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.

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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.

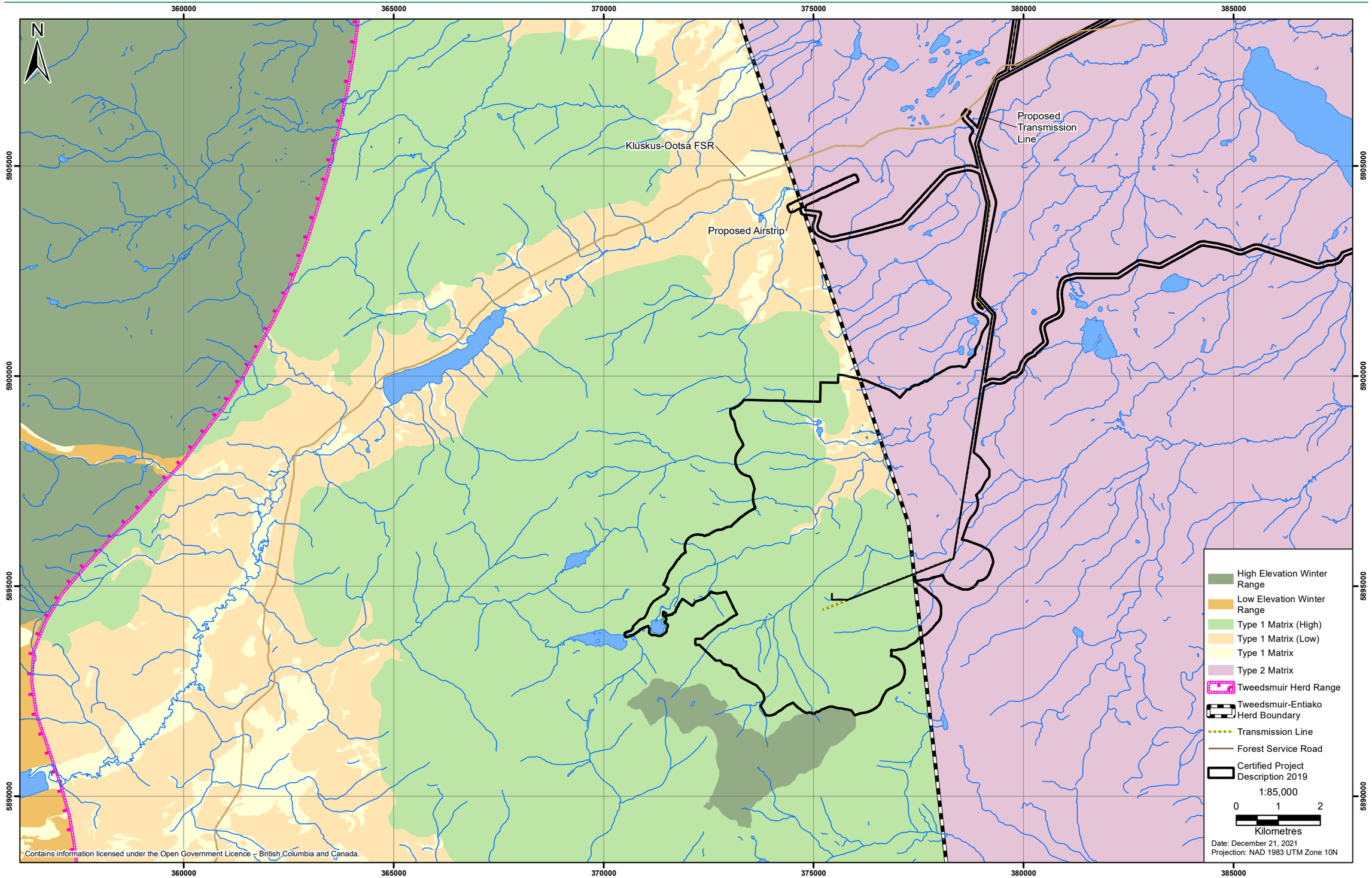

Figure 1.1-1: Tweedsmuir Caribou Range Habitat in Relation to the Blackwater Project Certified Project Description

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.

