

**Guidance for the Development of Caribou Mitigation and Monitoring Plans
for South Peace Northern Caribou – April 17, 2013**

PART ONE: INTRODUCTION

1.0 Overview

1.1 Background

This document outlines the considerations for proponents or their Qualified Professionals in developing mitigation and monitoring plans for South Peace Northern Caribou to support the *Natural Resource Board Direction: Planning and Approval of Development Activities in the Peace Northern Caribou Plan Area* document. The guidance contained in Part Two is based on the best information available at the time this document was prepared. This document may be revised in the future to reflect new information and lessons learned.¹

Principles

The content of mitigation and monitoring plans must be based on two foundational principles:

1. Proposed development activities and associated mitigation (including offsetting) can be demonstrated to result in a net neutral or positive effect on the viability of South Peace Northern Caribou within 10 years of receiving approval; and
2. Proponents are responsible for developing Caribou Mitigation and Monitoring Plans (CCMPs) and resourcing the management actions required to meet Principle 1.

Proponent Requirements:

Proponents must carry out the following in order to complete mitigation and monitoring plans:

1. Identify caribou use and caribou habitat within the proposed footprint of the activity and its area of influence.
2. Identify the impacts of proposed activities on caribou and caribou habitat.
3. Identify how impacts will be avoided and minimized by relocating activities, applying timing windows to operations, finding alternate means of development, etc.
4. Quantify the residual impact(s) of activities on caribou and caribou habitat. Residual impacts are defined as those impacts remaining after measures to avoid, minimize, and restore on-site have been fully considered.
5. Propose offsetting measures that meet the requirements of Principle 1 to address residual impacts.
6. Provide financial assurance sufficient to cover estimated mitigation costs.
7. Develop a monitoring plan to address the implementation and effectiveness of mitigation measures.

1.2 Document Structure

This document has three main parts:

1. Part One: Introduction.
2. Part Two: General mitigation guidance, sections 2 through 5.
3. Part Three: Template for a Caribou Mitigation and Monitoring Plan.

¹For government direction, recovery plan documents, and supporting background and management information refer to: <http://www.env.gov.bc.ca/wld/speciesconservation/nc/index.html>

PART TWO: GUIDANCE AND CONSIDERATIONS

2.0 Definitions

“area of influence” means the extent of the direct or indirect impact(s) to the caribou component beyond the footprint of the project or activity. It may be defined within each of the local, subregional, or regional scales based on the ecological scale of the processes affecting the caribou component.

“assessment area” means the spatial location used for the assessment of impacts on the caribou components. The assessment area is dependent on the caribou components being measured, and needs to consider the footprint of the activity and its area of influence. This not only covers the local scale, but may also include the subregional and regional scales depending on what scale is relevant to the caribou components.²

“current condition” is the state of the indicator prior to the proposed development or activity.

“effectiveness monitoring” measures condition of caribou components in the context of the performance of a program, plan, or activity and its progress toward desired outcomes or effects. Did what was implemented achieve the desired result?

“environmental component” means an attribute of the natural resource system that must be measured, managed, and maintained to ensure the integrity and well-being of the environmental value with which the component is associated. (This document focuses on the caribou components).

“environmental value” means an element of the natural environment that the people and government of British Columbia care about and see as important for assuring the integrity and well-being of the Province’s ecological systems. (This document focuses on the value caribou).

“indicator” means a metric used to measure and report the condition and trend of a caribou component.

“in-lieu payment” means a payment made by a person proposing a development project or activity to fund offsetting measures (conservation offsetting mechanisms) that will be carried out by a third party.

“minimize” means to *partially* avoid adverse impacts on one or more caribou components resulting from a development project or activity in either or both space and time.

“mitigation measure” means an action taken to avoid, minimize, restore on-site, or offset an adverse impact on a caribou component that would result from a development project or activity.

“offset” means a measure to counteract, or make up for, a residual impact on a caribou component after measures to avoid, minimize and restore on-site are considered.

“off-site” means outside of the area of the permit/authorization.

² The definition of “assessment area” used in this document is intended to compliment and support the approach used to defining assessment area in other processes, for example environmental assessment. What is important is that assessment area is defined in an ecologically relevant way that is necessary to evaluate the proposed activities against the foundational principle of “net neutral or positive effect”.

“proponent” means any party, including industry, local governments, federal agencies, and Crown corporations, seeking decisions from the Province in support of projects or activities related to land or resource development.

“reclamation” means actions taken to ensure stabilization of the terrain and to restore the functional utility of the ecosystem with regard to caribou habitat and other caribou components.

“remediation” means action(s) to eliminate, limit, correct, or counteract any contaminant or the adverse effect of a contaminant on the caribou component.

“residual impact” means an impact that adversely affects the caribou component, and remains or is predicted to remain, after “minimize” and/or “restore on-site”.

“restoration” means the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed (see SER Primer, 2004³). For purposes of this document, restoration would focus on the caribou components. It is an intentional human activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability. Restoration involves returning the impacted ecosystem to a sustainable ecological trajectory or pathway, determined by the restoration target and reference conditions.

3.0 Caribou Components

Understanding the environmental values that may be impacted is the basis for any mitigation planning. This guidance focuses on the value “caribou” and the components associated with this value. The Caribou components and associated indicators in Table 1 should be used as the basis for developing mitigation measures and the associated mitigation plan.

