriate survey area for the pre-clearing survey.

Data Collection – Survey Methods

Pre-clearing surveys for grizzly bear dens are not described by provincial RISC protocols, so methods have been developed based on similar surveys at other industrial sites. These include:

- Habitat suitability mapping for the denning period will be used to identify areas for survey;
- Historic incidental observations within the study area will be included as representing suitable habitat;
- If possible, conduct an aerial survey during the fall denning period to look for fresh digs by bears. This should be conducted after bears have denned but before snowfall covers and obscures the diggings;
- If surveys are conducted during winter, survey the area using a Forward Looking Infrared (FLIR) camera;
- Alternatively, and if available, survey the area with a dog trained to find grizzly bears;
- All probable dens will be marked and a minimum 60 m setback buffer established; and
- Track files of survey routes will be maintained along with waypoints and photographs of all probable den sites.

Reporting

Data will be reported in the annual WMMP report, which will include:

- Summaries of survey methods and data collected;
- A map of the construction area in the survey year, with habitat suitability, planned transects, conducted transects, and probable den sites; and
- Management actions taken (e.g., size of buffer established).

Schedule

- Surveys will be completed during the denning season and before the start of clearing and construction.

Trigger and Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for bear dens will be determined by the EM in consultation with a QP, and may include:

- If a suspected den is discovered, implement an appropriate buffer, and manage clearing and construction activities within the buffer.
- Set up a wildlife camera to record when the bear emerges and that it emerges successfully.
- Buffers may need to be increased or re-assessed, depending on the activities taking place and potential level of disturbance (e.g., larger buffers for noisier activities).
- Any sign of bears or den features in areas which are not buffered require immediate notification to the Environmental Manager and re-assessment of the area prior to work continuing.

4.6.3 Monitoring of Predicted Effects and Mitigation Effectiveness

Federal and EAC Conditions do not require a monitoring program for grizzly bear populations or distribution, except for ongoing use at kokanee spawning streams (MT 11-5). Monitoring is also proposed to examine potential Project effects (habitat loss and vehicle collisions) and effectiveness of den setbacks, as part of the requirement in EAC Condition 23h for a subcomponent plan for grizzly bear.

Objectives

1. To determine habitat loss and alteration from project activities;
2. To record mortality from grizzly bear-vehicle collisions;
3. To verify that setbacks around probable dens sites have been maintained; and
4. To verify ongoing use of kokanee spawning streams by bears.

Performance Indicators, Triggers or Thresholds

The monitoring objectives for grizzly bears are listed in Table 4.6-2 along with their specific performance indicators, the associated triggers or thresholds, and reference for the applicable monitoring program. Monitoring programs are described below.

Table 4.6-2: Follow-up Monitoring for Grizzly Bears

Objectives		Performance Indicator	Triggers / Thresholds	Methods for Monitoring
1	To determine habitat loss and alteration from Project activities	Area of each habitat type in the LSA and annual and cumulative habitat loss by type	Measurable habitat loss beyond that predicted in the EA	Remotely sensed imagery and GIS analysis
2	To prevent mortality from grizzly bear-vehicle collisions	Annual and cumulative totals of grizzly bear mortalities from grizzly bear-vehicle collisions and other Project related incidents	Any mortality associated with Project activities.	Incident reporting (Section 5.1.1)
3	To verify that setbacks around probable dens sties have been maintained	Absence of construction or human intrusion within established buffers around probable active dens	Evidence of human activity within established buffers	Visual check of area to be conducted weekly when construction activity is within 250 m of the identified site
4	To verify ongoing use of kokanee spawning streams by bears	Level of bear activity at kokanee spawning streams	Measurable decrease in bear activity at kokanee streams	Wildlife cameras

4.6.3.1 Habitat Loss Monitoring

Habitat for grizzly bears will be lost within the Project footprint during construction and operations and some habitat may be recovered during closure and reclamation.

Habitat loss monitoring will be conducted in the same way as habitat loss for moose (Section 4.4.3.1).

4.6.3.2 Grizzly Bear-Vehicle Collision Monitoring

Wildlife awareness training and road regulations (Section 2.1) are integral to wildlife safety at the Project. The Application/EIS predicted that grizzly bear mortality may occur due to collisions with vehicles on the access roads. The magnitude was classified as Low (0 grizzly bears killed during the life of the Project), medium (1 grizzly bear), or high (>1 grizzly bear).

Objective

- To monitor for grizzly bear-vehicle collisions and mortalities.

Performance Indicators

- Annual and cumulative totals of grizzly bear mortalities from grizzly bear-vehicle collisions and other Project related incidents.

Monitoring Methods, Analyses, Reporting, Schedule

- All wildlife incidents, including vehicle collisions and mortalities from human-wildlife interactions require that a formal incident report be completed (Section 5.1.1).
- All occurrences of grizzly bear-vehicle collisions will be included in the WMMP annual report.
- Where wildlife incidents, mitigations, or adaptive management require support or input from regulators and/or Aboriginal and Indigenous groups, reporting will be conducted in timelines appropriate to the action required.
- Any non-compliances associated with wildlife incidents will be reported according to procedures outlined in Section 6.1.1. All relevant communication, incidents, and outcomes will still be included in the WMMP annual report.

Trigger and Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for bear-vehicle collisions will be determined by the EM in consultation with a QP, and may include:

- All grizzly bear-vehicle collisions will all be evaluated relative to traffic regulations and mitigation measures, and staff training and awareness to determine the appropriate mitigation response.
- Mitigation response may include refresher trainings for employees and contractors driving on Project roads, updates to signage, and/or reduction in speed limits in areas designated to pose an ongoing risk of wildlife collisions.
- Should grizzly bear be observed in the waste management facility, then review the camp hardening management and waste management protocols to understand if the animal is being attracted to camp and why. Determine adaptive management actions according to situation to reduce the attractiveness of the site to bear.
- Should any bear mortality be observed on the road, an investigation should be conducted to determine:
  - Effectiveness of road management actions;
  - Potential interaction with moose if any observations or mortalities were reported nearby; and
  - Suitable grizzly bear habitat in the vicinity, including potential wildlife trails, high value foraging habitat such as berry patches or streams, or denning habitat, which may indicate the need for additional monitoring and management in that portion of road.

4.6.3.3 Monitoring of Den Site Mitigation Effectiveness

Objectives

- To verify that setbacks around probable dens sites have been maintained.

Performance Indicators

- Absence of construction or human intrusion within established buffers around probable active dens.

Methods for Monitoring and Evaluation

- Visual check of area to be conducted weekly when construction activity is within 250 m of the identified site.
- Establish a wildlife camera on the den site to confirm that the bear emerges successfully in the spring.

Reporting

Data will be reported in the annual WMMP report, which will include:

- Locations of surveys, dates of inspection, and observations at each location.

Schedule

- Monitoring checks will occur weekly when activity is within 250 m of the identified site, or the wildlife camera will be checked at the end of the sensitive period.

Trigger or Thresholds

- Report incursions into the buffer to the Environmental Manager.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Any incursions into buffer areas or other signs of disturbance at den sites will be reported to the EM. Adaptive management for setbacks around dens will be determined by the EM in consultation with a QP, and may include:

- Re-flag the setback buffer area and inform work crews of the location.
- If there is sign of disturbance at the den, work will be halted until the area is assessed by a QP for recommendation (e.g., increase buffer size, delay work).

4.6.3.4 Monitoring of Kokanee Spawning Streams

Objectives

- To verify ongoing use of kokanee spawning streams by bears.

Performance Indicators

- Level of bear activity at kokanee spawning streams.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

- The study area will incorporate all known kokanee spawning streams which were assessed during baseline surveys within the RSA: Davidson Creek, Creek 661, and Chedakuz Creek upstream of Tatelkuz Lake.

Data Collection – Survey Methods

Survey methods will include:

- Four wildlife cameras will be distributed along each study stream, in areas with recorded bear activity (based on previous baseline surveys).
- Camera deployment will include data collection on habitat and camera view.
- Cameras will be set to take motion triggered photos, as well as timed photos at least once per day to determine camera effort (whether the camera is clear of fog/snow and upright).
- Cameras will be checked once per year to refresh batteries and memory cards.

Analysis

- Survey design and number of sampling stations will be evaluated and updated for their effectiveness following the first few years of monitoring, during the early stages of the construction period.
- The level of bear activity (i.e., number of identifiable individuals and number of triggers per site) will be compared through time.

Reporting

Reporting will include, where applicable:

- Summaries of camera effort (number of days with clear recording by month);
- Bear detections by site and stream, and number of identifiable individuals where possible; and
- Assessment of changes over time.

Schedule

- Cameras will be deployed at the onset of construction and maintained annually.

Triggers or Thresholds

- Measurable decrease in level of bear activity at any kokanee spawning streams.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for bear use of salmon streams will be determined by the EM in consultation with a QP, and may include:

- Increasing camera monitoring frequency or number if power to detect change is too low, or if bear activity decreases;
- Surveys to investigate bear sign along the streams, to determine whether bear activity has shifted to areas without camera monitoring or decreased overall; and
- Investigating fisheries or water quality changes and determine whether potential effects are related to Project activities. Implement adaptive management actions according to results of investigation, which may include offsetting or compensation measures for grizzly bear habitat.

4.7 Birds

The bird community in and surrounding the Project area consists of upland birds (forest and grassland passerines such as sparrows, finches, jays, and warblers, as well as woodpeckers, nightjars), waterbirds (shorebirds, waterfowl, gulls), and raptors (eagles, hawks, falcons, and owls).

The mitigation and monitoring program for birds focuses on the bird groups listed in the DS and EAC Conditions; migratory birds, listed species, waterbirds and forest and grassland birds.

DS Condition 4.4 references migratory birds, including several species at risk: common nighthawk (*Chordeiles minor*), olive-sided flycatcher (*Contopus cooperi*), barn swallow (*Hirundo rustica*), bank swallow (*Riparia riparia*), and horned grebe (*Podiceps auritus*). Condition 4.4 also references yellow rail (*Coturnicops noveboracensis*), but this species range does not overlap the Project site and none have been observed during any field surveys and is not discussed further.

Federal and Provincial Conditions

DS conditions addressed include: 1.19, 2.1, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 4.1, 4.2, 4.3, 4.4, 4.5, and 8.16.

EAC conditions addressed include: 2, 3, 4, and 23.

DS Condition 4.4 requires mitigation to avoid bird breeding periods and conduct pre-clearing surveys if construction occurs in the breeding period. DS Condition 4.5 requires a follow up program for migratory birds.

EAC Condition 23c requires pre-clearing surveys for birds, while EAC Condition 23h requires a sub-component plan for “birds (waterbirds and forest and grassland birds)”.

4.7.1 Baseline and Pre-construction Surveys

DS Condition 4.3 requires pre-construction surveys for birds:

> “*The Proponent shall conduct pre-construction surveys for migratory birds and their habitat in the Designated Project area to validate the results of habitat suitability modelling for migratory birds, including migratory birds that are listed species at risk, conducted by the Proponent and presented in the Environmental Impact Statement and in* the Blackwater Gold Project – Waterbird Memo (Response to LDN/UFN #684, 693, 697, and NWFN/StFN #964*). As part of the pre-construction surveys, the Proponent shall validate the applicability of fisher* (Martes pennant*) habitat suitability modelling to migratory birds, as identified by the Proponent in the* Blackwater Gold Project – Forest Birds (Supplemental Information in Response to 681, 683, 685, 694, 695, 703, 717, 936; and ECCC Annex 1, IR 21, 24, 25). *Based on the results of the pre-construction surveys the Proponent shall, in consultation with Indigenous groups and relevant authorities, develop and implement mitigation measures for migratory bird habitat. “*

DS Condition 8.16 requires pre-construction surveys for short-eared owl in high-value nesting and foraging habitat.

Pre-construction field surveys were undertaken in June 2021 within the mine site and transmission line LSAs; these surveys are summarized below, and detailed pre-construction baseline results will be available in a separate report in early 2022.

Baseline Data (2011-2013, 2017)

Raptors

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 4.7-1). Call playback surveys were completed in 2011, 2012, and 2013, to detect raptors during the breeding season (Figure 4.7-1). 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 raptor species (144 individuals) were detected within the LSA (n = 16) and RSA (n = 14). 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 4.7-1). 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 baseline surveys (n = 2; Figure 4.7-1). One adult short-eared owl was detected during a stand watch in an agricultural field and grassland in the transmission line RSA on the Tatelkuz Ranch, next to the Kluskus FSR and Tatelkuz Lake. 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.

All raptor species detected may potentially nest within the Project area, 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 4.7-1). 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 intercept directly with the mine site or transmission line.

Upland Birds

Baseline surveys were completed for upland birds in 2011-2013 and 2017 (referred to as “forest and grassland birds” in the EIS). Baseline surveys from 2011-2013 included point counts, Clark’s nutcracker surveys, common nighthawk surveys and sharp-tailed grouse lek surveys (Figure 4.7-2). 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.

Ground surveys for common night hawk followed *Inventory Methods for Nighthawks and Poorwills* (RIC 1998b) 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.

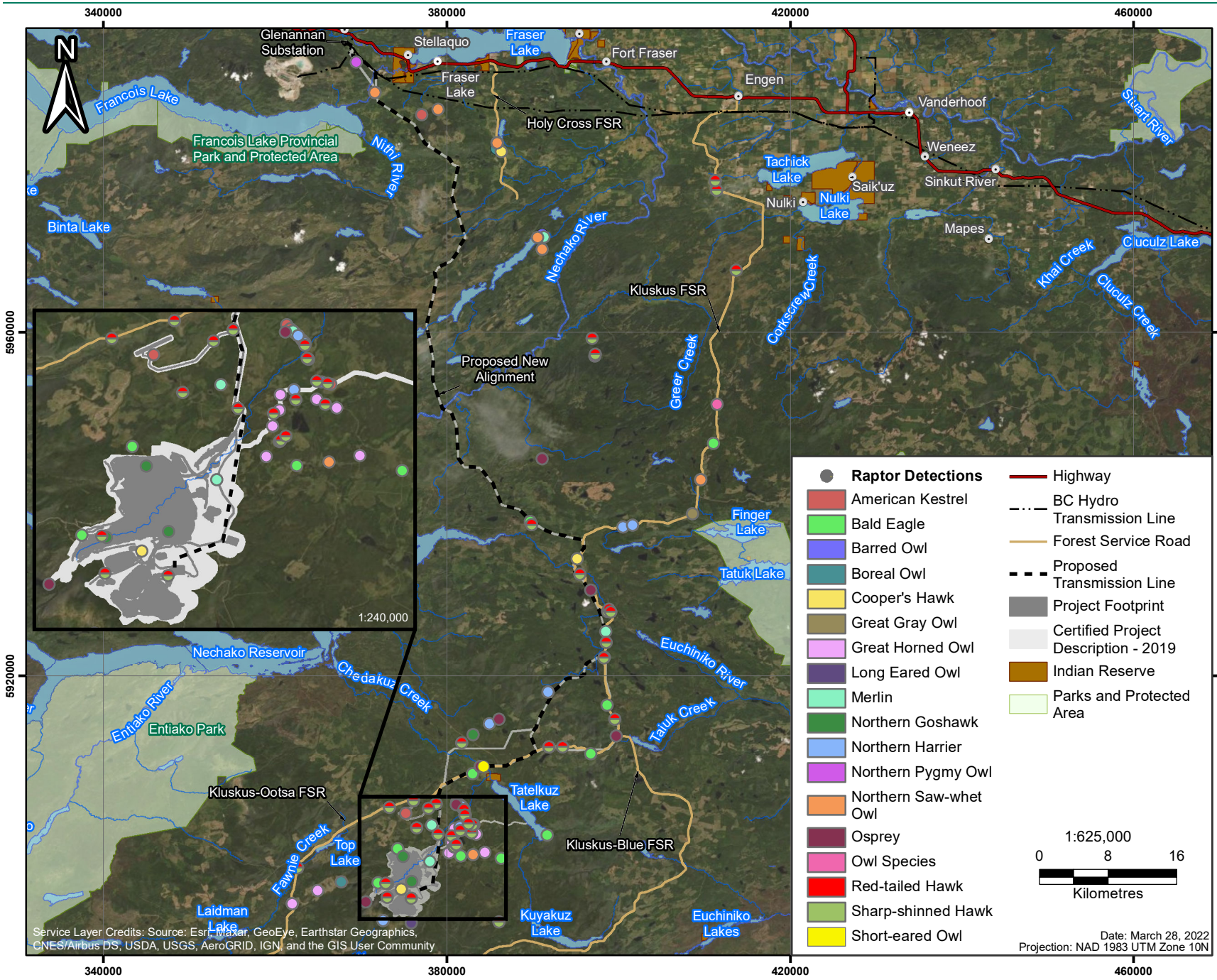


Figure 4.7-1: Raptor Observations, 2011-2013 and 2017

Automated Recording Units (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 4.7-2). 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. An individual nutcracker was detected on Mount Davidson in early June, but groups were not observed until late July when a group of seven were seen flying towards Mount Davidson (Figure 4.7-2). 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.

Sharp-tailed grouse lek surveys were completed in May and June 2012, and May 2013 following RIC (1997) methodology. No leks were detected during targeted surveys; however, sharp-tailed grouse are present in the RSA. Potential lek habitat at the Project area 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 4.7-2).

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;* Figure 4.7-2). 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 4.7-2). 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 4.7-2). 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 (1998d) methodology targeting barn swallow, bank swallow, and black swift. 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 4.7-2). 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.

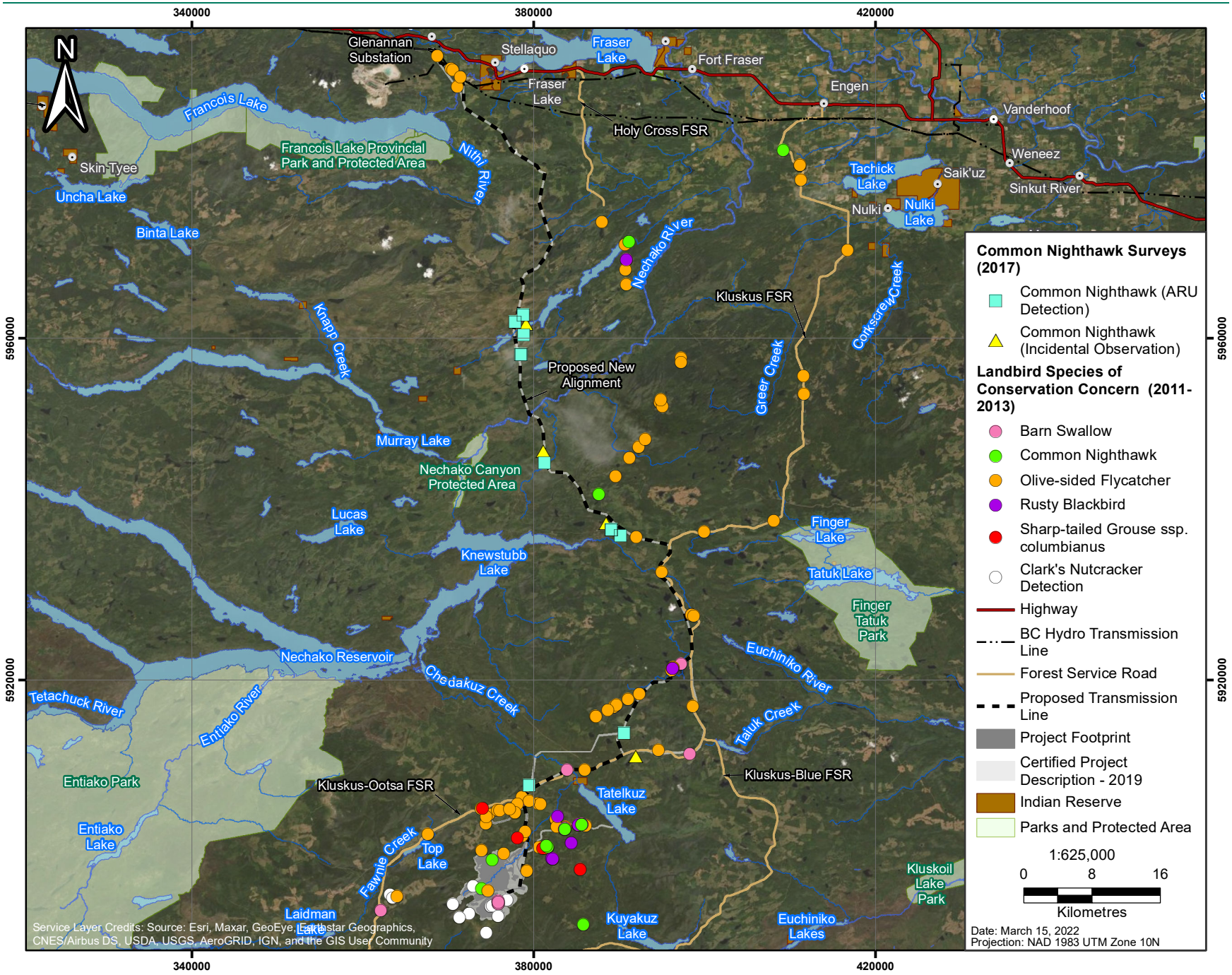


Figure 4.7-2: Upland Breeding Bird Species at Risk Observations, 2011-2013 and 2017

Waterbirds

Baseline surveys for waterbirds were completed in 2011-2013 and 2017. Surveys conducted in 2011 to 2013 included aerial migration and breeding surveys, yellow rail surveys, and incidental detections (Figure 4.7-3). 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 4.7-3).

Aerial breeding waterbird surveys were completed on July 17, 2011, July 7, 2012, and July 22, 2013, and fall migration waterbird surveys were completed on September 10, 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 1999d).

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. The great blue heron was the only waterbird species of conservation concern recorded during 2011-2013 baselines, with one individual being incidentally detected within the RSA, 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.

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.

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 (1999d) methodology. 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 4.7-3).

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 1998e) methodology and were used to survey suitable breeding habitat during the breeding season. No yellow rail were detected during any baseline surveys.

Pre-construction Surveys (2021)

Pre-construction surveys were conducted during the summer of 2021. General and species-specific surveys were conducted to detect species at risk (Table 4.7-1). These surveys are summarized below and will be included in a separate pre-construction baseline report in early 2022.

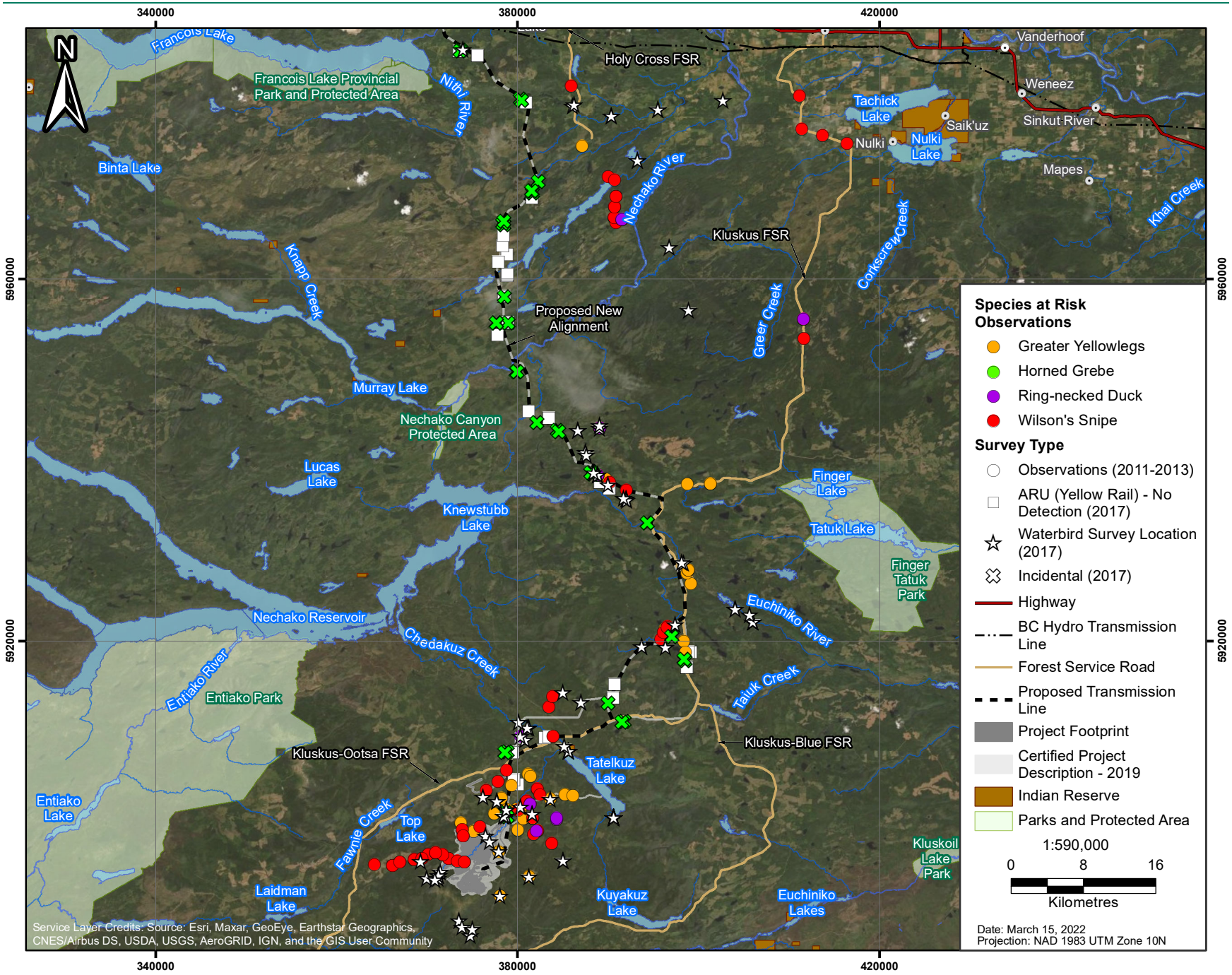


Figure 4.7-3: Waterbird Species at Risk Observations, 2011-2013 and 2017

Table 4.7-1: Bird Species at Risk Included in Baseline Habitat Surveys

Species	Conservation Status [1, 2]	Habitat	Defined Critical Habitat	Management Resources	Observed during Baseline (2011-2013, 2017)	Observed during Pre-construction Baseline 2021
Bank Swallow (*Riparia riparia*)	BC Yellow, Threatened	Aerial insectivore, colonial nesting in burrows dug into vertical banks (may be natural or artificial, e.g., pits)	None	Recovery Strategy [proposed] (ECCC 2021c)	No	Outside of Transmission Line RSA only
Barn Swallow (*Hirundo rustica*)	BC Blue, Special Concern	Aerial insectivore, colonial nesting typically in artificial structures: garages, houses, bridges, culverts	None	COSEWIC Status Report (2011)	Yes, Transmission Line & Mine Site	Yes, Mine Site
Black Swift (*Cypseloides niger*)	BC Blue, Endangered	Aerial insectivore, cliff-side nesting, often associated with waterfalls or caves	None	COSEWIC Status Report (2015)	No	No
Common Nighthawk (*Chordeiles minor*)	BC Blue, Threatened	Aerial insectivore, ground nests in open habitats including cleared forests, grasslands, marshes, banks, and rocky outcrops	None, but under current study	Recovery Strategy (Environment Canada 2016a)	Yes, Transmission Line & Mine Site	Yes, Transmission Line & Mine Site
Greater Yellowlegs (*Tringa melanoleuca*)	BC Yellow	Aquatic diet, forages and nests along low flow wetlands	None	NA	Yes, Transmission Line	Yes, Transmission Line & Mine Site
Horned Grebe (*Podiceps auritus*)	BC Yellow, Special Concern	Aquatic diet, nests in open water with abundant emergent vegetation	None	COSEWIC Status Report (2009a)	Yes, Transmission Line	Yes, Transmission Line
Olive-sided Flycatcher (*Contopus cooperi*)	BC Blue, Threatened	Insectivore, forages and nests along mature forest edges	None, but under current study	Recovery Strategy (Environment Canada 2016b)	Yes, Transmission Line & Mine Site	Yes, Transmission Line & Mine Site
Rusty Blackbird (*Euphagus carolinus*)	BC Blue, Special Concern	Inhabits coniferous forest adjacent to wetlands, nests near water	None	Management Plan (Environment Canada 2015)	Yes, Mine Site	No
Short-eared Owl (*Asio flammeus*)	BC Blue, Special Concern	Nests in open habitats with abundant small vertebrate prey, including meadows, grasslands, and marshes	None	Management Plan (ECCC 2018)	Yes, Kluskus FSR	No

[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).

Raptors

Short-eared owl habitat was assessed at 116 sites within the mine site and transmission line LSA from June 8 to 19, 2021, following provincial protocols for habitat suitability mapping (RIC 1999a). Suitability ratings for survey sites ranged from moderately low to very low for food, security, thermal, and overall (Table 4.7-2). Eighty-five percent of sites were rated overall as very low suitability, and the remaining 15% were rated as low. Only 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. No additional surveys were conducted for short-eared owl (in compliance with DS Condition 8.16) because no suitable breeding habitat was identified within the mine site or transmission line LSAs.

Table 4.7-2: 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

An aerial survey was complete on December 7, 2021 to identify raptor stick nests within the mine site and followed RIC protocols for aerial survey height and speed (RIC 2001; Figure 4.7-4). One raptor stick nest belonging to an unknown raptor species was observed during aerial surveys. Additionally, northern harrier (n = 5) and red-tailed hawk (n = 2) were incidentally observed during pre-construction surveys (Figure 4.7-4).

Upland Birds

Variable Radius Point Count (VRPC) surveys were conducted at 139 sites from June 9 to 16 and June 24 to 27, 2021, following RIC (1999b) methodology. A total of 760 individual upland birds were recorded across 60 species (Figure 4.7-5). 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*). Olive-sided flycatcher (n = 10) and common nighthawk (n = 1) were the only upland bird species at risk recorded during point count surveys. Olive-sided flycatchers were recorded at eight point count sites. One Clark's nutcracker was also recorded during VRPC surveys.

Common nighthawk count surveys were conducted at 11 sites in the mine site LSA from June 17 to 19, 2021, following the *Canadian Nightjar Survey Protocol* (Knight et al. 2019; Figure 4.7-5). Common nighthawk individuals were observed at two of the count survey locations. ARUs were also deployed at nine locations between June and August 2021, to detect common nighthawk in the mine site and transmission line LSAs. ARU data were processed using the Kaleidoscope software program cluster analysis and manual vetting from a trained listener. From the 3,603 audio detections recorded by ARUs, 223 were confirmed as common nighthawk detections. Confirmed detections were distributed across three sites (ARU 1 = 215, ARU 2 = 3, ARU 3 = 5; Figure 4.7-5). Detections do not indicate separate individuals, but the high activity level at ARU 1 indicates consistent occupancy by common nighthawk at that site.

Swift and swallow surveys were only conducted in suitable habitat locations within the mine site and transmission line LSAs. For barn swallows, habitat includes buildings, bridges, cliffs, and caves. Bank swallow habitat includes aggregate pits, road cuts, and banks of waterbodies. Habitat includes waterfalls, seeps, and wet portions of narrow canyons and caves.

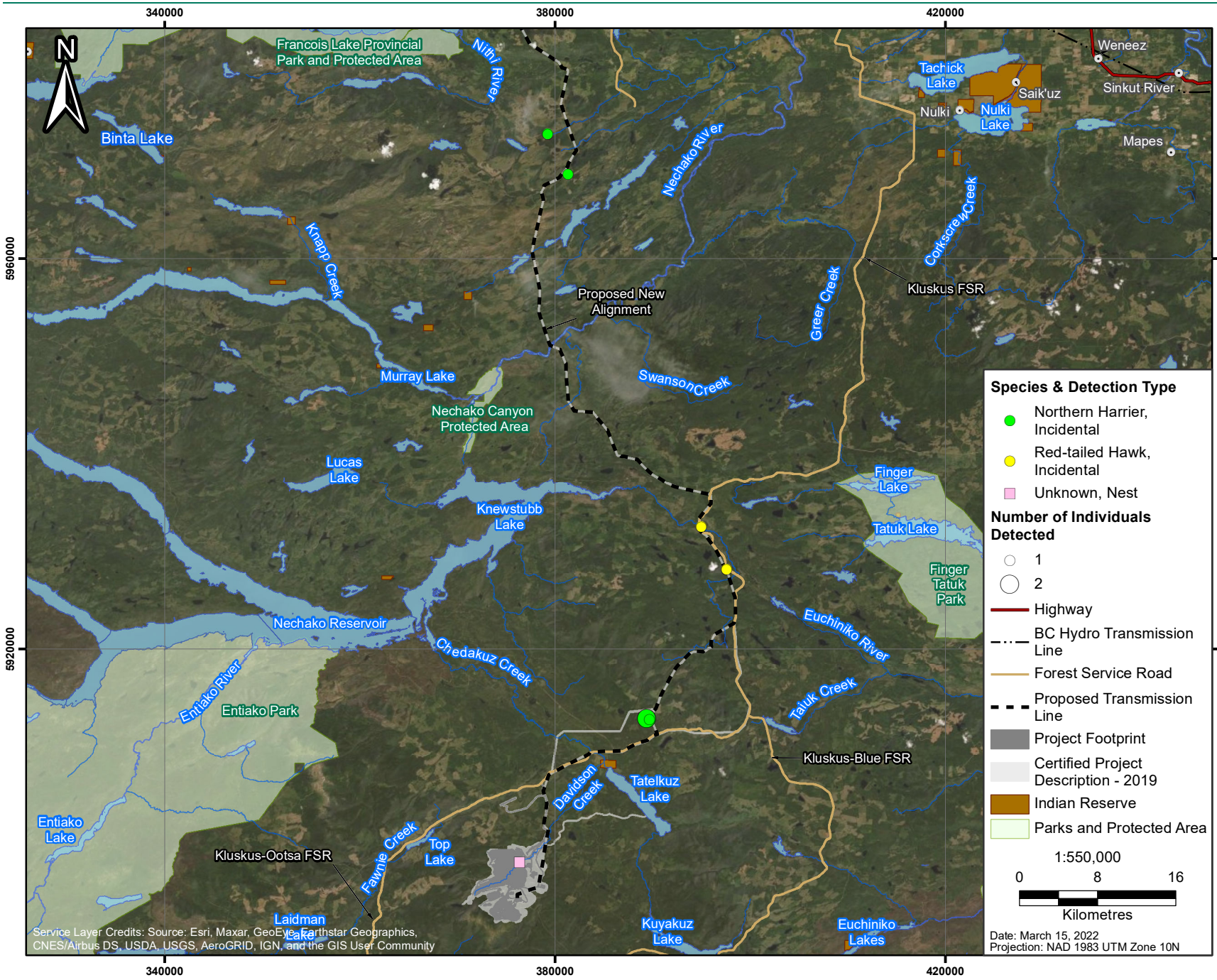


Figure 4.7-4: Stick Nest and Incidental Raptor Observations, 2021

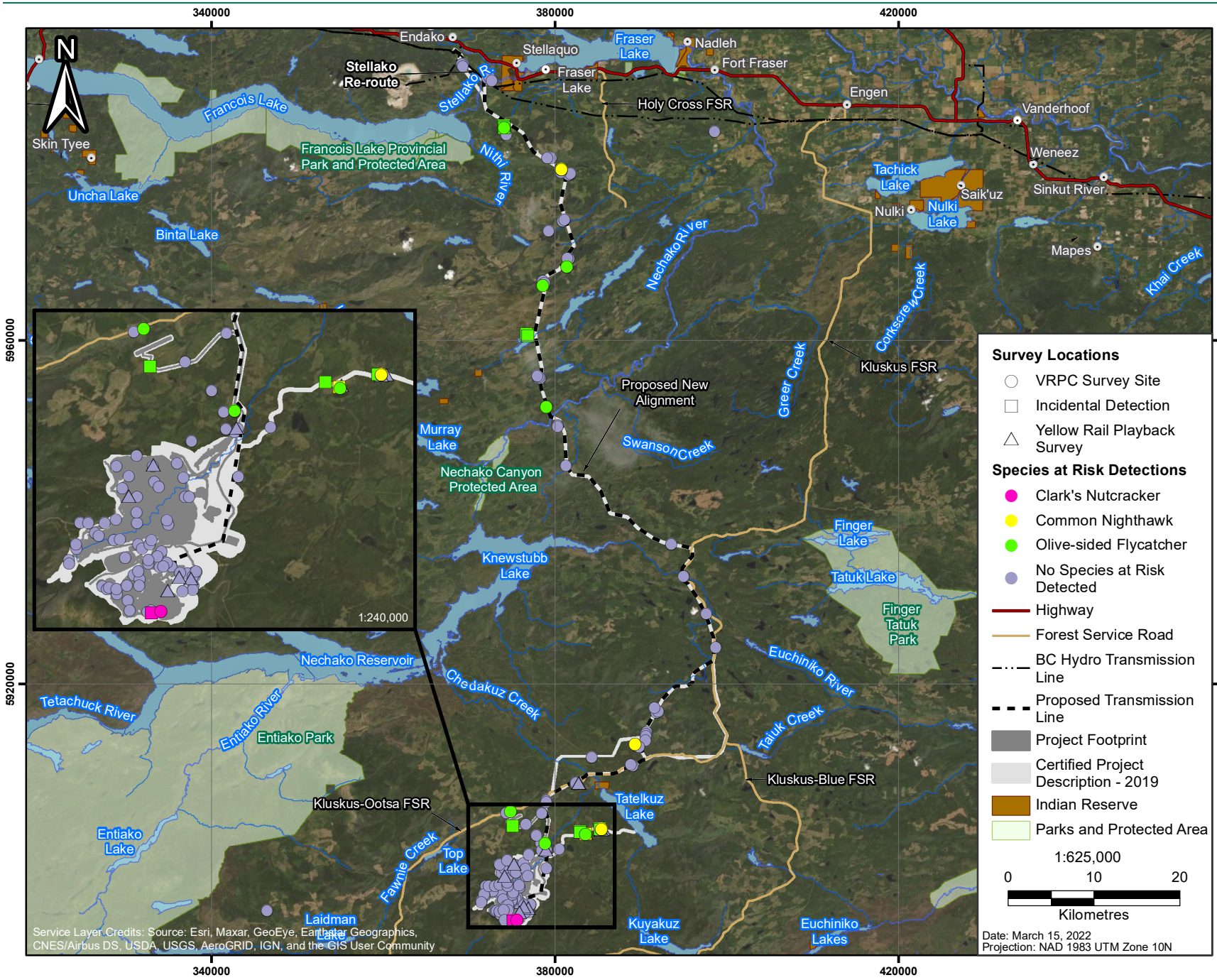


Figure 4.7-5: VRPC Survey Locations and Upland Breeding Bird Species at Risk Observations, 2021

Methods for barn swallow and bank swallow surveys follow *Inventory Methods for Swallows and Swifts* (RIC 1998d), while black swift survey protocols follow *Black Swift Survey Protocols in Canada: Site Occupancy, Nest Searching, and Site Habitat* (Rock et al 2021), and *Black Swift - Baseline Survey Protocol and Effects Assessment for Environmental Assessment* (ECCC 2021b). No suitable habitat was identified for bank swallows or black swifts, so species specific surveys were not conducted.

Point count surveys for barn swallows were conducted around the mine site infrastructure on June 11, 2021, in suitable habitat areas (Figure 4.7-5). 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 inability to see within the roofing structure. An estimated total of 10-12 barn swallow nesting pairs were counted around the camp, with several additional inactive nests noted.

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. An estimate of 30-40 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. 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.

An additional 339 individual upland birds from 54 species were incidentally observed during 2021 pre-construction bird surveys. Olive-sided flycatcher (n = 10) and common nighthawk (n = 2) were the only upland bird species at risk recorded during point count surveys incidentally recorded (Figure 4.7-5). Two Clark's nutcracker were also incidentally observed.

Waterbirds

Shoreline surveys were completed at 35 sites from June 9 to 10, 14 to 19, and 24 to 26, 2021, focusing on waterbodies within the mine site and transmission line LSAs (Figure 4.7-6). Playback surveys for horned grebe were conducted in conjunction with shoreline surveys and followed RIC (1998b) methodology (Figure 4.7-6).

A total of 75 waterbirds from 13 species were identified, comprised of six waterbird groups: 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). The most commonly observed species were bufflehead (*Bucephala albeola),* ring-necked duck (*Aythya collaris*), and Bonaparte's gull (*Chroicocephalus philadelphia*). Eight greater yellowlegs, a focal waterbird species, were observed during shoreline surveys. Horned grebe were observed at one site along the transmission line LSA.

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.

Playback surveys for yellow rail were conducted at 16 sites from June 24 to 26, 2021, starting at sunset and continuing for two hours after following RIC (1998e) methodology (Figure 4.7-6). ARUs were also deployed at nine locations between June and August, 2021, in conjunction with common nighthawk surveys to detect yellow rail in the mine site and transmission line LSAs. ARU data were processed using the Kaleidoscope software program. No yellow rails were recorded during playback surveys or ARU deployment.

An additional 71 individual waterbirds from 11 species were incidentally observed during 2021 surveys. The majority of observations (93%) were made during upland breeding bird VRPC surveys, while the remaining were outside the time and distance limits at the shoreline survey sites. Greater yellowlegs were incidentally detected during VRPC surveys (n = 9).

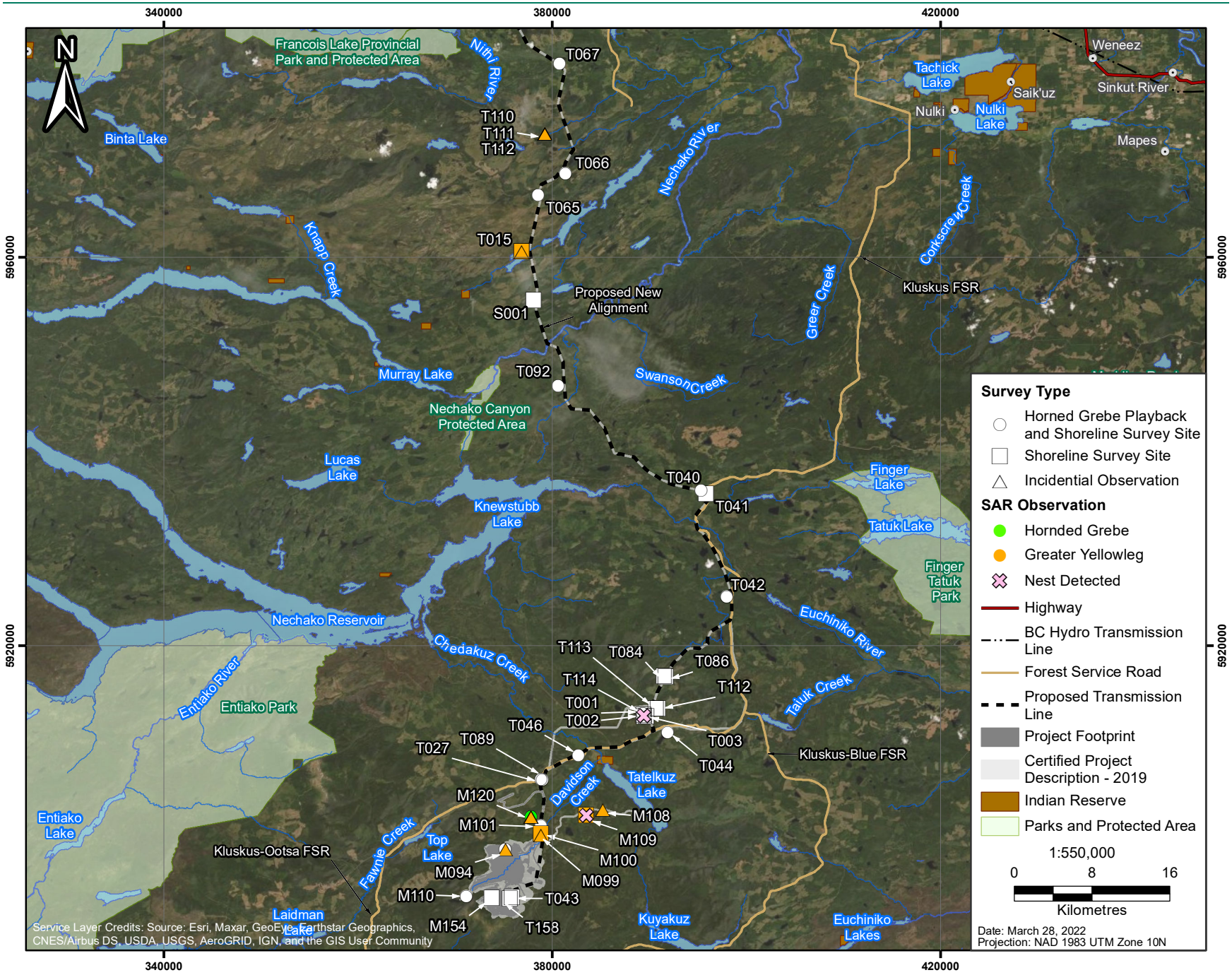


Figure 4.7-6: Waterbird Survey Locations and Species at Risk Distribution, 2021

4.7.2 Mitigation for Birds

DS Condition 4.1 requires BW Gold to carry out the Project in a manner that protects migratory birds and avoids harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests or eggs, and take into account ECCC's *Avoidance Guidelines* (ECCC 2021a). DS Condition 4.4 requires planning prior to construction to avoid sensitive periods and locations for migratory birds, including greater yellowlegs (*Tringa melanoleuca*), and with consideration of critical habitat for SARA listed species, including common nighthawk, olive-sided flycatcher, yellow rail, barn swallow, bank swallow, horned grebe. Defined critical habitat for listed species and reference documents are provided in Table 4.7-1.

The majority of mitigation measures for birds are shared with other wildlife species through minimization of Project effects, as described in Section 3. Mitigation specific to birds includes:

- Planning and avoiding vegetation clearing during the breeding season for birds;
  - The sensitive nesting period for forest and grassland birds and waterbirds begins April 15 (Birds Canada 2021, ECCC 2017; Table 3.3-1).
  - Clark's Nutcracker is an exception, with nesting dates from March 15 – July 30.
  - The sensitive nesting period for raptors begins March 15 and continues through August 15.
- If vegetation must occur during the breeding season, conducting pre-clearing surveys, and implementing no work setbacks around any nests (Section 3);
- Facility waterbodies management (Section 3.5.1), including water quality monitoring and implementation of deterrence methods; and
- Transmission line management (Section 3.4).

Following the mitigation hierarchy, vegetation clearing will be planned to occur outside of bird breeding periods (MT 9-3; Table 3.3-1). Planning for avoidance will utilize habitat suitability mapping, vegetation maps, and any available new imagery to determine habitat types present in the area. Types of birds that may occur in these habitats will be determined, such as forest birds, grassland birds, raptors, waterbirds, and specific species at risk. This information will guide the pre-clearing survey plan.

4.7.2.1 Pre-clearing Surveys for Birds

EAC Condition 23c, Table 1, indicates that if vegetation clearing must occur during the sensitive period, then pre-clearing surveys will be conducted to identify active nests and establish appropriate setback buffers.

Note that "pre-construction surveys" are conducted to gather information for planning purposes ahead of the construction period. In contrast, "pre-clearing surveys" are conducted in the closest window possible prior to vegetation clearing during sensitive periods (typically within one week), if clearing cannot be feasibly conducted at another time.

Objectives

- To identify and buffer active bird nests if clearing or construction activities cannot be scheduled outside of the breeding bird period.

Performance Indicators

- Buffers established at nests maintained.
- No incidental take recorded during clearing or construction activities.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

Surveys will be conducted in areas planned for clearing or construction, buffered by 100 m.

Data Collection – Survey Methods

Surveys will be conducted by a wildlife biologist with experience in the survey methods and can recognize indicators of bird nesting behaviour from a distance. Prior to pre-clearing surveys, a SOP will be developed, consistent with ECCC's *Avoidance Guidelines* (ECCC 2021a) and suitable guidance documents, such as:

- Point counts in forested environments (Ralph et al. 1993; Environment Canada 2004);
- Walking transects in open environments (e.g., around wetlands or waterbodies, using low-intensity ground sweeps);
- Nest searches for conspicuous species, including larger cavity nests (mature forests) and raptor nests (mature or riparian forests, cliffs);
- Species-specific survey methods will be used in identified suitable habitat for species at risk (Table 4.1-2); and
- BC Hydro Site C nest survey methodology (Strategic Resource Solutions 2015).

Site-specific buffer distances will be established based on the species present, habitat type, and intensity level of the planned activity. Buffers will be clearly marked with flagging tape, actual nests will not be marked. Additional details for monitoring buffered nests will be provided in the bird pre-clearing SOP.

BW Gold will document and maintain detailed records of efforts undertaken to avoid incidental bird takes during these surveys.

Reporting

Data and results will be presented in the annual WMMP report, including:

- Summaries of the type of monitoring conducted and the data collected;
- A map of the construction area in the survey year, with locations of conducted surveys;
- Identified mitigations measures (e.g., buffer distance) and circumstances and rational where exceptions or alternative measures were applied;
- The results of efforts undertaken to avoid incidental take of birds following pre-clearing surveys, and
- A summary adaptive management actions taken.

Schedule

- Surveys will be completed during the bird breeding season and as near as possible to the planned start of clearing and construction, typically within one week of planned clearing.

Trigger and Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for setbacks around bird nests will be determined by the EM in consultation with a QP, and may include:

- Establishment of setbacks around nests or probable nest locations will occur wherever identified.

- Any incidental take will be reported and investigated following wildlife incident procedures in Section 2.3. Investigations will include suggestions of adaptive management actions to prevent reoccurrence of incidents.

4.7.2.2 Facility Waterbody Monitoring

DS Condition 4.2 requires BW Gold to deter migratory birds from facility waterbodies:

> *"The Proponent [BW Gold] shall deter migratory birds from using or frequenting the tailings storage facility, reclamation wetlands, pit lake and sediment control ponds until such time that water quality in these structures meets legislative requirements and water quality objectives. The Proponent shall identify the water quality objectives using an ecological risk based approach, developed in consultation with Indigenous groups and relevant authorities."*

Facility waterbodies such as the TSF, Pit Lake, and sediment control ponds, may pose a health risk to birds. Mitigation measures are identified in Section 3.10, including deterrence methods, water quality objectives, and adaptive management triggers (DS 4.2).

Monitoring for effectiveness of these measures will be conducted via water quality sampling, remote cameras, and the incidental sightings program (MT 9-22). Monitoring for these mitigation measures are outlined in Section 4.7.3.

4.7.2.3 Transmission Line

The Application/EIS predicted the transmission line may pose a mortality risk for birds due to line-strikes. Mitigation measures to minimize the risk to birds are discussed in Section 3.4, and include construction management, habitat management, and installation of markers on the transmission line. Mortality along high-risk sections of the transmission line will be monitored for mitigation effectiveness (Section 4.7.3).

4.7.3 Monitoring of Predicted Effects and Mitigation Effectiveness

DS Condition 4.5 requires that a follow-up program be implemented for migratory birds, including migratory birds that are listed species at risk, their eggs and nests as follows:

> *"The Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and determine the effectiveness of all mitigation measures to avoid harm to migratory birds, including migratory birds that are listed species at risk, their eggs and nests. The follow-up program shall include the mitigation measures used to comply with condition 4.1 to 4.4. The Proponent shall implement the follow-up program during all phases of the Designated Project and shall apply conditions 2.9 and 2.10 when implementing the follow-up program."*

Monitoring programs to address these conditions and commitments are listed below. Where possible, methods will be used to study groups of birds (e.g., forest and grassland birds, waterbirds). However, species-specific monitoring programs are proposed for some species at risk because of their unique natural history (e.g., common nighthawk).

Objectives

1. To determine habitat loss and alteration from Project activities, for forest and grassland birds and waterbirds.
2. To detect changes in bird population dynamics in the Project area compared to control areas.
3. To determine the effectiveness of mitigation measures for bird mortality along the transmission line.

4. To monitor the Clark's nutcracker population and utilization of whitebark pine habitat (DS 5.2).
5. To determine potential effects of electromagnetic fields on birds interacting with the transmission line (MT 14-27).
6. To determine the effectiveness of deterrents for migratory birds used at facility waterbodies (DS 4.2).
7. Determine the nest success in setback buffers established during construction and vegetation clearing (DS 4.1).

Performance Indicators, Triggers, or Thresholds

The monitoring objectives for birds are listed in Table 4.7-3 along with performance indicators, associated triggers or thresholds, and reference for the applicable monitoring program.

Table 4.7-3: Follow-up Monitoring for Birds

Objectives	Performance Indicator	Triggers / Thresholds	Methods for Monitoring
1 Determine habitat loss and alteration for birds	Area of each habitat type in the LSA and annual and cumulative habitat loss by type	Measureable habitat loss beyond that predicted in the EA	Remotely sensed imagery and GIS analysis
2 Detect changes in bird population dynamics in the Project area compared to control areas	Number of birds at each survey point, by species or species groups, by habitat stratification within the study area	Formal triggers and thresholds will be determined based on the power to detect change after the first two years of data collection	RISC protocol; WildResearch 2018 for common nighthawk data collection
3 Determine the effectiveness of mitigation measures for waterbird mortality along the transmission line	Number of deceased waterbird individuals (e.g., feathers, body parts) at monitoring locations along the transmission line	More than 5 waterbird mortalities recorded on the transmission line in a year	Following Avian Power Line Interaction Committee (APLIC 2012) and Birdlife International (2015)
4 monitor the Clark's nutcracker population and utilization of whitebark pine habitat	Number of Clark's nutcracker individuals at each survey point in the study area	Formal triggers and thresholds will be determined based on the power to detect change after the first two years of data collection	RISC protocol for forest and grassland bird data collection
5 Determine potential effects of electromagnetic fields on birds interacting with the transmission line	-	-	Literature review and discussion about implementing monitoring programs
6 Determine the effectiveness of deterrents for migratory birds used at facility waterbodies	The presence of waterbirds on facility waterbodies	10 or more waterbird individuals are observed using a facility waterbody per year	Use of wildlife cameras (timed and motion-triggered photos); incidental observations of waterbirds on the facility waterbodies

Objectives	Performance Indicator	Triggers / Thresholds	Methods for Monitoring
7 Determine the nest success in setback buffers established during construction and vegetation clearing	Success of nests within the setback buffers	A trend of bird nests in the buffer zones fledging less frequently than normal	Nest watches.

The power to detect change from avian point count data is highly dependent on variance in observations within and among years. Following the second year of data collection, summary data will be tabulated for each species or species group observed in each habitat stratification. Based on these abundance data, a prospective power analyses will be carried out to identify the species for which there is sufficient power to detect trends of varying levels over a period of ten years. The power analysis will be used to identify potential modifications to sample sizes and sampling frequency that will be discussed with government agencies and Aboriginal and Indigenous groups. Monitoring will be adapted based on the outcome of those discussions.

4.7.3.1 Habitat Loss Monitoring

Habitat for birds will be lost within the Project footprint during construction and operations and will be recovered during closure and reclamation.

The amount of habitat lost will be evaluated each year by comparing the as-built Project footprint with available habitat suitability mapping. The total area and area of high and moderate quality habitat lost for each bird group will be reported in the WMMP annual report. See Section 4.4.3.1 (Habitat Loss Monitoring for moose) for addition details on habitat loss monitoring methods.

4.7.3.2 Forest and Grassland Bird Population Monitoring

The effects assessment for forest and grassland birds predicted habitat alteration and reduced bird density within 100 m of the Project footprint (Application/EIS, Volume 4, Section 5.4.9).

Objectives

Forest and grassland bird monitoring is part of Objective 2 from Table 4.7-3, with monitoring methods specific to this group of birds:

- Detect changes in bird population dynamics in the Project area compared to control areas.

Performance Indicators

- Number of birds at each survey point, by species and by BEC zone within the study area.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

- The study area for forest and grassland bird surveys will include the LSA and RSA.
- The study area will be divided into impact and control sites.
  - Impact sites will be located within the Project footprint and up to 200 m outside of the footprint. A measurement of 200 m is used to encompass the prediction from the effects assessment (100 m) plus an area to accommodate any error in this estimate.
  - Control sites will be located between 200 and 2,000 m from the Project footprint.

Data Collection – Survey Methods

Survey methods for forest and grassland birds will include:

- Seventy-five variable radius point counts (VRPCs), one third (25) within 200 m of the Project footprint as impact sites and the remaining 50 point counts at greater distance as control sites to determine the scale of avoidance effect;
- Even distribution of VRPCs according to BEC zones found in the impact study area; and
- Standard data collection from Inventory Methods for Forest and Grassland Songbirds, Version 2.0 (RIC 1999b);
  - Surveys will be conducted during the breeding season (end of May to beginning of July);
  - Surveys will be conducted during early morning hours to coincide with peak bird activity; and
  - Crews must have at least one qualified observer who is able to identify birds by sight and sound.

Analysis

- Survey design and number of sampling stations will be evaluated and updated for their effectiveness following the first few years of monitoring, during the early stages of the construction period.
  - A power analysis will also determine what changes in abundance can be detected based on initial data.
- Before-After-Control-Impact (BACI) analysis will be conducted after each sampling period following the onset of the operations period (see Schedule below).

Reporting

The annual WMMP report will include, where applicable:

- Summaries of data collected;
- Survey design and sampling effort;
- Power of detection;
- Results of BACI analysis; and
- Assessment of change in impact areas.

Schedule

- Forest and grassland bird surveys will occur before and after construction:
  - “Before” sampling will begin prior to substantial construction to allow for a minimum of 2 years data collection where construction is > 500 m from edge of the Project footprint.
  - “After” sampling will occur yearly during construction, where construction is < 500 m from the edge of the Project footprint, and continue every 3 years during the operations and closure periods.
- Surveys will occur during the breeding bird period (end of May to beginning of July).

Triggers or Thresholds

- Formal triggers and thresholds will be determined based on the power to detect change after the first two years of data collection.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for monitoring bird populations will be determined by the EM in consultation with a QP, and may include:

- Investigate Project related disturbances that may be impacting birds beyond predicted levels, such as noise monitoring reports, dust deposition monitoring reports, light emissions, and construction and/or operations activities occurring across the Project site.
- Adaptive management actions will be suggested according to specific findings, and may include additional mitigations or habitat restoration or compensation measures.

4.7.3.3 Common Nighthawk Monitoring

The effects assessment for forest and grassland birds, including common nighthawk, predicted habitat alteration and reduced bird density within 100 m of the Project footprint (EIS Application, Vol 4, Section 5.4.9). Common nighthawk monitoring is discussed separately from Forest and Grassland birds because it requires a different monitoring methodology.

Objectives

Common Nighthawk monitoring is part of Objective 2 from Table 4.7-3, with species-specific monitoring methods:

- Detect changes in common nighthawk population dynamics in the Project area compared to control areas.

Performance Indicators

- Number of common nighthawks at each survey point, by habitat type within the study area.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

- The study area for common nighthawk surveys will include the LSA and RSA.
- The study area will be divided into impact and control sites.
    - Impact sites will be located within the Project footprint and up to 200 m outside of the footprint. A measurement of 200 m is used to encompass the prediction from the effects assessment (100 m) plus an area to accommodate any error in this estimate.
    - Control sites will be located between 200 and 2,000 m from the Project footprint.
- Suitable habitats will be selected for sample sites, including grassland and open areas such as clearcuts and shrubland.

Data Collection – Survey Methods

Survey methods for common nighthawk will include:

- Twenty sampling locations, one third (7) within 200 m of the Project as impact sites and the remaining 13 point counts at greater distance as control sites to determine the scale of avoidance effect;
- Autonomous Recording Units (ARUs) deployed at sites and left for a minimum of five nights;

- Survey methods will be based on Canadian Nightjar Survey Protocol (WildResearch, Bird Studies Canada, and ECCC 2018), which replaces Inventory Methods for Nighthawks and Poorwills, Version 2.0 (RIC 1998b); and
- Surveys will be conducted during mid-June to mid-July.

Analysis

- Data collected with the ARUs will be analyzed with the program Kaleidoscope (Wildlife Acoustics 2019).
- Survey design and number of sampling stations will be evaluated and updated for their effectiveness following the first few years of monitoring during the early stages of the construction period.
  - A power analysis will also determine what changes in abundance can be detected.
- Before-After-Control-Impact (BACI) analysis will be conducted after each sampling period following the onset of the operations period (see Schedule below).

Reporting

The annual WMMP report will include, where applicable:

- Summaries of data collected;
- Survey design and sampling effort;
- Power of detection;
- Results of BACI analysis; and
- Assessment of change in impact areas.

Schedule

- Common nighthawk surveys will occur before and after construction.
  - “Before” sampling will begin prior to substantial construction to allow for a minimum of 2 years of data collection where construction is > 500 m from edge of the Project footprint.
  - “After” sampling will occur yearly during construction, where construction is < 500 m from the edge of the Project footprint, and continue every 3 years during the operations and closure periods.
- Surveys will occur during the breeding bird period (end of May to beginning of July).

Triggers or Thresholds

- Formal triggers and thresholds will be determined based on the power to detect change after the first two years of data collection.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for common nighthawk avoiding the Project will be determined by the EM in consultation with a QP, and may include:

- Investigate Project related disturbances that may be impacting common nighthawk beyond predicted levels, such as noise monitoring reports, dust deposition monitoring reports, light emissions, and construction and/or operations activities occurring in suitable habitat for common nighthawks.
- Adaptive management actions will be suggested according to specific findings, and may include additional mitigations or habitat restoration or compensation measures.

4.7.3.4 Swallow and Swift Monitoring

The effects assessment for forest and grassland birds, including swallows and swifts, predicted habitat alteration and reduced bird density within 100 m of the Project footprint (EIS Application, Vol 4, Section 5.4.9). Swallows and swifts are discussed separately from forest and grassland birds because they require a different survey methodology.

Objectives

Swallow and swift monitoring is part of Objective 2 from Table 4.7-3, with species-specific monitoring methods:

- Detect changes in swallow and swift population dynamics in the Project area compared to control areas.

Performance Indicators

- Number of birds at each survey point, by species within the study area.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution (swallows and swifts)

- The study area for swallow and swift surveys will include the LSA and RSA.
- The study area will be divided into impact and control sites.
    - Impact sites will be located within the Project footprint and up to 200 m outside of the footprint. A measurement of 200 m is used to encompass the prediction from the effects assessment (100 m) plus an area to accommodate any error in this estimate.
    - Control sites will be located between 200 and 2,000 m from the Project footprint.
- Suitable swallow and swift habitat will be targeted.

Data Collection – Survey Methods (swallows and swifts)

Survey methods for swallows and swifts will include:

- Fifty point counts, one third (17) within 200 m of the Project as impact sites, and the remaining 33 point counts at greater distance as control sites to determine the scale of avoidance effect;
- Survey methods for barn swallow and bank swallow based on Inventory Methods for Swallows and Swifts, Version 2.0 (RIC 1998d):
    - Surveys will be conducted during late May to early June.
    - Surveys will be conducted during between 10:00 AM and 3:00 PM.
    - Crews must have at least one competent observer who is an expert in swallow and swift identification.
- Currently, no suitable habitat for black swift has been identified. However if black swift surveys occur in future, they will be conducted following Black Swift Survey Protocols in Canada: Site Occupancy, Nest Searching, and Site Habitat (Rock et al 2021), and Black Swift - Baseline Survey Protocol and Effects Assessment for Environmental Assessment (ECCC 2021)

Analysis

- Survey design and number of sampling stations will be evaluated and updated for their effectiveness following the first few years of monitoring during the early stages of the construction period.
  - A power analysis will also determine what changes in abundance can be detected.
- Before-After-Control-Impact (BACI) analysis will be conducted after each sampling period following the onset of the operations period (see Schedule below).

Reporting

The annual WMMP report will include, where applicable:

- Summaries of data collected;
- Survey design and sampling effort;
- Power of detection;
- Results of BACI analysis; and
- Assessment of change in impact areas.

Schedule

- Swallow and swift surveys will occur before and after construction:
  - "Before" sampling will begin prior to substantial construction to allow for a minimum of 2 years data collection where construction is > 500 m from edge of the Project footprint.
  - "After" sampling will occur yearly during construction, where construction is < 500 m from the edge of the Project footprint, and continue every 3 years during the operations and closure periods.
- Surveys will occur during the end of May and early June.

Triggers or Thresholds

- Formal triggers and thresholds will be determined based on the power to detect change after the first two years of data collection.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for swallow or swifts avoiding the Project will be determined by the EM in consultation with a QP, and may include:

- Investigate Project related disturbances that may be impacting swallows and swifts beyond predicted levels, such as noise monitoring reports, dust deposition monitoring reports, light emissions, use of insecticides or pesticides, wetland management, and construction and/or operations activities occurring in suitable habitat for swallows and swifts.
- Adaptive management actions will be suggested according to specific findings, and may include additional mitigations or habitat restoration or compensation measures.

4.7.3.5 Waterbird Population Monitoring

The effects assessment for waterbirds predicted habitat alteration and reduced bird density within 100 m of the Project footprint (EIS Application, Vol 4, Section 5.4.9) and altered population dynamics near the Project

due to increased access for predators (EIS Application, Vol 4, Section 5.4.8). Waterbirds are discussed separately from forest and grassland birds because they require a different sampling methodology.

Objectives

Waterbird monitoring is part of Objective 2 from Table 4.7-3, with monitoring methods specific to waterbirds:

- Detect changes in waterbird species population dynamics in the Project area compared to control areas.

Performance Indicators

- Number of birds at each survey point, by species within the study area.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution (waterbirds)

- The study area for waterbird surveys will include the LSA and RSA.
- The study area will be divided into impact and control sites.
    - Impact sites will be located within 200 m of the Project footprint. A measurement of 200 m is used to encompass the prediction from the effects assessment (100 m) plus an area to accommodate any error in this estimate.
    - Control sites will be located between 200 and 2,000 m from the Project footprint.
- Survey sites will be at wetlands, streams, and ponds.

Data Collection – Survey Methods (waterbirds)

Aerial survey methods for waterbirds will include:

- A goal of 30 survey sites, one third within 200 m the Project as impact sites and the remaining point counts at greater distance as control sites to determine the scale of avoidance effect.
    - Survey sites are dependent on the number of separate wetland features in the study area.
- Survey methods will be based on Inventory Methods for Waterfowl and Allied Species, Version 2.0 (RIC 1999d).
    - Surveys will be conducted during three periods: spring migration (May), breeding (July), and fall migration (September).
    - Crews must have at least two qualified observers who are able to identify waterbirds by sight and sound from the helicopter.

Analysis

- Survey design and number of sampling stations will be evaluated and updated for their effectiveness following the first few years of monitoring during the early stages of the construction period.
    - A power analysis will also determine what changes in abundance can be detected.
- Before-After-Control-Impact (BACI) analysis will be conducted after each sampling period following the onset of the operations period (see Schedule below).

Reporting

The annual WMMP report will include, where applicable:

- Summaries of data collected;
- Survey design and sampling effort effectiveness;
- Power of detection;
- Results of BACI analysis; and
- Assessment of change in Impact areas.

Schedule

- Waterbird surveys will occur before and after construction;
  - "Before" sampling will begin prior to substantial construction to allow for a minimum of two years of data collection where construction is > 500 m from edge of the Project footprint.
  - "After" sampling will occur yearly during construction, where construction is < 500 m from the edge of the Project footprint, and continue every 3 years during the operations and closure periods.
- Surveys will occur during the spring (May) and fall (September) migration periods, and the breeding period (July).

Triggers or Thresholds

- Formal triggers and thresholds will be determined based on the power to detect change after the first two years of data collection.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for waterbirds avoiding the Project will be determined by the EM in consultation with a QP, and may include:

- Investigate Project related disturbances that may be impacting waterbirds beyond predicted levels, such as noise monitoring reports, dust deposition monitoring reports, light emissions, wetland and waterbody habitat management, and construction and/or operations activities occurring in suitable habitat for waterbirds.
- Adaptive management actions will be suggested according to specific findings, and may include additional mitigations or habitat restoration or compensation measures.

4.7.3.6 Transmission Line Monitoring

During the review of the environmental assessment, BW Gold committed to conducting a monitoring program to assess bird mortality for the transmission line (MT 9-22, 9-28, 9-33, 14-28). For the first three years of operations of the transmission line, a BW Gold technician under the guidance of a qualified professional will conduct annual monitoring for bird mortalities during three periods throughout the year (spring migration, breeding, and fall migration). The qualified professional's work will consider locations with a higher probability of mortality for birds, not just wetlands. High-risk areas for birds will be identified; including, but not limited to, wetlands. The monitoring program will inform adaptive management.

Objectives

- Determine the effectiveness of mitigation measures for waterbird mortality along the transmission line.

Performance Indicators

- Number of deceased waterbird individuals or sign of deceased individuals (e.g., feathers, body parts) at monitoring locations along the transmission line.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

- The study area will include a 50 m buffer on either side of the transmission line.
- A Qualified Professional will identify areas of high-risk for mortality along the lines to use as monitoring locations:
  - High-risk areas include, but are not limited to, wetlands.

Data Collection – Survey Methods

Survey methods for bird mortality at the transmission line will include:

- Methods will follow Avian Power Line Interaction Committee (APLIC 2012) and Birdlife International (2015):
  - An area of 50 m on each side of the transmission line will be searched, with a transect search width of 20-25 m.
- Each year will include three periods (April, June, and September), where transect surveys will be conducted weekly.

Analysis

- No analysis is anticipated for this monitoring.

Reporting

- A summary of the data collected and results will be included in the annual WMMP report.

Schedule

- Surveys will occur for the first three years of operation of the transmission line at three times per year (spring migration – April, breeding – June, and fall migration – September).

Triggers or Thresholds

- More than 5 waterbird mortalities recorded on the transmission line in a year.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for waterbird mortalities along the transmission line will be determined by the EM in consultation with a QP, and may include:

- Investigation into the extent of problems, to better understand what mitigations are needed and where, such as increasing the number of monitoring sites or frequency of monitoring sites;

- Installing new or additional line markers in identified high-risk areas of the transmission line;
- Installing additional guards on transmission towers; and
- Assessing mitigations that may be appropriate, depending on species and transmission line specifics, as described in *Reducing Avian Collisions with Powerlines* (APLIC 2012).

4.7.3.7 Clark's Nutcracker Monitoring

DS Condition 8.20.5.2 requires a monitoring program specific to Clark's nutcracker:

> *"monitoring of use of the reclaimed areas by Clark's nutcracker* (Nucifraga columbiana*) for the purpose of whitebark pine regeneration. Should the results of monitoring demonstrate that use of the reclaimed areas by Clark's nutcracker (*Nucifraga columbiana*) is not adequate, the Proponent shall implement additional mitigation measures."*

Clark's nutcracker is a high-elevation specialized corvid species (related to crows and jays). These birds feed on pine seeds, and are the only disperser of whitebark pine seeds, which do not release from cones on their own (Keane et al. 2017). Clark's nutcrackers cache the seeds of whitebark pine, many of which are never retrieved and therefore left to germinate. However, Clark's nutcrackers may leave whitebark pine dominated forests in favour of other more productive pine areas.

Clark's nutcrackers will be monitored to assess their use of whitebark pine in the Project area. The WPMP includes details on whitebark pine management and mitigation efforts (DS 8.20). The WMMP includes monitoring for Clark's nutcracker as part of the follow-up program for whitebark pine management (DS 8.20, MT 9-8).

Objectives

- Monitor the Clark's nutcracker population and utilization of whitebark pine habitat.

Performance Indicators

- Number of Clark's nutcracker individuals at each survey point in the study area.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

- The study area will be divided into impact and control sites:
  - Impact sites will be located on Mt. Davidson, within and outside of whitebark pine management areas.
  - Control sites will be located in whitebark pine/ Clark's nutcracker habitat in a high elevation area such as Capoose.
- Specific survey sites will be selected during the first year of the study (reconnaissance year).

Data Collection – Survey Methods

Survey methods for Clark's nutcracker will include:

- Fifty VRPCs with playback surveys of Clark's nutcracker, evenly distributed between control and impact sites; and

- Survey methods based on Inventory Methods for Forest and Grassland Songbirds, Version 2.0 (RIC 1999b):
  - Surveys will be conducted during the breeding season (end of May to beginning of July).
  - Surveys will be conducted during early morning hours to coincide with peak bird activity.
  - Crews must have at least one competent observer who is able to identify Clark's nutcracker by sight and sound.
  - Cone crop surveys being conducted for the Whitebark Pine Management Plan, will be used as a covariate when tracking changes in Clark's nutcracker through time.

Analysis

- Survey design and number of sampling stations will be evaluated and updated for their effectiveness following the first few years of monitoring during the early stages of the construction period.
- A power analysis will also determine what changes in abundance can be detected.
- Before-After-Control-Impact (BACI) analysis will be conducted after each sampling period following the onset of the operations period (see Schedule below).

Reporting

The annual WMMP report will include, where applicable:

- Summaries of data collected;
- Survey design and sampling effort effectiveness;
- Power of detection;
- Results of BACI analysis; and
- Assessment of change in Impact areas.

Schedule

- Clark's nutcracker bird surveys will occur before and after construction:
  - "Before" sampling will begin prior to substantial construction to allow for a minimum of 2 years of data collection where construction is > 500 m from edge of the Project footprint.
  - "After" sampling will occur yearly during construction, where construction is < 500 m from the edge of the Project footprint, and continue every 3 years during the operations and closure periods.
- Surveys will occur during the breeding bird period (end of May to beginning of July).

Triggers or Thresholds

- Formal triggers and thresholds will be determined based on the power to detect change after the first two years of data collection.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for reduction in Clark's nutcracker abundance will be determined by the EM in consultation with a QP, and may include:

- Increase the number of survey sites, or frequency of surveys to improve power of detection.

- Investigate Project related disturbances that may be impacting Clark's Nutcracker beyond predicted levels, such as habitat alteration effects (noise, light, dust) in and around whitebark pine habitat, and construction and/or operations activities occurring in whitebark pine habitat.
- Adaptive management actions will be suggested according to specific findings, and may include additional mitigations or habitat restoration or compensation measures.
- Review the WPMP with the intent of increasing the amount of whitebark pine on Mt. Davidson.

4.7.3.8 Electromagnetic Fields

A research program studying the potential effects of electromagnetic fields (EMF) on birds will be established in consultation with the Nadleh Whut'en, Saik'uz, and Stellat'en First Nations (MT 14-27). EMF are emitted by all electrical currents, including transmission lines. There is limited research regarding possible effects of EMF on birds, but studies have indicated possible effects on reproductive behaviour in some species (Fernie and Reynolds 2005). The program will include a literature review to examine the potential scale and severity of EMF effects on birds. This literature review will be shared with the Nadleh Whut'en Saik'uz, and Stellat'en First Nations within the first two years of the construction period. Based on the results of this literature review, a decision will be made by BW Gold in consultation with these Nations as to whether any monitoring programs are required.

4.7.3.9 Facility Waterbody Monitoring

DS Condition 4.2 requires BW Gold to deter migratory birds from facility waterbodies. Monitoring will be conducted at facility waterbodies to determine whether birds are using the ponds and whether deterrence is required. This monitoring program will also record other wildlife use of waterbodies, including furbearers.

Objectives

- Determine the effectiveness of deterrents for migratory birds used at facility waterbodies.

Performance Indicators

- The presence of birds in facility waterbodies.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

- Facility waterbodies, including the TSF, pit lake, and other facility waterbodies with deterrents implemented.

Data Collection – Survey Methods

Survey methods for facility waterbody surveys will include:

- Two wildlife cameras at each facility waterbody taking timed and motion-triggered photos to determine if birds are using the ponds; and
- Incidental observations of birds on facility waterbodies.

Analysis

- Camera data will be analyzed yearly following the fall migration when most birds have left the Project area.

- Species richness, abundance, and occurrences will be calculated for camera and incidental data, where possible.

Reporting

- A summary of the data collected will be included in the annual WMMP report.

Schedule

- Wildlife cameras will capture photos year-round and be processed once annually.
- Incidental observations will be reported year-round.

Triggers or Thresholds

- Water quality results will be used to trigger adaptive management.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for deterring waterbirds from the TSF will be determined by the EM in consultation with a QP, and may include:

- Change the deterrents in use, or add more deterrents of a different type.
- If threshold is reached, increase the frequency of data (photo) analysis, so that response can happen faster if additional deterrents are not effective.
- Add on site monitoring of facility waterbodies during peak bird activity periods.

4.7.3.10 Nest Success Surveys

EAC Condition 23 indicates that if construction must occur inside a sensitive area for birds during a sensitive period that a pre-clearing survey may be conducted and any active nests protected using setback buffers. The following outlines the monitoring program to determine the nest success in setback areas (DS 4.1).

Objectives

- Determine the nest success in setback buffers established during construction and vegetation clearing.

Performance Indicators

- Success of nests within the setback buffers.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

- The study area will incorporate any areas where clearing or construction is occurring, where active nests have been detected and buffered.

Data Collection – Survey Methods

Survey methods for nest success surveys will include:

- Weekly monitoring of nest activity, from at least the distance of the buffer (e.g., 50-100 m), using a spotting scope or binoculars:
  - A SOP with a detailed nest monitoring protocol will be shared with stakeholders prior to the onset of construction;
- Monitoring occurring during identified sensitive periods for birds;
- Monitoring nests detected during pre-clearing surveys that have been assigned a setback buffer; and
- Monitoring to be carried out by a competent observer who is able to identify birds by sight and sound.

Analysis

- Species richness and abundance will be calculated.

Reporting

- A summary of the data collected will be included in the WMMP annual report.

Schedule

- During the sensitive period for migratory birds, identified as May 1 to July 31.

Triggers or Thresholds

Nesting success can vary widely depending on the weather, food availability, predators, and other factors. Therefore, it should not be assumed that nesting success within buffered areas will be 100%. The success of bird nests is a trend of bird nests in the buffer zones fledging less frequently than average. Average nest success will be determined based on published research for species or species groups and will be included in reporting numbers.

Adaptive Management Response

The adaptive management approach is described in Section 1.4. Adaptive management for altered nest success in buffer areas will be determined by the EM in consultation with a QP, and may include:

- Increasing the size of the buffers;
- Leaving buffers in place for the duration of the sensitive period;
- Reviewing the types of work allowed near the buffer and alter the types of work allowed to produce less disturbance; and
- Delaying work until after the sensitive period.

4.7.3.11 Bird Mortality

Although multiple mitigations are in place to protect birds, bird incidents are possible. As such, all Project personnel will report any bird mortalities due to Project incidents (collisions with vehicles, windows, etc.). Reporting procedure will include:

- Any reports of incidental take (destruction of nests) of bird nests, including the species and habitat reported to the environmental manager;

- Assessment of bird incidents by a qualified professional (e.g., causes of collisions or mortalities, errors with current mitigation, possible improvements for the future); and
- Results and analysis reported annually in the WMMP report.