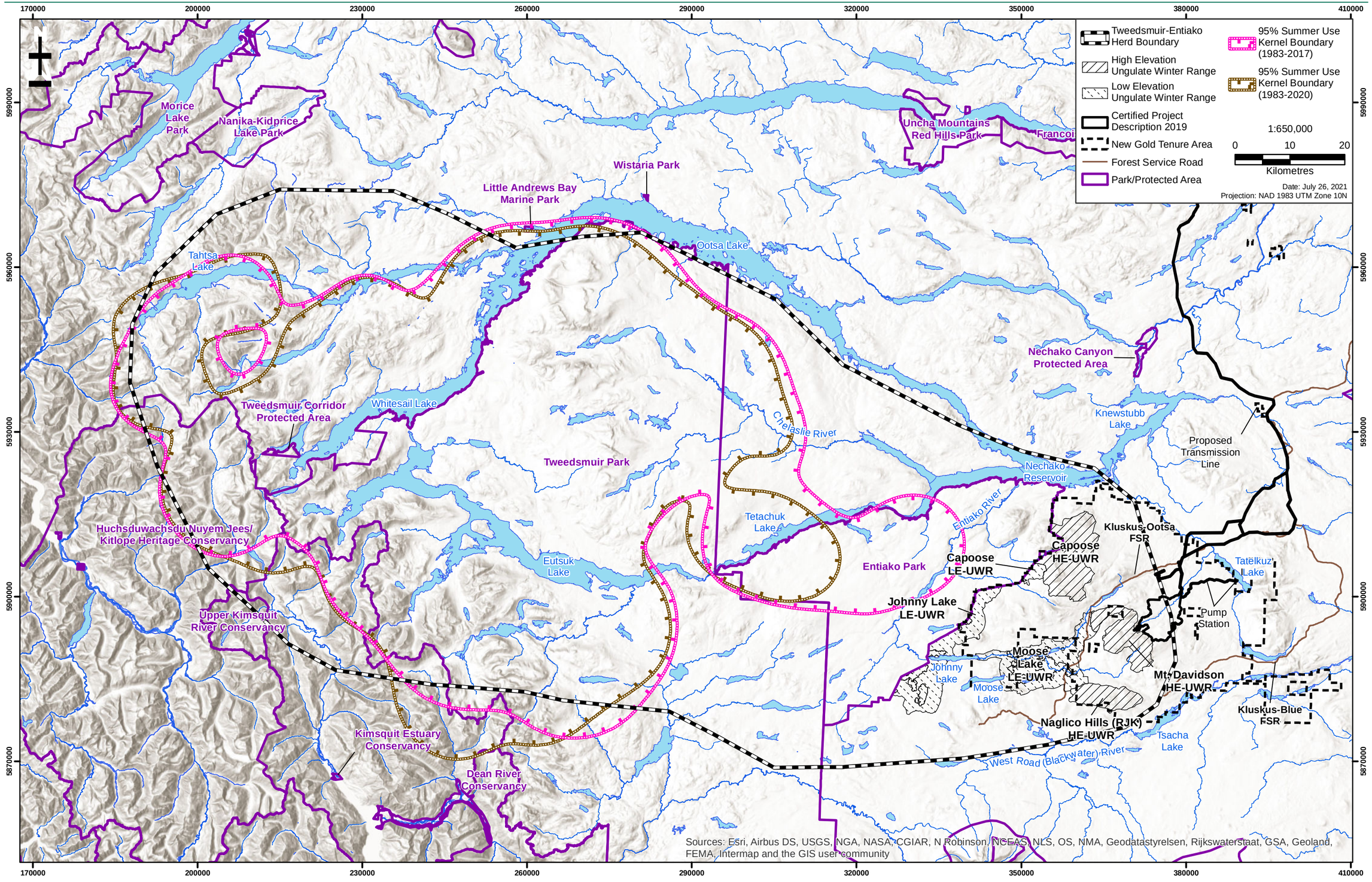

Figure 2-1: Range of the Tweedsmuir Caribou Population, Summer 1983-2020

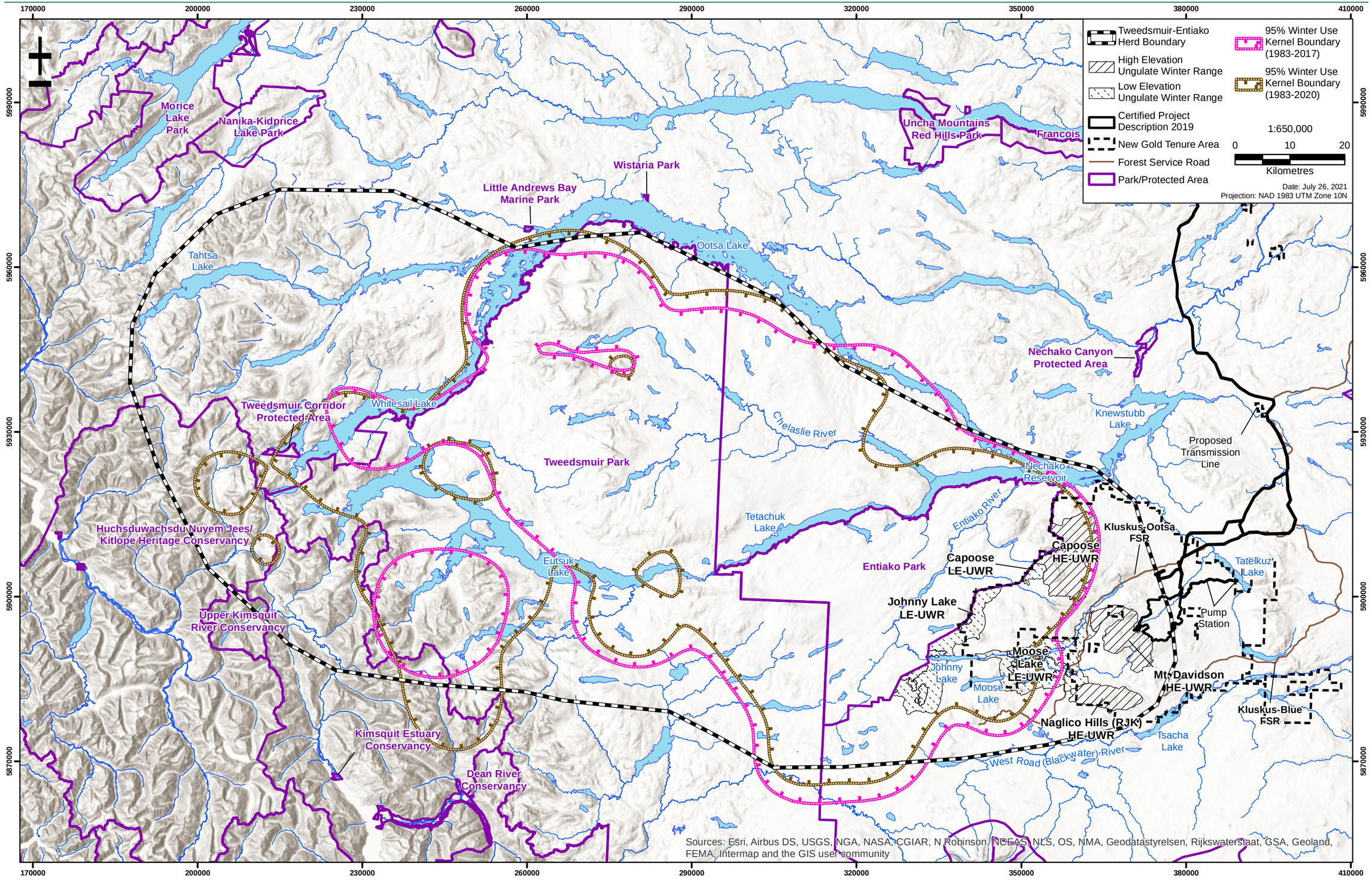

Figure 2-2: Range of the Tweedsmuir Caribou Population, Winter 1983-2020

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.

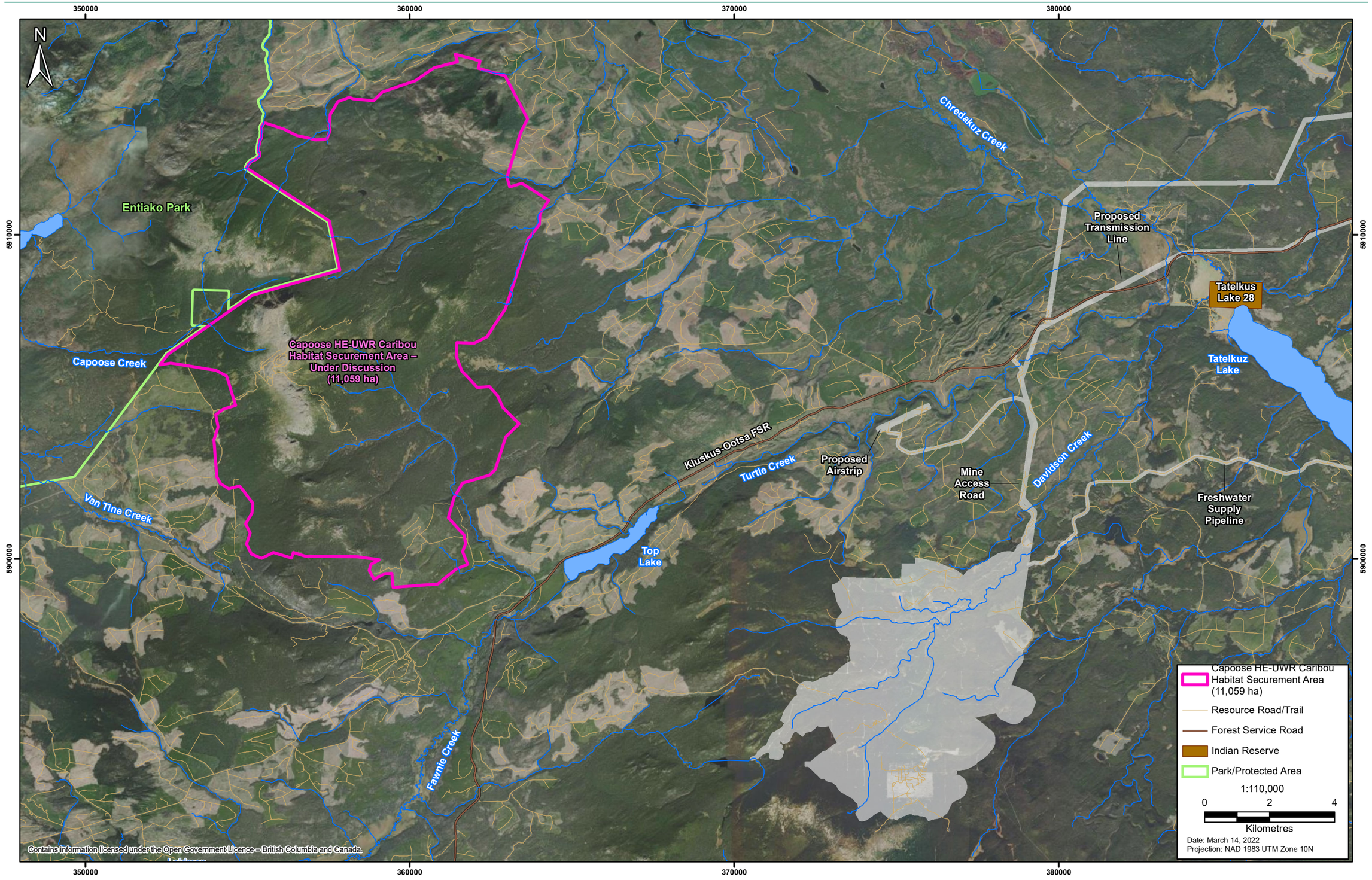

Figure 4.3-1 Capoose HE-UWR Caribou Habitat Securement Area

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.

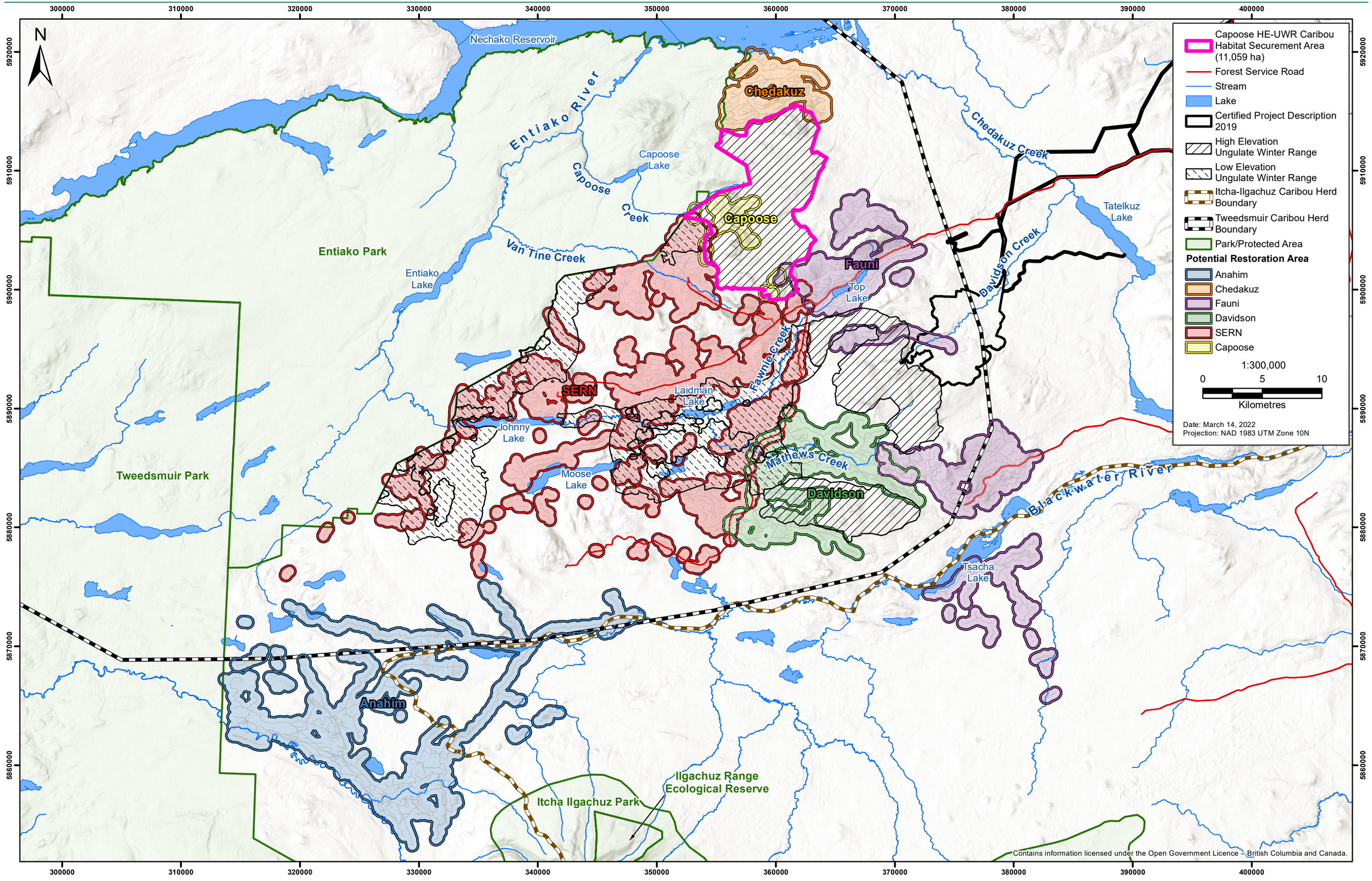

Figure 4.3-2: UFN/LDN Proposed Offsetting Areas

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.