Table 1. Caribou Components and Possible Indicators

Component	Indicator
Amount and condition of habitat	Abundance and distribution of suitable winter habitat. (note: Habitat in low and high elevation should be considered separately.)
	Proportion of disturbed habitat
	Abundance and distribution of early seral habitat
Population structure and dynamics	Density of moose
	Density of wolves
	Caribou population size
	Caribou adult survival
	Caribou calf survival
	Caribou lambda

³ The SER International Primer on Ecological Restoration. 2004. Society for Ecological Restoration International Science & Policy Working Group. (Version 2, October, 2004)

4.0 The Mitigation Hierarchy

The Mitigation Hierarchy establishes a structure to guide the development and application of mitigation measures. The four components in the hierarchy are prioritized in the following order:

1. Avoid
2. Minimize
3. Restore On-Site
4. Offset (Off-Site or On-Site)

A partial list of possible management actions to avoid, minimize, restore on-site or offset impacts caused by industrial activity on South Peace Northern Caribou is provided in Table 2.

Current direction for South Peace Northern Caribou is that proposed development activities will result in a net neutral or positive effect on the viability of caribou within 10 years of receiving approval; therefore, for the purposes of mitigation, the predicted condition of the component or caribou value must be at least equal to its current condition.

The requirement to consider mitigation actions is triggered by impacts within high-elevation winter habitats. Mitigation measures to address high-elevation impacts may be planned for low-elevation areas; however, activities in low elevation in and of themselves do not trigger the need to prepare a Caribou Mitigation and Monitoring Plan. Offsets for impacts associated with sensory disturbance are not expected nor are offsets expected for indirect impacts that occur off of the project footprint. However, these indirect impacts outside of the project footprint are expected to be considered during the avoid, minimize and restore on site levels of the mitigation hierarchy. They may also be used to inform the use of multipliers when determining offset amounts and accounting for risk and uncertainty.

Table 2. Possible management actions to mitigate impacts as a result of activities proposed by industry on south Peace northern caribou herds (continued on next page).

Avoid	Minimize / Restore on-site (permitted area)	Offset (on or off permitted area)
Relocating activities outside winter habitat	Remediation (e.g. construct berms across roads) or restoration (e.g., plant native vegetation) of areas affected by activities	In-lieu payment for third party habitat remediation or restoration in areas not affected by the proponent's activities
Using previously disturbed areas	Controlling recreational access	Securing suitable habitat by recommending changes to land use policy*
Operating within timing windows	Fencing roads, providing underpasses, posting speed limits	Securing suitable habitat by purchasing or relinquishing tenure or portion of tenure

Avoid	Minimize / Restore on-site (permitted area)	Offset (on or off permitted area)
Aerial access to sites	Noise abatement	Deactivating or restoring roads
	Applying standardized practices and guidelines	Predator-prey management*
	Using existing developed features	Caribou augmentation (e.g., penning)*
		Research, monitoring and inventory

* These measures require implementation by government or a third party, and contribute to a proponent’s offsets only to the extent that they are financially supported by the proponent through in lieu payments.

4.1 Rationales for Moving Through the Mitigation Hierarchy.

A rationale should be provided to describe how the various steps in the mitigation hierarchy were considered and why it was considered reasonable to move to the next step in the hierarchy. It is recognized that moving through the hierarchy may be more of an iterative process and not completely linear, but the intent is to document the rationale and thinking. Following consideration of “avoid” and “minimize” and “restore on-site”, document the reasons for the need to move to either “minimize” and “restore on-site” or “offset”, respectively. The rationale may include addressing the following questions:

- Have the impacts on caribou components been considered at all scale levels (spatial and temporal)?
- How were measures to “avoid”, “minimize”, or “restore on-site” the impacted caribou components considered?
- Why was it deemed not practicable to minimize impacts on caribou components to a greater extent?
- Why was it deemed not practicable to restore caribou components on the site of the impacts to a greater extent?
- If impacts remain after “avoid”, “minimize”, and “restore on-site”, is offsetting appropriate?

Note: Determining the acceptable impact for which no additional mitigation would be needed is the responsibility and role of the statutory decision-maker.

4.2 Mitigation Hierarchy – Level 1: Avoid

4.2.1 Principles

- The first priority for application of mitigation measures is to avoid adverse impacts on caribou components on the footprint and area of influence for the duration of the proposed project/activity. “Avoiding” adverse impacts should be considered before “minimizing”, “restoring on-site”, and/or “offsetting” adverse impacts.

4.2.2 Considerations

- What is the current condition of caribou components present within the footprint and area of influence of the proposed project or activity?
- Which caribou components will be impacted by the proposed project or activity?
- There may be multiple caribou components that possibly have conflicting management needs, and these potential conflicts need to be considered.
- To what degree and extent can the impacts of the proposed project or activity be avoided? Can the impacts on the caribou components be fully avoided?
- Can impacts to one caribou component be more fully mitigated than impacts to another?
- Have mitigation measures for impacts on caribou components been considered? Have mitigation measures been considered at all scales?
- Is there guidance (e.g., best management practices, guidelines) available?

4.2.3 Ways to Avoid

Location: Altering or adjusting the location of a project or activity within the project area to fully avoid impacts to one or more caribou components.

Considerations

- Is there an alternative location for the proposed development project or activity? Is it practicable to relocate?
- If and where required, plan both for project development and also for project closure.

Means: Avoiding impacts to caribou components on the footprint and area of influence of a development project or activity through the application of alternative project methodologies (including tools, techniques, actions, or measures).