4.7.4 Monitoring of Mitigation Measures

Monitoring of mitigation measures is described in Section 4.10.

4.7.5 Adaptive Management for Birds

The adaptive management approach is described in Section 1.4. Adaptive management for bird mortality will be determined by the EM in consultation with a QP, and may include:

- Habitat alteration effects: review dust deposition reports, noise monitoring reports, and light emissions that may create edge effects for birds.
- Mortality along the transmission line: install (new or additional) line markers in identified high-risk areas of the transmission line.
- Bird presence in facility waterbodies: review and update bird deterrence protocols and methods.
- Low nest success in buffered areas:
  - Increase the size of the buffer.
  - Review the types of work allowed near the buffer and alter the types of work allowed to produce less disturbance.
  - Delay work until outside of the sensitive breeding bird period.

4.8 Invertebrates

EAC Conditions 23a directs BW Gold to conduct mitigation for multiple species, including invertebrates:

> EAC 23.a *the means by which the mitigation measures identified in the Mitigations Table required under Condition 43 for the following valued components: Amphibians, Bats, Forest and Grassland Birds, Waterbirds, Furbearers, Grizzly Bear, Invertebrates, Moose, Ecosystem Composition and Plant species and Ecosystems at Risk will be implemented;*

EAC condition 43 directs BW Gold to develop a table of mitigation that captures all of the of the mitigation measures in the documents: “Blackwater Gold Project: Summary of Proposed Mitigation Measures (November 6, 2018) (November Table) and the document Blackwater Gold Project: Master Mitigation Table September 28, 2018 (September Table).” This master mitigation table includes mitigation for invertebrates.

4.8.1 Baseline Studies

The Application/EIS (Volume 4, Section 5.4.15) identified two invertebrate indicator species whose habitat requirements are representative of wetland types found within the study areas and potentially subject to impacts from the Project: the blue-listed butterfly jutta arctic (*Oeneis jutta chemocki*), which requires black spruce bog wetlands as habitat, and the dragonfly American emerald (*Cordulia shurtleffii*), which requires open wetland and riparian habitats for breeding and aquatic life stages.

4.8.2 Mitigation for Invertebrates

The Mitigation Table includes mitigation measures for invertebrates, many of which are common to other wildlife species and discussed in the following plans.

- The WMMP, Section 3, includes locating the transmission line in disturbed habitat (MT 12-2), using existing roads (MT 12-3 and 12-10), discharging water that meets guidelines (MT 12-6), and managing traffic (MT 12-13).
- The Vegetation Management Plan (VMP) includes mitigation for vegetation communities, particularly wetlands and riparian areas, that are important habitats for many invertebrates including the Jutta arctic butterfly and the American emerald dragonfly. More information on management for vegetation management is included in the VMP. Key mitigations include:
  - Preserving riparian area function with management setbacks or buffers adjacent to construction activities.
  - Setting a Riparian Management Area (RMA) buffer around wetlands and having an independent environmental monitor observe any work being completed within the buffer.
  - Retain streamside vegetation wherever possible, including trees, shrubs, and ground cover, in accordance with the Riparian Area Management SOP.
  - Clearing may occur within RRZs of the transmission line right of way and will follow the Integrated Vegetation Management Plan for BC Hydro Transmission and Distribution Power Line Corridors (BC Hydro 2016) in addition to Approved Work Practices for Managing Riparian Vegetation (BC Hydro 2003) and Measures to Protect Fish and Fish Habitat (DFO 2019).Protect natural drainages and watercourses by constructing appropriate on-site sediment control devices (including but not limited to silt fencing, hay bales, multi barrier approaches where necessary, diversion ditches, sediment traps, sediment ponds) in accordance with the SEPSCP.
  - No equipment refuelling or servicing (machines or hand tools) within an RMA to minimize risk of aquatic contamination in accordance with the Riparian Area Management SOP.
  - To protect fish and wildlife, riparian areas and wildlife habitat, herbicide use in riparian areas will be avoided and a Pesticide Free Zone established in accordance with Table 8.2 3 of the IPMP.
  - Comply with the Stellat'en First Nation and Nadleh Whut'en First Nation herbicide policies in their Traditional Territories (applicable to the transmission line).
  - Use native plants, seeds, or approved weed-free certified seed mixes, timing and scheduling appropriate for the ecosystems in accordance with the RCP.
  - Appropriate vegetation species and methods will be employed as instructed by a qualified person. Measures may include consideration of planting of suitable tree species, live staking of willows, and planting of riparian shrub vegetation.
- The Wetland Mitigation and Offsetting Plan (WMOP), includes mitigation for wetland communities, that are important habitats for many invertebrates including the Jutta arctic butterfly and the American emerald dragonfly. More information on management for vegetation management is included in the WMOP. Key mitigations include:
  - 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.
  - Establish protected riparian areas prior to clearing at locations.

- Construct the Northern and Southern diversions to supplement the Freshwater Supply System (FWSS) to mitigate changes in flows in Davidson Creek and Chedakuz Creek, downstream of Tatelkuz Lake, and provide flexibility in apportionment of flow to Davidson Creek during Operations, and Closure.
- Locate project components, including roads and TL poles away from wetlands and riparian areas and alongside existing disturbed areas and existing infrastructure footprints.
- Use existing roads and follow existing linear disturbances to support TL construction. The final routing and required access roads will be established as part of the Final Transmission Line Routing Plan.
- Replant native vegetation to expedite succession.
- Implement progressive wetland restoration during construction consistent with the concept of no-net-loss of wetlands.
- Minimize introduction and transport of invasive plants by ensuring earth moving equipment arrives in work areas clean.

- The Surface Erosion Prevention and Sediment Control Plan (SEPSCP), includes locating facilities and topsoil piles away from wetlands and riparian areas (MT 12-1) and implementing sediment control (MT 12-5 and 12-8).
- The Construction Environment Management Plan includes identifying no work zones (MT 12-4) and least risk timing periods (MT 12-9), minimize clearing of black spruce and maintain hydrology at wetlands (MT 12-11).
- The Reclamation and Closure Plan (RCP) includes progressive reclamation (MT 12-12).

4.8.3 Monitoring for Invertebrates

The EAC does not require a sub-component plan for invertebrates, and neither the EAC nor the decision statement require follow up monitoring for invertebrates, and a monitoring program for Jurra arctic and American emerald is not planned. However, since both species use wetlands as habitat, changes in habitat availability will be monitored through the wetland monitoring program in the WMOP.

The WMOP states in section 11.3:

The extent, location, and type (class and association) of wetlands impacted by the development of the Project will be recorded in a GIS database using pre-construction polygons a base layer overlain by as-built survey results and reviewed by a QP. This database will be updated annually to record all actual wetland losses.

Changes to wetland area and function will be evaluated for wetlands located within the mine site that remain after vegetation clearing by:

- Visual inspections at each wetland offset to monitor wetland ecosystems, including hydrological conditions and wetland extent (select wetlands). Visual inspections will include meandering transects through wetlands to identify accidental filling, pollutant discharge, or other stresses on wetland ecosystem functioning and vegetation cover.
- Photo-points to visually document each wetland over time (select wetlands).
- Vegetation monitoring (incl. invasive plants) to document plant cover, plant species, and survival to ensure the offset sites are on a successional trajectory towards the intended habitat types.
- Incidental wildlife use observations.

Pre-disturbance survey data will serve as baseline wetland condition and selected reference wetlands will represent natural conditions as benchmarks of functional values for comparison with wetlands affected by the Project.

For more information on wetland monitoring, please refer to the WMOP, Section 11, Monitoring.

4.9 Plant Species and Ecosystems at Risk

Plant species and ecosystems at risk are included as part of wildlife VCs. EAC Conditions 23a directs BW Gold to conduct mitigation for multiple species, including plant species and ecosystems at risk. EAC condition 43 directs BW Gold to develop a table of mitigation. That table includes mitigation for plant species and ecosystems at risk.

4.9.1 Baseline

Baseline studies for vegetation occurred in 2011, 2012 and 2021 and are described in the VMP, WMOP, and RCP.

4.9.2 Management

Management for plant species and ecosystems at risk is included in the following plans:

- The Vegetation Management Plan (VMP) includes mitigation for vegetation communities, particularly wetlands and riparian areas, that are important habitats for many invertebrates including the Jutta arctic butterfly and the American emerald dragonfly. More information on management for vegetation management is included in the VMP. Key mitigations include:
  - Preserving riparian area function with management setbacks or buffers adjacent to construction activities.
  - Setting a Riparian Management Area (RMA) buffer around wetlands and having an independent environmental monitor observe any work being completed within the buffer.
  - Retain streamside vegetation wherever possible, including trees, shrubs, and ground cover, in accordance with the Riparian Area Management SOP.
  - Clearing may occur within RRZs of the transmission line right of way and will follow the Integrated Vegetation Management Plan for BC Hydro Transmission and Distribution Power Line Corridors (BC Hydro 2016) in addition to Approved Work Practices for Managing Riparian Vegetation (BC Hydro 2003) and Measures to Protect Fish and Fish Habitat (DFO 2019).Protect natural drainages and watercourses by constructing appropriate on-site sediment control devices (including but not limited to silt fencing, hay bales, multi barrier approaches where necessary, diversion ditches, sediment traps, sediment ponds) in accordance with the SEPSCP.
  - No equipment refuelling or servicing (machines or hand tools) within an RMA to minimize risk of aquatic contamination in accordance with the Riparian Area Management SOP.
  - To protect fish and wildlife, riparian areas and wildlife habitat, herbicide use in riparian areas will be avoided and a Pesticide Free Zone established in accordance with Table 8.2 3 of the IPMP.
  - Comply with the Stellat'en First Nation and Nadleh Whut'en First Nation herbicide policies in their Traditional Territories (applicable to the transmission line).
  - Use native plants, seeds, or approved weed-free certified seed mixes, timing and scheduling appropriate for the ecosystems in accordance with the RCP.

  - Appropriate vegetation species and methods will be employed as instructed by a qualified person. Measures may include consideration of planting of suitable tree species, live staking of willows, and planting of riparian shrub vegetation.

- The Wetland Mitigation and Offsetting Plan (WMOP), includes mitigation for wetland communities, that are important habitats for many invertebrates including the Jutta arctic butterfly and the American emerald dragonfly. More information on management for vegetation management is included in the WMOP. Key mitigations include:
  - 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.
  - Establish protected riparian areas prior to clearing at locations.
  - Construct the Northern and Southern diversions to supplement the Freshwater Supply System (FWSS) to mitigate changes in flows in Davidson Creek and Chedakuz Creek, downstream of Tatelkuz Lake, and provide flexibility in apportionment of flow to Davidson Creek during Operations, and Closure.
  - Locate project components, including roads and TL poles away from wetlands and riparian areas and alongside existing disturbed areas and existing infrastructure footprints.
  - Use existing roads and follow existing linear disturbances to support TL construction. The final routing and required access roads will be established as part of the Final Transmission Line Routing Plan.
  - Replant native vegetation to expedite succession.
  - Implement progressive wetland restoration during construction consistent with the concept of no-net-loss of wetlands.
  - Minimize introduction and transport of invasive plants by ensuring earth moving equipment arrives in work areas clean.
- The Whitebark Pine Management Plan (WPMP) includes an orientation for workers on whitebark pine (MT 5-3), collecting cones, growing seedlings and conducting reclamation trials (MT 5-5, 5-15 and 5-16), monitoring of whitebark pine for blister rust (MT 5-17), conduct blister rust screening (MT 5-18), reporting fire suppression to protect whitebark pine (MT 5-22), apply verbenone if a mountain pine beetle outbreak occurs (MT 5-23).
- The SEPSCP includes implementing sediment control (MT 5-7).
- The IPMP includes measures to reduce introduction and spread of invasive plants (MT 5-6), cleaning earth moving vehicles before entering site (MT 5-24)
- The CEMP includes retaining topsoil and root mat when clearing vegetation (MT 5-1), flagging clearing limits (MT 5-2), minimizing cleared area (MT 5-11) and using existing roads (MT 5-12)
- The RCP includes progressive reclamation (MT 5-8), restoration of exploration roads on Mt. Davidson (MT 5-9) reclamation using whitebark pine (MT 5-19), reclamation trails (MT 5-20), transplanting healthy whitebark pine trees for closure (MT 5-21) and using weed-free seed mixes for reclamation (MT 5-26).

4.9.3 Monitoring

Monitoring for vegetation is discussed in the VMP, WMOP, WPMP, and RCP.

The VMP includes a variety of monitoring for vegetation, including quantifying the areas lost and disturbed, and monitoring to determine if mitigation was conducted properly and was successful. This monitoring includes:

- Vegetation clearing monitoring:
  - Clearing dimension size in relation to planned activity
  - Avoidance of rare plants, ecosystems at risk, riparian areas through implementation of pre clearing survey, flagging, and mitigation measures
- Clearing work windows:
  - for instream works refer to the Fisheries Act authorization (to be issued)
  - breeding bird season refer to the WMMP (Table 3.3-1)
- Post-clearing monitoring:
  - Total area disturbed (m^2)
  - Total area (m^2) revegetated and the specific prescriptions
  - Revegetation plots including vegetation species cover, composition, diversity and, invasive plant species
  - Documentation of evidence of erosion including sheet erosion, rills, gullies
  - Periodic inspections of the re-vegetated areas to assess performance objectives (including photos) compared to prescription targets
  - Evaluation of the success of the revegetation prescriptions in meeting site objectives and, if required, identification of additional mitigation activities

Please refer to the VMP, Section 9 for additional detail on the monitoring plans for vegetation.

Key monitoring described in the WMOP includes monitoring for the size and function of wetlands on the mine site, lost on the mine site, near the mine and in the transmission line corridor (Section 11.3).

The extent, location, and type (class and association) of wetlands impacted by the development of the Project will be recorded in a GIS database using pre-construction polygons a base layer overlain by as-built survey results and reviewed by a QP. This database will be updated annually to record all actual wetland losses.

Changes to wetland area and function will be evaluated for wetlands located within the mine site that remain after vegetation clearing by:

- Visual inspections at each wetland offset to monitor wetland ecosystems, including hydrological conditions and wetland extent (select wetlands). Visual inspections will include meandering transects through wetlands to identify accidental filling, pollutant discharge, or other stresses on wetland ecosystem functioning and vegetation cover.
- Photo-points to visually document each wetland over time (select wetlands).
- Vegetation monitoring (incl. invasive plants) to document plant cover, plant species, and survival to ensure the offset sites are on a successional trajectory towards the intended habitat types.

- Incidental wildlife use observations.

Pre-disturbance survey data will serve as baseline wetland condition and selected reference wetlands will represent natural conditions as benchmarks of functional values for comparison with wetlands affected by the Project.

For more information on wetland monitoring, please refer to the WMOP, Section 11, Monitoring.

5. DOCUMENTATION AND REPORTING

Mitigation and monitoring activities will be documented according to the standards described in Section 5.1. Annual and other reporting requirements are described in Section 5.2.

5.1 Documentation

All mitigation and monitoring activities relevant to the WMMP will be documented and records stored digitally.

Documentation relevant to the WMMP includes:

- Implementation of mitigation measures: dates, personnel, photos, and communications;
- Monitoring results: raw survey data and meta data (dates, times, personnel, photos), analyses, figures and maps, internal and external reports;
- Wildlife sightings, interactions, incidents log (EAC 23n, MT 11-21);
- Incident reports; and
- Adaptive management actions and outcomes.

Records associated with the WMMP will be maintained in accordance with DS Condition 12 as follows:

- Condition 12.1 requires “The Proponent shall maintain all records relevant to the implementation of the conditions set out in this Decision Statement. The Proponent shall retain the records and make them available to the Agency throughout construction and operation and for 25 years following the end of decommissioning of the Designated Project. The Proponent shall provide the aforementioned records to the Agency upon demand within a timeframe specified by the Agency.”
- Condition 12.2 requires “The Proponent shall retain all records referred to in condition 12.1 at a facility in Canada and shall provide the address of the facility to the Agency. The Proponent shall notify the Agency at least 30 days prior to any change to the physical location of the facility where the records are retained, and shall provide to the Agency the address of the new location.”

5.1.1 Incident Response Records

The wildlife sightings, interactions, and incidents reporting program will be initiated during the Construction phase and continued throughout the life of the mine. Wildlife logs will be maintained as part of this program, and will provide information regarding presence of wildlife and potential changes in use of areas over time (MT 9-25, 11-21). Risks to wildlife or people identified from this monitoring are reported, as well as how these risks are addressed.

- An **interaction** occurs when wildlife interacts with people or Project infrastructure (e.g., a bear observed on a road), but direct harm, injury, damage, or wildlife mortality does not take place.
- An **incident** is an interaction where direct harm, injury, damage, or wildlife mortality occurs.

A wildlife sightings log is maintained throughout all Project phases (MT 9-25). Wildlife sightings cards are distributed to personnel that include: the recorder, species, date, time, location, activity and any management response. The card includes a field for reporting incidents and any available information on their causes.

Incidental observations, interactions and records of any incidentally-observed dead animals (where the mortality was not caused by the Project) are recorded in a spatial database so the locations can be evaluated to determine if there are hotspots of wildlife activity and reported in the WMMP report.

Additionally, any incidents (human-wildlife interactions where there is active deterrence and direct harm, injury, damage, or wildlife mortality occurs) will have formal incident reporting completed, including (EAC 23n, MT 11-21):

- A summary of the event, response action, and means of implementation;
- Copies of internal and external communications; and
- Follow up monitoring results, and any adaptive management outcomes.

Wildlife incidents will be reported to the applicable agency (FLNRORD or ECCC) and Aboriginal and Indigenous groups through the WMMP annual report. Spatial data will be recorded, stored and reported for wildlife incidental and incident reports.

5.2 Reporting

5.2.1 WMMP Annual Report

An annual report will be prepared. The WMMP annual report will:

- Summarize and present the results of the follow up programs and monitoring of mitigation measures during the previous year, during construction and operations of the Project;
- Include a table of concordance indicating where EAC and DS Conditions have been addressed;
- Be sent to the EAO and Aboriginal Groups by March 31 the year following the reporting year;
- Subsequently, be sent to ECCC and Indigenous groups for review and comment by June 30 of the year following the reporting year (DS 2.12); and
- Be delivered in its final version to the Agency by September 30 of the year following the reporting year (DS 2.13).

5.2.2 Decision Statement Annual Reporting and Information Sharing

DS Conditions 2.11, 2.12, 2.13 and 6.15 set out annual reporting requirements related to the implementation of conditions in the DS. Condition 2.14 sets out information sharing requirements related to the annual reports. Reporting will commence when BW Gold begins to implement the conditions set out in the DS. Requirements in DS Conditions 2.11 – 2.14 are presented below.

DS Condition 2.11 requires:

> *"The Proponent [BW Gold] shall, commencing in the reporting year during which the Proponent begins the implementation of the conditions set out in this Decision Statement, prepare an annual report that sets out:*
>
> *2.11.1 the activities undertaken by the Proponent in the reporting year to comply with each of the conditions set out in this Decision Statement;*
>
> *2.11.2 how the Proponent complied with condition 2.1;*
>
> *2.11.3 for conditions set out in this Decision Statement for which consultation is a requirement, how the Proponent considered any views and information that the Proponent received during or as a result of the consultation, including a rationale for how the views have, or have not, been integrated;*
>
> *2.11.4 the information referred to in conditions 2.5 and 2.6 for each follow-up program;*
>
> *2.11.5 the results of the follow-up program requirements identified in conditions 3.14, 3.15, 3.16, 4.5, 5.5, 6.11, 6.12, 6.13, 6.14, 8.18.6, 8.20.5, 8.21, and 8.22 if required;*

2.11.6 any update made to any follow-up program in the reporting year;
2.11.7 any modified or additional mitigation measures implemented or proposed to be implemented by the Proponent, as determined under condition 2.9 and rationale for why mitigation measures were selected pursuant to condition 2.5.4; and
2.11.8 any change(s) to the Designated Project in the reporting year."

DS Condition 2.12 requires:

> *"The Proponent [BW Gold] will provide the draft annual report to Indigenous groups, no later than June 30 following the reporting year to which the annual report applies. BW Gold will consult Indigenous groups on the content and findings in the draft annual report."*

DS Condition 2.13 requires:

> *"The Proponent [BW Gold], in consideration of any comments received from Indigenous groups pursuant to condition 2.12 shall revise and submit to the Agency [Impact Assessment Agency of Canada] and Indigenous groups a final annual report, including an executive summary in both official languages, no later than September 30 following the reporting year to which the annual report applies."*

DS Condition 2.14 requires:

> *"The Proponent [BW Gold] shall publish on the Internet, or any medium which is publicly available, the annual reports and the executive summaries referred to in conditions 2.11 and 2.13, the offsetting plan(s) referred to in condition 3.11, the compensation plan referred to in condition 8.18 and, if required, condition 5.3, the whitebark pine management plan referred to in condition 8.20, the communication plans referred to in conditions 6.15 and 10.5, the reports related to accidents and malfunctions referred to in conditions 10.4.2 and 10.4.3, the schedules referred to in conditions 11.1 and 11.2, and any update(s) or revision(s) to the above documents, upon submission of these documents to the parties referenced in the respective conditions. The Proponent shall keep these documents publicly available for 25 years following the end of decommissioning of the Designated Project. The Proponent shall notify the Agency and Indigenous groups of the availability of these documents within 48 hours of their publication."*

DS Condition 2.15 requires:

> *"When the development of any plan is a requirement of a condition set out in this Decision Statement, the Proponent [BW Gold] shall submit the plan to the Agency and to Indigenous groups prior to construction, unless otherwise required through the condition."*

DS Condition 6.15 requires:

> *The Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, and implement, during all phases of the Designated Project, a plan to communicate the results of the follow-up program referred to in conditions 6.11, 6.12, 6.13 and 6.14 in plain language to Indigenous groups and relevant authorities. The communication plan shall include the procedures to communicate, including the frequency of communication."*

Conditions 6.11, 6.12 and 6.13 refer to the Human Health Risk Assessment, the Country Food and Socio-Economic Monitoring Follow-up Program and the Air Quality Monitoring Program. Condition 6.14 refers to the follow up program for moose (WMMP Section 4.4). To accomplish this condition, BW Gold will:

- Provide a plain language summary of the WMMP annually as part of the annual WMMP report;
- Offer to present a plain language summary of the WMMP monitoring results annually to Indigenous groups and relevant authorities;

- These plain language summaries will be delivered via email by June 30 of the year following the reporting year; and
- The WMMP report with plain language summary will be posted to the BW Gold website, following EAC Condition 42, by June 30 of the year following the reporting year.

5.2.3 Environmental Assessment Certificate Reporting

Condition 5 of the EAC sets out the compliance self-reporting requirements. BW Gold must submit a report to the EAO and Aboriginal Groups on the status of compliance with EAC #M19-01 at the following times:

a. at least 30 days prior to the start of Construction;
b. on or before March 31 in each year after the start of Construction;
c. at least 30 days prior to the start of Operations;
d. on or before March 31 in each year after the start of Operations;
e. at least 30 days prior to the start of Closure;
f. on or before March 31 in each year after the start of Closure until the end of Closure;
g. at least 30 days prior to the start of Post-closure; and
h. on or before March 31 in each year after the start of Post-closure until the end of Post-closure.

BW Gold will submit reports to the EAO and Aboriginal Groups within the timelines specified in Condition 5.

5.2.4 Incident Reporting

Wildlife sightings, interactions, and incidents will be included in the WMMP annual report. Where wildlife incidents, mitigations, or adaptive management require support or input from regulators and/or Aboriginal Groups, reporting will be conducted in timelines appropriate to the action required. Any non-compliances associated with wildlife incidents will be reported according to procedures outlined in Section 6.1.1. All relevant communication, incidents, and outcomes will be included in the WMMP Report.

6. EVALUATION AND ADAPTIVE MANAGEMENT

The WMMP will be updated to reflect changes in regulations, best management practices, and site conditions (see Section 1.3). Standards for analyzing and evaluating results, ensuring effective implementation, and adaptive management are discussed in the following sections.

6.1 Analysis and Evaluation

WMMP implementation, including monitoring surveys, analysis of results, and evaluation of effectiveness of the program, will be undertaken by a designated independent environmental monitor (qualified professional), as described in DS Conditions 9.1 through 9.3 and EAC Condition 12.

6.1.1 Noncompliance and Corrective Action

The independent environmental monitor will be responsible for identifying non-compliance, as described in the DS Conditions 9.2 and 9.3 and EAC Condition 12 including:

- Advising BW Gold, relevant provincial and federal authorities, and Indigenous groups if, in their view, the activities do not comply with the conditions, and whether measures should be taken to correct these activities;
- Creating reports for occurrence(s) of non-compliance related to the implementation of conditions observed, including a description and photo evidence; and
- Submitting reports to relevant provincial and federal authorities and Indigenous groups (directly from the independent environmental monitor), within 48 hours of the observation of occurrence(s) of non-compliance.

6.1.2 Audits

Implementation of the WMMP and related Project activities may be audited, as determined or requested by IAAC.

7. PLAN REVISION

The WMMP will be revised to include changes in mitigation or monitoring methods and implementation, including adaptive management actions. Revisions will occur as needed, due to a significant change in Project description, in response to scientific advancement or as requested by relevant provincial and federal authorities, Indigenous groups or the EMC.

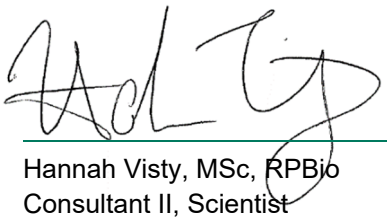
7.1 Notification and Consultation Required upon Plan Revision

A draft update of the WMMP will be provided to the Chief Inspector of Mines, Indigenous groups, the EAO, the Agency, FLNRORD, ECCC and the Environmental Monitoring Committee (if requested) for consultation on revisions.

8. QUALIFIED PROFESSIONALS

This management plan has been prepared and reviewed by, or under the direct supervision of, the following qualified professionals:

Prepared by:



Hannah Visty, MSc, RPBio
Consultant II, Scientist

Reviewed by:

Greg Sharam, PhD
Technical Director

9. REFERENCES

Definitions of the acronyms and abbreviations used in this reference list can be found in the Acronyms and Abbreviations section.

Legislation and Regulation

Canadian Environmental Protection Act, 1999, SC 1999, c. 33.

Canadian Environmental Assessment Act, 2012

Contaminated Sites Regulation, BC Reg. 375/96.

Declaration on the Rights of Indigenous Peoples Act, SBC 2019, c. 44.

Environmental Assessment Act, SBC 2018, c. 51.

Environmental Management Act, SBC 2003, c. 53.

Forest and Range Practices Act, SBC 2002, c. 69.

Impact Assessment Act, RSC 2019, c. 28.

Migratory Birds Convention Act, 1994, SC 1994, c. 22.

Migratory Birds Regulations, CRC, c. 1035.

Mineral Tenure Act, RSBC 1996, c. 292.

Mines Act, RSBC 1996, c. 293.

Species at Risk Act, SC 2002, c. 29.

United Nations Declaration on the Rights of Indigenous Peoples Act, SC 2021, c. 14.

Water Sustainability Act, SBC 2014, c. 15.

Wildlife Act, RSBC 1996, c. 488.

Wildlife Act Permit Regulation, BC Reg.253/2000.

Secondary Sources

APLIC. 2012. *Reducing avian collisions with power lines: The state of the art in 2012*. Edison Electric Institute and APLIC: Washington, DC and Sacramento, CA.

BC CDC. 2021. BC Species and Ecosystem Explorer. http://www.env.gov.bc.ca/cdc/ (accessed 01-05-2021).

BC MFLNRO. 2014. *A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia (Interim Guidance)*. Prepared for British Columbia Ministry of Forests, Lands, and Natural Resource Operations North Area by A. Roberts, Ecological Consulting Smithers, BC.

BC MOE. 2003. *Furbearer Management Guidelines - Marten (Martes americana)*. British Columbia Ministry of Environment. http://www.llbc.leg.bc.ca/public/PubDocs/bcdocs/378287/marten.pdf (accessed October 2009).

BC MOE. 2008. *Standard Operating Procedures: Hygiene Protocols for Aquatic Field Research, 2008*. British Columbia Ministry of Environment Ecosystems Branch: Victoria, BC.

BC MOE. 2013. *Best Management Practices for Raptor Conservation during Urban and Rural Land Development in British Columbia*. BC MOE Ecosystem Standards and Planning Biodiversity Branch: Nanaimo, BC.

BC MOE. 2014a. *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia*. British Columbia Ministry of Environment: Victoria, BC.

BC MOE. 2014b. *Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia (2014)*. British Columbia Ministry of Environment: Victoria, BC.

Birds Canada. 2021. *Nesting Calendar Query Tool*.

COSEWIC. 2009a. *COSEWIC assessment and status report on the Horned Grebe* Podiceps auritus*, Western population and Magdalen Islands population, in Canada.* Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 42 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

COSEWIC. 2009b. *COSEWIC assessment and status report on the Yellow Rail* Coturnicops noveboracensis *in Canada*. Committee on the Status of Endangered Wildlife in Canada: Ottawa, ON.

COSEWIC. 2011. *COSEWIC assessment and status report on the Barn Swallow* Hirundo rustica *in Canada*. Committee on the Status of Endangered Wildlife in Canada: Ottawa.

COSEWIC. 2013. *COSEWIC assessment and status report on the Bank Swallow* Riparia riparia *in Canada.* Committee on the Status of Endangered Wildlife in Canada: Ottawa.

COSEWIC. 2015. *Assessment and Status Report on the Black Swift* Cypseloides niger *in Canada*. Ottawa, ON.

CWHC. 2015. *Western Canada White Nose Syndrome Transmission Prevention*. Presented at Canadian Wildlife Health Cooperative.

ECCC. 2016. *Management Plan for the Western Toad (*Anaxyrus boreas*) in Canada [Proposed].* Environment and Climate Change Canada: Ottawa.

ECCC. 2017. *General Nesting Periods of Migratory Birds*.

ECCC. 2018. *Management Plan for the Short-eared Owl (*Asio flammeus*) in Canada*. *Species at Risk Act* Management Plan Series. Environment and Climate Change Canada, Ottawa. v + 37 pp.

ECCC. 2021a. *Avoidance Guidelines*. https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/reduce-risk-migratory-birds.html (accessed December 2021).

ECCC. 2021b. *Black Swift - Baseline Survey Protocol and Effects Assessment for Environmental Assessment.* Unpublished personal communication.

ECCC. 2021c. *Recovery Strategy for the Bank Swallow* (Riparia riparia) *in Canada [Proposed]*. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada: Ottawa. ix + 122 pp.

ECCS. *2018 Wildlife Habitat Features Field Guide (Kootenay Boundary Region*).

Environment Canada. 2004. *Protocol for Conducting Breeding Bird Surveys*. National Wildlife Research Centre. Canadian Wildlife Service: Ottawa, Ontario.

Environment Canada. 2015. *Management Plan for the Rusty Blackbird (*Euphagus carolinus*) in Canada*. Environment Canada: Ottawa, ON.

Environment Canada. 2016a. *Recovery Strategy for the Common Nighthawk (*Chordeiles minor*) in Canada*. Environment Canada: Ottawa, ON.

Environment Canada. 2016b. *Recovery Strategy for the Olive-sided Flycatcher (*Contopus cooperi*) in Canada*. Environment Canada: Ottawa, ON.

Fernie, K. J. and S. J. Reynolds. 2005. The effects of electromagnetic fields from power lines on avian reproductive biology and physiology: A review. *J Toxicol Environ Health B Crit Rev*, 8 (2): 127-40.

Government of Canada. 2021a. Species at Risk Act *Schedule 1: List of Wildlife Species at Risk.* (January): https://laws.justice.gc.ca/eng/acts/S-15.3/page-17.html#h-435647.

Government of Canada. 2021b. *Species at Risk Public Registry.* (January): https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html.

Holroyd, S. L. and V. J. Craig. 2016. *Best Management Practices Guidelines for Bats in British Columbia*. BC Ministry of Environment: Victoria, BC.

Keane, R. E., L. M. Holsinger, M. F. Mahalovich, and D. F. Tomback. 2017. *Restoring Whitebark Pine Ecosystems in the Face of Climate Change*. US Department of Agriculture, Forest Service, Rocky Mountain Research Station: Fort Collins, CO.

Krebs, J. A. and D. Lewis. 2000. *Wolverine ecology and habitat use in the North Columbia Mountains: progress report. In Proceedings of a Conference on the Biology and Management of Species and Habitats at Risk*. L. M. Darling, Ed. Proceedings of a Conference on the Biology and Management of Species and Habitats at Risk. Kamloops, BC, Feb. 15–19, 1999: BC Ministry of Environment, Lands and Parks, Victoria, BC. and University College of the Cariboo, Kamloops, BC.

MFLNRO. 2016. *Best Management Practices for Amphibian and Reptile Salvages in British Columbia*. Ministry of Forests, Lands, and Natural Resource Operations:

Pyare, S. 2005. *Establishment of a large-scale monitoring program for the western toad (*Bufo boreas*) in Southeast Alaska*. Alaska Department of Fish and Game: Juneau, Alaska.

Ralph, C. J., G. R. Geupel, P. Pyle, T. E. Martin, and D. E. DeSante. 1993. *Handbook of field methods for monitoring landbirds*. US Forest Service Pacific Southwest Research Station General Technical Report PSW-GTR-144:

RIC. 1997. *Standardized Inventory Methodologies for Components of British Columbia's Biodiversity: Upland Gamebirds. Grouse, Quail, and Columbids*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystem Task Force, Resources Information Committee (RIC): Victoria, BC.

RIC. 1998a. *Inventory Methods for Bats. Standards for Components of British Columbia's Biodiversity No. 20*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystem Task Force, Resources Information Committee (RIC): Victoria, BC.

RIC. 1998b. *Inventory Methods for Nighthawks and Poorwills. Standards for Components of British Columbia's Biodiversity No. 9*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystem Task Force, Resources Information Committee: Victoria, BC.

RIC. 1998c. *Inventory Methods for Pond-breeding Amphibians and Painted Turtle. Standards for Components of British Columbia's Biodiversity No. 37*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystem Task Force, Resources Information Committee (RIC): Victoria, BC.

RIC. 1998d. *Inventory Methods for Swallows and Swifts. Standards for Components of British Columbia's Biodiversity No. 16*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystem Task Force, Resources Information Committee: Victoria, BC.

RIC. 1998e. *Inventory Methods for Marsh Birds: Bitterns and Rails. Standards for Components of British Columbia's Biodiversity No. 7*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystem Task Force, Resources Information Committee (RIC): Victoria, BC.

RIC. 1999a. *British Columbia Wildlife Habitat Ratings Standards, version 2.0*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for Terrestrial Ecosystem Task Force, Resources Inventory Committee (RIC): Victoria, BC.

RIC. 1999b. *Inventory Methods for Forest and Grassland Songbirds. Standards for Components of British Columbia's Biodiversity No.15. Version 2*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for Terrestrial Ecosystem Task Force, Resources Inventory Committee (RIC): Victoria, BC.

RIC. 1999c. *Inventory Methods for Medium-sized Terrestrial Carnivores: Coyote, Red Fox, Lynx, Bobcat, Wolverine, Fisher & Badger. Standards for Components of British Columbia's Biodiversity No.25*. Prepared by Ministry of Environment, Lands and Parks Resources Inventory Branch for the Terrestrial Ecosystems Task Force Resources Inventory Committee, Victoria, B.C.

RIC. 1999d. *Inventory Methods for Waterfowl and Allied Species: Loons, Grebes, Swans, Geese, Ducks, American Coot and Sandhill Crane. Standards for Components of British Columbia's Biodiversity No. 18*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for Terrestrial Ecosystem Task Force, Resources Inventory Committee (RIC): Victoria, BC.

RIC. 2001. *Inventory Methods for Raptors. Standards for Components of British Columbia's Biodiversity No.11.* Prepared by Ministry of Environment, Lands and Parks Resources Inventory Branch for the Terrestrial Ecosystems Task Force Resources Inventory Committee, Victoria, B.C.

RIC. 2002. *Aerial-based inventory methods for selected ungulates: bison, mountain goat, mountain sheep, moose, elk, deer and caribou. Standards for Components of British Columbia's Biodiversity No. 32*. Prepared by Ministry of Sustainable Resource Management, Terrestrial Information Branch for the Terrestrial Ecosystem Task Force, and Resources Information Committee (RIC): Victoria, BC.

RIC. 2006. *Inventory Methods for Owl Surveys. Standards for Components of British Columbia's Biodiversity No.42*. Prepared for Ecosystems Branch of the Ministry of Environment for the Resources Information Standards Committee by Doris Hausleitner, M.Sc., R.P.Bio. Seepanee Ecological Consulting Victoria BC.

RISC. 2007. *About RISC*. http://ilmbwww.gov.bc.ca/risc/about.htm (accessed May 27, 2008).

Rock, C., P.G. Levesque, and W.E. Gross. 2021. *Black Swift Survey Protocols in Canada: Site Occupancy, Nest Searching, and Site Habitat.* Accessed from: https://www.researchgate.net/profile/Christine-Rock-2/publication/351245754_Black_Swift_Survey_Protocols_in_Canada_Site_Occupancy_Nest_Searching_and_Site_Habitat/links/608cd108a6fdccaebdfba401/Black-Swift-Survey-Protocols-in-Canada-Site-Occupancy-Nest-Searching-and-Site-Habitat.pdf (Accessed February 15 2022).

Strategic Resource Solutions. 2015. Methodology to Determine the Presence of Active Bird Nests. (accessed September 2021).

Tomback, D. 2005. Draft protocol for monitoring Clark's Nutcracker populations. Prepared by Whitebark Pine Ecosystem Foundation.

Weir, R. D. and P. L. Almuedo. 2010. British Columbia's interior: Fisher wildlife habitat decision aid. *BC Journal of Ecosystems and Management*, 10 (3): 35-41.

Wildlife Acoustics. 2019. *Kaleidoscope Pro Sound Analysis Software.* In Ed. Maynard, MA, USA: Wildlife Acoustics Inc.

WildResearch, Bird Studies Canada, and ECCC. 2018. *Canadian Nightjar Survey Protocol*.

APPENDIX A CONCORDANCE WITH FEDERAL DECISION STATEMENT (APRIL 15, 2018)

Appendix A: Concordance with Canadian Environmental Assessment Agency Decision Statement (April 2018)

Condition	Description	Location in Plan
Condition 2.1 (General Conditions)	The Proponent shall ensure that its actions in meeting the conditions set out in this Decision Statement during all phases of the Designated Project are considered in a careful and precautionary manner, promote sustainable development, are informed by the best information and knowledge available at the time the Proponent takes action (including community and Indigenous traditional knowledge), are based on methods and models that are recognized by standard-setting bodies, are undertaken by qualified individuals, and have applied the best available economically and technically feasible technologies.	All sections of Plan
Condition 2.2 (General Conditions)	The Proponent shall, when mitigation is a requirement of a condition set out in this Decision Statement, give preference to avoiding the adverse environmental effect of the Designated Project over minimizing the adverse environmental effect of the Designated Project. If unable to avoid the adverse environmental effect, the Proponent shall give preference to minimizing the adverse environmental effect of the Designated Project over compensating for the adverse environmental effect of the Designated Project. If unable to minimize the adverse environmental effect, the Proponent shall compensate for the adverse environmental effect of the Designated Project.	All sections of plan Specifically addressed in Sections 3 and 4
	The Proponent shall, where consultation is a requirement of a condition set out in this Decision Statement: 2.3.1 provide a written notice of the opportunity for the party or parties being consulted to present their views and information on the subject of the consultation;	Draft WMMP provided to Indigenous groups (UFN and LDN) in August 2021. Updated versions of the WMMP were provided in November 2021 and December 2021.
	2.3.2 provide all information available and relevant on the scope and the subject matter of the consultation and a period of time agreed upon with the party or parties being consulted, not less than 15 days, to prepare their views and information;	Completed concordance tables identifying where requirements are addressed in the WMMP included in appendices.
	2.3.3 undertake a full and impartial consideration of all views and information presented by the party or parties being consulted on the subject matter of the consultation;	Completed. Comments and responses, including how comments were incorporated into the plan or why not are included in the Issues Tracking Table (ITT).

Condition	Description	Location in Plan
	2.3.4 strive to reach consensus with Indigenous groups; and	Ongoing
	2.3.5 advise the party or parties being consulted on how the views and information received have been considered by the Proponent including a rationale for why the views have, or have not, been integrated. The Proponent shall advise the party or parties in a time period that does not exceed the period of time taken in 2.3.2.	BW Gold has met with Indigenous groups and solicited and responded to technical comments on the WMMP and endeavoured to incorporate Indigenous views.
Condition 2.4 (Consultation)	The Proponent shall, where consultation with Indigenous groups is a requirement of a condition set out in this Decision Statement, determine and strive to reach consensus with each Indigenous group regarding the manner by which to satisfy the consultation requirements referred to in condition 2.3, including: 2.4.1 the methods of notification; 2.4.2 the type of information and the period of time to be provided when seeking input; 2.4.3 the process to be used by the Proponent to undertake impartial consideration of all views and information presented on the subject of the consultation; and 2.4.4 the period of time and the means by which to advise Indigenous groups of how their views and information were considered by the Proponent.	Sections 1.3, 3, 4, 5, 6, 7 Method of notification informed by Indigenous Participation Agreements and otherwise conveyed by email. Email conveying the draft WMMP identifies timing for providing comments, taking into account Indigenous Participation Agreements.
Condition 2.5 (Follow-up and Adaptive Management)	The Proponent shall, where a follow-up program is a requirement of a condition set out in this Decision Statement, have a Qualified Professional, where such a qualification exists for the subject matter of the follow-up program, determine, as part of the development of each follow-up program and in consultation with the party or parties being consulted during the development, the following information: 2.5.1 the follow-up activities that must be undertaken by a qualified individual; 2.5.2 the methodology, location, frequency, timing and duration of monitoring associated with the follow-up program; 2.5.3 the scope, content, format and frequency of reporting of the results of the follow-up program; 2.5.4 the levels of environmental change relative to baseline conditions that would require the Proponent to implement modified or additional mitigation measure(s), including instances where the Proponent may require Designated Project activities to be stopped; and 2.5.5 the technically and economically feasible mitigation measures to be implemented by the Proponent if monitoring conducted as part of the follow-up program shows that the levels of environmental change referred to in condition 2.5.4 have been reached or exceeded.	Section 1.4 describes the adaptive management approach. Follow-up programs, methods for monitoring, level of environmental change triggering mitigation and proposed mitigation are described in Section 4. Reporting is discussed in Section 5.

Condition	Description	Location in Plan
Condition 2.6 (Follow-up and Adaptive Management)	The Proponent shall update and maintain the follow-up and adaptive management information referred to in condition 2.5 during the implementation of each follow-up program in consultation with the party or parties being consulted during the development of each follow-up program.	Section 1.4; Adaptive Management Framework – provides the steps in the adaptive management process, including updating of the monitoring and mitigation measures. Section 7; Plan Revisions – discusses the process for updating the WMMP.
Condition 2.7 (Follow-up and Adaptive Management)	The Proponent shall provide a draft of the follow-up programs referred to in conditions 3.14, 3.15, 3.16, 4.5, 5.5, 6.11, 6.12, 6.13, 6.14, 8.18.6, 8.20.5, 8.21, and 8.22, if required, to the party or parties being consulted during the development of each follow-up program for a consultation period of up to 60 days prior to providing follow-up programs pursuant to condition 2.8.	Section 4
Condition 2.8 (Follow-up and Adaptive Management)	The Proponent shall provide the follow-up programs referred to in conditions 3.14, 3.15, 3.16, 4.5, 5.5, 6.11, 6.12, 6.13, 6.14, 8.18.6, 8.20.5, 8.21, and 8.22, if required, to the Agency and to the party or parties being consulted during the development of each follow-up program prior to the implementation of each follow-up program. The Proponent shall also provide any update(s) made pursuant to condition 2.6 to the Agency and to the party or parties being consulted during the development of each follow-up program within 30 days of the follow-up program being updated.	Section 4
Condition 2.9 (Follow-up and Adaptive Management)	The Proponent shall, where a follow-up program is a requirement of a condition set out in this Decision Statement: 2.9.1 conduct the follow-up program according to the information determined pursuant to condition 2.5; 2.9.2 undertake monitoring and analysis to verify the accuracy of the environmental assessment as it pertains to the particular condition and/or to determine the effectiveness of any mitigation measure(s); 2.9.3 determine whether modified or additional mitigation measures are required based on the monitoring and analysis undertaken in accordance with condition 2.9.2; and 2.9.4 if modified or additional mitigation measures are required pursuant to condition 2.9.3, develop and implement these mitigation measures in a timely manner and monitor them in accordance with condition 2.9.2.	Section 4
Condition 2.10 (Follow-up and Adaptive Management)	Where consultation with Indigenous groups is a requirement of a follow-up program, the Proponent shall discuss the follow-up program with Indigenous groups and determine, in consultation with Indigenous groups, opportunities for their participation in the implementation of the follow-up program, including the analysis of the follow-up results and whether modified or additional mitigation measures are required, as set out in condition 2.9.	Section 4

Condition	Description	Location in Plan
Condition 2.11 (Annual Reporting)	The Proponent shall, commencing in the reporting year during which the Proponent begins the implementation of the conditions set out in this Decision Statement, prepare an annual report that sets out: 2.11.1 the activities undertaken by the Proponent in the reporting year to comply with each of the conditions set out in this Decision Statement; 2.11.2 how the Proponent complied with condition 2.1; 2.11.3 for conditions set out in this Decision Statement for which consultation is a requirement, how the Proponent considered any views and information that the Proponent received during or as a result of the consultation, including a rationale for how the views have, or have not, been integrated; 2.11.4 the information referred to in conditions 2.5 and 2.6 for each follow-up program; 2.11.5 the results of the follow-up program requirements identified in conditions 3.14, 3.15, 3.16, 4.5, 5.5, 6.11, 6.12, 6.13, 6.14, 8.18.6, 8.20.5, 8.21, and 8.22 if required; 2.11.4 any update made to any follow-up program in the reporting year; 2.11.7 any modified or additional mitigation measures implemented or proposed to be implemented by the Proponent, as determined under condition 2.9 and rationale for why mitigation measures were selected pursuant to condition 2.5.4; and 2.11.8 any change(s) to the Designated Project in the reporting year.	Sections 4 and 5
Condition 2.12 (Annual Reporting)	The Proponent shall provide a draft annual report referred to in condition 2.11 to Indigenous groups, no later than June 30 following the reporting year to which the annual report applies. The Proponent shall consult Indigenous groups on the content and findings in the draft annual report.	Section 5
Condition 2.13 (Annual Reporting)	The Proponent, in consideration of any comments received from Indigenous groups pursuant to condition 2.12 shall revise and submit to the Agency and Indigenous groups a final annual report, including an executive summary in both official languages, no later than September 30 following the reporting year to which the annual report applies.	Section 5
Condition 2.14 (Information Sharing)	The Proponent shall publish on the Internet, or any medium which is publicly available, the annual reports and the executive summaries referred to in conditions 2.11 and 2.13, the offsetting plan(s) referred to in condition 3.11, the compensation plan referred to in condition 8.18 and, if required, condition 5.3, the whitebark pine management plan referred to in condition 8.20, the communication plans referred to in conditions 6.15 and 10.5, the reports related to accidents and malfunctions referred to in conditions 10.4.2 and 10.4.3, the schedules referred to in conditions 11.1 and 11.2, and any update(s) or revision(s) to the above documents, upon submission of these documents to the parties referenced in the respective conditions. The Proponent shall keep these documents publicly available for 25 years following the end of decommissioning of the Designated Project.	Section 5

Condition	Description	Location in Plan
	The Proponent shall notify the Agency and Indigenous groups of the availability of these documents within 48 hours of their publication.	
Condition 2.15 (Information Sharing)	When the development of any plan is a requirement of a condition set out in this Decision Statement, the Proponent shall submit the plan to the Agency and to Indigenous groups prior to construction, unless otherwise required through the condition.	Section 5
Condition 4.1	The Proponent shall carry out the Designated Project in a manner that protects migratory birds and avoids harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests or eggs. In this regard, the Proponent shall take into account Environment and Climate Change Canada's Avoidance Guidelines and the risk of incidental take. The Proponent's actions when carrying out the Designated Project shall be in compliance with the *Migratory Birds Convention Act, 1994*, the *Migratory Birds Regulations* and with the *Species at Risk Act*.	Sections 3 and 4.7
Condition 4.2	The Proponent shall deter migratory birds from using or frequenting the tailings storage facility, reclamation wetlands, pit lake and sediment control ponds until such time that water quality in these structures meets legislative requirements and water quality objectives. The Proponent shall identify the water quality objectives using an ecological risk based approach, developed in consultation with Indigenous groups and relevant authorities.	Section 3.10.3
Condition 4.3	The Proponent shall conduct pre-construction surveys for migratory birds and their habitat in the Designated Project area to validate the results of habitat suitability modelling for migratory birds, including migratory birds that are listed species at risk, conducted by the Proponent and presented in the Environmental Impact Statement and in the Blackwater Gold Project – Waterbird Memo (Response to LDN/UFN #684, 693, 697, and NWFN/StFN #964). As part of the pre-construction surveys, the Proponent shall validate the applicability of fisher (Martes pennant) habitat suitability modelling to migratory birds, as identified by the Proponent in the Blackwater Gold Project – Forest Birds (Supplemental Information in Response to 681, 683, 685, 694, 695, 703, 717, 936; and ECCC Annex 1, IR 21, 24, 25). Based on the results of the pre-construction surveys the Proponent shall, in consultation with Indigenous groups and relevant authorities, develop and implement mitigation measures for migratory bird habitat.	Section 4.7
Condition 4.4	The Proponent shall develop, prior to construction, and in consultation with relevant authorities, mitigation measures related to sensitive periods and locations for migratory birds, including greater yellowlegs (*Tringa melanoleuca*). The mitigation measures shall consider critical habitat identified in applicable recovery strategies under the *Species at Risk Act* and suitable habitat identified by the Proponent in the environmental assessment for migratory birds, including common nighthawk (*Chordeiles minor*), olive‐sided flycatcher (*Contopus cooperi*), yellow rail (*Coturnicops noveboracensis*), barn swallow (*Hirundo rustica*), bank swallow (*Riparia riparia*),	Sections 3.3 and 4.7

Condition	Description	Location in Plan
	horned grebe (*Podiceps auritus*). The Proponent shall implement the mitigation measures during all phases of the Designated Project.	
Condition 4.5	The Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and determine the effectiveness of all mitigation measures to avoid harm to migratory birds, including migratory birds that are listed species at risk, their eggs and nests. The follow-up program shall include the mitigation measures used to comply with condition 4.1 to 4.4. The Proponent shall implement the follow-up program during all phases of the Designated Project and shall apply conditions 2.9 and 2.10 when implementing the follow-up program.	Section 4.7
Condition 6.2	The Proponent shall establish a speed limit of a maximum of 50 kilometres/hour on project roads and require that all persons abide by this speed limit during all phases of the Designated Project.	Section 3.6
Condition 6.10	The Proponent shall, during all phases of the Designated Project, prohibit employees and contractors associated with the Designated Project from fishing, hunting, trapping and gathering for any purposes not associated with the Designated Project, within the Designated Project area, or using the Designated Project area to access lands outside the Designated Project area for fishing, hunting, trapping and gathering, unless an employee or contractor is provided access by the Proponent for traditional purposes or for exercising Aboriginal rights, to the extent that such access is safe.	Section 2.1
Condition 6.14	The Proponent shall, prior to construction and in consultation with Indigenous groups and relevant authorities, develop a follow-up program to verify the accuracy of the environmental assessment as it pertains to adverse effects from the Designated Project on moose (*Alces alces*) and determine the effectiveness of mitigation measures. As part of the implementation of the follow-up program, the Proponent shall conduct winter distribution and density surveys for moose (*Alces alces*) starting prior to construction and until the end of operation. The Proponent shall implement the follow-up program from construction through decommissioning and shall apply conditions 2.9 and 2.10 when implementing the follow-up program.	Section 4.4
Condition 8.1	The Proponent shall control lighting required for all phases of the Designated Project, including direction, timing and intensity, to avoid adverse effects on listed species at risk, while meeting health and safety requirements.	Section 3.1
Condition 8.2	The Proponent shall, prior to construction and in consultation with Indigenous groups and relevant authorities, identify wildlife corridors that intersect project roads and shall install and maintain, during all phases of the Designated Project, wildlife crossing signs where the wildlife corridors intersect the project roads.	Sections 3.6 and 4

Condition	Description	Location in Plan
Condition 8.3	The Proponent shall not use salt for de-icing or traction control purposes on project roads during all phases of the Designated Project, unless all other methods used for de-icing or traction control purposes do not meet safety requirements.	Section 3.6
Condition 8.4	The Proponent shall, from the start of construction to the end of decommissioning, manage carrion on project roads in consultation with relevant authorities and Indigenous groups.	Section 3.6
Condition 8.5	The Proponent shall, during all phases of the Designated Project, manage snow bank height along project roads and shall create and maintain escape pathways where the wildlife corridors identified pursuant to condition 8.2 intersect the project roads to allow ungulates and wolverines (Gulo gulo) to exit the plowed roads in winter.	Section 3.6
Condition 8.6	The Proponent shall, prior to the start of construction, conduct mineral lick surveys within the Designated Project area. If the results of the surveys indicate the presence of mineral licks outside the area disturbed by Designated Project components, the Proponent shall, in consultation with Indigenous groups and relevant authorities, maintain the mineral licks in their natural state.	Section 4.4
Condition 8.7	The Proponent shall maintain vegetation under the transmission line right of way to a minimum height of 1 metre from the ground except at the location of the tower bases, guy anchor points and along the transmission line access roads, or where not feasible for safety reasons.	Section 3.4
Condition 8.8	The Proponent shall deposit woody debris on the surface of upland slopes, between rocks and parallel and perpendicular to the slope when undertaking vegetation maintenance under the transmission line pursuant to condition 8.7, unless not feasible for safety reasons.	Section 3.4
Condition 8.9	The Proponent shall identify, prior to construction and in consultation with Indigenous groups and relevant authorities, time periods during which construction activities must be carried out to protect wildlife during sensitive life stages, including for grizzly bear (*Ursus arctos*), western toad (*Anaxyrus boreas*), wolverine (*Gulo gulo*), American marten (*Martes americana*), fisher (*Pekania pennanti*) and southern mountain caribou (*Rangifer tarandus caribou*). In doing so, the Proponent shall: 8.9.1 apply British Columbia's Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia. Interim Guidance, North Area when identifying these time periods; 8.9.2 notify, prior to construction, the Agency and Indigenous groups of these time periods and of the areas within which each of these time periods shall apply; and 8.9.3 conduct construction activities during these time periods, unless not technically feasible.	Sections 3.3, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7

Condition	Description	Location in Plan
Condition 8.10	If construction during the time periods referred to in condition 8.9 for grizzly bear (*Ursus arctos*), western toad (*Anaxyrus boreas*), wolverine (*Gulo gulo*), American marten (*Martes americana*) and fisher (*Pekania pennanti*) is not technically feasible, the Proponent shall conduct pre-construction surveys to identify western toad (*Anaxyrus boreas*) breeding habitat and wolverine (*Gulo gulo*), American marten (*Martes americana*), fisher (*Pekania pennanti*) and grizzly bear (*Ursus arctos*) denning habitat and develop and implement additional mitigation measures, from construction until the end of operation, in consultation with Indigenous groups and relevant authorities. In doing so, the Proponent shall: 8.10.1 establish no work buffer zones for habitat identified during pre-construction surveys. The Proponent shall take into account British Columbia's Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia when establishing buffer zones for western toad breeding habitat and shall take into account British Columbia's Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia. Interim Guidance, North Area when establishing buffer zones for wolverine (*Gulo gulo*), American marten (*Martes americana*), fisher (*Pekania pennanti*) and grizzly bear (*Ursus arctos*) denning habitat.	Sections 3.3, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7
Condition 8.11	The Proponent shall, in consultation with Environment and Climate Change Canada, have a qualified individual salvage and relocate western toad (*Anaxyrus boreas*) to suitable habitat, prior to clearing activities that cannot be scheduled outside of sensitive periods pursuant to condition 8.9.	Section 4.1
Condition 8.12	The Proponent shall deter western toad (*Anaxyrus boreas*) from the tailings storage facility, reclamation wetlands, pit lake, sediment control ponds, and environmental control dam until such time that water meets British Columbia's Water Quality Guidelines for the Protection of Wildlife and from project roads during construction, operation and decommissioning.	Sections 3.10.3 and 4.1
Condition 8.13	The Proponent shall take into account the Western Canada White Nose Syndrome Transmission Prevention when undertaking construction activities in little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*) habitat. The Proponent shall report evidence of white nose syndrome as indicated by white muzzle or dead bats to British Columbia's Ministry of Forests, Lands, and Natural Resource Operations and Rural Development, Environment and Climate Change Canada, and Indigenous groups.	Section 3.2
Condition 8.14	The Proponent shall conduct pre-construction surveys to determine the distribution of little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*), and establish from construction until the end of operation, in consultation with Indigenous groups and relevant authorities, buffer zones around active hibernacula and active roosts. The Proponent shall take into account British Columbia's Compendium of Wildlife Guidelines for Industrial Development	Sections 3.3 and 4.2

Condition	Description	Location in Plan
	Projects in the North Area, British Columbia when identifying active hibernacula and active roosts and when establishing buffer zones.	
Condition 8.15	If the pre-construction surveys referred to in condition 8.14 identify the loss of little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*) roosting habitat, the Proponent shall install, prior to construction, and maintain, during construction operation, and decommissioning, roosting structures to offset any loss of little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*) roosting habitat.	Sections 3.3 and 4.2
Condition 8.16	The Proponent shall, prior to construction and in consultation with Indigenous groups and relevant authorities, conduct pre-construction surveys to identify short-eared owl (*Asio flammeus*) moderate to high-value nesting and foraging habitat, and shall implement measures to mitigate the loss of short-eared owl (*Asio flammeus*) habitat caused by the Designated Project.	Section 4.7
Condition 8.21	The Proponent shall develop, in consultation with Indigenous groups, Environment and Climate Change Canada and other relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and determine the effectiveness of the mitigation measures as it pertains to the effects of changes caused by the Designated Project on western toad (*Anaxyrus boreas*). The Proponent shall implement the follow-up program from construction through decommissioning and shall apply conditions 2.9 and 2.10 when implementing the follow-up program. As part of the follow-up program, the Proponent shall: 8.21.1 conduct western toad surveys annually in breeding habitat identified pursuant to condition 8.10 from the start of construction until the end of decommissioning; 8.21.2 monitor western toad (*Anaxyrus boreas*) in relocation areas for western toad (*Anaxyrus boreas*) salvage conducted pursuant to condition 8.11; and 8.21.3 monitor western toad (*Anaxyrus boreas*) mortality on project roads from the start of construction until the end of decommissioning.	Section 4.1
Condition 8.22	The Proponent shall develop, in consultation with Indigenous groups, and implement a follow-up program to monitor little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*) usage of buffer zones established pursuant to condition 8.14 and roosting structures installed and maintained by the proponent pursuant to condition 8.15 to determine the effectiveness of the mitigation measures. The Proponent shall implement the follow-up program during construction and operation and shall apply conditions 2.9 and 2.10 when implementing the follow-up program.	Section 4.2

APPENDIX B CONCORDANCE WITH ENVIRONMENTAL ASSESSMENT CERTIFICATE #M19-01 (JUNE 21, 2019)

Appendix B: Concordance with Environmental Assessment Certificate #M19-01 (June 2019)

Condition	Description	Location in Plan
2 Plan Development	Where a condition of this Certificate requires the Holder to develop a plan, program or other document, any such plan, program or other document must, at a minimum, include the following information: a) purpose and objectives of the plan, program or other document; b) roles and responsibilities of the Holder and Employees; c) names and, if applicable, professional certifications and professional stamps/seals, of those responsible for the preparation of the plan, program, or other document; d) schedule for implementing the plan, program or other document throughout the relevant Project phases; e) means by which the effectiveness of the mitigation measures will be evaluated including the schedule for evaluating effectiveness; g) schedules and methods for the submission of reporting to specific agencies, Aboriginal Groups and the public and the required form and content of those reports; and process and timing for updating and revising the plan, program or other document, including any consultation with agencies and Aboriginal Groups that would occur in connection with such updates and revisions.	Sections 1.1, 1.2, 3, 4, 5, 8
3 Adaptive Management	Where a condition of this Certificate requires the Holder to develop a plan, program or other document that includes monitoring, including monitoring of mitigation measures or monitoring to determine the effectiveness of the mitigation measures, the Holder must include adaptive management in that plan. The objective of the adaptive management is to address the circumstances that will require the Holder to implement alternate or additional mitigation measures to address effects of the Project if the monitoring shows that those effects: a) are not mitigated to the extent contemplated in the Application; b) are not predicted in the Application; or c) have exceeded the triggers identified in paragraph g) of this condition.	Sections 1.4 and 4
	The adaptive management in the plan must include at least the following: d) the monitoring program that will be used including methods, location, frequency, timing and duration of the monitoring;	Sections 1.4 and 4
	e) the baseline information that will be used, or collected where existing baseline information is insufficient, to support the monitoring program;	Sections 1.4 and 4
	f) the scope, content and frequency of reporting of the monitoring results;	Sections 4 and 5
	g) the identification of qualitative and quantitative triggers, which, when observed through monitoring required under paragraph d), will require the Holder to alter existing, or develop new, mitigation measures to avoid, reduce, and/or remediate effects;	Sections 1.4 and 4

Condition	Description	Location in Plan
3 Adaptive Management *(cont'd)*	h) the methods that will be applied to detect when a numeric trigger, or type or level of change referred to in paragraph g), has occurred;	Sections 1.4 and 4
	i) a description of the process for and timing to alter existing mitigation measures or develop new mitigation measures to reduce or avoid effects;	Sections 1.4 and 4
	j) identification of the new and/or altered mitigation measures that will be applied when any of the changes identified in paragraphs a) to c) occur, or the process by which those will be established and updated over the relevant timeframe for the specific condition;	Sections 1.4 and 4
	k) the monitoring program that will be used to determine if the altered or new mitigation measures and/or remediation activities are effectively mitigating or remediating the effects and or avoiding potential effects; and	Sections 1.4 and 4
	l) the scope, content and frequency of reporting on the implementation of altered or new mitigation measures.	Sections 1.4 and 4
	If there are any requirements or mitigation measures required in the plan, program or other document for which adaptive management, or elements of adaptive management listed in paragraphs d) to l) are assessed to be not appropriate or applicable, the plan must include identification of those requirements and measures, and the rationale for that assessment.	Sections 1.4 and 4
4 Consultation	Where a condition of this Certificate requires the Holder consult a particular party or parties regarding the content of a plan, program or other document, the Holder must, to the satisfaction of the EAO: a) provide written notice to each such party that: i. includes a copy of the plan, program or other document; ii. invites the party to provide its views on the content of such plan, program or other document; and iii. indicates: i) if a timeframe for providing such views to the Holder is specified in the relevant condition of this Certificate, that the party may provide such views to the Holder within such time frame; or ii) if a timeframe for providing such views to the Holder is not specified in the relevant condition of this Certificate, specifies a reasonable period during which the party may submit such views to the Holder;	A draft of the WMMP was provided to Indigenous groups and the EMC for review and comment in August 2021. Comments on the plans and responses are listed in the WMMP Issues Tracking Table and Consultation Report.
	b) undertake a full and impartial consideration of any views and other information provided by a party in accordance with the timelines specified in a notice given pursuant to paragraph (a);	Completed. See WMMP Issues Tracking Table.
	c) provide a written explanation to each such party that provided comments in accordance with a notice given pursuant to paragraph (a) as to: i. how the views and information provided by such party to the Holder have been considered and addressed in a revised version of the plan, program or other document; or ii. why such views and information have not been addressed in a revised version of the plan, program or other document.	Completed. See WMMP Issues Tracking Table.

Condition	Description	Location in Plan
4 Consultation *(cont'd)*	d) maintain a record of consultation with each such party regarding the plan, program or other document; and	Completed. See WMMP Issues Tracking Table and Consultation Log.
	e) provide a copy of such consultation record to the EAO, the relevant party, or both, promptly upon the written request of the EAO or such party. The copy of such consultation record must be provided to the EAO, relevant party, or both, no later than 15 days after the Holder receives the request for a copy of the consultation record, unless otherwise authorized by the EAO.	Noted.
5 (Compliance Verification and Reporting)	The Holder must provide to the EAO and to the Aboriginal Groups any document, data or information requested by the EAO for the purposes of compliance inspection and verification. The Holder must provide any document, data or information requested within the timeframe and in the manner specified by the EAO. The Holder must submit a report to the attention of the EAO and Aboriginal Groups on the status of compliance with this Certificate at the following times: a) at least 30 days prior to the start of Construction; b) on or before March 31 in each year after the start of Construction c) at least 30 days prior to the start of Operations; d) on or before March 31 in each year after the start of Operations; e) at least 30 days prior to the start of Closure; f) on or before March 31 in each year after the start of Closure until the end of Closure; g) at least 30 days prior to the start of Post-closure; and h) on or before March 31 in each year after the start of Post-closure until the end of Post-closure. The reports must be in a form satisfactory to the EAO. The EAO may adjust or extend this reporting requirement by providing written notice to the Holder.	Section 5, Documentation and Reporting
23 Wildlife Mitigation and Monitoring Plan	The Holder must retain one or more Qualified Professionals to develop a Wildlife Management and Monitoring Plan. The plan must be developed in consultation with EMPR, ENV, FLNRORD, ECCC and Aboriginal Groups. The plan must include at least the following: a) the means by which the mitigation measures identified in the Mitigations Table required under Condition 43 for the following valued components: Amphibians, Bats, Forest and Grassland Birds, Waterbirds, Furbearers, Grizzly Bear, Invertebrates, Moose, Ecosystem Composition and Plant species and Ecosystems at Risk will be implemented;	Sections 3 and 4
	b) the means by which the implementation and effectiveness of mitigation measures in the plan will be monitored;	Section 4

Condition	Description	Location in Plan
23 Wildlife Mitigation and Monitoring Plan *(cont'd)*	c) pre-construction surveys for wildlife features to be undertaken and the associated avoidance or mitigation measures to be undertaken if specified wildlife features are found in the Project Area, as listed in Table 1, including: i) the method(s), timing and duration for surveys and the related rationale for that method(s), timing and duration; ii) the identified measures to be undertaken in light of the requirements for different wildlife features; and iii) the circumstances under which the required measures in the Table 1 would not be implemented, if any, including a clear rationale for those exceptions and identification of alternative measures that will be applied.	Sections 3.3 and 4
	Table 1 Pre-construction Surveys and Associated Avoidance and Mitigation Measures: **Mineral Licks:** If pre-construction surveys identify that mineral licks are present within or near areas disturbed (sensory and physical) by Project components, identify measures to maintain the mineral licks in their natural state as determined by a Qualified Professional. If a mineral lick is discovered during Construction or Operations that wasn't identified in a pre-construction survey, the Qualified Professional must identify appropriate mitigation measures to minimize impacts to the mineral lick.	Section 4.4
	Grizzly bear dens: If the results of the survey indicate that there are grizzly bear dens in use, establish a setback around the den(s) while it is in active use, as determined by Qualified Professional.	Sections 3.3 and 4.6
	Bat roosts and hibernacula features: If the results of the pre-construction surveys indicate bat roosts or hibernacula are in the Project Area, avoid disturbance. If avoidance is not possible, install alternative roosts within the vicinity of the observed roost, as well as other mitigation measures as determined by a Qualified Professional. The Holder must demonstrate how the Best Management Practices Guidelines for Bats in British Columbia (ENV February 2016, or as updated or replaced from time to time) were applied. In addition to the pre-construction survey, the Holder must maintain an inventory of features that may function as potential roosts and hibernacula and must conduct surveys to confirm whether these features are used and by which species. If the features are being used by bats, avoid disturbance or apply appropriate mitigation measures if avoidance is not possible, as determined by a Qualified Professional.	Sections 3.3 and 4.2
	Furbearer dens: Should a probable active natal or maternal furbearer den be located, establish a 50-metre setback around the den during the denning period as determined by a Qualified Professional. Should the survey or assessment determine that there is furbearer denning habitat within the Project Area, the plan must identify mitigation measures to be applied during the denning period, as determined by a Qualified Professional, if avoidance is not possible, and in consideration of BC Environmental Mitigation Policy, including Procedures for Mitigating Impacts on Environmental Values (BC EMP).	Sections 3.3 and 4.5

Condition	Description	Location in Plan
23 Wildlife Mitigation and Monitoring Plan *(cont'd)*	**Active bird nests (resident and migratory, forest, grassland and waterbirds:** If the results of the survey indicate that there are nests in use, establish a setback around the nest while it is in active use, as determined by Qualified Professional. The Holder must document and maintain detailed records of efforts undertaken to avoid incidental bird takes during these surveys.	Sections 3.3 and 4.7
	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: 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; 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; iii) the role of Aboriginal Group monitors or members of Aboriginal Groups in gathering the information; 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; 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; vi) how the effectiveness of the mitigation measures identified in paragraphs d)iv) and d)v) will be monitored; and 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;	Sections 4, 4.4, and 4.6 describe follow-up monitoring. Section 5 describes reporting. Appendix D describes habitat suitability monitoring for grizzly bear and moose.
	e) the means by which the Holder will confirm effects on wildlife and ecosystems in the area flooded in the Davidson Creek watershed upstream of the TSF and the mitigation measures that will be applied to address identified effects;	Sections 3.9 and 4.4
	f) the timing and frequency, which must be at least once per year, or as otherwise authorized by the EAO, that the Holder will request to meet with FLNRORD and Aboriginal Groups to discuss the Holder's Participation in provincial moose and grizzly bear regional wildlife and resource management initiatives in Wildlife Management Units 6-01 and 7-12 and initiatives related to wildlife established under sections 5.2b)i.c. and 5.2b)i.g. under the Hubulhsooninats'uhoot'alh: Foundation Framework Agreement (July 22, 2018, or as updated or replaced from time to time) between the Province and the Southern Dakelh Nation Alliance. When FLNRORD and/or Aboriginal Groups agree to meet, the Holder must organize such meeting;	Sections 4.4 and 4.6

Condition	Description	Location in Plan
23 Wildlife Mitigation and Monitoring Plan *(cont'd)*	g) the development of a work plan for the Holder's Participation in those initiatives identified in paragraph f) when invited to do so by FLNRORD or the Ministry of Indigenous Relations and Reconciliation;	Ongoing
	h) the development of sub-component plans, which must include: i) related mitigation measures, the type, timing and frequency for undertaking wildlife surveys during Construction and Operations, and how that information will inform development and implementation of monitoring and mitigation for the following species: i. moose; ii. grizzly bears; iii. bats; iv. amphibians; v. birds (waterbirds and forest and grassland birds); and vi. furbearers; ii) identification of sensitive life stages for grizzly bears, moose, furbearers, and birds and how the Holder will avoid or mitigate impacts during these time periods taking into account at least the following: i. mitigation measures must include no-work zones, rescheduling construction activities, and applying minimum setbacks to construction activities. Where the Qualified Professional is of the view that such measures are not necessary or are impracticable, the plan must include clear justification as to under what circumstances those measures are not feasible or required and identification of alternative measures that are equally effective in mitigating effects; and ii. in identifying these life stages and mitigation measures, the Holder must document how it has taken into consideration the A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia. Interim Guidance, FLNRORD, 2014 (or as updated or replaced from time to time time).	Sections 3.3.1 and 4
	i) the means by which the Wildlife Management and Monitoring Plan will inform the Country Foods Monitoring Plan (Condition 41) and the End Land Use Plan (Condition 25);	Section 2.2
	j) establishment of policies that prohibit Employees, unless that activity is specifically related to employment requirements, from: i) fishing, hunting, or trapping; ii) harassing or feeding wildlife; or iii) possessing firearms; when travelling, for work-related purposes along Project Roads, the Kluskus and Kluskus-Ootsa Forest Service Roads, and/or when at the Project Site. The policies must identify the circumstances under which any of these activities may be allowed if they are by members of Aboriginal Groups exercising Aboriginal Interests;	Section 2.1

Condition	Description	Location in Plan
23 Wildlife Mitigation and Monitoring Plan *(cont'd)*	k) how the Holder will implement at least the following mitigation measures specific to the Project Site: i) management of lighting including direction, timing and intensity, to avoid adverse effects on wildlife, while meeting health and safety requirements; ii) regular monitoring of wildlife use of the TSF and water quality in the TSF to determine whether the water quality in the TSF poses a health risk to wildlife; and iii) measures to exclude wildlife from the TSF during periods of health risk for wildlife that are becoming habituated to using or drinking water from the TSF;	Sections 3.1, 3.5 and 3.10.3
	l) the means by which the Holder will implement at least the following mitigation measures specific to the transmission line right of way and transmission line access roads: i) after the transmission line is constructed, allowing the vegetation within the transmission line right of way to grow in order to minimize predator sight lines by maintaining limits of approach and, after vegetation has grown to one meter in height or more, not reducing the height of the plant community to any lower than one metre from ground level, unless the area is required for tower bases, guy anchor points or along existing access roads; ii) the means by which visual barriers will be created, as directed by a Qualified Professional, to reduce sight lines for predators along the transmission line right of way; and iii) a vegetation and access management plan for the transmission line right of way that sets out the timing and means by which all newly created access roads for the construction of the transmission line will be decommissioned and revegetated after they are no longer needed for Construction, the circumstances under which access may be re-established for maintenance and/or repairs of the transmission line, and the means by which roads re-opened for maintenance or repair activity will be decommissioned and revegetated following the maintenance and/or repair activities to meet the requirements in paragraphs l) i) and ii);	Section 3.4
	m) how the Holder will implement at least the following mitigation measures specific to road use: i) establishing a 50 kilometres per hour speed limit on all Project Roads; ii) identifying wildlife corridors and/or habitual crossing areas that intersect Project Roads and install and maintain wildlife crossing signs where those wildlife corridors intersect the Project Roads; iii) identifying wildlife corridors and/or habitual crossing areas that intersect the Kluskus and Kluskus-Ootsa Forest Service Roads and describe how the Holder will identify those to FLNRORD and offer to install and maintain wildlife crossing signs where those wildlife corridors intersect the Kluskus and Kluskus-Ootsa Forest Service Roads; and iv) the means and timing by which the Holder will notify FLRNORD of carrion resulting from impacts with Project Vehicles on Project Roads and the Kluskus and Kluskus-Ootsa Forest Service Roads, and when safe to do so, remove the carrion to a suitable location where the carrion can serve as a food source for wildlife, as determined by a Qualified Professional, unless FLRNORD is not able to authorize that removal and relocation;	Section 3.6

Condition	Description	Location in Plan
23 Wildlife Mitigation and Monitoring Plan *(cont'd)*	n) the means by which the Holder will, throughout all phases of the Project: i) record wildlife observations, wildlife mortalities observed, and significant interactions and/or conflicts between people and wildlife in the Project Area; ii) tabulate and submit the information recorded in paragraph n) i) to ENV, FLNRORD and Aboriginal Groups on an annual basis; and iii) report on identified risks to wildlife and/or people learned from such monitoring and how such risks will be addressed; and	Section 4 and 5.1.1
	o) identify the project phase or phases applicable for each mitigation and/or management measure in the plan, including a rationale for why mitigation and/or management measures would not be applicable in a certain project phase or phases.	Sections 3 and 4
	The Holder must provide the draft plan that was developed in consultation with EMPR, ENV, FLNRORD, ECCC, and Aboriginal Groups to EMPR, ENV, FLNRORD, ECCC, Aboriginal Groups, and the EAO for review a minimum of 60 days prior to the planned commencement of Construction or as listed in the Document Submission Plan required by Condition 10 of this Certificate.	Complete
	The plan, and any amendments thereto, must be implemented to the satisfaction of a Qualified Professional throughout Construction, Operations, Closure and Post-closure and to the satisfaction of the EAO.	Ongoing

APPENDIX C BEAR AWARENESS PROGRAM

Blackwater Gold Project

Bear Awareness Program
Pre-construction, Construction, and Operations

STANDARD OPERATING PROCEDURE	ENVIRO-01
April 2021	Version B.1

Scope:

This SOP provides guidance for all Project personnel:

1. Plan and conduct work in bear country;
2. Respond appropriately to bears in the field; and
3. Respond appropriately to bears in camp and Project facilities.

It is essential for all working crews to understand the procedures involved to ensure safety of all wildlife and employees.

Contacts:

Ryan Todd
Director, Blackwater Project
Ryan.Todd@artemisgoldinc.com
604-329-8179

Bob Nicholls
Camp Manager, Blackwater Project
Bnicholls@artemisgoldinc.com
250-991-9694

CONTENTS

1. INTRODUCTION

BW Gold is committed to conducting all aspects of its business in accordance with the principles outlined in “Artemis Gold Environmental Policy Statement”.

This Standard Operating Procedure (SOP) is intended for use by all Project personnel working outside, including those conducting fieldwork and working in camp. It provides important information on bears and summarizes the mitigation actions provided in BW Gold’s Wildlife Mitigation and Monitoring Plan (WMMP) including:

- Training and preparation for work outside;
- Identification of bears;
- Responding to bears in the field;
- Responding to bears in or near camps – management and dealing with habituated wildlife; and
- Reporting and follow-up for bear sightings and incidents.

The Environmental Manager or his designate will work closely with the Mine Manager, Camp Manager, Safety Superintendent, Security Personnel, and Departmental Supervisors to ensure the proper and full implementation of this SOP into routine outdoor field activities and emergency response protocols including bear action levels.

2. PREPARING AND EQUIPMENT

2.1 Employee Orientation and Training

Upon arrival at site, all site personnel (employees, contractors, and visitors) will receive an overview on bear safety as part of the site orientation package prior to commencing any work outdoors. The overview training during orientation will consist of the following:

1. Review of this SOP;
2. Review of the BC government Bear Aware safety video: https://www.for.gov.bc.ca/hfd/library/documents/bib22777.htm
3. Communication resources (radio, satellite phone, inReach, etc.);
4. How to access information about recent bear sightings and observations.

Dependent upon specific job requirements, select project personnel will receive practical and hands-on training in bear deterrence and hazing methods. This training will be developed and delivered by BW Gold’s Safety or Training personnel or other qualified personnel to individuals who will be authorized to perform hazing operations to protect human health and welfare if necessary. Only properly trained and authorized personnel will have access to deterrents. Personnel authorized to haze bears will be required to take annual refresher deterrence-training.