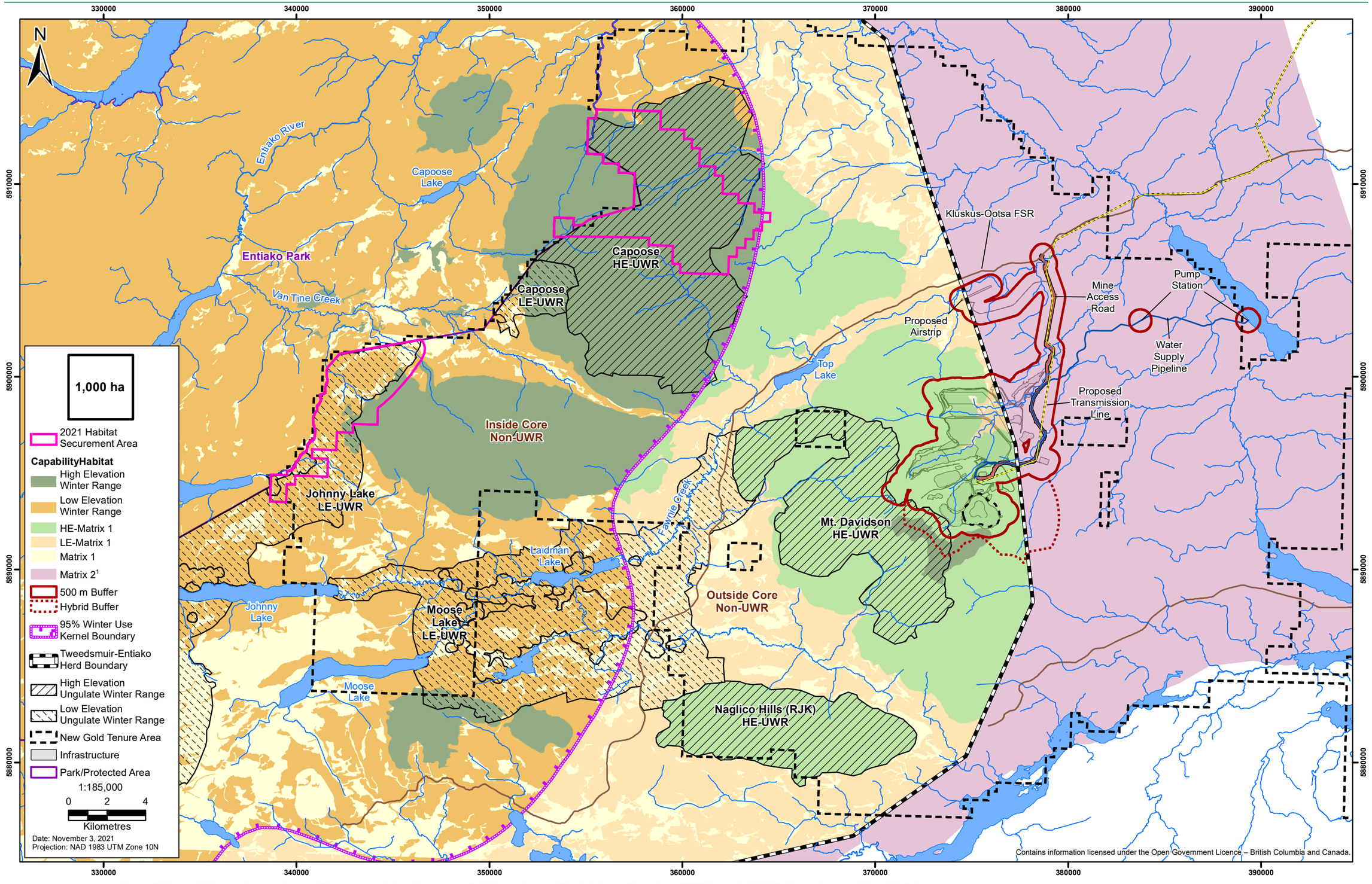

Figure 5.7-1: Candidate Offset Locations Proposed in August 2021, where Field Studies for TEM and HSM Conducted in 2021

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.

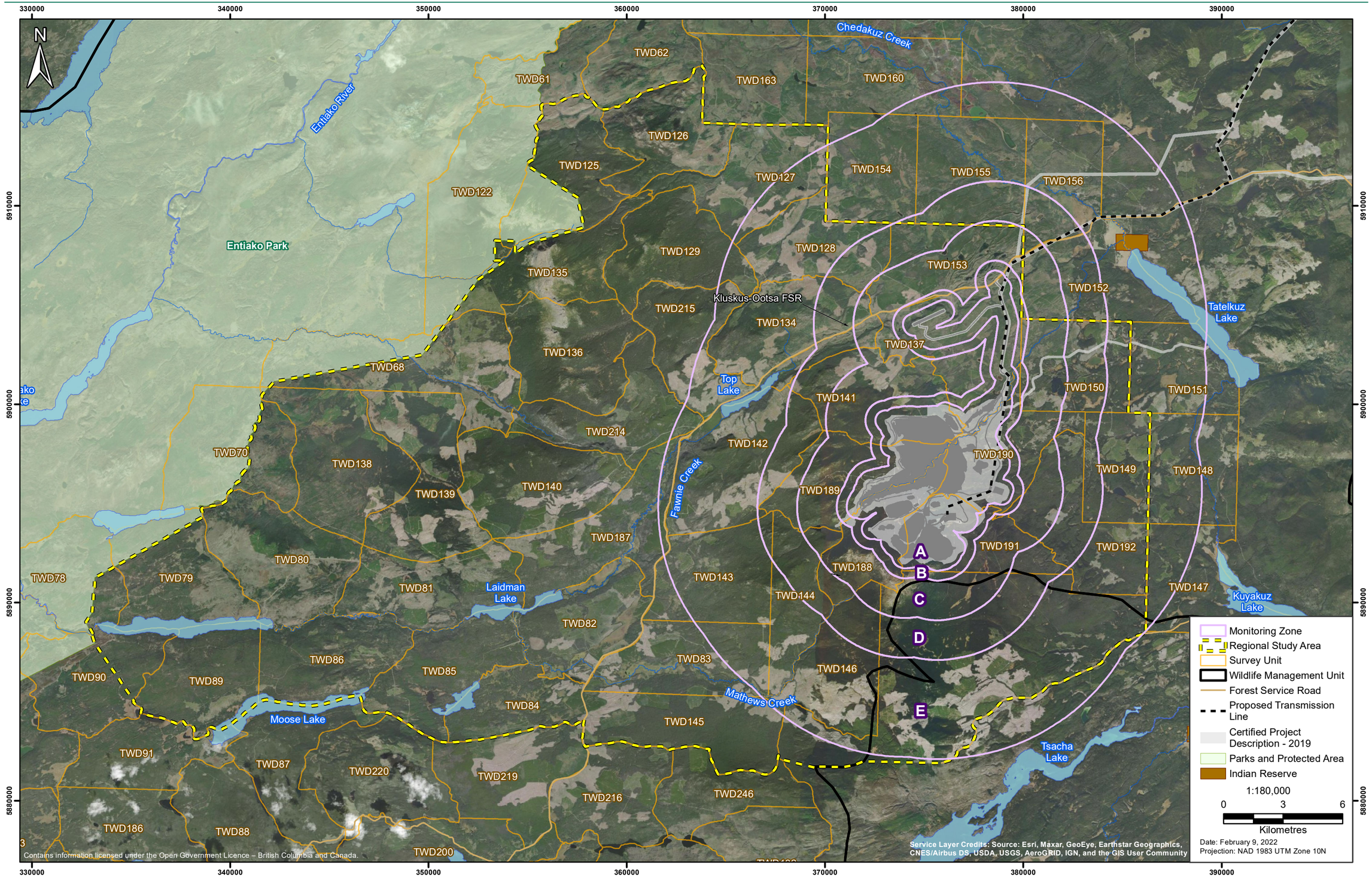

Figure 6.2-1: Study Area for Pellet Counts and Snowtrack Surveys

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.