Considerations

- Can alternative development approaches or alternative technology be used to avoid the impacts to caribou components?
- Can the proponent collaborate with another operator in the same area to reduce the project footprint?
- Can a measure to fully avoid impacts to one caribou component impact another one?

Timing: Avoiding impacts to caribou components within the footprint and area of influence of a development project or activity through application of alternative timing of the project, or of specific elements of the project.

Considerations

- Can alternative timing of project-related activities (e.g., construction) be used to fully avoid adverse impacts on the caribou components within the footprint and area of influence of a development project or activity?
- Can short-term timing measures be used, e.g., to avoid sensitive periods within a season?

- Can the frequency of an activity be modified?

4.3 Mitigation Hierarchy – Level 2: Minimize

4.3.1 Principles

- “Minimize” is the highest priority or level in the mitigation hierarchy, and should be considered only when measures to fully avoid impacts on caribou components have been exhausted, or where avoidance is not practicable given the situation.

4.3.2 Considerations

- Measures to minimize should consider the scope, scale, and duration of the adverse impacts on caribou components on the footprint and area of influence.
- Although avoid and minimize are two distinct steps within the mitigation hierarchy, they are often considered at the same time.
- The same considerations as outlined above for avoid (location, means and timing) generally apply when considering ways to minimize impacts, i.e., *partially* avoiding impacts.

4.4 Mitigation Hierarchy – Level 3: Restore On-Site

“Restoration” is treated as a separate level or step in the mitigation hierarchy. Compared with “minimizing” impacts, measures to “restore on-site” differ largely in timing, in that restoration activities may be implemented or completed at a future date. Although planning for restoration and implementation of some restoration measures may begin at the present time, the impacts on the caribou component will persist until the restoration is completed.

Restoration (in general) focuses on establishing appropriate composition, structure, pattern, and ecological processes necessary to make terrestrial and aquatic ecosystems sustainable, resilient, and healthy under current and future conditions (US Forest Service, 2010).⁴ In simpler terms, restoration attempts to make up for what was lost as a result of impacts on ecological systems.

“Restoration” is considered broadly here as encompassing a continuum of degrees or stages of restoration, covering the various terms in different statutes and other legal mechanisms, e.g., “restoration”, “rehabilitation”, “remediation”, and “reclamation”.

These measures to remedy impacts on the caribou components range from measures to immediately stabilize the site of the impacts, to measures to bring a site back to full ecosystem structure and function as existed prior to the project or activity, or what historically existed. For the purposes of mitigation planning, the restoration target that the measure(s) is predicted to achieve should be clearly defined both functionally and temporally. Restoration measures are carried out within the footprint of the project or activity, specifically within the area of the permit or other form of authorization.

⁴ US Forest Service (2010). Ecological Restoration. Retrieved from <http://www.fs.fed.us/restoration/QandAs.shtml>

Note: Restoration measures implemented off-site may be used as environmental offsets, as for example at a location where another previously-conducted project or activity has resulted in impacts to the caribou components.

4.4.1 Principles

- An ecosystem is considered “restored” when it contains adequate biotic and abiotic resources to continue to develop without further assistance, sustaining itself structurally and functionally (see SER Primer, 2004). The ecosystem is resilient to environmental stress and disturbance, and its biotic and abiotic elements interact and flow with contiguous ecosystems. The many features of restored ecosystems are context-dependent and it may be considered restored before it meets the restoration target. For the purposes of this document, the focus is on caribou habitat and the caribou population supported by that habitat.
- Restoration can be conducted at a wide variety of scales; however, restoration should be approached from a landscape perspective to ensure that the work done to restore a site will ensure suitable ecosystem function and interactions with contiguous ecosystems.
- The order of preference for restore on-site measures designed to rectify adverse impacts on caribou components are as follows:
 - **Restore:** Return caribou components to the original or pre-existing structure, composition, pattern, and ecosystem processes, productivity, and services.
 - **Remediate:** Eliminate, limit, correct, or counteract any contamination and/or associated adverse effects of a contaminant on caribou components.
 - **Reclaim:** Ensure stabilization of the terrain and restoration of the functional utility of the ecosystem with regard to caribou habitat and other caribou components.
- Restoration measures should be well-planned and implemented taking a scientific approach.
- Monitoring and evaluation are integral to assessing a restoration project to determine whether the restoration project is achieving what it set out to do. Properly-planned restoration projects attempt to fulfill clearly stated goals that reflect important attributes of the restored ecosystems (see SER Primer, 2004).
- Costs of planning, implementing, and monitoring the restoration measures are the responsibility of the proponent.

4.4.2 Considerations

- Although it is best to replace what was taken away as a result of disturbance, this is not always possible or practicable.
- Consider whether there are restoration techniques for similar ecological systems in similar circumstances. The potential contribution of restoration to mitigation is uncertain in many situations, particularly on heavily impacted project footprints.
- *Restoration targets* represent the point of advancement along the *ecological trajectory* intended for restoration. It is anticipated that the restored ecosystem will emulate the attributes of the reference state (e.g., often current condition, but not necessarily), which drives restoration goals and planning.

