

Memo

To: **Suzanne Dooley, CPAWS NL** File no: **2058**
Simone Cominelli, CPAWS NL

From: Brian Kopach (<email address removed>) cc: Abbie Stewart
Tel: <personal information removed>

Date: **December 18, 2020**

Subject: Review of the Woodland Caribou Assessment in the Valentine Gold Mine Environmental Impact Statement

Executive Summary

Key findings of the caribou assessment review include:

- Quantitative analysis of caribou habitat preferences, connectivity, and fragmentation are currently missing from the assessment. This information would further our understanding of predicted impacts of the proposed project, such as potentially severing the migration corridor for the Buchans caribou herd.
- Impacts of indirect habitat loss are underestimated because the size of the LAA is defined using a buffer around the development that is smaller than observed response distances of caribou to industrial developments in the region and across Canada.
- There is a lack of detail provided on the follow-up and monitoring plans. No monitoring targets or triggers for management action are identified and there is a lack of peer-reviewed literature or monitoring reports from other similar projects used to demonstrate proposed mitigation effectiveness.
- The amount of landscape disturbance is not quantified in the cumulative effects assessment making it difficult to know how close regional caribou herd ranges are to the 65% undisturbed habitat threshold identified in the woodland caribou recovery strategy (Environment Canada, 2012).

1.0 Introduction

Management and Solutions in Environmental Science (MSES) was retained by the Canadian Parks and Wilderness Society – Newfoundland and Labrador (CPAWS NL) Chapter to provide a technical review of the Caribou assessment completed for the Valentine Gold Project (the Project) Environmental Impact Statement (Valentine Gold EIS; Stantec 2020a). The purpose of this review memo is to identify questions about, or gaps in, the caribou assessment for the Project. MSES focuses their reviews on the scientific rigor underlying the analysis of baseline conditions, impact predictions and mitigation proposals put forward in an EIS.

1.1 Project Background

Marathon Gold Corporation (Marathon) is proposing to construct and operate an open pit gold mine near Valentine Lake, southwest of Millertown, on the Island of Newfoundland. Construction is expected to take 16 to 20 months, while operations will occur 24 hours per day, seven days per week, for an estimated 12 years. Project components associated with mining, milling and processing activities include the development of two pits (i.e., the Marathon pit and the Leprechaun pit) and their associated waste rock piles (Figure 1), a Tailings Management Facility (TMF), the construction and maintenance of haul roads, site wide stormwater and effluent management, fuel stations and storage, mine and plant workshops, administrative offices, personnel accommodations, and associated infrastructure including a power line to Newfoundland Hydro’s Star Lake Generating Station.