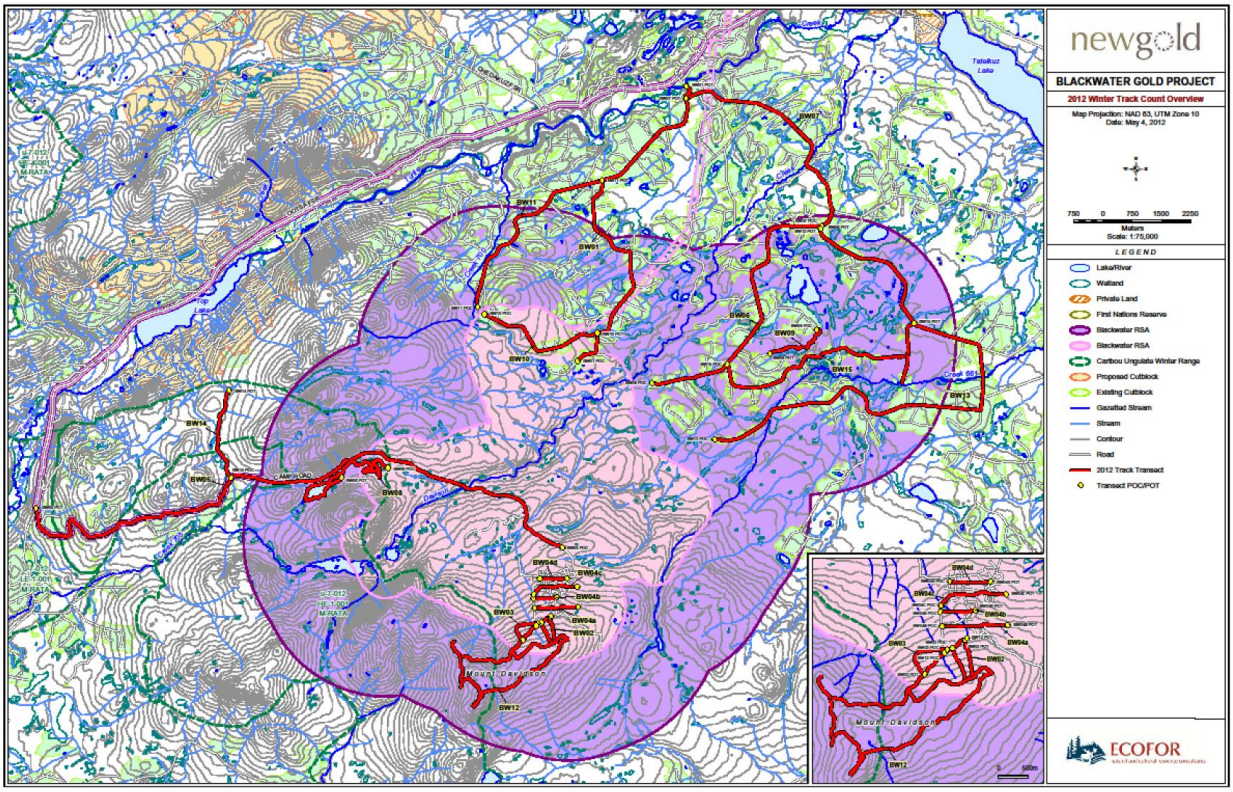

Figure 6.2-2: Winter Snow-Track Surveys, March 2012

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)

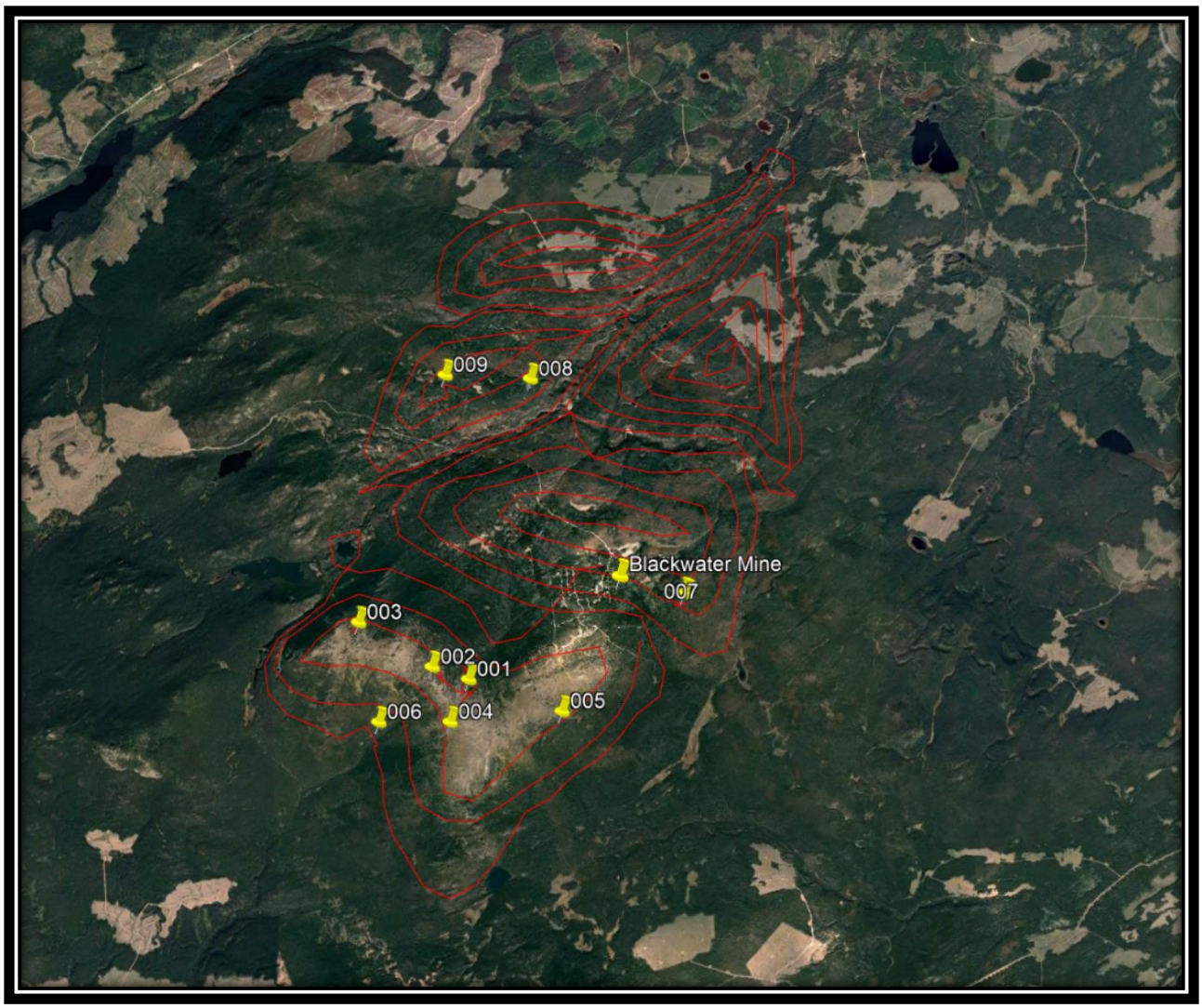

Figure 6.2-3: Early Winter Aerial Survey Transects, December 2016

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).

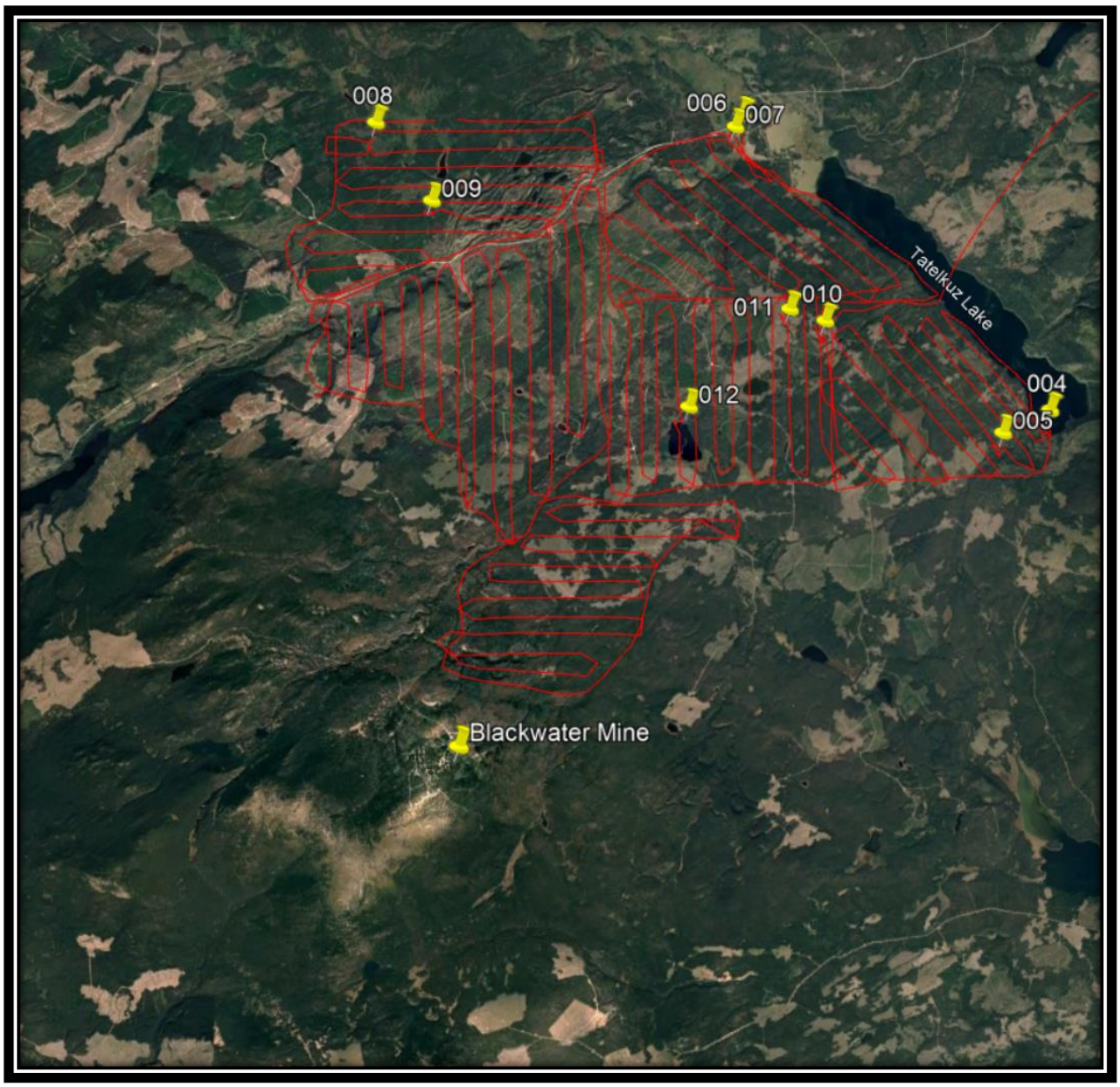

Figure 6.2-4: Late Winter Aerial Survey Transects, February 2018

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).