- It is usually much more expensive to restore caribou components than it would be to conserve them by avoidance or by minimizing impacts. Where restoration is deemed appropriate, thought should be given early in the project design and planning process to determine what will be needed to achieve restoration targets.
- Guidance may be available in the form of land-use plans and other higher-level plans, park plans, strategic restoration plans, or best management practices. These documents may help to establish whether restoration is suitable, and may provide guidance for establishing restoration targets for the site.
- More specific considerations include the following questions:
 - Are transformer (or ecosystem engineer) species involved in processes necessary to achieve the restoration target, e.g., beavers?
 - How can restoration replace the pre-existing biomass at the site?
 - How can restoration bring back the site productivity?
 - Are there ecological resources adjacent to the damaged site that may contribute to effective restoration? Restoration that is well-planned in advance of work on the project or activity can facilitate this.

For example, during a project construction phase, five hectares are disturbed. After the year when the construction phase is finished, perhaps two hectares can be restored. In that situation, native soil and duff may have been set aside before and during construction. After the construction phase is completed, that soil and duff may be re-distributed over some of the construction site footprint.

- What are the temporal considerations that will affect restoration? Where will the system be along the *ecological trajectory* in 10 years? How will any temporal lag affect the caribou component(s) (i.e., will partial restoration be achieved, or should part or all of the impact be considered for offset)?
- Are there species for which the habitat can be recovered in the short-term? Recovery of habitat for some species (e.g., species suited to late-seral conditions) may take decades to centuries to achieve. Particularly in these situations, consider the temporal effects of climate change, invasive non-native species, and altered successional pathways that may have resulted from past management (e.g., grazing, fire exclusion, timber harvest, and road access).
- Is restoration to a pre-existing or historic condition possible?
- Restoring to a pre-existing or historic ecosystem may not be technically feasible given the impacts of invasive species, changing climate, etc.

4.5 RESIDUAL IMPACTS

Residual impacts are impacts that remain after measures to avoid, minimize, and restore on-site are implemented. Defining residual impacts requires measuring the difference between the predicted condition (after measures to avoid, minimize, and restore on-site) and a starting point (e.g., current condition), or a target end point (e.g., management target). If these differ, then the difference needs to be documented and explained. This identification of residual

impacts is intended to be a calculation based as much as possible on quantifiable data and information about impacts.

The definition of residual impact in this guidance is distinct from some other environmental assessment procedures that define residual impact as the difference between the predicted condition remaining after all measures to mitigate, including offset measures, and the current condition.

4.5.1 Principles

- Transparency as to what residual impacts remain after measures to avoid, minimize, and restore on-site, is important, and needed to inform decisions on offsetting and to ensure that all parties understand the resulting situation with respect to the caribou components.

4.5.2 Considerations

- Residual impacts in the project footprint and area of influence should be clearly identified with respect to individual caribou components.
- It is important to provide the ecological context of the residual impacts. For example, a small residual impact may have a large potential effect on the caribou component. A risk assessment may be appropriate to provide this context.
- To the extent possible, residual impacts should be stated quantitatively.
- Identification of residual impacts should include consideration of both direct and indirect impacts, however because offsets are targeted at direct impacts associated with the project footprint, indirect and direct impacts should be tracked separately.

4.6 MITIGATION HIERARCHY – LEVEL 4: OFFSETS

Offsetting is the last priority in the mitigation hierarchy, and only to be taken only after measures to avoid and minimize impacts, and/or restore on-site the caribou components have been duly considered, and residual impacts requiring offsetting remain to meet government's direction for south Peace northern caribou.

In the context of the Implementation Plan for South Peace Northern Caribou, for impacts that occur within high-elevation winter habitat, two types of offsets are considered: financial and habitat securement. Impacts to caribou from sensory disturbance are not required to be offset nor are indirect impacts occurring off the project footprint. However these indirect impacts outside of the project footprint are expected to be considered during the avoid, minimize and restore-on-site levels of the mitigation hierarchy. In some circumstances additional on-site or off-site offsetting may be proposed by the proponent including actions within low-elevation winter habitat. Where there are mitigation actions that are carried out by the proponent, but results would not be achieved within the timeframe set by government (i.e. neutral or beneficial within 10 years), these may be proposed as additional offset measures. For

additional guidance associated with offsetting, please refer to the Environmental Mitigation Policy and associated Procedures.⁵

The following principles and considerations address both financial (e.g., in-lieu payments) and habitat securement offsetting:

4.6.1 Principles

- “Offset” may be appropriate after all measures to fully avoid, minimize and restore on-site have been duly considered and where residual impacts remain.
- Offsets deliver tangible, measurable on-the-ground conservation outcomes for caribou components.
- Offsetting measures will be designed to obtain the best result for caribou components in the shortest timeframe practicable, considering the effort and resources expended.
- Offsets will deliver conservation outcomes that are *additional* to what otherwise would be achieved through existing natural resource management programs or activities (i.e., maintains or improves the status quo).
- Offsets need to be legally secured for the duration of the offset commitment, which may include authorization conditions.
- All offsetting-related costs are the responsibility of the proponent whose project or activity results in the adverse impact on the caribou components.
- Depending on the circumstance, the proponent or 3rd party may implement the offsetting measures in a manner that best achieves the caribou outcomes for which the funds were negotiated. In all cases the proponent is responsible for all costs of offsetting.
- In-lieu payments must be delivered through a governance model to ensure strategic delivery of offset actions over time to achieve the best conservation outcomes for caribou.
- The offsetting needed to mitigate residual impacts will increase in accordance with the degree of uncertainty of the effectiveness of the offset measures, the risk to the caribou component,⁶ the timeline in which the offset measure will be implemented, or any combination of those factors (i.e., additional offsets or a multiplying factor may be applied).
- Impacts to caribou from sensory disturbance are not required to be offset nor are indirect impacts occurring off the project footprint.
- The residual impact and proposed offset measure should use the same unit of measure, e.g., how many hectares of residual impact and offset.