BW Gold will utilize the following approaches to provide and reinforce bear-elated safety and conflict prevention messaging to ensure that collectively all workers receive current and accurate information:

- Site orientation and bear safety overview;
- Additional targeted training sessions as required;
- Refresher classes – annually for designated monitors/personnel authorized to haze;

- Safety meetings and periodic safety memos – used to increase / reinforce awareness of bears, specific issues and how to avoid problems; and
- Awareness posters around the Project accommodations and contractor trailers.

2.2 Equipment

The following equipment will be available for workers in the field; in the case of deterrents, workers will require targeted training to promote safe operation of the equipment:

- Bear bangers (pen launcher and/or cap revolver) or Air horn;
- Bear spray;
- Communication devices (inReach, satellite phone, radio);
- GPS; and
- Observation Forms (attached).

3. KNOW YOUR BEARS

There are two types of bears in British Columbia: black bears (*Ursus americanus*) and grizzly bears (*Ursus arctos horriblis*).

3.1 Black Bears

Black bears are relatively common in British Columbia, with an estimated 120,000 in the province and are much more common than grizzly bears in the Blackwater area. A few facts about black bears:

- Black bears vary in size from 80-300 kg (175-650 lbs), with smaller females 40-140 kg (85-300 lbs).
- Black bears are omnivores, feeding any high protein, high fat food they can access. This includes vegetation, berries, remains of dead animals, salmon and insects.
- Black bears are relatively tolerant of humans and can be found in most rural towns in BC, including the Project site.
- Black bears can easily become habituated to any food available from people, such as garbage, bird feeders, or barbecues.
- Kermode bears are white fur sub-species of black bears generally found along the central coast.
- Black bears hibernate during the winter from November, generally to April. Bears excavate dens in large stumps and dead trees and in some cases holes in the ground.

3.2 Grizzly Bears

Grizzly bears are a sub-species of brown bears (*Ursus arctos*) that have a circumpolar distribution and number approximately 16,000 in BC. A few facts about grizzly bears:

- Grizzly bears are generally larger than black bears, with males weighing 180-360 kg (400-800 lbs) and females weighing 130-180 kg (280-400 lbs).
- Like black bears, grizzlies are omnivores, feeding mostly on vegetation, berries and fish.
- Grizzly bears are intolerant of humans and are less frequently observed in rural towns in BC, but are observed at remote camps such as Blackwater.

- Grizzly bears are less common and less commonly in towns, so there are fewer of them that become habituated to garbage. However, at a remote camp, garbage habituation is a genuine concern.
- Grizzly bears generally hibernate from November to April, with dens at high elevation, often dug into the ground under shrubs.

3.3 Identifying Bears in the Field

Bears can be difficult to identify in the field because the primary traits we see – size and colour – can be misleading; for identification traits, see Figure 3.3-1, Table 3.3-1 and Photos 3.3-1 and 3.3-2.

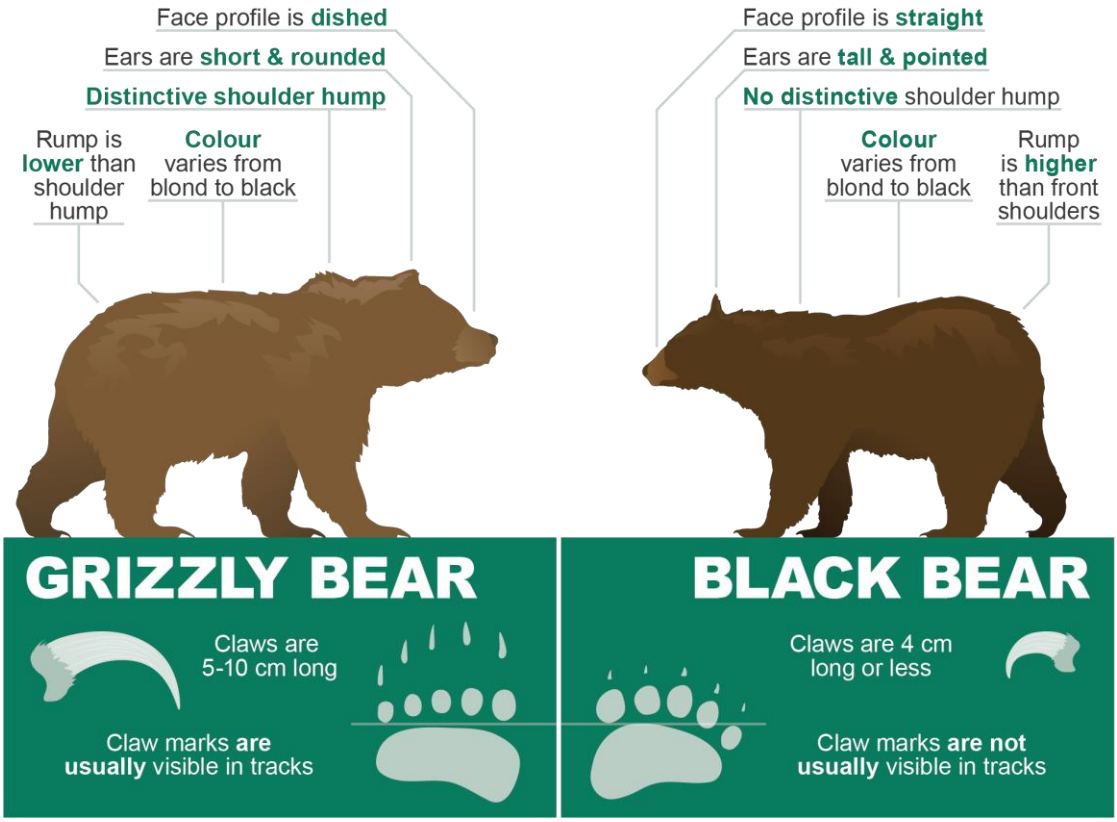


Figure 3.3-1: Identifying Grizzly Bears and Black Bears

Table 3.3-1: Identification of Grizzly and Black Bear

Traits	Grizzly	Black Bear
Reliable	Dished face	Straight or bullet-shaped face
	Ears small and round	Larger, pointed ears
	Distinct shoulder hump	No shoulder hump
Less reliable features	Colour – dark brown, cinnamon to blond	Colour – glossy black but sometimes brown
	Larger	Smaller (though a 600 lb black bear can look very large)
Tracks	Long claws (5-10 cm)	Short claws (1-4 cm)
	Row of toes in gentle arc	Row of toes curved

Photo 3.3-1: Grizzly bear (left) and black bear (right).

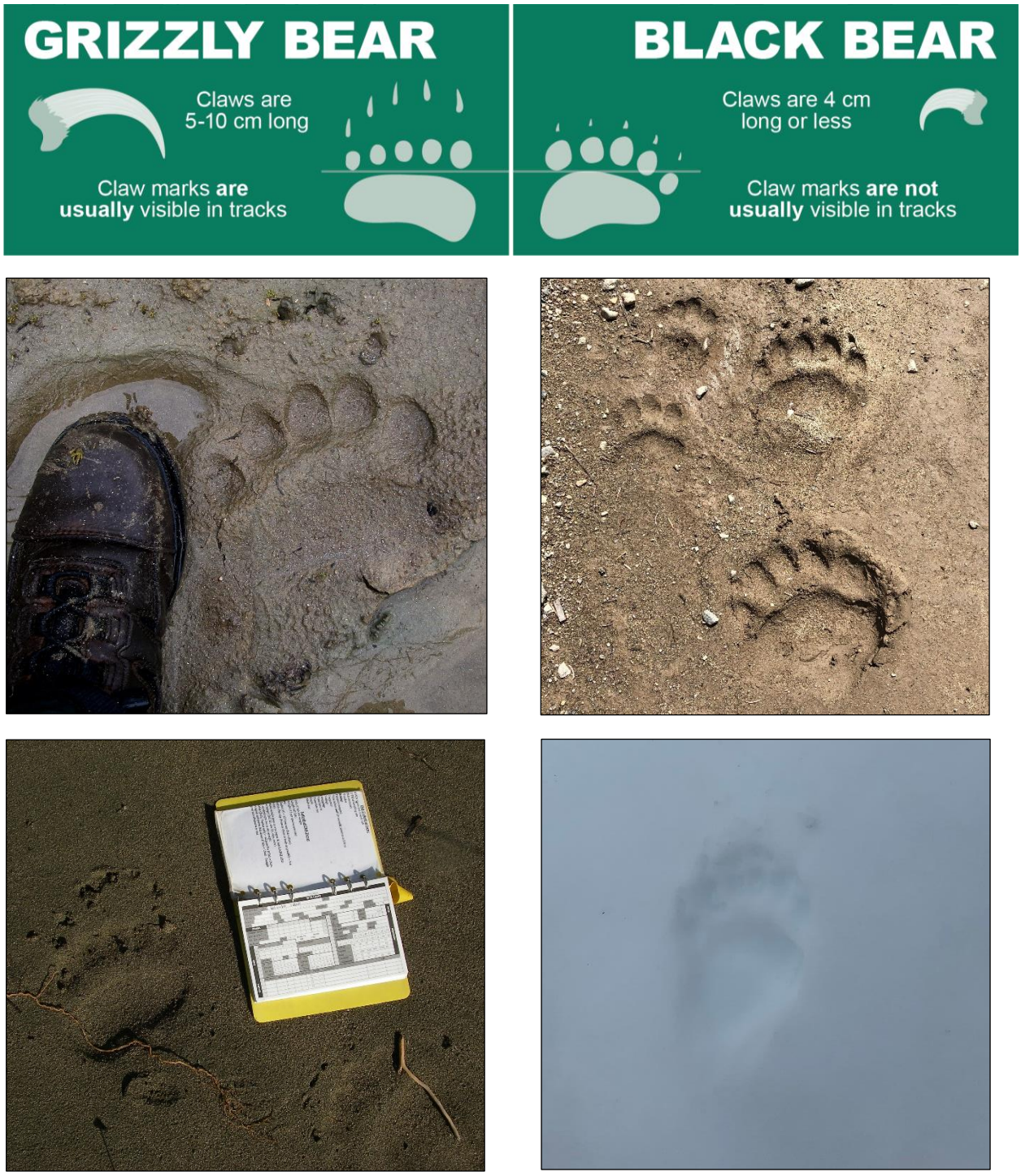


Photo 3.3-2: The grizzly bear track (left) has long claws and toes in a gentle arc; the black bear tracks (right) have shorter claws and the toes are curved around the foot pad.

4. IN THE FIELD

Proper preparation and planning can reduce the chances of having a bear encounter and improve your response when a bear is observed in the field.

4.1 Preparation

- Read the Blackwater Bear Awareness SOP (this document).
- Watch the BC provincial Bearwise video.
- Field crew will be equipped and trained in the use of communication devices (e.g., radio, satellite phone, or inReach) – preferably two forms of communication. Field crew will be trained on the check in protocol in place.
- Obtain and be familiar with the use of appropriate bear deterrents and other field equipment, including the following: bear bangers, bear spray, air horn, and binoculars. For the use of deterrents, ensure you have the practical hands-on training that will be made available.
- Avoid “interesting smells” that may attract bears – this includes food with strong odours and synthetic odours such as cologne & perfume.

4.2 Daily – Before You Go

- Check with your supervisor for any reports of bears in your work area. If the supervisor is unaware, contact Environment staff for an update. All bear sightings will be distributed site wide via e-mail and tool box meetings.
- Bears are animals of habit. If they have been spotted in a particular area at a particular time, there is a good chance they will return.
- If a bear is known to be using a particular area (e.g., fishing in a stream, feeding in a particular wetland), consider changing or re-scheduling fieldwork.
- If a bear has been reported in an area and the work must occur, consider what other mitigations are possible – can a truck or helicopter stay with the field crew? Is a bear monitor available?

4.3 Staying Safe in the Field

- If using a helicopter, scan the area by helicopter, circling around in a large loop prior to being dropped off. Keep in mind that this precaution should not be considered foolproof since bears can hide in underbrush and travel long distances in a short time.
- On exit from the helicopter, test communication to ensure it is working properly. Ensure you do not store bear deterrents in the cockpit of the helicopter; they should be stored in helicopter side compartments for safekeeping.
- On exit from the helicopter, conduct a scan of the work site for bear sign and call back helicopter if it is observed.
- If deploying using a truck, scan the immediate area from a vantage point on the road prior to leaving the vehicle.
- Ensure a field member is assigned a wildlife observer role at all times (e.g., bear monitor or field crew member if no bear monitor is present).

- While working, all crew members should regularly scan the areas around the work site for wildlife (approximately every two minutes). Bears can move very quickly when foraging.
- Make noise and lots of it.

4.4 Responding to Bears

If a bear is encountered in the field, understanding their behaviour and responding appropriately will greatly increase your chances of a positive outcome. The following sections describe different bear encounters of increasing severity and what research indicates are suitable responses.

4.4.1 Observations of Bear Sign

Staying alert for the sign of bears can provide important information about whether bears are in the area and the likelihood of a future encounter. Common bear sign includes:

- Bear tracks – See Section 3.3.
- Bear dung or scat – Bear dung is usually easy to identify: it is often of copious quantity, very dark coloured and full of half-digested berries and other vegetation.
    - In contrast, carnivore dung (wolves and wolverines) is often full of hair, smaller in quantity (similar to domestic dogs) and will often turn white when old.
    - Ungulate dung (moose and deer) is different because those species are ruminants, and so have small, dark pellets without obvious remaining vegetation structures.
- Scratching posts – Bears will mark their territory by scratching deep vertical grooves into trees.
- Smell – Bears have a distinct smell. Once you've smelled it once, you can identify that bears are nearby from the smell.
- Strong rotting smell and bear smell, particularly in the spring – Bears may be feeding on a kill or an animal that died during the winter.

If you observe lots of bear sign at your fieldwork location. Consider how bears are using the area – is there sign on a trail? Bear sign near a river during the fall suggests bears may be fishing? Potential responses include:

- If the area looks to be a high-use area, consider leaving and re-assessing whether fieldwork at that location is required, or whether there are other preventative measures that could be added – e.g., keeping the helicopter or a vehicle, or having a bear monitor accompany the field team.
- If the area looks like bears are fishing, or a bear is feeding on a kill/carrion – leave the area immediately. Bears can be highly unpredictable and very territorial around good food sources.

4.4.2 Long-distance Encounters

Both black bears and grizzly bears are often observed at a long distance; for example down a river or road, or on a ridge or across a large wetland. Often bears and field personnel see each other at the same time. This is generally a positive encounter but the proper response depends on what the bears do.

If the bear sees you, is at a great distance (>500 m) and responds by immediately walking away into cover or running away:

- This is a generally good response. The bear isn't being territorial and isn't habituated. Consider reassessing and moving to another area. Continuing to work in the area may be fine, but the bear may respond differently if encountered again.

If the bear seems curious or undecided, respond by letting the bear know what you are, i.e., “Whoah Bear”:

- Move together as a group;
- Speak in a quiet, but confident voice;
- Raise your arms and any gear you have to make yourself look larger;
- Start moving slowly away;
- Radio the bear observation in to the helicopter or camp.
- If the bear leaves, then proceed as above and consider why the bear was there and alter your plan accordingly. Working in another area may be required.
- If the bear moves towards you, particularly if shows signs of stress, see below for Surprise Encounters.
- If the bear is approaching slowly, or doesn’t seem to want to leave, having the helicopter come and pick you up or deter the bear is an option.

4.4.3 Surprise Short-distance Encounters

Surprise, short-distance encounters with bears are not a rare occurrence and can be very dangerous. Both grizzly and black bears can act defensively, particularly if they have cubs nearby and they have been surprised. A typical scenario is personnel working in dense bush and all of a sudden they hear or see a bear.

Stressed or Aggressive Behaviours

Bears may react defensively from fear or in territorial manner. Typical bear behaviours may include:

- Standing to look at you;
- Jaw popping and drooling (a sign of stress);
- A short bluff charge (3-4 steps towards you), often followed by turning (to make itself look bigger) or standing and watching your reaction – it is trying to frighten you and drive you away; and
- A long bluff charge ending 3-10 m from you.

Whoah Bear

In all cases, the response to unexpectedly encountering a bear at close range is “Whoah Bear”. You’re objective is to calm the bear and show that you are not a threat:

- Move together as a group;
- Speak in a quiet, but confident voice “Whoah Bear”;
- Raise your arms and any gear you have to make yourself look larger;
- Start backing away;
- Prepare your deterrents.

If you have time:

- Call for help on the radio;

If the bear continues to approach you in an aggressive manner:

- Use your bear deterrents:
  - Fire bear bangers **behind** you; and/or
  - Use your bear spray; and/or
    - Bear spray exits the canister as a fine stream that travels about 10-15 feet, so don't spray too soon.
    - Bear spray works when it gets in the eyes and mouth of the bear, so aim there.
    - Watch for wind – a strong wind will push the spray back towards you.
    - Bear spray won't work at all if it's sprayed on to something – don't spray it on the ground or in front of the bear.
  - Use your air horn.
- Climbing a tree is not always recommended, but may be required once your other options are exhausted. Remember, though that bears can climb better than you. Better to keep moving away, keep using your deterrents.

Do Not

Do NOT do any of the following:

- DO NOT RUN! (bears will chase you if you run)
- Do not run downslope (bears will chase you and they can definitely run faster than you down a slope).
- Do not play dead (reserve this for later).

Bear Attack and Playing Dead

In some cases, actions to calm the bear don't work – the bear is too upset or you are too close to its young. In some of these cases, a charging bear will make contact and push you down. You should play dead:

- Keep your backpack on;
- Curl up into a ball (knees to chest) to protect your stomach;
- Pull your elbows in and interlock your fingers behind your neck to protect your neck; and
- If the bear leaves, stay rolled up in a ball, they will often come back.

4.4.4 Predatory Bears

While most bear encounters are by surprise and end with the bear running or moving away, there are cases of bears being predatory on people. Most reports of predatory bears are by black bears, but in a few cases grizzly bears have been reported as acting predatory.

It is very important to observe the bear and determine whether it is reacting fearfully, or in a predatory manner. You're response to these two encounters will be very different.

Typical behaviours of a predatory bear:

- Approaching you in a stalking manner – looking at you, appearing curious, walking slowly;
- Circling you to move downwind;
- Following you; and
- The bear appears to run, but then you see it again (it's been following you or circling you).

In all cases, the response to a predatory bear is more aggressive than “Whoah Bear”; in this case you are trying to communicate to the bear that you are not prey:

- Move together as a group;
- Speak in a strong voice; yell; and bang items you may have together to make noise;
- Raise your arms and any gear you have to make yourself look larger;
- Prepare your deterrents; and
- Call for help on the radio.

If the bear continues to approach you in a curious or predatory manner:

- Use your bear deterrents:
  - Fire bear bangers **behind** you; and/or
  - Use your bear spray; and/or
  - Use your air horn.
- Do NOT do any of the following:
  - DO NOT RUN! (bears will chase you if you run);
  - DO NOT PLAY DEAD!

If the bear is not deterred, and tries to predate you:

- FIGHT! Use whatever you can – sticks, knives, whatever you have at hand (your objective is to drive the bear away).

5. IN OR NEAR CAMP

The philosophy of responding to bears in or near camps is:

1. Reduce risk to Project personnel through training and immediate response. A bear in camp tiered action level system will be developed in consort with the Camp Manager, Safety Superintendent, and Emergency Management Team Lead (EMTL). The action levels will be developed based on factors such as distance of the bear to camp or a work site and the behavior of the bear, The EMTL will activate the appropriate level of response in consideration of available information, advice of the Environment staff, and a precautionary approach to safety.
2. Reduce the attractiveness of the Project for bears; manage wastes, eliminate wildlife attractants, maintain skirting and fencing, etc.
3. If bears are observed in or near camp or work sites , first review and assess the area for potential bear attractants to understand the reasons why the bear is in or near camp and what can be done to mitigate the risk (i.e., locating and eliminating any identified attractants).
4. Eliminate any potential attractant, if possible, prior to implementing bear deterrent and hazing measures. If Project personnel are at risk, deterrence measures should be implemented immediately.

The camp manager is responsible for all aspects of the camp. Several management plans provide guidance and instructions for making the camp less attractive to bears, including:

- The Wildlife Mitigation and Monitoring Plan (WMMP); and
- The Waste (Refuse and Emissions) Management Plan.

If a bear is repeatedly observed in camp, complete the following actions:

- Review waste management storage facilities and practices to ensure there are no bear attractants present.
- Review food storage management and management for other possible attractants such as grey water, hydrocarbons, plastics, or food preparation equipment.
- Review camp facilities to ensure that skirting and fencing are in good condition, and repair any structures that may allow access for these animals.
- Consider whether the animal is habituated.

The following management options are meant to ensure the safety of personnel, and dissuade habituated or aggressive bears from visiting the site. Ideally, this list of options would be followed sequentially as a situation develops, but managers may choose to escalate the actions taken in response to an aggressive, predatory, or injured animal as described in Table 5-1:

1. Monitoring: report and record wildlife sightings and signs.
2. Alert the camp on the radio using the appropriate method, e.g., Call “Code 1, Code 1, Code 1”. Identify yourself, identify your location, and provide information to dispatch regarding the details of the situation. Follow the direction of the EMTL.
3. Post warnings: provide accurate and current information of all potentially dangerous wildlife in the area via radio.
4. Area closures: restrict worker access to areas with problem wildlife, pending suitable controls.
5. Adverse conditioning (AVCD): apply adverse conditioning to problem wildlife to prevent or reverse habituation (bear bangers, rubber bullets, or running the bear away with vehicles or the helicopter).
6. Destruction: undertake (with authorization from appropriate wildlife management authority) only when an animal is considered to pose an unacceptable hazard to human safety. This will require specialized training in firearms; there should always be at least one or two individuals in camp who can be called upon for this purpose.

Table 5-1: Protocol to Determine Appropriate Management Responses to Human-Animal Interactions

Type of Human-Animal Interaction	Management Response Options				
	Monitor	Post Warning	Area Closure	AVCD	Destroy
1. Incidental sighting or sign reported	X	X			
2. Animal showing normal feeding behaviour and avoids people	X	X			
3. Animal reacting defensively following surprise or provoked encounter (defensive aggression)	X	X	X		
4. Animal tolerates people but ignores them and their facilities (no threat present)	X	X	X	X	
5. Animal shows repeated interest in people and/or human facilities, which will likely result in food-conditioning or close approaches (habituated)	X	X	X	X	

Type of Human-Animal Interaction	Management Response Options				
	Monitor	Post Warning	Area Closure	AVCD	Destroy
6. Animal receives minimal or low-level reinforcement to unnatural food sources (mildly food-conditioned)	X	X	X	X	
7. Animal is heavily habituated to people and has repeatedly obtained unnatural foods (food-conditioned)	X	X	X	X	
8. Animal has previously been relocated and is unlikely to change its behaviour		X	X	X	X
9. Animal displays aggressive, offensive, or predatory behaviour and is an imminent threat to human safety		X	X	X	X

6. REPORTING

If wildlife are observed on the Project site, Project personnel are responsible for completing and submitting the Incidental Wildlife Observation Datasheet to the Environment Department no later than the end of their shift.

All incidental wildlife observations and wildlife encounters will be reported in the annual Wildlife Mitigation and Monitoring Program (WMMP) Report.

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

ERM

#1000 – 1100 Melville Street
Vancouver, BC
Canada V6E 4A6

Telephone: +1 604 689 9460
Fax: +1 604 687 4277

www.erm.com

Blackwater Grizzly Bear and Moose Habitat Suitability Modelling Assessment Report

BW Gold
23 December 2021

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.

CONTENTS

List of Tables

List of Figures

List of Photos

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

EAC Condition		Concordance
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
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.
- 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 to 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.

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.

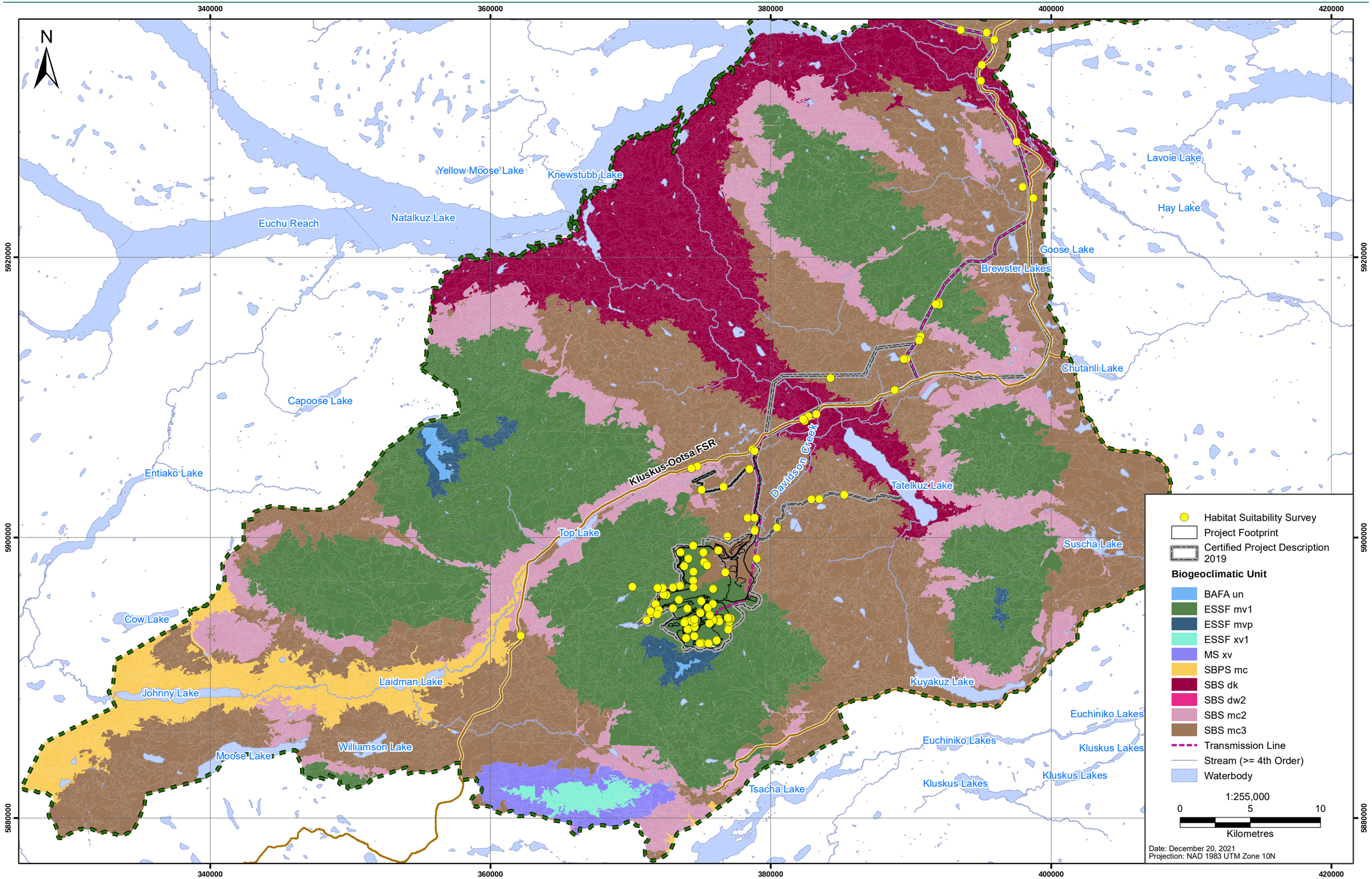


Figure 2.1-1: Habitat Suitability Field Survey Locations (2021) across Biogeoclimatic Units in the Project Site

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.

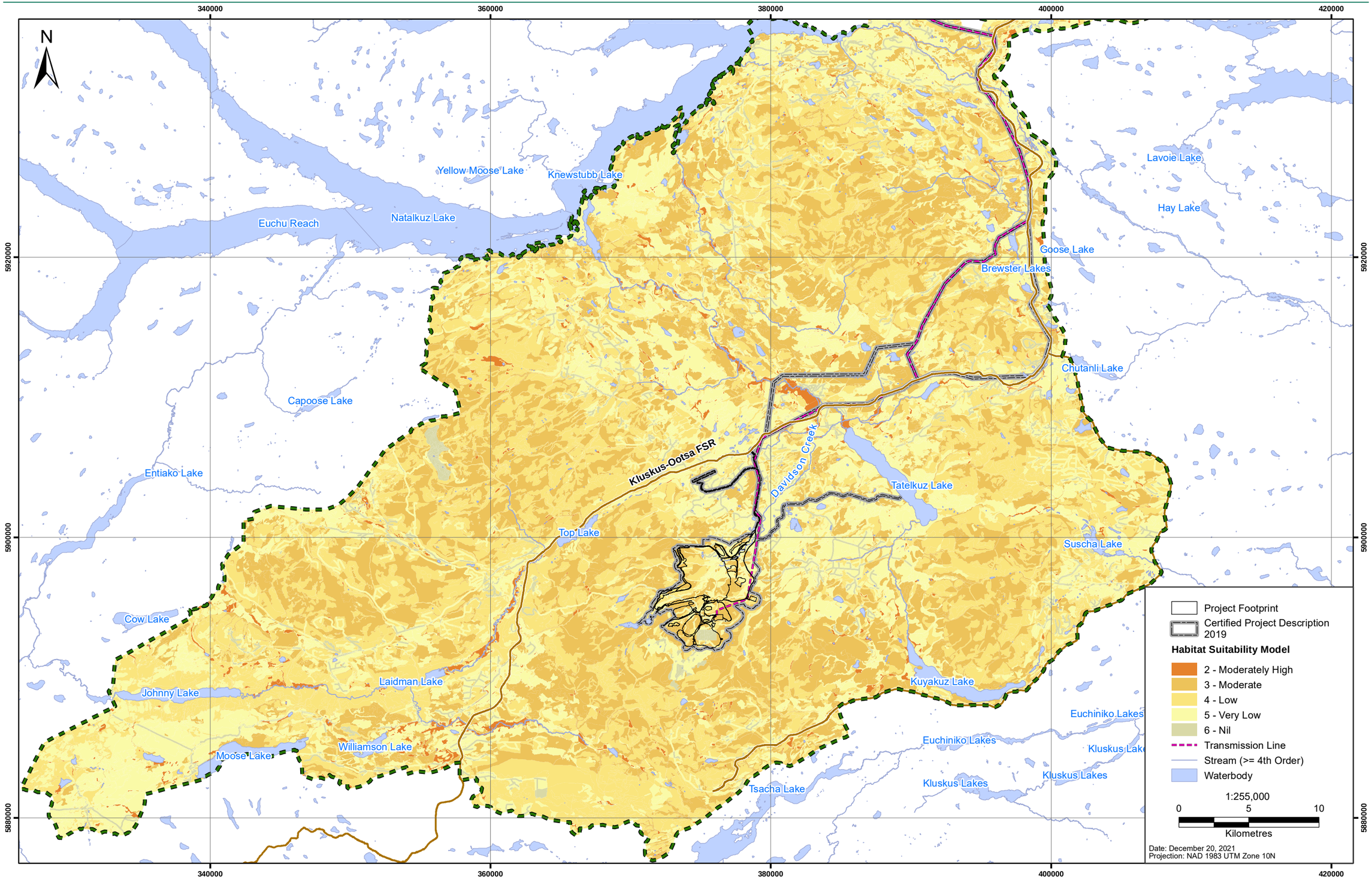


Figure 3.1-1: Grizzly Bear Spring Habitat Suitability Rating (EA)

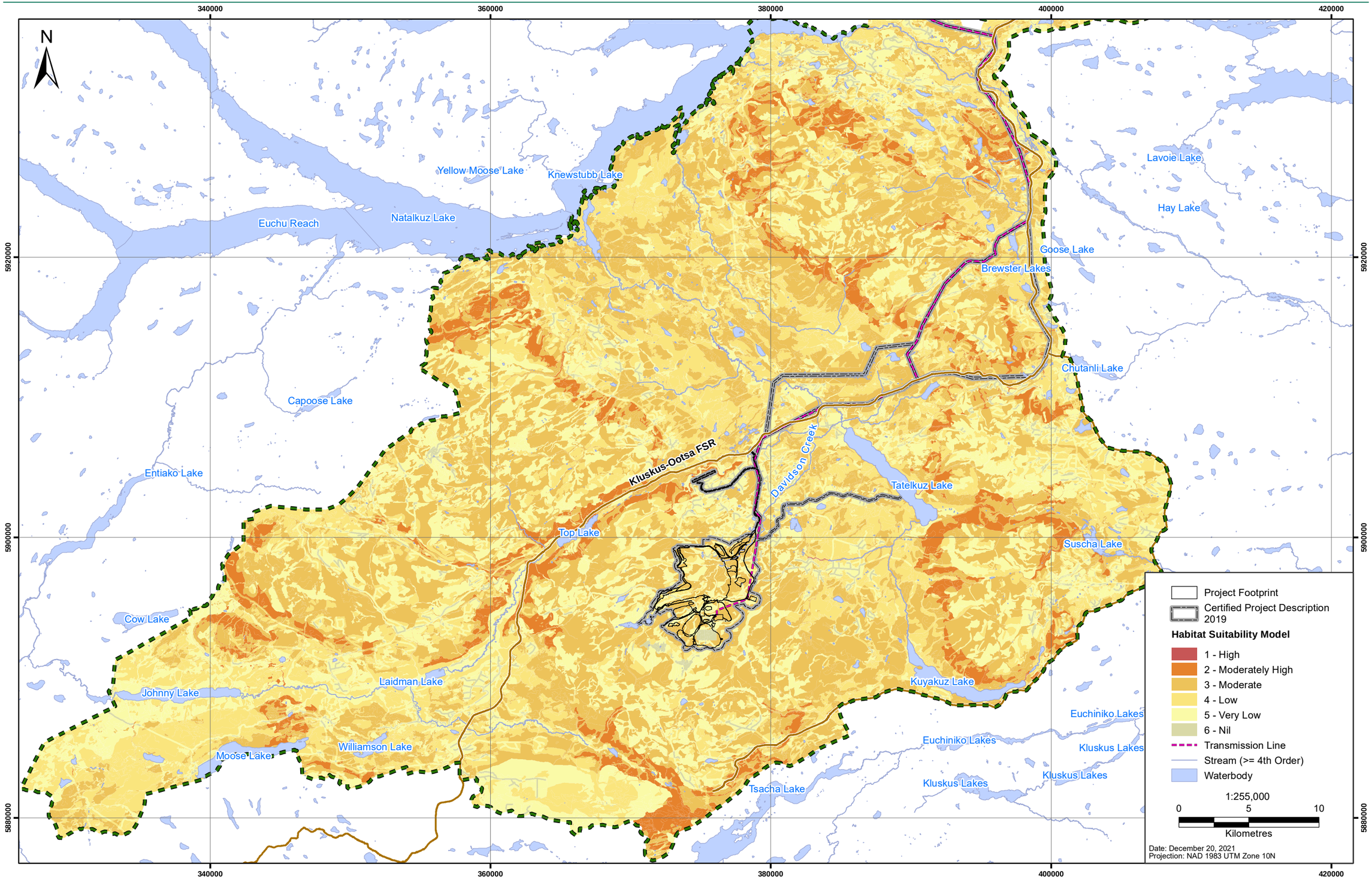


Figure 3.1-2: Grizzly Bear Summer Habitat Suitability Rating (EA)

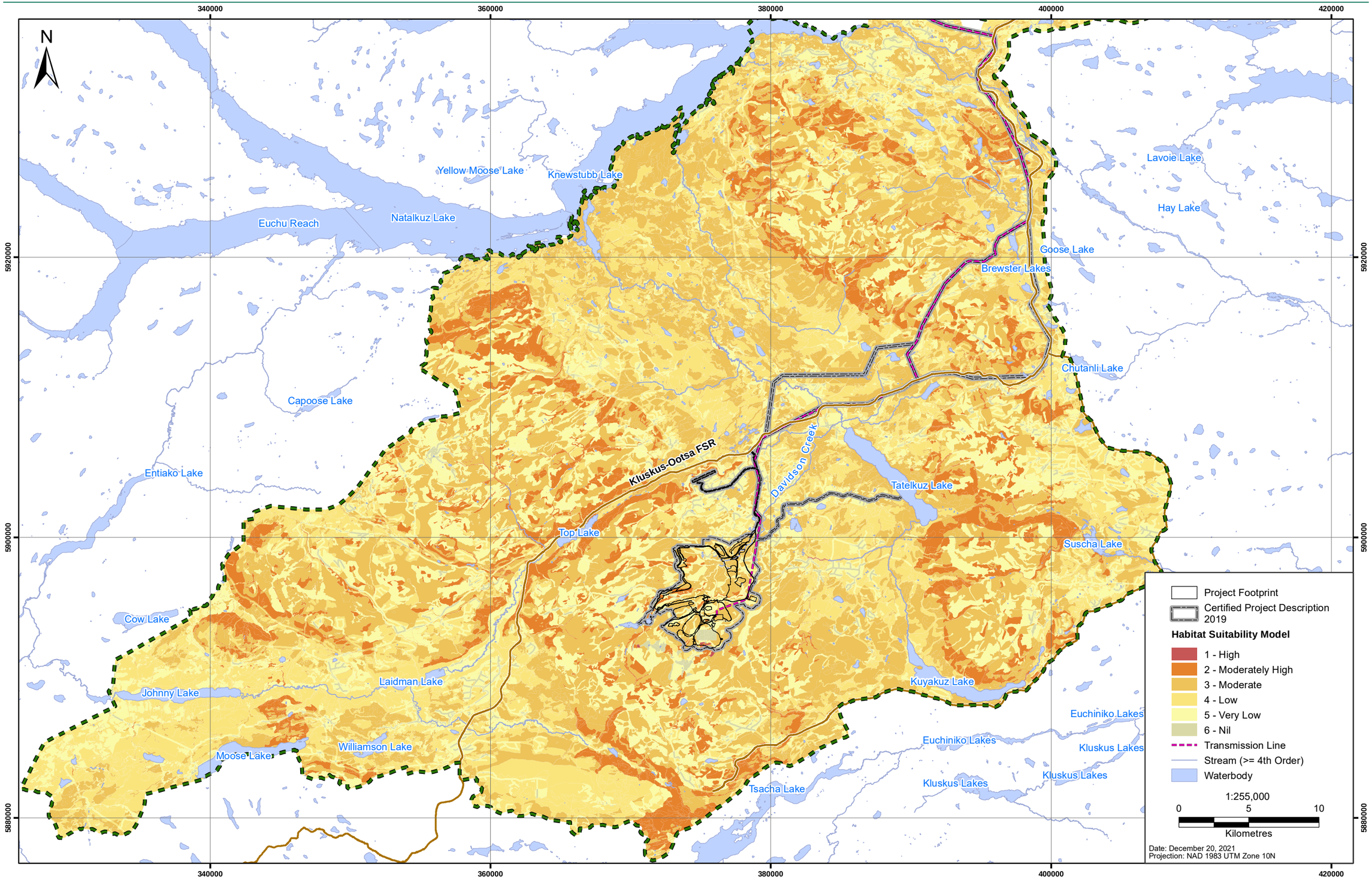


Figure 3.1-3: Grizzly Bear Fall Habitat Suitability Rating (EA)

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.

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).

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**

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

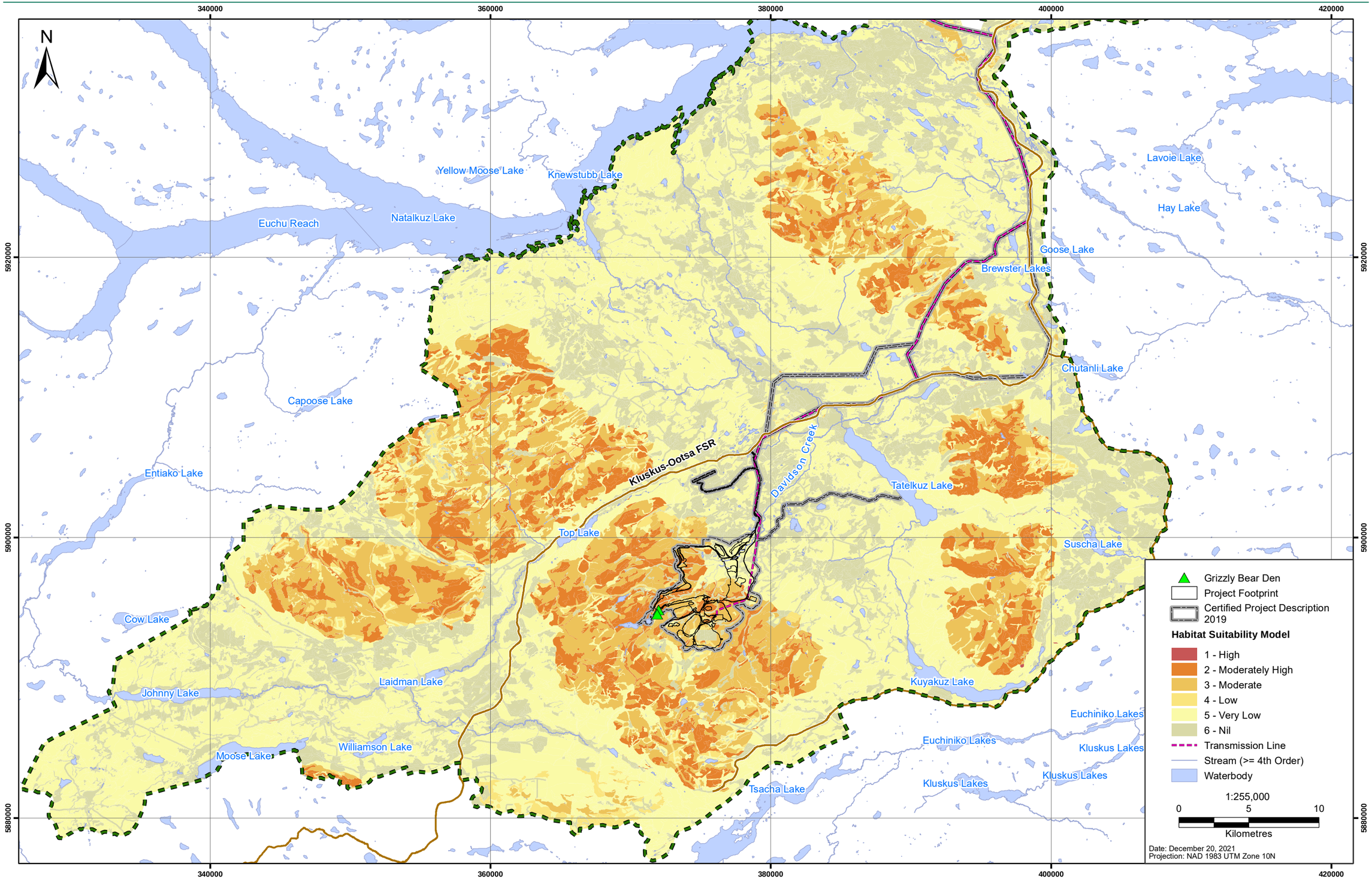


Figure 3.1-4: Grizzly Bear Winter Denning Habitat Suitability Rating (EA)

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.

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 2 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 2 additional grizzly bear dens in the same area, in the boulder field to the northwest of Mt. Davidson (Photos 3.1-2 and 3.1-3).

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.

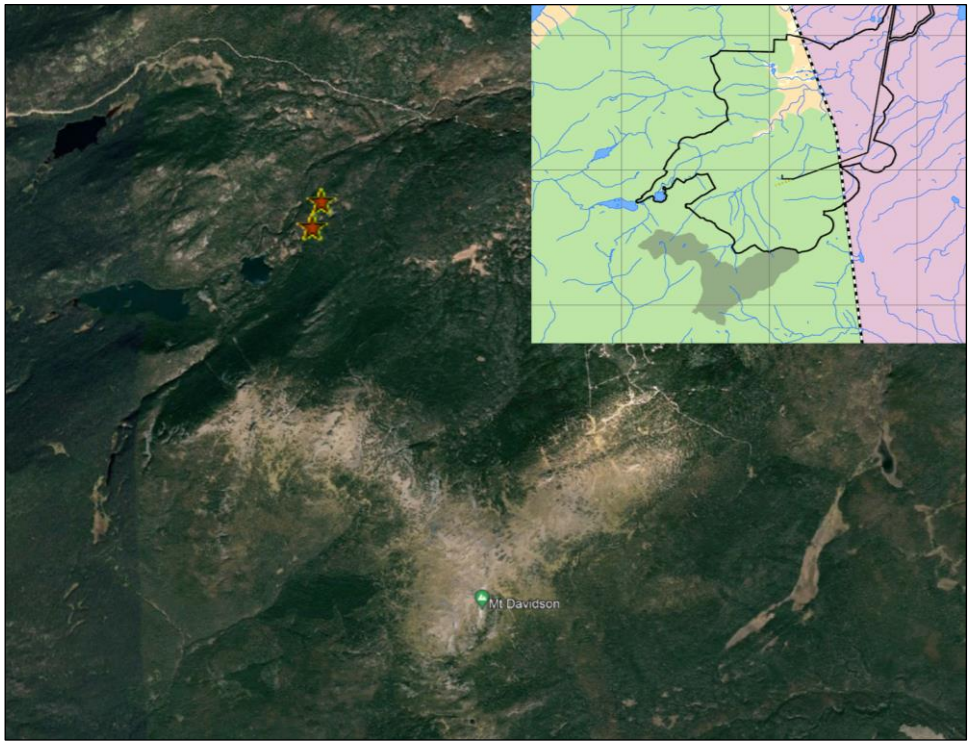


Photo 3.1-2: Field map of grizzly bear dens recorded on the northwest side of Mt. Davidson, 2021. Inset is project footprint.

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.

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.

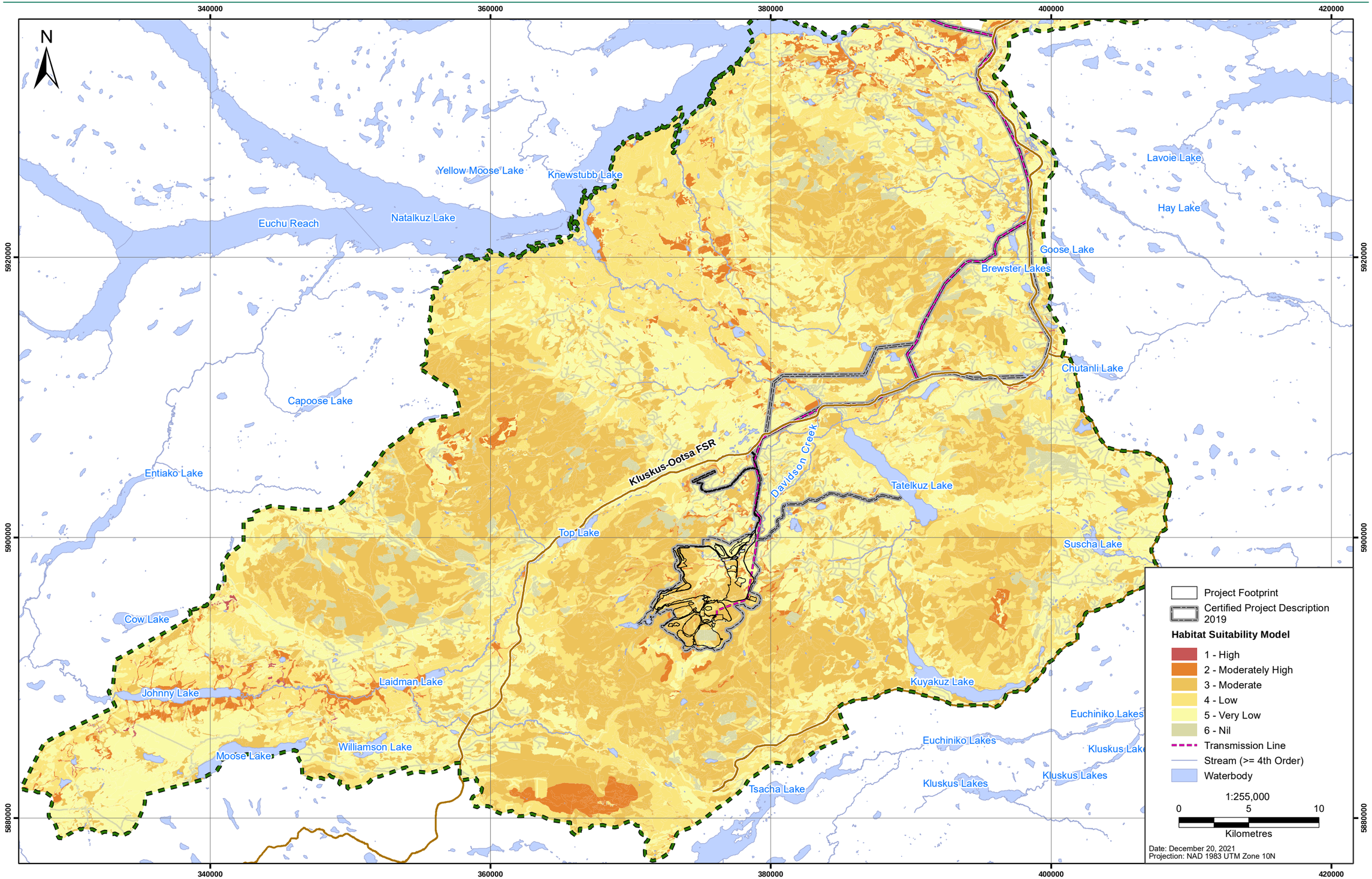


Figure 3.2-1: Moose Growing Season (Summer) Habitat Suitability Rating (EA)

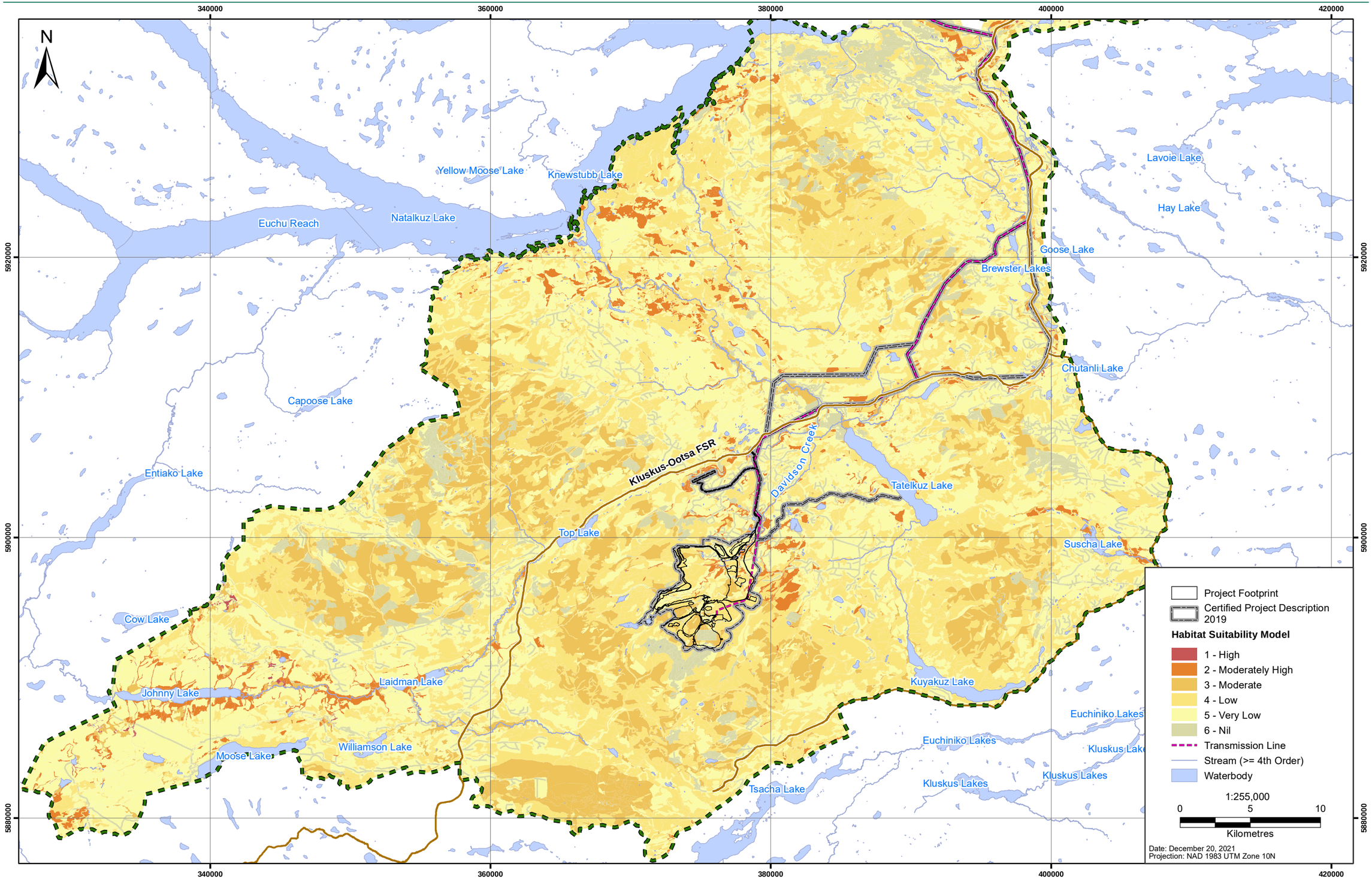


Figure 3.2-2: Moose Winter Season Habitat Suitability Rating (EA)

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).

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

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

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.

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); and
- 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).
- 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

BC MFLNRO. 2014. *A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia (Interim Guidance)*. Prepared for British Columbia Ministry of Forests, Lands, and Natural Resource Operations North Area by A. Roberts, Ecological Consulting Smithers, BC.

BC MOE. 2014. *Procedures for Mitigating Impacts on Environmental Values (Environmental Mitigation Procedures).* British Columbia Ministry of Environment: Victoria, BC.

RISC. 1999. *British Columbia Wildlife Habitat Ratings Standards, version 2.0*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for Terrestrial Ecosystem Task Force, Resources Inventory Committee (RIC): Victoria, BC.

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

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

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

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

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 E ENVIRONMENT AND CLIMATE CHANGE CANADA (ECCC) COMMENTS ON: "BLACKWATER GOLD PROJECT WILDLIFE MITIGATION AND MONITORING PLAN" (NOVEMBER 20201 VERSION) SECTION 4.2.2 MITIGATIONS FOR BATS

Environment and Climate Change Canada (ECCC) Comments on: "Blackwater Gold Project Wildlife Mitigation and Monitoring Plan" (November 2021 version) Section 4.2.2 Mitigations for Bats

February 28, 2022

Context

Environment and Climate Change Canada (ECCC) received a draft Wildlife Mitigation and Monitoring Plan (WMMP; July Version) for the Blackwater Gold Project on August 11, 2021 and provided initial comments on Nov. 18, 2021. A revised WMMP (November Version) was received on December 30, 2021 as well as responses to our comments. ECCC provided a number of comments on Section 4.2.2-Mitigations for Bats of the WMMP including:

- ECCC requests clarification on how far in advance 'pre-construction' surveys will be conducted to determine if roosting habitat will be lost for little brown myotis and northern myotis. Any necessary compensation should be provided prior to any roosting habitat loss from construction. Furthermore, bat boxes are not a satisfactory 'offset' or solution for significant loss of habitat for roosting or hibernacula sites. ECCC recommends wildlife tree conservation/creation (particularly aspen trees), restoration of aspen habitat, and consideration of BrandenBark™, or similar designs, as mitigation measures to offset impacts to bat roosting habitat.
- In addition to the above mitigation measures for bats, ECCC also considers a financial contribution to bat research a suitable compensation measure. For example, commitment to fund 5-years of monitoring of a NABAT grid cell in the area could provide useful information to help conserve bats in the region.
- ECCC does not recommend bat boxes as mitigation for loss of bat roosting habitat. If other roosting 'structures' are selected to be used for compensation ECCC should review these plans prior to installation.

ECCC also received a draft work plan on February 2, 2022 for the proposed bat program to be implemented in 2022 and it includes installing two bat boxes (approximately 120 in total; design to be determined) per wetland within the mine site footprint.

Federal and Provincial Conditions

ECCC is aware of the approved federal and provincial conditions for the Blackwater Gold Project related to bats (Federal conditions 8.13, 8.14, 8.15, and 8.22 and provincial condition 23). In particular federal condition 8.15 and provincial condition 23 (bat roosts and hibernacula features) are provided below:

- Federal Condition 8.15: If the pre-construction surveys referred to in condition 8.14 identify the loss of little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*) roosting habitat, the Proponent shall install, prior to construction, and maintain, during construction operation, and decommissioning, roosting structures to offset any loss of little brown myotis (*Myotis lucifugus)* and northern myotis (*Myotis septentrionalis*) roosting habitat.

- Provincial Condition 23 (bat roosts and hibernacula features): If the results of the pre-Construction surveys indicate bat roosts or hibernacula are in the Project Area, avoid disturbance. If avoidance is not possible, install alternative roosts within the vicinity of the observed roost, as well as other mitigation measures as determined by a Qualified Professional. The Holder must demonstrate how the Best Management Practices Guidelines for Bats in British Columbia (ENV February 2016, or as updated or replaced from time to time) were applied. In addition to the pre-Construction survey, the Holder must maintain an inventory of features that may function as potential roosts and hibernacula and must conduct surveys to confirm whether these features are used and by which species. If the features are being used by bats, avoid disturbance or apply appropriate mitigation measures if avoidance is not possible, as determined by a Qualified Professional.

For this Project, the Minister of the Environment and Climate Change also has obligations under section 79 of the *Species at Risk Act* (SARA) to ensure measures to avoid, lessen and monitor adverse effects to species at risk and their critical habitat are taken in a way that is consistent with applicable recovery strategy and action plans.

Background – Bats

Nine species of bats including three species of conservation concern: eastern red bat (*Lasiurus borealis),* little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*) were detected within the Blackwater Gold Project area (ERM 2016). The eastern red bat is provincially red-listed while the little brown myotis and northern myotis are listed as Endangered under Schedule 1 of the SARA. Based on the information provided in the Environmental Assessment (Oct. 2015; Section 5.4.14), the Project's residual effects to bats will include habitat loss and degradation of 4,434 ha of moderate to high value habitat for bats. In addition, there will be a temporal loss and alteration effect to bat habitat, including forest and wetland loss due to clearing and construction. Other potential effects to bats due to the Project include: direct mortality from vehicle collisions, displacement from suitable habitat from sensory disturbance (e.g., noise, visual disturbance from mine related activities), and change in bat health. Mitigation measures to minimize residual effects on bats and bat habitat presented in the Environmental Assessment (Oct. 2015) include:

- Maintain quantity and quality of wetlands and forest cover;
- Include provisions for wildlife in transportation and access management;
- Close and decommission access roads and trails after mine closure and reclamation where feasible;
- Conduct habitat restoration of existing disturbed habitats, transmission line, and including closure and decommissioning spur roads/trails; and
- Establish bat breeding and roosting boxes in suitable habitat to mitigate potential residual Project effects of lost living habitat for some species of bats.

Environment and Climate Change Canada's Additional Comments and Advice Regarding Mitigations and Offsetting for Bats

ECCC is of the view that the installation of bat boxes are not an appropriate mitigation measure for the loss of roosting habitat due to the Blackwater Gold Project and the rationale is provided below.

1. Bat boxes were not designed to replace natural habitat.
   Large free-standing structures were initially implemented in North America to try and attract insectivorous bats to a specific location to increase their numbers and provide insect pest control (Storer 1926). Later developments saw these being operationalized as smaller structures that could be mounted on buildings or poles to provide an alternative roost when bats had to be evicted from roosting in buildings in urban or other human dominated settings (Tuttle 1988). Similarly, in Germany, bat boxes were used to provide roost resources with the goal to augment populations and provide pest control for forest pests (Altum 1876, cited in Rueegger 2019). In other areas of Europe, observations of bats occupying bird houses placed in forests in Europe led to the development of small bat houses being placed on trees in forests (Altringham 1998; Mering and Chambers 2014). Since then, bat boxes have been deployed for a wide variety of purposes around the globe but remain largely untested in meeting goals as effective tree roost replacements such that they could be used for compensation for the destruction of natural roosts. Recent reviews continue to show that empirical evidence for effectiveness as a conservation tool remains largely absent owing to limited long-term monitoring studies that explicitly test effectiveness using rigorous designs (Mering and Chambers 2014; Rueegger 2019; Crawford and O'Keefe 2021,). This makes implementation of constructed bat boxes at a landscape scale particularly risky in having adverse outcomes, as uncertainty in their use for positive outcomes remains high. As noted by a recent global review of bat boxes, "Bat boxes should not be used as a justification for the removal of trees that comprise potential roost cavities" (Rueegger 2019).
2. Bat houses may be ecological traps, a habitat resource where bat fitness is lower than in other available habitats (Robertson and Hutto 2006).
   Using bat boxes as habitat replacement enhancement tools without knowledge of their roosting needs and the specific environmental context, may lead to unintentionally facilitating the creation of ecological traps (Lausen et al., in press). Despite recommendations for their installation, few studies to date have examined how well bats fare in these structures against a range of fitness measures (such as reproductive success, survival and age structure, e.g., Boyd and Stebbings 1989). Guidance for and assessment of their use has typically focused on capacity (how many individuals they can accommodate; Tuttle 1988) or simply documented basic use (e.g., occupancy as in presence of a bat in a box). Occupancy does not necessarily equal reproductive success. There remains much uncertainty on whether bats using bat boxes have equal or increased survival or reproductive success (compared to natural roosts).

a) Potential for over-heating.
   Recent concerns have developed around bat boxes having microclimates that have inappropriate thermal profiles (e.g., structural qualities leading to unstable and highly variable profiles) such that they can overheat and cause mortality (Bidguren et al., 2019; Crawford and O'Keefe 2021). This is especially concerning under scenarios of climate change where variability is increasing and extreme temperature events may become more common (Griffiths et al., 2018). High temperatures can also be reached in boxes from factors such as bat box placement at a site (e.g., unshaded areas in high sun exposures; Lausen et al., in press). This may represent an ecological trap as females may seek roosts with warmer temperatures for some key stages (e.g., pregnancy and lactation; Garroway and

Broders 2008; Patriquin et al., 2016) that on some roost days, bat boxes may provide. However, some boxes may become too hot such that the bats are pushed beyond their thermal limits. Further, there may be risks associated with large groups of bats occupying a bat box where overcrowding in some bat box designs can reduce the ability of the colony to dissipate heat. Mass mortality from overheating has been observed in various areas of the world (e.g., Spain (Flaquer et al., 2014); Australia (Griffiths 2021)). Overheating in occupied bat boxes has also recently been documented in southern British Columbia where bats were observed fleeing the box to seek shade at a site in the interior when the ambient temperature exceeded 40°C. In the Lower Mainland, a similar heat event occurred when the ambient temperature reached 46°C where approximately 75 bats died during that event (Lausen et al., in press).

b) Potential for increased predation risk.
Bat boxes can be an ecological trap if they increase predation risk to bats when they use them (Lausen et al., in press). For example, a Western Screech-Owl in the Okanagan perched on a bat house and learned to depredate one bat after another as they flew out of the bat house for its evening foraging bout (S. Dulc, pers comm.).

c) Potential for changes in roosting behaviour, ecology.
Bats roosting in natural structures (e.g., trees, rock crevices) use a network of resources over the active summer season changing roosts frequently (e.g., every 1-2 days; reviewed in Lewis 1995; Barclay and Kurta 2007). These roost networks are reused as bats exhibit site fidelity to an overall area as well as to some specific roosts over their lifetimes which can be upwards of 20-30 years. A key component of roosting ecology is also the linkage in having suitable foraging opportunities and habitat nearby (Duchamp et al., 2007). For some species, roost switching also corresponds with social structure exhibited such that sharing roosts may facilitate social thermoregulation, interactions and cohesion of the bat community (Willis and Brigham 2004; Russo et al., 2017). This use of a roost network may be partly driven by the ephemerality of these roost resources (e.g., natural decay of trees or destabilization of rock crevices) requiring knowledge and use of multiple roosts, but also from different roosts having different thermal properties. This means that using a roosting network facilitates bats being able to select the most appropriate roost for daily conditions in relation to their own health status, e.g. pregnant or nursing bats (Garroway and Broders 2008; Patriquin et al., 2016). Bats may also switch roosts frequently to reduce parasite load and predation risk (Barclay and Kurta 2007). Given the complex needs and properties of roosts used by bats in their use of roosting networks, a handful (1-2) bat boxes may be insufficient to meet the needs of bats, particularly maternity colonies. This is especially a concern if current designs/site setups are prone to overheating. If only 1 or 2 structures are provided to the bats they may only have these structures or perceive these as the only suitable roosts, and will not have the options for use of other more buffered and cooler thermal roosts on exceptionally hot days. Lastly, without baseline data prior to installation and long-term monitoring after installation, we do not have sufficient knowledge of how colony roosting dynamics have changed to have confidence that bat boxes provide equally for the long-term social roosting requirements of bats.

d) Potential for competitive exclusion and change in community structure.
Landscape context and box design can lead to the preferential use and domination of bat boxes by only one or a few species and can include favoring non-target species by competitive exclusion (Mering and Chambers 2014; Rueegger 2019). This has triggered concerns that the installation of boxes may cause an overall shift in community composition as recently shown in Australia (Griffiths et al., 2018). For example, while some tree crevice roosting bats in the United States and Canada

have adapted to human-built structures, only 15 of 47 species (32%) have been documented using bat boxes (M. Kellner, unpublished data cited in Lausen et al., in press).

3. Use of bat boxes by northern myotis is limited and no long-term studies have been undertaken to assess long-term suitability or effectiveness of bat boxes on the species.
Northern myotis, is a forest interior specialist using primarily trees in forest stands for roosting and also foraging largely within the forest (Owen et al., 2003; Henderson and Broders 2008; Thorne et al., 2021). In contrast, the little brown myotis, is a generalist species that roosts in buildings and trees in a variety of landscape settings including forests and open, urban/agricultural settings and also forages in more open locations around ponds, forest edges etc. (Coleman and Barclay 2011; Olson and Barclay 2013; Thomas and Jung 2019). With differences in roosting resources used between these two species it is reasonable to expect differences in thermal microclimate preferences and possibly tolerances. Little brown myotis can be frequent occupants of bat boxes (e.g., Alberta Community Bat Program) because their more generalist resource requirements provides them with greater flexibility in roost site selection. With current bat box design and site placement recommendations favoring generalist species such as the little brown myotis, there is concern that the installation of bat boxes in a forest setting may favour little brown occupancy at the expense of northern myotis. Without baseline studies of current bat community structure and roosting ecology to compare to, it is not appropriate to implement bat box installation over a large, primarily forested landscape for northern myotis. Although northern myotis are listed as bats likely to be occupants of bat houses in the Bat house builders Handbook (Tuttle et al., 2013), no studies have been undertaken to assess long-term suitability or effectiveness of bat boxes on the species. Limited studies are restricted to bat box occupancy studies from Indiana (Ritzi et al., 2005; Whitaker et al., 2006) and West Virginia (De La Cruz et al., 2018) with most occurrences documented as individuals and fewer occurrences of maternity colonies. The later West Virginia study was from one year after installation and is thus quite limited in scope.

Recommendations

For the Blackwater Gold Project, ECCC recommends the following mitigation measures and offsetting for bats:

1. Use the information collected for the Environmental Assessment (EA) and during the pre-construction surveys to map areas for conservation of bat habitat (i.e., riparian areas, water bodies, wetlands, forest stands, rock outcrops, talus slopes) and wildlife tree retention where practices can be put in place to avoid or minimize disturbance to roosting habitat and loss of roosts is avoided or minimized when it cannot be avoided altogether. Conservation of known bat roosts, identified candidate wildlife trees, or stands containing wildlife trees is of high priority since they provide or are likely to provide current roosting resources for bats (Kalcounis et al., 2005; Fabianek et al., 2015; Drake et al., 2020). There should be a focus on maintaining the integrity of foraging, drinking, and roosting habitat where connectivity among these is also maintained.

2. Plan to retain key bat habitat resources when possible. Using the information collected for the EA and during the pre-construction surveys to identify key bat habitats, incorporate these into the long term planning to set them aside for bats. Planning should include identifying forest stands of varying ages such that continual recruitment of trees and snags for bat roosts is incorporated into long-term land management objectives making sure important roosting, foraging and commuting

habitat resources are retained and conserved to support bat populations beyond the life of the project.

3. Restoration of disturbed habitats. The restoration and reclamation plan should be carried out to ensure the continuity of forest stand succession to provide and maintain appropriate roosting and foraging areas well into the future as existing trees die off. Retention of forest stands of a range of ages, including old-growth which more often contains the types of roosting trees preferred by bats (Kalcounis et al., 2005), would provide mature trees for bat roosting resources in the future. The restoration of disturbed habitat should also consider the wildlife tree density required for bats.
4. Where protected and/or restoration habitat areas for other wildlife (e.g., caribou, migratory birds, western toads) have been identified as offsets, consider implementing measures within these areas (e.g., Capoose HE-UWR, caribou and wetland restoration areas) that are beneficial to bats. This could include creating an inventory of current habitat resources that are important to bats in the proposed offset areas such that they can be prioritized for protection and maintenance within the offset plan. These include riparian, wetland and water sources for foraging, commuting and drinking, as well as identified roosting resources (e.g., suitable wildlife trees (Kalcounis et al., 2005), wildlife tree patches, mature forest stands, rock outcrops, etc.). Where offset area plans identify areas for habitat restoration, consider including measures that restore or create habitat resources for bats. If the offset area contains areas subject to previous forest harvest, consider silvicultural techniques/activities and forest management principles that create or conserve bat habitats. For example, the retention of developing stands of native species that may be of less commercial value could be important resources for bat roosts (e.g. aspen stands containing trees that have defects (cracks, broken limbs, heart rot forming cavities etc.; Vonhof and Wilkinson 1999; Psyllakis and Brigham 2006). Depending on the temporal bounds of the offset, planning should be carried out to ensure the continuity of forest stand succession to provide and maintain appropriate roosting areas continuously as existing trees die off. Retention of forest stands of a range of ages would provide mature trees for bat roosting resources in the future.
5. ECCC considers a financial contribution to bat research a suitable compensation measure. For example, commitment to fund 5-years of monitoring of a NABAT grid cell in the area could provide useful information to help conserve bats in the region.
6. ECCC does not support the current proposed bat box study (draft work plan provided on Feb. 2, 2022); however, is open to discussing other potential bat studies.

Note

Please note that ECCC is providing technical, science-based information and knowledge, pursuant to its mandate[1], to inform the mitigations and offsetting for the Blackwater Gold project on valued ecosystem components. The information provided by ECCC has been prepared based upon Artemis Gold Inc.'s (previously New Gold Inc.) documentation made available to date, and project design as proposed during the environmental assessment. Should changes occur to the proposed project, ECCC's advice may need to be revised. Any information or comments received from ECCC in this context does not relieve the proponent of its obligations to respect all applicable federal Acts and regulations.

[1] *https://www.canada.ca/en/environment-climate-change/corporate/transparency/acts-regulations/acts-administered.html*

References

Altringham, J.D. 1998. Bat houses in British forests. BATS magazine 16(1).

Barclay, R.M.R., and A. Kurta. 2007. Ecology and behavior of bats roosting in tree cavities and under bark In Bats in Forests: Conservation and management, pp.18-59.

Bideguren, G.M., López-Baucells, A., Puig-Montserrat, X., Mas, M., Porres, X. and C. Flaquer. 2019. Bat boxes and climate change: testing the risk of over-heating in the Mediterranean region. Biodiversity and Conservation 28:21-35.

Boyd, I.L. and R.E. Stebbings. 1989. Population changes of brown long-eared bats (*Plecotus auritus*) in bat boxes at Thetford Forest. Journal of Applied Ecology 26(1):101-112.

Coleman, J.L. and R.M.R. Barclay. 2011. Influence of urbanization on demography of little brown bats (*Myotis lucifugus*) in the prairies of North America. PLOS One 6:e20483.

Crawford, R.D. and J.M. O'Keefe. 2021. Avoiding a conservation pitfall: Considering the risks of unsuitably hot bat boxes. Conservation Science and Practice. DOI:10.1111/csp2.412.

De La Cruz, J., Ward, R.L. and E.S. Schroder. 2018. Landscape characteristics related to use of artificial roosts by northern long-eared bats in North-central West Virginia. Northeastern Naturalist 25:487-501.

Drake, E.V., Gignoux-Wolfsoh, S., and Maslo, B. 2020. Systematic review of the roost-site characteristics of North American forest bats: Implications for conservation. Diversity 12(76):doi.10.3390/d12020076.

Duchamp, J.E., Arnett, E.B., Larson, M. A. and R.K., Swihart. 2007. Ecological considerations for landscape-level management of bats. In Bats in Forests: Conservation and management, pp. 238-261.

Fabianek, F., Simard, M.A., and A. Desrochers. 2015. Exploring regional variation in roost selection by bats: Evidence from a meta-analysis.

Flaquer, C., Puig, X, López-Baucells, A., Torre, I., Freixas, L., Mas, M., Porres, X. and A. Arrizabalaga. 2014. Could overheating turn bat boxes into death traps? Barbastella 7. http://dx.doi.org/10.14709/BarbJ.7.1.2014.08

Garroway, C. and H.G. Broders. 2008. Day-roost characteristics of Northern long-eared bats (Myotis septentrionalis) in relation to female reproductive status. Ecoscience 15:89-93.

Griffiths, S.R. 2021. Overheating turns a bat box into a death trap. Pacific Conservation Biology 28:97-98. https://doi.org/10.1071/PC20083

Griffiths, S.R., Lumsden, L.F., Bender, R., Irvine, R., Godinho, L.N., Visintin, C., Eastick, D.L., Robert, K.A. and P.E. Lentini. 2018. Long-term monitoring suggests bat boxes may alter local bat community structure. Australian Mammalogy https://doi.org/10.1071/AM18026

Henderson, L.E. and H.G. Broders. 2008. Movements and resource selection of the northern long-eared myotis (*Myotis septentrionalis*) in a forest-agriculture landscape. Journal of Mammalogy 89:952-63.

Kalcounis, M.C., Psyllakis, J.M., and R.M. Brigham. 2005. Tree roost selection by bats: An empirical synthesis using meta-analysis. Wildlife Society Bulletin 33:1123-1132.

Lausen, C.L, P. Lentini, S. Dulc, L. Rensel, C. Threlfall, E. de Freitas, and M. Kellner. Bat boxes as roosting habitat in cities – 'thinking outside the box'. In: Urban Bats - Biology, Ecology, and Human Dimensions (eds. L. Moretto, MB Fenton, K Patriquin, J Coleman, C Korine, C Davy). In press. Springer.

Lewis, S.E. 1995. Roost fidelity of bats: a review. Journal of Mammalogy 76:481-496.

Mering, E.D., and C.L. Chambers. 2014. Thinking outside the box: A review of artificial roosts for bats. Wildlife Society Bulletin 38(4):741-751.

Olson, C.R. and R.M.R. Barclay. 2013. Concurrent changes in group size and roost use by reproductive female little brown bats (*Myotis lucifugus*). Canadian Journal of Zoology 91:149-155.

Owen, S.F., Menzel, M.A., Ford, W.M., Chapman, B.R., Miller, K.V., Edwards, J.W., and P.B. Wood. 2003. Home-range size and habitat used by the northern myotis (*Myotis septentrionalis*). American Midland Naturalist 150:352-369.

Patriquin, K.J., Leonard, M.L., Broders, H.G., Ford, W.M., Britzke, E.R. and A. Silvis. 2016. Weather as a proximate explanation for fission-fusion dynamics in female northern long-eared bats. Animal Behaviour 122:47-57.

Psyllakis, J.M., and R.M. Brigham. 2006. Characteristics of diurnal roosts used by female Myotis bats in sub-boreal forests. Forest Ecology and Management 223:93-102.

Ritzi, C.M., Everson, B.L., and J.O. Whitaker Jr. 2005. Use of bat boxes by a maternity colony of Indiana Myotis (*Myotis sodalist*). Northeastern Naturalist 12:217-220.

Robertson BA, Hutto RL (2006) A framework for understanding ecological traps and an evaluation of existing evidence. Ecology 87(5):1075-1085. doi:10.1890/0012-9658(2006)87[1075:AFFUET]2.0.CO;2

Rueegger, N. 2019. Bat boxes – A review of their use and application, past, present and future. Acta Chiropterologica 18(1):279-299

Russo, D., Cistrone, L. Cistrone, Budinski, I., Console, G., Corte, M.D., Milighetti, C., Di Slavo, I, Nardone, V., Brigham, R.M, and L. Ancillotto. 2017. Sociality influences thermoregulation and roost switching in a forest bat using ephemeral roosts. Ecology and Evolution DOI:10.1002/ece3.3111

Storer, T.I. 1926. Bats, bat towers and mosquitoes. Journal of Mammalogy 7(2):85-90

Thomas, J.P. and T.S. Jung. 2019. Life in a Northern town: Rural villages in the boreal forest are islands of habitat for an endangered bat. Ecosphere 10:e02563.

Thorne, T.J., Matczak, E., Donnelly, M., Franke, M.C. and K.C.R. Kerr. 2021. Occurrence of a forest-dwelling bat, northern myotis (*Myotis septentrionalis*), within Canada's largest conurbation. Journal of Urban Ecology DOI10.1093/jue/juab029

Tuttle, M.D. 1988. America's Neighborhood bats. University of Texas Press, Austin, TX, USA. 98 pages.

Tuttle, M.D., Kiser, M., and S. Kiser. 2013. The bat house builder's handbook. Updated and revised 2013. Bat Conservation International. 36 pages.

Vonhof, M.J, and L. Wilkinson. 1999. A summary of roosting requirements of northern long-eared myotis in northeastern British Columbia In Proceedings of the Biology and Management of Species at Risk Symposium, Kamloops, BC. Pages 459-460

Willis, C. K, and R.M. Brigham. 2004. Roost switching, roost sharing and social cohesion: Forest-dwelling big brown bats, *Eptesicus fuscus*, conform to the fission-fusion model. Animal Behaviour 68:495-505.

Whitaker, J.O. Jr., Sparks, D.W., and V. Brack Jr. 2006. Use of artificial-roost structures by bats at the Indianapolis International Airport. Environmental Management 38:28-36.

.