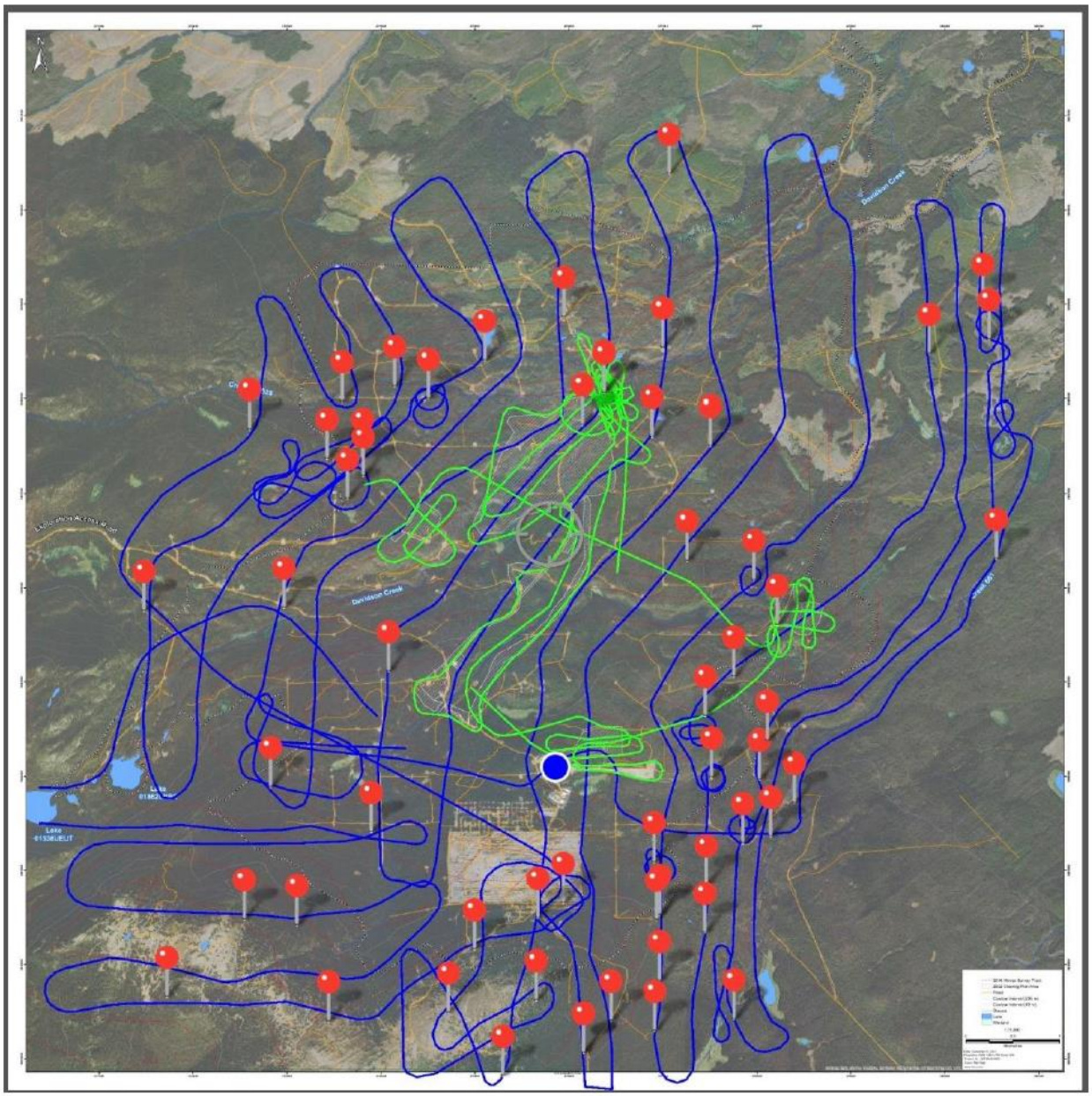

Figure 6.2-5: Early Winter Aerial Survey Transects, December 2021

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
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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".

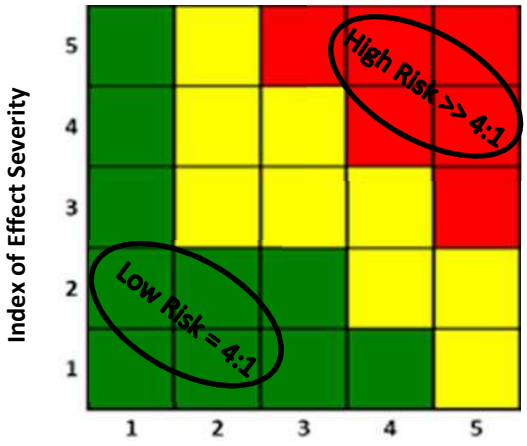
The Minister of the Environment and Climate Change also has obligations under section 79 of SARA to ensure measures to avoid, lessen and monitor adverse effects to species at risk and their critical habitat are taken in a way that is consistent with applicable recovery strategy and action plans.

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:

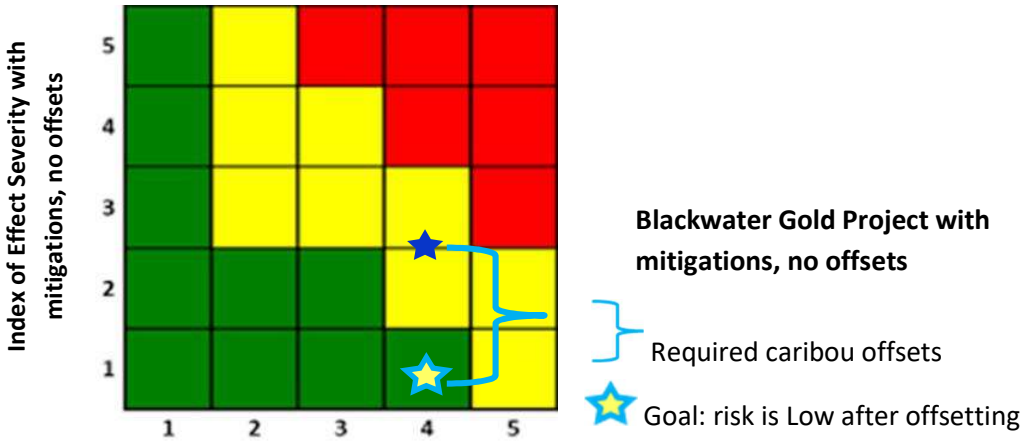
- Given the long term to permanent duration of the effects, the low resilience of caribou in general to stressors, and the assessment that the Tweedsmuir LPU is highly vulnerable, ECCC's view is that the effects of the Project may **not be reversible**.

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).