4.6.2 Considerations

- Selection of offsetting measures should first consider like-for-like and on-site or in-proximity offsetting.
- Implementation of offsets should minimize the time-lag between the occurrence of the impact on the caribou components and the delivery of the offset measures.

⁵ <http://www.env.gov.bc.ca/emop/>

⁶ For a suggested approach to risk assessment refer to section 2(d) of Part 3 of this document.

- Off-site offsetting (e.g. restoration activities off-site such as habitat enhancement) may recruit potential habitat in a shorter timeframe than on-site offsetting or restoration.
- In determining whether the proponent will carry out the offsetting or provide a financial offset (i.e., in-lieu payment), consideration should be given to whether the party responsible for offsetting will have:
 - legal authority to implement the offsetting measure;
 - the capability to see the offsetting measures through to the “end”, the point at which conservation outcomes expected for which the offset was intended will be achieved;
 - the ability to support effective management and monitoring of the footprint and area of influence for the duration of the offset, and monitoring to determine effectiveness of the offsetting measures.
- Where multipliers are being considered in offsetting, to account for risk and uncertainty, the multiplier chosen should be supported by a rationale

4.6.3 Determining the Financial Offset Amount (In-lieu Payments)

The financial offset mechanism applies when it has been determined that proponents cannot themselves carry out the environmental offset measures, but instead will voluntarily provide funds to a third-party who will then implement conservation measures to offset impacts on caribou components. As with all offsets, in-lieu payments are the responsibility of the proponent whose project or activity results in the impacts to caribou components; however, once an agreement is reached and the financial offset is provided to the third party, the proponent’s obligations are met. Examples for calculating financial offsets are provided below, but alternate approaches may be proposed.

The first example is a flat rate, hectare valuation approach. The valuation amounts per hectare are based on habitat suitability rankings and a retrospective analysis of offset amounts calculated for pilot projects. The second example (Table 3) is based on anticipated proportional impacts to high elevation winter habitat and cost estimates for activities related to the Implementation Plan for South Peace Northern Caribou. Where an alternate approach to the two provided is taken for calculating financial offsets, it is expected that the approach will be accompanied by a detailed rationale. For additional guidance associated with offsetting, please refer to the Environmental Mitigation Policy and associated Procedures.⁷

Example 1. Flat Rate Offset Amount Per Hectare

- A. Determine the residual impacts within each of the following suitability ranking and multiply the habitat amounts by the per hectare dollar amounts below.
 - Very High = \$9,000
 - High = \$4,000
- B. In the Babcock-Quintette subgroup area for projects >100ha, telemetry points could be used instead of habitat mapping at \$10,000/winter telemetry point based on the baseline dataset used for the pilot project (contact government for access to this data).

⁷ <http://www.env.gov.bc.ca/emop/>

Example 2: Offset Calculation Based on Proportional Impacts and Anticipated Program Costs

Table 3. Example of an approach to calculate an in-lieu payment to offset impacts.

	Descriptor	Amount	Considerations
1	Estimated annual cost of Implementation Plan for South Peace Northern Caribou (including, but not limited to predator-prey management, herd augmentation, monitoring, research, outreach, etc.)	Fixed dollar amount	Refer to government for best available information.
2	Assumed Annual return of a charitable annual endowment after inflation	3%	Fixed
3	Target Endowment Contribution for Herd Management		(100/Line 2) x Line 1
4	High elevation winter habitat expected to be developed by all activities within the herd habitat. May be used to estimate either in-lieu payment or habitat securement targets or both.	%	Total estimated proportion of area impacted within the caribou habitat where development is proposed (i.e., proposed project plus others). Refer to government herd habitat targets for the herd to which impacts are predicted to occur (e.g., Quintette herd development is expected to be approximately 20% of the high elevation winter habitat)
5	Proportion of estimated high elevation winter habitat to be developed under the proposed Project	%	Project specific impacts. Can use either hectares or proportion of telemetry locations impacted. Include rationale for approach.
6	Proposed Project “share” of estimated proportion of high elevation winter habitat expected to be developed (e.g., of the amount provided in line 1 is a result of the proposed project if approved).		Line 5/Line 4
7	Proportion of financial offsetting for proposed project	\$	Line 3 x Line 6
8	Additional start up costs if appropriate		Refer to government for best available information.
9	Amount of financial offsetting before uncertainty		Line 7 + Line 8
10	Uncertainty multiplier	1.5	Minimum. Provide rationale.
11	Amount of financial offsetting		Line 9 x Line 10

4.6.4 Habitat Securement - only applies to High Elevation Winter Habitat

The requirement to consider habitat securement only applies to activities occurring in high elevation winter habitat, within herd ranges where habitat securement targets have not been met, and for projects where the project footprint exceeds 25 hectares. However, habitat securement options may be considered for any potential impacts. Habitat securement options may include voluntarily relinquishing existing tenures or portions of tenures from disposition, acquiring additional tenures from another party to be subsequently relinquished, or legally ensuring that surface disturbance will not occur within the tenure or portion of the tenure held by the proponent (e.g., conditions of an authorization). Land acquisition, land leases and rezoning and transfer of development rights are not topics that will be covered in this guidance. For specific guidance on these or other mechanisms, please refer to the Environmental Mitigation Policy and Procedures.