ANNEX A CARIBOU MITIGATION AND MONITORING PLAN

BW GOLD LTD
a subsidiary company of Artemis Gold Inc

Blackwater Gold Project

Draft Caribou Mitigation and Monitoring Plan – Version 4

March 2022

EXECUTIVE SUMMARY

As required by EAC condition 22 and federal condition 8.18, BW Gold has developed a Caribou Mitigation and Monitoring Plan (CMMP) to avoid, reduce and offset the Projects adverse effects on caribou and its critical habitat as defined in the Recovery Strategy for the Woodland Caribou, Southern Mountain population.

The CMMP is a living document that will be updated as needed during the life of the mine. These updates will consider feedback from Indigenous groups and regulators, the results of monitoring programs, significant changes in Project activities, newly communicated Traditional Knowledge or advances in scientific understanding of caribou or mitigation measures. BW Gold is committed to consulting with Indigenous groups and will provide an annual report of Project-based monitoring and adaptive management outcomes.

Approximately half of the Project mine site lies within the Tweedsmuir caribou herd local population unit (LPU) and is considered by ECCC to be Critical Habitat (Section 2). As a result, BW Gold proposed a caribou offset in August 2018, *New Gold Response to Canadian Environmental Assessment Agency Information Request (IR1-30, IR1-32, and IR2-10) – Updated Assessment of Impacts to Southern Mountain Caribou and Proposed Caribou Offset* (ERM 2018).

The August 2018 draft offset plan (Version 1) categorized all of BW Gold's mineral tenures within the Tweedsmuir LPU range into eight potential offset polygons; six within ungulate winter range (UWR) and two outside of UWR. Forest harvesting is prohibited in high elevation (HE) UWR polygons, and restricted to 50% of the forest in the low elevation (LE) polygons. For each polygon, BW Gold quantified an ecological equivalency, project offsetting ratio and offset area ratio. BW Gold proposed to select its final offset location from within one of the eight polygons and develop a detailed offsetting plan and proposed monitoring plan. This draft offset proposal was provided to UFN, LDN, NWFN, STFN and SFN, ECCC, and FLNRORD for review.

The draft CMMP Version 2 (V2) was submitted in August 2021 to BC EAO, EMPR, ENV, FLNRORD ECCC, and Aboriginal groups (UFN, LDN, NWFN, STFN, SFN and NFN). CMMP V2 proposed offsetting in two of the polygons from the first draft plan, Capoose North and Johnny-Fawnie areas. CMMP V2 incorporated discussions with the UFN and LDN held between May and July 2021 and at the June 2021 Environmental Monitoring Committee meeting. During these discussions, UFN and LDN indicated a preference to see additional offsets more focussed on recovery at the herd scale. UFN and LDN proposed that a habitat model be developed to:

- Identify priority areas for habitat restoration;
- Restore the areas identified; and
- Monitor and manage the restoration areas using LDN and UFN monitors.

On September 13, 2021, BW Gold committed up to $50,000 to the LDN/UFN to support the development of models that build on scientific and traditional knowledge to assist decision-making, targeting recovery actions and assist in herd management and recovery monitoring. This commitment was made in response to the LDN/UFN *Solution to Caribou Offsetting: Ensuring the Survival of our Caribou populations* (June 28, 2021) document and its BW Gold's hope that this contribution catalyzes the development of models that can be used to guide planning and implementation of other caribou restoration initiatives beyond the scope of this CMMP.

Following the submission of CMMP V2, Indigenous groups and regulators commented on V2, including:

- UFN and LDN comments on September 8, 2021;
- ECCC comments on November 5, 2021; and
- FLNRORD comments on November 5, 2021.

On November 30, 2021 BW Gold received a joint letter from BC EAO, UFN, LDN, ECCC, and FLNRORD, stating:

> *Shared views of ECCC, UFN, LDN, and FLNRORD include:*
>
> *1) A significant amount of habitat restoration within the Tweedsmuir Local Population Unit (consistent with advice provided by ECCC) is necessary to offset the direct and indirect loss of habitat as a result of the project. The outcomes of this restoration must result in an increase, over time, in the overall amount of undisturbed habitat within the Tweedsmuir Local Population Unit.*
>
> *2) Securement of Capoose High Elevation Ungulate Winter Range (11,059 ha) for a period of 50 years is a necessary part of the offset proposal.*

BW Gold also received a letter from ECCC on November 30, 2021 which clarified ECCC's views with respect to land securement, indicating that the long-term securement of the Capoose High Elevation Ungulate Winter (HE-UWR) range could represent an incremental benefit to caribou and thus contribute to the overall offsetting package when combined with meaningful amounts of habitat restoration.

On December 1, 2021, BW Gold received a letter from LDN and UFN asserting that the Nations expect to lead the caribou habitat restoration activities in conjunction with FLNRORD that would be conducted as part of the CMMP.

BW Gold updated the CMMP (V3) to address these comments and in response to discussions during a meeting held between UFN, LDN, ECCC, BC EAO, FLNRORD, ENV, and EMLI on December 3, 2021 and submitted it to the groups above on December 28, 2021.

On January 21, 2022 BW Gold met with representatives of UFN, LDN, ECCC, BC EAO, EMLI, and FLNRORD to discuss the December 2021 draft CMMP. At that meeting, ECCC summarized their comments which were subsequently provided in writing on January 28, 2022. ECCC shared examples of offset calculations using the caribou version of the draft BC Habitat Offset Decision Support Tool (the DST), and suggested the DST represents a transparent, repeatable mechanism to inform offset ratios that includes each of the considerations required by federal condition 8.18.2. ECCC further indicated that the draft runs of the DST had been shared with FLNRORD, UFN and LDN; and that there was general agreement on the approach and DST inputs.

ECCC also provided a range of potential conversion factors to translate the DST outputs of area of habitat to be offset through restoration to linear kilometers of roads as well as cost estimates for restoring roads.

On January 25, 2022 UFN and LDN provided comments on the Dec 2021 draft CMMP and a report that described five priority areas for restoration in the Tweedsmuir LPU and surrounding area, which was discussed at a meeting with UFN, LDN, ECCC, EMLI, and FLNRORD on January 26, 2022, along with further discussion on monitoring, adaptive management, and inputs to the DST.

During January and February of 2022, BW Gold updated Section 4 (Offsetting), 5.7 (Habitat Suitability Mapping) and 6 (Adaptive Management) of the CMMP and delivered it to BC EAO, EMLI, ENV, FLNRORD, ECCC and Indigenous groups (UFN and LDN). Comments and edits were received from ECCC, FLNRO, LDN, UFN, and BC ENV.

BW Gold accepted the offsetting calculations, justifications, and assumptions proposed by ECCC, as well as the edits and comments from reviewers and update the CMMP to Version 4 of the offset proposal, that includes:

- The total area lost and disturbed due to the Project is 248 ha of HEWR and 4,468 ha of Matrix 1.
- The BW Gold mineral tenures in the Capoose HE-UWR (an area of approximately 11,059 ha) will be secured against future development for a period of 50 years as described in Section 4.2.4.

- The securement of 11,059 ha of Capoose HEWR will account for the offset area associated with all 248 ha of impacted HEWR and 1,446 ha of impacted Matrix 1.
- The remaining 3,022 ha of impacted Matrix 1 will be offset through restoration of forestry roads, assuming half in LEWR and half in Matrix 1.
- The total area to be restored is 27,100 ha (271 km^2).
- Assuming a 1.25 multiplier to account for road overlap, 338 km of road at a cost of $8,000 per km equals an estimated cost of $2,707,614.
- UFN and LDN will lead the implementation of the offsetting program on the ground.
- UFN and LDN provided 5 draft areas for restoration. BC and Indigenous Nations will determine the final locations.
- This cost of the restoration program will be paid in two tranches; one within 30 days of the start of early works construction and the second in equal payments over the first 5 years following commercial production. The mechanism for receiving and funding the offsetting program will be determined by BC in consultation with UFN/LDN and ECCC.
- With the Capoose Securement of 11,059 ha and the first tranche of payment for restoration, 62% of the offset will occur within 30 d of the beginning of construction. By the start of commercial production, it is planned that approximately 30% of the disturbance at the mine site will be built out. By year 8, the mine reaches approximately 65% of the total footprint. The second tranche of payments for restoration, representing the remaining 38% of the offset, will occur during the first 5 years of commercial production.

CONTENTS

List of Tables

List of Figures

List of Photos

ACRONYMS AND ABBREVIATIONS

Aboriginal Groups or Indigenous nations	Ulkatcho First Nation, Lhoosk'uz Dené Nation, Nadleh Whut'en First Nation, Stellat'en First Nation, Saik'uz First Nation, and Nazko First Nation (as defined in the Project's Environmental Assessment Certificate #M19-01).
AMWG	Access Management Working Group
Artemis	Artemis Gold Inc.
BAFA	Boreal Altai Fescue Alpine Unit of the Biogeoclimatic Ecosystem Classification
BAFAun	Boreal Altai Fescue Alpine Unit, Undifferentiated Variant of the Biogeoclimatic Ecosystem Classification
BC	British Columbia
BC CDC	British Columbia Conservation Data Centre
BEC	Biogeoclimatic Ecosystem Classification
Blackwater or Project	Blackwater Project or Blackwater Gold Project
BW Gold	BW Gold LTD.
CEA Agency	Canadian Environmental Assessment Agency
CMMP	Caribou Mitigation and Monitoring Plan
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWD	Coarse woody debris
DPA	Designated Project Area
DS	Decision Statement
EA	Environmental Assessment
EAC	Environmental Assessment Certificate
EC	Environment Canada
ECCC	Environment and Climate Change Canada, formerly Environment Canada
EAO	Environmental Assessment Office
EMPR	Ministry of Energy, Mines and Petroleum Resources
EMLI	Ministry of Energy, Mines and Low Carbon Innovation
EMP	Environmental Management Plan
ENV	Ministry of Environment and Climate Change Strategy
ERM	Environmental Resources Management
ESSF	Englemann Spruce Subalpine Fir Unit of the Biogeoclimatic Ecosystem Classification

ESSFmc	Englemann Spruce Subalpine Fir Unit, Moist Cold Variant of the Biogeoclimatic Ecosystem Classification
ESSFmcp	Englemann Spruce Subalpine Fir Unit, Moist Cold Parkland Variant of the Biogeoclimatic Ecosystem Classification
ESSFmk	Englemann Spruce Subalpine Fir Unit, Moist Cool Variant of the Biogeoclimatic Ecosystem Classification
FLNRO	Ministry of Forests, Lands, and Natural Resource Operations
FLNRORD	Ministry of Forests, Lands, Natural Resource Operations, and Rural Development, formerly FLNRO
FRPA	*Forest and Range Practices Act*
FSR	Forest Service Road
ha	Hectare
HESR	High Elevation Summer Range
HEWR	High Elevation Winter Range
Indigenous groups or Aboriginal Peoples	Lhoosk'uz Dené Nation, Ulkatcho First Nation, Nadleh Whut'en First Nation, Saik'uz First Nation, Stellat'en First Nation, Nazko First Nation, Skin Tyee Nation, Tŝilhqot'in Nation, Métis Nation British Columbia, and Nee-Tahi-Buhn Band (as defined in the Project's federal Decision Statement)
km	Kilometre
km^2	Kilometres squared (equal to 100 hectares)
LDN	Lhoosk'uz Dené Nation
LEWR	Low Elevation Winter Range
LPU	Local Population Unit
LRMP	Land and Resource Management Plan
m	Metre
MAR	Mine Access Road
MOE	BC Ministry of Environment
MSTCP	Mine Site Traffic Control Plan
MPB	Mountain pine beetle
Mt	Million tonnes
Mtpa	Million tonnes per annum
NTB	Nee-Tahi-Buhn Band
NWFN	Nadleh Whut'en First Nation
QP	Qualified Professional

RoW	Right-of-way
SARA	*Species at Risk Act*
SFN	Saik'uz First Nation
StFN	Stellat'en First Nation
STN	Skin Tyee Nation
UD	Utilization distribution
t	Tonne
TAMP	Transportation and Access Management Plan
TEM	Terrestrial ecosystem mapping
TK/TLU Committee	Traditional Knowledge/ Traditional Land Use Committee
ToR	Terms of Reference
TNG	Tsilhqot'in National Government
UFN	Ulkatcho First Nation
UWR	Ungulate Winter Range
VC	Valued component
WMMP	Wildlife Management and Monitoring Plan
YFN	Yekooche First Nation

1. INTRODUCTION

1.1 Purpose and Objectives

The purpose of the Caribou Monitoring and Management Plan (CMMP) is to describe the mitigation and monitoring measures that will be implemented to avoid, reduce and offset the Blackwater Project's adverse effects on caribou and its critical habitat as defined in the *Recovery Strategy for the Woodland Caribou, Southern Mountain Population* (Rangifer tarandus *caribou) in Canada* (Environment Canada 2014, or as updated from time to time).

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 from UFN and LDN and includes areas mapped as winter caribou habitat (Figure 1.1-1). The mine site is outside of the annual range (1980-2020) used by collared female caribou, but is still used intermittently by caribou based on aerial surveys, snow track surveys and incidental observation. The construction of the Project will result in the removal and disturbance of three types of Type 1 Matrix habitat (high elevation, low elevation and general) and potential disturbance by noise of High Elevation Winter Range habitat (suitable habitat, but outside of the multi-year range of the herd).

The objectives of the CMMP, which includes a plan to offset the loss of caribou habitat with recovery and protection of caribou habitat, are to:

- Identify measures to mitigate potential adverse effects on southern mountain caribou in accordance with the mitigation hierarchy (avoid, minimize, restore, offset);
- Quantify the habitat values in the Project area and offset area, establish the habitat value of both areas, and calculate the area to be offset using equations provided by the province of British Columbia (MOE 2014);
- Detail securement in the offset area;
- Present the plan for restoration activities associated with offsetting;
- Describe non-habitat offset actions to be undertaken to further mitigate effects on caribou;
- Identify plans for monitoring mitigation measures and their effectiveness and adaptive management; and
- Provide a follow-up program to assess the effectiveness of mitigation measures included in the offset plan.

1.2 Roles and Responsibilities

BW Gold environmental roles and responsibilities are identified in Table 1.2-1. Other positions not specifically listed in Table 1.2-1 but who will provide supporting roles include independent environmental monitors, an Engineer of Record (EOR) for each tailings storage facility and dam, an Independent Tailings Review Board (ITRB), TSF qualified person, geochemistry qualified professional, and other qualified persons and qualified professionals.

1.3 Compliance Obligations, Guidelines and Best Management Practices

The CMMP is guided by federal and provincial legislation, the federal Decision Statement (DS) and Environmental Assessment Certificate #M19-01 (EAC), as well as federal and provincial guidelines and best management practices.

Table 1.2-1: Blackwater Roles and Responsibilities

Position	Responsibility
Chief Executive Officer (CEO)	The CEO is responsible for overall Project governance. Reports to the Board.
Chief Operating Officer (COO)	The COO is responsible for engineering and Project development, and coordinates with the Mine Manager to ensure overall Project objectives are being managed. Reports to CEO.
Vice President Environment & Social Responsibility	The VP Environment & Social Responsibility is responsible for championing the Environmental Policy Statement and EMS, establishing environmental performance targets and overseeing permitting. Reports to COO.
General Manager (GM) Development	The GM is responsible for managing project permitting, the Project's administration services and external entities, and delivering systems and programs that ensure Artemis's values are embraced and supported: Putting People First, Outstanding Corporate Citizenship, High Performance Culture, Rigorous Project Management and Financial Discipline. Reports to COO.
Construction Manager (CM)	The CM is accountable for ensuring environmental and regulatory commitments/ and obligations are being met during the construction phase. Reports to Mine Manager.
Environmental Manager (EM)	The EM is responsible for the day-to-day management of the Project's environmental programs and compliance with environmental permits, updating EMS and MPs. The EM or designate will be responsible for reporting non-compliance to the CM, and Engineering, Procurement and Construction Management (EPCM) contractor, other contractors, the Company and regulatory agencies, where required. Supports the CM and reports to Mine Manager.
Departmental Managers	Departmental Managers are responsible for implementation of the EMS relevant to their areas. Report to Mine Manager.
Indigenous Relations Manager	Indigenous Relations Manager is responsible for Indigenous engagement throughout the life of mine. Also responsible for day-to-day management and communications with Indigenous groups. Reports to VP Environment & Social Responsibility.
Community Relations Advisor	Community Relations Advisor is responsible for managing the Community Liaison Committee and Community Feedback Mechanism. Reports to Indigenous Relations Manager.
Environmental Monitors	Environmental Monitors (includes Environmental Specialists and Technicians) are responsible for tracking and reporting on environmental permit obligations through field-based monitoring programs. Reports to EM.
Aboriginal Monitors	Aboriginal Monitors are required under EAC condition 17 and will be responsible for monitoring for potential effects from the Project on the Indigenous interests. Indigenous Monitors will be involved in the adaptive management and follow-up monitoring programs. Report to EM.
Qualified Professional (QP)	Professionals will be retained by the EM to review objectives conduct various aspects of the Project's environmental monitoring as specified in various EMPs.
Employees and Contractors	Employees are responsible for being aware of permit requirements specific to their roles and responsibilities. Report to Departmental Managers.

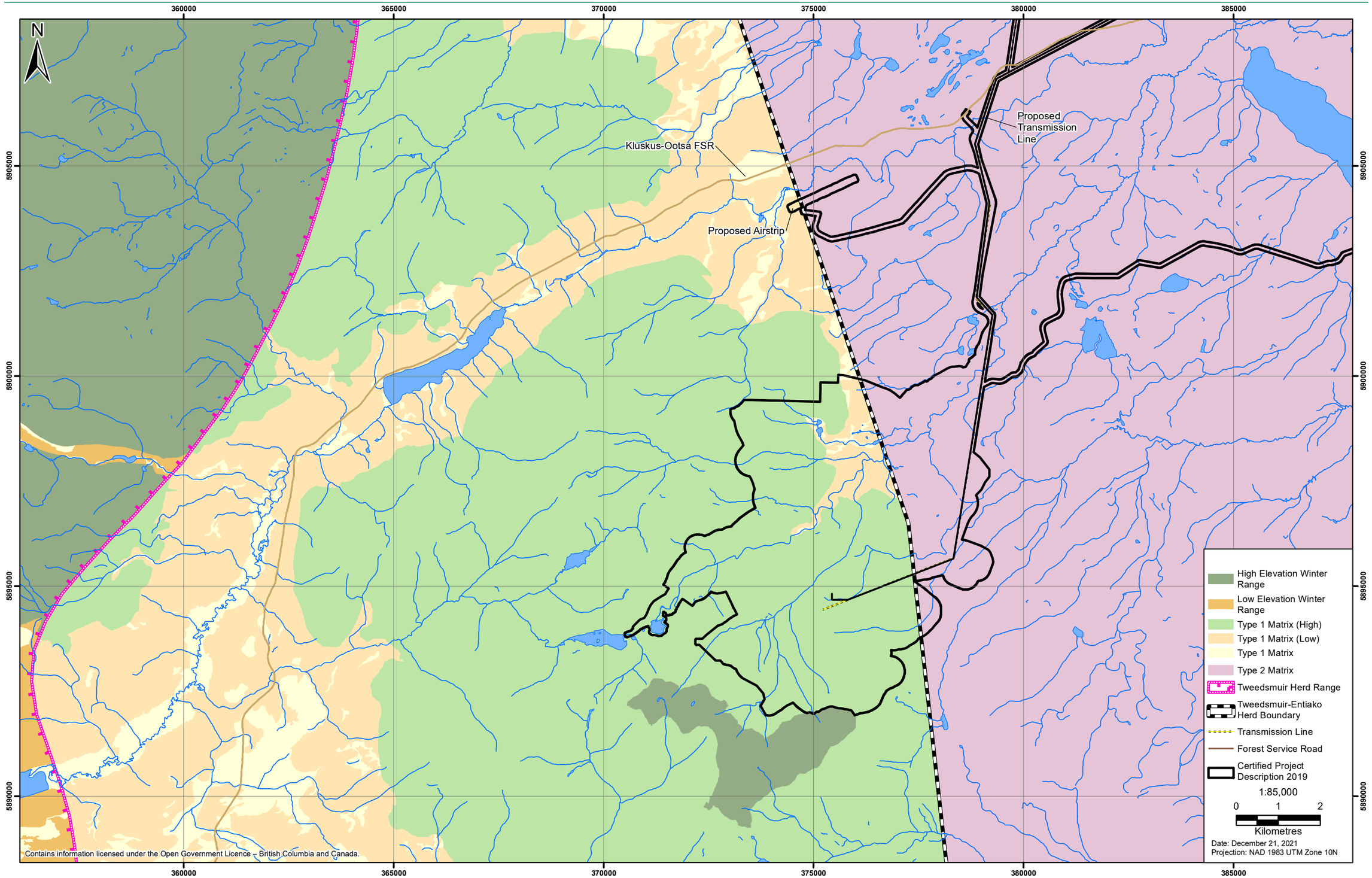


Figure 1.1-1: Tweedsmuir Caribou Range Habitat in Relation to the Blackwater Project Certified Project Description

1.3.1 Legislation

Legislation relevant to the CMMP is listed in Table 1.3-1.

Table 1.3-1: Federal and Provincial Legislation, Strategies and Best Management Practices Applicable to the CMMP

Legislation	Level of Government	Description
Canadian Environmental Protection Act,1999	Federal	Aims at preventing pollution and protecting the environment (including wildlife) and human health from the effects of deleterious substances.
Canadian Environmental Assessment Act, 2012	Federal	Assesses potential positive and negative environmental, economic, health, and social effects, and impacts to Indigenous groups and rights of Indigenous peoples for major projects. The Blackwater Project received a DS in April 2019.
Species at Risk Act (SARA)	Federal	Prevents Canadian indigenous species, subspecies, and distinct populations from becoming extirpated or extinct, provides for the recovery of endangered or threatened species, and encourages the management of other species to prevent them from becoming at risk. Woodland Caribou, Southern mountain population, which includes the Tweedsmuir caribou herd, is listed as Threatened under Schedule 1 of the SARA. The project activities must be compliant with the relevant provisions of SARA, and with the conditions of the Decision Statement issued under CEAA 2012 that refer to the listed species.
United Nations Declaration on the Rights of Indigenous Peoples Act	Federal	Affirms the human rights of Indigenous Peoples as an international human rights instrument that can help interpret and apply Canadian law, and provides a framework to advance implementation of the Declaration at the federal level.
Recovery Strategy for the Woodland Caribou, Southern Mountain Population (*Rangifer tarandus caribou*) in Canada (EC 2014)	Federal	Under SARA, the federal competent ministers are responsible for the preparation of recovery strategies for listed Extirpated, Endangered, and Threatened species. The Tweedsmuir caribou herd is classified as Threatened under SARA Schedule 1. Establishes a recovery goal of achieving self-sustaining caribou populations in all local population units (including Tweedsmuir) within their current distribution. Identifies multiple categories of critical habitat, includes a description of activities likely to destroy critical habitat, and outlines strategies and approaches to meet recovery objectives.
Declaration on the Rights of Indigenous Peoples Act	BC	Sets out process to align BC laws with the United Nations Declaration on the Rights of Indigenous Peoples.
Environmental Assessment Act	BC	Provides process for reviewing and assessing the potential adverse and positive environmental, social, economic, health, and cultural effects of major projects. The Blackwater Project received an environmental assessment certificate on June 21, 2019 under the 2002 *Environmental Assessment Act* and was transitioned into the 2018 *Environmental Assessment Act*.

Legislation	Level of Government	Description
Environmental Management Act	BC	Authorizes discharges to water, land and air, storage/treatment of wastes, disposal of solid waste to the land. The Project received *Environmental Management Act* Permit 110603 on June 24, 2021, which authorizes discharge of treated storm water effluent to ground from early stage construction activities.
Forest and Range Practices Act	BC	Governs forest and range practices on Crown land during all stages of planning, road building, logging, reforestation and/or grazing, and establishes ungulate winter range.
Mines Act (Health, Safety and Reclamation Code for Mines in BC 2021)	BC	Regulates mining activities, including mineral exploration, mine development, and reclamation and closure. The Project received *Mines Act* Permit M-246 on June 22, 2021 which authorizes early construction.
Wildlife Act	BC	Governs protection of wildlife and wildlife habitat, and wildlife management, including alien species, angling, hunting, trapping and guide outfitting, and firearms, and designation of wildlife management areas and species at risk Section 34 of the Act protects birds, eggs, and occupied nests from possession, molestation, injury, or destruction.
Water Sustainability Act	BC	Authorizes short-term water use, changes in and about a stream, water storage, withdrawals and diversions, and groundwater wells.
Procedures for Mitigating Impacts on Environmental Values	BC	Provides procedures for mitigating impacts to environmental values.
Interim Mitigation Offset Guidance for Proponents and Staff	BC	Provides offsetting guidance to proponents and staff in BC.

1.3.2 Environmental Assessment Certificate and Federal Decision Statement Conditions

The CMMP has been developed in accordance with the Project's federal Decision Statement (DS; CEA Agency 2019) and Environmental Assessment Certificate (EAC) #M19-01 (EMPR & ENV 2019a). Conditions applying to the CMMP and where they are addressed in the plan are provided in Appendix and Appendix B respectively.

1.3.3 Permitting

Aside from the conditions in EAC #M19-01 and the federal DS, there are no conditions in permits related to caribou.

1.3.4 Guidelines and Best Management Practices

The CMMP addresses the requirements in federal and provincial conditions related to caribou.

At the federal level, ECCC is developing an offsetting policy but at the time of writing the CMMP, has not yet published the policy.

At the provincial level, the CMMP has been informed by the Environmental Mitigation Policy – BC Habitat Offset Decision Support Tool. Guidelines & Operational Manual. Trial Version 1.0. February 2019

(BC 2019), and the *Tweedsmuir-Entiako Caribou (Rangifer tarandus) Tactical Restoration Plan* (Cichowski et al. 2020). At the time of the writing of the CMMP, there are no practical examples of this policy being used for caribou habitat offsets in BC.

The *Tweedsmuir-Entiako Caribou (Rangifer tarandus) Tactical Restoration Plan* (Cichowski et al. 2020) for the range of the Tweedsmuir LPU identifies priorities for range restoration, including (page 1 of the Plan):

- "to produce a comprehensive habitat disturbance map for the range;
- to develop criteria for prioritizing restoration activities and identifying restoration sites within priority restoration areas;
- to engage with First Nations to incorporate knowledge and interests, develop criteria, and coordinate priority areas for restoration activities within the range;
- to develop preliminary restoration implementation plans for two priority restoration sites; and
- to develop a monitoring plan for collecting data to assess treatment success and wildlife response to restoration activities."

These priorities support the provincial and federal objectives for the conservation and growth of the population.

A search for guidance and examples in other jurisdictions that support caribou populations identified that there is little formal guidance on habitat offsetting, including in Alberta, Saskatchewan, Manitoba or Ontario. In Saskatchewan, a recent woodland caribou range plan referenced offsetting in the mitigation strategies. The Saskatchewan document does not include offset ratios or specific guidance and is ideally looking for functional offsets to match Project habitat loss through time (Saskatchewan Environment 2019).

1.4 Consultation and Engagement on the CMMP

Aboriginal Groups, primarily the UFN and LDN, were involved in the development of the mitigation measures for the CMMP during the review of the Application/EIS, including submission of comments and participation in the EAO Wildlife Working Group.

The August 2018 draft offset plan (ERM 2018) categorized all of BW Gold's mineral tenures within the Tweedsmuir LPU and quantified ecological equivalency, project offsetting ratio and offset area ratio. BW Gold proposed to select its final offset location from within one of eight polygons and develop a detailed offsetting plan and proposed monitoring plan in consultation with UFN, LDN, NWFN, STFN and SFN, ECCC, and FLNRORD before the Project was constructed. The Project has Federal and Provincial EA conditions requiring consultation on a CMMP prior to the start of construction.

A draft CMMP Version (V2) was submitted to BC EAO, EMPR, ENV, FLNRORD, ECCC and Aboriginal groups in August 2021. CMMP V2 proposed offsetting in the form of habitat securement in portions of two of the polygons from the first draft plan; Capoose North and Johnny-Fawnie areas. CMMP V2 incorporated discussions with the UFN and LDN held between May and July 2021 and at the June 2021 Environmental Monitoring Committee meeting. During these discussions, UFN and LDN indicated that a preference to see additional offsets more focussed on recovery at the herd scale.

In June 28, 2021, the UFN and LDN provided BW Gold a discussion paper entitled *Solution to Caribou Offsetting: Ensuring the Survival of our Caribou populations.* The paper proposes using current knowledge and building a scientifically based First Nations caribou restoration program that meets the Project's offset obligations and promotes caribou recovery, including:

1. Develop models that build on scientific and traditional knowledge to assist decision making, targeting recovery actions and assist in herd management and recovery monitoring;
2. Initiate a habitat restoration project as a long-term solution to caribou recovery; and

3. Build local capacity to manage caribou recovery, monitoring and conservation.

The discussion paper also includes an action Plan over Three Phases commencing with development of resource selection function models and 20 years for restoration and monitoring. On September 13, 2021, BW Gold committed up to $50,000 to the LDN/UFN to catalyze the LDN/UFN initiative.

On September 8, 2021, UFN and LDN provided comments on the draft CMMP (V2), which BW Gold responded to on October 7, 2021, and which are recorded in the Issues Tracking Table (ITT).

On November 5, 2021, ECCC and FLNRORD provided comments on the draft CMMP (V2) (Appendices D, E and F), which BW Gold will respond to in the ITT.

On November 30, 2021, BW Gold received a joint letter from BC EAO, UFN, LDN, ECCC and FLNRORD, stating (Appendix G):

1. A significant amount of habitat restoration within the Tweedsmuir Local Population Unit (consistent with advice provided by ECCC) is necessary to offset the direct and indirect loss of habitat as a result of the project. The outcomes of this restoration must result in an increase, over time, in the overall amount of undisturbed habitat within the Tweedsmuir Local Population Unit.
2. Securement of Capoose High Elevation Ungulate Winter Range (11,059 ha) for a period of 50 years is a necessary part of the offset proposal.

BW Gold also received a letter from ECCC on November 30, 2021, which clarified ECCC's views with respect to land securement, indicating that the long-term securement of the Capoose High Elevation Ungulate Winter Range (HE-UWR) could represent an incremental benefit to caribou and thus contribute to the overall offsetting package when combined with meaningful amounts of habitat restoration (Appendix H).

ECCC has requested a legally binding form of securement for the Capoose habitat. It is BW Gold's understanding that the Province will provide securement protection using an appropriate legislative tool upon agreement with BW Gold. BW Gold has significant mineral resources underlying the Capoose HE-UWR, and the company and previous owners of the property have made substantial investments in advancing the understanding of those resources. To ensure that the purpose of the 50 year securement period being requested serves the ultimate goal, BW Gold has proposed further discussions on the establishment of reasonable review periods for implementing this securement. These discussions began at a meeting on December 3, 2021 and will continue into 2022. When agreement has been reached on the form of securement for the portions of BW Gold's mineral tenure holdings underlying the Capoose HE-UWR, the CMMP will be updated to reflect relevant aspects of this agreement.

On December 1, 2021, both the UFN and LDN provided a letter to BW (Appendix C) indicating that they expect to lead the caribou habitat restoration activities. BW Gold supports UFN and LDN leading these activities. BW Gold understands that the restoration priorities will be determined and led by UFN/LDN in conjunction with FLNRORD, and that BW Gold's involvement will be to provide the funding as set out in Section 4.3 BW Gold has updated the CMMP (V3) to reflect this approach.

On December 3, 2021, BW Gold met with UFN, LDN, ECCC, BC EAO, FLNRORD, ENV and EMLI to discuss the comments received in November from ECCC and FLNRORD on the draft CMMP (V2) in November 2021, and the November 30, 2021, joint letter from BC EAO, UFN, LDN, ECCC and FLNRORD. ECCC indicated that an updated draft CMMP would need to be submitted by December 31 to allow for a final plan to be submitted by the end of January. This would allow ECCC to sign off on the plan in time for BW Gold's proposed construction window starting March 1, 2021. ECCC indicated that the plan must be developed to the satisfaction of ECCC and that the plan must include a habitat-based offset following ECCC's comments in November. The Capoose HE-UWR securement was also discussed as well as the

desire by UFN/LDN to lead the offsetting program. On December 16, 2021, BW Gold wrote to ECCC, UFN, LDN and FLNRORD in response to the November 30, 2021 joint letter to communicate its next steps for revising the CMMP and to request to meet to continue the discussion on CMMP.

In response to the shared ECCC, UFN, LDN and FLNRORD views, BW Gold prepared the V3 CMMP to include a financial contribution to restoration initiatives (Section 4.3) as well as securement of the portion of its mineral tenures underlying the Capoose HE-UWR (Section 4.3), pending alignment on other aspects of this CMMP. The CMMP V3 was submitted on December 31 to UFN, LDN, ECCC, BC EAO, FLNRORD, ENV and EMLI.

On January 21, 2022, BW Gold met with UFN/LDN, ECCC, EMLI, ENV and FLNRORD to discuss the CMMP V3. ECCC indicated that they wanted more information on the governance of the proposed Capoose HE-UWR securement, additional justification for the offsetting ratios provided and additional information on priority areas for restoration. To support this discussion, ECCC provided examples of offsetting calculations using the BC Offsetting tool, a meeting on governance was proposed and UFN/LDN agreed to share some mapping they've undertaken on priority areas for restoration for consideration.

On January 21, 2022 BW Gold met with representatives of UFN, LDN, ECCC, BC EAO, EMLI, and FLNRORD to discuss the December 2021 draft CMMP. At that meeting, ECCC summarized their comments which were subsequently provided in writing on January 28, 2022. ECCC shared examples of offset calculations using the caribou version of the draft BC Habitat Offset Decision Support Tool (the DST), and suggested the DST represents a transparent, repeatable mechanism to inform offset ratios that includes each of the considerations required by federal condition 8.18.2. ECCC further indicated that the draft runs of the DST had been shared with FLNRORD, UFN and LDN; and that there was general agreement on the approach and DST inputs.

ECCC also provided a range of potential conversion factors to translate the DST outputs of area of habitat to be offset through restoration to linear kilometers of roads as well as cost estimates for restoring roads.

On January 25, 2022 UFN and LDN provided comments on the Dec 2021 draft CMMP and a report that described five priority areas for restoration in the Tweedsmuir LPU and surrounding area, which was discussed at a meeting with UFN, LDN, ECCC, EMLI, and FLNRORD on January 26, 2022, along with further discussion on monitoring, adaptive management, and inputs to the DST.

During January and February of 2022, BW Gold updated Section 4 (Offsetting), 5.7 (Habitat Suitability Mapping) and 6 (Adaptive Management) of the CMMP and delivered it to BC EAO, EMPR, EMLI, ENV, FLNRORD, ECCC and Indigenous groups (UFN and LDN). Comments and edits were received from ECCC, FLNRO, LDN, UFN, and BC ENV.

BW Gold accepted the offsetting calculations, justifications, and assumptions proposed by ECCC, and addressed the edits and comments from reviewers to update the CMMP to Version 4 of the offset proposal.

2. TWEEDSMUIR CARIBOU HERD CONTEXT

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 (Figure 2-1). The Tweedsmuir caribou are part of the northern group of Southern Mountain caribou, as defined by Environment Canada (EC 2014). The herd is immediately north of the Itcha-Ilgachuz and Rainbows subpopulation caribou ranges in the northern group of southern mountain caribou (EC 2014).

Environment Canada (EC 2014) defined all Southern Mountain caribou Local Population Unit (LPUs) and the LPU range boundaries based on the best available biological information including radio-telemetry data and regional expertise. These include the Tweedsmuir LPU and the adjacent Chilcotin LPU, which contains the Itcha-Ilgachuz and Rainbows subpopulations. Traditional Land Use shared with BW Gold indicates caribou in the area previously had a more continuous distribution with connections between the Tweedsmuir LPU and the Itcha-Ilgachuz and Rainbows subpopulations to the south. Based on discussions during the environmental assessment (EA) and the EAC condition 22, BW Gold's habitat offset is proposed within critical habitat of the Tweedsmuir LPU (EC 2014).

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 2-1 displays a 95% utilization distribution (UD) kernel of satellite collar data for the female caribou during summer.

Using collar data from 1983 to 2020, during winter, female caribou use the eastern portion of the LPU range, including Entiako Park (Figure 2-2).

This section describes:

- The Recovery Strategy for Woodland Caribou (EC 2014);
- The results of discussions during the EAC/Application review on the types and distribution of habitat on the mine site;
- The population status and trends for the herd; and
- Additional context on the Tweedsmuir herd and the draft CMMP provided by ECCC and FLNRORD on November 5, 2021, and ECCC on November 30, 2021.

2.1 Recovery Strategy for Woodland Caribou, Southern Mountain Population

The *Recovery Strategy for the Woodland Caribou, Southern Mountain Population* (hereafter: Recovery Strategy), was published by Environment Canada (EC) in 2014. The Tweedsmuir herd is an LPU of the Woodland Caribou Southern Mountain caribou population (hereafter: Southern Mountain Caribou).

The Recovery Strategy indicates that:

- The recovery goal for southern mountain caribou is to achieve self-sustaining populations in all LPUs [including the Tweedsmuir LPU] within their current distribution.
- "Minimal disturbance for high-elevation winter and/or summer ranges in all Groups, and at least a 65% undisturbed habitat level for low elevation winter ranges and Type 1 matrix range in the Northern and Central Groups, are currently considered as necessary to achieve recovery of LPUs", in addition to maintaining the ecological function of Type 2 Matrix range with respect to predator / prey dynamics.
- Environment Canada (2011, 2012) assessed habitat disturbance by natural and anthropogenic disturbance by natural and anthropogenic sources in some boreal caribou ranges, and found that a minimum of 65% undisturbed habitat resulted in a 60% probability that a boreal caribou range would be self-sustaining.
- As data became available from more boreal caribou populations, Environment and Climate Change Canada (ECCC) has revisited the relationship between disturbance level and the likelihood of boreal

caribou populations to be self-sustaining. Their new analyses, based on more extensive data, supported the minimum 65% undisturbed threshold first identified in 2011, for boreal caribou (Johnson et al. 2020). Equivalent analyses have not been completed for Southern Mountain Caribou, the critical habitat of which is less homogenous than that of boreal caribou.

2.1.1 Provincial Conservation Status

Northern Mountain Caribou are blue-listed by the BC Conservation Data Centre (BC CDC 2021). The province lists the Tweedsmuir-Entiako subpopulation as part of the Northern Mountain caribou population (population 15).

2.2 Habitat

During the review of the Application/EIS, BW Gold worked with Aboriginal Groups, Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), and ECCC to develop definitions for caribou habitat. BW Gold then produced habitat mapping for the Tweedsmuir LPU range. This mapping was used to estimate potential Project effects on Tweedsmuir caribou habitat. This section describes the mapping process and results.

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 from UFN and LDN and includes areas mapped as winter caribou habitat (Figure 1.1-1). The mine site is outside of the annual range (1980-2020) used by collared female caribou, but is still used intermittently by caribou based on aerial surveys, snow track surveys and incidental observations.

BW Gold produced caribou habitat mapping in response to direction from FLNRORD and ECCC, the federal Recovery Strategy (EC 2014) and nine communications – Appendices 2 through 10 of the BW Gold Response to Canadian Environmental Assessment Agency Information Request (IR1-30, IR1-32, and IR2-10; ERM 2018).

Environmental Assessment Certificate Condition 22.j) requires BW Gold to provide a caribou habitat offset plan which demonstrates consideration of the habitat assessment and proposals in the Application/EIS, information requests submitted during the EA and related responses (EMPR & ENV 2019b). The habitat classification approach described here follows the work completed in 2018 under the FLNRORD and ECCC guidance noted above (ERM 2018).

Principal advice provided by FLNRORD and ECCC, which was accounted for in BW Gold's analysis, included the following:

1. The Project interacts in some years with the winter range of the Tweedsmuir herd, but does not interact with the summer range of the herd.
2. The mapping should be conducted at a coarse scale using Biogeoclimatic Ecosystem Classification (BEC) sub-units (Table 2.2-1) to define critical habitat.
3. Habitat mapping to evaluate the potential effects of the Project should use Habitat Capability Mapping, which describes the best habitat condition without anthropogenic or natural disturbance.
4. Habitat mapping to evaluate cumulative effects within the LPU range should use Habitat Suitability Mapping, which includes current disturbance from forestry, roads, etc.
5. FLNRORD characterizes core winter range (areas of demonstrated use) by the 95% UD kernel calculated from all winter telemetry data collected since 1983.
6. High and Low Elevation Winter Range (HEWR and LEWR; Table 2.2-2) are defined by having demonstrated use by caribou. Used area was defined as the area within the 95% UD kernel. This area includes the majority of the Tweedsmuir LPU range except its eastern edge.

7. Although it is outside the 95% UD kernel, Mount Davidson is defined as HEWR where there are open parkland BEC subzones of Boreal Altai Fescue Alpine Zone (BAFA) and parkland variants of Engelmann Spruce – Subalpine Fir Zone (ESSF) at elevations greater than 1,700 m.
8. Matrix 1 habitat is defined as areas within the LPU range, but outside the area with demonstrated use (delineated by the 95% UD kernel).
9. Matrix 1 with high elevation attributes (HE-Matrix 1) is outside the 95% UD kernel, but inside the LPU range; if it were inside the 95% UD kernel it would be classified as HEWR (Table 2.2-2). A similar relationship exists between LEWR and Matrix 1 with low elevation attributes (LE-Matrix 1).
10. Matrix 2 was defined as forested areas outside of the LPU range, within 20 km of the range boundary.
11. Overall, specific BEC sub-units and their location inside or outside the LPU range and inside or outside the 95% UD kernel were identified as HEWR, LEWR, HE-Matrix 1 and LE-Matrix 1, Matrix 1 and Matrix 2 as described in Table 2.2-2.

Table 2.2-1: Biogeoclimatic Ecosystem Classification Sub-units in the Tweedsmuir Local Population Unit

Elevation	BEC Abbreviation	BEC Sub-Units
High Elevation	BAFA	Boreal Altai Fescue Alpine
	ESSFmvp	Engelmann Spruce and Subalpine Fir – parkland
	ESSF	Englemann Spruce and Subalpine Fir
Mid-Elevation	MS	Montane Spruce
	MH	Mountain Hemlock
Low Elevation	SBS	Sub-Boreal Spruce
	SBPS	Sub-Boreal Pine Spruce
	CWH	Coastal Western Hemlock

Table 2.2-2: Definitions of Critical Habitat Used for Mapping Tweedsmuir Caribou Local Population Unit Range

Elevation	Habitat Description[1]	Type of Critical Habitat		
		Inside 95% UD Kernel and in LPU Range	Outside 95% UD Kernel and in LPU Range	Outside LPU Range to a Distance of 20 km
High	Alpine tundra (BAFA), Parkland above 1,700 m (ESSFmvP)	HEWR	HEWR	-
High	Alpine tundra (BAFA), Parkland (ESSFmvP); High elevation forest – ESSF, all subzones	HEWR	HE–Matrix 1	-
Low	Low elevation forests with open canopies and wetlands (SBS, SBPS, CWH, structural stages 5 and above[2])	LEWR	LE–Matrix 1	-
Mid	Mid-elevation forest types not described above	Matrix 1 (general)		-
Outside LPU range	Forested areas within 20 km, outside the LPU range boundary	-	-	Matrix 2

[1] Biogeoclimatic Ecosystem Units are listed in Table 2.2-1.

[2] Structural Stage 5 and above includes mature forest which is capable of producing terrestrial lichen, as described in the Recovery Strategy. Structural Stage 1-4 includes barren areas and shrub communities that do not support terrestrial lichen.

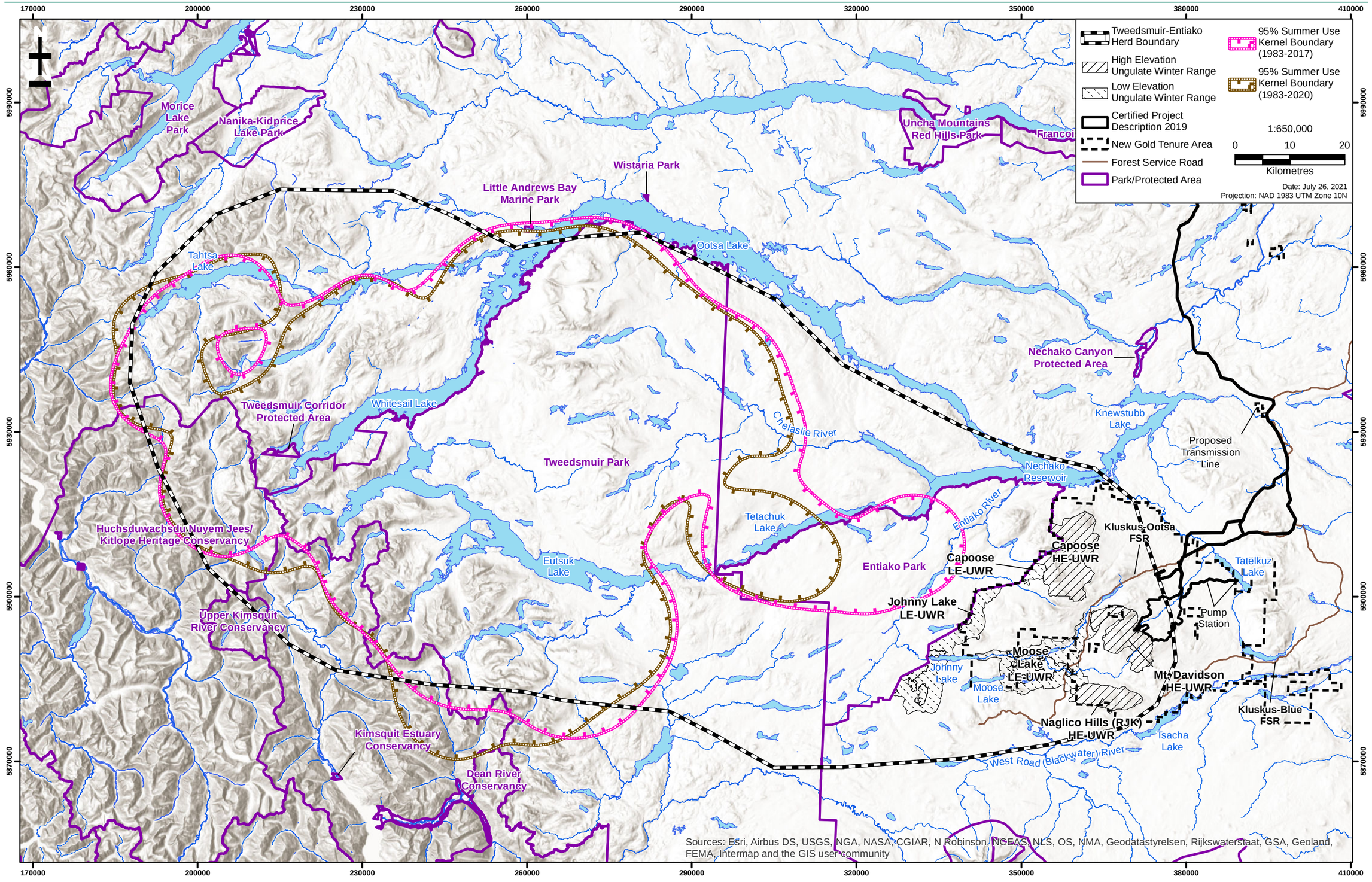


Figure 2-1: Range of the Tweedsmuir Caribou Population, Summer 1983-2020

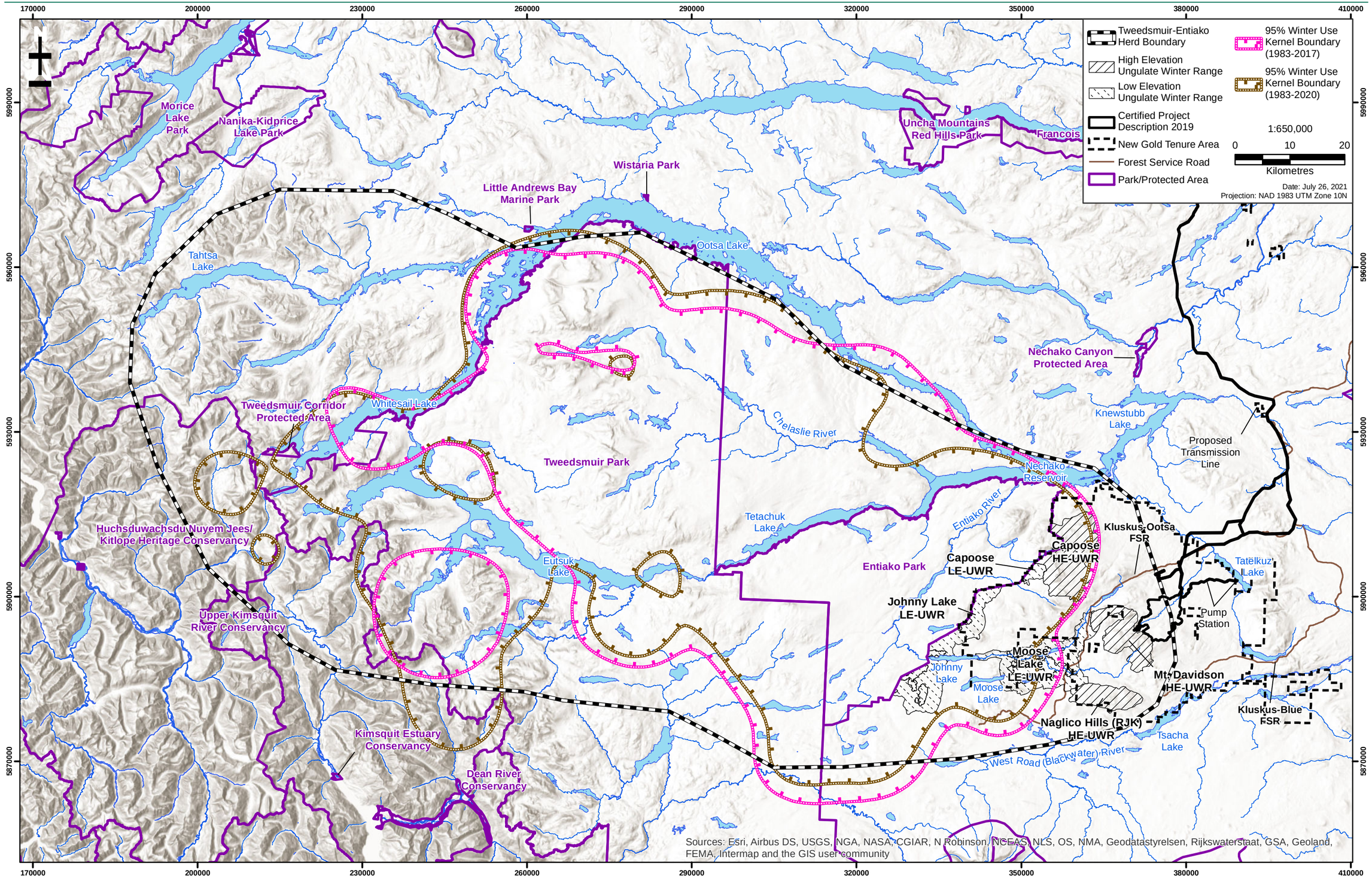


Figure 2-2: Range of the Tweedsmuir Caribou Population, Winter 1983-2020

Note that the terms of HE-Matrix 1 and LE-Matrix 1 were defined through discussion with FLNRORD and ECCC to be used for the Blackwater project, but are not found in the Recovery Strategy (EC 2014).

Following FLNRORD and ECCC direction, BW Gold produced habitat mapping for the Tweedsmuir LPU range and surrounding Matrix 2 habitat (Figures 2-1 and 2-2).

The habitat classifications within the Tweedsmuir LPU range are as follows.

High Elevation Winter Range (HEWR) and HE-Matrix 1

High Elevation Winter Range is dominated by open alpine areas and parklands downslope from the alpine. These alpine areas and parklands are classified as HEWR inside the 95% UD kernel use area for the Tweedsmuir herd and HE-Matrix 1 outside of the 95% UD kernel, but inside the LPU range. The area is comprised largely of alpine tundra, parkland and high elevation subalpine forests that have low timber value and so there has been limited forestry activity and road building in this area.

High elevation habitats make up approximately 19% of the Tweedsmuir LPU range and do not have high levels of natural disturbance (Cichowski et al. 2020). In contrast, disturbance is understood to be important for low elevation habitats, as forested areas between 60 and 120 years provide the best lichen forage for caribou.

These areas are largely intact within the LPU range since they are generally at lower risk to fires, beetle kill and have low forestry values. Only 9% of the area has been disturbed to date and it is expected to remain low (~5%) in the foreseeable future. Approximately 2/3 of HEWR/HE-Matrix 1 is in provincial parks, protected from any industrial activity, and in provincially designated high elevation ungulate winter range orders (HE-UWRs) where no commercial harvesting is permitted but other tenures, such as mineral tenures, are possible.

Low Elevation Winter Range (LEWR) and LE-Matrix 1

Low Elevation Winter Range and Low Elevation Matrix 1 (LE-Matrix 1) occurs at the bottoms of valleys and in lowlands throughout the LPU range. This habitat is referred to as LEWR inside the 95% UD kernel use area for the herd and LE-Matrix 1 outside the 95% UD kernel, but inside the LPU range. LEWR/ LE-Matrix 1 is much more common than HEWR. Habitat usage by Tweedsmuir caribou is focused in LEWR, with the herd being considered primarily a low elevation herd during winter (Cichowski 2010).

Low Elevation Winter Range/LE-Matrix 1 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. There is currently no proposed oil and gas activity within the LPU range.

Relative to modelled baseline conditions, mapping indicates that approximately 40% of the available LEWR habitat across the LPU range has been disturbed in some way. This value surpasses the disturbance threshold of 35% identified in the Recovery Strategy (EC 2014) for LEWR and Type 1 categories of critical habitat within the Northern Group ranges. This disturbance is primarily associated with fires and cut blocks and associated roads at lower elevations. An important distinction to be made is that 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).

Matrix 1 (General) Habitat

Matrix 1 habitat is comprised largely of mid-slope forests, located between LEWR/LE-Matrix 1 at low elevations and HEWR/HE-Matrix 1 at high elevations. The Recovery Strategy considers the role of Matrix 1 to be primarily for movement between patches of HEWR and LEWR. Forage capability in this area is typically lower, but caribou will still opportunistically forage in these areas while passing through to better forage areas.

This area has moderate forestry potential and has been disturbed by forestry operations and associated road building and road effects. Fires are also common in this area. The area of disturbed habitat is currently 19% of Matrix 1.

Matrix 2 Habitat

Matrix 2 habitat is defined as all forested areas outside the LPU range boundary to a distance of 20 km, or a natural barrier to caribou movement, such as a lake or reservoir.

The habitat classifications described here match those used in the BW Gold Response to Canadian Environmental Assessment Agency Information Request (IR1-30, IR1-32 and IR2-10) (ERM 2018).

The amount of caribou habitat expected to be directly removed or altered by the Project is presented in Section 4.1.1.

2.3 Population

The most recent estimate for the Tweedsmuir caribou population is between 150 and 200 animals (Cichowski et al. 2020). Cichowski (2015) summarized the historic Tweedsmuir herd population data, and showed long-term population decline from the 1980s to 2010. In 2018, DeMars and Serrouya (2018) summarized 2014 to 2018 vital rate data from the herd to yield an annual population growth rate of $\lambda = 0.89$ (i.e., an 11% annual decline). Grant and Roberts (2020) indicated that 2019 data pointed to a continued decline in the most recently available year. Both DeMars and Serrouya (2018) and Grant and Roberts (2020) supported Cichowski's (2015) conclusion that the Tweedsmuir population had declined to between 150 and 200 caribou.

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 and the predators that follow (Cichowski 2015; DeMars and Serrouya 2018). The observed decline is despite 68% of the Tweedsmuir range being undisturbed, though the disturbances were uneven with only 40% of LEWR undisturbed (DeMars and Serrouya 2018).

2.4 Offsetting Guidance from ECCC and FLNRORD

On November 5, ECCC and FLNRORD separately provided comments on the draft CMMP (V2) released in August 2021. ECCC then provided additional direction and comments on how to proceed with the offsetting plan on November 30, 2021.

2.4.1 ECCC Risk Characterization and Comments (November 5, 2021)

On November 5, ECCC provided a risk characterization for the Tweedsmuir herd (Appendix D) and based on that risk characterization, comments on the draft CMMP (V2; Appendix F).

ECCC provided context for the risk characterization (Appendix D) of critical habitat for the Tweedsmuir local population unit (LPU) of Southern Mountain Caribou (SMC), including:

- Listing the 5 categories of critical habitat: high elevation winter/summer range (HEWR & HESR), low elevation winter and summer range (LEWR, LESR), Matrix 1 in the LPU and Type 2 outside the LPU;
- Mapping the mine site as HEWR, HE-Matrix 1, LE-Matrix 1, Matrix 1 and Matrix 2;
- Providing the attributes of HEWR, Matrix 1 and Matrix 2 from the Recovery Strategy; and
- Stating that HEWR should have minimal disturbance, while LEWR and Matrix 1 should have <35% disturbed habitat.

ECCC evaluated the vulnerability of the Tweedsmuir LPU and concluded that the vulnerability is High:

- Population Status – SMC are threatened on Schedule 1 of SARA and habitat disturbance has led to population declines, resulting in a wolf reduction program.
- Irreplaceability – habitat disturbance exceeds the 35% limits set in the Recovery Strategy, so any remaining habitat highly valuable and HEWR is irreplaceable.
- Habitat Functions – the Project area is both disturbed and undisturbed critical habitat.
- Habitat Connectivity – the Project is on the edge of the LPU and collar data does not indicate it is a movement corridor, however LDN Traditional Knowledge indicates that it was historically a movement corridor.

ECCC evaluated the severity of adverse effects, with a low magnitude of effect, medium level geographic scope, long-term to permanent duration, continuous to permanent frequency, and continuous timing which may not be reversible. ECCC concluded the severity of adverse effects is medium.

ECCC concluded the risk assessment:

> *"This risk assessment will inform ECCC's review of proposed offsets. If ECCC is satisfied that the offsets reduce the risk of significant adverse effects on the recovery of the species to Low, ECCC would then consider the residual environmental effects to be fully offset.*
>
> *As indicated in the 2019 Decision Statement, if residual environmental effects cannot be fully offset by habitat-based measures including habitat restoration and securement, ECCC will look to the Proponent to provide details on non-habitat-based measures in order to meet federal condition 8.18."*

Based on the risk assessment, ECCC then provided comments (Appendix F) on the draft CMMP. ECCC's stated that their primary concern is that "the current suite of proposed offsetting measures area not sufficient to fully address the residual adverse effects resulting from the Project." Comments included:

- Habitat Restoration – ECCC supports habitat restoration, which should be the main focus of the offsetting plan, and apply offset ratio calculations on the amount of habitat restored or enhanced including a 500 m buffer on restored linear features.
- Offset Ratios, Ecological Equivalency – ECCC previously indicated a minimum offset ratio of 4:1 would be a benchmark ratio for a project with low risk, that BC's draft Habitat Offset Decision Support Tool has a base ratio of 10:1, and suggested updating the habitat values for the mine site and offsetting areas.
- Habitat Securement – HEWR and Matrix 1 CH lost due to the Project would not be replaced by the temporary habitat securement of Capoose and Johnny Lake areas because the securement areas are not under immediate threat, would not preclude other development, and would not address the concepts of additionally or equivalency (i.e., adding new, similar habitat).
- Buffers and Project Effects – ECCC supports the hybrid 3 km/500 m buffer, which is used in the current draft of the CMMP.
- Mapping – ECCC does not agree with the area mapped as non-CH on Figure 1.1-1. BW Gold has updated this figure for the current CMMP to remove non-CH habitat.

2.4.2 FLNRORD Comments (November 5, 2021)

FLNRORD provided comments on the draft CMMP (V2) on November 5, 2021 (Appendix D). FLNRORD commented that "in general, the information provided in the draft CMMP regarding offsets does not provide for "no net loss" or additional benefit to caribou as described." Specific comments included:

- Habitat Characterization – The characterization of habitats is consisted with the descriptions in the EA except for non-CH habitat identified in Figure 1.1-1. BW Gold has updated this figure for the current CMMP to remove non-CH habitat.
- Restoration – Restoration and reclamation are used interchangeably. BW Gold has updated the use of these terms in the current version of the CMMP.
- Buffer – FLNRORD did not object to the use of the 3 km/500 m hybrid buffer rather than the 500 m buffer.
- Proposed Offset – The proposed offsetting via tenure deferral, which does not provide net-neutral or benefit to caribou, the habitat value should be updated, and the offsetting ratio discussed. The duration will also need to be discussed since some of the Project effects will be permanent.
- Pre-Construction Surveys – The wording implies that the surveys have yet to be done.
- Adaptive Management – Additional discussion is required on some of the programs, including camera studies, permanent plots to assess physical works and vegetation, and the monitoring appears to be focused on preventing access rather than restoring habitat.

2.4.3 ECCC Offsetting Guidance (November 30, 2021)

ECCC provided additional direction and comments on how to proceed with the offsetting plan on November 30, 2021. This letter indicates that following discussions with LDN, UFN and BC, ECCC supports the view that securement of Capoose HE-UWR (11,059 ha) for 50 years is a necessary part of the offset plan. This long term securement would represent an incremental conservation benefit for the species and thus contributes to the overall offsetting package, when combined with meaningful amounts of habitat restoration.

The CMMP has been updated to reflect ECCC, FLNRORD and comments from LDN and UFN and the inclusion of Capoose HE-UWR as part of the offsetting plan.

2.4.4 ECCC Offsetting Guidance (January 21, 2022)

On January 21, 2022 BW Gold met with representatives of UFN, LDN, ECCC, BC EAO, EMLI, and FLNRORD to discuss the December 2021 draft CMMP. At that meeting, ECCC summarized their comments which were subsequently provided in writing on January 28, 2022. ECCC shared examples of offset calculations using the caribou version of the draft BC Habitat Offset Decision Support Tool (the DST), and suggested the DST represents a transparent, repeatable mechanism to inform offset ratios that includes each of the considerations required by federal condition 8.18.2. ECCC further indicated that the draft runs of the DST had been shared with FLNRORD, UFN and LDN; and that there was general agreement on the approach and DST inputs. ECCC also provided a range of potential conversion factors to translate the DST outputs of area of habitat to be offset through restoration to linear kilometers of roads, in the absence of a comprehensive GIS analysis that would consider overlapping buffers on specific roads planned for restoration, and account for buffers on roads that would not be restored. Finally, ECCC provided a range of cost estimates to restore the resultant amount of linear features. FLNRORD raised concerns about the Adaptive Management and Follow-up section of the draft CMMP, and comprehensive monitoring programs for caribou and moose were discussed.

2.4.5 UFN and LDN Offset Areas Guidance (January 25, 2022)

On January 25, 2022 UFN and LDN provided comments on the Dec 2021 draft CMMP and a report that described five priority areas for restoration in the Tweedsmuir LPU and surrounding area (Appendix J). This document was discussed at a meeting with UFN, LDN, ECCC, EMLI, and FLNRORD on January 26, 2022, along with further discussion on monitoring, adaptive management, and inputs to the DST.

Following this meeting, BW Gold accepted the offsetting calculations, justifications, and assumptions proposed by ECCC and used these to update the CMMP.

2.4.6 Updates and Edits to the CMMP (February, 2022)

BW Gold updated Section 4 (Offsetting) of the CMMP and delivered it to BC EAO, EMLI, ENV, FLNRORD, ECCC and Indigenous groups (UFN and LDN) for review on January 28, 2022. This section was returned on February 7, 2022 with comments and edits from ECCC, FLNRO, LDN, UFN, and BC ENV.

BW Gold updated Sections 5.7 (Habitat Suitability Mapping) and 6 (Adaptive Management) of the CMMP and delivered it to BC EAO, EMPR, EMLI, ENV, FLNRORD, ECCC and Indigenous groups (UFN and LDN) for review on January 28, 2022. This section was returned on March 2, 2022 with comments and edits from FLNRORD, ECCC, UFN and LDN.

BW Gold accepted the edits, addressed comments and produced Version 4 of the offsetting proposal.

3. MITIGATION

This section summarizes the caribou mitigation measures. The CMMP follows the mitigation hierarchy: 1) avoid, 2) minimize, 3) restore; and 4) offset (BBOP 2012; MOE 2014). Mitigation measures are drawn from several sources, including:

- Blackwater Gold Project Application for an Environmental Assessment Certificate / Environmental Impact Assessment (New Gold 2015; Volume 4, Section 5.4.11 of the Application/EIS);
- The federal Decision Statement (DS; CEA Agency 2019); and
- EAC #M19-01 (EMPR & ENV 2019a, 2019b);
    - Schedule B – Table of Conditions; and
    - Condition 43 (Mitigations Table Update) – *Mitigations Table* (April 2020) includes the commitments made during review of the Project Environmental Assessment (ERM 2018).

Aboriginal Groups were involved in the development of the mitigation measures described in this section during the review of the Application/EIS, including submission of comments and participation in the EAO Wildlife Working Group. Many of the mitigation measures and monitoring commitments described in the Mitigations Table were in response to comments and recommendations from Aboriginal Groups.

Mitigation is referenced below as federal DS conditions (F), EAC conditions (P), Mitigations Table (MT), or the EA along with the condition or commitment number. Mitigations are arranged in order of the mitigation hierarchy: Avoid, Minimize, Restore, and Offset. BW Gold will follow the hierarchy with for avoidance as the preferred mitigation strategy and offsetting as the last option (F 8.17).

3.1 Avoid

The Project will avoid impacts to caribou habitat through siting and design of mine site and linear components.

The Project is designed to minimize the overall size of its footprint in caribou habitat, in particular the provincial high elevation ungulate winter range order area (HE-UWR) on the top of Mt. Davidson:

- Avoid large scale clearing of old-growth forest, riparian stands and lichen-rich stands (MT 8-1);
- Mine Access Road will avoid UWR HE-1-001 on Mt. Davidson (MT 8-2); and
- No recreation trails are allowed in caribou habitat (MT 8-19).

The transmission line lies outside of the Tweedsmuir LPU range in Matrix 2 habitat (EC 2014). Further, there are also measures to minimize effects on Matrix 2 habitat, including:

- Locating the transmission line in disturbed areas where possible (MT 8-5);
- Avoiding riparian and old growth habitat (MT 8-14); and
- Utilizing existing roads for construction (MT 8-6) and removing any temporary roads (MT 8-37).

Prior to construction, BW Gold has conducted pre-construction surveys to identify certain wildlife important areas and avoid impacts to those areas, including:

- Conduct a survey for mineral licks and in consultation with Indigenous groups, manage any mineral licks outside the footprint to maintain them in their natural state, (F 8.6, P 23) as described in Section 6.
- Construction activities will respect sensitive periods for various wildlife species including caribou (BC FLNRO 2014) as described in the Wildlife Mitigation and Monitoring Plan (2021). Prior to

construction, BW Gold will notify, the Agency and Indigenous groups of these time periods and of the areas within which each of these time periods shall apply (F 8.9, P 22).

- The critical sensitive period for caribou is listed as the winter period through to the end of the calving period (January 15 to July 15) with the cautionary period during the fall (September 15 to January 14; FLNRO 2014).
- BW Gold will avoid clearing vegetation and construction during these periods in high-quality caribou habitat, particularly in any area that is identified as HEWR.
- If clearing or construction must occur during this period, a wildlife monitor will conduct a daily check for caribou in the work area and 200 m surrounding the work area prior to felling or construction. This work will follow an SOP to be developed prior to construction.
- If caribou are observed in the area during felling or construction, or 200 m surrounding the area, a work pause may be called as described below.

3.2 Minimize

Measures to minimize potential effects on caribou include:

- Prior to construction, BW Gold has conducted pre-construction surveys to identify certain wildlife important areas, including (see Section 6 for pre-construction monitoring):
  - Conducted an aerial survey in December 2021 to establish a baseline and evaluate habitat usage (MT 8-36);
  - Habitat Suitability Mapping (HSM) field plots of the mine site and offset area is planned for 2022 (Section 5.7);
  - Conducted ground searches for important habitat features such as salt licks and trails in 2021; and
  - Identified wildlife corridors that intersect Project roads in 2021 and installing wildlife crossing signs in 2022 where wildlife corridors intersect the Project roads (MT 8-8, F 8.2).
- A wildlife awareness training program including mitigation and guidance for caribou will be presented to mine personnel and contractors, during site orientation and regularly during employment (P 22.g, MT 8-12 and 33), including:
  - Access road use and haulage operating protocols;
  - No hunting / no fishing policy while on site;
  - Wildlife observation and interaction reporting procedures;
  - Bear awareness program;
  - Waste management procedures;
  - Wildlife sensitive locations/timing as applicable; and
  - Where monitoring and incidental sightings identify areas with increased wildlife activity, this will be communicated to mine personnel (MT 8-30).
- Manage road and vehicles to minimize the potential for mortality or disturbance of caribou, including:
  - Wildlife right-of way policy on Project roads;
  - Using buses to transport mine workers and contractors instead of personal vehicles to reduce traffic (MT 8-25);

  - Establish and enforcing speed limits (MT 8-8);
  - Avoiding the use of road salt (MT 8-10, F 8.3);
  - Managing roads and dust to allow good line of sight and reduce the potential for collisions with wildlife (MT 8-9);
  - Managing snow banks by plowing escape routes on roads so wildlife can cross (F 8.5) with a focus on locations where pre-construction surveys found wildlife trails intersecting roads;
  - Restricting and controlling mine road access to ensure no unauthorized traffic use of the road. All traffic flow on the Forest Service Road (FSR) will be monitored and controlled via radio communications (EA); and
  - Reporting wildlife observations and incidents (MT 8-24 and 28).
- Aircraft will be managed to reduce potential effects on caribou (MT 8-18) including maintaining a minimum elevation of 400 m above Mt. Davidson and other identified caribou habitat (MT 8-26).
- Minimizing sensory disturbances from dust by implementing measures to manage fugitive dust as defined in the Air Quality and Dust Management Plan (MT 8-23).
- Minimizing disturbance due to noise through the use noise abatement technology, equipment placement, regular equipment maintenance, and enforcing speed limits (MT 8-23). Note that BW Gold is required to deter waterfowl from the Tailings Impoundment and other Project ponds. This deterrence will be conducted to minimize noise disturbance of other wildlife, focusing on visual deterrence and using noise deterrence sparingly and only when needed.
- Lighting will be managed to reduce fugitive light while meeting health and safety requirements (F 8.1).
- Vegetation management, including:
  - Selecting re-vegetation species that minimize attraction to roadsides (MT 8-10 and 11);
  - Maintaining vegetation buffers adjacent to the mine and roads (MT 8-29);
  - Maintaining vegetation in the transmission line right of way at >1 m height (F 8.7); and
  - Depositing woody debris on upland slopes when undertaking vegetation maintenance (F 8.8) to limit predator sight lines.
- If caribou are observed on site or on Project roads during construction or operations, management measures will be implemented following a risk-based approach based on time of year, caribou behaviour and location, and Project activity (P 22.e & f, F8.9, F8.17).
  - The critical sensitive period for caribou is listed as the winter period through to the end of the calving period (January 15 to July 15) with the cautionary period during the fall (September 15 to January 14) (FLNRO 2014).
  - If a caribou is observed during vegetation clearing at the work front, the crews will take a short break (20 min to 2 hrs) and allow the caribou to leave the area (Project site plus 200 m).
  - If a caribou is observed during the sensitive period and the caribou is not leaving the area, the work crew conducting vegetation clearing will move to a new area and allow the caribou to move off. An environmental monitor (EM) will check on the caribou periodically. If the caribou hasn't moved off within 48 hours, and may be acclimated to the mine site, a qualified biologist will be consulted on the appropriate monitoring, management or mitigation measures to avoid, reduce or mitigate impacts on the observed caribou in the area of the vegetation clearing during the sensitive period.

- If a caribou is observed during the sensitive period after clearing, during Construction work, the crews will take a short break (20 min to 2 hrs) and allow the caribou to leave the area (Project site plus 200 m). If the caribou hasn't moved off within 48 hours, and may be acclimated to the mine site, a qualified biologist will be consulted on the appropriate monitoring, management or mitigation measures to avoid, reduce or mitigate impacts on the caribou upon resumption of Construction in the area.
- If a caribou is observed during the sensitive period during Operations at the mine, the EM will inform work crews and, where practicable, manage the work flow in the area to reduce potential impacts of Operations on caribou in the vicinity. If the animal becomes acclimated to the site during Operations, management will focus on allowing the caribou to use the site safely, including through installation of signage indicating the presence of caribou at the Project site, ensuring that the site is clean and safe for caribou, implementation of Employee training and caribou awareness protocols, and monitoring by the EM of such protocols during Operations in the vicinity of acclimated caribou.

3.3 Reclamation

BW Gold will conduct progressive reclamation during the life of the mine (P 8.19). This habitat reclamation is described in the Reclamation and Closure Plan, Vegetation Management Plan and Whitebark Pine Management Plan, including:

- Choosing plants in consultation with Aboriginal Groups, ECCC and other relevant authorities (P 8.19);
- Using native or non-native, weed-free seed (MT 8-3);
- Planting areas of Whitebark Pine (see Whitebark Pine Management Plan); and
- Being informed by the Recovery Strategy for Woodland Caribou, Southern Mountain Population (Rangifer tarandus caribou) in Canada (EC 2014) and/or the provincial Draft Caribou Recovery Program and/or the Tweedsmuir Herd Plan when it becomes available and/or the Tweedsmuir-Entiako Caribou Tactical Restoration Plan 2020 (MT 8-22).

3.3.1 Reclamation – Exploration and Access Roads

Distinct from reclamation on the mine site, BW Gold will also reclaim caribou habitat that has been altered as a result of its exploration activities. This includes reclaiming the existing exploration access road and the Mt. Davidson exploration road. The exploration access road will be decommissioned and reclamation works commenced prior to the start of Phase 2 of mine development, prior to completion of construction of TSF D. The Mt. Davidson exploration road will be decommissioned and reclamation works commenced during the initial Construction phase (P 22 and MT 8-27).

The exploration access road connects the Kluskus-Ootsa FSR with the existing BW Gold exploration camp, primarily in sub-boreal spruce at low elevation. The Mt. Davidson exploration road crosses areas of parkland and open alpine on the top of Mt. Davidson.

BW Gold has experience reclaiming exploration trails in both types of environments and will use established best practice to reclaim these roads. Reclamation of existing trails/roads includes blocking access, mechanical site preparation for re-sloping and soil preparation, and piling of woody debris to block predator views, and revegetation in a manner that will support the re-establishment of caribou habitat (Photo 3.3-1).

Reclamation works for both these roads will build on BW Gold's experience in reclaiming similar features. Details for the reclamation works are described in Section 5.

Photo 3.3-1: Reclaimed exploration trail in the Capoose Ridge area (September 2017).

3.4 Mitigation-Related Plans and Activities

In addition to the mitigations listed above, the Project will be guided by input from Aboriginal Groups and management and monitoring programs that will also support caribou. These include:

- Traditional Knowledge/ Traditional Land Use Committee (TK/TLU Committee)
  - The TK/TLU Committee will include representatives from BW Gold and Aboriginal Groups. The Committee will review and consider TK/TLU information from these groups during construction, operations and closure (MT 8-34).
- Access Management Working Group (AMWG)
  - The AMWG will include BW Gold, Aboriginal Groups, FLNRORD and other relevant government agencies and will provide input on access management for the transmission line, including areas that are high quality wildlife habitat and the timing and means by which all newly created access roads for the construction of the transmission line will be decommissioned and revegetated after they are no longer needed for construction (MT 8-34 and 35).
- Wildlife Management and Monitoring Plan (WMMP)
  - The WMMP is the primary management plan for wildlife species. The plan will include information on minimizing effects of the Project on wildlife, including mitigation for habitats, disturbances such as noise, light and vehicles and mortality risk (MT 8-23). The WMMP will be developed in consultation with EMLI, ENV, FLNRORD, ECCC, and Aboriginal Groups (P 23).
  - The WMMP will describe waste management to reduce attraction by wildlife and include measures to exclude wildlife (MT 8-31).

- Construction Environmental Management Plan (CEMP)
  - The CEMP will provide detailed management direction to construction crews, including least-risk timing windows, pre-construction surveys and mitigation measures. The plan will be developed by a qualified professional in consultation with EMLI, ENV, FLNRORD, and Aboriginal Groups (P 13).
- Vegetation Management Plan (VMP)
  - The VMP will describe management for soils and vegetation throughout the construction, operation and closure of the Project (MT 8-16).
- Access Management Plan (AMP)
  - The AMP will describe the timing and means by which all newly created access roads for the construction of the transmission line will be decommissioned and revegetated after they are no longer needed for Construction, the circumstances under which access may be re-established for maintenance and/or repairs of the transmission line (P 23.L.iii, MT 8-7, 13, 21, 34, and 35).
- Country Foods Monitoring Plan (CFMP)
  - The CFMP will including monitoring for trace elements in soils and plants that may be deposited by dust.

4. OFFSETTING

4.1 Process

As required by EAC condition 22 and federal condition 8.18, BW Gold is required to offset the Project's adverse effects on caribou and its critical habitat as defined in the Recovery Strategy (EC 2014). BW Gold's proposed offset, including the offset locations, restoration opportunities within the offset, and costs are described in this section.

Approximately half of the Project mine site lies within the Tweedsmuir LPU, is identified federally as critical habitat for southern mountain caribou (EC 2014), and is considered by BC as being within the herd's winter range (BC EAO 2019). Along with an updated effects assessment, BW Gold proposed a caribou offset within the August 2018 submission, *New Gold Response to Canadian Environmental Assessment Agency Information Request (IR1-30, IR1-32, and IR2-10) – Updated Assessment of Impacts to Southern Mountain Caribou and Proposed Caribou Offset* (ERM 2018).

The August 2018 draft offsetting proposal (Version 1) categorized all of BW Gold's mineral tenures within the Tweedsmuir LPU range into eight potential offset polygons; six within UWR and two outside of UWR. Forest harvesting is prohibited in high elevation (HE) UWR polygons, and restricted to 50% (+/- 20%) of the economically viable timber on each harvesting rotation in the low elevation (LE) polygon aggregates. For each polygon, BW Gold quantified an ecological equivalency, project offsetting ratio, and offset area ratio. BW Gold proposed to select its final offset location from within one of the eight polygons and develop a detailed offsetting plan and proposed monitoring plan in consultation with UFN, LDN, NWFN, STFN and SFN, ECCC, and FLNRORD before the Project was constructed.