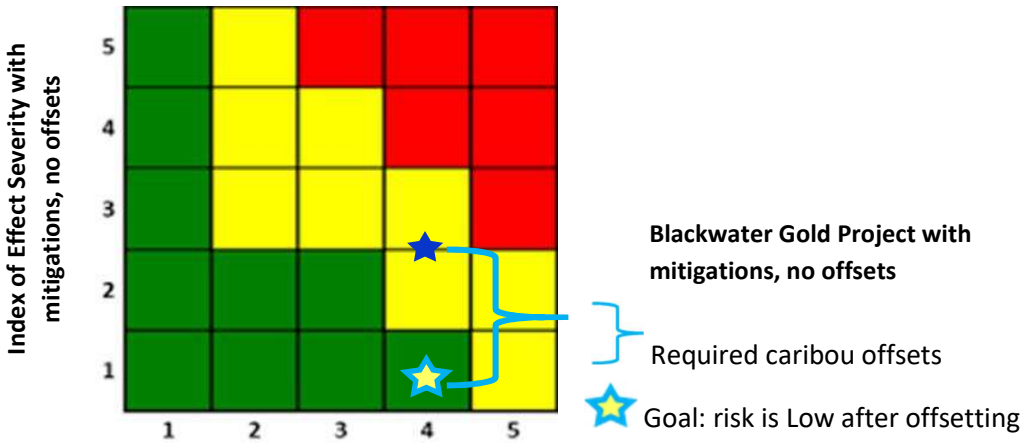
In ECCC's view, based on the current status of the species under SARA, the finding of imminent threat to recovery for the species, declining population trend and a population size lower than 300 animals, the reduced habitat availability due to existing levels of disturbance above recommended thresholds, 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
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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

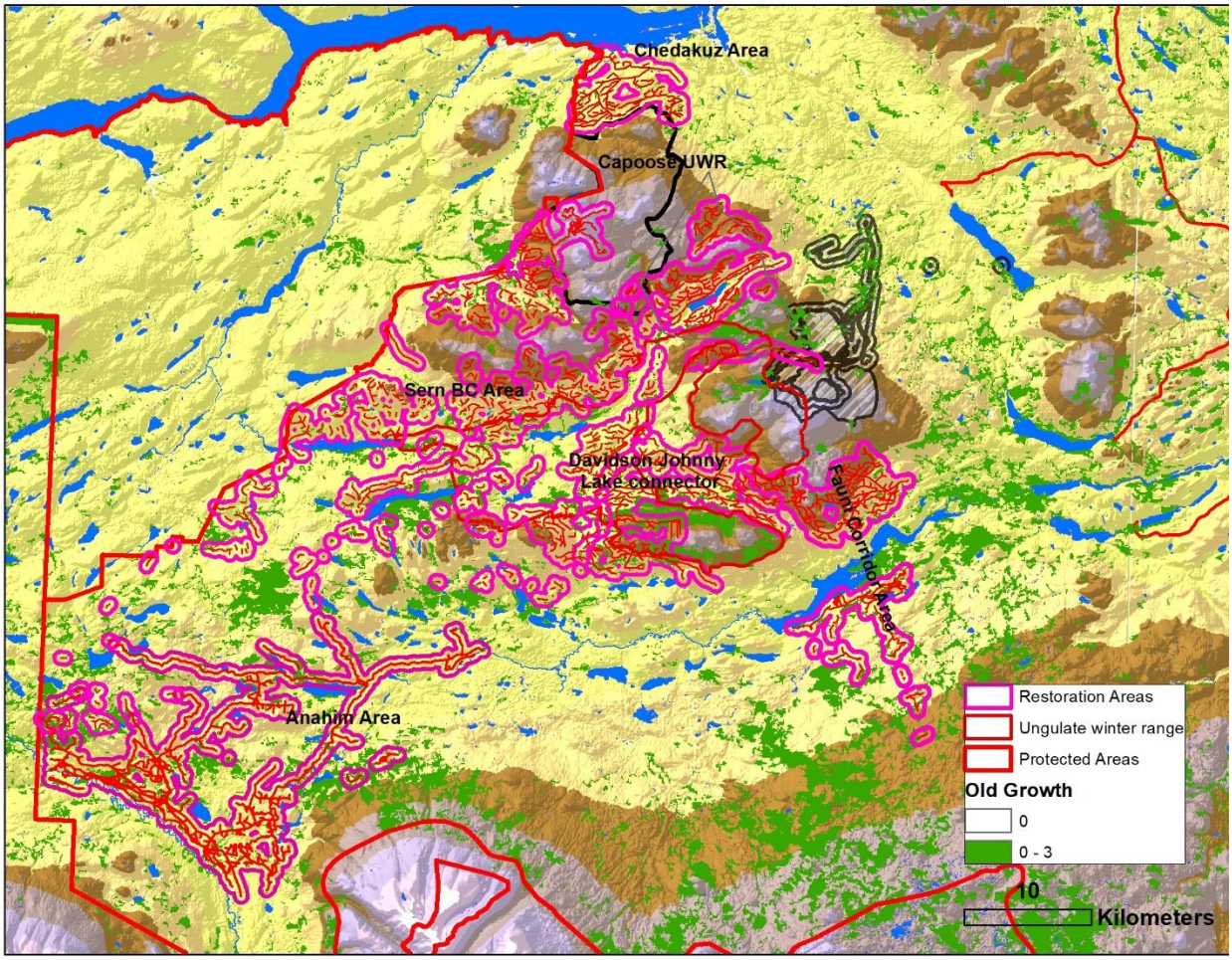
This report provides a preliminary, desk-based assessment of road coverage for road restoration to meet caribou offsetting requirements as part of the Blackwater Gold Caribou Mitigation and Monitoring Plan (CMMP). As well as mapping out road availability, the potential impact of road restoration in improving 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.

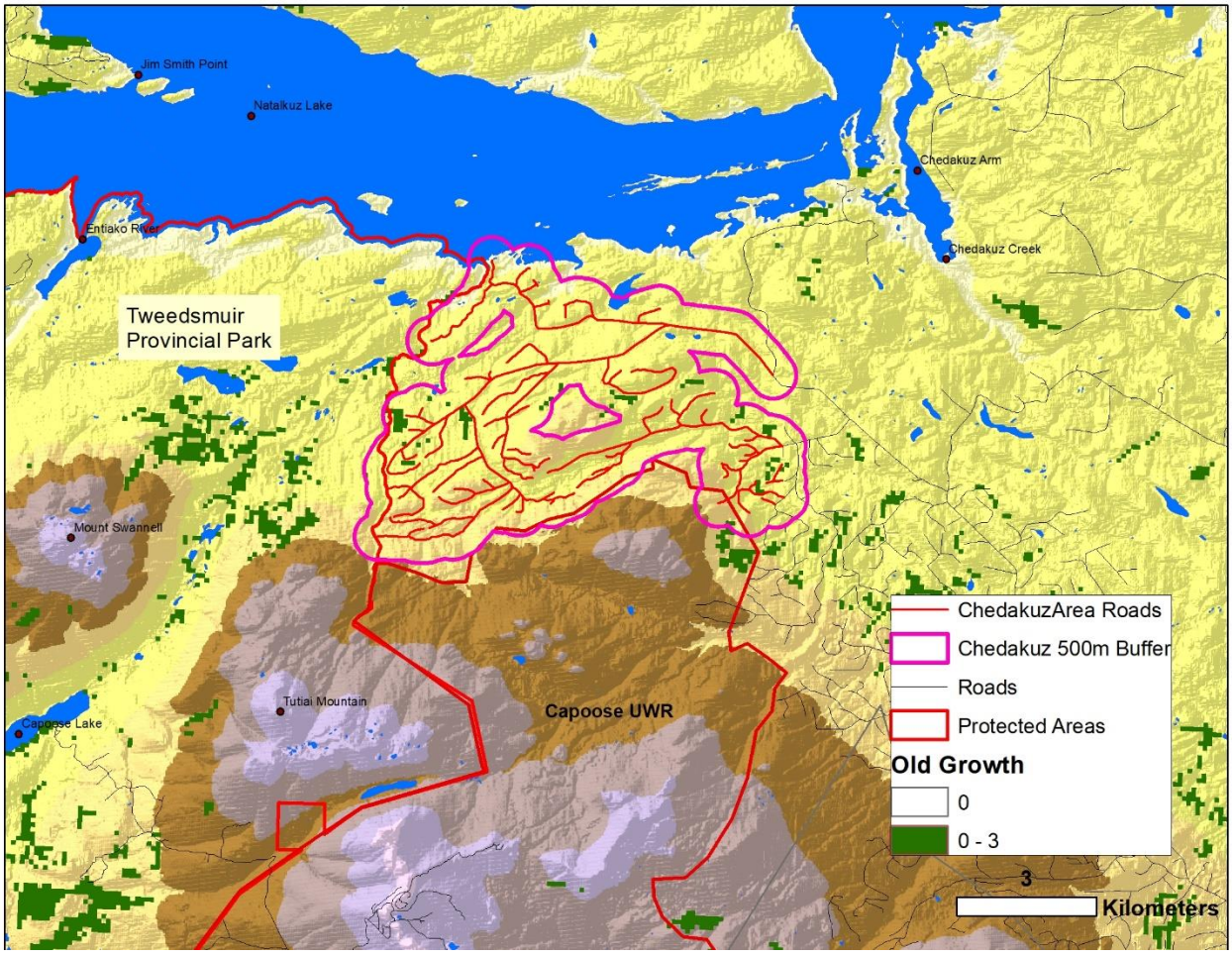
Caribou use – Collared caribou use the area occasionally and did so much more frequently before a large fire destroyed some of the forested habitat.