The purpose of habitat securement is to secure capable and/or suitable habitat for the caribou components that would otherwise be threatened by activities outside the footprint of the proposed development project or activity.

The following steps are provided as an example for how to calculate habitat securement amounts.

1. Identify areas where it is possible to voluntarily relinquish tenure (or portions of), acquire tenures to subsequently relinquish, or place legal constraints over existing tenures to ensure that surface disturbance will not occur within the tenure or portion of the tenure held by the proponent. For off-site securement options, the areas should be like, or nearly like, the areas impacted in terms of structure and function (i.e., like-for-like) at both the stand and landscape scale (e.g., patch size, connectivity, linear feature development).
2. Document any deviations from like-for-like as well as associated assumptions and describe uncertainties made in determining similarity between area impacted and area being proposed for securement (e.g., may have similar ecological capability that will more likely attain equivalency in the long term).
3. Where possible, prioritize areas for habitat securement within the same herd range. If habitat securement options are proposed outside the same herd range, support should be provided demonstrating that achieving habitat securement targets within that herd range are not compromised.
4. The amount of area identified for securement should consider the overall goals set by government for habitat securement and industrial development that is anticipated (Note: in the Quintette herd area, a ratio of 4 hectares secured to each hectare impacted has been suggested based on the anticipated build out of 20% of high elevation winter habitat for caribou).
5. Where actual securement options cannot be located, for projects with small project footprints (less than 25 ha), or within herd range areas where habitat securement targets are met, an alternative approach is to conduct a valuation of the cost of a hypothetical securement (based on recent transactions or tenure values). That valuation amount may then be voluntarily offered as an in-lieu payment to a third

party for administration. Proponents can consider that previous examples have used \$5,000 as a default amount for each hectare developed (\$1,250 for each hectare to be secured) based on valuations conducted to date.

4.6.5 Additional On-site or Off-site Mitigation Measures

The proponent may propose activities which they commit to implement that may reasonably mitigate impacts, but results cannot be achieved within the timeframe set by direction given by government for management of caribou in the south Peace region (i.e., predicted outcomes will be achieved in some time frame longer than 10 years). These actions may be considered offsets. For additional guidance refer to the Environmental Mitigation Policy and Procedures.⁸

5.0 Monitoring and Reporting

The purpose of monitoring is to ensure that mitigation measures are implemented as planned, and are effective at meeting the intended principle of neutral or beneficial to caribou components over 10 years.

5.1 Principles

- The proponent is responsible for carrying out the relevant monitoring, or alternatively and where appropriate, for providing funds for another party to carry out monitoring.
- Planning for monitoring needs to be done early, ideally during project-scoping, and revised as needed as the project plan develops.
- The type and scope of monitoring will be commensurate with the uncertainty of the proposed mitigation measures and the resulting risk⁹ to caribou components; i.e., the greater the uncertainty associated with a mitigation measure, the greater the need to monitor the implementation and/or effectiveness of the measure.
- Monitoring data will be reported and shared with the Province.
- Monitoring objectives and commitments need to be established prior to finalization of the mitigation plan.
- Any monitoring will involve the appropriate qualified professional(s).
- Monitoring results should be used to improve the approach to mitigation for the current project activity or development, if appropriate, and future mitigation opportunities.

5.2 Considerations

- Monitoring of implementation and effectiveness of mitigation measures should utilize a before/after control study design.
- Where possible, indicators and associated monitoring protocols should align with indicators and protocols developed for and utilized as part of other initiatives, e.g., Cumulative Effects Assessment, Forest and Range Evaluation Program (FREP).
- Data and learning from project monitoring should benefit monitoring procedures for environmental values and components generally.
- Data should be submitted and stored so that they are available for future monitoring.
- Modelling should be considered part of the monitoring suite of tools.

⁸Website for the Environmental Mitigation Policy: <http://www.env.gov.bc.ca/emop/>

⁹For a potential approach to risk assessment, refer to section 2(d), below in Part 3 of this document.

- Consider prioritizing monitoring based on an assessment of the likelihood of the effectiveness of proposed mitigation and the severity of the impact on the caribou component.

Table 4. The level of expected impact and uncertainty of mitigation should be considered when determining the type of monitoring to conduct.

Decision Matrix for How to Monitor			
<i>Uncertainty of effectiveness of proposed mitigation</i>	<i>Impact</i>		
	High	Moderate	Low
High	Effectiveness Monitoring	Effectiveness Monitoring	Implementation Monitoring
Medium	Effectiveness Monitoring	Implementation Monitoring	Implementation Monitoring
Low	Implementation Monitoring	Implementation Monitoring	Implementation Monitoring

- For implementation monitoring, the monitoring plan should:
 - Identify the obligations resulting from the mitigation plan;
 - The scope and frequency of monitoring required to assess implementation;
 - The data collection and analysis methods to be used (using standard protocols, where available);
 - The reporting structure.
- For effectiveness monitoring, the monitoring plan should include the following information:
 - *Purpose and Objectives*
 - Describe objectives and purpose of mitigation activities.
 - Specify management objectives
 - *Monitoring Questions*
 - Clearly communicate key monitoring questions (e.g., are you interested in changes over time, or comparison among groups, or treatment categories?)
 - *Indicators (for Caribou Components)*
 - If not already completed within a standard monitoring protocol, select indicators and provide a description and rationale for each indicator. The rationale includes a discussion of important relationships and how the selected indicator demonstrates whether objectives have been achieved. Include supporting literature.