A draft CMMP was submitted in August 2021 to BC EAO, EMPR, ENV, FLNRORD, ECCC and Indigenous groups (UFN, LDN, NWFN, StFN, SFN and NFN), which included Version 2 of a draft offset proposal. Version 2 proposed offsetting in portions of two of the eight potential polygons, Capoose North and Johnny-Fawnie areas. The Aug 2021 draft CMMP incorporated discussions with the UFN and LDN held between May and July 2021 and at the June 2021 Environmental Monitoring Committee meeting. During these discussions, UFN and LDN indicated a preference to see additional offsets more focused on recovery at the herd scale. UFN and LDN proposed that a habitat model be developed to:

- Identify priority areas for habitat restoration;
- Restore the areas identified; and
- Monitor and manage the restoration areas using LDN and UFN monitors.

On September 13, 2020, BW Gold committed up to $50,000 to the LDN/UFN "to support the development of habitat suitability models that build on scientific and traditional knowledge to assist decision-making, targeting recovery actions and assist in herd management and recovery monitoring (the "Caribou Model"). The Caribou Model Funds reflect BW Gold's understanding that the goals and objectives of the Nations' herd-scale caribou recovery initiatives (the "Nations' Caribou Initiatives") are broader than the Caribou Offsetting Plan and BW Gold's continued commitment to supporting the Nations' Caribou Initiatives."

Indigenous groups and regulators commented on the Aug 2021 draft CMMP, including:

- UFN and LDN comments on September 8, 2021;
- ECCC comments on November 5, 2021; and
- FLNRORD comments on November 5, 2021.

On November 30, 2021, BW Gold received a joint letter from BC EAO, UFN, LDN, ECCC, and FLNRORD, stating:

> *Shared views of ECCC, UFN, LDN, and FLNRORD include:*
>
> *1) A significant amount of habitat restoration within the Tweedsmuir Local Population Unit (consistent with advice provided by ECCC) is necessary to offset the direct and indirect loss of habitat as a result of the project. The outcomes of this restoration must result in an increase, over time, in the overall amount of undisturbed habitat within the Tweedsmuir Local Population Unit.*
>
> *2) Securement of Capoose High Elevation Ungulate Winter Range (11,059 ha) for a period of 50 years is a necessary part of the offset proposal.*

BW Gold also received a letter from ECCC on November 30, 2021, which clarified ECCC's views with respect to land securement, indicating that the long-term securement of the Capoose HE-UWR could represent an incremental benefit to caribou and thus contribute to the overall offsetting package when combined with meaningful amounts of habitat restoration (Appendix H).

BW Gold updated the CMMP to address these comments and in response to a meeting held between UFN, LDN, ECCC, BC EAO, FLNRORD, ENV, and EMLI on December 3, 2021. The updated CMMP, including Version 3 of an offset proposal, was submitted on December 31, 2021 to Indigenous Nations and regulators.

On January 21, 2022 BW Gold met with representatives of UFN, LDN, ECCC, BC EAO, EMLI, and FLNRORD to discuss the December 2021 draft CMMP. At that meeting, ECCC summarized their comments which were subsequently provided in writing on January 28, 2022. ECCC shared examples of offset calculations using the caribou version of the draft BC Habitat Offset Decision Support Tool (the DST), and suggested the DST represents a transparent, repeatable mechanism to inform offset ratios that includes each of the considerations required by federal condition 8.18.2. ECCC further indicated that the draft runs of the DST had been shared with FLNRORD, UFN and LDN; and that there was general agreement on the approach and DST inputs. ECCC also provided a range of potential conversion factors to translate the DST outputs of area of habitat to be offset through restoration to linear kilometers of roads, in the absence of a comprehensive GIS analysis that would consider overlapping buffers on specific roads planned for restoration, and account for buffers on roads that would not be restored. Finally, ECCC provided a range of cost estimates to restore the resultant amount of linear features. FLNRORD raised concerns about the Adaptive Management and Follow-up section of the draft CMMP, and comprehensive monitoring programs for caribou and moose were discussed.

On January 25, 2022 UFN and LDN provided comments on the Dec 2021 draft CMMP and a report that described five priority areas for restoration in the Tweedsmuir LPU and surrounding area (Appendix J). This document was discussed at a meeting with UFN, LDN, ECCC, EMLI, and FLNRORD on January 26, 2022, along with further discussion on monitoring, adaptive management, and inputs to the DST.

Following this meeting, BW Gold accepted the offsetting calculations, justifications, and assumptions proposed by ECCC and used these to update the CMMP. Version 4 of the offset proposal includes:

- A description of the area of habitat directly and indirectly impacted by the Project;
- A description of the securement of the portions of BW Gold's mineral licences underlying the Capoose HE-UWR;
- Offset ratios for securement and restoration based on the draft DST, and a description of the inputs and assumptions behind the ratios;
- Estimates of the costs for habitat restoration as part of the habitat offset;

- Areas proposed for restoration by UFN and LDN; and
- Next steps to implement the habitat offset.

BW Gold updated Section 4 (Offsetting) of the CMMP and delivered it to BC EAO, EMLI, ENV, FLNRORD, ECCC and Indigenous groups (UFN and LDN) for review on January 28, 2022. This section was returned on February 7, 2022 with comments and edits from ECCC, FLNRO, LDN, UFN, and BC ENV.

BW Gold updated Sections 5.7 (Habitat Suitability Mapping) and 6 (Adaptive Management) of the CMMP and delivered it to BC EAO, EMPR, EMLI, ENV, FLNRORD, ECCC and Indigenous groups (UFN and LDN) for review on February 28, 2022. This section was returned on March 2, 2022 with comments and edits from FLNRORD, ECCC, UFN and LDN.

BW Gold addressed the edits and comments and produced Version 4 of the offsetting proposal.

4.2 Project Impact Area

Habitat offset requirements began with a determination of Project-related habitat loss in the Tweedsmuir LPU range based on the habitat classifications described in Section 2.2. The loss of each type of caribou habitat (Section 2.1) was calculated for each Project phase (Table 4.2-1). Direct habitat loss was defined as a hybrid buffer with 3 km surrounding the open pit due to noise from blasting (to the height of land on Mt. Davidson) and other perceived disturbances by caribou, and with 500 m surrounding other mine infrastructure. The ECCC letter of November 5, 2021 indicates that the hybrid buffer should be used for offsetting. The FLNRORD letter of November 5, 2021 indicates that it would not object to the use the hybrid buffer.

Using the hybrid buffer, the Project impact area during construction and operation phases will be 4,716 ha (248 ha of HEWR and 4,468 ha of Matrix 1) and 1,825 ha in post closure, assuming reclamation is successful (Table 4.2-1). These values are the basis for the habitat offset.

Table 4.2-1: Characterization of Habitat Loss in the Blackwater Project Area

Project Phase and Area	HEWR (ha)	HE Matrix 1 (ha)	LE Matrix 1 (ha)	Matrix 1 (ha)	Total (ha)
CONSTRUCTION, OPERATIONS AND CLOSURE					
Mine Site Footprint					
Permanent features[1] not reclaimed	0	1,220	231	46	**1,497**
Permanent features[1] to be reclaimed	0	821	23	3	**847**
Total Mine Site Footprint	*0*	*2,041*	*254*	*49*	***2,343***
Disturbance Buffer					
Hybrid 3 km/500 m buffer	248	1,972	115	38	**2,373**
Total Mine Site Footprint + hybrid buffer	*248*	*4,013*	*369*	*86*	***4,716***
POST CLOSURE					
Assuming no Reclamation[1]					
Mine Site Footprint (reclaimed + not reclaimed)	0	2,041	254	49	**2,343**
Post Closure Buffer[2] on Road, WTP and TL	0	183	0	0	**183**
Mine Site Footprint (reclaimed and not reclaimed) + Buffer on Road, WTP and TL	*0*	*2,224*	*254*	*49*	***2,526***

Project Phase and Area	HEWR (ha)	HE Matrix 1 (ha)	LE Matrix 1 (ha)	Matrix 1 (ha)	Total (ha)
POST CLOSURE *(cont'd)*					
Assuming Reclamation Successful					
Mine Site Footprint (not reclaimed)[2]	0	1,220	231	46	**1,497**
Post Closure Buffer[3] on Road, WTP and TL	0	328	0	0	**328**
Mine Site Footprint (not reclaimed) + Buffer on Road, WTP and TL	*0*	*1,548*	*231*	*46*	***1,825***

Notes:

[1] The Project Effects Assessment and Cumulative Effects Assessment assumed that the entire area of the mine site footprint and closure disturbance buffer is lost permanently for caribou.

[2] Infrastructure that will not be reclaimed includes the open pit, tailings storage facility, transmission line, water treatment plant, and access road.

[3] Disturbance buffer used in Post Closure scenario is applied to active features, including the road, WTP and TL. Buffer area includes only those areas not already assumed lost in the footprint. The hybrid buffer is not applied in post-closure since there will be no open pit mining.

Road = Mine Site Access Road from the Kluskus FSR

WTP = Water Treatment Plant

TL = Transmission Line

4.3 Offsetting Plan

4.3.1 Introduction

This section identifies the offsetting plan for the Blackwater Project, containing three steps:

- Identify the area of habitat directly and indirectly lost, and appropriate offsetting ratios;
- Provide a land securement for the Capoose HE-UWR mineral leases; and
- Calculate the cost of removing sufficient forestry roads to address the remaining habitat offsetting needs.

4.3.2 Calculating Offset Ratios Using the Draft BC Habitat Offset Decision Support Tool

To support implementation of BC's 2014 Environmental Mitigation Policy and procedures, BC has developed a draft Habitat Offset Decision Support Tool (DST). The version used to inform this offsetting plan includes:

- BC Habitat Offset Decision Support Tool; Guidelines & Operational Manual, Trial Version 1.0, February 2019; and
- Draft Habitat Offset Decision Support Tool, Caribou version, Trial v1.3, September 14, 2021.

In light of the comfort expressed by ECCC, FLNRORD, LDN, and UFN with the use of the DST, BW Gold has used the runs of the tool completed by ECCC, with agreed-upon revised inputs, to calculate offset ratios.

The manual for the draft DST indicates the default baseline offset ratio is 8:1; and that, given the vulnerable state of caribou in BC, the caribou-specific version of the tool sets a baseline offset ratio of 10:1. The DST uses a series of mathematical equations to suggest an offset ratio based on user inputs for a given impact site and offset site.

ECCC evaluated several scenarios, including:

- Impacted areas of HEWR on Mt. Davidson being offset with a land securement in Capoose HEWR habitat;
- Impacted areas of Matrix 1 on the mine site being offset with land securement in Capoose HEWR habitat;
- Impacted areas of Matrix 1 on the mine site being offset with restoration of disturbed LEWR; and
- Impacted areas of Matrix 1 on the mine site being offset with restoration of disturbed Matrix 1.

Different assumptions were input for each scenario, with the DST being particularly sensitive to changes in the years of time lag between development of the impact site and the time when the benefits of conservation actions are realized, and the risk of failure of the conservation action.

Habitat Value Inputs to Draft BC Habitat Offset Decision Support Tool

Inputs to the draft DST to describe habitat for both impacted area and offsetting sites are listed in Table 4.3-1. One of the key inputs to the draft DST is Ecological Quality. The DST assigns a score to each of five possible inputs from Highest Quality to Low Quality. ECCC provided the following definitions in the DST shared with BW Gold on January 28, 2022 to support the inputs they used for the various impact and offset sites, for this project:

- "Highest – HE, in a range with minimal disturbance in HE (does not apply to Tweedsmuir range).
- High – HE, in a range with more than minimal disturbance in HE (e.g., Tweedsmuir); or Type 1 Matrix / LEWR, in a range with less than 65% disturbance in Type 1 Matrix and LEWR (does not apply to Tweedsmuir).
- Medium – LEWR, in a range with more than 65% disturbance in Type 1 Matrix and LEWR (e.g., Tweedsmuir).
- Moderate – Type 1 matrix, in a range with more than 65% disturbance in Type 1 Matrix and LEWR (e.g., Tweedsmuir); Type 2 Matrix.
- Low – Permanently disturbed.

The draft DST includes a series of modifiers for Ecological Quality that affect the calculated habitat value. In their example runs of the tool, ECCC focused on modifiers specific to caribou habitat. Where data was unknown, such as the regional distribution of invasive plants, the answers for both impact and offset areas were both left blank, which removes this variable from consideration in the calculation of offset ratios.

ERM reviewed the ECCC inputs to the draft DST and provided baseline data where unknowns were identified, including:

- Red-listed ecosystems are not found in HEWR, but are found at low elevations. These red-listed ecosystems are generally wetland associations (Table 4.3-1; Red-Listed Ecosystems);
- Species at risk are found in HEWR (whitebark pine) and LEWR and Matrix 1 (western toad and little brown myotis) (Table 4.3-1; Habitat Occupied by Other Species at Risk); and
- ERM also corrected one oversight – The HEWR on Mt. Davidson is located in a high elevation UWR for caribou (Table 4.3-1; UWR/WHA).

Inputs to the draft DST provided by ECCC on January 21, 2022 are summarized in Table 4.3-1. ERM's edits to address missing information and the three items listed above are identified in bold.

Table 4.3-1: Draft Habitat Offset Decision Support Tool Inputs for 2 Components of the Impact site (HEWR and Matrix) and 3 Offset Sites (Capoose HE-UWR, LEWR, Matrix)

Input Descriptor	Impact Site			Offset Sites			
	HEWR (248 ha)	Matrix (44,68 ha)	Justification / Assumptions etc.	Capoose	LEWR	Matrix	Justification / Assumptions etc.
Ecological Quality	High	Mod	Draft Calculator has a 5-point scale (Highest, High, Medium, Moderate, Low). See above for ECCC definitions.	High	Mod	Mod	Draft Calculator has a 5-point scale (Highest, High, Medium, Moderate, Low). See above for ECCC definitions.
Listed Species, Ecosystems, or Habitat Modifiers							
Critical Habitat (SARA)	Yes	Yes	The habitat is within the Tweedsmuir LPU, and is not permanently disturbed. It meets the description of CH included in Section 7.1 of the recovery strategy for the species, **and following mapping advice provided by the province during the EA Review phase (Section 2.2).** During the EA process, ECCC agreed with the Proponent's mapping which categorized the area as HEWR. Both HEWR and Matrix are categories of critical habitat for this species.	Yes	Yes	Yes	Same as impacted site.
Red-listed Sensitive Ecosystem	-	Yes	**The ESSFmp1 parkland on Mt. Davidson and Capoose are not considered red-listed ecosystems in BC.** **Several red-listed ecosystems occur in Matrix 1 across the landscape, including the mine site and likely all offsetting sites.**	-	Yes	Yes	Same as impacted site.
Habitat Currently Occupied by Species/ Ecosystem Under Consideration	unkn	unkn	For the mine site: Depends on the definition of "currently occupied". Recent aerial surveys by Blackwater Gold recorded caribou tracks on top of Mount Davidson and caribou may still use the area on a seasonal basis. The Capoose area shows abundant evidence of current occupancy by SMC.	Yes	unkn	unkn	The Capoose area shows abundant evidence of current occupancy by SMC. The exact location of the remaining restoration offset is unknown and so caribou occupancy can not yet be determined.

Input Descriptor	Impact Site			Offset Sites			
	HEWR (248 ha)	Matrix (44,68 ha)	Justification / Assumptions etc.	Capoose	LEWR	Matrix	Justification / Assumptions etc.
Listed Species, Ecosystems, or Habitat Modifiers *(cont'd)*							
Habitat Suitable for Species/ Ecosystem Under Consideration	Yes	Yes	As HEWR CH **and Type 1 Matrix CH** that currently possesses the necessary biophysical attributes, it is suitable for occupancy by the species.	Yes	Yes	Yes	Capoose is HEWR and UWR. Same as impact site.
Habitat Occupied by Other Listed Species	Yes	Yes	Given the number of species and how generally widespread they are, we assume this will be "yes" for at least some of the area.	**Yes**	**Yes**	**Yes**	Same as impacted site.
Impact on Other Listed Species or First Nations Species of Importance	-	Yes	HEWR doesn't include any part of the project footprint. **There will also be project effects on Whitebark pine which are being mitigated through restoration.** **Matrix 1 habitat will be removed and supports other SAR and species of importance to First Nations (moose).**	-	-	-	Unknown if offset site includes listed species.
Impact on Species of Concern	-	-	HEWR doesn't include any part of the project footprint.	-	-	-	Same as impacted site.
Localized Rarity or Scarcity of Ecosystem or Species	-	-	**HEWR and Matrix 1 are not common, but would not be considered rare within the context of availability in Entiako Park in the LPU.**	-	-	-	Same as impacted site.
Land Designations							
Provincial Park	No	No	No spatial overlap	No	No	No	For the purpose of a theoretical exercise, we chose the same inputs as the impact site. However, these could change for a scenario where the offset site is a known location.
Wildlife Management Area (WMA)	No	No	No spatial overlap	No	No	No	As above

Input Descriptor	Impact Site			Offset Sites			
	HEWR (248 ha)	Matrix (44,68 ha)	Justification / Assumptions etc.	Capoose	LEWR	Matrix	Justification / Assumptions etc.
Land Designations *(cont'd)*							
Ungulate Winter Range / Wildlife Habitat Areas	**Yes**	No	**HEWR overlaps caribou UWR u-7-012, unit HE-1-01.** Matrix 1 does not overlap UWR.	Yes	No	No	Capoose overlaps with Capoose UWR u-7-012, unit HE-4-01. **Some areas of LEWR and Matrix 1 overlap Low Elevation UWR.**
Land Act Reserves	No	No	No spatial overlap	No	No	No	As above
Proximity to Land with Designations or Conservation	No	No	No spatial overlap	No	No	No	As above
Lands Under Conservation Covenant	No	No	No spatial overlap	No	No	No	As above
Caribou Specific Modifiers							
High Elevation Winter Range	Yes	No	Per agreed upon mapping, this scenario applies specifically to the HEWR component of the project impacts.	Yes	No	No	Capoose overlaps with Capoose UWR **u-7-012, unit** HE-4-01.
High Elevation Summer Range	No	No	No spatial overlap	No	No	No	Same as impacted site.
Low Elevation Winter Range	No	No	No spatial overlap	No	Yes, new growth cedar hemlock	No	Same as impacted site. LEWR and Matrix 1 assumed to be disturbed.
Core Areas (Boreal Caribou)	No	No	Not applicable	No	No	No	Same as impacted site.

Input Descriptor	Impact Site			Offset Sites			
	HEWR (248 ha)	Matrix (44,68 ha)	Justification / Assumptions etc.	Capoose	LEWR	Matrix	Justification / Assumptions etc.
Additional Considerations							
Invasive Species Risk	-	-	Given the context is an EA condition requirement related to caribou, we opted not to include modifiers that were not directly related to caribou. If this was to be included, an analysis for the Capoose area would need to be completed. **Baseline surveys did not identify a priority invasive plant on the mine site.**	-	-	-	Given the context is an EA condition requirement related to caribou, we opted not to include modifiers that were not directly related to caribou. If this was to be included, an analysis for the Capoose area would need to be completed.
Functionality	-	-	ECCC is not of the view that the HEWR CH in this location needs emphasis at a local or regional level.	-	-	-	Same as impacted site.
Special Features	No	No	**No known mineral licks or other unique features occur in the HEWR on Mt. Davidson that would further increase the value of the impact site for caribou.**	No	No	No	Same as impacted site.
Cumulative Effects	Yes, above high bench mark	Yes, above high bench mark	Although this modifier was considered when assessing ecological quality, it is worth noting here given the importance of cumulative effects for caribou and the extent of existing disturbance in the LPU.	Yes, above high bench mark	Yes, above high bench mark	Yes, above high bench mark	Same as impacted site.

Conservation Actions Inputs to Draft Habitat Offset Decision Support Tool

The draft DST considers whether there is a plan for conservation action on the offset site, and the following factors, with the associated possible input values:

- **Type of conservation action** – restoration, enhancement, creation, or protection of habitat;
- **Offset risk** – approaches with a proven track record, an unproven/experimental record, or limited past success;
- **Offset duration** refers to the length of time the offset is protected – duration of the project impact (minimum length), continuing after the project impact, or permanent;
- **Discount rate** accounts for the perceived risk of failure – zero, low, medium or high; and
- **Time lag** is the number of years between the impact and the time when offset conservation actions are realized, or on a trajectory of reasonable certainty- 0 to a maximum of 20 years.

Inputs to the draft BC Offset Tool provided by ECCC on January 21, 2022 for the land securement of the Capoose HE-UWR and restoration of LEWR and Matrix 1 are listed in Tables 4.3-2 and 4.3-3, respectively.

Table 4.3-2: Selected Offset Inputs for Land Securement of the Capoose HE-UWR

Offset Component	Selected Input	Justification/Assumptions
Is there a plan?	Yes, the CMMP.	
Conservation Action Type & Offset Risk	Protection with proven track record	Protection (securement) has a proven track record in that it is effective at preventing further disturbance.
Offset Arrangement	Low Risk	Any protection measures that are put in place will be in the form of legally binding regulatory measures, so assume risk is low here.
Offset Duration	Permanent	Equating 50 years to permanent, as it's a meaningful amount of time.
Discount Rate	Low	The tool allows for discount rates of 0% (no risk of implementation failure), 3%, 5%, and 7% (very high risk of implementation failure). The tool is very sensitive to this input. Given the EA context, and that ultimate responsibility for securement lies with BC through regulatory measures (e.g., ELUA order), risk of failure is low.
Time Lag (years)	Zero	Assuming securement is in place immediately. Note that the tool is very sensitive to this input.

Table 4.3-3: Selected Offset Inputs for Restoration of Disturbed LEWR and Matrix 1

Offset Component	Selected Input	Justification/Assumptions
Is there a plan?	Yes, the CMMP.	
Conservation Action Type & Offset Risk	Restoration with proven track record	Key assumption that this offset scenario is for area to be restored. Although caribou habitat restoration is still a relatively new practice, and time lags for ecological restoration are long enough that results are not yet fully proven, the principle of restoring habitat (particularly in matrix areas), which will reduce overall disturbance, is a well supported approach consistent with the body of knowledge on caribou recovery. Functional restoration has been shown in the literature to reduce predator access and efficiency, which is key to reducing impacts to caribou, on a shorter timescale.

Offset Component	Selected Input	Justification/Assumptions
Offset Arrangement	Low Risk	We assume that in the context of legally binding EA conditions, the need for BC to be involved in tenure negotiations related to offset areas, and the availability of regulatory measures that regulate the scope of activities at the offset site, that risk is low.
Offset Duration	Duration of Project Impact	There is uncertainty around this input, in the absence of assurance that restored areas will be secured. However, based on forestry rotation cycles and the amount of planning needed to execute the restoration, it seems likely that restoration actions will remain in effect for at least the duration of the project impact.
Discount Rate	Low	The tool allows for discount rates of 0% (no risk of implementation failure), 3%, 5%, and 7% (very high risk of implementation failure). The tool is very sensitive to this input. Although we said that restoration in general has uncertain outcomes, our interpretation of this input is this is the risk that the implementation activities will not be completed (including monitoring and any ongoing activities such as replanting trees that die, etc.). Given the EA context, and that the Proponent will have legal obligations to complete the work in accordance with the final CMMP, we selected a Low (3%) risk.
Time Lag (years)	5	20 years is the maximum allowed by the tool (see section 2.3.5 of the Habitat Offset Decision Support Tool Manual). Given the objective is full ecological restoration (which likely takes >40 years), not only functional restoration, we could have selected the maximum number of years. The Manual indicates this should be sufficient time for the trajectory toward achieving the conservation goal to be apparent (i.e., if the restoration is going well after 20 years it's likely to continue going well for another 20+ years). However, there is also an argument to be made that the outcomes of functional restoration will be established relatively quickly (e.g., 1-5 years) and that the trajectory to ecological restoration be on track. For the purpose of this exercise we therefore chose a shorter timeframe of 5 years which allows time for delays in implementation etc. Note that the tool is very sensitive to this input.

Resulting Offset Ratios from Draft Habitat Offset Decision Support Tool

The runs of the draft DST provided by ECCC on January 21, 2022 included outputs of offset ratios for four scenarios that ECCC, FLNRORD, LDN, and UFN agree represent reasonable assumptions associated with the delivery of conservation actions, including location. As noted above, the caribou version of the draft DST has a baseline offset ratio of 10:1. Using the inputs in Tables 4.3-1, 4.3-2, and 4.3-3, each of the four scenarios resulted in a different offsetting ratio (Table 4.3-4. Note that the ERM edits identified in Table 4.3-1 resulted in small (<5%) changes in the offset ratios compared to the ECCC results.

Table 4.3-4: Offset Ratios from the Draft Habitat Offset Decision Support Tool for Four Likely Scenarios

Impacted Habitat	Offset Site	Conservation Action	Time Lag	Offsetting Ratio
HEWR	Capoose HEWR	Land securement	0 years	8.44 : 1
Matrix 1	Capoose HEWR	Land securement	0 years	6.20 : 1
Matrix 1	LEWR	Restoration	5 years	8.10 : 1
Matrix 1	Matrix 1	Restoration	5 years	9.82 : 1

On January 21, 2022, ECCC also presented the offset ratio outputs for additional scenarios with different assumptions and inputs (Table 4.3-5), in support of comments they previously provided with a range of ratios. These additional ratios provide key additional context to understand the chosen scenarios and their resulting ratios (Table 4.3-4). ERM has not reviewed the runs of the draft DST associated with these scenarios.

Table 4.3-5: Offset Ratios from the Draft Habitat Offset Decision Support Tool for Additional Scenarios

Impacted Habitat	Offset Site	Conservation Action	Time Lag	Offsetting Ratio
HEWR	Capoose HEWR	Land securement	15 years	13.22 : 1
Matrix 1	Capoose HEWR	Land securement	15 years	9.34 : 1
HEWR	HEWR	Restoration	20 years	20.91:1
Matrix 1	HEWR	Restoration	20 years	14.77:1
Matrix 1	LEWR	Restoration	12 years	12.86 : 1
Matrix 1	Matrix 1	Restoration	12 years	15.78 : 1

4.3.3 Offset Area Based on Ratios from the Draft Habitat Offset Decision Support Tool

The total offset area was calculated as follows:

1. Offsetting of HEWR and Matrix 1 through land securement of Capoose HE UWR (at ratios of 8.44 and 6.20, respectively, Table 4.3-4), which has a known size and was identified as an essential component of the offset plan by ECCC, BC, LDN, and UFN, and
2. Offsetting of any remaining Matrix 1 through restoration of LEWR and Matrix 1 (at ratios of 8.10 and 9.82, respectively; Table 4.3-4).

The total impact area to be offset is (Table 4.2-1): 248 ha of HEWR and 4,468 ha of Matrix 1.

The total area of Capoose is 11,059 ha, and the areas of HEWR and Matrix 1 that can be offset by the securement of Capoose is identified in Table 4.3-6.

Table 4.3-6: Offsetting HEWR and Matrix 1 at Capoose

Impacted Habitat	Impacted Area	Offset Site	Conservation Action	Offset Ratio	Offset Area
HEWR	248 ha	Capoose HE UWR	Securement (proven track record, low risk, permanent, low discount rate, 0 years time lag)	8.44	2,093 ha
Matrix 1	1,446 ha			6.2	8,966 ha
				Total	11,059 ha

After accounting for the securement of Capoose, there are 3,022 ha of Matrix 1 to be offset through restoration. For the purpose of the offset plan and in the absence of a detailed restoration plan at this time, it is assumed that this will occur through restoration of forestry roads, and that half the restoration will occur in LEWR and half in Matrix 1 (Table 4.3-7).

Table 4.3-7: Offsetting Remaining Matrix 1 through Restoration

Impacted Habitat	Impacted Area	Offset Site	Conservation Action	Offset Ratio	Offset area
Matrix 1	1,511 ha	LEWR	Restoration (5 year time lag)	8.10 : 1	12,239 ha
Matrix 1	1,511 ha	Matrix 1	Restoration (5 year time lag)	9.82 : 1	14,838 ha
				Total	27,077

4.3.4 Land Securement of Capoose Mineral Licenses

BW Gold understands that ECCC, UFN, LDN, and FLNRORD view the securement of the HE-UWR for a period of fifty (50) years as a necessary part of the offset proposal for the CMMP, as outlined in the November 30, 2021 (Joint Letter) and November 30 letter from ECCC (Appendices G and H).

As such, BW Gold shall defer the rights outlined in the *Mineral Tenure Act* and *Mines Act* that are associated with the mineral tenures associated with the Capoose HE-UWR that are displayed on Figure 4.3-1 and listed in Appendix I (the "**Deferral**").

BW Gold understands that ECCC, UFN, LDN, ENV, EMLI, and FLNRORD have, in recognition of the economic value of the rights that BW Gold has agreed to defer, committed to work with BW Gold on the development of a separate securement agreement that is anticipated to provide for collaborative reviews of the Deferral at least every 10 years ("**Periodic Reviews**"), with an additional review period targeted in advance of mine closure. The securement agreement is also expected to contemplate ENV, EMLI and FLNRORD developing and advancing suitable regulatory measures to establish a moratorium prohibiting provincial statutory decision makers from adjudicating applications for all resource development activities within the Capoose HE-UWR during the term of the Deferral, with certain exceptions.

The term of the Deferral will continue for 50 years from [the date of approval of this CMMP], unless ECCC, FLNRORD, UFN and LDN (or their successors) each provide BW Gold with written notification, or until the Periodic Reviews determine, that the Deferral is no longer necessary to support BW Gold's obligations to offset the environmental effects of the Project on caribou.

The Capoose HE-UWR represents approximately 11,000 ha of caribou habitat area. Owing to obligations under its existing exploration permits, BW Gold will be restoring the existing exploration trails in the Capoose HE-UWR (Section 5) and adaptively managing these roads to ensure they are set on the path towards functional caribou habitat (Section 6).

4.3.5 Costs for Restoration

Given the type of existing habitat disturbance in the Tweedsmuir LPU, forestry roads represent the majority of habitat restoration opportunities. To calculate the costs for habitat restoration outside of the Capoose area, BW Gold evaluated:

- The linear km of restored roads that are estimated to result in the target area of habitat restoration, following a procedure discussed at the meeting on January 21, 2022, and
- The costs of road restoration using values provided by FLNRORD (Meeting on December 3, 2021).

Area Restored by Road Restoration

When forestry roads are restored, the area on both sides of the road is considered to have benefitted from reduced access for harvesting and recreation, and reduced wolf traffic. As ECCC stated in their letter on November 5, 2021, a 500 m buffer can be applied to either side of each 1 km of road restored, leading to 100 ha of restored habitat. However, it is also necessary to factor in overlapping buffers when road densities are high, and to subtract buffers associated with roads that will not be restored.

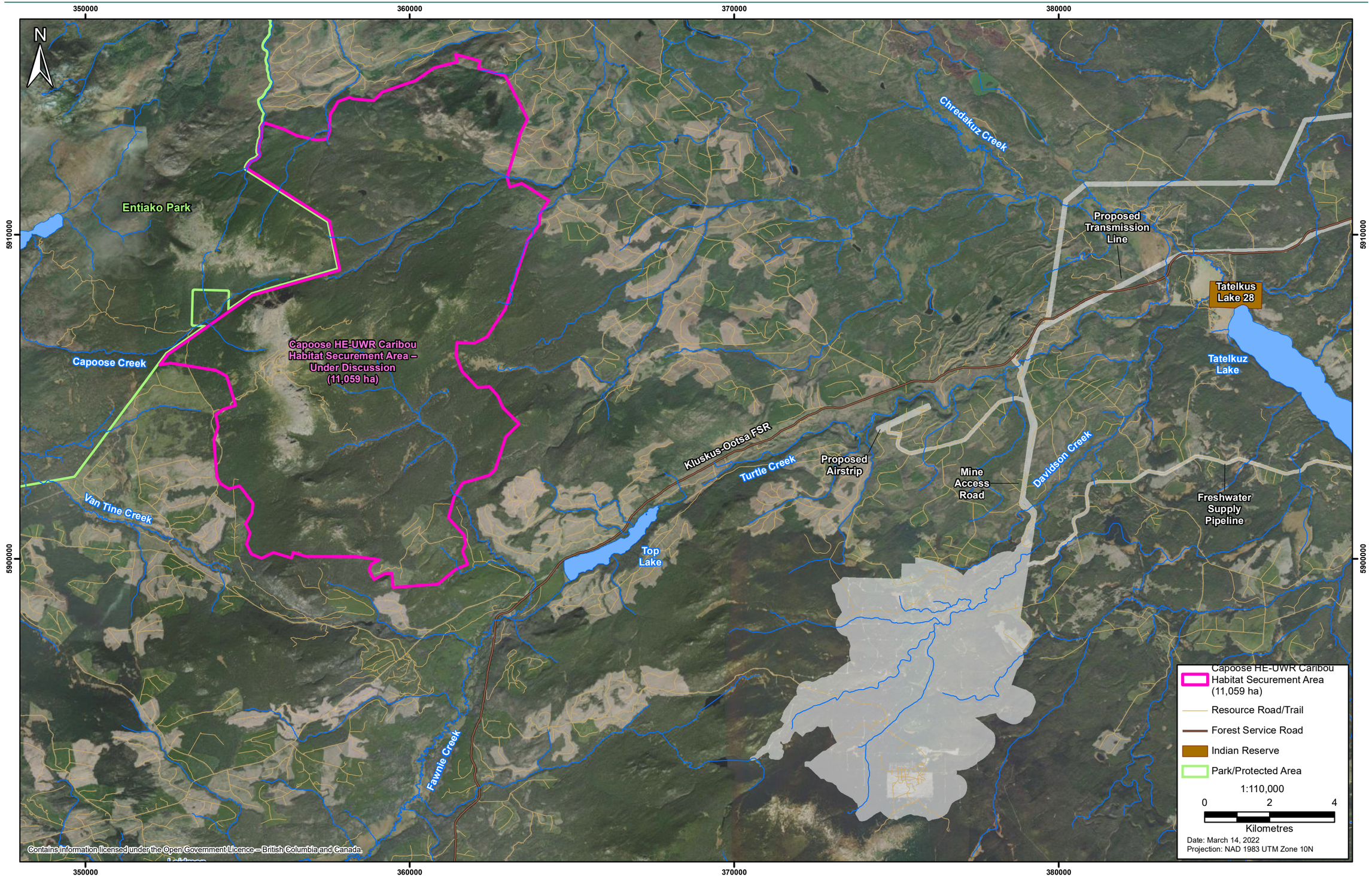


Figure 4.3-1 Capoose HE-UWR Caribou Habitat Securement Area

In the January 21, 2022 meeting, ECCC indicated that ideally, a GIS analysis based on known restoration locations would be completed in order to accurately estimate the km of road that would need to be restored to achieve the target restoration area. In the absence of a detailed restoration plan, expected to be developed by BC and Indigenous Nations, and which will require negotiations with forestry licensees, ECCC indicated that a conversion factor could be used to translate the area targeted for restoration to linear km of road to be restored, giving examples of 1.25, 1.5 and 2 times the square kilometers of restoration. BC, ECCC, UFN, and LDN have indicated their comfort with using 1.25 for the purposes of the offsetting plan.

Costs of Restoring Roads

In a presentation on December 3, 2021, FLNRORD indicated that the costs for restoring roads can range from $2,000 to $13,415/km of road:

- $2,000/km for roads with light deactivation or rehabilitation activities;
- $4-6,000/km for roads requiring a full re-contour of in-block spur roads;
- >$6,000/km for larger branch roads with culverts, capping, ditching and other features; and
- $13,415/km for restoration in the Quintette herd range including planning and implementation costs.

During the meeting on January 21, 2022, ECCC and BC indicated that $8,000 per km may be a reasonable estimate given that the Tweedsmuir LPU is heavily roaded, so there are likely to be efficiencies, and access is generally easier than in the Quintette example, but also factoring in cost increases since the projects on which FLNRORD's estimates were based were completed.

Area and Estimated Costs of Restoration

As indicated in Table 4.3-6, the offset area to be restored is calculated as 27,100 ha (271 km^2). A 1.25 conversion factor results in an estimated 338 km of roads to restore, which at $8,000 per km equals an estimated cost of $ 2,707,614.

4.3.6 Restoration Locations Proposed by UFN and LDN

As discussed in Section 4.1, UFN and LDN indicated in December 2021 that they would like to lead the implementation of the restoration program on the ground (Appendix J). On January 25, 2022, representatives for UFN and LDN presented a description of five priority locations for restoration to occur. The proposed areas and anticipated restoration outcomes presented at the meeting were (Figure 4.3-2):

- Chedakuz area – to regain caribou habitat next to Capoose and Entiako Park;
- Fawnie Corridor area – to regain connectivity between the Tweedsmuir and Itcha Ilgachuz herds across the Fawnie Mountain Range;
- Davidson Johnny Lake connector – to reconnect Mt. Davidson to the Johnny Lake UWR;
- Anahim area – to maintain connectivity between the Tweedsmuir, Itcha Ilgachuz and the Rainbows herds; and
- SERN BC area – included for completeness and because it includes areas adjacent to the Entiako and Tweedsmuir Parks, adjacent to UWRs and covers connectivity habitat for the herd.

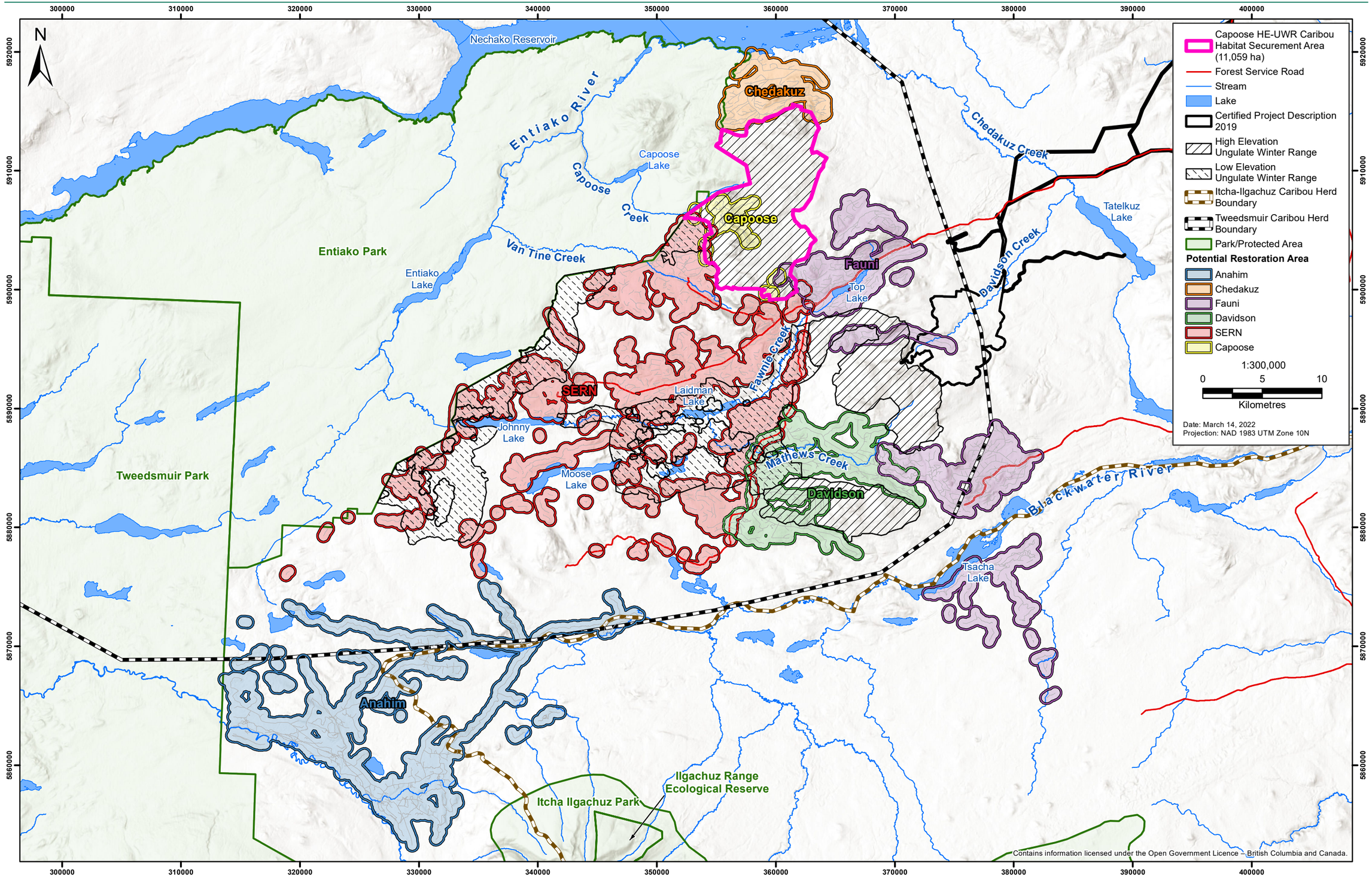


Figure 4.3-2: UFN/LDN Proposed Offsetting Areas

4.3.7 Implementing the Habitat Offset

Following acceptance of this plan by ECCC and EAO and with support from UFN and LDN BW Gold will take the following steps to implement the plan:

- Work with the BC government to implement the land securement of the portions of the mineral licenses underlying the Capoose HE-UWR;
- Continue good-faith negotiations with BC, UFN/LDN with the objective of executing and implementing the agreement in support of the securement of the Capoose high elevation UWR as overlapped by BW Gold Ltd's mineral tenures;
- Provide funding for the offsetting program described in Section 4.3; and
- Undertake the restoration of existing exploration roads in the Capoose area (Section 5) and monitoring of that restoration (Section 6).

With respect to the habitat restoration within the Tweedsmuir Local Population Unit, it is BW Gold's understanding that contributions toward restoration will be administered by an independent society or other arrangement established for the furtherance of the restoration initiatives, as determined by the BC Government and Indigenous groups.

BW Gold's contribution to the restoration initiatives will be in two tranches; one within 30 days of the start of early works construction and the second in equal payments over the first 5 years following commercial production. The mechanism for receiving and funding the offsetting program will be determined by BC in consultation with UFN/LDN and ECCC.On December 1, 2021, both the UFN and LDN provided a letter to BW indicating that they expect to lead the caribou habitat restoration activities. BW Gold understands that the restoration priorities will be determined and led by the UFN/LDN in conjunction with FLNRORD.

- UFN/LDN indicated that they would like to lead the research program to identify the final locations for offsetting via road removal, and other habitat augmentation programs.
- UFN/LDN would then be responsible for conducting the restoration steps for offsetting, including to identify restoration objectives, locations, consult with resource companies, implement the road removal, conduct monitoring on the offset and conduct any other activities necessary for implementation of the restoration work.

4.4 Summary of the Offset

The following provides a summary of the total impacts and offsetting measures in the offsetting plan.

- The total area lost and disturbed due to the Project is 248 ha of HEWR and 4,468 ha of Matrix 1.
- The BW Gold mineral tenures in the Capoose HE-UWR (an area of approximately 11,059 ha) will be secured against future development for a period of 50 years as described in Section 4.2.4.
- The securement of 11,059 ha of Capoose HEWR will account for the offset area associated with all 248 ha of impacted HEWR and 1,446 ha of impacted Matrix 1.
- The remaining 3,022 ha of impacted Matrix 1 will be offset through restoration of forestry roads, assuming half in LEWR and half in Matrix 1.
- The total area to be restored is 27,100 ha (271 km^2).
- Assuming a 1.25 multiplier to account for road overlap, 338 km of road at a cost of $8,000 per km equals an estimated cost of $ 2,707,614.
- UFN and LDN will lead the implementation of the offsetting program on the ground.

- UFN and LDN provided 5 draft areas for restoration. BC and Indigenous Nations will determine the final locations.
- This cost of the restoration program will be paid in two tranches; one within 30 days of the start of early works construction and the second in equal payments over the first 5 years following commercial production. The mechanism for receiving and funding the offsetting program will be determined by BC in consultation with UFN/LDN and ECCC.
- With the Capoose Securement of 11,059 ha and the first tranche of payment for restoration, 62% of the offset will occur within 30 d of the beginning of construction. By the start of commercial production, it is planned that approximately 30% of the disturbance at the mine site will be built out. By year 8, the mine reaches approximately 65% of the total footprint. The second tranche of payments for restoration, representing the remaining 38% of the offset, will occur during the first 5 years of commercial production.

4.5 Consideration of Migratory Birds and Species at Risk

Federal condition 8.18 requires BW Gold to take into account habitat needs for migratory birds and listed species at risk.

> "When developing the compensation plan, the Proponent shall take into account habitat needs for migratory birds and listed species at risk…"

For migratory birds and species at risk (forest birds, bats, western toads), the securement of Capoose HE-UWR mineral leases will provide an incremental benefit of habitat protection from mineral exploration for 50 years.

In addition, the restoration of forestry roads will have a benefit to migratory birds and species at risk, primarily through reducing habitat fragmentation and improving wetland hydrology and sediment transport. Prior to the boom in forestry operations that began in the 1980s, the area surrounding the Blackwater project would have consisted largely of mature stands of forest in the ESSF and SBS BEC zones. With forest harvesting, the forest landscape has been heavily fragmented by forestry roads and cut blocks of early and mid-seral trees. In addition, edge effects from roads and cut blocks have further degraded stands of mature forests.

The benefits of road removal on wetlands and habitat values are listed in the following sections.

Wetlands

Wetlands were identified as a Valued Ecosystem Component (VEC) in the EA (New Gold 2015). Roads can have a variety of impacts on their surroundings that can indirectly change wetland ecosystems. The effects of roads on their surrounding ecosystem start at construction and last throughout the roads lifespan. The removal of vegetation during road construction increases solar radiation reaching the ground which subsequently can effect an area's hydrologic processes (Pike and Scherer 2003).

Once constructed, the presence of roads can effect an areas hydrologic dynamic by changing the source and pathways water travels. Roads situated along natural drainage networks can change the path of runoff reaching streams and wetlands, leading to extreme peaks and lows in flow (Pike and Scherer 2003). Roads can also act as a source for sediments in waterways, and can increase sediment settling in low gradient wetlands (Tamblyn and Allen 1998).

Changes in the hydrologic dynamic and water flow patterns caused by road construction can change and deteriorate habitat conditions required to sustain a wetlands native vegetation community (Batllori-

Sampedro and Febles-Patron 1999). The Interim Guidelines for Wetland Protection and Conservation in British Columbia states the following about road effects on species within wetlands:

> "Roads in or close to wetlands can cause habitat loss through infilling or dewatering. Roads and crossings can also lead to habitat fragmentation. Once in place, roads can also facilitate the distribution of non-native species and provide opportunities for increased recreational impacts" (WSP 2009).

Roads can lead to higher mortality rates of animal species such as amphibians and reptiles as they move between wetlands. Increases in road mortality rates can alter population structures and in some cases lead to local population extirpation (Steen and Gibbs 2004; Gibbs and Shriver 2004).

Removal of forestry roads, culverts and re-grading slopes will therefore have several benefits to wetlands, including:

- Restoration of natural hydrologic flow;
- Restoration of sediment transport; and
- Restoration of habitat value for wildlife species that use wetlands, such as bats, amphibians and wetland birds.

Migratory Birds

Interior forest birds were identified as evaluated as a Valued Ecosystem Component (VEC) in the EA along with grassland birds. Fifty species of forest interior birds were identified during baseline studies, including nine federally or provincially listed species at risk.

Removal of forestry roads will assist migratory birds who prefer forest interiors by reducing fragmentation of the landscape and edge effects. The forest dwelling bird community will benefit from larger contiguous habitat patches and lower fragmentation resulting from the road restoration work in the offset area. This is supported by research indicating that smaller forest patches and more fragmented areas experience lower species richness, higher species turnover, and rarer occurrence among sensitive species (Boulinier et al. 2001; Martensen et al. 2008; Smith et al. 2011).

Species that forage and breed on or near wetlands will also benefit from road restoration and the subsequent improvements to wetland conditions. This includes four species at risk identified in baseline studies; horned grebe (*Podiceps auritus*), rusty blackbird (*Euphagus carolinus*), common nighthawk (*Chordeiles minor*), and greater yellowlegs (*Tringa melanoleuca*).

Greater yellowlegs are yellow listed in BC, and both feed and nest in marshes, ponds, lakes, wetlands and lagoons (BC CDC 2022). Horned grebes also breed on wetlands and are particularly sensitive to wetland condition, as they require stable water levels in wetlands during dry summer months for breeding success (COSEWIC 2009). Road removal is expected to have positive effect on wetland nesting birds by restoring the natural hydrologic flow regime and decreasing the likelihood of temporary loss or degradation of wetlands.

Road removal may also improve the abundance of food resources for species that forage over wetlands but do not necessarily breed near them, such as aerial insectivores. Two aerial insectivore species at risk were identified in baseline studies – bank swallow (*Riparia riparia*) and barn swallow (*Hirundo rustica*). However, these species have specific nesting habitat requirements that are more likely to be limiting than forage quality.

Other species identified in the study area use mature forest edges, such as olive-sided flycatcher (*Contopis cooperi*), while short-eared owl (*Asio flammeus*) prefer grasslands found at the northern end of

the transmission line. For these species road removal is not expected to substantively improve habitat conditions.

Bats (Little Brown Myotis)

Baseline studies indicate that there are between 9 and 12 bat species in the Project area, including the endangered little brown myotis (*Myotis lucifugus*). The COSEWIC status report on little brown myotis (COSEWIC 2013) indicates that the primary habitat requirements are:

> "Habitat for bats is composed of: 1) hibernacula for overwinter survival and 2) summering areas with suitable foraging areas within commuting range to structures used for roosting or maternity colonies. The habitat requirements of temperate-region bats vary by season."

The COSEWIC status report describes foraging habitats as:

> "Foraging occurs over water (mainly *M. lucifugus*, *P. subflavus*), along waterways, forest edges, and in gaps in the forest (mainly *M. septentrionalis*). Large open fields or clearcuts generally are avoided."

Little brown bats have a strong association with aquatic habitats, where they forage extensively on swarms of aquatic insects (Belwood and Fenton 1976; Saunders and Barclay 1992; Clare et al. 2014). The Wildlife Conservation Society of Canada indicates that loss of wetlands as foraging habitat is a major threat to bats:

> "Foraging habitat or areas where bats hunt for food may be eliminated or degraded as a result of draining wetlands, diverting waterways, eliminating ephemeral wet areas or reducing insect productivity as a result of toxic run-off or high rates of sedimentation."

Therefore, the plan to remove forestry roads, and resulting positive effects for wetland hydrology and sediment flow, should also benefit the aquatic insects favoured by bats and local bat populations.

Amphibians (Western Toad)

The COSEWIC status report on western toad (*Anaxyrus boreas*; COSEWIC 2012) identifies four major threats to western toads, including:

- Amphibian chytrid fungus;
- Habitat loss and fragmentation due to human settlement, agriculture, forestry, oil and gas industry, and transportation corridors, which can isolate sub-populations, leading to increased risk of extinction;
- Road mortality during mass migrations to and from breeding sites; and
- Several stressors including chemical pollution, pathogens such as Saprolegnia (introduced with stocked fish), and increased UV-B radiation, which may act independently or synergistically to reduce populations.

Forestry roads can affect western toads through the first three of these threats, with specific pathways being: 1) access to pass chytrid fungus to new populations, 2) altered wetland habitat, 3) habitat fragmentation, 4) road-related mortality, and 5) a breeding sink.

Anthropogenic threats to western toads include the wetland habitat destruction and degradation (Hammerson 1999) through alteration of water tables and timber harvest introduction of invasive species, and road-related mortality (Davis 2002; AmphibiaWeb 2022).

Forestry roads can create significant barriers to movement (Carr and Fahrig 2001) leading to habitat fragmentation. On a landscape scale, western toads likely exist as a meta-population – a group of small, linked populations – which are more susceptible to the effects of linear barriers. These low-density

populations are characterized by repeated small-scale extirpations of certain sub-populations, followed by subsequent recolonization from other linked sub-populations. With linear barriers and reduced immigration, areas are not re-colonized and populations can decline.

Even low traffic roads can cause considerable mortality, particularly during the breeding migration (Davis 2002; AmphibiaWeb 2022; Lesbarrères et al. 2004).

Forestry roads may also become a breeding sink, where toads breed in water-filled ditches that warm up early in the spring and attract toads for breeding (Wind and Dupuis 2002). Western toads utilize a variety of natural wetland areas for breeding, including man-made structures such as ditches and road ruts (Gyug 1996; COSEWIC 2012). However, these breeding sites are normally unsuccessful because they dry out too early, are too warm, and lack the heterogeneous microclimate conditions required for tadpole development (Stevens et al., 2006).

Removing forestry roads should reverse each of these five pathways for negative effects on western toad populations in the offset area.

5. HABITAT RESTORATION IN OFFSET AREAS

In Section 4 of the CMMP BW Gold has identified the costs of a habitat-based offset for the Blackwater Project, totalling $2,786,295. These costs are based on offsetting ratios, ecological equivalency and costs per km of roads restored provided by the NE Pilot Program for Caribou Road Restoration.

In their letter of December 1, 2021, both UFN and LDN indicated to BW Gold that they expect to lead the caribou habitat restoration activities. BW Gold understands that the restoration priorities will be determined and led by the UFN/LDN in conjunction with FLNRORD, with the exception being the exploration trails within the Capoose HE-UWR which BW Gold has exploration permit obligations to reclaim.

In this section, BW Gold identifies the background and process for restoring the exploration trails in the Capoose HE-UWR land securement. This program draws on the types of activities which have been required for restoration of exploration trails on Mt. Davidson to date and provides background on the scale of activities which result in the costs/km of restoring roads provided by FLNRORD on December 3 (see Section 4.3 for more information on costing).

This restoration program can be used as a conceptual model for the UFN/LDN and BC FLNRORD to consider in implementing the larger offsetting program. This section provides background and a process for designing the habitat restoration objectives for the offset, including:

- Draft restoration objectives based on discussions with LDN and UFN, and consideration of the Tactical Restoration Plan (Cichowski et al. 2020);
- BW Gold's reclamation program to date at Mt. Davidson, including lessons learned;
- Draft restoration methods based on lessons learned;
- Field surveys conducted in the offset area during 2021 to inform restoration planning; and
- Process for development of final restoration objectives and detailed prescriptions in collaboration with LDN and UFN following a field survey of the offset location.

Specific restoration prescriptions are not provided in the CMMP at this time. Based on discussions with LDN and UFN, the preferred approach is to determine the specific prescriptions following a field assessment of the offsetting area. BW Gold will provide the data collected in support of this program in summer 2021.

The final restoration objectives and methods will then be determined by UFN/LDN in conjunction with FLNRORD.

5.1 Functional Road Restoration

Based on discussions with LDN, UFN, consideration of the Tweedsmuir-Entiako Caribou (*Rangifer tarandus*) Tactical Restoration Plan (Cichowski et al. 2020), and professional judgement, the draft goals of restoration actions within the offset area are to restore caribou habitat by:

- Reducing predation by reducing linear corridors (forestry roads); and
- Decreasing human activity within caribou habitat.

The offsetting areas were chosen due to existing disturbances by forestry roads. The draft restoration objectives focus on functional restoration of the area – reduction in human and predator use of linear features to decrease predation of caribou Ray (2014).

This objective is in alignment with the Tactical Restoration Plan (Cichowski et al. 2020) that identifies the Vanderhoof subunit (that overlaps the offset area) as a priority area for restoration.

Most caribou habitat restoration initiatives in Canada are in boreal caribou habitat and are focused on restoring linear features from oil and gas development (ERM 2018; Golder 2015). Roads and linear features from industrial and recreational activities can increase the frequency of predator and caribou encounters (EC 2014; Whittington et al. 2011). Habitat alteration from industrial activities is associated with a decrease in: spatial separation between caribou, other prey species, and predators (Peters 2010); occupancy by caribou; adult caribou survival, and population of the Southern Mountain population (EC 2014; Wittmer et al. 2007). While Southern Mountain caribou are not a primary prey species for wolves, they are predated opportunistically, and can experience a significant population decline by wolf predation (EC 2014; Seip 1992; Stotyn 2008; Williamson-Ehlers 2012).

5.2 BW Gold Reclamation Experience on Mt. Davidson

BW Gold has experience reclaiming both high and low elevation trails, roads and drill pads within Tweedsmuir caribou habitat. The company completed reclamation activities at the exploration trail and drill sites in the UWR zones of the Mt Davidson and Capoose areas from 2016-2019. These sites were functionally restored and monitored by Avison Management Services (Avison 2016, 2017, 2018, 2019).

The objective of these reclamation activities was to return the areas disturbed by exploration to an undisturbed state through both functional restoration (blocking access) and ecological restoration (re-grading terrain, replacing soils and planting vegetation).

Original slope profiles and draining patterns on trails and drill pads were restored, and compacted surfaces were ripped. Topsoil and woody debris was applied, and a native seed mix with slow-release fertilizer was applied in select areas. Whitebark pine seedlings were planted on Mount Davidson in September of 2016.

Piled log barriers were used to assist in the deactivation of the main trail from the forestry road to the Capoose Mountain exploration area, however it was discovered in 2016 that recreational users cut through these. The log barriers were rebuilt and covered in soil, the hydraulic relief features were restored, and the first 30 m of the trail were seeded with a quick-growing reclamation seed mix (Avison 2016).

Annual monitoring of the reclaimed areas indicated success in ground cover growth and planted tree seedling survival (Photos 5.2-1 and 5.2-2). In September 2017, the Ministry of Energy and Mines inspector discouraged the used of seed unless necessitated by site conditions due to success of previous natural revegetation approaches (Photo 5.2-3). Monitoring has indicated that areas without seed or fertilizer were performing well, and that access barriers to the UWR were intact (Avison 2019).

BW Gold conducted this reclamation work with LDN and UFN members and will build on this experience in developing the draft and final prescriptions for the offset area.

5.3 Restoration Methods

The draft restoration plan is provided as a template for road removal as part of the BW Gold offset. It is drawn from:

- BW Gold practices for removing exploration trails on Mt. Davidson (Avison 2016, 2017, 2018, 2019);
- Road removal prescriptions provided by DWB Consulting Services: *Ulkatcho Restoration Prescriptions, West Chilcotin Forest Products Ltd.* (DWB 2019); and
- Standard practices currently used for woodland caribou and being tested by the provinces of BC and Alberta.

A)

B)

Source: Avison (2019)

Photo 5.2-1: DCP-13-008 at Capoose.

A) Immediately after reclamation was complete (September 17, 2017) with woody debris and a native seed mix appropriate to the Englemann Spruce-Subalpine Fir biogeoclimatic zone. B) 2019, two years after reclamation (August 8, 2019).

A)

B)

Source: Avison (2019)

Photo 5.2-2: The trail to CPRC-13-10 at Capoose.

A) September 2017, one year after reclamation (seeding with native seed mix and planting lodgepole pine seedlings). B) August 2019, three years after reclamation.

Source: Avison (2018)

Photo 5.2-3: Three years of natural revegetation at the reclaimed trail from the Blackwater Mt. Davidson Exploration Road toward pad DKR-15-003; no seeding was done at this site (September 2018).

The proposed restoration activities will be updated following field surveys in 2021 and ultimately finalized and led by LDN and UFN in conjunction with FLNRORD (Section 5.4).The following methods will be applied in the order listed to all linear features and areas disturbed by linear features and forestry within the selected offsetting location, the existing exploration access road (from its origin at the Kluskus-Ootsa FSR road to the mine site) and the Mt. Davidson Exploration Road.

5.3.1 Blocking Access

Blocking access for backcountry users is an important first step to implementing road removal. Backcountry users, including wildlife harvesters, fishers, etc., will maintain tracks as open. Blocking access through mechanical means, such as removing bridges and tree felling and piling (Photo 5.3-1) is advised. Placement of rocks, gates, or digging holes can also be used to block access to pickup trucks.

Following lessons learned (Section 5.2), BW Gold plans to block access using log barriers covered in soil with the hydraulic relief features restored. The first 30 m of the trail will be seeded with a quick-growing reclamation seed mix given recent experience restoring trails.

Source: Avison (2017)

Photo 5.3-1: Example of redistribution of timber felled during trail construction.

5.3.2 Mechanical Site Preparation

In order to restore linear features, mechanical site preparation on compacted sites such as road and trails is often recommended. Mounding is commonly used in wetter, low-lying areas to create microsites with improved drainage for seedlings in silviculture, and increased vegetation growth (Macadam and Bedford 1998; MacIsaac et al. 2004). Mounds are created by excavating a hole 0.75 m deep, and placing the excavated material placed beside the hole, with a density of 600-1,200 mounds/ha. Mounding is expected to be effective, depending on the intensity of implementation (NOVA 2020; Golder 2015; Pyper et al. 2014). In drier, upland areas, ripping may be used as site preparation. Both ripping and mounding will reduce soil compaction, mix soils, improve aeration, and create microsites for seed germination in passive and active revegetation. Mechanical site preparation may also decrease access on linear features by creating uneven surfaces that discourage the use by off-road vehicles (Golder 2015).

5.3.3 Tree Felling or Bending

Manually felling trees perpendicular to a linear feature decreases access, use, and line-of sight. Tree felling or bending mimics natural forest processes and can decrease the shade effect on an adjacent linear corridor, allowing more light penetration for vegetation growth (Photo 5.3-1). Felled trees will be distributed approximately every 15-20 m, with two or more trees felled from opposite sides of the line to reduce line of sight and access (Golder 2015). This method may be cost-effective for short sections of linear features or in steep or hazardous terrain where heavy equipment operation is not recommended. Creating barrier segments on linear features via tree felling or bending has an expected effectiveness of moderate to high depending on the intensity of implementation (NOVA 2020; Dickie et al. 2016; Pyper et al. 2014). Early results from the Cenovus Energy Linear Deactivation (LiDEA) project in north-eastern Alberta suggest that tree-felling has been successful in access control along corridors (Cenovus 2014).

5.3.4 Piling or Spreading of Woody Debris

Woody debris from felling or slash rollback may be used to reduce human and predator access on linear features, as well as provide erosion control, nutrients from decomposition, conservation of soil moisture, seedling protection from extreme weather or damage from wildlife or humans, and microsites for seed germination. Between 60-100 m^3/ha of woody material (10-25% coverage target) should be applied to upland reclaimed sites, and 30-50 m^3/ha on lowland reclaimed sites to mimic the amount of woody material found naturally (Vinge and Pyper 2012).

For barrier segments, debris should be arranged perpendicular to the linear feature to limit access and line-of-sight for predators (Photo 5.3-2). Debris should have a diameter of 12 cm or greater to discourage fire spread as fine fuels (BC MFLNRO 2012). Creating barrier segments with rollback is expected to have low to high effectiveness as an offset measure depending on the intensity of application (NOVA 2020; Dickie et al. 2016; Golder 2015; Pyper et al. 2014). It may be necessary to cover woody piles with soil to prevent recreational users from cutting through (Avison 2016). Excessive coarse woody debris, such as disturbance blowdown from fires and MPB, may obstruct caribou movement and final management prescriptions will consider whether this debris may need removal or dispersal. Woody obstructions along shorelines in Johnny Lake LE-UWR should be removed.

Source Avison (2016)

Photo 5.3-2: Log pile used to block access and sight lines for predators in the Emma main trail (September 2016).

5.3.5 Revegetation

Although the benefits are not immediate, revegetation can sometimes be used to accelerate the regeneration of community structure and composition of preferred caribou habitat. Revegetation activities should be combined with site preparation methods to maximize effectiveness (Photo 5.3-2). Effectiveness of this offset measure is considered high (NOVA 2020; Golder 2015; Osko and Glasgow 2010; Vinge and Pyper

2012), although previous reclamation activities at Blackwater with the natural revegetation approach have shown some success (Photo 5.3-3; Avison 2019).

Source Avison (2016)

Photo 5.3-3: Example of ripped exploration trail surface with woody debris pile in the background on the Emma main trail (September 2016).

5.3.5.1 Tree and Shrub Planting

Planting coniferous seedlings that are appropriate to the ESSF and SBS BEC zones in the offset area and site conditions will reduce access and line-of-sight, limit the growth of moose forage species, and accelerate habitat structure and composition development. When planting shrubs, select species such as Alder (*Alnus* spp.) that are not favoured moose forage to reduce prey habitat use. Planting trees and shrubs in groups in a staggered pattern can achieve restoration objectives faster (Cichowski et al. 2020).

BW Gold has an existing program to plant whitebark pine, a federally-listed species at risk, within restoration areas on Mt. Davidson and intends to use whitebark pine as part of the restoration for the Exploration Access Road and Mt. Davidson Exploration Road (Photo 5.3-4).

5.4 2021 Field Surveys in the Offset Area

During a meeting on April 7, 2021, UFN and LDN wildlife consultants suggested the BW Gold conduct a series of field surveys during the summer of 2021 in the offset area, which are listed below. The surveys followed the methods used to determine the Ulkatcho restoration prescriptions (DWB 2019). The results of these surveys will be used to define the detailed habitat restoration prescriptions to be used in the offset area.

In addition, Federal Condition 8.18 requires Habitat Suitability (HS) mapping of the prioritized offset area. BW Gold conducted field surveys of the offset area in 2021 with LDN and UFN to support this mapping.

Source Avison (2018)

Photo 5.3-4: Whitebark pine specimens growing in the reclaimed trail near pad DKR-15-003 on Mount Davidson (September 26, 2018).

The following was conducted in 2021 to evaluate caribou habitat in the offset areas and to inform the restoration prescriptions:

1. To support the production of 1:20,000 topographic maps of the offset area, aerial imagery was taken during August, September and October by Kisik Aerial Survey Inc., but the images of the offset locations were obscured by smoke and cloud on each attempt. The plan is to take new imagery during the spring of 2022.
2. Terrestrial Ecosystem Mapping (TEM) following RISC standards using aerial imagery to be collected during spring 2022.
3. Habitat suitability mapping for caribou habitat using the following standards:
    a. Provincial RISC standards;
    b. Critical Habitat definitions from the ECCC Recovery Strategy (EC 2014); and
    c. Provincial guidance on mapping provided during 2018 as part of the EA review.
4. TEM field plots were conducted in the Capoose and Johnny Lake areas following RISC standards to identify vegetation types and ground-truth vegetation mapping.
5. HS mapping field plots were conducted following RISC standards.
6. Trail cameras were installed in the offset area to identify timing of use by caribou, and the presence of moose and wolves.
7. Transects to determine lichen density were conducted following standard methods.

During 2021, the surveys were conducted to evaluate the restoration potential of forestry roads in and adjacent to the offset areas:

1. Wolf sightability – Survey road segments to determine how long is the road straight – greater or less than 100 m.
2. Soils – Conduct a survey of road segments and adjacent disturbed areas to determine if mechanical soil prescriptions (ripping or disking) are required. This survey will include an assessment of percent coarse fragments (%CF) and surface stoniness. Soil fertility will also be measured through collected soils samples to determine if any soil augmentation is required.
3. Vegetation – Conduct a survey of road segments to determine the current restoration state and potential of the road – is it already in-grown? What is the in-growth potential in future?
4. Access – Rate each road segment to determine the current state of access – are there quad trails? Pickup trails? Are trees in-growing? Are there natural access breaks such as removed bridges?

5.5 Finalizing Objectives and Restoration Activities

Field surveys were conducted to support the offsetting program during 2021 in the Capoose and Johnny Lake areas. BW Gold will summarize the data collected and provide the results to the UFN/LDN and FLNRORD, EMPR, ECCC and ENV.

On December 1, 2021, both UFN and LDN indicated to BW Gold that they expect to lead the caribou habitat restoration activities. BW Gold understands that the restoration priorities will be determined and led by the UFN/LDN in conjunction with FLNRORD (Section 4.6).

BW Gold will then work with the UFN and LDN to define final restoration prescriptions for the exploration trails and forestry roads in the Capoose area.

The objectives and methods for the larger habitat-based offsetting program will be determined by UFN/LDN and FLNRORD.

5.6 Non-Habitat-Based Offsetting

In addition to habitat-based offsetting, BW Gold will participate in a variety of non-habitat-based offsetting measures. BW Gold proposes to collaborate on caribou stewardship initiatives with Aboriginal Groups, and the provincial and federal government. BW Gold's involvement in regional initiatives to support non-habitat based activities may include:

- Providing input as an active stakeholder in the drafting of the Tweedsmuir herd plan.
- Sharing site specific information to support regional initiatives, including monitoring information.
- BW Gold will request to meet with FLNRORD and Aboriginal Groups to discuss opportunities for the Holder's Participation in provincial caribou regional initiatives and in initiatives related to caribou established under Section 5.2b)i.c. of the Hubulhsooninats'uhoot'alh: Foundation Framework Agreement (July 22, 2018, or as updated or replaced from time to time), between the Province and the Southern Dakelh Nation Alliance. BW Gold will organize the meeting when FLNRORD and/or Aboriginal Groups are ready to meet.
- Participating in Indigenous-led initiatives (as described in Section 4.6).

BW Gold understands that this document, the CMMP (V3) addresses points 3 and 4 on this list.

5.7 Habitat Suitability Mapping for the Offset Area

The federal DS and provincial EAC require that BW Gold must produce mapping for the caribou offset area:

- DS 8.18.3 – Field verified suitability mapping of areas to be prioritized for offsetting; and
- EAC 22.n – 1:20,000 scale topographic maps including UTM grid for areas proposed and secured for habitat-based offsetting.

To address these conditions, BW Gold intends to produce vegetation mapping (TEM) and habitat suitability models for the planned offsetting areas. To support this mapping, in 2021 BW Gold:

- Conducted field plots for TEM and habitat mapping in and within 5 km of the mine site, and in the Capoose and Johnny Lake areas proposed as a securement in August 2021 (Figure 5.7-1). Note that the offsetting area has been enlarged, as described in Section 4.2.5.
- Aerial photography the area bounded by Johnny Lake, the mine site and Capoose UWR was attempted in August, September, and October 2021, but was hampered by smoke and cloud cover.

During 2022, BW Gold plans to:

- Take aerial stereo-photos of the restoration offset locations proposed by the UFN/LDN (Section 4.2.6, Figure 4.2-2);
- Liaise with Indigenous groups, FLNRORD and ECCC on available data and proposed mapping methods;
- Conduct additional field plots in the updated offsetting area proposed by UFN/LDN (Section 4.2.6) to support TEM and habitat suitability with field participation from UFN/LDN and following provincial guidelines – RIC 1998, *Field Manual for Describing Terrestrial Ecosystems*;
- Conduct TEM for the updated offset area, following provincial guidelines – RIC 1998, *Standard for Terrestrial Ecosystems Mapping in British Columbia*;
- Conduct habitat suitability mapping for the updated offset area using any available TK or field data available from UFN/LDN and following provincial guidelines – RIC 1999, *British Columbia Wildlife Habitat Rating Standards Version 2.0*; and
- The results of TEM and habitat models will be presented in a report by the end of 2022.

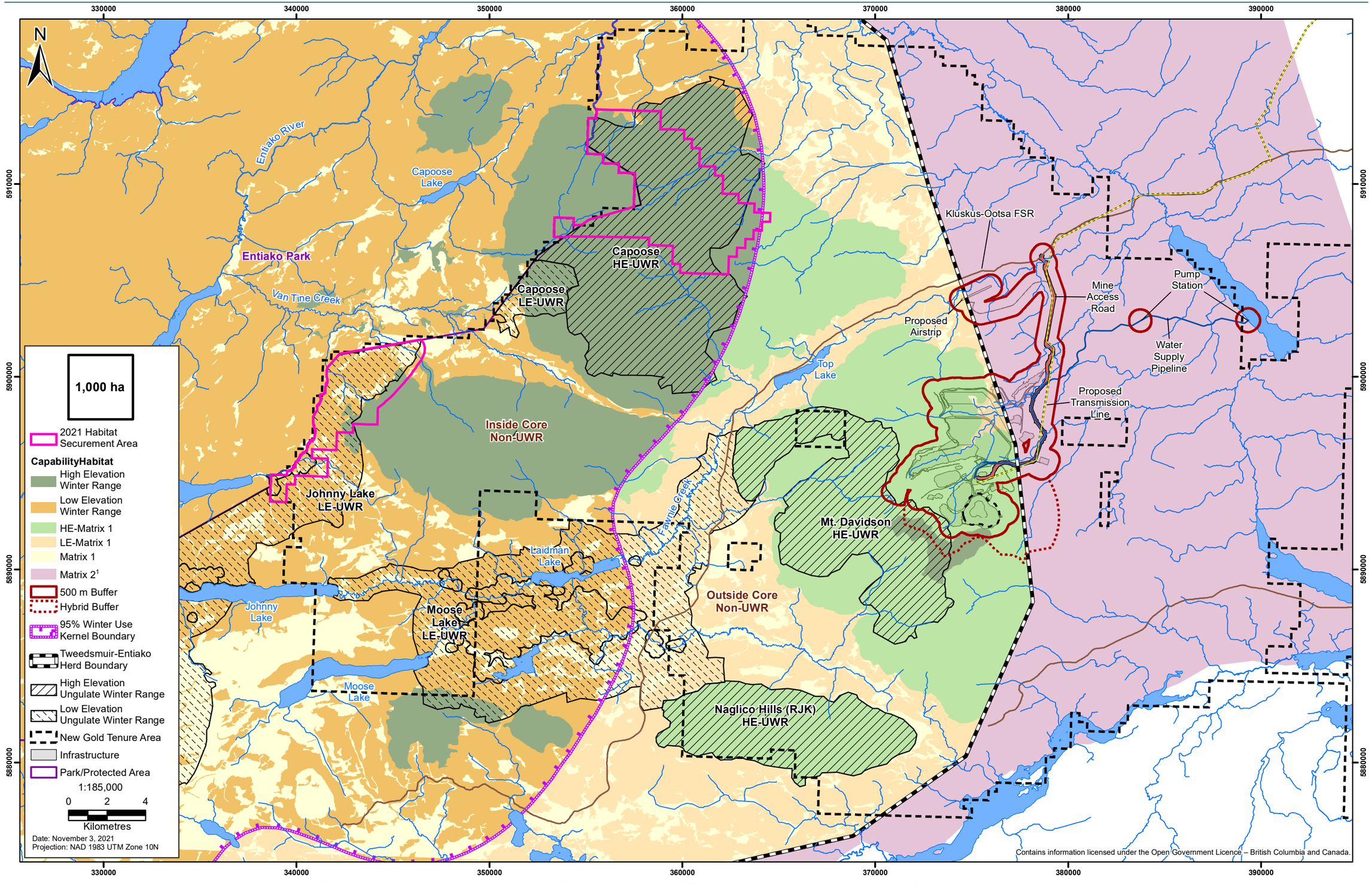


Figure 5.7-1: Candidate Offset Locations Proposed in August 2021, where Field Studies for TEM and HSM Conducted in 2021

6. ADAPTIVE MANAGEMENT AND FOLLOW-UP

6.1 Introduction

The CMMP is a living document that will evolve over time as part of adaptive management – in response to the results of the monitoring program, changing conditions or development at the Project, updates to scientific methods, and through consultation and discussions with Indigenous groups, regulators, or other stakeholders.

Adaptive Management is defined by the Canadian Environmental Assessment Agency as: “In general, adaptive management is a planned and systematic process for continuously improving environmental management practices by learning about their outcomes. Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project”.

6.1.1 Monitoring Program Requirements

The federal DS and provincial EAC have several requirements related to general monitoring plans and adaptive management, as well as specific requirements for caribou monitoring.

Follow-up Programs and Adaptive Management

Condition 3 of the EAC requires an adaptive management plan to provide a framework for identifying triggers to determine effectiveness of mitigation and whether additional mitigation is required to address effects of the Project on caribou. The monitoring and adaptive management plan, as defined in Condition 3(d) to 3(l) of the EAC, must include:

“3(d) the monitoring program that will be used including methods, location, frequency, timing and duration of the monitoring;

3(e) the baseline information that will be used, or collected where existing baseline information is insufficient, to support the monitoring program;

3(f) the scope, content and frequency of reporting of the monitoring results;

3(g) the identification of qualitative and quantitative triggers, which, when observed through monitoring required under paragraph d), will require the Holder to alter existing, or develop new, mitigation measures to avoid, reduce, and/or remediate effects;

3(h) methods that will be applied to detect when a numeric trigger, or type or level of change referred to in paragraph g) occurs;

3(i) a description of the process for and timing to alter existing mitigation measures or develop new mitigation measures to reduce or avoid effects;

3(j) identification of the new and/or altered mitigation measures that will be applied when any of the changes identified in paragraphs a) to c) occur, or the process by which those will be established and updated over the relevant timeframe for the specific condition;

3(k) the monitoring program that will be used to determine if the altered or new mitigation measures and/or remediation activities are effectively mitigating or remediating the effects and or avoiding potential effects; and

3(l) the scope, content and frequency of reporting on the implementation of altered or new mitigation measures.”

Similarly, the federal DS has requirements related to follow-up programs and adaptive management frameworks including:

"Definition 1.19

Follow-up program means a program for a) verifying the accuracy of the environmental assessment of a designated project; and b) determining the effectiveness of any mitigation measures, as defined in subsection 2(1) of the Canadian Environmental Assessment Act, 2012."

"2.5 The Proponent shall, where a follow-up program is a requirement of a condition set out in this Decision Statement, have a Qualified Professional, where such a qualification exists for the subject matter of the follow-up program, determine, as part of the development of each follow-up program and in consultation with the party or parties being consulted during the development, the following information:

2.5.1 the follow-up activities that must be undertaken by a qualified individual;

2.5.2 the methodology, location, frequency, timing and duration of monitoring associated with the follow-up program;

2.5.3 the scope, content, format and frequency of reporting of the results of the follow-up program;

2.5.4 the levels of environmental change relative to baseline conditions that would require the Proponent to implement modified or additional mitigation measure(s), including instances where the Proponent may require Designated Project activities to be stopped; and

2.5.5 the technically and economically feasible mitigation measures to be implemented by the Proponent if monitoring conducted as part of the follow-up program shows that the levels of environmental change referred to in condition 2.5.4 have been reached or exceeded.

2.6 The Proponent shall update and maintain the follow-up and adaptive management information referred to in condition 2.5 during the implementation of each follow-up program in consultation with the party or parties being consulted during the development of each follow-up program."

"2.9.2 Undertake monitoring and analysis to verify the accuracy of the environmental assessment as it pertains to the particular condition and/or to determine the effectiveness of any mitigation measure(s)"

Caribou Monitoring

The federal DS and provincial EAC also include specific monitoring requirements for caribou:

DS Condition 8.18

6) a description of the follow-up program the Proponent shall implement to determine the effectiveness of the mitigation measures included in the compensation plan. As part of the development of the follow-up program, the Proponent shall determine, in consultation with Indigenous groups, the methods, timing and frequency for conducting winter surveys for caribou abundance and distribution within the Designated Project area. The Proponent shall apply conditions 2.9 and 2.10 when implementing the follow-up program.