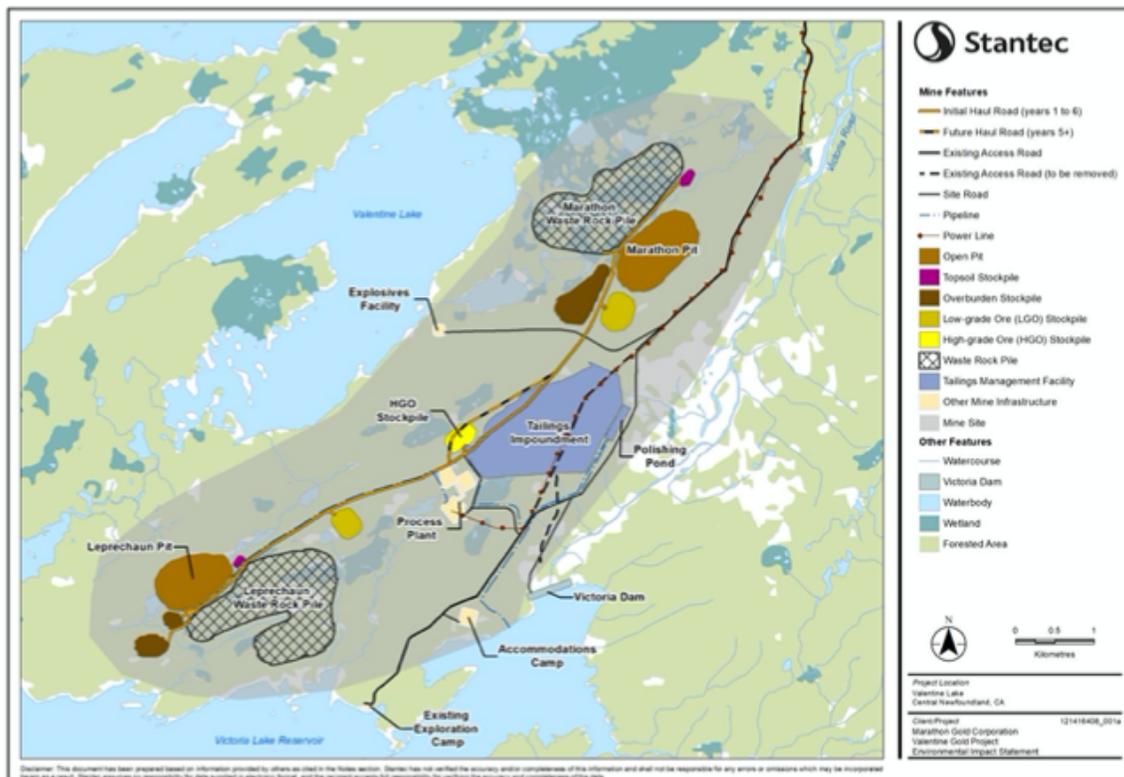


Figure 1 Proposed Mine Site (Stantec, 2020a, Figure I-2, pg. I.6)

When mining is completed, decommissioning activities will remove much of the Project infrastructure, but the mining pits, waste rock piles and TMF will remain as features on the closure landscape. The open pits will be filled with surface runoff and water drawn from Valentine Lake and Victoria Lake Reservoir, waste rock piles will be progressively reclaimed (i.e., reclamation will start during operations) which will include sloping, benching and placing overburden / organic materials to facilitate revegetation. The TMF will also be progressively reclaimed but will remain in some form on the landscape into the closure period.

1.2 Review Approach & Structure

This memo presents a technical review of the Caribou assessment in the Project EIS. The review focused on Chapter 11 of the EIS (Stantec, 2020a), and associated Woodland Caribou Baseline Studies (Stantec, 2020b). The technical review was completed by Dr. Brian Kopach of MSES (See Appendix A – CV). Dr. Kopach has reviewed wildlife assessments for industrial development projects across Canada for a range of Indigenous groups and stakeholders. This memo includes a general comments section which provides an overview of the key issues or gaps identified during the technical review and a specific comments section where individual issues are raised and supported by comments to provide context for a particular question or recommendation. The text in *italics* features quotes from the EIS. Quotes from other sources are provided within quotations but are not italicized. The text **in bold** features comments, requests or questions directed to the proponent that are related to gaps in the information presented in the EIS.

2.0 Valentine Gold Caribou Assessment Technical Review

2.1 General Comments

While the caribou assessment for the Valentine Gold Project EIS utilizes recent data on caribou herd ecology in the region to determine impact magnitude and significance, there are gaps in the analyses provided in the EIS that could inform impact significance predictions and the development of follow-up and monitoring programs. Project-specific data was gathered on caribou use of some of the movement pathways through the Project Area, but much of the analyses in the caribou assessment were based on data gathered primarily by the province of Newfoundland and Labrador which conducts a wide-ranging caribou research program on the Island of Newfoundland. As a result, the available data, as presented in the EIS, is sufficient to identify impact pathways for caribou in the region, but gaps remain that raise questions about the magnitude of potential impacts. Previous research has demonstrated the precarious state of caribou on the Island, where population declines have only recently begun to slow down after declining rapidly from the mid-1990s to mid-2000s (Weir et al., 2014). The main hypotheses explaining the decline are that while:

“predation is the main proximate factor influencing calf survival, limited forage conditions (as a result of competition, degradation, or phenology) ultimately may have predisposed calves to higher predation rates because of smaller sizes at birth and a lower ability to escape predators ... or adult nutritional stress may have resulted in reduced maternal care and defence.” (Weir et al., 2014, pg. 27)

This demonstrates the complex set of interactions that are driving the density dependent response of Island caribou herds to changes in foraging conditions. The proposed project is likely to sever the main

migratory corridor for the Buchans herd, but is missing an assessment of the habitat quantity, quality and connectivity in areas likely to be used as alternative migration corridors, if the Project proceeds. While the EIS acknowledges the significance of this potential impact, there is a lack of further analysis on the habitat quality of alternative movement routes to fully understand how forcing changes on caribou movement will impact herd fitness. Addressing questions about the habitat quality, quantity and connectivity along potential alternative migration corridors would inform our understanding of the consequences of the proposed Project for the Buchans herd.