- *Methods*
 - Use standard monitoring protocols where available. Where not available, describe field procedures in detail or refer to a more detailed protocol if it exists.
- *Sampling Design and Analysis*
 - Describe sampling design and define population of interest (target population).
 - Describe and justify sampling unit (size/shape), how sampling units will be distributed (e.g., define any strata), and positioned (e.g., simple random sample, systematic, multi-stage), and whether sampling sites are permanent or temporary, or some combination.
 - Describe how many and when samples will be collected.
 - Describe potential sources of detection or measurement error and actions taken to prevent them.
 - Describe how data are intended to be analyzed.
- *Results*
 - Report findings.

PART THREE: TEMPLATE FOR A CARIBOU MITIGATION AND MONITORING PLAN

6.0 Table of Contents for a Caribou Mitigation and Monitoring Plan

1. Overview
 - a. Regulatory Context
 - b. Project Description
 - c. Boundaries of Assessment Area
 - d. Caribou Components
 - e. Potential Impacts
2. Mitigation Hierarchy
 - a. Avoid
 - b. Minimize
 - c. Restore On-Site
 - d. Residual Impacts and Characterization
3. Offsetting
 - a. Financial Offset
 - b. Habitat Securement
 - c. Additional On-Site or Offsite Offsetting Measures
4. Mitigation Commitment
5. Effectiveness Monitoring and Reporting
6. Non-proponent Actions
7. Conclusion

6.1 Detailed Content for Caribou Mitigation and Monitoring Plan

1. OVERVIEW

a. Regulatory Context

Provide the regulatory context of this mitigation and monitoring plan, what the requirements and expectations for the plan are, and what the plan will address.

b. Project Description

Provide a description of the project, including the following:

- i. Background of Project. Provide a general description of the project, previous activities at the site, and authorizations to date.
- ii. Project Elements. Provide a description of the high-level elements of the project (e.g. open pits, roads, transmission lines, water management structures, conveyors, support facilities, processing plants, tailings) to provide context for the mitigation plan.

c. Boundaries of the Assessment Area

Identify the boundaries of the assessment area (i.e., project footprint and area of influence) based on the proposed project or activity. The assessment area should consider: (1) the provincial and regional physiographical context of the project; (2) the anticipated scope of impact of the proposed activity; (3) the geographic scale of influence of the proposed activity; and, (4) the ecological processes affecting the component. The assessment area may vary for different components at each the local, subregional, or regional scale and not all scales are necessarily relevant to each impact. The rationale supporting the description of the assessment area, including any definitions for or deviations from the area of influence, may be described here or as a part of the potential impact (see below in section e).

d. Caribou Components

Provide an assessment of caribou components, including the following:

- i. Caribou component. Identify caribou components (see Table 1).
- ii. Indicator. The metric used to measure and report on the condition and trend of the caribou component (see Table 1).
- iii. Current Condition. The current condition is a key variable that is used to assess the outcomes of the mitigation plan. Assess the current condition of each component, at the appropriate scale, using consistent information and methodologies to measure the indicators. Current condition, assumptions, uncertainties, and any comments should be documented.
- iv. Data and Information. At each step in the impact assessment analysis, and in the development of a mitigation plan, document data and information sources, associated assumptions and uncertainties. Submit data and reports for new data and information collected by the proponent to the appropriate information

management system. Submit data and information using the appropriate forms and procedures where these are available. If deviating from provincially-accepted standards, a rationale supporting professional judgement should be made available at the time the application is submitted.

e. Potential Impacts

- i. Impact Description. Identify the impacts associated with the proposed activity within the footprint and area of influence (i.e., forest clearing, linear development, drilling, water extraction, etc.). Indicate the project phase that the potential impact is occurring (e.g., pre-construction; construction; operations; and post-closure) and general project timelines. This should include both direct (caused by the impact in the same space and time period) and indirect impacts (caused as a consequence of the impact in either the same, or another, space or period of time).
- ii. Project Impacts. Describe the potential impact on the caribou components using the same indicators that were used to describe current condition. The predicted change that the project will have on the components, as measured by the indicators. e.g., habitat disturbance; increased mortality and expected causes of this mortality. This impact description is the impact prior to implementation of mitigation measures other than those impacts that have already been avoided in the initial project design.
- iii. Impact Boundary. Describe the spatial extent and temporal aspect of each impact. The impact boundary is the footprint and area of influence of the proposed project or activity and should take into consideration the appropriate scale given the caribou component. Impact boundaries may, therefore, be described at different scales dependent on the type of impact and the component being affected. .
- iv. Rationale. If applicable, provide a rationale for why there is no impact to the caribou component.
- v. Data and Information. Capture the sources of data and information for the quantification and characterization of the project impacts.
- vi. Assumptions. Capture the assumptions made in order to quantify the project impacts on caribou components (e.g. mine build-out rate, disturbance buffers, any existing activities that are not included in the assessment).