EAC Condition 22

> *c) the type, timing and frequency for undertaking caribou surveys prior to commencement of Construction, as well as during Operations, and how that information will inform development and implementation of monitoring and mitigation measures during Construction and Operations;*
>
> *d) provision of survey results to Aboriginal Groups, FLNRORD, EMPR and ENV;*
>
> *p) a monitoring program to determine the effectiveness of the offset*

6.1.2 Adaptive Management Framework

An adaptive management framework has been incorporated into the CMMP to meet regulatory requirements and the second objective for the CMMP (Section 1.1, second bullet). The CMMP applies the adaptive management framework shown in Figure 6.1-1 and described below.

Figure 6.1-1: Adaptive Management Framework

Plan: The CMMP represents the "plan" component of adaptive management and documents the proposed approach to mitigate and offset potential effects to caribou. The measures described meet federal DS and EAC conditions.

Do: BW Gold will implement the mitigation measures as described in Section 3 of the CMMP.

Monitor: The CMMP includes follow-up monitoring programs to test the effectiveness of the proposed mitigation and offset measures are provided in Section 5. The follow-up monitoring program is described in Sections 6.2 through 6.6 below.

BW Gold will review and update the monitoring program during the life of the mine in consultation with Indigenous groups, FLNRORD, ECCC, Impact Assessment Agency of Canada, and EAO. The review will include an assessment of the effectiveness of the mitigations and, if necessary, recommendations for changes to the monitoring plan, objectives, frequency, methods, or timing.

Adjust: The CMMP defines qualitative and quantitative triggers to measure the level of change relative to baseline conditions to assess whether mitigation measures need to be altered or additional mitigation measures implemented. Specific triggers and actions are included in the sections below.

6.1.3 Overview of Monitoring Programs

The caribou monitoring programs include adaptive management and details of the follow-up programs for caribou to address regulatory requirements listed in Section 6.1.1. The DS and EAC conditions contain three general monitoring requirements:

1. "Verify the accuracy of the environmental assessment", which includes all of the potential effects assessed, rather than those predicted to be residual effects (DS Condition 2.9.2).
2. "Determine the effectiveness of the mitigation measures" (DS Condition 2.9.2, 8.18.6).
3. "Determine the effectiveness of the offset" (EAC Condition 22).

The Application/EIS (New Gold 2015) and the updated effects assessment for caribou (ERM 2018; *Blackwater Gold Project: New Gold's Response to the May 25, 2018 Information Request from the Canadian Environmental Assessment Agency – Updated Assessment of Impacts to Southern Mountain Caribou and Proposed Caribou Offset*) evaluated five potential Project effects on caribou:

- Habitat loss and alteration;
- Changes in caribou population dynamics;
- Changes in caribou movement patterns;
- Mortality risk; and
- Changes in caribou health.

Habitat loss and alteration was the only variable predicted to result in a residual effect (ERM 2018). Habitat loss will occur in the Project footprint, and habitat alteration was predicted in a hybrid 3 km/500 m buffer surrounding the Project footprint. Habitat alteration was predicted to result in caribou avoidance within the buffer area.

The monitoring programs for caribou will therefore address each of these effects, as well as the effectiveness of the offset and mitigation measures. Specific program components will be:

1. Testing predictions of the environmental assessment
    a. Habitat loss in the mine footprint;
    b. Indirect habitat loss in the hybrid buffer, referencing possible mechanisms of avoidance monitored in other plans (noise, air quality, dust, soils and vegetation) and monitoring caribou distribution using:
        i. Pellet counts; and
        ii. Snow tracks.
    c. Changes in caribou population dynamics – monitored by the Province of BC;
    d. Changes in caribou movement patterns – monitored by the Province of BC;
    e. Mortality risk monitored through wildlife interactions and incidents; and
    f. Changes in caribou health – monitored in the Country Foods Monitoring Plan (CFMP).
2. Monitoring effectiveness of habitat restoration measures, by monitoring of restored roads for:
    a. Vegetation re-growth;
    b. Public access using trail cameras;
    c. Sight lines for wolves; and

   d. Wildlife use of restored roads – predators (wolves & bears) and alternate prey (moose) using trail cameras;

3. Monitoring effectiveness of habitat securement measures:
   a. Will be addressed through the process of periodic reviews of the habitat securement measures
4. Monitoring effectiveness of mitigation measures by:
   a. Referencing the physical parameters that may act on caribou (monitored in other plans: noise, air quality, dust, soils and vegetation); and
   b. Response of caribou described above in habitat loss, indirect habitat loss and avoidance, and mortality risk.

Each monitoring program will include a description of the program, baseline information used for comparison, reporting, identification of triggers, and a process for identifying and monitoring updated mitigation measures.

Indigenous Monitors

Indigenous Monitors will be involved in the monitoring programs for caribou, including field-based studies.

Related Monitoring Plans

Monitoring for caribou will be conducted as part of the broader wildlife monitoring program, as described in the WMMP. Several other monitoring programs will inform the monitoring programs in the WMMP, including:

- The Vegetation Management Plan (VMP) – The VMP will include monitoring for Project effects on vegetation, and in turn on wildlife habitat.
- Access Management Plan (AMP) – The AMP will include monitoring of the length of roads being constructed and decommissioned for the transmission line, and in turn on alteration of wildlife habitat.
- Air Quality and Fugitive Dust Management Plan (AQDMP) – The AQDMP will monitor for air quality surrounding the mine site.
- Country Foods Monitoring Plan (CFMP) – The CFMP will include dust and vegetation monitoring, and in turn alteration of wildlife habitat.
- The Reclamation and Closure Plan (RCP) – will include details on adaptive management that pertain to reclamation monitoring and effectiveness monitoring.

Adaptive Management Trigger Response Framework

Triggers are provided at the following action levels of the adaptive management framework: none, low, medium, and high. The framework is intended to provide an early-warning system such that when defined action levels (none, low, medium, and high) are triggered there is sufficient time to prevent adverse effects to caribou.

For each of the caribou CMMP monitoring components (testing effects assessment, evaluating success of offset and effectiveness of mitigation) the following is required for an effective trigger response framework:

- Definition of appropriate measurement endpoints and assessment endpoints, and action levels (none, low, and medium action levels) that will enable mitigation of Project-related effects prior to occurrence of adverse effects;
- Define the level of change that may result in effects to caribou (high action level);
- Define the process by which the Project-related effect will be assessed for each of the trigger levels;

- Identify the types of mitigations that may be implemented at each action level; and
- Define the reporting procedures for exceedances of trigger levels, including the information that will be provided in a response plan.

Reporting

Monitoring of predicted effects on wildlife valued components (VCs) and monitoring of mitigation efforts will be reported in the WMMP Report. A CMMP Report will also be produced that focuses on monitoring for caribou and of the effectiveness of the offsetting activities for caribou.

After the first two years of annual monitoring, data from all monitoring programs will be statistically assessed for power of detections and compared to set thresholds and triggers. Statistical analyses will be shared with the EAO, FLNRORD, and Aboriginal and Indigenous groups for engagement regarding potential updates to monitoring programs to address shortcomings in the data (e.g., changing the number or distribution of survey sites, frequency of monitoring, or survey methods).

See Section 7 for additional information on reporting.

6.2 Verifying Accuracy of Effects Assessment

The monitoring program to address predicted effects for caribou includes all five potential effects which were evaluated in the EAC Application (New Gold 2015). For the purposes of this monitoring program, habitat loss (in the mine footprint) and alteration (in the 3 km/500 m hybrid buffer around the Project footprint) are addressed separately, yielding six monitoring programs:

- Habitat loss and degradation in the mine footprint;
- Indirect habitat loss in the hybrid buffer;
- Changes in caribou population dynamics;
- Changes in caribou movement patterns;
- Mortality risk; and
- Changes in caribou health.

6.2.1 Direct Habitat Loss

The updated assessment of potential effect on caribou (ERM 2018) predicted that habitat would be lost for caribou in the mine site, with a total of 2,343 ha of Matrix 1 critical habitat removed. Monitoring will be conducted to track habitat loss and compare to predictions.

Objectives

- To track direct habitat loss of Matrix 1 critical habitat in the mine site footprint; and
- Compare the area of lost habitat to the prediction of 2,343 ha of Matrix 1.

Existing Field Data

Existing field and mapping data include:

- Vegetation mapping (TEM) and habitat suitability mapping were conducted for the Project area in 2012 and are being updated in 2022.

- TEM and habitat suitability field plots were conducted in 2011, 2012 and 2021 to validate the existing 2012 mapping and support the updated mapping to be conducted in 2022.
- Existing disturbances due to forestry, roads and exploration activities have also been mapped.
- The spatial distribution of HEWR and UWR on Mt. Davidson are also available.

Performance Indicators

- Yearly tracking of habitat loss; and
- Removing less than the predicted amount of Matrix 1 critical habitat.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The study area will include the mine site footprint in the Certified Project Description and any associated infrastructure, plus a 500 m buffer.

Data Collection – Survey Methods and Analysis

Monitoring of direct habitat loss will be conducted through a GIS analysis comparing the Project "as built" footprint taken from engineering CAD drawings to the Certified Project Description. The types of habitat removed will be reported from vegetation mapping (TEM) and habitat suitability mapping.

Schedule

Habitat loss will be calculated on an annual basis ending with March 31 of each year following the start of construction through to the end of reclamation.

Triggers, Thresholds and Adaptive Management Response

Triggers and potential management responses are described for each action level depending on measured habitat loss (Table 6.2-1). The management actions listed are not exclusive, as the adaptive management framework needs to be flexible enough to enable the tailoring of specific management responses at each action level to the types of actions most likely to be able to address the root cause of the identified changes.

Table 6.2-1: Triggers and Management Responses for Direct Habitat Loss

Level	Trigger	Management Response
None	■ <80% of predicted habitat loss (2,343 ha of Matrix 1); and ■ No direct loss of HEWR.	■ No management change. ■ Continue monitoring.
Low	■ >80% of predicted habitat loss (2,343 ha of Matrix 1); and ■ No direct loss of HEWR.	■ Review if any mine plan changes may result in future exceedance of predicted habitat loss. ■ Continue monitoring.
Medium	■ >90% of predicted habitat loss (2,343 ha of Matrix 1); and ■ No direct loss of HEWR.	■ Review if additional permitting or changes to the project certificate are required to address planned area of habitat loss. ■ Continue monitoring.

Level	Trigger	Management Response
High	■ >100% of predicted habitat loss (2,343 ha of Matrix 1); or ■ Direct loss of HEWR.	■ Report exceedance to BC EAO. ■ Conduct permitting or changes to the project certificate to address area of habitat loss. ■ Continue monitoring.

Reporting

- The results of monitoring, any exceedances of triggers and management responses will be reported annually as part of the wildlife monitoring program (WMMP).
- See Section 7 for more information on reporting.

6.2.2 Indirect Habitat Loss Surrounding the Mine Site

The updated effects assessment for caribou (ERM 2018) predicted that habitat may be altered and/or caribou may avoid the mine in a hybrid buffer surrounding the mine site, with a total of 248 ha of HEWR and 2,125 ha of Matrix 1 critical habitat affected. The habitat in this area would not be removed, but it was predicted that caribou would avoid this habitat, resulting in indirect habitat loss. The effects assessment also predicted that moose may avoid the mine site. As such, the programs for monitoring caribou and moose avoidance are shared.

Research indicates that caribou avoid industrial sites in Canada (EC 2014), however the mechanism that causes this avoidance is not well understood. Avoidance could occur due to noise pollution, vehicle traffic, avoidance of people, large ecological changes to the local area, lower air quality, increased dust, or altered vegetation. Monitoring of indirect habitat loss will include monitoring for potential causes of avoidance and the response of caribou (whether they are avoiding the mine site).

During the review of the EAC Application, the plan for long-term effects monitoring for caribou and moose was to use aerial surveys (ERM 2018). EAC and DS conditions therefore reflect this understanding:

- DS 8.18 "*a description of the follow-up program the Proponent shall implement to determine the effectiveness of the mitigation measures included in the compensation plan. As part of the development of the follow-up program, the Proponent shall determine, in consultation with Indigenous groups, the methods, timing and frequency for conducting winter surveys for caribou abundance and distribution within the Designated Project area…*"
- DS 6.14 *"…as part of the implementation of the follow-up program, the Proponent shall conduct winter distribution and density surveys for moose (*Alces alces*) starting prior to construction and until the end of operation…"*
- EAC 22.c "*the type, timing and frequency for undertaking caribou surveys prior to commencement of Construction, as well as during Operations, and how that information will inform development and implementation of monitoring and mitigation measures during Construction and Operations"*

BW Gold also made commitments during the review of the EAC Application to conduct aerial surveys:

- 8.36 and 13.33 – *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*
- 13.18 – *Conduct moose aerial surveys prior to the commencement of construction, and subsequently every five years until the end of mine operations*

Earlier versions (August and December 2021) of the CMMP included aerial surveys for caribou and moose to determine whether these animals were avoiding the mine. Both FLNRORD and UFN/LDN provided formal comments during their review of the CMMP (Version 2 and 3, August and December 2021) that aerial surveys are not the best method to determine if caribou and moose are avoiding the mine.

BW Gold met with FLNRORD, ECCC and UFN/LDN on January 26th, 2022 to discuss the monitoring program. At that time, FLNRORD indicated that the province is already doing aerial surveys for moose population and composition estimates and caribou population estimates, caribou herd composition, and caribou calf survival estimates in the Tweedsmuir area and would prefer that BW Gold:

1. contact the province in September each year to discuss data sharing of provincial data, and
2. conduct pellet counts and/or snow track surveys to measure relative distribution of caribou and moose in lieu of aerial surveys.

The parties on the call agreed that this is the preferred approach, including ECCC, FLNRORD and UFN/LDN.

As such, based on this feedback and direction, BW Gold is not proposing any aerial surveys for caribou or moose as part of the monitoring program. Assessment of any caribou avoidance of the mine will be measured by monitoring pellet counts (Section 6.2.2.1) and snow track surveys (Section 6.2.2.2) and use of Provincial telemetry and survey data where appropriate.

Potential causes of disturbance to caribou will be monitored through other monitoring programs and will be referred to in the annual WMMP report, including:

- Noise monitoring in the Noise and Vibration Effect Mitigation and Monitoring Plan (NVEMMP);
- Air quality monitoring in the Air Quality and Dust Management Plan (AQDMP);
- Dust monitoring in the Country Foods Management Plan (CFMP); and
- Soil, vegetation and berry monitoring in the CFMP.

Note that avoidance behaviours have been reported for caribou, but the causes are largely unknown. Some potential causes, such as human presence, smell, altered predation risk or subtle interactions between effects may not be quantifiable by this monitoring program.

6.2.2.1 Caribou Avoidance Monitoring – Pellet Counts

The relative abundance/habitat use of caribou and moose will be monitored via pellet counts over time. Each species has identifiable pellets which change with diet differences by season (winter vs summer) and remain on the ground for a year or more; degradation of pellets also indicate whether the sign is fresh within the last year or not.

Objectives

- To determine whether there is a change relative abundance by caribou, relative to the mine site; and
- To determine whether there is a change relative abundance by moose, relative to the mine site.

Existing Field Data

Observations of both moose and caribou pellets were made in the summer of 2021 during habitat suitability fieldwork and incidentally during other surveys in the mine site Local Study Area (covering roughly 1 km buffer around the Project footprint). Moose pellets were abundant and observed daily, while caribou pellets were rare compared to moose pellets, with approximately 10-15 observations.

Performance Indicators

- Yearly estimates of caribou and moose relative abundance surrounding the mine site.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The study area for pellet count surveys will include the mine site and a 10 km buffer area. The pellet count program is designed as a Before-After, Control-Impact (BACI) study.

- Sampling will occur in transects, with 10 transects in each designated study zone:
- Four Potential Impact Zones
    a. < 500 m from the mine site;
    b. Between 500 m and 1 km from the mine site;
    c. Between 1 and 3 km from the mine site; and
    d. Between 3 and 5 km from the mine site.
- One Control Zone between 5 and 10 km from the mine site.

Development of the mine will occur during the construction phase, generally starting from the centre and building outwards towards the eventual final footprint. During the early years of construction, mining activities will be in the centre of the footprint, 1-3 km from the future edge of the final footprint – the 0 km mark in this study.

Therefore all samples in any zones > 4 km from the edge of the existing mine footprint will be considered "Before" impact. In this manner, data collection can occur with updates to the potential impact zones based on the rate of construction and expansion of the mine each year (Figure 6.2-1).

Data Collection – Survey Methods

Survey methods will follow RIC 1998, *Ground-based Inventory Methods for Selected Ungulates: Moose, Elk and Deer.* Survey transects will be stratified by habitat type as much as possible within each study zone, to cover suitable caribou habitat types such as lowland mesic forest and dry forest sites proportional to the amount of habitat in each zone. Study zones closest to the mine site may only have one habitat type, and therefore may not allow for stratification. BW Gold aims to collaborate with Indigenous technicians on all field surveys.

Ideally, the same sampling methods can be used for both caribou and moose, however field observations indicate that caribou pellets are much less common than moose pellets (ERM – *personal observation*). Therefore, the first year of surveys will use two methods for sampling to investigate which method is best for both species. The two survey methods will be:

1. The standard pellet count methods, using transects with repeated sample circles (RIC 1998).
    a. Sampling will occur in spring;
    b. Ten sampling circles per transect, spaced 15 m along transect line;
    c. Each circle has a 1.7 m radius, centers will be marked with a staked and ferromagnetic marker;
    d. All pellets/pellet piles in the circle will be counted, then cleared.
2. Distance sampling of pellets will also be conducted during the first year (RIC 1998), which may to be a more appropriate method for detecting caribou, given the lower density of pellets.
    a. Sampling will occur in spring;
    b. Ten sample points spaced evenly at 18 m along transect line;
    c. Search within 10 m of each sample point to locate the nearest pellets, and record the distance between the pellets and the sample point.

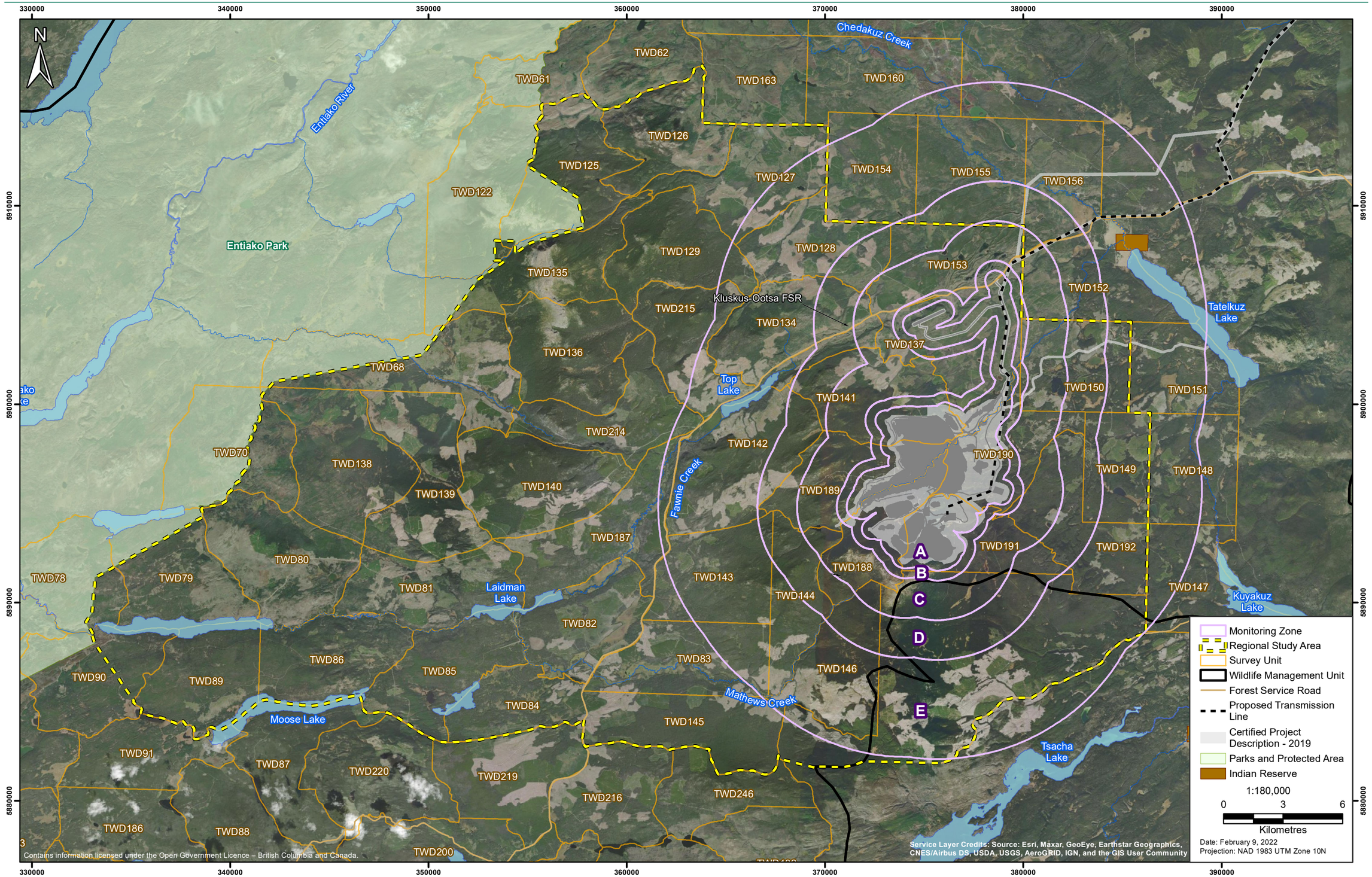


Figure 6.2-1: Study Area for Pellet Counts and Snowtrack Surveys

Following the first year of study, an analysis will be conducted to determine which method will be used for the remainder of the study – transect sampling or distance sampling – based on level of field effort and detection levels of caribou and moose pellets for each method. The first year of sampling will be conducted in spring/summer 2022.

Analysis

Pellet count data will be assessed using a BACI analysis to test the interaction between study zone type (control vs impact) and time period (before vs. after). The analysis will include a random effect due to repeated measurements at transects and include covariates to control for habitat type. In addition, pairwise comparisons will be conducted to compare each impact zone (A-D) to control (E) to explore more precisely the distances at which a potential effect is detected.

Schedule

- Pellet counts will occur every year during construction and the first 5 years of operations.
- After the first year of sampling an analysis will be conducted to evaluate power to detect change, whether there are any updates to the program required and to inform the decision between pellet counts and snow tracks as a long term monitoring tool.
- After the first 5 years, a comprehensive analysis will be conducted to inform whether to continue sampling every year or go to a schedule of sampling every 3 years. BW Gold will consult with ECCC, FLNRORD and Indigenous groups on the outcome of this analysis and plan for continued sampling.

Triggers, Thresholds and Adaptive Management Response

Triggers and potential management responses are described for each action level depending on estimated caribou avoidance of the mine site (Table 6.2-2). The management actions listed are not exclusive, as the adaptive management framework needs to be flexible enough to enable the tailoring of specific management responses at each action level to the types of actions most likely to be able to address the root cause of the identified changes.

Table 6.2-2: Triggers and Management Responses for Avoidance of Mine Site

Level	Trigger	Management Response
None	■ No detectable avoidance of the mine.	■ No management change. ■ Continue monitoring.
Low	■ Detectable avoidance of the mine.	■ No management change. ■ Continue monitoring.
Medium	■ Detectable avoidance of the mine. ■ Effect size of 50% reduction in relative density within any of the surveyed areas (A to E).	■ Compare area of avoidance with data from monitoring programs for noise, air quality, dust, and metals in soils and vegetation to determine what mechanism may be causing caribou/moose to avoid the mine site. ■ For an identified potential cause of avoidance, add mitigation measures to reduce effect. ■ Continue monitoring.

Level	Trigger	Management Response
High	■ Detectable avoidance of the mine. ■ Effect size of 80% reduction in relative density within any of the surveyed areas (A to E).	■ Compare area of avoidance with data from monitoring programs for noise, air quality, dust, and metals in soils and vegetation to determine what mechanism may be causing caribou/moose to avoid the mine site. ■ Implement adaptive management to further control noise, air quality or dust based on results of comparisons/research above. ■ Continue monitoring.

Reporting

- The results of monitoring, any exceedances of triggers and management responses will be reported annually as part of the wildlife monitoring program (WMMP).
- See Section 7 for more information on reporting.

6.2.2.2 Caribou Avoidance Monitoring – Snow Tracks

Protocols for ungulate snow track surveys recommend ground-based monitoring (in RIC 2006 *Ground-based Inventory Methods for Ungulate Snow-track Surveys*). However, ground-based snow track survey in 2012 did not observe caribou tracks, while aerial surveys did report caribou snow tracks, but at low rates.

As a consequence, during the first year of study, BW Gold will conduct both aerial and ground-based surveys for caribou snow tracks and compare the data obtained to decide on whether either method can be used as a monitoring tool in this location.

Objectives

1. To test whether aerial or ground-based surveys are better for determining avoidance of the mine by caribou.
2. To determine whether there is a change in relative abundance (measured through track counts) by caribou through time, relative to the mine site.
3. To determine whether there is a change in relative abundance (measured through track counts) by moose through time, relative to the mine site.

Existing Field Data

Ground-based and aerial surveys have been completed for the project, including:

- Ground-based survey for snow tracks in March 2012 (~100 km) reported 34 moose tracks, but not caribou tracks;
- Aerial survey for animals in December 2015 (~230 km) reported 9 moose, but no caribou;
- Aerial survey for animals in February 2018 (~250 km) reported 10 adult moose, 2 calves, and no caribou. One incidental observation of a mid-sized ungulate was observed in the BAFA on Mt. Davidson which was likely a caribou; and
- Aerial survey for animals and snow tracks in December 2021 (~200 km) reported 47 moose tracks and three caribou tracks.

Based on these data, an aerial survey focusing on snow tracks may have a higher success of recording caribou tracks than a ground-based survey, and may provide better data on whether caribou are avoiding the mine. Both methods would likely work equally well for moose.

Ground-Based Snow-Track Surveys, 2012

Snow track surveys were conducted as part of the baseline program for the Project in 2012 by Ecofor Consulting Ltd. Surveys were conducted along 15 transects on roads, forestry tracks and seismic lines over 5 days in March, 2012, covering 97.4 km of transect (Figure 6.2-2, Photo 6.2-1). Surveys were conducted in BAFA on top of Mt. Davidson, ESSF at high elevation and SBS at low elevation. Forest communities were classified into four groups; immature coniferous – pine and three types mature coniferous – pine, spruce and sub-alpine fir.

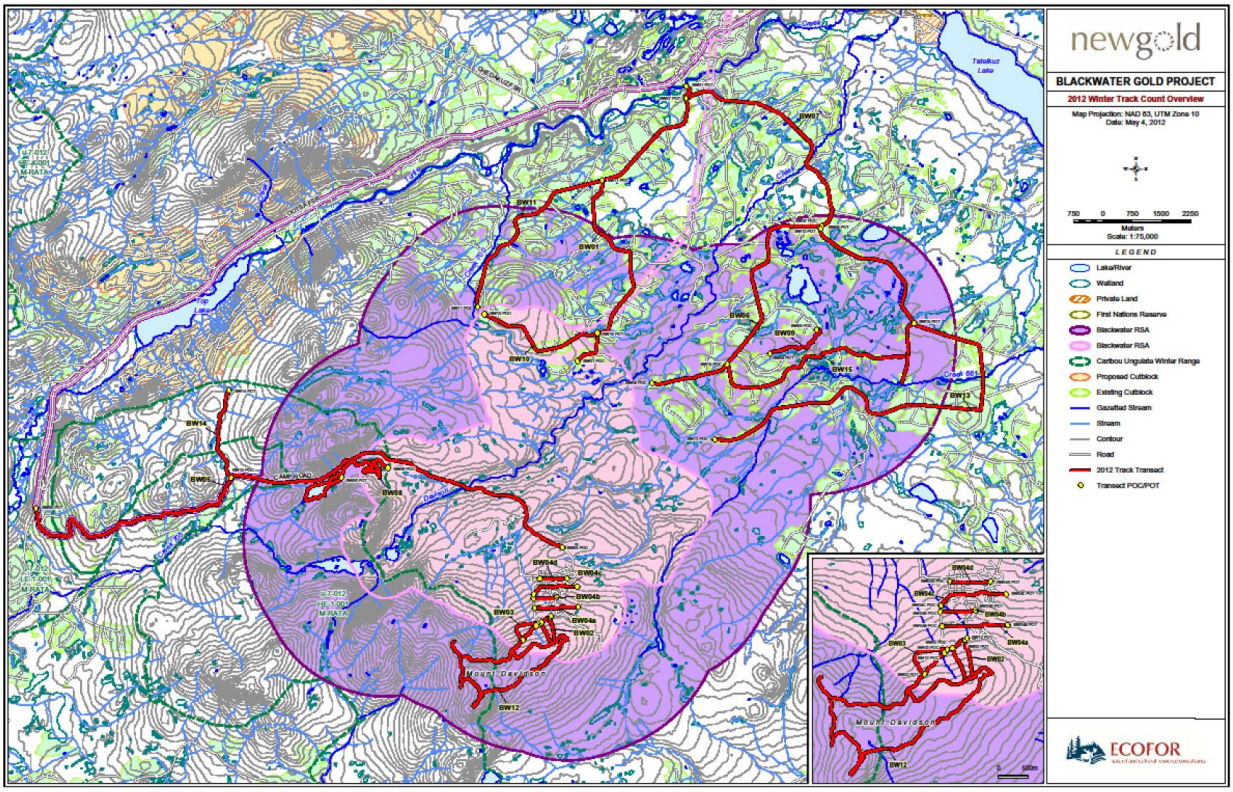


Figure 6.2-2: Winter Snow-Track Surveys, March 2012

Snow track surveys recorded 9 wildlife species (Table 6.2-3). The vast majority (84%) of observations were of snowshoe hare and red squirrel, with six species of meso-predators making up the majority of the remaining observations (weasel, pine marten, lynx, wolverine, fox and coyote). Moose tracks were also observed (n = 34), but surveys did not report any caribou or mule deer observations.

Aerial Survey, Dec 2016

An aerial survey was conducted in December 2016 to examine the Mt. Davidson area for signs of moose and caribou occupancy during early winter. The purpose of the survey was to observe animals, rather than specifically to record tracks. Survey transects were approximately 230 km long and reported 9 moose and no caribou (Figure 6.2-3).

Source: Ecofor (2012)

Photo 6.2-1: Transect in regenerating pine cutblocks.

Table 6.2-3: Winter Track Survey – Observations by Habitat Type

TOTALS	Immature Pine	Mature Pine	Mature Spruce	Mature Sub-alpine Fir	TOTAL
Birds					
Grouse	2	4	2	--	8
Small Mammals					
Snowshoe Hare	510	188	55	38	791
Red Squirrel	34	48	14	7	103
Meso Predators					
Weasel	14	16	3	8	41
Pine Marten	1	7	3	1	12
Lynx	19	10	2	4	35
Wolverine	--	1	1	--	2
Fox	--	--	--	1	1
Coyote	2	8	2	3	15
Ungulates					
Moose	16	15	1	2	34
Caribou	--	--	--	--	--
Mule Deer	--	--	--	--	--
Unk. Ungulate	7	5	1	2	15
Small Mammal	8	5	1	1	15
Total	**613**	**307**	**85**	**67**	**1,072**

Source: Table 3 in Ecofor (2012)

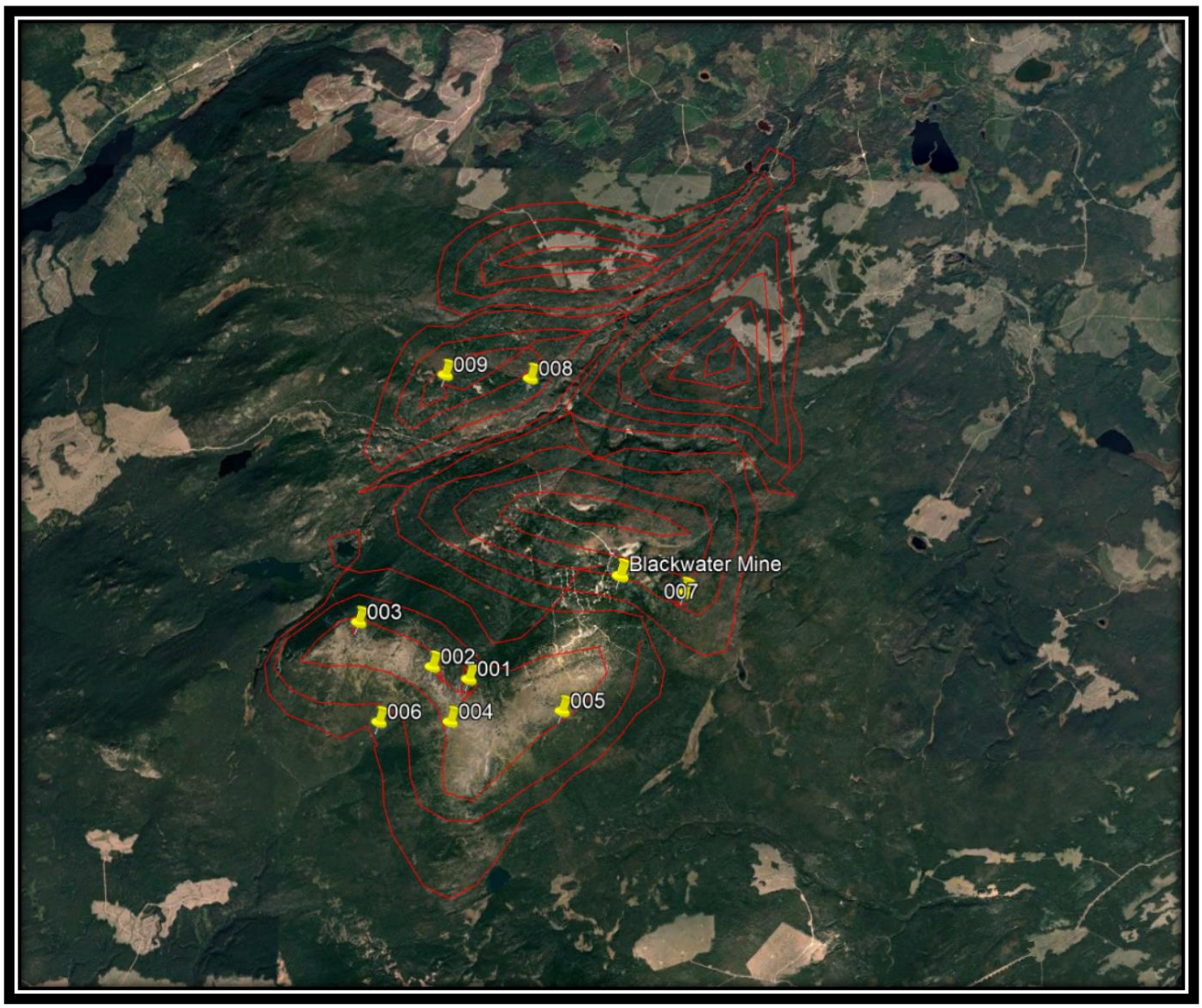


Figure 6.2-3: Early Winter Aerial Survey Transects, December 2016

Aerial Survey, February 2018

A second aerial survey was conducted in February 2018 to examine the Mt. Davidson area and possible offset areas surrounding Johnny Lake moose and caribou occupancy during early winter – specifically to record animals. This survey recorded 10 adult moose and 2 calves over approximately 250 km (Figure 6.2-4). This survey reported multiple incidental observations of moose tracks and one “mid-sized ungulate” track on top of Mt. Davidson that was likely a caribou track.

Aerial Survey, Dec 2021

A third aerial survey was conducted in December 2021 to examine the Mt. Davidson area for signs of moose and caribou occupancy during early winter – specifically to record snow tracks and any animals. This survey recorded 47 moose tracks, 3 caribou tracks, and 3 bear tracks while covering approximately 200 km of transects in the project area (Figure 6.2-5).

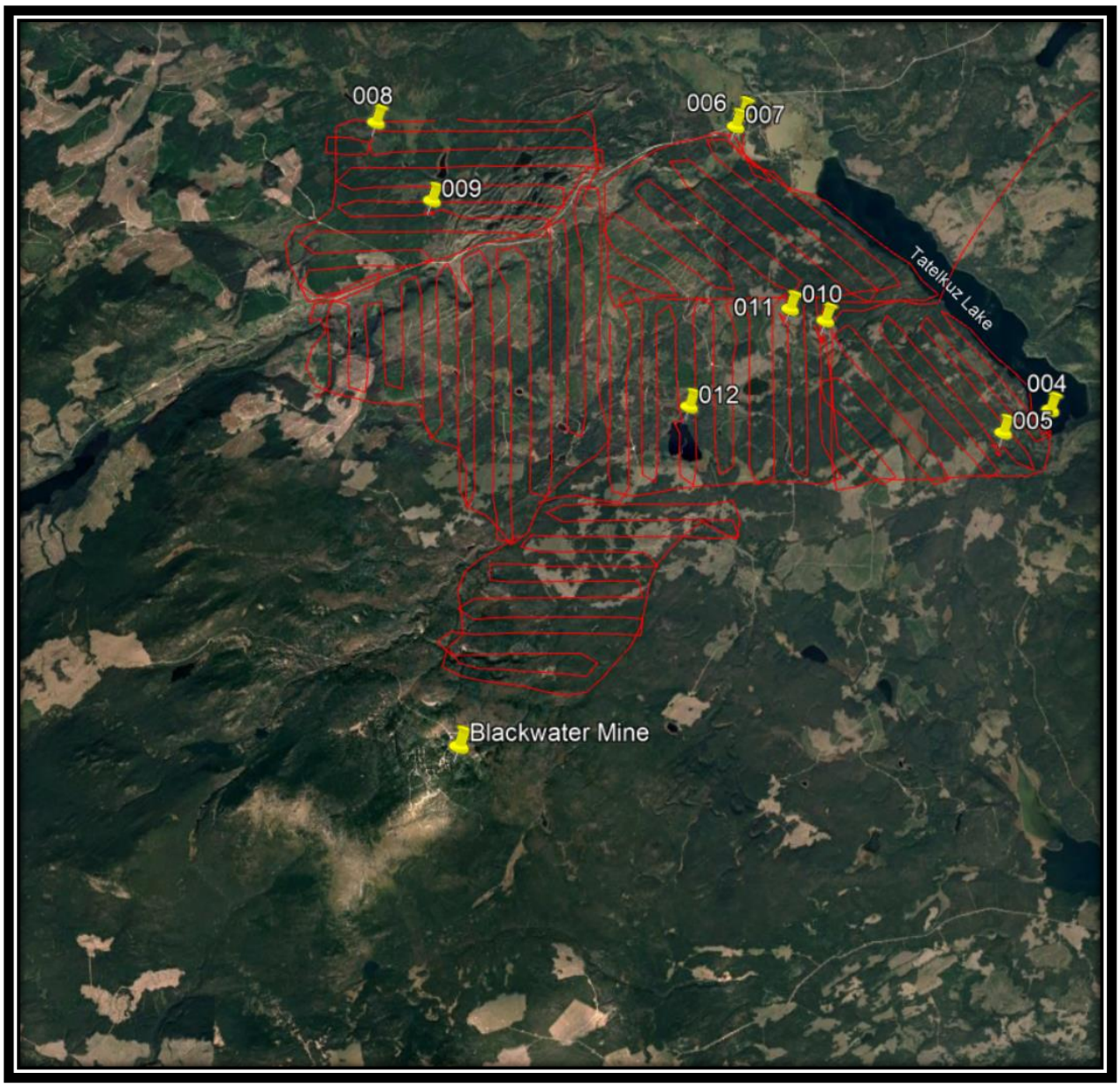


Figure 6.2-4: Late Winter Aerial Survey Transects, February 2018

Performance Indicators

- Yearly estimates of caribou and moose relative abundance surrounding the mine site.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The study area for snow track will include the mine site and a 10 km buffer area. The snow track survey uses the same design as the pellet count study, using a Before-After, Control-Impact (BACI) study with four impact zones (<500 m, 500 m to 1 km, 1 to 3 km, and 3 to 5 km) and a control zone (5-10 km).

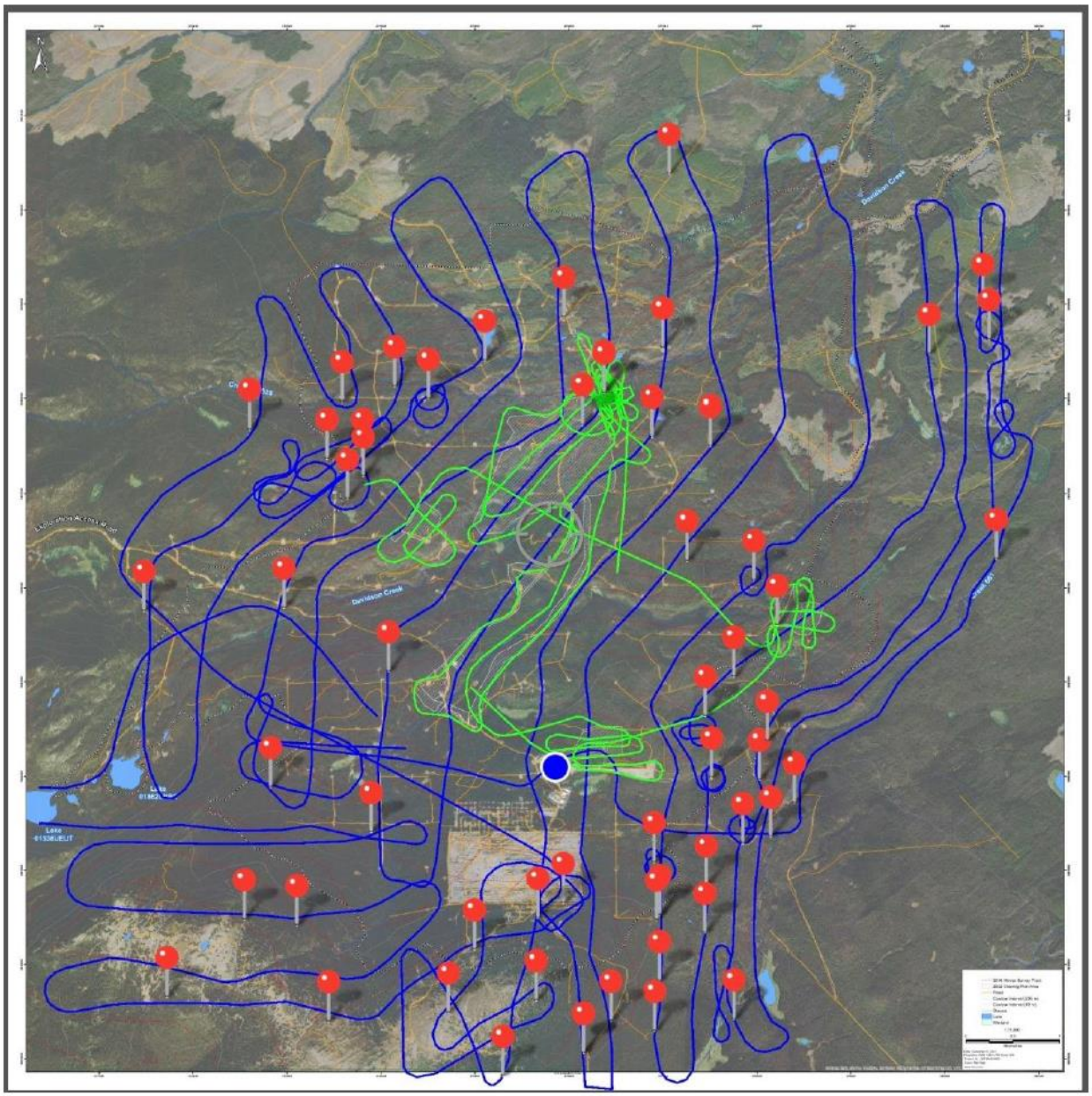


Figure 6.2-5: Early Winter Aerial Survey Transects, December 2021

All samples in any zones > 4 km from the edge of the existing mine footprint will be considered “Before” impact. In this manner, data collection can occur with updates to the potential impact zones based on the rate of construction and expansion of the mine each year (Figure 6.2-1).

Data Collection – Aerial Survey Methods

Survey methods will follow RIC 2002, *Aerial-based Inventory methods for Selected Ungulates: Bison, Mountain Goat, Mountain Sheep, Moose, Elk, Deer and Caribou.* An aerial survey will be conducted for snow tracks in survey units (Figure 6.2-1):

- that directly intersect the mine footprint: TWD-137, 141, 188, 189, 190, and 191; and
- extending to approximately 10 km from the mine site: TWD-144, 146, 149, 150, 152, 153 and 192.

The timing of aerial surveys will be determined based Traditional Knowledge of caribou movement from UFN/LDN and on an analysis of collars to determine when caribou are most likely to overlap the Project (early or late winter).

The survey crew will consist of a wildlife biologist and two Indigenous observers from UFN/LDN, with the following information recorded:

- Date and time;
- Time since last snowfall;
- Transect start and end points and track logs;
- Temperature, snow depth and conditions, and wind; and
- Location and direction of snow tracks, species and number.

Data Collection – Ground-Based Survey Methods

Survey methods will follow RIC 2006, *Ground-based Inventory Methods for Ungulate Snow-track Surveys.* Prior to fieldwork, transects will be established, radiating outwards from the mine site, preferentially oriented uphill towards Mt. Davidson on existing trails, roads, and seismic lines. Transects will be stratified to occur evenly throughout the 5 study zones (see *Study Area* above).

Crews will consist of at least one wildlife biologist and one Indigenous observer. Transects will be 1 km long, covered by walking or use of a snow-machine, recording the same information as for aerial surveys above. Habitat will be recorded along the transects to describe forest type and cover.

Analysis

The two methods of snow track surveys will be compared based on the number and distribution of caribou tracks observed in the study area. BW Gold will consult with ECCC, FLNRORD and Indigenous groups on the outcome of this analysis and plan for whether snow track surveys will be continued as a monitoring tool.

Snow track data will be conducted with a BACI analysis to test the interaction between site type (control vs. impact), and time period (before vs. after). The analysis will include a random effect due to repeated measurements at transects and include covariates to control for habitat type. In addition, pairwise comparisons will be conducted to compare each impact zone (A-D) to control (E) to explore at what distance there is an effect.

Schedule

The schedule will be:

- After the first year of studies, an analysis will be conducted to determine the power to detect change, whether there are any updates to the methods required and to inform the decision between pellet counts and snow tracks as a long term monitoring tool.
- If snow tracks are chosen as the monitoring tool, surveys will occur every year during construction and the first 5 years of operations.
- After the first 5 years, a comprehensive analysis will be conducted to determine whether to continue sampling every year or go to a schedule of sampling every 3 years. BW Gold will consult with ECCC, FLNRORD and Indigenous groups on the outcome of this analysis and plan for continued sampling.

Triggers, Thresholds and Adaptive Management Response

Triggers and adaptive management response for snow tracks are shared with those for pellet counts (Table 6.2-2).

Reporting

- The results of monitoring, any exceedances of triggers and management responses will be reported annually as part of the wildlife monitoring program (WMMP).
- See Section 7 for more information on reporting.

6.2.3 Changes in Caribou Population Dynamics and Movement Patterns

The effects assessment (New Gold 2015) and updated effects assessment for caribou (ERM 2018) evaluated the potential for effects to caribou population dynamics and movement patterns, focusing on:

- The potential for the transmission line to increase access and movement by wolves and result in changes to caribou population dynamics.
  - In response to concerns around wolves and access, the transmission line was redesigned and multiple mitigation measures put in place including placing the line in existing cut blocks, having a minimum vegetation height, visual blocks, and removing roads.
  - This potential effect was not rated as a residual effect of the Project as a consequence of the implemented avoidance and mitigation measures.
- The potential for caribou movement patterns to be altered by traffic on Project roads and added traffic to the Kluskus FSR.
  - Mitigations such as speed limits and management of crossing points for wildlife were established.
  - This was not considered a residual effect due to the mitigations applied, and with consideration that the mine site sits on the edge of the LPU.

Monitoring the population dynamics and movement of Tweedsmuir caribou at the herd or LPU level is beyond the ability or responsibility for any one proponent alone. The provincial government already conducts aerial inventories of caribou herds, and in a meeting on January 28, FLNRORD indicated that it did not support separate aerial surveys by BW Gold to examine caribou distribution for the Project. This is because of the relatively small spatial coverage and point in time nature of the surveys, which would be unlikely to produce appropriate data to investigate population dynamics and movement. Instead, BW Gold will engage with the Province and other groups on herd-level monitoring. Herd-level monitoring will be addressed through participation in:

- Environmental Monitoring Committee (established by EAC Condition 19); and
- Participation in regional programs with FLNRORD, ECCC, and Indigenous groups to monitor caribou herds by sharing data collected as part of BW Gold's caribou monitoring programs and/or coordinating monitoring efforts.

BW Gold will meet with FLNRORD, ECCC and Indigenous groups each September during construction, operations and closure to discuss collaborating with provincial monitoring, and whether these data may be used to address effects of the Project on population dynamics or movement patterns of caribou.

6.2.4 Mortality Risk

The potential for Project-related vehicle traffic on mine roads, the access road and Kluskus FSR was evaluated in the effects assessment (New Gold 2015), but was not deemed to be a residual effect due to mitigation such as training, speed limits and management at wildlife crossing points on the roads.

Monitoring of mortality due to traffic is addressed through tracking and responding to any wildlife incidents. Mortality of wildlife is considered an "incident" and is reported through the Incidental Observations program for caribou (Section 6.4) and for all wildlife species in the WMMP.

Objectives

- To record any caribou mortality and trigger appropriate review and updates to mitigation measures to prevent future mortality due to the Project.

Existing Field Data

Existing field data include:

- Records of incidental observations of caribou and other wildlife collected by on-site personnel (2011-2021).

Performance Indicators

- Yearly records of Project wildlife incidents, including mortalities of caribou and other wildlife due to the Project.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The study area is the mine site footprint, access roads, and Kluskus FSR.

Data Collection – Survey Methods

All wildlife observations will be reported to the EM, including incidental observations, near misses and incidents (mortalities) of caribou and any other wildlife.

Analysis

Wildlife observations and incidents will be tracked on a yearly basis to look for locations of concern and any trends that may require mitigation.

Schedule

- Wildlife incidents will be recorded as part of incidental observations in all years of construction, operations, and closure.
- Wildlife incidents will be calculated on an annual basis ending with March 31 of each year.

Triggers, Thresholds and Adaptive Management Response

Triggers and potential management responses are described for each action level depending on recorded caribou mortalities (Table 6.2-4). The management actions listed are not exclusive, as the adaptive management framework needs to be flexible enough to enable the tailoring of specific management responses at each action level to the types of actions most likely to be able to address the root cause of the identified changes.

Table 6.2-4: Triggers and Management Responses for Caribou Mortality

Level	Trigger	Management Response
None	■ No caribou incidents/mortality.	■ No management change. ■ Continue monitoring.
Low	■ One near-miss with vehicle and caribou.	■ Review mitigations – education, speed limits and location to determine if additional mitigation is required. ■ Continue monitoring.
Medium	■ > 1 near-miss with vehicle and caribou.	■ Review mitigations – education, speed limits and location to determine if additional mitigation is required. ■ Conduct refresher training on wildlife interactions along roadways (described in the WMMP) for all employees and contractors driving on Project roads. ■ Continue monitoring.
High	■ One caribou mortality, or ■ > 3 near-misses with vehicle and caribou.	■ Report mortality or exceedance to BC EAO, FLNRORD Indigenous groups and ECCC. ■ Review mitigations – education, speed limits and location to determine if additional mitigation is required. ■ Conduct refresher training on wildlife interactions along roadways (described in the WMMP) for all employees and contractors driving on Project roads. ■ Continue monitoring.

Reporting

- Any caribou incidents/mortality will be reported to BC EAO, FLNRORD, Indigenous groups and ECCC
- The results of monitoring, any exceedances of triggers and management responses will be reported annually as part of the wildlife monitoring program (WMMP).
- See Section 7 for more information on reporting.

6.2.5 Changes in Caribou Health

Monitoring of caribou health is a landscape-level task that includes many potential effects, such as disease, parasites, predators, habitat supply and quality, and environmental contaminants. Changes to caribou health were evaluated in the effects assessment for the potential of altered water or vegetation quality to affect animal health. Mitigation includes controlling dust and the quality of discharge water. A Human Health and Terrestrial Ecological Risk Assessment concluded that there would not be any effects on wildlife health, and therefore found no residual effect.

Direct measurement of metals uptake by large mammals is impractical because: 1) Their large home range size dilutes the effects of point sources of pollutants, 2) acquiring sufficient number of large mammal samples for analysis is challenging, and 3) samples cannot be collected from species at risk such as caribou.

Instead of sampling caribou directly, the Country Foods Monitoring Program (CFMP) monitors potential effects on wildlife and people by measuring the quality of environmental media, primary producers, and local-scale wildlife including:

- Air quality;
- Dust;
- Soil, plants, and berries;
- Surface water quality and fish tissue; and
- Pollutant uptake in small mammal tissues.

The CFMP study area is a 40 km X 40 km square centered on the mine site. The available baseline sample data and the plan for sample collection and analysis are described in Sections 4 and 5 of the CFMP. Triggers and thresholds are discussed in Section 6 of the CFMP and focus on 1) exposure point concentrations from predictive modelling, 2) comparison to baseline conditions, and 3) human health-based environmental and tissue quality guidelines and benchmarks.

Adaptive management responses are described in Section 6.3 of the CFMP and may include:

- Continued monitoring;
- Identification of potential causes of changes in environmental media;
- Planning and implementation of additional monitoring to determine sources of changes in environmental media; and
- Dust management responses described in the AQDMP.

The CFMP Annual Report will include the results of country foods monitoring, any exceedances of triggers, and management responses; reporting is detailed in Section 8 of the CFMP. These results will be referenced in the annual WMMP report to evaluate potential effects on caribou health.

6.3 Monitoring Effectiveness of Offsetting

Federal condition 8.18.5 requires BW Gold to develop:

> *"a description of performance indicators to be used by the Proponent to evaluate the effectiveness of habitat-based and non-habitat-based compensation measures;"*

Likewise, provincial condition 22.p. requires:

> *"a monitoring program to determine the effectiveness of the offset;"*

This section describes the monitoring program for the habitat restoration within the Capoose securement area and the larger restoration area led by UFN/LDN.

BW Gold is required to conduct a monitoring program in accordance with federal condition 8.18.5, and provincial condition 22.p, BW Gold will be consulting on any updates to the monitoring program in accordance with the DS and EAC condition, and intends to collaborate with the UFN and LDN on implementation of the monitoring program.

The proposed monitoring programs include:

- Road restoration;
- Success of excluding public from roads (via trail cameras);
- Elimination of sight lines on reclaimed roads; and
- Use of the restored roads by moose and wolves (via trail cameras).

These monitoring programs are designed to be conducted by personnel on the ground. However, given the scale of the restoration program, tools such as satellite imagery and/or LiDAR may also be appropriate to inform the broader monitoring program.

Indigenous Monitors will be involved in the design, field work and interpretation of monitoring data.

The monitoring program for the habitat securement component of the offset will be addressed through the process of periodic reviews of the measures.

6.3.1 Monitoring Road Restoration

Section 5 describes potential methods for restoring forestry and mining exploration roads through removal of infrastructure (culverts and bridges), re-sloping, blocking access to the public and revegetation. This section describes monitoring of the success of this road restoration.

Objectives

- To determine the success of revegetation along deactivated roads compared to natural restoration.

Existing Field Data

Existing field and mapping data include:

- Vegetation mapping (TEM) and habitat suitability mapping are planned in 2022 for the securement area and the areas proposed by UFN/LDN as priority restoration areas, which will help assessments of habitat around restored roads.
- Field plots for vegetation structure (as described below), access, sight lines and wildlife use (using cameras) were conducted in 2021 in the Capoose and Johnny Lakes areas. These data will be supplemented with additional baseline data to be collected in 2022.

Performance Indicators

- Spatial mapping and associated treatment descriptions (area and area by treatment type).
- Establishment (stems per hectare and diameter at breast height) of trees on restored roads.
- Percent cover of shrub species at all restoration areas, leading to the assessment of moose forage abundance.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The study area will include the areas where road restoration is planned.

The study will be established as a Before-After, Control-Impact (BACI) design. Before and after measurements will be taken at roads to be removed (impact) and roads that will be left to restore naturally (control). The control will be split into 2 types: 1) roads with evidence of vehicle access, and 2) roads without access where natural restoration is occurring.

Samples will be taken during the construction period prior to restoration as a “before” sample, and after restoration at years 3, 5, 10, and every 5 years thereafter until the end of closure pending review through adaptive management framework.

Data Collection

For each road section (including "impact" roads to be removed and control roads) the following data will be recorded:

- A description of the road prior to restoration – road type, road bed, location and type of infrastructure;
- Sight lines (Section 6.3.3); and
- Vegetation in-growth on the road bed.
    - Permanent vegetation sample plots to be installed prior to road removal and restoration;
    - Sample plots will be 100 m^2 (circular 5.64 m radius, or rectangle to attain the 100 m^2 area), and spaced every 500 m – 1 km along each road to be revegetated, depending on the length of the revegetation area;
    - Within the plot, surveyors will record:
        - Percent cover of shrubs by species;
        - Percent cover of terrestrial lichens;
        - Number of trees by species and size class (0-30, 30-130, >130 cm) in a 10 m^2 mil-hectare plot from same plot centre; and
        - Diameter at Breast Height (DBH), recorded as trees mature (minimum size to tag and begin recording 30 cm for conifers, 130 cm for broadleaf).

Analysis

Road restoration measurements will be assessed using a BACI analysis to test the interaction between site type (control vs. impact) and time period (before vs. after). The analysis will include a random effect due to repeated measurements at survey plots and include covariates to control for habitat type. Analysis of vegetation plot data will be summarised by species using percent cover, stems per hectare, and DBH for mature trees.

Schedule

Sample plots are visited prior to mitigation measures being conducted and at years 3, 5, 10 and every 5 years thereafter until the end of closure or until analysis has shown that the road surface is on a trajectory to be restored and no further monitoring is warranted.

Triggers, Thresholds and Adaptive Management Response

Triggers and potential management responses are described for each action level depending on recorded road restoration (Table 6.3-1). The management actions listed are not exclusive, as the adaptive management framework needs to be flexible enough to enable the tailoring of specific management responses at each action level to the types of actions most likely to be able to address the root cause of the identified changes.

Reporting

- The results of monitoring, any exceedances of triggers and management responses will be reported annually as part of the wildlife monitoring program (WMMP).
- See Section 7 for more information on reporting.

Table 6.3-1: Triggers and Management Responses for Road Restoration

Level	Trigger	Management Response
None	■ Restored roads have a 2X higher % cover, stem density.	■ No management change. ■ Continue monitoring.
Low	■ Restored roads have higher % cover, and stem density, but <2X, or ■ Evidence that vegetation on restored roads are stalled or reverted to open space.	■ Investigating why the trees in vegetation plots are not growing – this may be due to vehicle access, poor soils, or alternative stable vegetation communities. ■ Additional mitigation may be conducted to reclaim areas, such as soil augmentation or ripping, actively planting trees, or additional measures to close roads and stop disturbance by vehicles. ■ Stand tending (brush cutting, herbicide application) may be required to manage shrub growth. ■ Continue monitoring.
Medium	■ Restored roads indistinguishable from control roads, or ■ Evidence that vegetation on restored roads are stalled or reverted to open space.	
High	■ Restored roads have lower % cover, stem density or % lichen covering than control roads.	

6.3.2 Monitoring Access

Part of road removal and restoration is blocking access on forestry roads to members of the public. Vehicle access can impede regrowth of vegetation and be used for harvesting, which can cause wildlife to avoid road routes. This section describes monitoring for access.

Objectives

- To determine whether the public is able to access restored roads.
- If there is evidence of access, to determine the means and locations of access, and prevent further access.

Existing Field Data

Existing field and mapping data include:

- Vegetation mapping (TEM) and habitat suitability mapping are planned in 2022 for the securement area and the areas proposed by UFN/LDN as priority restoration areas, which will help assessments of habitat around restored roads.
- Field plots for vegetation structure (as described below), access, sight lines and wildlife use (using cameras) were conducted in 2021 in the Capoose and Johnny Lakes areas. These data will be supplemented with additional baseline to be collected in 2022.

Performance Indicators

- Confirmation that road closure and linear barriers placed by BW Gold have remained in place and are in good condition.
- Evidence of human use of linear features.
- Change in amount and distribution of human activity on linear features.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The study area will include areas where road restoration has occurred.

Data Collection

The study is designed as a Before-After-Impact study, with records of human access before and after road restoration. Sampling will be conducted in coordination with the monitoring of road restoration at years 3, 5, 10 and every 5 years thereafter until the end of closure or until analysis has shown that the road surface is on a trajectory to be fully restored and no further monitoring is warranted. Camera traps will be monitored on an annual basis, in concert with the wildlife monitoring (Section 6.3.4).

Monitoring will be conducted to determine the success of restoration activities to block linear feature access (Section 5.3):

- Any evidence of human access will be recorded, along with type of evidence (e.g., tire tracks, vegetation disturbed, evidence of hiking trail, all terrain vehicle, snow machine, or pickup);
- The status of each of the barriers established during restoration will be assessed and photographed;
- Additional assessment, including:
    - Any visible ways to circumvent the road closure measures; and
    - Any apparent mitigations and/or improvements that may be required to meet linear corridor closure objectives;
- Monitoring of human access using cameras in concert with the wildlife monitoring (Section 6.3.4).

Analysis

Analyses of access data will include:

- Mapping points of access and linear travel routes in the offsetting areas; and
- Comparison of change in access through time since restoration.

Schedule

Sampling will be conducted in coordination with the monitoring of road restoration at years 3, 5, 10 and every 5 years thereafter until the end of closure or until analysis has shown that the road surface is on a trajectory to be fully restored and no further monitoring is warranted. Camera traps will be monitored on an annual basis, in concert with the wildlife monitoring (Section 6.3.4).

Triggers, Thresholds and Adaptive Management Response

Triggers and potential management responses are described for each action level depending on access recorded on restored roads (Table 6.3-2).

Reporting

- The results of monitoring, any exceedances of triggers and management responses will be reported annually as part of the wildlife monitoring program (WMMP).
- See Section 7 for more information on reporting.

Table 6.3-2: Triggers and Management Responses for Access

Level	Trigger	Management Response
None	■ Roads are successfully blocked with no evidence of vehicle use.	■ No management change. ■ Continue monitoring.
Low	■ Observations of deteriorating barriers.	■ Review if additional barriers or maintenance are required to maintain barriers.
Medium	■ Observations of circumvented barriers.	■ Installation or construction of additional road closure measures, such as burying logs, mounding, removing temporary bridges or culverts and tree felling and bending to make it difficult for vehicles to pass.
High	■ Increasing observations of circumvented barriers through time.	

6.3.3 Monitoring Sight Lines on Roads

Use of roads and other linear features by wolves can lead to greater predation rates. Part of road restoration (Section 5) is to block sight lines for wolves by creating visual barriers (mounded soil or piles of debris) and increased vegetation regrowth. This monitoring program will be conducted in coordination with vegetation and access monitoring to determine if sight lines along restored roads have successfully been blocked.

Objectives

- To determine if sight lines on restored roads have been blocked for wolves.

Existing Field Data

Existing field and mapping data include:

- Vegetation mapping (TEM) and habitat suitability mapping are planned in 2022 for the entire securement area and the areas proposed by UFN/LDN as priority restoration areas, which will help assessments of habitat around restored roads.
- Field plots for vegetation structure (as described below), access, sight lines and wildlife use (using cameras) were conducted in 2021 in the Capoose and Johnny Lakes areas. These data will be supplemented with additional baseline to be collected in 2022.

Performance Indicators

- Confirmation that barriers placed by BW Gold have remained in place and are in good condition.
- Visual obstruction measurements and line-of-sight distances along linear features.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The study area will include all the areas of restored roads.

Data Collection

The study is designed as a Before-After, Control-Impact (BACI) study, with records of sight lines before and after road restoration and on restored roads and control roads that are not restored. Sampling will be conducted in coordination with the monitoring of road restoration at years 3, 5, 10 and every 5 years

thereafter until the end of closure or until analysis has shown that the road surface is on a trajectory to be fully restored and no further monitoring is warranted.

Data Collection

At each vegetation plot being conducted in Section 6.3.1, a sight line measurement will also be taken to monitor restoration activities intended to establish vegetation and provide visual obstructions, including:

- Measurements of the degree of visual obstruction and line-of-sight distance (Pyper, Nishi, and McNeil 2014; Golder Associates 2015);
- Photographs of each site at each visit; and
- Incidental observations of use by wolves.

Analysis

Analyses of sight line data will include:

- Comparison of the proportion of roads with blocked sight lines and the distance of sight lines between restored and control roads; and
- Comparison of incidental observations of wolves on restored and control roads.

Schedule

Sampling and reporting will be conducted in coordination with the monitoring of road restoration at years 3, 5, 10 and every 5 years thereafter until the end of closure or until analysis has shown that the road surface is on a trajectory to be fully restored and no further monitoring is warranted.

Triggers, Thresholds and Adaptive Management Response

Triggers and potential management responses are described for each action level depending on recorded sight lines (Table 6.3-3).

Table 6.3-3: Triggers and Management Responses for Sight Lines

Level	Trigger	Management Response
None	■ Restored roads have at least 2X shorter sight lines than control roads.	■ No management change. ■ Continue monitoring.
Low	■ Restored roads have shorter sight lines, but sight lines have been reduced by less than predicted (approximately 2X).	■ Review if vegetation re-growth is occurring as planned on restored roads. ■ Review if structures to block sight lines – soil mounds, log and brush piles are degraded or require maintenance.
Medium	■ Restored roads have shorter sight lines, but sight lines have been reduced by less than predicted (less than 2X).	■ Review if vegetation re-growth is occurring as planned on restored roads. ■ Review if structures to block sight lines – soil mounds, log and brush piles are degraded or require maintenance. ■ Conduct additional mitigation - tree bending, tree planting, installation of brush or log piles, or mounding to reduce sight lines for wolves
High	■ Restored roads have similar sight lines as control roads.	

Reporting

- The results of monitoring, any exceedances of triggers and management responses will be reported annually as part of the wildlife monitoring program (WMMP).
- See Section 7 for more information on reporting.

6.3.4 Monitoring Wildlife Use

This monitoring program is designed for to track the relative use of common wildlife on restored and control roads, focusing on wildlife that can be detrimental to caribou such as moose and wolves.

Objectives

- To determine the relative utilization of the securement area by moose and wolves.

Existing Field Data

Existing field and mapping data include:

- Vegetation mapping (TEM) and habitat suitability mapping are planned in 2022 for the entire securement area and the areas proposed by UFN/LDN as priority restoration areas, which will help assessments of habitat around restored roads.
- Field plots for vegetation structure (as described below), access, sight lines and wildlife use (using cameras) were conducted in 2021 in the Capoose and Johnny Lakes areas. These data will be supplemented with additional baseline to be collected in 2022.

Performance Indicators

- Wildlife observations per 100 camera days for moose, wolves, grizzly bears, and other ungulates and large carnivores;
- Spatial distribution of those wildlife species detections within the restoration area; and
- Changes in distribution and observation frequency through time.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The study area will include the area where road restoration has occurred.

Data Collection

The study is designed as a Before-After study, with records of wildlife before and after road restoration. Sampling will be conducted in coordination with the monitoring of road restoration at 3, 5, 10 and every 5 years thereafter until the end of closure or until analysis has shown that the road surface is on a trajectory to be fully restored and no further monitoring is warranted or based on the adaptive management approach should other forms of monitoring be available. Camera traps will be monitored on an annual basis.

Forty trail cameras will be distributed on restored roads and control roads, with the following procedures:

- Cameras will be protected from being obscured by snow by: 1) placing the camera at a height above average snowfall; and 2) covering the camera with a roof to keep the camera screen protected.
- Cameras will be visited twice per year for battery replacement and data downloads.
- Cameras will be programmed to take both triggered and timed photos, as described in Table 6.3-4.

Table 6.3-4: Detailed Camera Settings for Motion and Timed Photos

Photo Type	Setting	Setting
Motion-triggered Photos	Trigger Sensitivity (Low, Low/Med, Med, Med/High, High)	High
	Trigger Response Time*	1/5 Second
	No. Photos Taken (per Trigger)	10
	Capture Interval (time between successive photos)	1 second
	Delay (time between successive triggers)	1 second
	Photo Schedule	On All Day
	Nighttime shutter speed	1/30 Second
	Nighttime ISO Sensitivity (Low, Medium, High)	Medium
Timed Photos	No. Photos Taken	1
	Photo Frequency	30 min
	Photo Schedule	On All Day
General (motion and timed)	Brightness (1 - 9)	Default (Low-Medium; 3)
	Contrast (1 - 9)	Default (Medium-High; 7)
	Sharpness (1 - 9)	Default (Medium; 5)
	Saturation (1 - 9)	Default (Medium; 5)
	White Balance	Default (Auto)
	Flash	On

** Reported values from Reconyx User Manual (Reconyx 2013) and Instruction Manual (Reconyx 2017a). Trigger response speed is the time between when motion occurs within the sensor range and when the camera is activated and records an image.*

Analysis

Analysis of photos will include:

- All photos, including timed and motion-triggered photos, will be manually scanned for wildlife observations using photo viewing software.
- Moose, caribou, wolf, grizzly bear, other ungulate, and large carnivore observations will be recorded in a database with the following information:
  - Species and number of individuals;
  - Date and times of observations (including start and end times for motion-triggered photo sets); and
  - Photo type and photo number (including start and end photo numbers for motion-triggered photo sets).
- A selection of wildlife observations will be checked by a second person for quality control.
- Camera effort will be calculated as the total number of active deployment days.
  - Cameras occluded by snow (25% or more of the screen occluded) for 24 hours or more will be considered to have no effort until the screen clears (75% visibility or better).

  - Cameras are considered to have no effort during periods in which they are knocked over.
- Number of camera events will be calculated as the detection of an individual or group of animals on a timed (T) or motion-triggered (M) photo.
  - Events are considered separate from one another if there is at least a 30 minute period of inactivity at the camera between two successive photo observations of wildlife, regardless of photo type.
  - Events will be summarized as “events per 100 camera days”.
- Once sufficient observations have been recorded, trends in the number of caribou, moose and wolf observations will be analysed over time using occupancy models or Generalized Additive Mixed Models (GAMM).
- Annual distributions of observations will be mapped for each species.

Analyses will be put into a report for each year of active camera monitoring with:

- Summaries of active cameras, camera effort, and observations of wildlife as events/100 camera days;
- Maps of spatial distributions of observations for each species;
- Summaries of trends through time in the number of observations will reported; and
- Any proposed changes in survey areas.

Schedule

Cameras will be active all year and visited twice per year for battery replacement and data downloads.

Triggers, Thresholds and Adaptive Management Response

For each action level for habitat loss, triggers and potential management responses are described (Table 6.3-5).

Table 6.3-5: Triggers and Management Responses for Wildlife Observations

Level	Trigger	Management Response
None	■ Lower moose and wolf observations on restored roads than control roads	■ No management change. ■ Continue monitoring.
Low	■ Lower moose and wolf observations on restored roads than control roads, but the difference is small.	■ Review if vegetation growth, access or sight line mitigation is effective. ■ Consider what additional mitigation may be warranted and apply as needed.
Medium	■ No change in moose and wolf observations compared to control sites.	■ Review if vegetation growth, access or sight line mitigation is effective. ■ Identify additional mitigation options and apply them
High	■ Increase in moose and wolf observations to above levels on control roads.	

Reporting

- The results of monitoring, any exceedances of triggers and management responses will be reported annually as part of the wildlife monitoring program (WMMP).
- See Section 7 for more information on reporting.

6.4 Monitoring Using Incidental Observations

Incidental observations can be used to trigger management actions and identify unexpected outcomes. This monitoring program will be used to trigger certain management actions listed in Section 3.

Objectives

- To record incidental observations of caribou and use these observations to guide management actions.

Existing Field Data

Existing field data include:

- Records of incidental observations of caribou and other wildlife collected by on-site personnel.

Performance Indicators

- Numbers of incidental observations, together with their dates and locations.

Methods for Monitoring and Evaluation

Study Area and Sample Distribution

The study area is the mine site, transmission line, Project access roads, and securement areas.

Data Collection

- All Project personnel will be responsible to report wildlife sightings whenever they occur.
- Wildlife sightings can be reported by radio through dispatch or through a wildlife observation form which will be provided to all personnel and contractors.

Analysis

Analysis of incidental observation data will include:

- Analysis to determine if wildlife observations are increasing or decreasing with time; and
- Analysis to determine if observations are clustered in particular locations or time periods – which may assist adaptive management.

Schedule

Incidental observations will be recorded throughout the life of the Project.

Triggers or Thresholds

- Observations of caribou or other wildlife on roads;
- Observations of caribou using trails near the Project footprint or roads;
- Observations of mineral licks or of caribou using mineral licks; and
- Observations of caribou on the mine site.

Triggers, Thresholds and Adaptive Management Response

Triggers and potential management responses are described for each action level depending on levels of incidental observations (Table 6.4-1).

Table 6.4-1: Triggers and Management Responses for Incidental Observations

Level	Trigger	Management Response
None	■ Observations of caribou during aerial surveys, fieldwork away from the mine site.	■ No management change. ■ Record observations and continue monitoring.
Low	■ Observations of caribou on Kluskus FSR, Project roads.	■ Confirm wildlife awareness training is maintained for all employees and contractors, and being followed for wildlife right of way (Section 3.2). ■ Observations shared with road users, continue monitoring
Medium	■ Observations of caribou on Project roads in the same location. ■ Observations of salt lick or caribou using salt lick near mine site or roads ■ Observations of caribou near the mine site (within 500 m)	■ If there is a new wildlife trail near a road or the mine site, conduct training for wildlife encounter protocols, and install signage (Section 3.2). ■ Management response will be based on an assessment of the risk of disturbance to caribou based on the Project activity, distance and behaviour of caribou and duration of activity (Section 3.2).
High	■ Observations of caribou on the mine site during construction and operations.	■ Stop work protocol (Section 3.2).

Reporting

- The results of monitoring, any exceedances of triggers and management responses will be reported annually as part of the wildlife monitoring program (WMMP) with summaries of data collected in table and map form and assessment of trends through time and spatial trends in observations.
- See Section 7 for more information on reporting.

6.5 Monitoring Effectiveness of Habitat Securement Measures

As outlined in Section 4.3, BW Gold has committed to defer the rights associated with the mineral tenures in the Capoose securement area for a period of 50 years. It is anticipated that the deferral will be reviewed collaboratively by representatives of UFN, LDN, the federal and provincial governments, and BW Gold every 10 years, with an additional review period targeted in advance of mine closure. Those reviews will include an assessment of the effectiveness of the habitat securement measures and whether such measures continue to be an effective means to address the Project's adverse effects on the conservation and recovery of the Tweedsmuir herd and its critical habitat.

6.6 Monitoring Effectiveness of Mitigation Measures

The federal Decision Statement includes requirements to monitor for the effectiveness of mitigation measures (Definition 1.19 and Condition 8.18, see Section 6.1.1). Evaluating whether the mitigation was successful at reducing potential effects on caribou is measured for each of the six potential effects (habitat loss and alteration are addressed as two potential effects).

Direct Habitat Loss

Mitigation for direct habitat loss focused on reducing the size of the mine site to the degree possible and avoiding high quality habitats for caribou, including HEWR and UWR on Mt. Davidson.

Effectiveness of mitigation for direct habitat loss will be monitored by recording the actual area of the mine site, the area of caribou habitat removed, and Project avoidance of HEWR and the UWR. This mitigation is described in the CMMP, Section 6.2.1.

Indirect Habitat Loss

The EAC Application predicted that caribou may avoid the mine site, leading to indirect habitat loss. Mitigation for indirect habitat loss, focuses on managing mine features that may disturb or frighten caribou, including noise, air quality, dust, and alteration of vegetation.

1. Noise – Potential disturbance from noise will be managed through the use noise abatement technology, equipment placement, regular equipment maintenance, and enforcing speed limits. Effectiveness of noise management will be evaluated through the noise monitoring, as described in the Noise and Vibration Effect Mitigation and Monitoring Plan (NVEMMP).
2. Air Quality – Air quality will be managed as described in the Air Quality and Dust Management Plan (AQDMP). The AQDMP includes monitoring for air quality, including NO2 and SO2.
3. Dust – Mitigation for dust includes identifying sources of dust, managing dust producers through dust collection at crushers and wet grinding, watering surfaces that produce dust, and controlling speed limits. Monitoring for dust is included in the AQDMP and the Country Foods Management Plan (CFMP) to confirm mitigation is successful.
4. Metals in Soil and Plant – Mitigation for dust deposition on soil and plants, and alteration of vegetation is discussed in the AQDMP. Monitoring of dustfall outside the mine site is discussed in the AQDMP and the CFMP. Monitoring of resulting metals from dust in soil, vegetation and berries is described in the CFMP.
5. Aircraft – Aircraft will be managed to reduce disturbance to caribou including maintaining a minimum elevation of 400 m above Mt. Davidson, unless as part of a permitted wildlife survey. Monitoring that mitigation is successful will be through tracking flight logs of helicopters, as described in the Wildlife Mitigation and Monitoring Plan (WMMP).
6. Caribou Response – Direct measurement of caribou response to the mine will be monitored using pellet counts (Section 6.2.2.1) and snow track surveys (Section 6.2.2.2).

Changes in Population Dynamics and Changes in Movement

The effects assessment evaluated the potential for the transmission line to change caribou population dynamics via increased access and movement by wolves. In response to concerns around wolves and access, the transmission line was redesigned and multiple mitigation measures put in place including placing the line in existing cut blocks, having a minimum vegetation height, visual blocks, and removing roads. As a consequence, this potential effect was not rated as a residual effect of the Project.

The potential for caribou movement patterns to be altered by traffic on Project roads and added traffic to the Kluskus FSR were evaluated, but not considered a residual effect because the mine site sits on the edge of the LPU and due to mitigation measures such as speed limits.

Caribou predation and movement patterns are regional matters being monitored by the province and will not be directly monitored by BW Gold (See Section 6.2.2.1 for a discussion on the program to do ground-based surveys, as requested by FLNRORD, for caribou distribution instead of aerial surveys).