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)

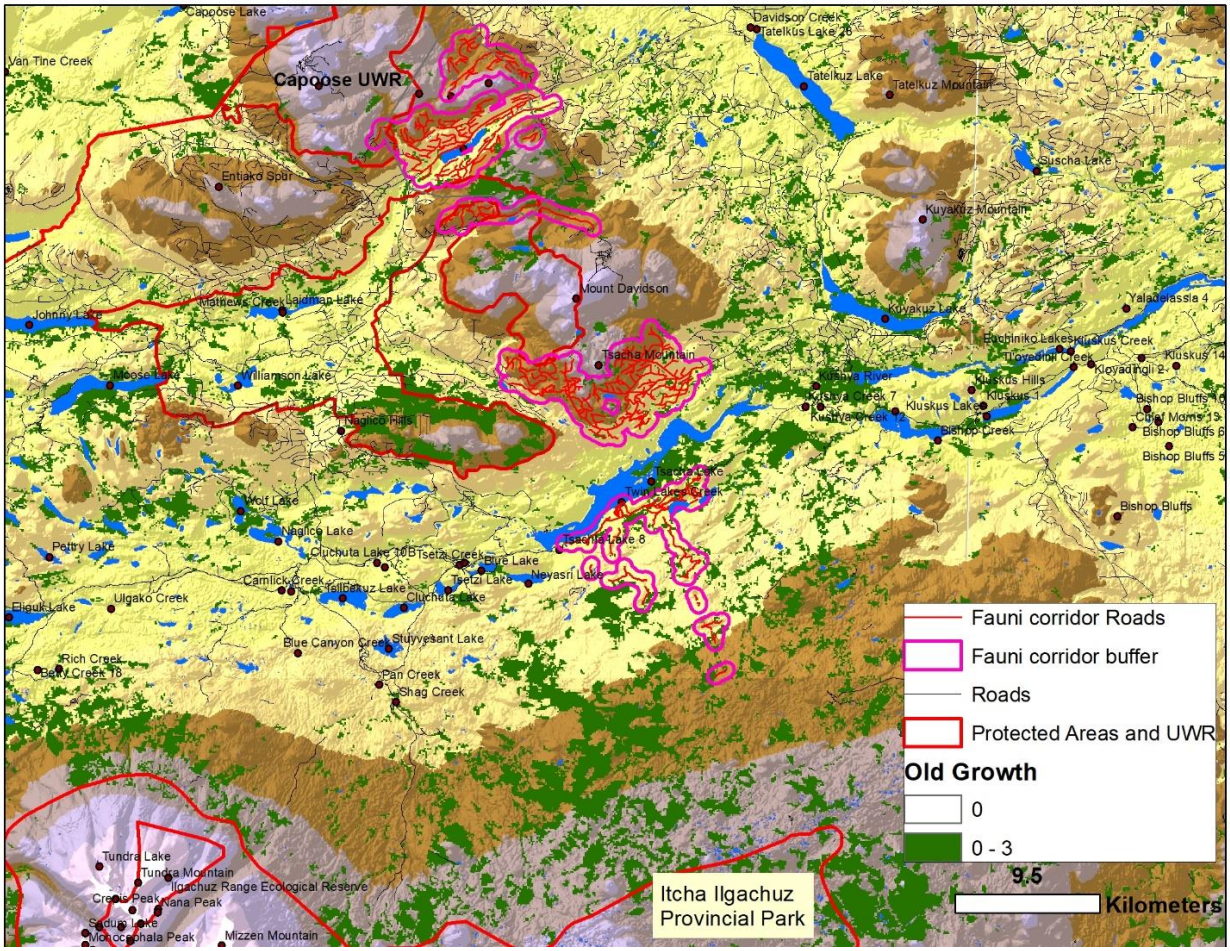
Purpose – Initiate the restoration process to regain caribou herd connectivity between the Tweedsmuir and Itcha Ilgachuz Herds across the Fauni Mountain Range, travelling from the Capoose UWR, across Mount Davidson and connecting to Itcha Ilgachuz Mountain Range.

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.

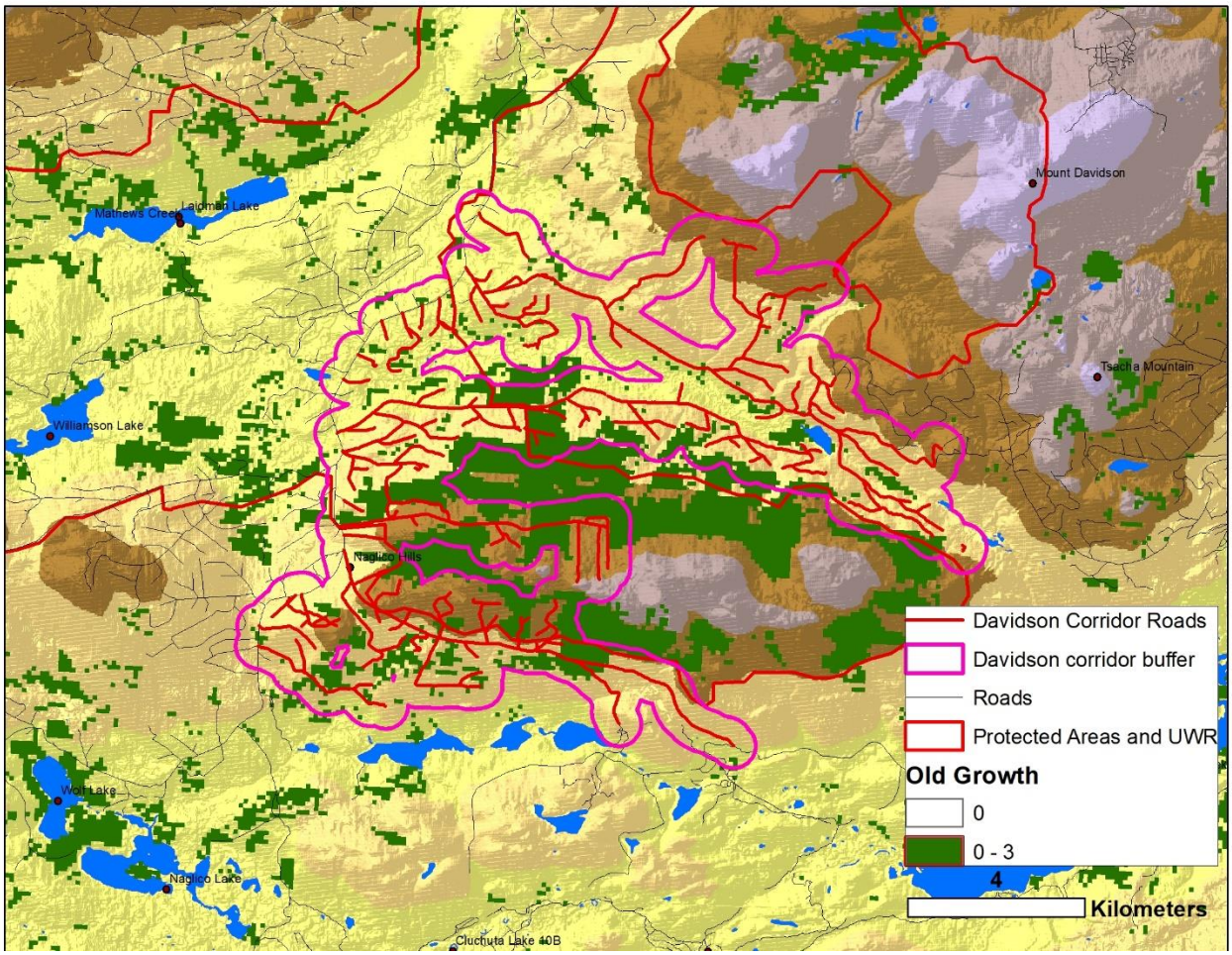
Caribou use – Collared caribou are known to use the area occasionally; aerial surveys have also sighted caribou here. Recent fieldwork recorded caribou sign in old growth fragments in the area and habitat characteristics suggest the area is likely to be used more frequently by caribou than GPS collars 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

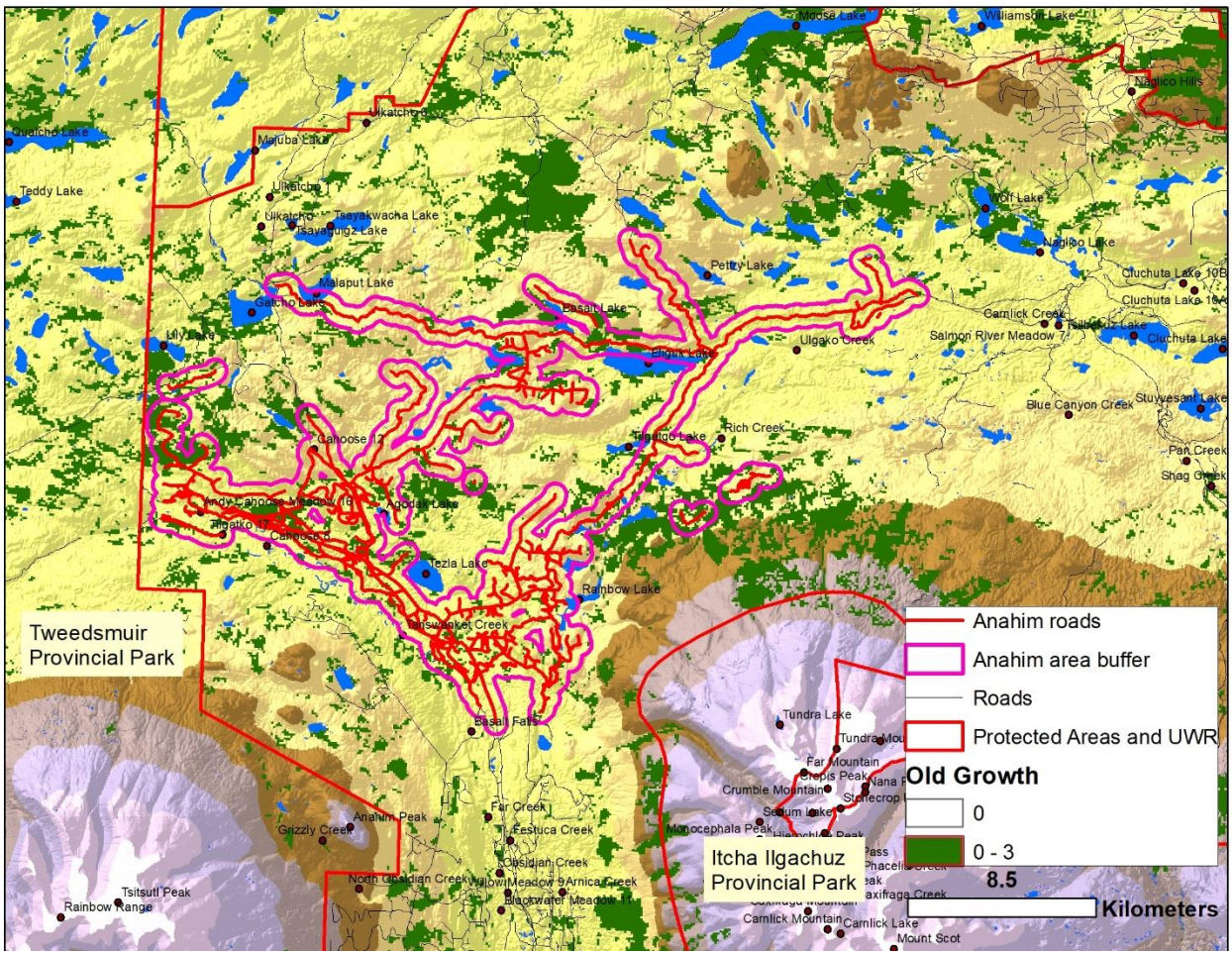
Tweedsmuir and Itcha Ilguchuz caribou herds. The area is important for the genetic exchange and viability of both populations.