2. MITIGATION

a. Avoid

- i. Proposed Proponent Mitigation for Avoid. Determine the specific strategies and actions (mitigation measures) that will be used to avoid impacts to caribou components on the footprint and area of influence procedures to avoid impacts.
- ii. Results and Discussion. Describe the science that supports the effectiveness of the types of mitigation measures being proposed and the validity and reliability of that science. Describe any potential barriers to the mitigation actions being implemented including logistical uncertainty.
- iii. Rationale. Provide a rationale for moving from Avoid to Minimize, and from Minimize to Restore On-Site.

b. Minimize

- i. Proposed Proponent Mitigation for Minimize. Determine the specific strategies and actions (mitigation measures) that will be used to minimize impacts to caribou components on the footprint and area of influence procedures to minimize impacts.
- ii. Results and Discussion. Describe the science that supports the effectiveness of the types of mitigation measures being proposed and the validity and reliability of that science. Describe any potential barriers to the mitigation actions being implemented including logistical uncertainty.
- iii. Rationale. Provide a rationale for moving from Minimize to Restore On-Site.

c. Restore On-Site

- i. Proposed Proponent Mitigation for Restore On-site. Determine the specific strategies and actions (mitigation measures) that will be used to restore the impacted caribou components on the footprint area. The description will include reference to the end condition that is being planned relevant to the current condition and the length of time it is expected to achieve that target.
- ii. Results and Discussion. Describe the science that supports the effectiveness of the types of mitigation measures being proposed and the validity and reliability of that science. Describe any potential barriers to the mitigation actions being implemented including logistical uncertainty.

d. Residual Impacts and Characterization

- i. Residual impacts after avoid, minimize, and restore on-site. Identify the residual impacts that are expected to remain after the proposed implementation of mitigation measures to, avoid, minimize, or restore on-site impacts to caribou components are considered. This should include both direct and indirect impacts, but to facilitate potential offsetting calculations these should be tracked separately.
- ii. Residual Impact Characteristics. The characterization of the residual may be used to describe the consequence of the impact and its probability of occurrence, which may be considered risk to the caribou component. The following guidance may be used:
 - a. Context: The specific ecological setting that the caribou component is assessed within (e.g., critical component for life history requirement or common and not limited).
 - b. Magnitude. Describe the assessed severity of the residual impact(s). This description can be categorical / qualitative or quantitative.
 - c. Duration. Describe the duration of the residual impact(s), i.e., the anticipated length of time of the impact, on the environmental component.
 - The number of years considered to describe duration should be biologically relevant with respect to the environmental component (e.g., life history, regeneration time, etc.)
 - d. Frequency. Indicate how often the residual impact(s) will occur.
 - Check the relevant column in the Table: single event; occasional or seasonal; regular (recurring); continuous.

- e. Reversibility. Indicate the degree of permanence of the residual impact.
 - Check: Reversible or irreversible.
- f. Consequence. Describe the end result or outcome with regard to the environmental component, based on considering and understanding the combined effects of magnitude, duration, frequency, and reversibility. If there are multiple impacts on an environmental component, these should be indicated in a summation row that describes a total consequence. A rationale to support the assessment of consequence should be completed.
- g. Likelihood/Probability of Occurrence. Describe the likelihood that the impact on the environmental component will occur. This description can be categorical/qualitative or quantitative.
- h. Risk after avoid, minimize, and restore on-site. Determine and describe the risk to the environmental component based on consideration of the likelihood and consequence of the impact(s) and the influence of the residual impact on the environmental component. The description should include reference to established standards, guidelines, or government objectives. The significance of the residual impact and risk should be described, quantitatively or qualitatively, and should be supported by a rationale based on the judgement of a qualified professional.

3. OFFSETTING

Identify the residual impacts in high elevation habitat that are proposed to be offset to meet government's direction for south Peace northern caribou (i.e. neutral or beneficial within 10 years). Note: Impacts to caribou from sensory disturbance are not required to be offset nor are indirect impacts occurring off the project footprint. However indirect impacts be used to inform the use of multipliers in offsetting when accounting for risk and uncertainty.

This should include the rationale for moving to offset in the mitigation hierarchy.

a. Financial Offset

Specify and describe any commitments to financial offsetting that are being proposed in-lieu of carrying out the mitigation action necessary to address the residual impact. Provide details around how the amount of financial offsetting was determined. Refer to Table 3 for an example of one approach to complete this assessment.

b. Habitat Securement

Specify and describe the habitat securement measures and commitments being proposed to address residual impacts. Describe how the amount, quality and location of habitat securement were determined. Where actual habitat is not being secured, but rather an in-lieu payment is being provided to a third party, identify how this in-lieu payment was determined.

c. Additional On-Site or Offsite Offsetting Measures

Where applicable, describe any additional on-site or offsite offsetting measures that are being proposed to address the residual impacts identified.

4. MITIGATION COMMITMENT

a. Mitigation commitment

Specify the expected condition of the caribou component within the footprint and area of influence after all mitigation measures (avoid, minimize, restore on-site, and offset, combined) are completed and what forms the commitment of the proponent as part of their application.

5. EFFECTIVENESS MONITORING AND REPORTING

a. Effectiveness monitoring and reporting

Specify what monitoring will be used, and by whom, to determine the net effect of the mitigation measures. Is a contingency plan in place for the application of alternative mitigation measures if it is found that the mitigation measures are not having the expected and desired effect?

6. NON-PROPONENT ACTIONS

Non-proponent actions are mitigation actions that may be used to reduce residual impacts, but where the proponent is not taking direct responsibility either by funding or implementation (e.g., Provincial management, research initiatives). These types of actions may be described here, but are not to be included in any calculation of residual impact or documented as the proponent's mitigation measures. These actions are separate from any lists of proposed offset measures for which a proponent provides in-lieu payments.

7. CONCLUSION

Provide the overall implications of the development activities and the proposed mitigation on Caribou components based on the analysis done in the Caribou Mitigation and Reporting Plan.