Mortality Risk

The potential for Project-related vehicle traffic on mine roads, the mine access road and Kluskus FSR was evaluated in the effects assessment (New Gold 2015), but was not deemed to be a residual effect due to mitigation such as training, speed limits and management at wildlife crossing points on the roads.

Monitoring of mortality due to traffic is addressed through tracking and responding to any wildlife incidents or mortality, as described in Section 6.2.4.

Caribou Health

Changes to caribou health were evaluated in the effects assessment for the potential for altered water or vegetation quality to affect animal health. Mitigation includes controlling dust and the quality of discharge water. A Human Health and Terrestrial Ecological Risk Assessment in the effects assessment (New Gold 2015) concluded that there would not be any effects on wildlife health, and therefore found no residual effect.

The Country Foods Monitoring Program (CFMP) monitors potential effects on wildlife and people by measuring the quality of environmental media, primary producers and local-scale wildlife, including: air quality, dust, soils, plants and berries, surface water and fish tissue, and small mammal tissue. The CFMP will report whether there is a risk to caribou health due to Project activities.

7. REPORTING

7.1 Federal Decision Statement

Conditions 2.11, 2.12 and 2.13 set out annual reporting requirements related to the implementation of conditions in the DS. Condition 2.14 sets out information sharing requirements related to annual reports. Reporting will commence when BW Gold begins to implement the DS conditions. The annual report will set out:

1. The activities undertaken by BW Gold in the reporting year to comply with each of the conditions set out in the DS;
2. How BW Gold has complied with condition 2.1;
3. how BW Gold considered any views and information that they received during or as a result of the consultation, including a rationale for how the views have, or have not, been integrated;
4. The information referred to in conditions 2.5 and 2.6 for the caribou follow-up program;
5. Any update made to any follow-up program in the reporting year;
6. Any modified or additional mitigation measures implemented or proposed to be implemented by BW Gold, as determined under condition 2.9 and rationale for why mitigation measures were selected pursuant to condition 2.5.4; and
7. Any change(s) to the Designated Project in the reporting year.

Draft annual reports will be provided to Indigenous groups, no later than June 30 following the reporting year to which the annual report applies. BW Gold will consult Indigenous groups on the content and findings in the draft annual report. In consideration of any comments received from Indigenous groups, BW Gold will revise and submit to the Impact Assessment Agency and Indigenous groups a final annual report, including an executive summary in both official languages, no later than September 30 following the reporting year to which the annual report applies.

BW Gold will report on the caribou follow-up program in the annual reports.

Draft annual reports will be provided to Indigenous groups, no later than June 30 following the reporting year to which the annual report applies. BW Gold will consult Indigenous groups on the content and findings in the draft annual report.

7.2 Environmental Assessment Certificate

Condition 5 of the EAC sets out reporting requirements. BW Gold will submit a report to the attention of the EAO and Indigenous Nations [Aboriginal Groups] on the status of compliance with EAC #M19-01 at the following times:

1. At least 30 days prior to the start of Construction;
2. On or before March 31 in each year after the start of Construction;
3. At least 30 days prior to the start of Operations;
4. On or before March 31 in each year after the start of Operations;
5. At least 30 days prior to the start of Closure;
6. On or before March 31 in each year after the start of Closure until the end of Closure;

7. At least 30 days prior to the start of Post-Closure; and
8. On or before March 31 in each year after the start of Post-Closure until the end of Post-Closure.

BW Gold will submit reports to the EAO and Aboriginal Groups within the timelines specified in Condition 5 of the EAC #M19-01. The reports will report on status of compliance with the Project's EAC.

8. PLAN REVISIONS

The CMMP is a living document. BW commits to reviewing and updating the CMMP in collaboration with the Indigenous nations to confirm that the measures in the plan are being implemented and identify any improvements to ensure effectiveness of mitigation and management measures.

BW Gold commits to reviewing the CMMP annually with Indigenous nations each year following the start of construction and throughout the Operations and Closure Phases.

Notification and consultation related to modifications to the CMMP will be communicated to EAO, Impact Assessment Agency of Canada, ECCC, EMLI, FLNRORD, ENV, Lhoosk'uz Dené Nation, Ulkatcho First Nation, Nadleh Whut'en First Nation, Saik'uz First Nation, Stellat'en First Nation, Nazko First Nation, Skin Tyee Nation, Tŝilhqot'in Nation, Métis Nation British Columbia, and Nee-Tahi-Buhn Band. Updated versions of the plan will be filed with EMLI and ENV and provided to Lhoosk'uz Dené Nation, Ulkatcho First Nation, Nadleh Whut'en First Nation, Saik'uz First Nation, Stellat'en First Nation, Nazko First Nation, Skin Tyee Nation, Tŝilhqot'in Nation, Métis Nation British Columbia, and Nee-Tahi-Buhn Band.

9. QUALIFIED PROFESSIONALS

A team of consultants have supported preparation of this management plan. This management plan has been prepared and reviewed by the following QPs:

Prepared by:

Dr. Greg Sharam
Technical Director, ERM

Reviewed by:

Philip Lee
Senior Consultant, ERM

10. REFERENCES

1996. *Land Act*, RSBC, c. 245.

1996. *Mineral Tenure Act*, RSBC, c. 292.

1996. *Mines Act,* RSBC, c. 293.

1996. *Wildlife Act,* RSBC, c. 487.

1999. *Canadian Environmental Protection Act, 1999,* SC, c.33

2002. *Forest Range and Practices Act,* SBC, c. 69.

2002. *Species at Risk Act*, SC. c. 29.

2003. *Environmental Management Act,* SBC, c. 53

2012. *Canadian Environmental Assessment Act*.

2016. *Water Sustainability Act,* SBC, c.15.

2018. *Environmental Assessment Act*. SBC, c.51

2019. *Declaration on the Rights of Indigenous Peoples Act*, SBC, c. 44.

2019. *Impact Assessment Act*, SC, c. 28. s.1.

AmphibiaWeb. 2022. Information on amphibian biology and conservation. [web application]. Retrieved March 1, 2022, from http://amphibiaweb.org.

Apps, C., and B.N. McLellan 2006. Factors influencing the dispersion and fragmentation of endangered mountain caribou populations. *Biological Conservation* 130: 84-97

Avison Management Services Ltd. (Avison). 2016. *2016 Annual Report: Blackwater Project Reclamation.* Vanderhoof, BC.

Avison Management Services Ltd. (Avison). 2017. *2017 Annual Report: Blackwater Project Reclamation.* Vanderhoof, BC.

Avison Management Services Ltd. (Avison). 2018. *2018 Annual Report: Blackwater Project Reclamation.* Vanderhoof, BC.

Avison Management Services Ltd. (Avison). 2019. *2019 Annual Report: Blackwater Project Reclamation.* Vanderhoof, BC.

Batllori-Sampedro, E. and J. L. Febles-Patron. 1999. Landscape Change in Yucatan's Northwest Coastal Wetlands (1948-1991). *Research in Human Ecology*, 6 (1).

BC. 2019. *Environmental Mitigation Policy - BC Habitat Offset Decision Support Tool. Guidelines & Operational Manual.* Trial Version 1.0. February 2019.

BC. 2021. Interim Mitigation Offset Guidance for Proponents and Staff (Website) *https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/environmental-guidance-and-policy/environmental-mitigation-policy*

BC Conservation Data Centre. 2021. *Conservation Status Report:* Rangifer tarandus *pop. 15. B.C. Ministry of Environment and Climate Change Strategy.* Available: https://a100.gov.bc.ca/pub/eswp/ (accessed February 1, 2021).

BC EMLI. 2021. *Health, Safety and Reclamation Code of British Columbia.* British Columbia Ministry of Energy and Mines.

BC EMPR & ENV. 2019a. In the matter of the ENVIRONMENTAL ASSESSMENT ACT (S.B.C. 2002, c. 43 (the Act) and in the matter of an Application for an Environmental Assessment Certificate (Application) by New Gold Inc. (Proponent) for the Blackwater Gold Project ENVIRONMENTAL ASSESSMENT Certificate #M19-01. 2 p.

BC EMPR & ENV. 2019b. Environmental Assessment Certificate #M19-01. Schedule B Table of Conditions for an Environmental Assessment Certificate. 50 pp.

BC FLNRO. 2012. *A Guide to Fire Hazard Assessment and Abatement in British Columbia.* https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/bc-timbersales/ems-sfm-certification/business-area/kamloops/hazard-assessment-abatement.pdf. Accessed April 2021.

BC FLNRO. 2014. *A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia*. Interim Guidance.

BC FLNRORD. 2017. *Boreal Caribou Recovery Implementation Plan.*

BC Ministry of Environment. 2014. Procedures for Mitigating Impacts on Environmental Values – May 2014.

Belwood, J.J., and M.B. Fenton. 1976. Variation in the diet of *Myotis lucifugus* (Chiroptera: Vespertilionidae). *Canadian Journal of Zoology* 54(10): 1674–1678.

Boulinier, T., Nichols, J.D., Hines, J.E., Sauer, J.R., Flather, C.H., and Pollock, K.H. 2001. Forest fragmentation and bird community dynamics: inference at regional scales. *Ecology*, 82: 1159-1169. https://doi.org/10.1890/0012-9658(2001)082[1159:FFABCD]2.0.CO;2

Brough, A.M., R.J. DeRose, M.M. Conner, and J.M. Long. 2017. Summer-fall home-range fidelity of female elk in northwestern Colorado: Implications for aspen management. *Forest Ecology and Management* 389:220-227.

Business and Biodiversity Offsets Programme (BBOP). 2012. *Resource Paper: No Net Loss and Loss-Gain Calculations in Biodiversity Offsets.* BBOP, Washington, D.C. Available from: http://bbop.forest-trends.org/guidelines/Resource_Paper_NNL.pdf

Carr, L. W. and L. Fahrig. 2001. Effect of road traffic on two amphibian species of differing vagility. *Conservation Biology*, 15(4): 1071-1078.

CEA Agency. 2019. *Decision Statement Issued under Section 54 of the Canadian Environmental Assessment Act, 2012 to New Gold Inc. for the Blackwater Gold Project.* Issued April 15, 2019, Minister of the Environment, Ottawa, ON. 26 pp.

Cenovus. 2014. *Presentation given to members of Regional Industry Caribou Collaboration.* December 10, 2014.

Cichowski, D. 2010. *Tweedsmuir-Entiako Caribou Project: Effects of a Mountain Pine Beetle Epidemic on Northern Caribou Habitat Use – Final Report.* Prepared for the Bulkley Valley Centre for Natural Resources Research and Management, Smithers, B.C. 66p.

Cichowski, D. 2015. *Tweedsmuir-Entiako Caribou Population Status and Background Information* Summary. Prepared for BC Ministry of Forests, Lands and Natural Resource Operations, Smithers, BC.

Cichowski, D., R. S. McNay, and V. Brumovsky. 2020. *Tweedsmuir-Entiako Caribou* (Rangifer tarandus) *Tactical Restoration Plan.* Prepared for BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC.

Clare, E.L., W.O.C. Symondson, H. Broders, F. Fabianek, E.E. Fraser, A. MacKenzie, A. Boughen, R. Hamilton, C.K.R. Willis, F. Martinez-Nuñez, A.K. Menzies, K.J.O. Norquay, M. Brigham, J. Poissant, J. Rintoul, R.M.R. Barclay, and J.P. Reimer. 2014a. The diet of Myotis lucifugus across Canada: assessing foraging quality and diet variability. *Molecular Ecology* 23(15): 3618–3632.

COSEWIC. 2002a. COSEWIC assessment and status report on the western toad Bufo boreas in Canada. Ottawa.

COSEWIC. 2009. COSEWIC assessment and status report on the Horned Grebe Podiceps auritus, Western population and Magdalen Islands population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 42 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

COSEWIC. 2013. *COSEWIC assessment and status report on the Little Brown* Myotis Myotis lucifugus*, Northern Myotis* Myotis septentrionalis *and Tri-colored Bat* Perimyotis subflavus *in Canada*. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxiv + 93 pp.

COSEWIC. 2012. *COSEWIC assessment and status report on the Western Toad* Anaxyrus boreas *in Canada*. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiv + 71 pp.

Davis, T. M. 2002. *Research priorities for the management of the Western toad,* Bufo boreas*, in British Columbia*. Ministry of Water Land and Air Protection: Biodiversity Branch Wildlife Working Report No. WR-106: Victoria, BC.

DeMars, C., and R. Serrouya. 2018. *Assessment of factors influencing predation within the Tweedsmuir-Entiako caribou herd: Predator feasibility project phase I*. Technical report for BC Ministry of Forests, Lands, Natural Resource Operations, and Rural Development. Caribou Monitoring Unit, Alberta Biodiversity Monitoring Institute. Edmonton, AB. 33 pp. + appendix.

Dickie, M., R. Serrouya, C. DeMars, J. Cranston and S. Boutin. 2017. Evaluating functional recovery of habitat for threatened woodland caribou. *Ecosphere* 8(9):e01936. 10.1002/ecs2.1936.

Dickie, M., R. Serrouya, R.S. McNay, and S. Boutin. 2016. Faster and farther: wolf movement on linear features and implications for hunting behavior. *Journal of Applied Ecology*. https://doi: 10.1111/1365-2664.12732.

DWB. 2019. *Ulkatcho Restoration Prescriptions, West Chilcotin Forest Products Ltd.* Prepared by DWB Consulting Services Ltd. Lac la Hache Division.

EC. 2011. *Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou* (Rangifer tarandus caribou), *Boreal population, in Canada: 2011 update.* Ottawa, ON, Canada. 102 pp. plus appendices.

EC. 2012. *Recovery Strategy for the Woodland Caribou* (Rangifer tarandus caribou), *Boreal population, in Canada*. *Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa, ON. Xi + 138 pp.

EC. 2014. *Recovery Strategy for the Woodland Caribou, Southern Mountain population* (Rangifer tarandus caribou) *in Canada*. *Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa. viii + 103 pp.

ERM. 2018. *Blackwater Gold Project: New Gold Response to Canadian Environmental Assessment Agency Information Request (IR130, IR132, and IR210) – Updated Assessment of Impacts to Southern Mountain Caribou and Proposed Caribou Offset.* Prepared for New Gold Inc. by ERM Consultants Canada Ltd.: Vancouver, BC.

Fieberg, J., and C.O. Kochanny. 2005. Quantifying home-range overlap: the importance of the utilization distribution. *Journal of Wildlife Management* 69:1346–1359.

Finnegan, L., K. Pigeon, J. Cranston, M. Hebblewhite, M. Musiani, L. Neufeld, F. Schmiegelow, J. Duval and G. Stenhouse. 2018. *Natural regeneration on seismic lines influences movement behaviour of wolves and grizzly bears.* PLoS ONE 13 (4): e0195480. https://doi.org/10.1371/journal.pone.0195480.

Gibbs, James P. and W. Gregory Shriver. 2005. Can Road Mortality Limit Populations of Pool-Breeding Amphibians? *Wetlands Ecology and Management*, 13 (3): 281–89.

Golder Associates. 2015. *Boreal Caribou Habitat Restoration Operational Toolkit for British Columbia*. Prepared by Golder Associates Ltd. For the BC Science and Community Environmental Knowledge (SCEK) Fund's Research and Effectiveness Monitoring Board (REMB). British Columbia, iii + 54 pp. + Appendices.

Grant, L. and A.-M. Roberts. 2020. *Tweedsmuir-Entiako late winter caribou recruitment survey: March 21, 2019.* BC Ministry of Forests, Lands, and Natural Resource Operations. Smithers, BC, 10 pp.

Gyug, L.1996. Part IV Amphibians. *Timber harvesting effects on wildlife and vegetation in the Okanagan Highlands of British Columbia*. Penticton, BC, BC Ministry of Environment.

Hervieux, D., M. Hebblewhite, N.J. DeCesare, M. Russell, K. Smith, S. Robertson, and S. Boutin. 2013. Widespread declines in woodland caribou (Rangifer tarandus caribou) continue in Alberta. *Canadian Journal of Zoology* 91:872-882.

Horne, J.S., E.O. Garton, S.M. Krone, and J.S. Lewis. 2007. Analyzing animal movements using Brownian bridges. *Ecology* 88, 2354-2363.

Johnson, C. A., G. D. Sutherland, E. Neave, M. Leblond, P. Kirby, C. Superbie, and P. D. McLoughlin. 2020. Science to inform policy: Linking population dynamics to habitat for a threatened species in Canada. *Journal of Applied Ecology* 57: 1314-1327.

Lesbarrères, D., T. Lodé and J. Merilä. 2004. What type of amphibian tunnel could reduce road kills? *Oryx*, 38(2): 220-223.

Macadam, A. and Bedford, L., 1998. Mounding in the sub-boreal spruce zone of west-central British Columbia: 8-year results. *The Forestry Chronicle*, *74*(3), pp.421-427.

MacIsaac, D.A., Hillman, G.R. and Hurdle, P.A., 2004. *Alternative silvicultural systems for harvesting and regenerating spruce-dominated boreal mineral wetlands* (Vol. 399). Northern Forestry Centre.

Martensen A.C., Pimentel, R.G., and Metzger, J.P. 2008. Relative effects of fragment size and connectivity on bird community in the Atlantic Rain Forest: Implications for conservation. *Biological Conservation*, 141(9): 2184:2192. https://doi.org/10.1016/j.biocon.2008.06.008.

Millspaugh, J.J., R.A. Gitzen, B.J. Kernohan, M.A. Larson, and C.L. Clay. 2004. Comparability of three analytical techniques to assess joint space use. *Wildlife Society Bulletin* 32:148-157.

Minns, C.K. 2006. Compensation ratios needed to offset timing effects of losses and gains and achieve no net loss of productive capacity of fish habitat. *Canadian Journal of Fisheries and Aquatic Sciences* 63:1172-1182.

Moilanen, A., A.J.A. van Teeffelen, Y. Ben-Haim, and S. Ferrier. 2009. How much compensation is enough? A framework for incorporating uncertainty and time discounting when calculating offset ratios for impacted habitat*. Restoration Ecology* 17:470-478.

MOE. 2014. *Procedures for mitigating impacts on environmental values (environmental mitigation procedures) Version 1.0.* 68 pp.

New Gold. 2015. *Black water Gold Project Application for and Environmental Assessment Certificate.* Prepared for New Gold Inc., Vancouver. BC.

NOVA Gas Transmission Ltd (NOVA). 2020. *Preliminary Caribou Habitat Restoration and Offset Measures Plan*. NCC Remediation Project. December 2020.

Osko, T.J., and M. Glasgow. 2010. *Removing the well-site footprint: recommended practices for construction and reclamation of wellsites on upland forests in boreal Alberta.* Department of Biological Sciences, University of Alberta, Edmonton, AB.

Parkes, D., G. Newell, and D. Dheal. 2003. Assessing the quality of native vegetation: The 'habitat hectares' approach. *Ecological Restoration & Management* 4: S29-S38.

Peters, W. 2010. *Resource selection and abundance estimation of moose: implications for caribou recovery in a human altered landscape*. M.Sc. Thesis. University of Montana, Missoula, Montana, USA. 104 p.

Pike, Robin G. and Rob Scherer. 2003. Overview of the potential effects of forest management on low flows in snowmelt-dominated hydrologic regimes. *BC Journal of Ecosystems and Management*, 3 (1).

Pyper, M., J. Nishi, and L. McNeill. 2014. *Linear feature restoration in caribou habitat: a summary of current practices and a roadmap for future programs.* Prepared for Canadian Oil Sands Innovation Alliance, Calgary, AB. 38 pp + appendices. Available at: https://www.cosia.ca/uploads/documents/id24/COSIA_Linear_Feature_Restoration_Caribou_Habitat.pdf. Accessed April 2021.

R Development Core Team. 2017. *R: a language and environment for statistical computing.* R Foundation for Statistical Computing, Vienna.

Rapai, S.B., McColl, D. and McMullin, R.T., 2017. Examining the role of terrestrial lichen transplants in restoring woodland caribou winter habitat. *The Forestry Chronicle*, *93* (3), pp. 204-212.

Ray, J. C. 2014. *Defining habitat restoration for boreal caribou in the context of national recovery: a discussion paper. Prepared for Environment and Climate Change Canada.* Prepared by Wildlife Conservation Society Canada, Toronto, ON.

RIC. 2002. *Aerial-based Inventory Methods for Selected Ungulates: Bison, Mountain Goat, Mountain Sheep, Moose, Elk, Deer & Caribou.* Standards for Components of British Columbia's Biodiversity No. 32. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for Terrestrial Ecosystem Task Force, Resources Inventory Committee (RIC): Victoria, BC.

Ronalds, I., and L. Grant. 2018. *Tweedsmuir Lichen Restoration Trial Year 1 Report.* Prepared for L. Grant and Skeena Region, Ministry of Forests, Lands, Natural Resource Operations, and Rural Development, Smithers, BC.

Saskatchewan Environment. 2019. *Draft Range Plan for woodland caribou in Saskatchewan.* Boreal Plane Ecozone – SK2 West Caribou Administrative Unit. Saskatchewan Environment. 100 pp.

Saunders, M.B., and R.M.R. Barclay. 1992. Ecomorphology of insectivorous bats: a test of predictions using two morphologically similar species. *Ecology* 73(4): 1335–1345

Seip, D. 1992. Factors limiting woodland caribou populations and their interrelationships with wolves and moose in southeastern British Columbia. *Canadian Journal of Zoology* 70:1492-1503.

Serrouya, R. S. Gilbert, R.S. McNay, B.N. McLellan, D.C. Heard, D.R. Seip, and S. Boutin. 2017. Comparing population growth rates between census and recruitment-mortality models. *Journal of Wildlife Management* 81:297-305.

Smith, A.C., Fahrig, L., and Francis, C.M. 2011. Landscape size affects the relative importance of habitat amount, habitat fragmentation, and matrix quality on forest birds. *Ecography*, 34: 103-113. https://doi.org/10.1111/j.1600-0587.2010.06201.x

STEEN, DAVID A. and JAMES P. GIBBS. 2004. Effects of Roads on the Structure of Freshwater Turtle Populations. Conservation Biology, 18 (4): 1143–48.

Stevens, C. E., C. A. Paszkowski and D. Stringer. 2006. Occurrence of the Western toad and its use of 'borrow pits' in west-central Alberta. *Northwestern Naturalist*, 87: 107-117.

Stotyn, S. 2008. *Ecological interactions of mountain caribou, wolves and moose in the North Columbia Mountains, British Columbia.* MSc thesis. University of Alberta, Edmonton, Alberta, Canada. 126 pp.

Tamblyn, Greg C. and Dean W. Allen. 1998. *Preliminary wetland inventory for select watersheds within the Morice Forest District: Owen Creek, Fenton Creek, False Tagit Creek, Tagit Creek, Thautil River and Morrison Lake watersheds*. Prepared for the Ministry of Environment, Lands and Parks by Greg C. Tamblyn and Dean W. Allen.

Tanaka, A. 2008. *How to assess 'no net loss' of habitats – a case study of Habitat Evaluation Procedure in Japan's EIA.* Available at http://www.yc.tcu.ac.jp/~tanaka-semi2/pdf/tanaka/tanaka2008_152.pdf.

US Fish and Wildlife Service. 1980. *Habitat Evaluation Procedures (HEP). Ecological Service manuals 101, 102 and 103.* U.S. Dept. of Interior, Fish and Wildlife Service.

van Beest, F.M., E. Vander Wal, A.V. Stronen, P.C. Paquet, and R K. Brook. 2013. Temporal variation in site fidelity: scale-dependent effects of forage abundance and predation risk in a non-migratory large herbivore. *Oecologia* 173:409-420.

Vinge, T., and M. Pyper. 2012. *Managing woody materials on industrial sites: Meeting economic, ecological, and forest health goals through a collaborative approach*. Department of Renewable Resources, University of Alberta, Edmonton, Alberta. 32 pp.

Walker, S., Brower, A.L., Stephens, R.T., Lee, W.G. 2009. Why bartering biodiversity fails. *Cons Letters* 2, 149-157.

Whittington, J., M. Hebblewhite, N. DeCesare, L. Neufeld, M. Bradley, J. Wilmshurst and M. Musiani. 2011. Caribou encounters with wolves increase near roads and trails: a time-to-event approach. *Journal of Applied Ecology* 48:1535-1542.

Williamson-Ehlers, L., C. Johnson, and D. Seip. 2013. *Behavioural responses, landscape change and habitat loss for woodland caribou (*Rangifer tarandus *caribou) across the Peace region of northeastern British Columbia.* Prepared for the Habitat Conservation Trust Foundation, Victoria, B.C. 58 p.

Wind, E. I. and L. A. Dupuis. 2002. *COSEWIC status report on the western toad Bufo boreas in Canada. Committee on the Status of Endangered Wildlife in Canada*. Committee on the Status of Endangered Wildlife in Canada: 31.

Wittmer, H., B. McLellan, R. Serrouya and C. Apps. 2007. Changes in landscape composition influence the decline of a threatened woodland caribou population. *Journal of Applied Ecology* 76:568-579.

WSP (Wetland Stewardship Partnership). *2009. Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia*.

APPENDIX A CONCORDANCE WITH CANADIAN ENVIRONMENTAL ASSESSMENT AGENCY DECISION STATEMENT (APRIL 2019)

Table A-1: Concordance with Canadian Environmental Assessment Agency Decision Statement Conditions

Condition	Description	Location in Plan / Comments
2.3 (Consultation)	The Proponent shall, where consultation is a requirement of a condition set out in this Decision Statement: 2.3.1 provide a written notice of the opportunity for the party or parties being consulted to present their views and information on the subject of the consultation;	Draft CMMP provided to Indigenous groups (as defined in the federal Decision Statement; DS) for review and comment in August 2021. Draft CMMP provided to Aboriginal Groups (as defined in the Environmental Assessment Certificate; EAC) prior to August 2021. An updated CMMP was provided to ECCC, FLNRO, EMLI, UFN and LDN in December 2021.
	2.3.2 provide all information available and relevant on the scope and the subject matter of the consultation and a period of time agreed upon with the party or parties being consulted, not less than 15 days, to prepare their views and information;	Completed concordance tables identifying where requirements are addressed in the CMMP included in appendices. Indigenous groups advised of timing to submit comments, taking into account review timelines in Indigenous Participation Agreements.
	2.3.3 undertake a full and impartial consideration of all views and information presented by the party or parties being consulted on the subject matter of the consultation;	Completed. See Section 1.4, 2.4. Comments and responses, including how comments were incorporated into the plan or why not are included in the Issues Tracking Table (ITT).
	2.3.4 strive to reach consensus with Indigenous groups; and	Ongoing. See Section 1.4, 6.1 and Section 8.0
	2.3.5 advise the party or parties being consulted on how the views and information received have been considered by the Proponent including a rationale for why the views have, or have not, been integrated. The Proponent shall advise the party or parties in a time period that does not exceed the period of time taken in 2.3.2.	BW Gold has met with Indigenous groups and solicited and responded to technical comments on the CMMP and endeavoured to incorporate Indigenous viewed and information received into the updated CMMP (V3) released in December 2021, and the CMMP (V4) released in March 2022.
2.4 (Consultation)	The Proponent shall, where consultation with Indigenous groups is a requirement of a condition set out in this Decision Statement, determine and strive to reach consensus with each Indigenous group regarding the manner by which to satisfy the consultation requirements referred to in condition 2.3, including: 2.4.1 the methods of notification;	Method of notification informed by Indigenous Participation Agreements and otherwise conveyed by email.

Condition	Description	Location in Plan / Comments
	2.4.2 the type of information and the period of time to be provided when seeking input;	Completed concordance tables identifying where requirements are addressed in the CMMP included in appendices. Email conveying the draft CMMP identifies timing for providing comments, taking into account Indigenous Participation Agreements.
	2.4.3 the process to be used by the Proponent to undertake impartial consideration of all views and information presented on the subject of the consultation; and	To be discussed with Indigenous groups.
	2.4.4 the period of time and the means by which to advise Indigenous groups of how their views and information were considered by the Proponent.	Subject to Indigenous Participation Agreements and discussion with Indigenous groups.
2.5 (Follow-up and Adaptive Management)	The Proponent shall, where a follow-up program is a requirement of a condition set out in this Decision Statement, have a Qualified Professional, where such a qualification exists for the subject matter of the follow-up program, determine, as part of the development of each follow-up program and in consultation with the party or parties being consulted during the development, the following information: 2.5.1 the follow-up activities that must be undertaken by a qualified individual;	CMMP prepared and reviewed by Qualified Individuals.
	2.5.2 the methodology, location, frequency, timing and duration of monitoring associated with the follow-up program;	Section 6.2-6.6
	2.5.3 the scope, content, format and frequency of reporting of the results of the follow-up program;	Section 7; Reporting
	2.5.4 the levels of environmental change relative to baseline conditions that would require the Proponent to implement modified or additional mitigation measure(s), including instances where the Proponent may require Designated Project activities to be stopped; and	Thresholds for adaptive management are provided with the monitoring programs in Sections 6.2-6.6
	2.5.5 the technically and economically feasible mitigation measures to be implemented by the Proponent if monitoring conducted as part of the follow-up program shows that the levels of environmental change referred to in condition 2.5.4 have been reached or exceeded.	Possible adaptive management responses provided in Sections 6.2-6.6. Further or changes to mitigation measures to be determined based on consultation with Indigenous groups regarding monitoring results.

Condition	Description	Location in Plan / Comments
2.6 (Follow-up and Adaptive Management)	The Proponent shall update and maintain the follow-up and adaptive management information referred to in condition 2.5 during the implementation of each follow-up program in consultation with the party or parties being consulted during the development of each follow-up program.	Section 6.1.2; Adaptive Management Framework – provides the steps in the adaptive management process, including updating of the monitoring and mitigation measures. In the adaptive management process, including updating of the monitoring and mitigation measures. Section 8; Plan Revisions – discusses the process for updating the CMMP.
2.7 (Follow-up and Adaptive Management)	The Proponent shall provide a draft of the follow-up programs referred to in conditions 3.14, 3.15, 3.16, 4.5, 5.5, 6.11, 6.12, 6.13, 6.14, 8.18.6, 8.20.5, 8.21, and 8.22, if required, to the party or parties being consulted during the development of each follow-up program for a consultation period of up to 60 days prior to providing follow-up programs pursuant to condition 2.8.	Draft CMMP (Version 2), which include follow-up program provided to Indigenous groups (as defined in the federal DS) for review and comment in August 2021, Version 3 provided in December 2021 and Version 4 proficed in March 2022.
2.8 (Follow-up and Adaptive Management)	The Proponent shall provide the follow-up programs referred to in conditions 3.14, 3.15, 3.16, 4.5, 5.5, 6.11, 6.12, 6.13, 6.14, 8.18.6, 8.20.5, 8.21, and 8.22, if required, to the Agency and to the party or parties being consulted during the development of each follow-up program prior to the implementation of each follow-up program. The Proponent shall also provide any update(s) made pursuant to condition 2.6 to the Agency and to the party or parties being consulted during the development of each follow-up program within 30 days of the follow-up program being updated.	The CMMP addresses the follow up program for caribou in condition 8.18.6. The other follow up programs refer to fish (3.14, 3.15, and 3.16), wildlife (4.5, 6.14, 8.20.5, 8.21 and 8.22), wetlands (5.5), contaminants (6.11), air quality (6.12) and socio-economics (6.13) as part of the major works submission on November 26, 2021.
2.9 (Follow-up and Adaptive Management)	The Proponent shall, where a follow-up program is a requirement of a condition set out in this Decision Statement: 2.9.1 conduct the follow-up program according to the information determined pursuant to condition 2.5;	The caribou follow-up program is discussed in Section 6; Adaptive Management and Follow-up.
	2.9.2 undertake monitoring and analysis to verify the accuracy of the environmental assessment as it pertains to the particular condition and/or to determine the effectiveness of any mitigation measure(s);	The caribou follow-up program to verify the accuracy of the environmental assessment is discussed in Section 6.2: Verifying the Accuracy of Effects Assessment and Section 6.6, Monitoring Effectiveness of Mitigation Measures.

Condition	Description	Location in Plan / Comments
	2.9.3 determine whether modified or additional mitigation measures are required based on the monitoring and analysis undertaken in accordance with condition 2.9.2; and	To be determined by monitoring and in consultation with Indigenous groups. The caribou follow-up program is discussed in Section 6; Adaptive Management and Follow-up – where the process for altering and adding mitigation measures and additional examples of mitigation are provided.
	2.9.4 if modified or additional mitigation measures are required pursuant to condition 2.9.3, develop and implement these mitigation measures in a timely manner and monitor them in accordance with condition 2.9.2.	The caribou follow-up program is discussed in Section 6; Adaptive Management and Follow-up. The results of monitoring programs and any resulting changes to, or additions of mitigation too be described in the annual reports.
2.10 (Follow-up and Adaptive Management)	Where consultation with Indigenous groups is a requirement of a follow-up program, the Proponent shall discuss the follow-up program with Indigenous groups and determine, in consultation with Indigenous groups, opportunities for their participation in the implementation of the follow-up program, including the analysis of the follow-up results and whether modified or additional mitigation measures are required, as set out in condition 2.9.	To be discussed with Indigenous groups. The caribou follow-up program is discussed in Section 6; Adaptive Management and Follow-up – this section describes the involvement of the Aboriginal monitors.
2.11 (Annual Reporting)	The Proponent shall, commencing in the reporting year during which the Proponent begins the implementation of the conditions set out in this Decision Statement, prepare an annual report that sets out: 2.11.1 the activities undertaken by the Proponent in the reporting year to comply with each of the conditions set out in this Decision Statement;	Reporting for federal conditions is discussed in Section 7.1
	2.11.2 how the Proponent complied with condition 2.1;	Reporting for federal conditions is discussed in Section 7.1
	2.11.3 for conditions set out in this Decision Statement for which consultation is a requirement, how the Proponent considered any views and information that the Proponent received during or as a result of the consultation, including a rationale for how the views have, or have not, been integrated;	Reporting for federal conditions is discussed in Section 7.1
	2.11.4 the information referred to in conditions 2.5 and 2.6 for each follow-up program;	Reporting for federal conditions is discussed in Section 7.1

Condition	Description	Location in Plan / Comments
	2.11.5 the results of the follow-up program requirements identified in conditions 3.14, 3.15, 3.16, 4.5, 5.5, 6.11, 6.12, 6.13, 6.14, 8.18.6, 8.20.5, 8.21, and 8.22 if required;	Reporting for federal conditions is discussed in Section 7.1. Note that the CMMP addresses the follow-up program described in condition 8.18.6 and will be reporting on that program.
	2.11.6 any update made to any follow-up program in the reporting year;	Reporting for federal conditions is discussed in Section 7.1
	2.11.7 any modified or additional mitigation measures implemented or proposed to be implemented by the Proponent, as determined under condition 2.9 and rationale for why mitigation measures were selected pursuant to condition 2.5.4; and	Reporting for federal conditions is discussed in Section 7.1
	2.11.8 any change(s) to the Designated Project in the reporting year.	Reporting for federal conditions is discussed in Section 7.1
2.12 (Annual Reporting)	The Proponent shall provide a draft annual report referred to in condition 2.11 to Indigenous groups, no later than June 30 following the reporting year to which the annual report applies. The Proponent shall consult Indigenous groups on the content and findings in the draft annual report.	Reporting for federal conditions is discussed in Section 7.1
2.13 (Annual Reporting)	The Proponent, in consideration of any comments received from Indigenous groups pursuant to condition 2.12, shall revise and submit to the Agency and Indigenous groups a final annual report, including an executive summary in both official languages, no later than September 30 following the reporting year to which the annual report applies.	Reporting for federal conditions is discussed in Section 7.1
2.14 (Information Sharing)	The Proponent shall publish on the Internet, or any medium which is publicly available, the annual reports and the executive summaries referred to in conditions 2.11 and 2.13, the offsetting plan(s) referred to in condition 3.11, the compensation plan referred to in condition 8.18 and, if required, condition 5.3, the whitebark pine management plan referred to in condition 8.20, the communication plans referred to in conditions 6.15 and 10.5, the reports related to accidents and malfunctions referred to in conditions 10.4.2 and 10.4.3, the schedules referred to in conditions 11.1 and 11.2, and any update(s) or revision(s) to the above documents, upon submission of these documents to the parties referenced in the respective conditions. The Proponent shall keep these documents publicly available for 25 years following the end of decommissioning of the Designated Project. The Proponent shall notify the Agency and Indigenous groups of the availability of these documents within 48 hours of their publication.	Reporting for federal conditions is discussed in Section 7.1

Condition	Description	Location in Plan / Comments
2.15 (Information Sharing)	When the development of any plan is a requirement of a condition set out in this Decision Statement, the Proponent shall submit the plan to the Agency and to Indigenous groups prior to construction, unless otherwise required through the condition.	Draft CMMP provided to Indigenous groups (as defined in the federal Decision Statement; DS) for review and comment on 26 July 2021.
8.9	The Proponent shall identify, prior to construction and in consultation with Indigenous groups and relevant authorities, time periods during which construction activities must be carried out to protect wildlife during sensitive life stages, including for grizzly bear (*Ursus arctos*), western toad (*Anaxyrus boreas*), wolverine (*Gulo gulo*), American marten (*Martes americana*), fisher (*Pekania pennanti*) and southern mountain caribou (*Rangifer tarandus caribou*). In doing so, the Proponent shall: 8.9.1 apply British Columbia's Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia. Interim Guidance, North Area when identifying these time periods;	CMMP Sections 3.1 and 3.2 discuss the sensitive life stages for caribou. The Wildlife Mitigation and Monitoring Plan (WMMP) discusses the sensitive periods for other wildlife species.
	8.9.2 notify, prior to construction, the Agency and Indigenous groups of these time periods and of the areas within which each of these time periods shall apply; and	CMMP Sections 3.1 and 3.2 discuss the sensitive life stages for caribou.
	8.9.3 conduct construction activities during these time periods, unless not technically feasible.	CMMP Sections 3.1 and 3.2 discuss the sensitive life stages for caribou.
8.17	The Proponent shall, during all phases of the Designated Project and in consultation with Indigenous groups, Environment and Climate Change Canada and other relevant authorities, mitigate adverse environmental effects on southern mountain caribou (*Rangifer tarandus caribou*) and its habitat, including by carrying out construction activities during time periods referred to in condition 8.9 for southern mountain caribou (Rangifer tarandus caribou). In doing so, the Proponent shall give preference to avoiding the destruction or alteration of habitat over minimizing the destruction or alteration of habitat, to minimizing the destruction or alteration of habitat over restoring altered or destroyed habitat on-site, and to restoring altered or destroyed habitat on-site over offsetting.	CMMP Sections 3.1 and 3.2 discuss the sensitive life stages for caribou.

Condition	Description	Location in Plan / Comments
8.18	For any offsetting required pursuant to condition 8.17, the Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, and to the satisfaction of Environment and Climate Change Canada, a compensation plan for southern mountain caribou (*Rangifer tarandus caribou*). When developing the compensation plan, the Proponent shall take into account habitat needs for migratory birds and listed species at risk. The Proponent shall implement the compensation plan from the beginning of construction. The compensation plan shall include: 8.18.1 mapping of critical habitat of southern mountain caribou (*Rangifer tarandus caribou*) altered or destroyed by the Designated Project;	Section 4.3 describes the offsetting plan. Section 4.5, Consideration of Migratory Birds and Species at Risk describes how migratory birds and species at risk were taken into account in the offsetting plan. Section 2.2 Habitat, and Figures 2.1-2, 2.2-2 indicate the habitat lost due to the project. Section 4.2 lists the areas of habitat directly and indirectly lost due to the project.
	8.18.2 an offsetting ratio for direct habitat loss and indirect (e.g., sensory) losses based on an assessment of options, including revegetation and road closures, that consider the types of offset, location, time lags, securement, technical and economic feasibility, and probability of success;	Section 4; Offsetting
	8.18.3 field verified suitability mapping of areas to be prioritized for offsetting;	Section 5.7, Habitat Suitability Mapping for the Offset Area, describes the habitat suitability mapping for the offsetting areas. Field surveys were conducted in summer of 2021 as noted in Section 5. Aerial imagery to support vegetation and habitat suitability mapping was flown in August, September and October 2021, but was hampered by heavy smoke and cloud cover. New imagery is scheduled to be flown in spring 2022.
	8.18.4 if residual environmental effects cannot be fully offset with habitat-based measures, a description of non-habitat measures to be implemented by the Proponent and a description of how these measures will be implemented by the Proponent, including a schedule for implementation;	Section 4.3 Section 5.6; Non-Habit-Based Offsetting – describes some of the activities to be carried out as part of the non-habitat-based offset.
	8.18.5 a description of performance indicators to be used by the Proponent to evaluate the effectiveness of habitat-based and non-habitat-based compensation measures; and	Section 6.3, Monitoring Effectiveness of Offsetting, describes the monitoring programs and performance indicators to be used to evaluate the effectiveness of habitat-based compensation measures.

Condition	Description	Location in Plan / Comments
	8.18.6 a description of the follow-up program the Proponent shall implement to determine the effectiveness of the mitigation measures included in the compensation plan. As part of the development of the follow-up program, the Proponent shall determine, in consultation with Indigenous groups, the methods, timing and frequency for conducting winter surveys for caribou abundance and distribution within the Designated Project area. The Proponent shall apply conditions 2.9 and 2.10 when implementing the follow-up program.	The follow up program for caribou is described in Section 6; Adaptive Management and Follow-Up. Section 6.2.2 describes the conversations with FLNRORD, ECCC, UFN and LDN on whether aerial surveys are the correct approach for monitoring, and a preferred approach, using snow track surveys and pellet counts to examine relative abundance of caribou with distance to the mine.

APPENDIX B CONCORDANCE WITH ENVIRONMENTAL ASSESSMENT CERTIFICATE #M19-01 (JUNE 2019)

Table B-1: Concordance with Environmental Assessment Certificate #M19-01 Conditions

Condition	Description	Location in Plan / Comments
2 (Plan Development)	Where a condition of this Certificate requires the Holder to develop a plan, program or other document, any such plan, program or other document must, at a minimum, include the following information: a) purpose and objectives of the plan, program or other document;	Section 1.1
	b) roles and responsibilities of the Holder and Employees;	Section 1.2, Table 1.2-1
	c) names and, if applicable, professional certifications and professional stamps/seals, of those responsible for the preparation of the plan, program, or other document;	Section 9, Qualified Professionals
	d) schedule for implementing the plan, program or other document throughout the relevant Project phases;	Sections 5, 6
	e) means by which the effectiveness of the mitigation measures will be evaluated including the schedule for evaluating effectiveness;	Section 6.5, Monitoring Effectiveness of Habitat Securement, and Section 6.6 Monitoring Effectiveness of Mitigation measures
	g) schedules and methods for the submission of reporting to specific agencies, Aboriginal Groups and the public and the required form and content of those reports;	Section 7, Reporting
	h) and process and timing for updating and revising the plan, program or other document, including any consultation with agencies and Aboriginal Groups that would occur in connection with such updates and revisions.	Section 8, Plan Revisions
3 (Adaptive Management)	Where a condition of this Certificate requires the Holder to develop a plan, program or other document that includes monitoring, including monitoring of mitigation measures or monitoring to determine the effectiveness of the mitigation measures, the Holder must include adaptive management in that plan. The objective of the adaptive management is to address the circumstances that will require the Holder to implement alternate or additional mitigation measures to address effects of the Project if the monitoring shows that those effects: a) are not mitigated to the extent contemplated in the Application; b) are not predicted in the Application; or c) have exceeded the triggers identified in paragraph g) of this condition.	Section 6, Adaptive Management and Follow-up
	The adaptive management in the plan must include at least the following: d) the monitoring program that will be used including methods, location, frequency, timing and duration of the monitoring;	Section 6, Adaptive Management and Follow-up

Condition	Description	Location in Plan / Comments
	e) the baseline information that will be used, or collected where existing baseline information is insufficient, to support the monitoring program;	Sections 6.2, 6.3, 6.4
	f) the scope, content and frequency of reporting of the monitoring results;	Section 7, Reporting
	g) the identification of qualitative and quantitative triggers, which, when observed through monitoring required under paragraph d), will require the Holder to alter existing, or develop new, mitigation measures to avoid, reduce, and/or remediate effects;	Section 6, Adaptive Management and Follow-up
	h) the methods that will be applied to detect when a numeric trigger, or type or level of change referred to in paragraph g), has occurred;	Sections 6.2 - 6.6
	i) a description of the process for and timing to alter existing mitigation measures or develop new mitigation measures to reduce or avoid effects;	Section 6.1.2, Adaptive Management Framework, Section 6.5, Monitoring Effectiveness of Habitat Securement, and Section 6.6 Monitoring Effectiveness of Mitigation measures
	j) identification of the new and/or altered mitigation measures that will be applied when any of the changes identified in paragraphs a) to c) occur, or the process by which those will be established and updated over the relevant timeframe for the specific condition;	Possible adaptive management responses provided in Sections 6.2 through 6.6. Potential additional mitigation measures are proposed for each sections. Updates to mitigation measures will be determined based on consultation with Indigenous groups.
	k) the monitoring program that will be used to determine if the altered or new mitigation measures and/or remediation activities are effectively mitigating or remediating the effects and or avoiding potential effects; and	Sections 6.2 - 6.6
	l) the scope, content and frequency of reporting on the implementation of altered or new mitigation measures.	Section 7, Reporting
	If there are any requirements or mitigation measures required in the plan, program or other document for which adaptive management, or elements of adaptive management listed in paragraphs d) to l) are assessed to be not appropriate or applicable, the plan must include identification of those requirements and measures, and the rationale for that assessment.	Sections 7, 8

Condition	Description	Location in Plan / Comments
4 (Consultation)	Where a condition of this Certificate requires the Holder consult a particular party or parties regarding the content of a plan, program or other document, the Holder must, to the satisfaction of the EAO: a) provide written notice to each such party that: i) includes a copy of the plan, program or other document; ii) invites the party to provide its views on the content of such plan, program or other document; and iii) indicates: i. if a timeframe for providing such views to the Holder is specified in the relevant condition of this Certificate, that the party may provide such views to the Holder within such time frame; or ii. if a timeframe for providing such views to the Holder is not specified in the relevant condition of this Certificate, specifies a reasonable period during which the party may submit such views to the Holder.	Draft CMMP (Version 2) provided to Indigenous groups (as defined in federal Decision Statement [DS]) in August 2021. Draft Plan includes a Context Statement to indicate the Plan is required by the Project's federal DS and Environmental Assessment Certificate (EAC). Completed concordance tables identifying where requirements are addressed in the Plan included in appendices. Email conveying the draft CEMMP identifies timing for providing comments, taking into account Indigenous Participation Agreements. CMMP updated in response to comments from Indigenous groups and regulators and released in December 2021 (Version 3) and March 2022 (Version 4).
	b) undertake a full and impartial consideration of any views and other information provided by a party in accordance with the timelines specified in a notice given pursuant to paragraph (a);	Completed. See Sections 1.4, 2.4, 6.1 and ITT
	c) provide a written explanation to each such party that provided comments in accordance with a notice given pursuant to paragraph (a) as to: i) how the views and information provided by such party to the Holder have been considered and addressed in a revised version of the plan, program or other document; or ii) why such views and information have not been addressed in a revised version of the plan, program or other document;	Completed. Tracked change versions of the CMMP were provided to UDN/LFN, FLNRORD, ENV, EMPR, ECCC. Comments and responses, including how comments were incorporated into the plan or why not are included in the Issues Tracking Table (ITT).
	d) maintain a record of consultation with each such party regarding the plan, program or other document; and e) provide a copy of such consultation record to the EAO, the relevant party, or both, promptly upon the written request of the EAO or such party. The copy of such consultation record must be provided to the EAO, relevant party, or both, no later than 15 days after the Holder receives the request for a copy of the consultation record, unless otherwise authorized by the EAO.	Noted
5 (Compliance Verification and Report)	The Holder must provide to the EAO and to the Aboriginal Groups any document, data or information requested by the EAO for the purposes of compliance inspection and verification. The Holder must provide any document, data or information requested within the timeframe and in the manner specified by the EAO.	Section 7, Reporting

Condition	Description	Location in Plan / Comments
22 (Caribou Mitigation and Monitoring Plan)	Draft CMMP to be submitted a minimum of 180 days prior to planned commencement of construction. BW Gold must provide the draft plan that was developed in consultation with FLNRORD, ENV, EMPR, ECCC, and Aboriginal Groups to the EAO, FLNRORD, EMPR, ENV, ECCC, and Aboriginal Groups for review a minimum of 180 days prior to the planned commencement of Construction, or as listed in the Document Submission Plan required by Condition 10 of this Certificate.	Draft CMMP provided to Indigenous groups for review and comment in August 2021. CMMP updated in response to comments from Indigenous groups and regulators and released in December 2021 (Version 3) and March 2022 (Version 4).
22a	The plan must include at least the following: the means by which the means by which the mitigation measures identified in the Mitigation Table required under Condition 43 for the valued component Caribou will be implemented;	Section 3
22b	a requirement that during Construction the Existing Exploration Access Road (from its origin at the Kluskus-Ootsa Forest Service road to the Mine Site) and the Mt. Davidson Exploration Road, as identified in Figures A1-1 and A-2 of Schedule A to the Certificate, be decommissioned and caribou habitat disturbed by these roads be reclaimed in a manner that supports the reestablishment of caribou habitat;	Sections 3.3.1 and 5.3
22c	the type, timing and frequency for undertaking caribou surveys prior to commencement of Construction, as well as during Operations, and how that information will inform development and implementation of monitoring and mitigation measures during Construction and Operations;	The objective of aerial surveys was to measure caribou avoidance of the mine site – monitoring predicted effects. At the request of FLNRORD, ECCC, UFN and LDN in January 2022, the methods for measuring caribou avoidance of the mine were updated to use snow track surveys and pellet counts instead of aerial surveys. The request for a change to methods, justification and updated methods are described in Section 6.2.2.
22d	provision of survey results to Aboriginal Groups, FLNRORD, EMPR, and ENV;	The results of any surveys (whether aerial or snow track/pellet counts) will be provided to Aboriginal Groups, FLNRORD, EMPR, and ENV
22e	scheduling Construction activities to take into account the caribou “least risk window” (as defined by Ungulate Winter Range Order U-7-012), including monitoring and implementation of management or mitigation measures to avoid or reduce impacts in the event caribou are observed in the area of the Project Site;	Sections 3.1 and 3.2
22f	the conditions under which work would be stopped if caribou are seen in the area during Construction;	Sections 3.2
22g	development and implementation of caribou awareness protocols for Employees;	Section 3.2

Condition	Description	Location in Plan / Comments
22h	the timing and frequency, which must be at least once per year, unless otherwise authorized by the EAO, that the Holder will request to meet with FLNRORD and Aboriginal Groups to discuss opportunities for the Holder's Participation in provincial caribou regional initiatives and in initiatives related to caribou established under Section 5.2b)i.c. of the Hubulhsooninats'uhoot'alh: Foundation Framework Agreement (July 22, 2018, or as updated or replaced from time to time), between the Province and the Southern Dakelh Nation Alliance. When FLNRORD and/or Aboriginal Groups agree to meet, the Holder must organize such meeting;	Section 5.6
22i	the development of a work plan for the Holder's Participation in those initiatives identified in paragraph h) when invited to do so by FLNRORD or the Ministry of Indigenous Relations and Reconciliation.	Noted
22j-q	The plan must also include a plan to offset the loss of caribou habitat with recovery and protection of caribou habitat that will benefit the same herd of caribou that is affected by the Project. The offsetting plan must include at a minimum:	Sections 4and 5
22j	Demonstration of how the plan takes into consideration the assessment and proposals contained in the Application document: New Gold's Response to the May 25, 2018 Information Request from the Canadian Environmental Assessment Agency – Updated Assessment of Impacts to Southern Mountain Caribou and Proposed Caribou Offset, submitted on August 31, 2018 (August 2018 Caribou Memo), including with respect to: 22j) i) mapping of the caribou critical habitat altered or destroyed by the Project; 22j) ii) identifying offset locations within the Tweedsmuir-Entiako Herd Boundary; 22j) iii) defining ecological equivalency for areas of proposed offsets compared to the areas affected by the Project and related offset area ratios; 22j) iv) providing a rationale for any deviation from the assessment or proposal in the August 2018 Caribou Memo, including how deviations result in the same or improved overall effectiveness in offsetting the adverse effects to caribou as compared to that included in the August 2018 Caribou Memo;	Sections 2 to 2.3; 4
22k	demonstration of how the Holder has considered and designed the offsetting plan to be consistent with or to support any provincial and/or federal plans for the recovery of the herd of caribou affected by the Project;	Sections 2 to 3.3; 4, 5.1
22l	how, in identifying offset locations, the Holder sought and considered information on: 22l) i) areas currently used by caribou; 22l) ii) Traditional Knowledge and Traditional Land Use; and 22l) iii) areas that would create contiguous blocks of protected habitat;	Sections 2.1 to 4.5

Condition	Description	Location in Plan / Comments
22m	how the proposed offset selection takes into account the duration of effects, including the potential for the duration to change in the future, and technical and financial considerations;	Section 4.3
22n	1:20,000 scale topographic maps including UTM grid for areas proposed and secured for habitat-based offsetting;	Section 5.7
22o	a description of how areas secured for habitat-based offsetting will be maintained;	Section 4, 5
22p	a monitoring program to determine the effectiveness of the offset; and	Sections 6.6, Monitoring the Effectiveness of the Offset
22q	the specific actions required on the part of the Holder to secure the offsets, identification of the extent to which the Holder has the ability to implement the offset and identification of actions required by other parties that have been identified by the Holder for the offsets to be fully secured and implemented.	Section 4.3
	The Holder must provide the draft plan that was developed in consultation with FLNRORD, ENV, EMPR, ECCC, and Aboriginal Groups to the EAO, FLNRORD, EMPR, ENV, ECCC, and Aboriginal Groups for review a minimum of 180 days prior to the planned commencement of Construction, or as listed in the Document Submission Plan required by Condition 10 of this Certificate.	Delivered in August, 2021
	The Holder must not commence Construction on the Project Site until the plan has been approved by the EAO and the Holder has completed all actions identified in paragraph q) that are the Holder's responsibility to secure and implement, unless otherwise authorized by the EAO. The plan, and any amendments thereto, must be implemented to the satisfaction of a Qualified Professional throughout Construction.	To be completed

APPENDIX C UFN & LDN BLACKWATER GOLD PROJECT CARIBOU HABITAT OFFSET AND RESTORATION LETTER (DECEMBER 2021)

Travis Desormeaux
Environmental Manager
Artemis Gold Inc.
595 Burrard Street,
Suite 3083
Vancouver, BC V7X 1L3

1st December 2021

Re: Blackwater Gold Project Caribou Habitat Offset and Restoration

Dear Travis,

As a follow-up to the joint Governmental-First Nations letter on caribou habitat offsetting, we would like to assert that both Ulkatcho and Lhoosk'uz Dené Nations expect to lead the caribou habitat restoration activities. As explained in the letter, offsetting for the Blackwater Mine requires a significant amount of habitat restoration, though the exact scope remains undetermined. We are currently building capacity and expertise in caribou habitat restoration, and as stewards of the land we feel we are in the best position to conduct this work. We look forward to working together to determine the funding required for restoration that will bring the Blackwater Mine to a point considered to be a low risk to caribou.

Regards

Laurie Vaughan, Natural Resources Director Ulkatcho First Nation

Neil Gauthreau, Lands and Resource Manager Lhoosk'uz Dené Nation

Michael Keefer, President, Lead Visionary, Keefer Ecological Services

Steve Ross, Wildlife Biologist, Keefer Ecological Services

APPENDIX D FLNRO COMMENTS ON BLACKWATER GOLD PROJECT DRAFT CARIBOU MITIGATION AND MONITORING PLAN (CMMP), AUGUST 2021 (NOVEMBER 2021)

November 5, 2021

RE: FLNRO Comments on Blackwater Gold Draft Caribou Mitigation and Monitoring Plan (CMMP), August 2021

I have completed my initial review of the Draft Caribou Mitigation and Monitoring Plan ('Draft CMMP') dated August 12, 2021 and offer the following comments for your consideration and Artemis's response. I have included a spreadsheet detailing sections of text, and comments on those sections (Attachment 1).

As a general comment, the details surrounding the proposed offset and offset ratios will be visited in detail separately with Environment and Climate Change Canada (ECCC) and First Nations. I have provided comment on some specifics regarding the characterization of the offset in the Draft CMMP and the "use" of the B.C. draft habitat decision support tool ("the tool"). In general, the information provided in the Draft CMMP regarding offsets does not provide for "no net loss" or additional benefit to Caribou as described. Additional follow up will be required.

The related plans referenced within the Draft CMMP (e.g., Wildlife Management and Monitoring Plan, Construction Management Plan, Vegetation Management Plan), show some inconsistencies in the language used to describe mitigation measures and in some of the strategies described therein. These plans are being concurrently reviewed and it is likely there will be additional requests for clarification and alignment among the various plans that have been provided.

Habitat Characterization

The characterization of habitats in the Draft CMMP aligns with the information in the Environmental Assessment (EA)and is consistent with the mapping and descriptions from the EA. There is one exception; in Figure 1.1-1 within Matrix 1 habitat there is one area within identified as non-critical habitat. All Matrix 1 habitat is characterized as critical habitat. This figure is the only place in the Draft CMMP where Matrix habitat is depicted as non-critical habitat. If the Matrix 1 habitat that was described as non-critical in Figure 1.1-1 was excluded from disturbance calculations the resultant disturbance percentages would be incorrect.

Ministry of Forests, Lands & Natural Resource Operations
Fish & Wildlife Section / Landbase Stewardship Section
Omineca Region
Mailing/Location Address: 2000 South Ospika Blvd Prince George BC V2N 4W5
Telephone: (250) 614-7400
Facsimile: (250) 953-0413
Website: www.env.gov.bc.ca/esd

Restoration

Restoration and reclamation are not the same. The terms are not interchangeable. Reclamation is defined within the reclamation provisions of the *Mines Act* and the *Health, Safety and Reclamation Code for Mines in British Columbia* (Mines Code). Restoration is to return the sites' hydrology, topography, and natural vegetative communities to pre-disturbance conditions

Buffer

FLNRORD will not object to the use of the hybrid buffer as it likely better reflects the disturbance potential and is more in line with recent work that looks at more specific effects of disturbances in a behavioral context rather than the 500 meter (m) buffer the has been used to account for disturbances at a herd scale.

Proposed Offset

As noted, this section will require additional work. In general, the following are the main messages regarding proposed offsetting.

- Proposed offset does not provide net-neutral or benefit to caribou as currently written;
- Discussion of the habitat value both on and off the mine site is warranted (i.e., proposed mine site caribou habitat valued at lowest value, offset area valued at highest value);
- Discussion on the determination of the offset ratio, as the minimum ratio of 4:1 was used but then reduced to 1:1 in some instances.
- Proposed offset focuses mainly on tenure development deferral; to aid caribou recovery – expectation is for larger area paired with concerted effort on restoration to provide "additional" value of lands set-a-side.

The duration of the offset will need to be discussed as there are components of the Project (water treatment facility, access road, transmission line, and the related disturbances) that would be considered to be permanent (in place for more than 300 years). Additionally, the implications of using auditory deterrents to prevent birds from accessing the tailings ponds may need to be further explored as a potential impact to caribou.

Pre-Construction Surveys

Within the Draft CMMP pre-construction surveys are mentioned in a manner that indicates they have yet to be undertaken, this includes the work proposed in Sections 5.4, and the pre-work that is the foundation of much of Section 6. This is rather important as it is needed to undertake monitoring activities where there is a desire to observe change. Identifying data that has been collected and the specific linkages to the monitoring goals and analysis. If this data has not been collected it may be difficult to implement the some of the monitoring especially where the

adaptive management triggers depend on significant results. Where works have been undertaken it should be indicated.

Adaptive management

This section will require some discussion. As I have noted in my previous comments regarding pre-construction surveys, data collected to this point needs to be identified and clearly connected to the monitoring question, monitoring data collection, and the intended analysis. Some of the methods described for data collection my be at scales (spatial and temporal) that are not appropriate to answer the monitoring question. This is very relevant for areal surveys, telemetry data, and behavioral response to restoration.

Camera studies require detailed planning to determine minimum numbers of cameras required to allow for meaningful analysis. Given the trigger window tends to be 7 m by 7 m the information that they provide is very limited. Using a small number of cameras to infer trends in distribution and abundance is not appropriate.

Permanent plots to assess physical works (blocking of access) and vegetation (whitebark pine and restoration) can be effective providing the data being collected is appropriate for the analysis, and reflects the purpose of the works.

Restoration of caribou habitat can be considered in different ways depending on the habitat and the purpose of restoration. In terms of caribou habitat the return to a state of functional habitat can be in excess of 70 years. For management of alternative prey that period may be 40 years. The monitoring questions appear to be mostly targeting prevention of access rather than restoration of habitat.

Thank you for the opportunity to comment on this draft, I look forward to participating in the continued development of the CMMP with Artemis, Ulkatcho First Nation, Lhoosk'uz Dené Nation, Nadleh Whut'en First Nation, Stellat'en First Nation, Saik'uz First Nation and Nazko First Nation, and ECCC.

Regards,

Duncan McColl M.Sc. R.P.Bio.
Sr. Ecosystems Biologist
Landbase Stewardship | Omineca Region
Phone: **2506494372** | Email: duncan.mccoll@gov.bc.ca
Ministry of Forests, Lands, Natural Resource Operations and Rural Development

Attachment: Excel sheet with detailed comments on the Draft CMMP (August 2021)

APPENDIX E ECCC RISK CHARACTERIZATION TO INFORM ADVICE REGARDING OFFSETS FOR SOUTHERN MOUNTAIN CARIBOU – BLACKWATER GOLD PROJECT (NOVEMBER 2021)

ECCC Risk Characterization to Inform Advice Regarding Offsets for Southern Mountain Caribou - Blackwater Gold Project

Background

Artemis Gold Inc. is proposing the construction, operation, and closure of an open-pit gold and silver mine located approximately 110 kilometres southwest of Vanderhoof, British Columbia. As proposed, the Blackwater Gold Project would produce 60,000 tonnes per day of gold and silver ore, over a mine life of 17 years.

The Minister of the Environment and Climate Change decided that the project was not likely to cause significant adverse effects considering the mitigation measures established in the conditions for approval in the Decision Statement on April 15, 2019 under the *Canadian Environmental Assessment Act, 2012*. The Project also received an Environmental Assessment Certificate under the BC *Environmental Assessment Act* (2002) on June 21, 2019. A Caribou Mitigation and Monitoring Plan (CMMP) is being prepared by Artemis Gold to meet both provincial and federal conditions.

In particular, federal condition 8.18 states, "the Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, and to the satisfaction of Environment and Climate Change Canada (ECCC), a compensation plan for Southern Mountain Caribou (SMC; *Rangifer tarandus caribou*)". "The compensation plan shall include: … an offsetting ratio for direct habitat loss and indirect (e.g. sensory) losses based on an assessment of options, including revegetation and road closures, that consider the types of offset, location, time lags, securement, technical and economic feasibility, and probability of success".

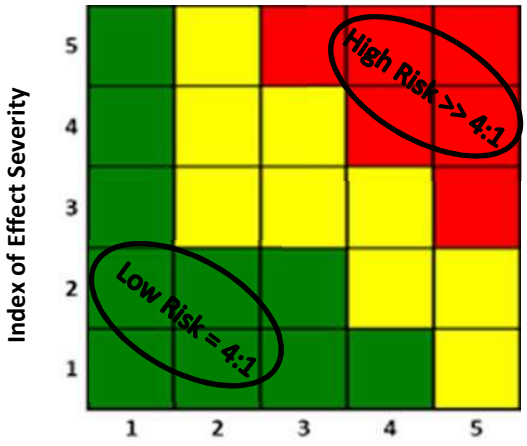
The Minister of the Environment and Climate Change also has obligations under section 79 of SARA to ensure measures to avoid, lessen and monitor adverse effects to species at risk and their critical habitat are taken in a way that is consistent with applicable recovery strategy and action plans.

Key Biodiversity Offsetting Considerations:

- ECCC's Biodiversity Offsetting approach is described in its Operational Framework for Use of Conservation Allowances (EC 2012; hereafter referred to as the 'Framework').
- ECCC applies the Framework where the Department has a role related to the review or approval of proposed land- or resource-use activities for which it has a jurisdictional role. This includes activities occurring on federal lands or waters; for projects for which the federal government is the proponent or that receive federal funding; for activities that are subject to federal legislation, actions that would affect Indigenous and/or treaty rights; or, when ECCC has environmental protection or conservation objectives that would be affected by the proposed activity.

- Biodiversity offsets are measurable and demonstrable conservation benefits designed to balance the residual adverse effects of a project after the implementation of all feasible avoidance, minimization, and on-site restoration measures. The goal of biodiversity offsetting is to achieve a balance against the residual adverse effects of a project so that No Net Loss is achieved. In the context of species at risk, the amount of offset, typically in form of habitat measures though not always, aims to ensure that projects do not contribute to jeopardizing the survival or recovery of the species.
- Biodiversity offsetting is the last step in the mitigation hierarchy, which establishes an order of preference that promotes project development designs with the least environmental impact. The mitigation hierarchy prioritizes avoidance of disturbance over minimization of adverse impacts, followed by on-site disturbance restoration and, lastly, offsetting.
- 'Equivalency' is a key consideration in the design of a biodiversity offset. Equivalency describes the type and amount of offsetting needed to balance against the residual adverse effects. Multipliers (ratios) are typically employed to manage to acceptable levels the uncertainties and risks associated with the offset. Larger ratios reflect situations that are riskier or more uncertain in their potential outcomes, or both.
- ECCC typically recommends a minimum offset ratio of 4:1 (offset outcome : residual impact). This is a benchmark ratio applied to a project that is in the lower end of the risk spectrum; for example, for a project with a low severity impact adversely affecting a low vulnerability ecological component. In general, the minimum 4:1 ratio accounts for time-lags to restoration, uncertainty in outcomes, a precautionary approach, and the adverse impact itself in its specific context. Offset ratios will variously be higher or as determined by project-specific circumstances and associated risks and uncertainties. For example, the offset ratio has been as high as 30:1 for high risk projects (e.g., NGTL 2021 Project).
- The determination of each offset outcome is currently determined on a case-by-case basis, and includes some degree of professional judgement with respect to the determination of risk in consideration of the key factors at play. ECCC is considering the use of BC's draft Habitat Offset Decision Support Tool to help inform offset ratios for projects that affect caribou.
- Figure 1 illustrates ECCC's draft interim approach to deriving an offset ratio based on the severity of the project's adverse effects and vulnerability of the wildlife population affected. The assessment takes into account the nature of the adverse effects of the project, and information on the biology and ecology of the species, its population and habitat status, and the implications of these to survival and recovery of the species.

Figure 1: Risk Management Matrix



Context for Risk Characterization: Critical Habitat for the Tweedsmuir Local Population Unit of Southern Mountain Caribou (SMC)

- The federal recovery strategy for Woodland Caribou, Southern Mountain population (EC 2014) identifies five categories of critical habitat in the Tweedsmuir LPU: high elevation summer and/or winter range, low elevation winter range, low elevation summer range, Type 1 matrix range within annual ranges, and Type 2 matrix range surrounding annual ranges.
- During the environmental assessment process, the proponent mapped and classified habitat within the mine site footprint and buffered areas as either High Elevation Winter Range (HEWR), HE-Matrix 1, LE-Matrix 1, Matrix 1, or Matrix 2.
- The federal recovery strategy indicates that the attributes of HEWR include windswept alpine slopes, subalpine parkland, and subalpine forests that provide security from predators (low predation risk), have low levels of sensory disturbance, and provide SMC with access to terrestrial and arboreal lichens as forage. Type 1 matrix range includes forested habitats at high and low elevations, and may include seasonal migration areas (or portions of migration areas) and areas of relatively lower use compared to delineated seasonal ranges (EC 2014). The function of Type 1 matrix range is to provide some forage, connectivity between seasonal ranges, security from human disturbance, and a low risk of predation (EC 2014).Type 2 matrix range includes forested habitats at high and low elevations, and consists of areas surrounding annual ranges where predator / prey dynamics influence predation within the subpopulation's annual range. It may also include trace occurrences of caribou, and dispersal zones between subpopulations and between LPUs.

- The federal recovery strategy states that "*Minimal disturbance for high-elevation winter and/or summer ranges in all Groups, and less than 35% disturbed habitat level for low elevation winter ranges and Type 1 matrix range in the Northern and Central Groups, are currently considered as necessary to achieve recovery of LPUs*."; and that "*maintaining the function of Type 2 matrix range is crucial to the survival and recovery of SMC*".

ECCC's Risk Characterization for SMC (Tweedsmuir Local Population Unit (LPU)) in relation to the Blackwater Gold Project

The purpose of this assessment is to inform ECCC's views on the CMMP, including the approach to offsetting the adverse effects of the Project on the Tweedsmuir LPU.
ECCC's assessment of risk associated with the Project takes into account the following factors:

- Vulnerability of the Tweedsmuir LPU; and,
- Severity of adverse effects due to the Project.

Based on these factors, ECCC will assign a risk score which will be the basis for ECCC's advice on offsetting for the Blackwater Gold Project. The sections below provide the details considered in ECCC's draft risk characterization to date and a preliminary risk score, for the purpose of further input and discussion.

1) <u>Vulnerability of Tweedsmuir LPU</u>

a) <u>Population status</u>

Key considerations:

- Based on the best available information.
- Population numbers and trend are factored into the population status.
- Considers whether the province has measures in place to manage predators.

Assessment:

- SMC (including the Tweedsmuir LPU) are listed as Threatened under Schedule 1 of the *Species at Risk Act* (SARA).
- Habitat disturbance, and the resultant changes to predator prey dynamics, are the leading cause of caribou decline.
- In 2018, the Minister of Environment and Climate Change determined that SMC are facing imminent threats to their recovery.
- In 2019, the Tweedsmuir LPU population was estimated to be between 150 and 200 individuals (Cichowski et al. 2020). The population has been declining over the last 50-60 years; population size was estimated to be 600 in 1963, 470 in 1987, and 300 in 2003 (Greene and Roberts 2021).
- To stabilize ongoing declines in the near term, a two-year wolf reduction program was initiated in February 2020 by the BC Government (Green and Roberts 2021). A continuation of that program for an additional five years is currently proposed and under consideration.

b) Irreplaceability

Key considerations:

- Relates to the current availability of habitat for the species/herd. A caribou range with a high level of habitat disturbance (i.e., above 35% disturbed), has low habitat availability and increased rareness of the habitat.

Assessment:

- The Tweedsmuir LPU range has been subjected to cumulative disturbance associated with forestry, wildfires, mountain pine beetle kill, mineral exploration, mine development, and roads associated with industrial activities (Cichowski et al. 2020).
- Current Disturbance: Calculations of habitat disturbance vary, but it is recognized that the existing level of habitat disturbance in this LPU already exceeds the levels the federal recovery strategy considers necessary to achieve recovery of the species, regardless of methodology and characterization of habitat types.
    - In 2018, the Proponent estimated habitat disturbance at approximately: 9% in High Elevation Winter Range (HEWR), 40% in Low Elevation Winter Range (LEWR), and 19% in Type 1 Matrix Range (ERM 2018a, ERM 2018b).
    - In 2017, ECCC estimated disturbance levels at 7% in HE critical habitat and 43% in the remainder of the LPU (i.e. a combination of LEWR and Type 1 Matrix range). This internal analysis followed methods similar to Environment Canada 2011, using a 2012 digitization of 2011 Landsat imagery at 1:50,000 viewing scale and 30m resolution for anthropogenic disturbances, updated with data on forest fires between 1976 and 2015.
    - The Tweedsmuir-Entiako Caribou Tactical Restoration Plan (Chichowski et al 2020) calculated total disturbance at 18% in HE summer/winter range, 38% in LE summer range, 75% in LE winter range, 79% in Matrix winter range, and 32% in Matrix summer range, following a methodology that captures more disturbance than the ECCC method, and using provincial linework to define the different categories of range.
    - Anthropogenic disturbance is concentrated in the north and east of the LPU.
- Given current disturbance levels, all remaining undisturbed habitat at any elevation is among the most valuable habitat to avoid jeopardizing recovery through additional predation pressure on caribou. Although undisturbed habitat is relatively rare, it is replaceable outside of high elevation areas with appropriate restoration techniques.
- All high elevation critical habitat (winter and/or summer) is irreplaceable, as indicated by the recommended management prescription of minimal disturbance in the federal Recovery Strategy.

c) Habitat Functions (Project Area):

Key considerations:

- Relates to the quality of the habitat impacted by the project and the functions it serves for caribou. Habitat quality will be based on the degree of presence of biophysical attributes that define critical habitat, data on the current use of the habitat by caribou.

Assessment:

- The area that will be impacted by the Project includes both disturbed and undisturbed habitat that contains the biophysical attributes of critical habitat.
- All areas of currently or recently occupied habitat, even infrequently used, are among the most valuable habitat to support existing caribou populations, and short- to medium-term future occupancy of recovering caribou populations, especially given the context of recent wolf control efforts to increase the population. Caribou currently use and have historically used the critical habitat expected to be impacted by the Project, but at low frequency relative to other parts of the range.

d) Habitat Connectivity

Key considerations:

- If the habitat is important for connectivity reasons or is part of a movement corridor (e.g. for movement to adapt to more suitable habitat due to climate change), this will increase the vulnerability of the herd to the project.

Assessment:

- Project is located at the eastern edge of the Tweedsmuir LPU boundary.
- Based on recent telemetry data, the habitat that will be affected by the Project is not a known movement corridor or specifically known to be important for connectivity reasons within or between LPUs, but this latter point is likely conflated by the existing high level of habitat disturbance that started in 1991.
- In contrast, confidential Traditional Knowledge collected in 1988, and shared by Loosk'uz Dene First Nation (LDFN) with the Proponent, BC, and ECCC, shows that the project area (Mt. Davidson) is an important location on the migration path between Tweedsmuir LPU and Chilcotin LPU to the south, and LDFN members utilized caribou in this area until at least 1988.

e) Habitat Sensitivity

Key considerations:

- How sensitive the habitat is to disturbance (the likelihood the habitat can be restored post disturbance, how much time it will take to restore the habitat).

Assessment:

- It is likely that the habitat that will be directly affected by the Project, and that is planned to be restored (i.e. a portion of the mine footprint), is restorable. Ecological restoration could be expected to be achieved within [40] years.

Vulnerability of Tweedsmuir LPU Conclusion: based on the current status of the species under SARA, the finding of imminent threat to recovery for the species, declining population trend and a population size fewer than 300 animals, the reduced habitat availability due to existing levels of disturbance above recommended thresholds, and that the Project will impact habitat identified as and possessing the biophysical attributes of critical habitat, the vulnerability of the Tweedsmuir LPU is considered to be **High**[i].

2) Severity of Adverse Effects

a) Magnitude of Impact

Key considerations:

- Relates to the nature of the impact such as destruction of critical habitat (including categories of CH, existing disturbance vs. undisturbed CH), sensory disturbance, direct risk of mortality as a result of increased vehicle traffic, reduction in connectivity of habitat through linear disturbance or fragmentation of habitat, etc.), and intensity of the effects during the operation phase of the project.
- This takes into consideration the type and quality of the habitat and the level of impact potentially caused by the project (destruction of higher quality habitat will be considered higher magnitude).

Assessment:

- Habitat mapping provided by the Proponent in the Environmental Assessment (2018) and Draft CMMP (2021) identifies impacts to HEWR and Matrix categories of critical habitat.
- Habitat types mapped by the Proponent:
    - HEWR or HE-Matrix 1: alpine tundra (Boreal Altai Fescue Alpine - BAFA), parkland (Engelmann Spruce and Subalpine Fir – parkland – ESSFmvp), and Engelmann Spruce and Subalpine Fir (ESSF).
    - LEWR or LE-Matrix 1: Sub-Boreal Spruce (SBS), Sub-Boreal Pine Spruce (SBPS), and Coastal Western Hemlock (CWH) at low elevation
    - Matrix 1: Montane Spruce (MS) and Mountain Hemlock (MH) at mid-elevation
    - Matrix 2: areas outside but within 20 km of the LPU boundary.
- Habitat quality
    - HEWR: The Project is expected to affect 248 ha of HEWR, which is irreplaceable (see Irreplaceability, above). Additionally, these areas are occupied with historical and recently-verified, albeit infrequent, use relative to other parts of the range. Additionally, this HEWR represents an area to support short-to-medium term future occupancy of recovering caribou populations, especially given context of recent wolf control efforts to increase the population.
    - Matrix Type 1: Given current disturbance levels above recommended thresholds, all remaining undisturbed habitat at any elevation is among the most valuable habitat to avoid jeopardizing recovery. Further increases in disturbance contributes to additional predation pressure on caribou.
- Sensory disturbance is likely within the 'hybrid' buffer, and that disturbance will manifest in the form of avoidance of the project site. The number of animals that could be affected is unknown and likely small, given infrequent known caribou use. The intensity of the effect is likely low for the same reasons. However, it is possible that caribou will continue to avoid the mine footprint and some area around it after operations have ceased. The future use of this area by recovering caribou populations that may otherwise have used the area is unknowable. The Project could

result in a permanent removal of 248 ha of high elevation critical habitat from future caribou range.

- Direct risk of mortality is low given infrequent known caribou use, likelihood that caribou will avoid the project site, and mitigation measures the proponent has put in place.
- Additional reduction in connectivity of habitat between LPUs is likely low. However, due to the existing levels of disturbance, migration corridors within the Chilcotin LPU and between other LPUs have already been disrupted. For example, the Traditional Knowledge shared in confidence by LDFN indicates that the Mount Davidson HEWR is an important location on the migration path between Tweedsmuir LPU and Chilcotin LPU to the south.
- The Proponent rated the magnitude of the potential effect as negligible, largely on the basis of the infrequent use by caribou of the impacted area and their view that the level of use is unlikely to change in the future even if habitat suitability improves, predation risk is lowered, and the herd expands; as well as the small area of impact relative to the total amount of habitat within the LPU (i.e. 0.35% of all capable habitat).
- The Canadian Environmental Assessment Agency (2019) disagreed that the magnitude of the effect would be negligible, but determined the effect of the project was not significant.
- ECCC's view is that the magnitude of impact is **low.**

b) Geographic Scope

Key Considerations:

- The total area in ha of the impact, and the proportional amount compared with the total current available habitat (the percentage of the total available habitat that is expected to be lost due to the project).