There is a lack of quantification of information in key areas that are necessary to inform the development of follow-up and monitoring plans. For example, the amount of landscape disturbance in the region is not measured as a part of the cumulative effects analysis even though it is used in the woodland caribou recovery strategy as a metric for landscape disturbance and population sustainability (Environment Canada, 2012). This information is necessary to understand the magnitude and trajectory of cumulative effects and their potential impact on population sustainability. Further, added quantification would contribute to the definition of monitoring targets to test impact predictions and mitigation effectiveness. It would also allow for the definition of triggers for adaptive management action.

2.2 Specific Comments

2.2.1 Adequacy of the Baseline Data

Issue 1: Impacts to Caribou Movement and Alternative Movement Routes

Reference: Valentine Gold EIS, Section 11.5.2.2 & Figures 11-12 & 11-13, Table 11-4

Comments: The EIS does a reasonable job qualitatively discussing the potential impacts of the Project on caribou movement, particularly for the Buchans herd as the Project has the potential to sever its primary migratory pathway. However, the quantitative analysis of current movement routes is limited, and no predictions are made about where caribou pathways may occur if the Project proceeds. The quantitative analysis in the EIS focuses on identifying the preferred migratory path for the herd based on current use (e.g., 55.1% of collared caribou use the spring migratory corridor identified in Figure 11-12, pg. 11.32), and then calculating the proportion of the entire migratory corridor that overlaps with the Project Area.

While the EIS acknowledges the significant, long-term impact the Project will have on caribou movement, there is only a qualitative discussion of landcover, or other environmental features (e.g., slope or elevation), preferred by caribou. No quantitative assessment of habitat preferences, and no figures are provided in the EIS that show the spatial configuration of preferred habitats during migration. Further, no information is provided on the habitat quality of potential alternative movement routes. This information could serve as the basis of a movement analysis to predict alternative movement routes and ultimately to estimate changes in energetic costs based on distance travelled to fully understand the potential impacts of the Project on the Buchans herd. Caribou on the Island of Newfoundland already traverse a narrow ecological pathway to acquire the resources required to grow their populations. Any upset to the ecological balance could initiate further population declines. Understanding the energetic costs of

potentially significantly longer or abbreviated migrations is an important factor in fully understanding the impacts of the proposed Project.

A better understanding of the relationship between caribou and their habitat would also inform reclamation planning. For example, a quantitative analysis of the caribou-habitat relationship which included not only landcover characteristics, but also additional variables which described habitat structure, such as slope or elevation, could inform the reclamation of the waste rock piles, where re-sloping will be necessary.

Requests/Recommendations:

- a) **Please provide a quantitative analysis of caribou habitat preferences during each season.**
- b) **Please identify alternative migratory corridors based on habitat requirements and assuming a Zone of Influence (ZOI) around the Project Area at different distances based on similar developments, as identified in Table 11-14, pg. 11.56, to inform predictions.**
- c) **How much farther are caribou expected to travel as they migrate around the Project Area?**

Issue 2: Habitat Fragmentation Not Quantified

Reference: Valentine Gold EIS, Section 11.5.2.2

Comments: Habitat fragmentation is described qualitatively and focuses primarily on the impact of the access road. How the Project footprint, including the road, will fragment caribou habitat in different seasons is not quantified. The EIS notes the importance of interconnected habitats to caribou but provides no meaningful analysis of habitat fragmentation at baseline, or during operations, if the proposed project is approved.

Requests/Recommendations:

- a) **Please provide an analysis of caribou habitat connectivity in the Regional Assessment Area (RAA), with and without the Project.**
- b) **Please conduct a quantitative caribou habitat fragmentation analysis, including an analysis of habitat patch size, number, distribution and connectivity.**

Issue 3: Placement of Wildlife Cameras in Project Area

Reference: Baseline Studies 2 Woodland Caribou, Figure 3-2, pg. 7

Comments: The baseline wildlife camera program was focused on estimating the timing of caribou movement through the mine site. The cameras were placed along identified caribou migration routes. Routes were identified using remote sensing data to identify game trails, and caribou sign (e.g. pellets, sheds) identified in the field. As a result, all 12 cameras deployed to examine migration timing were located in the northern half of the study area. However, game trails were identified in the southern half of the Project Area, but no cameras were placed in this area. Presumably, no caribou signs were observed in the field to confirm caribou use the other game trails across the site, but telemetry data (Valentine Gold EIS,

Figures 11-13 & 11-14) shows that caribou do move across the southern half of the Project Area. Even if no caribou sign was observed in the field to confirm use, it is unclear why all the cameras were only placed in the northern half of the Project Area. At a minimum, cameras placed in the southern half of the Project Area could at least confirm that no, or very little use, by caribou occurs.