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

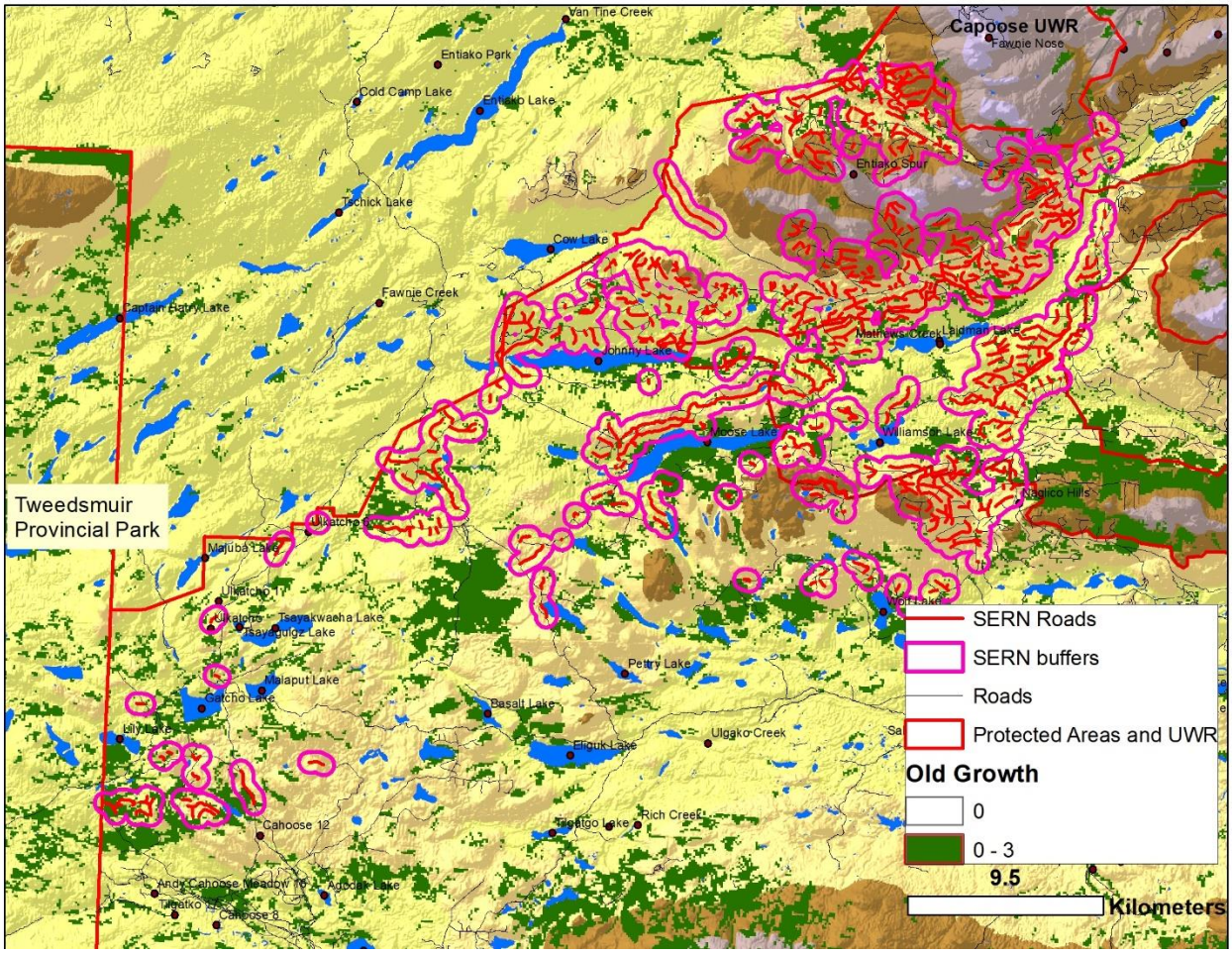
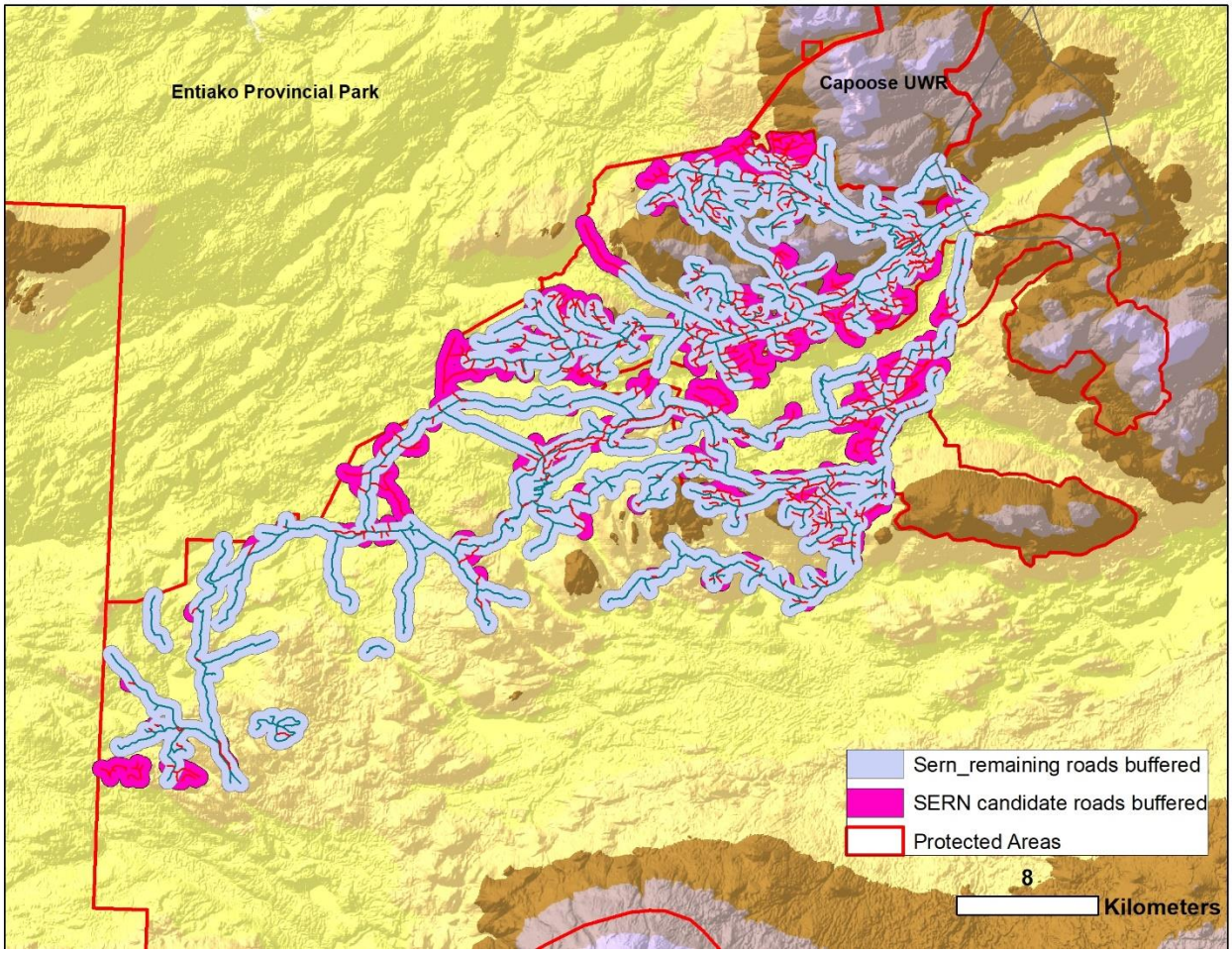


Figure 7. The candidate roads identified by SERN BC for restoration with remaining unrestored roads and 500m buffer overlapping the area and reducing the restoration impact.



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:

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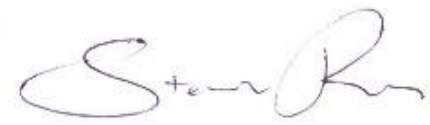	
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