Assessment:

- The EA (2018) found that the geographic extent of the Project is local, i.e. within the LSA.
- The amount of SMC habitat loss due to the Project is provided below. Note that habitat capability mapping provides habitat classes under ideal conditions, without any anthropogenic or natural disturbances, within each of the categories of critical habitat. Habitat capability mapping was used by the Proponent to evaluate the potential effects of the Project during the EA. Habitat suitability mapping includes current disturbances and was used by the Proponent to evaluate cumulative effects.

Table 1: Loss and alteration of capable habitat due to Blackwater Gold Project (Construction, Operations, and Closure phase) in the Tweedsmuir LPU

	HEWR (ha)	HE-Matrix 1 (ha)	LE-Matrix 1 (ha)	Matrix 1 (ha)	Total (ha)
Mine Site Footprint	0	2,041	254	49	2,343
500m Buffer	40	1,429	115	38	1,621
Hybrid 500 m / 3 km Buffer	248	1,972	115	38	2,373
Total (Mine Site +500 m Buffer)	40	3,470	369	86	3,965
Total (Mine Site + Hybrid Buffer	**248**	**4,013**	**369**	**86**	**4,716**

Abbreviations: ha: hectares; HEWR: high elevation winter range; HE: high elevation

- The Project footprint also overlaps with 414 ha of Type 2 Matrix critical habitat which occurs outside the LPU boundaries. For this EA process, impacts on Type 2 Matrix was agreed to be outside the scope for potential offsets.

Table 2: Calculations of percent loss and alteration of capable habitat (as mapped by Proponent) due to Blackwater Gold Project, with amounts of suitable habitat (as calculated by Proponent) provided for context.

	HEWR	HE-Matrix 1	LE-Matrix 1	Matrix 1	LEWR	Total
Capable Habitat in Tweedsmuir LPU (ha)	162,812	24,900	36,404	639,524	479,494	1,343,134
Suitable Habitat in Tweedsmuir LPU (ha)	143,888	17,510	7,023	582,327	108,795	859,543
Total loss / alteration (Mine Site + Hybrid buffer) (ha)	248	4,013	369	86	0	4,716
% loss / alteration (Mine Site + Hybrid buffer) – Capable Habitat	0.15	16.11	1.01	0.01	0	0.35
% loss / alteration (Mine Site + Hybrid buffer) – Suitable Habitat	0.17	22.91	5.25	0.01	0	0.55

- ECCC's view is that in light of the percentage impact to Type 1 matrix critical habitat (i.e. HE-Matrix 1, LE-Matrix 1, and Matrix 1), the geographic scope is **Medium**.

c) Duration of Effects

Key considerations:

- The length of time that the impact will persist. Typically from the beginning of construction to the time the impact no longer persists.

Assessment:

- The proponent indicates sensory disturbance effects are long term (assumed to be 20 years; construction to closure); loss of habitat in the mine footprint is considered permanent.
- In addition to these sensory disturbance considerations, ECCC emphasizes that habitat disturbance effects are likely to be 40+ years in duration, as they exist for as long as the disturbance remains on the landscape (i.e. until restored to a condition that supports caribou populations including the predator-prey dynamic; e.g. 40+ years).
- As there are components of the mine footprint that will not be restored, or will take time to restore, ECCC's view is that the habitat disturbance within the hybrid buffer will persist beyond the closure of the mine, contrary to the Proponent's position that the hybrid buffer is not relevant after mine closure.
- ECCC is therefore of the view that the duration is **long-term to permanent.**

d) Frequency

Key considerations:

- linked to the operation phase of the project when there are specific activities that may have an impact on the species (vehicle road traffic (e.g. number of vehicles/trips per day), sensory disturbance from equipment noise (noise levels)).

Assessment:

- ECCC's view is that the loss of Matrix type 1 habitat in the mine site will be continuous to permanent; sensory disturbance within the 500m and hybrid buffers are **continuous** until closure of the mine (assumed to be 20 years). Non-sensory effects of disturbance within the 500m and hybrid buffers will be **continuous to permanent** for those Project components that cannot be successfully reclaimed.

e) Timing

Key considerations:

- The timing of the construction and operational activities. For example, does the impact occur during a sensitive time for the species (e.g. if the project occurs on or near calving areas).

Assessment:

- Once constructed, the Project will be in **continuous** operation.

f) Reversibility

Key considerations:

- Whether the species/herd is expected to recover from the environmental effects caused by the project. This would correspond to a return to baseline conditions or other target, through mitigation or natural recovery within a reasonable timescale.
- Reversibility is influenced by the resilience of the species/herd to imposed stresses and the degree of existing stress on that species/herd.

Assessment:

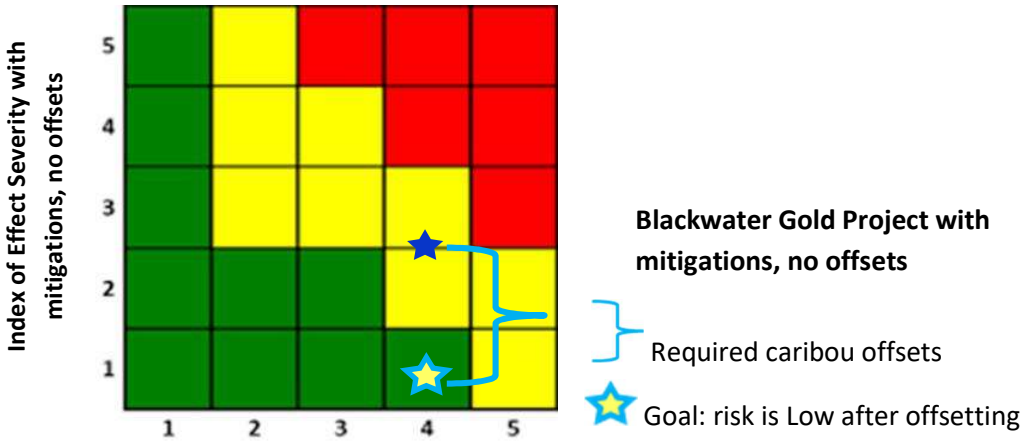
- Given the long term to permanent duration of the effects, the low resilience of caribou in general to stressors, and the assessment that the Tweedsmuir LPU is highly vulnerable, ECCC's view is that the effects of the Project may **not be reversible**.

Severity of Adverse Effects Conclusion: based on Magnitude of Impact = Low; Geographic Scope = Medium; Duration = Long-term to Permanent; Timing = continuous, and Frequency = Continuous to Permanent; Reversibility = Not Reversible , ECCC's view is that the severity of residual adverse effects is **Medium**.

ECCC Preliminary Assessment of Risk

ECCC's view is that the Project, considering the mitigations the Proponent has committed to in the EA process, but prior to offsetting, poses a **Medium Risk** of having an adverse effect on the recovery of the species (see Figure 2).

Figure 2: Risk Management Matrix



This risk assessment will inform ECCC's review of proposed offsets. If ECCC is satisfied that the offsets reduce the risk of significant adverse effects on the recovery of the species to **Low**, ECCC would then consider the residual environmental effects to be fully offset.

As indicated in the 2019 Decision Statement, if residual environmental effects cannot be fully offset by habitat-based measures including habitat restoration and securement, ECCC will look to the Proponent to provide details on non-habitat-based measures in order to meet federal condition 8.18.

References:

BC Ministry of Environment (BC MOE). 2014. Procedures for Mitigating Impacts on Environmental Values (Environmental Mitigation Procedures). Working Document. May 27, 2014. Ecosystems Branch Environmental Sustainability and Strategic Policy Division, Victoria, BC. Available at: https://www2.gov.bc.ca/assets/gov/environment/natural-resource policylegislation/environmental-mitigation-policy/em_procedures_may27_2014.pdf.

Cichowski, D., R.S. McNay, and V. Brumovsky. 2020. Tweedsmuir-Entiako Caribou (*Rangifer tarandus*) Tactical Restoration Plan. Prepared for BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC.

Environment Canada, 2011. Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada: 2011 update. Ottawa, Ontario, Canada. 102 pp. plus appendices. Available at : https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/ri_boreal_caribou_science_0811_eng.pdf

Environment Canada. 2012. *O*perational Framework for the Use of Conservation Allowances. Retrieved from the Government of Canada Publications website: http://publications.gc.ca/site/eng/9.696852/publication.html

Environment Canada. 2014. Recovery Strategy for the Woodland Caribou, Southern Mountain population (*Rangifer tarandus caribou*) in Canada. *Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa. viii + 103 pp. Available at: https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_woodland%20caribou_bois_s_mtn_0614_e.pdf

ERM. 2018a. Blackwater Gold Project: Tweedsmuir Local Population Unit – Response to Information Request (IR) 1-30 to IR1-32 and IR2-10. Prepared for New Gold Inc. by ERM Consultants Canada Ltd.: Vancouver, British Columbia; March 2018.

ERM. 2018b. Blackwater Gold Project: New Gold's Response to the May 25, 2018 Information Request from the Canadian Environmental Assessment Agency – Updated Assessment of Impacts to Southern Mountain Caribou and Proposed Caribou Offset. Prepared for New Gold Inc. by ERM Consultants Canada Ltd.:Vancouver, British Columbia; August 2018.

Greene, L. and Roberts, A-M. 2021. Tweedsmuir-Entiako caribou rut survey: October 2020. BC Ministry of Forests, Lands, and Natural Resource Operations. Smithers, BC. 12pp.

[i] Other potential findings of vulnerability for SMC could include:

Low, if there was no finding of imminent threat to the species, the LPU(s) were self-sustaining at levels that allow for a meaningful Indigenous harvest, and there was minimal habitat disturbance within the range.

Medium, if there was no finding of imminent threat to the species, the LPU(s) were self-sustaining but not at levels that allowed for a meaningful Indigenous harvest, and there was some habitat disturbance but below management thresholds.

Very high, if the LPU had a very low population size (e.g. below 100), was one of the LPUs identified as being of particular concern in the imminent threat assessment, and the level of habitat disturbance was above management thresholds.

APPENDIX F ENVIRONMENT AND CLIMATE CHANGE CANADA (ECCC) COMMENTS ON: "BLACKWATER GOLD PROJECT DRAFT CARIBOU MITIGATION AND MONITORING PLAN (AUGUST 2021 VERSION)" (NOVEMBER 2021)

Environment and Climate Change Canada (ECCC) Comments on: "Blackwater Gold Project Draft Caribou Mitigation and Monitoring Plan" (August 2021 version)

November 5, 2021

Executive Summary

To provide comments and recommendations on the draft Caribou Mitigation and Monitoring Plan (dCMMP; dated August 2021), ECCC followed a step-wise process. First, ECCC undertook an assessment of the risk to the Tweedsmuir LPU in relation to the Project (ECCC 2021). Based on this assessment of risk, ECCC's view is that the Project, considering the mitigations the Proponent has committed to in the Environmental Assessment process, but prior to offsetting, poses a Medium Risk of having an adverse effect on the recovery of the species. This risk characterization was used to inform ECCC's review of proposed offsets. If ECCC is satisfied that the offsets reduce the risk of significant adverse effects on the recovery of the species to Low Risk, ECCC would then consider the residual environmental effects to be appropriately offset.

Following the risk characterization, ECCC reviewed the dCMMP in detail. ECCC's view of the dCMMP is that the current suite of proposed offsetting measures are not likely to address the Project's contribution to cumulative effects; or to reduce the risk of significant adverse effects on the recovery of the species to low. As such, in ECCC's expert opinion, the residual environmental effects have not been fully offset, and thus finds that the dCMMP is not satisfactory as drafted. ECCC is of the view that the amount of habitat restored should be the main focus of the offset plan and the offset ratio should be informed by BC's draft Habitat Offset Decision Support Tool, in collaboration with ECCC, BC, and First Nations. Lastly, regardless of the amount of habitat proposed for securement, ECCC is of the view that the proposed habitat securement does not sufficiently address the concepts of additionality or equivalency.

Context

The Blackwater Gold Project (the Project) proposed by Artemis Gold Inc., will be an open pit gold and silver mine and will include associated ore processing facilities. The Project is located approximately 110 kilometres southwest of Vanderhoof, British Columbia (BC). The Project received an Environmental Assessment Certificate #M19-01 (EAC) on June 21, 2019 under the BC *Environmental Assessment Act* (2002) and a Decision Statement on April 15, 2019 under the *Canadian Environmental Assessment Act* (2012), approving the Project, with conditions.

As required by provincial and federal conditions, Artemis Gold Inc. submitted a draft Caribou Mitigation and Monitoring Plan (dCMMP) for review on August 12, 2021 to the Ulkatcho First Nation, Lhoosk'uz Dené Nation, Nadleh Whut'en First Nation, Stellat'en First Nation, Saik'uz First Nation, Nazko First Nation, BC Environmental Assessment Office (EAO), BC Ministry of Forest, Lands, Natural Resource Operations and Rural Development (FLNRORD), Ministry of Energy, Mines, and Low Innovation Carbon (EMLI), Ministry of Environment and Climate Change Strategy (ENV) and Environment and Climate Change Canada (ECCC).

The federal condition 8.18 states, "the Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, and to the satisfaction of Environment and Climate Change Canada (ECCC), a compensation plan for Southern Mountain Caribou (SMC; *Rangifer tarandus caribou*)". "The compensation plan shall include: … an offsetting ratio for direct habitat loss and indirect (e.g. sensory) losses based on an assessment of options, including revegetation and road closures, that consider the types of offset, location, time lags, securement, technical and economic feasibility, and probability of success".

The provincial condition 22 states that "The Holder must provide the draft plan that was developed in consultation with FLNRORD, ENV, EMLI, ECCC, and Aboriginal Groups to the EAO, FLNRORD, EMLI, ENV, ECCC, and Aboriginal Groups for review a minimum of 180 days prior to the planned commencement of Construction, or as listed in the Document Submission Plan required by Condition 10 of this Certificate."

ECCC notes that the dCMMP submitted on August 12, 2021 was not developed in consultation with ECCC. The Proponent presented a high level summary of their intentions with respect to the dCMMP to ECCC and other Parties on June 23, 2021, but ECCC was not provided with an opportunity to comment during the development of the dCMMP prior to Aug 12th.

Background

The Project location is within the range of the Tweedsmuir herd of Woodland Caribou, Southern Mountain population (Southern Mountain Caribou; {SMC}). SMC are listed as Threatened under Schedule 1 of the Species at Risk Act (SARA). The Tweedsmuir herd equates to the Tweedsmuir local population unit (LPU), which is part of the Northern Group as defined in the federal recovery strategy for the species (Environment Canada 2014). In 2018, the federal Minister of Environment and Climate Change determined that SMC are facing imminent threats to their recovery (ECCC 2018).

The Tweedsmuir herd range has been subjected to high cumulative disturbance associated with forestry, wildfires, mountain pine beetle kill, mineral exploration, mine development, and roads associated with industrial activities (Cichowski et al. 2020, ERM 2018a, ERM 2018b).

The federal recovery strategy states that "Minimal disturbance for high-elevation winter and/or summer ranges in all Groups, and at least a 65% undisturbed habitat level for low elevation winter ranges and Type 1 matrix range in the Northern and Central Groups, are currently considered as necessary to achieve recovery of LPUs." Various analyses (Chichowski et al 2020, ERM 2018a, ERM 2018b, internal ECCC analysis) have found that the existing levels of disturbance within the Tweedsmuir LPU does not meet the management objectives set out in the recovery strategy.

In 2019, the Tweedsmuir LPU population was estimated to be between 150 and 200 individuals (Cichowski et al. 2020). The population has been declining over the last 50-60 years; population size was estimated to be 600 in 1963, 470 in 1987, and 300 in 2003 (Greene and Roberts 2021).

To stabilise ongoing declines in the near term, a two-year wolf reduction program was initiated in February 2020 by the Government of BC (Green and Roberts 2021). A continuation of that program for an additional five years is currently proposed and under consideration. Responses of the Tweedsmuir LPU to this emergency management action remains uncertain given the recent initiation of the program, although some gains in calf recruitment may be already occurring (Green and Roberts 2021).

Summary of ECCC's Risk Characterization for SMC (Tweedsmuir LPU) in relation to the Blackwater Gold Project

ECCC has undertaken an assessment of the risk to the Tweedsmuir LPU in relation to the Project, to inform ECCC's views on the dCMMP, including the approach to offsetting the adverse effects of the Project on the Tweedsmuir LPU (ECCC 2021).

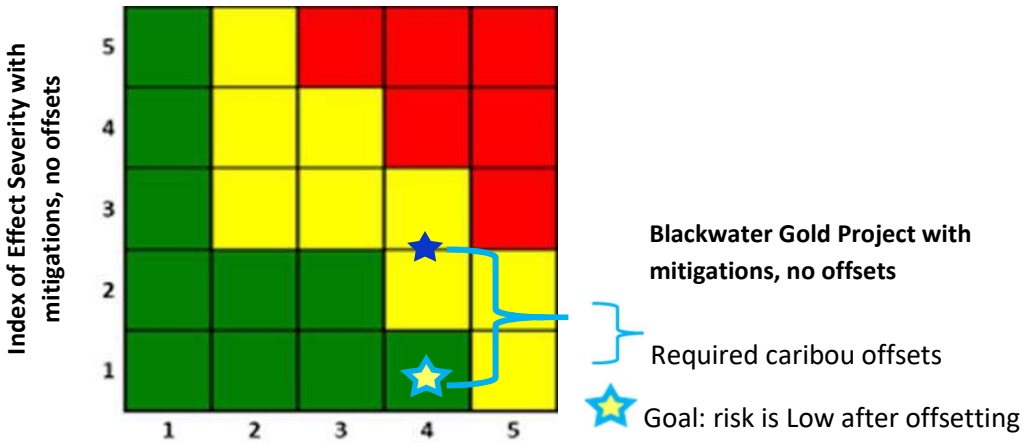
In ECCC's view, based on the current status of the species under SARA, the finding of imminent threat to recovery for the species, declining population trend and a population size lower than 300 animals, the reduced habitat availability due to existing levels of disturbance above recommended thresholds, and that the Project will impact habitat identified as and possessing the biophysical attributes of critical habitat, is that the vulnerability of the Tweedsmuir LPU to this Project is considered to be High.

ECCC's view is also that, the Project, based on a low Magnitude of Impact, medium Geographic Scope, long-term to permanent Duration, continuous to permanent Frequency, and some effects that are not reversible, is likely to result in residual adverse effects that are considered to be Medium in terms of their severity.

As such, ECCC's view is that the Project, considering the mitigations the Proponent has committed to in the EA process, but prior to offsetting, poses a Medium Risk of having an adverse effect on the recovery of the species (Figure 1). This risk characterization informs ECCC's review of proposed offsets. If ECCC is satisfied that the offsets reduce the risk of significant adverse effects on the recovery of the species to Low Risk, ECCC would then consider the residual environmental effects to be appropriately offset.

As indicated in the 2019 Decision Statement, if residual environmental effects cannot be fully offset by habitat-based measures including habitat restoration and securement, ECCC will look to the Proponent to provide details on non-habitat-based measures in order to meet federal condition 8.18.

Figure 1: Risk Management Matrix



Index of Species Vulnerability for the Tweedsmuir caribou LPU

Environment and Climate Change Canada's Initial Response to the dCMMP

ECCC has reviewed the Proponent's dCMMP provided August 12, 2021 and other Project-related information concerning the Tweedmuir LPU, including Information Requests (IRs) and responses throughout the assessment phase of the Environmental Assessment.

ECCC's primary concern with the dCMMP is that the current suite of proposed offsetting measures are not sufficient to fully address the residual adverse effects resulting from the Project. In other words, as proposed, including consideration of offsetting measures, the Project will result in additional cumulative risk to the recovery of the Tweedmuir LPU, contrary to the species' SARA recovery strategy.

More specific comments follow, organized by topic. ECCC has also provided suggestions to improve the readability and accuracy of the dCMMP in an accompanying tracking table.

Habitat Restoration

The dCMMP indicates that BW Gold will provide funding of up to $50,000, and in-kind support, to assist in developing a habitat model to inform habitat restoration efforts, and to conduct habitat restoration in the offsetting areas up to a value of $200,000.

a) ECCC supports habitat restoration that benefits caribou in an ecologically appropriate timeframe and location, and is of the view that such measures could, in sufficient amounts, provide sufficient

incremental conservation benefits to fully offset the risk of significant adverse effects on the recovery of the species this Project otherwise presents.

b) ECCC is of the view that the amount of habitat restored should be the main focus of the offset plan, with habitat securement contextualized as a complimentary approach.

c) The dCMMP does not give any indication as to how much habitat would be restored with a proposed $200,000 financial contribution, nor does the dCMMP identify how this was determined to be an appropriate figure.

d) ECCC is of the view that offset ratio calculations should be applied to the amount of habitat restored or enhanced, including a 500 m buffer on restored linear features, and that there may be additional areas for restoration outside the proposed habitat securement areas.

ECCC recognises that the details of habitat restoration, including exact locations, may take some time to finalize, and that the approach of a financial contribution rather than a commitment by the Proponent to restore a given amount of habitat may be appropriate. However, ECCC's view is that the amount of the financial contribution should be calculated transparently, based on reasonable expected costs to plan, restore, and monitor the total amount of habitat to which offset ratios have been applied. As an illustrative and non-prescriptive example of how this could be presented: Estimates of costs to plan, fully implement, and monitor linear feature restoration in each of the field verified priority areas within the Tweedsmuir LPU range from approximately $xx-$xx/km2. After applying a 500m buffer to either side of each 1 km of restored linear features while considering the need to restore overlapping disturbance within the buffer, this results in each 1 km2 of restored habitat costing $xx-$xx. The Proponent's proposed contribution of $xx is thus expected to restore approximately xx km2 of habitat.

Offset ratios, ecological equivalency

Calculations of ecological equivalency of offset sites vs. the impact site were used to determine an area ratio in the dCMMP and range from 1:1 up to 4:1.

a) ECCC is of the view that the proposed offset ratios are unlikely to address the Project's contribution to cumulative effects. ECCC previously indicated that a *minimum* offset ratio of 4:1 (offset outcome : residual impact) would be a benchmark ratio that could be applied to a project that is in the lower end of the risk spectrum; for example, a project with a low severity impact adversely affecting a low vulnerability ecological component.

b) ECCC suggests BC's draft Habitat Offset Decision Support Tool, which has a 10:1 base ratio, could inform the offset components of the dCMMP, with the considerations around equivalency provided below. ECCC has completed some example runs of the Tool, and output ratios include of over 20:1 for the 256 ha of HEWR, and over 8:1 for the 4,468 ha of Type 1 Matrix, but ECCC recognizes the calculator is sensitive to inputs on both the impact site and potential offset sites. As such, ECCC suggests that collaborative workshop focussed on how this decision support tool could be used would be a valuable next step.

c) ECCC is of the view that the habitat value of the mine site plus buffered area that will be affected by the Project should be assigned habitat values that better reflect habitat equivalency and rarity.

Specifically, and using here the dCMMP suggested scale ranging from 1 to 4, any high elevation winter range (HEWR) (i.e. the 248 ha on Mt Davidson that falls within the hybrid buffer) should be valued as a 4, regardless of the amount of documented current consistent use, on the basis of scarcity of that habitat in the Tweedsmuir range, and its identification in the species' recovery strategy as critical habitat (i.e., the habitat necessary for the recovery of the species). Similarly, Type 1 matrix habitat that currently possesses the biophysical attributes of critical habitat (i.e. is not part of a current temporary or permanent disturbance footprint) should be valued as 3, again on the basis of scarcity of remaining habitat within the LPU boundaries, where the disturbance threshold has already been surpassed. For context, ECCC's view is that a 1 or 2 habitat valuation may be appropriate for Type 2 matrix or for situations where habitat disturbance thresholds have not been surpassed.

d) ECCC suggests that the following sentence in the dCMMP is a mischaracterization. "The offset proposal, including the metrics to describe each polygon, were accepted by these groups, ECCC, and FLNRORD and were therefore the basis of the federal and provincial EA conditions". As noted in the Environmental Assessment Report (CEAA 2019), ECCC expressed a number of concerns with the offsetting approach, which were intended to be addressed through the current process of developing the final offset plan.

Habitat Securement

The dCMMP outlines proposed temporary deferral of mineral rights held by Artemis of 4516 ha of habitat in the Capoose north area and 2101 ha in the Johnny Lake-Fawnie area, which are portions of two of eight potential offset areas identified during the EA process. This temporary deferral of 6617 ha of Artemis' tenure is characterized as habitat securement, and the dCMMP indicates it would be put in place prior to construction through as-yet-undetermined mechanisms, and remain in place for 25-50 years. The area of habitat proposed for deferral for 50 years vs 25 years is unclear.

a) ECCC's Operational Framework for Use of Conservation Allowances (ECCC 2012) (hereafter the Framework) speaks to **incremental** conservation benefits. In this case, there is no net improvement to habitat condition; caribou are currently using the offset area, so it remains status quo from a caribou perspective – the 4716 ha of (High Elevation Winter Range) HEWR and Type 1 Matrix critical habitat that could be permanently lost as a result of the Project would not be replaced by the proposed temporarily and partially secured habitat, nor will the deferral have an immediate benefit on caribou behaviour as asserted by the Proponent.

b) Furthermore, the Framework recommends for offsets that propose to preserve existing habitat, that existing habitat be under identified threat and that the proposed offset extend effective legal protection that responds to that threat. For example, a threat may exist when all required regulatory approvals are in place, a project or activity has all the required financing, and construction is essentially ready to begin. However, the proposed securement offset areas are not under threat of development; to the contrary, as noted in the dCMMP, certain types of resource development within a subset of these areas (e.g., those designated as UWRs) is currently constrained.

c) In addition, ECCC notes that the Proponent's proposed temporary relinquishment of mineral rights would not preclude the issuance of other industrial authorizations, so the area could not be considered secured unless all other holders of industrial tenures and authorizations were also willing to relinquish their rights, and a legally binding form of long term securement put in place.

d) Regardless of the amount of habitat proposed for securement, ECCC is of the view that the proposed habitat securement does not sufficiently address the concepts of additionality or equivalency.

e) ECCC's view is that some of the indirect effects of the Project on caribou habitat, including HEWR captured in the hybrid buffer, will extend beyond the operational life of the mine, and that any measures intended to offset those effects should be long term.

Buffers and Project Effects

Throughout the dCMMP, the Proponent provides calculations for the Project impact area using both a 500 m buffer and a hybrid 3km/500m buffer. The Project impact area during construction and operation phases was determined to be 3,965 ha including the 500 m disturbance buffer, and 4,716 ha with the hybrid buffer of 3km/500m. With the hybrid buffer, this includes 248 ha of High Elevation Winter Range (HEWR) and 4468 ha of Type 1 Matrix categories of critical habitat. The impact area post-closure, assuming reclamation of portions of the mine site is successful, is calculated as 1,825 ha, which includes the 500m buffer only.

a) Consistent with comments provided during the EA process, ECCC maintains the view that the hybrid buffer should be used to quantify the Project impact area, including for the purpose of calculating offsets in the post-closure phase, as a precautionary approach encourages working under the assumption of the real possibility that caribou would continue to avoid the area within the hybrid buffer until full restoration of the mine site footprint is complete, which may be on a long time horizon (e.g. >60 years).

Mapping

ECCC notes that there is no explanation or definition of "non-CH" in Fig 1.1-1: Tweedsmuir Caribou Range Habitat in Relation to the Blackwater Project Certified Project Description. We assume it aligns with the note under Table 4-1 of the 2018 Updated Effects Assessment and Significance Determination which states "In habitat suitability, non-critical habitat is that habitat with high densities of linear features or a high degree of fire or forestry disturbance."

a) ECCC notes that, consistent with the Recovery Strategy, within the LPU boundaries of the Northern Group, in general, only permanent anthropogenic disturbances are excluded from the identification of critical habitat, and as such would not agree with the extent of mapped "non-CH".

References

Canadian Environmental Assessment Agency. 2019. Blackwater Gold Project Environmental Assessment Report. Available at: https://www.ceaa-acee.gc.ca/050/documents/p80017/129204E.pdf

BC Ministry of Environment (BC MOE). 2014. Procedures for Mitigating Impacts on Environmental Values (Environmental Mitigation Procedures). Working Document. May 27, 2014. Ecosystems Branch Environmental Sustainability and Strategic Policy Division, Victoria, BC. Available at: https://www2.gov.bc.ca/assets/gov/environment/natural-resource-policylegislation/environmental-mitigation-policy/em_procedures_may27_2014.pdf. Accessed Sept. 2021.

Environment Canada. 2012. Operational Framework for Use of Conservation Allowances. Environment Canada, Ottawa, ON. 13pp. Available at: https://www.canada.ca/en/environment-climate-change/services/sustainabledevelopment/publications/operational-framework-use-conservation-allowances.html. Accessed Sept. 2021.

Environment Canada. 2014. Recovery Strategy for the Woodland Caribou, Southern Mountain population (*Rangifer tarandus caribou*) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. viii + 103 pp. Available at: https://www.registrelepsararegistry.gc.ca/virtual_sara/files/plans/rs_woodland%20caribou_bois_s_mtn_0614_e.pdf. Accessed Sept. 2021.

ECCC. 2018. Imminent Threat Assessment for Southern Mountain Caribou. Available: https://species-registry.canada.ca/index-en.html#/consultations/3319. Accessed Sept. 2021.

ECCC 2021. ECCC Risk Characterization to Inform Advice Regarding Offsets for Southern Mountain Caribou – Blackwater Gold Project. Draft prepared on Oct 25, 2021.

ERM. 2018a. Blackwater Gold Project: Tweedsmuir Local Population Unit – Response to Information Request (IR) 1-30 to IR1-32 and IR2-10. Prepared for New Gold Inc. by ERM Consultants Canada Ltd.: Vancouver, British Columbia; March 2018.

ERM. 2018b. Blackwater Gold Project: New Gold's Response to the May 25, 2018 Information Request from the Canadian Environmental Assessment Agency – Updated Assessment of Impacts to Southern Mountain Caribou and Proposed Caribou Offset. Prepared for New Gold Inc. by ERM Consultants Canada Ltd.:Vancouver, British Columbia; August 2018.

Greene, L. and Roberts, A-M. 2021. Tweedsmuir-Entiako caribou rut survey: October 2020. BC Ministry of Forests, Lands, and Natural Resource Operations. Smithers, BC. 12pp.

Johnson, C.J., L.P.W. Ehlers, and D.R. Seip. 2015. Witnessing Extinction – Cumulative Impacts Across Landscapes and the Future Loss of an Evolutionary Significant Unit of Woodland Caribou in Canada. *Biological Conservation* 186:176-186.

Oberg, P.R. 2001. Responses of Mountain Caribou to Linear Features in a West-central Alberta Landscape. M.Sc. Thesis, University of Alberta, Edmonton, AB. 126 pp.

APPENDIX G LETTER FROM ECCC, UFN, LDN AND BC FLNRORD (NOVEMBER 2021)

Environment and Climate Change Canada | Environnement et Changement climatique Canada

November 30, 2021

Travis Desormeaux
Environmental Manager
Artemis Gold Inc.
595 Burrard Street, Suite 3083
Vancouver, BC V7X 1L3

Dear Travis Desormeaux:

Re: Blackwater Gold Project – Draft Caribou Mitigation and Monitoring Plan (August 2021 Version)

The undersigned received the draft Caribou Mitigation and Monitoring Plan (CMMP) for the Blackwater Gold Project on August 12, 2021, and subsequently provided initial comments to Artemis Gold Inc. (Artemis), that remain valid. In anticipation of meeting with Artemis, Environment and Climate Change Canada (ECCC), Ulkatcho First Nation (UFN), Lhoosk'uz Dené Nation (LDN), and British Columbia (BC) Ministry of Forest, Lands, Natural Resource Operations and Rural Development (FLNRORD), have taken the opportunity to discuss and share views regarding the draft CMMP.

Shared views of ECCC, UFN, LDN, and FLNRORD include:

1) A significant amount of habitat restoration within the Tweedsmuir Local Population Unit (consistent with advice provided by ECCC) is necessary to offset the direct and indirect loss of habitat as a result of the project. The outcomes of this restoration must result in an increase, over time, in the overall amount of undisturbed habitat within the Tweedsmuir Local Population Unit.
2) Securement of Capoose High Elevation Ungulate Winter Range (11,059 ha) for a period of 50 years is a necessary part of the offset proposal.

We, the undersigned, look forward to discussing the development of the next draft of the CMMP, including specifics of the amount (based on an offset ratio) and timing of the habitat restoration (or financial contribution that will result in habitat restoration), with Artemis in the near future.

Regards,

Blair Hammond, Director, Pacific Region
Canadian Wildlife Service
Environment and Climate Change Canada

Laurie Vaughan, Natural Resources Director
Ulkatcho First Nation

Neil Gauthreau, Lands and Resource Manager
Lhoosk'uz Dené Nation

Duncan McColl, Senior Ecosystems Biologist
BC Ministry of Forest, Lands, Natural Resource Operations and Rural Development

APPENDIX H LETTER FROM ECCC (NOVEMBER 2021)

Canadian Wildlife Service
Pacific and Yukon Region
5421 Robertson Road
Delta, BC V4K 3N2

November 30, 2021

Travis Desormeaux
Environmental Manager
Artemis Gold Inc.
595 Burrard Street, Suite 3083
Vancouver, BC V7X 1L3

Dear Travis Desormeaux:

Re: Blackwater Gold Project – ECCC expectations regarding Federal Condition 8.18

Environment and Climate Change Canada (ECCC) received the draft Caribou Mitigation and Monitoring Plan (CMMP) for the Blackwater Gold Project on August 12, 2021 and provided initial comments on Nov. 5, 2021. ECCC's comments have been provided to assist Artemis in meeting condition 8.18 of the federal Decision Statement and to ensure that ECCC advice reflects First Nations rights and interests where they overlap with the Crown's mandate.

Federal condition 8.18 states, "the Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, and to the satisfaction of Environment and Climate Change Canada (ECCC), a compensation plan for Southern Mountain Caribou (SMC; *Rangifer tarandus caribou*)". "The compensation plan shall include: … an offsetting ratio for direct habitat loss and indirect (e.g. sensory) losses based on an assessment of options, including revegetation and road closures, that consider the types of offset, location, time lags, securement, technical and economic feasibility, and probability of success".

As outlined in ECCC's initial comments provided on Nov 5, 2021, if the Department is satisfied that the offsets reduce the risk of significant adverse effects on the recovery of the species to Low Risk, ECCC would then consider the residual environmental effects to be appropriately offset. ECCC is of the view that habitat restoration should be the main focus of the offset plan. As previously noted, the range of offset ratios could vary from between 8:1 and 20:1, or higher or lower depending on the inputs for impact site and potential offset sites. The dollar amount of this restoration will be determined by the cost of restoration to meet the objective of ensuring the mitigation and offsets result in a low level of risk to the species, informed by expertise provided by the Government of British Columbia (BC) and First Nations.

After discussions with First Nations and BC (as indicated in the joint letter provided Nov 30, 2021), ECCC supports the view that securement of Capoose High Elevation Ungulate Winter Range (11,059 ha) for 50 years is a necessary part of the offset plan. The long-term securement of this entire area would provide certainty with respect to maintenance of the existing habitat for current and future caribou, and First Nation use. ECCC's understanding is that, in the absence of a legally binding form of securement, the possibility of further mineral exploration and potential development exists, which could represent a threat

to the caribou herd. As such, the securement of this 11,059 ha could represent an incremental conservation benefit for the species and thus contribute to the overall offsetting package, when combined with meaningful amounts of habitat restoration.

Finally, ECCC expects that subsequent drafts of the CMMP will be developed in consultation with Indigenous groups, ECCC, and BC, as required by federal condition 8.18. ECCC is available to discuss the development of the next draft of the CMMP with Artemis, BC and the Nations in the coming weeks and requests a formal response to this letter by January 10, 2021.

Regards,

Blair Hammond, Director, Pacific Region
Canadian Wildlife Service
Environment and Climate Change Canada

APPENDIX I MINERAL LICENCES HELD BY BW GOLD IN THE CAPOOSE HE-UWR

Appendix I: Mineral Licences Held by BW Gold in the Capoose HE-UWR

Title Number	Claim Name	Owner	Title Type	Title Sub Type	Map Number	Issue Date	Good to Date	Status	Area (ha)	Within Capoose
238045	CAP	287312 (100%)	Mineral	Claim	093F025	1978/SEP/18	2024/FEB/19	GOOD	100.0	Yes
512838		287312 (100%)	Mineral	Claim	093F	2005/MAY/17	2024/FEB/19	GOOD	811.88	Yes
534364	JAG-1	287312 (100%)	Mineral	Claim	093F	2006/MAY/24	2024/FEB/19	GOOD	482.75	Yes
534365	JAG-2	287312 (100%)	Mineral	Claim	093F	2006/MAY/24	2024/FEB/19	GOOD	482.919	Yes
534366	JAG-3	287312 (100%)	Mineral	Claim	093F	2006/MAY/24	2024/APR/29	GOOD	482.597	Yes
534367	JAG-4	287312 (100%)	Mineral	Claim	093F	2006/MAY/24	2024/FEB/19	GOOD	289.666	Yes
552493	NE CAPOOSE	287312 (100%)	Mineral	Claim	093F	2007/FEB/22	2024/FEB/19	GOOD	483.1181	Partial
552494	NE CAPOOSE 2	287312 (100%)	Mineral	Claim	093F	2007/FEB/22	2024/FEB/19	GOOD	483.0008	Partial
552495	E CAPOOSE	287312 (100%)	Mineral	Claim	093F	2007/FEB/22	2024/FEB/19	GOOD	483.3117	Partial
552497	NE CAPOOSE3	287312 (100%)	Mineral	Claim	093F	2007/FEB/22	2024/FEB/19	GOOD	482.9662	Partial
555053	CAP	287312 (100%)	Mineral	Claim	093F	2007/MAR/26	2024/FEB/19	GOOD	251.3024	Yes
557495	JAG-5	287312 (100%)	Mineral	Claim	093F	2007/APR/23	2024/FEB/19	GOOD	482.7312	Partial
557496	JAG-6	287312 (100%)	Mineral	Claim	093F	2007/APR/23	2024/APR/29	GOOD	482.4912	Yes
564372	CAPOOSE S	287312 (100%)	Mineral	Claim	093F	2007/AUG/09	2024/FEB/19	GOOD	464.1767	Partial
564373	CAPOOSE SW	287312 (100%)	Mineral	Claim	093F	2007/AUG/09	2024/FEB/19	GOOD	464.1784	Yes
564376	CAPOOSE E2	287312 (100%)	Mineral	Claim	093F	2007/AUG/09	2024/FEB/19	GOOD	483.4884	Partial
564377	CAPOOSE E3	287312 (100%)	Mineral	Claim	093F	2007/AUG/09	2024/FEB/19	GOOD	483.2432	Yes
580086	CAPOOSE NORTH	287312 (100%)	Mineral	Claim	093F	2008/APR/01	2024/FEB/19	GOOD	77.2921	Yes
625624	M-4	287312 (100%)	Mineral	Claim	093F	2009/AUG/29	2024/FEB/19	GOOD	464.4796	Yes
625625		287312 (100%)	Mineral	Claim	093F	2009/AUG/29	2024/FEB/19	GOOD	483.6828	Yes
642544	FAWNIE DOME	287312 (100%)	Mineral	Claim	093F	2009/SEP/28	2024/FEB/19	GOOD	116.0761	Partial
642564	FD 2	287312 (100%)	Mineral	Claim	093F	2009/SEP/28	2024/FEB/19	GOOD	464.4016	Yes
642565	FD 3	287312 (100%)	Mineral	Claim	093F	2009/SEP/28	2024/FEB/19	GOOD	348.3583	Yes
642583	FD 4	287312 (100%)	Mineral	Claim	093F	2009/SEP/28	2024/FEB/19	GOOD	309.6229	Yes
643108	BUCK 5	287312 (100%)	Mineral	Claim	093F	2009/SEP/29	2024/FEB/19	GOOD	483.8534	Yes
643109	BUCK 6	287312 (100%)	Mineral	Claim	093F	2009/SEP/29	2024/FEB/19	GOOD	483.7444	Yes
643110	BUCK 7	287312 (100%)	Mineral	Claim	093F	2009/SEP/29	2024/FEB/19	GOOD	483.69	Yes
649243	JAG-8	287312 (100%)	Mineral	Claim	093F	2009/OCT/08	2024/FEB/19	GOOD	483.0504	Yes
694123		287312 (100%)	Mineral	Claim	093F	2010/JAN/04	2024/FEB/19	GOOD	464.132	Partial
694144		287312 (100%)	Mineral	Claim	093F	2010/JAN/04	2024/FEB/19	GOOD	464.1768	Yes
694146		287312 (100%)	Mineral	Claim	093F	2010/JAN/04	2024/FEB/19	GOOD	425.3731	Yes
706593	CPN1	287312 (100%)	Mineral	Claim	093F	2010/FEB/19	2024/FEB/19	GOOD	482.8872	Yes

Appendix I: Mineral Licences Held by BW Gold in the Capoose HE-UWR

Title Number	Claim Name	Owner	Title Type	Title Sub Type	Map Number	Issue Date	Good to Date	Status	Area (ha)	Within Capoose
706594	CPN2	287312 (100%)	Mineral	Claim	093F	2010/FEB/19	2024/APR/29	GOOD	482.6129	Yes
706595	CPN3	287312 (100%)	Mineral	Claim	093F	2010/FEB/19	2024/APR/29	GOOD	444.0303	Yes
706596	CPN4	287312 (100%)	Mineral	Claim	093F	2010/FEB/19	2024/APR/29	GOOD	328.0669	Yes
706630	CPNW2	287312 (100%)	Mineral	Claim	093F	2010/FEB/19	2024/FEB/19	GOOD	154.646	Yes
713542	KL11	287312 (100%)	Mineral	Claim	093F	2010/MAR/04	2024/APR/29	GOOD	463.1958	Yes
713682	KL18	287312 (100%)	Mineral	Claim	093F	2010/MAR/04	2024/APR/29	GOOD	463.0209	Yes
713702	KL19	287312 (100%)	Mineral	Claim	093F	2010/MAR/04	2024/APR/29	GOOD	463.0236	Yes
713722	KL20	287312 (100%)	Mineral	Claim	093F	2010/MAR/04	2024/APR/29	GOOD	463.0257	Yes

APPENDIX J ROAD RESTORATION OPPORTUNITIES TO MEET CARIBOU OFFSETTING REQUIREMENTS FOR THE BLACKWATER CARIBOU MITIGATION AND MONITORING PLAN

Road Restoration Opportunities to Meet Caribou Offsetting Requirements for The Blackwater Caribou Mitigation and Monitoring Plan (CMMP)

Lhoosk'uz Dené Nation and Ulkatcho First Nation

1/25/2022

Keefer Ecological Services Ltd
PO Box 430
Cranbrook BC | V1C 4H9
(250) 489-4140
www.keefereco.com

Summary

A total of 1772 km of forestry roads in five separate areas were identified as having potential impact on caribou if restored as part of the Blackwater Gold caribou offsetting plan. In terms of potential area of roads that need to further assessment, there were 41 km^2 in Chedakuz, 171 km^2 across the Fauni Range, 98 km^2 between Davidson and Johnny Lake, 205 km^2 in the Anahim area and additional roads in an area already assessed by SERN BC. The SERN BC area contained 909 km of roads but following assessment of candidate roads by SERN BC and then removal of remaining roads and overlapping buffers, only 95 km^2 of restored area remained. The SERN BC example shows that due to remaining road overlap restored road length does not transfer to restored area at a 1:1 ratio unless all roads in an area are restored. This highlights the importance of stakeholder engagement in the restoration process. Negotiations need to prioritise all opportunities to remove roads and planning needs to focus on regaining contiguous areas of caribou habitat to enable functional habitat recovery.

Introduction

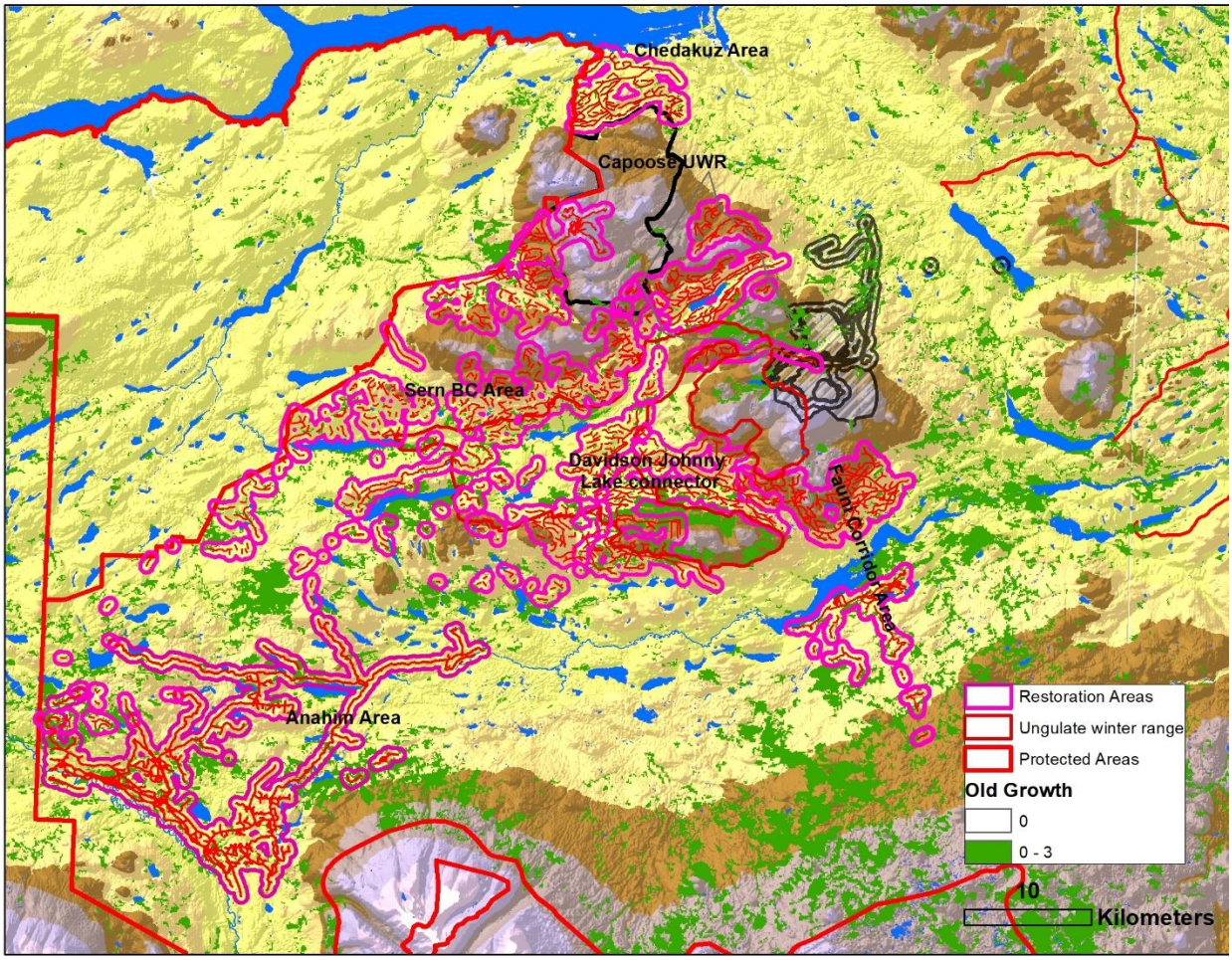
This report provides a preliminary, desk-based assessment of road coverage for road restoration to meet caribou offsetting requirements as part of the Blackwater Gold Caribou Mitigation and Monitoring Plan (CMMP). As well as mapping out road availability, the potential impact of road restoration in improving caribou habitat functionality for the Tweedsmuir caribou herd was evaluated (Figure 1). The areas were identified based on potential value to the Tweedsmuir caribou herd in terms of reducing predation pressure and access to the caribou population, reduction in human access / disturbance to the herd, and improving habitat connectivity and supporting a long-term vision of caribou habitat recovery in each respective area. Five areas were identified including the SERN BC area, which was assessed for road restoration opportunities in 2017 (SERN BC, 2017). The majority of roads are located in the Tweedsmuir LPU and those outside the LPU were selected due to their direct benefit to the herd in terms of improving inter-herd movement, connectivity and gene flow, through the process of reducing disturbance and predation pressure within corridors. If additional roads are required beyond those identified in this report, 100's of kms of roads lie directly north of Entiako Provincial Park. The area is adjacent to current Tweedsmuir caribou herd activity and would also benefit from restoration efforts.

It is assumed that a substantial amount of further work to identify candidate roads, and subsequent assessment of potential impact on caribou recovery will be required. This includes contacting tenure holders and fieldwork to ground truth roads and their status. The following GIS based identification of roads is therefore the first step in a process to allow an understanding of potential road availability and impact of restoration in the identified areas. Some of the steps still to be completed include:

- Assessing future planned forest harvesting in the local opportunities data
- Identifying silviculture obligations that require continued access as identified in the free growing data
- Recreational and Private land access
- On the ground status of roads (ground truthing)
- Engagement with all stakeholders

Discussions with stakeholders would then allow candidate roads, and candidate areas where silviculture requirements are soon to cease, to be identified. The overall objective would be to focus on larger contiguous areas that have potential to improve caribou habitat through strategic restoration. As remaining unrestored roads reduce the impact of restoration activities, focal areas should ideally be road free or have good potential to be road free in the near future.

Figure 1. Summary map showing the potential road restoration areas including the Anahim area, the Fauni Corridor Area, the Davidson to Johnny Lake Connector, the Chedakuz Area and the area identified previously by SERN BC.



Areas Identified

1. Chedakuz Area

Purpose – Regain caribou habitat next to Capoose and Entiako Park.

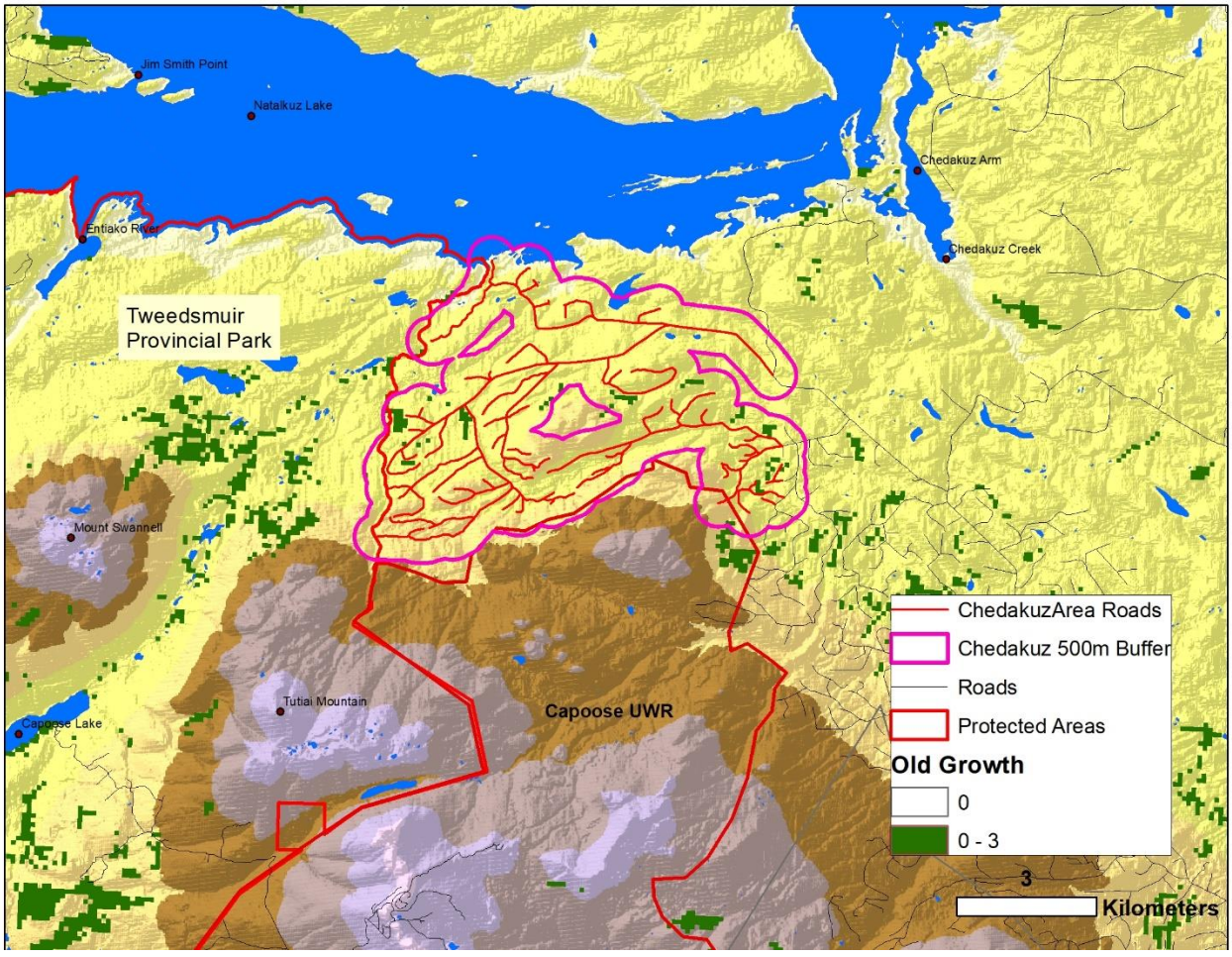
Caribou use – Collared caribou use the area occasionally and did so much more frequently before a large fire destroyed some of the forested habitat.

Table 1. Chedakuz Area Statistics

Road Number	Minimum Length	Maximum Length	Mean Length
129	20 m	2647.1 m	578.6 m

Total length of forestry roads in the area	74.63 km
Area of road restoration without overlap	41.2 km^2

Figure 2. Chedakuz restoration area roads prioritised for restoration (Red) and the restoration area (purple polygon showing 500m road buffer).



2. Fauni Connector (Capoose-Mount Davidson-Itcha Ilgachuz connectivity corridor)

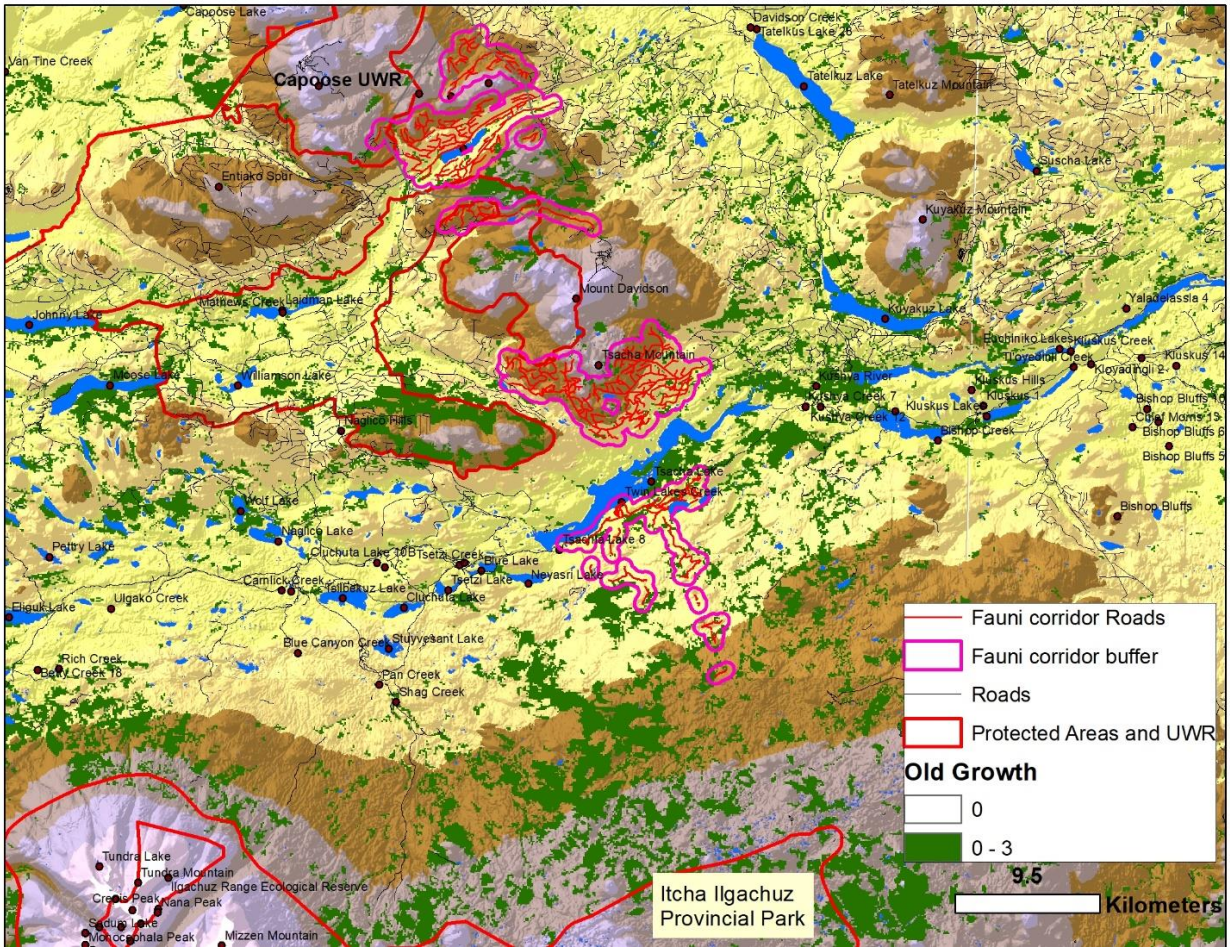
Purpose – Initiate the restoration process to regain caribou herd connectivity between the Tweedsmuir and Itcha Ilgachuz Herds across the Fauni Mountain Range, travelling from the Capoose UWR, across Mount Davidson and connecting to Itcha Ilgachuz Mountain Range.

Caribou use – There is little use of the Davidson area by collared caribou, but recent aerial surveys have detected caribou in the area and the high elevation range is likely still used across the full area. Historically caribou are known to have frequented the area and Mount Davidson was a traditional caribou hunting ground. The Fauni range is known as a historical corridor between the Tweedsmuir and Itcha Ilguchuz herds, as identified through Lhoosk'uz Dené Nation Traditional Knowledge. The long-term restoration objective would be to regain this historic corridor.

Table 2. Fauni Corridor Area Statistics

Road Number	Minimum Length	Maximum Length	Mean Length
599	2.2 m	7639.4 m	503.0 m
Total length of forestry roads in the area			301.3 km
Area of road restoration without overlap			171.2 km^2

Figure 3. The Fauni Corridor Area roads prioritised for restoration (Red) and a 500m buffer (Purple) designating the total restoration area.



3. Davidson to Johnny Lake Corridor

Purpose – 1) Reconnect Mount Davidson UWR to the Johnny Lake UWR, 2) Reconnect high elevation habitats as summer and winter range and 3) Restore functional characteristics and improve caribou access to old growth forest remnants in the Johnny Lake area.

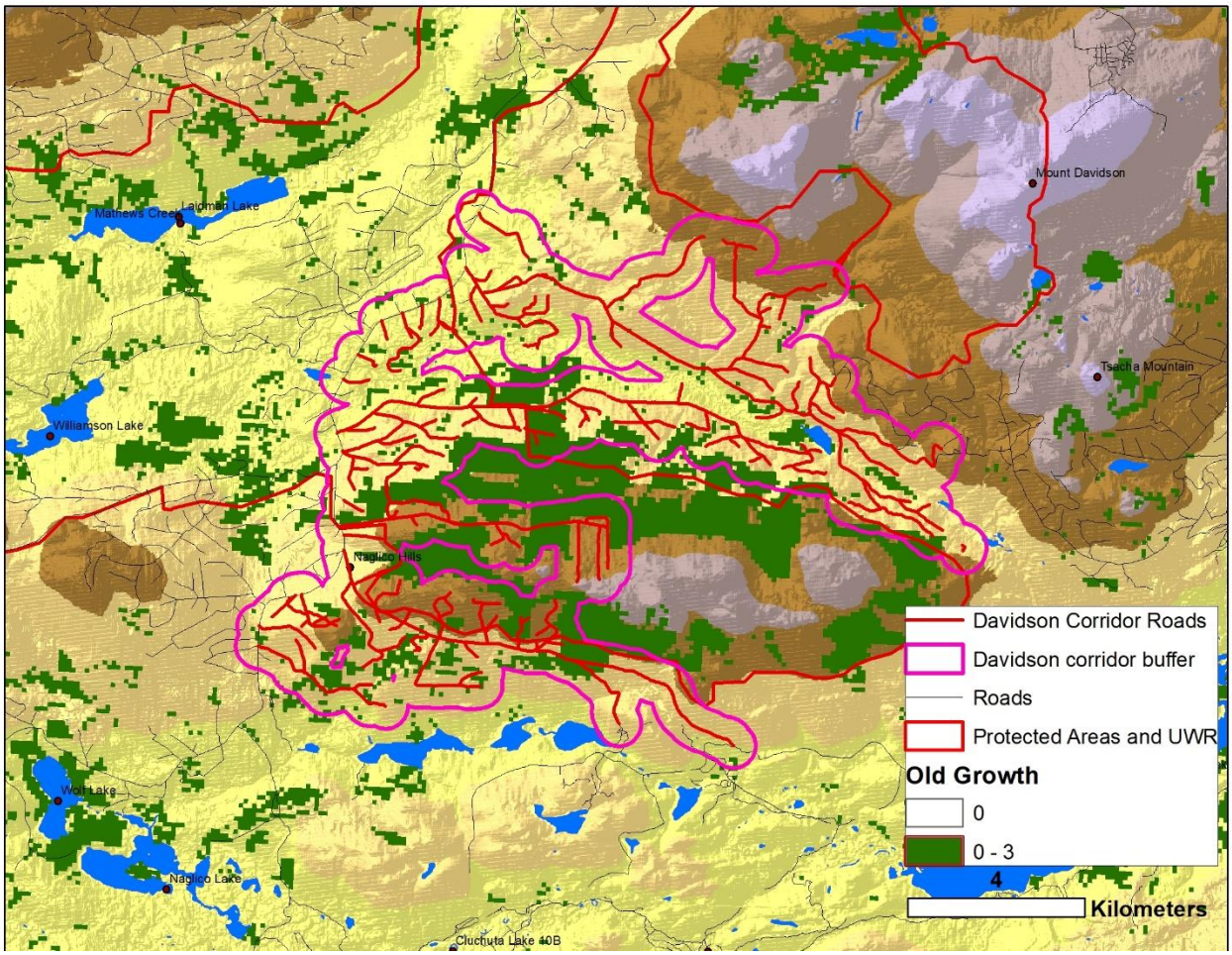
Caribou use – Collared caribou are known to use the area occasionally; aerial surveys have also sighted caribou here. Recent fieldwork recorded caribou sign in old growth fragments in the area and habitat characteristics suggest the area is likely to be used more frequently by caribou than GPS collars and aerial surveys suggest. High elevation and old growth habitats are available, but forestry operations have reduced connectivity.

Table 3. Mount Davidson to Johnny Lake Area Statistics

Road Number	Minimum Length	Maximum Length	Mean Length
274	2.93 m	4378.3 m	554.4 m

Total length of forestry roads in the area	151.9 km
Area of road restoration without overlap	98.1 km^2

Figure 4. Mount Davidson to Johnny Lake corridor showing roads prioritised for restoration (Red) and a 500m buffer (Purple) designating the total restoration area.



4. Anahim connector area, confluence of Tweedsmuir, Itcha Ilguchuz and Rainbows caribou herds

Purpose – Although a new egress road will soon be built through the Anahim area to serve Ulkatcho First Nation, the purpose of this restoration area will be to restore and minimise other road disturbances in this area while maintaining the new Anahim Connector Road. The overall objective is to maintain existing connectivity between the Tweedsmuir, Itcha Ilguchuz and the Rainbows caribou herds, which are still connected through this corridor area.

Caribou use – Collared caribou use the surrounding area frequently and calving grounds are known to exist close by. This corridor is known to be the last area facilitating semi-regular movement between the

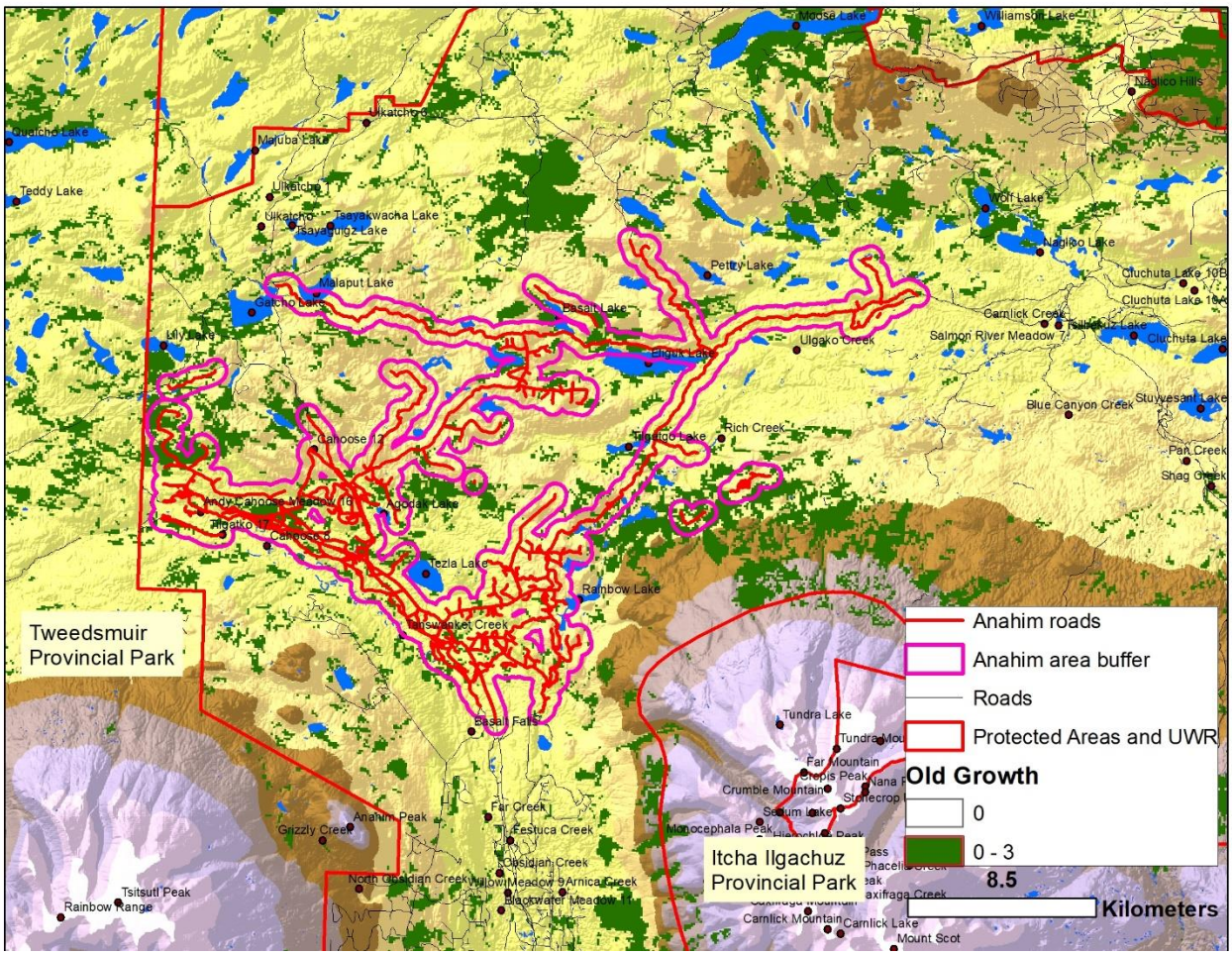
Tweedsmuir and Itcha Ilguchuz caribou herds. The area is important for the genetic exchange and viability of both populations.

Table 4. Anahim Connector Road Area Statistics

Road Number	Minimum Length	Maximum Length	Mean Length
629	15.1 m	23441 m	533.1 m

Total length of forestry roads in the area	335.3 km
Area of road restoration without overlap	205.2 km^2

Figure 5. Anahim connector road area (see Anahim connector road in yellow), showing roads prioritised for restoration (Red) and a 500m buffer (Purple) designating the total restoration area.



5. SERN BC Road Layer

The SERN BC road layer is already included in the CMMP. It includes a large area adjacent to the Entiako and Tweedsmuir Provincial Parks, adjacent to the UWRs in the area and covers connectivity habitat relevant to caribou herd restoration.

Table 5. SERN BC Area Statistics

Road Number	Minimum Length	Maximum Length	Mean Length
1863	15.1 m	4575.1 m	399.9 m

Total length of forestry roads in the area	909 km
Area of road restoration without overlap identified by SERN BC as candidate roads	344.5 km^2
Functional impact area after remaining buffer roads are removed (see Figure 7)	94 km^2

Figure 6. The potential road network identified by SERN BC for restoration. Showing roads prioritised for restoration (Red) and a 500m buffer (Purple) design

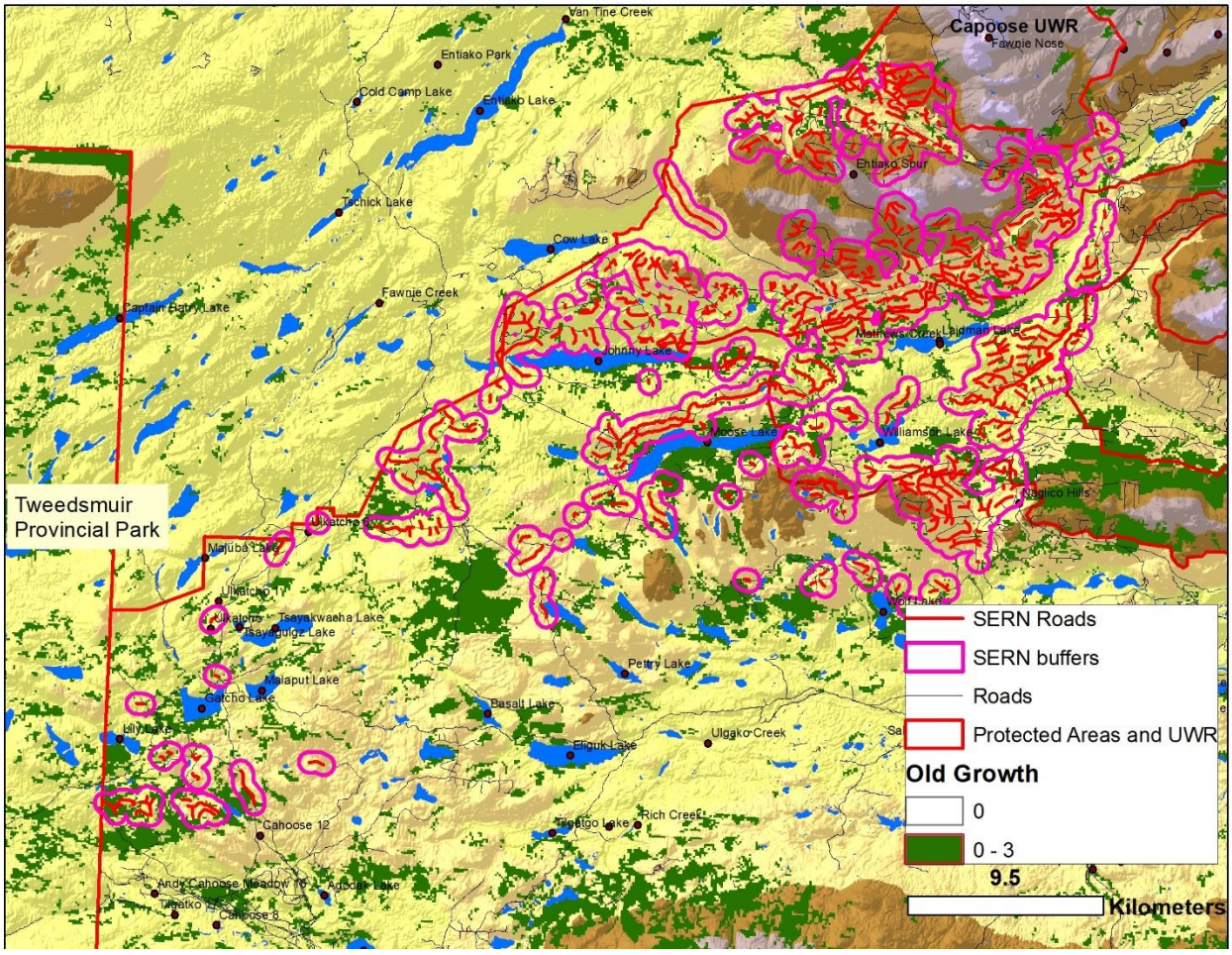
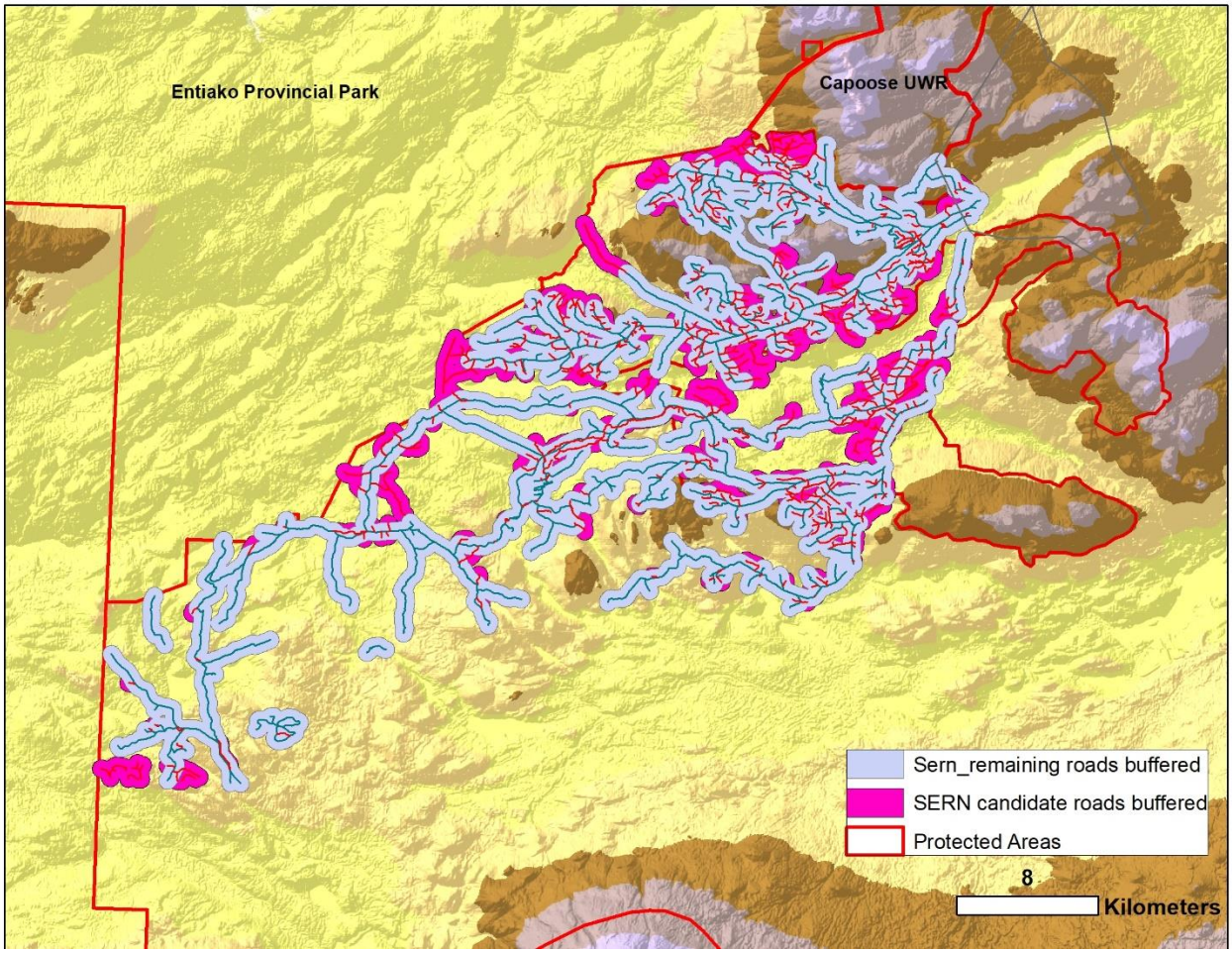


Figure 7. The candidate roads identified by SERN BC for restoration with remaining unrestored roads and 500m buffer overlapping the area and reducing the restoration impact.



A desktop analyses was carried out by SERN BC on the road layer, providing an opportunity to assess road availability following a desktop review. Just under half of the road length found in the area were thought to be candidate roads for restoration according to SERN BC (SERN BC, 2017). The candidate roads were mapped and the Capoose UWR removed due to this area being restored by Blackwater Gold under separate obligations. The candidate roads, including a 500m buffer, covered approximately 342 km^2 (Figure 6). However, after remaining unrestored roads (with a 500m buffer) were overlapped and removed from the restoration area, only 94 km^2 of functional restoration area remained (Figure 7). Due to the fragmented nature of the restored habitat the remaining area would have a low impact on caribou recovery.

Although this example is incomplete, as many of the required steps in the process of road identification were not conducted, the exercise shows how important negotiations with stakeholders are. Negotiations need to consider and prioritise areas as future caribou habitat and increase candidate road coverage to increase the contiguous area that can be restored. Otherwise, restoration could result in small fragments of restored road areas that have little impact on restricting predator movement or improving connectivity.

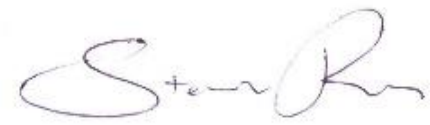
Negotiations could include strategic release of tenures, early release of silviculture requirements or other opportunities not identified here. Finding restoration opportunities that are acceptable to all stakeholders is likely to be challenging but will be necessary to ensure restoration efforts lead to caribou recovery.

References

SERN BC (2017) Facilitating Road Rehabilitation Discussions, Vanderhoof Forest District, March 2017. Project [1273-2].

Qualified Professionals

This report has been prepared by Keefer Ecological Services Ltd. The contents have been written and reviewed by the following qualified professionals:

Prepared by:	Reviewed by:
	
Steve Ross, PhD, RPBio Wildlife Biologist Keefer Ecological Services	Michael Keefer, MSc, PAg President Keefer Ecological Services

Keefer Ecological Services Ltd.
PO Box 430
Cranbrook, BC, V1C 4H9
www.keefereco.com

(250) 489-4140
info@keefereco.com