Requests/Recommendations:

- a) **Please discuss relative use by caribou of different migration pathways across the Project Area. The population-level migration corridor accounts for ~50-60% of collared caribou, where does the other 40-50% of the herd migrate?**

2.2.2 Methods and Quantitative Analysis

Issue 4: Local Assessment Area Definition

Reference: Valentine Gold EIS, Section 11.1.3.1, pg. 11.4, Table 11-14, pg. 11.56

Comments: The EIS states that the Local Assessment Area (LAA) “includes a 1 km buffer surrounding the mine site and a 500 m buffer surrounding the access road (Figure 11-1). The LAA was established to reflect the area within which caribou-specific Project effects are most likely to occur, including indirect habitat loss due to sensory disturbance (i.e., displacement or avoidance) (e.g., Benítez-López et al. 2010).” (pg. 11.4) The article cited by the proponent to justify their selection of 1 km and 500 m buffers is a meta-analysis of previous studies that “[r]eported effects for most ... mammal populations up to about 5 km”. (Benítez-López et al. 2010, pg. 1314) That same article also found an average “decline in species abundance of 28-36% and 25-38% for birds and mammals within 2.6 km and 17 km from infrastructure, respectively.” (Benítez-López et al. 2010, pg. 1312) Both of these results indicate a potential ‘zone of influence’ (ZOI) around industrial infrastructure that is larger than the buffer used to define the LAA in the EIS. While the findings of the Benítez-López et al. (2010) meta-analysis are not specific to caribou and response to industrial development obviously varies by taxa and habitat type, it is unclear why information on the response of caribou more specific to the region or type of development was not used to define the LAA.

Requests/Recommendations:

- a) **Please discuss how the findings of Benítez-López et al. (2010) justify the selection of 1 km and 500 m buffers around project-related infrastructure to define the LAA for the caribou assessment.**
- b) **Please discuss how studies focused on caribou responses to anthropogenic structures (e.g., Table 11.14, pg. 11.56) were incorporated in the definition of the LAA.**

Issue 5: Assessment of Indirect Changes in Habitat

Reference: Valentine Gold EIS, Section 11.3.5.2, pg. 11.48, Section 20.8.4.1, pg. 20.63

Comments: The EIS states that:

“[i]ndirect effects on habitat were measured based on the estimated area of potential sensory disturbance, primarily from sound and light emissions. The sensory disturbance zone [or Zone of

*Influence] defines the area over which the effects of a disturbance are assumed to reduce the effectiveness of the adjacent caribou habitat due to avoidance or underutilization. For this assessment, a sensory disturbance zone of 500 m was applied around the outer extent of the Project Area where vegetation will not be removed. The use of a 500 m buffer for caribou is aligned with the federal Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada (Environment Canada 2011), which applies a 500 m zone to anthropogenic disturbances to determine overall disturbed caribou habitat.” (pg. 11.48)*

Alternatively, as part of the cumulative effects analysis, the EIS states that “[a]nthropogenic disturbances (sensory disturbance) are generally avoided by caribou. Caribou have been documented to reduce use of areas within 2 to 11 km from mines” (Section 20.8.4.1, pg. 20.63). Given the documented response of caribou to mines across Canada, the choice of 500 m buffer does not appear to be reflective of the indirect effects of a mine on the distribution and abundance of caribou. As a result of the smaller ZOI used in the EIS, the potential impacts of indirect effects are likely underestimated. Currently, the EIS predicts low magnitude impacts of habitat loss, but if a larger ZOI (i.e., buffer) around the Project Area was used, the magnitude of predicted impacts due to habitat loss could be of moderate or higher magnitude.

Requests/Recommendations:

- a) **Please provide estimates of indirect habitat loss based on previously observed zones of influence around mining projects in Canada and Newfoundland and Labrador.**
- b) **Please discuss how adjusting the ZOI and revising estimates of indirect habitat loss potentially changes predictions of impact magnitude.**

2.2.3 Monitoring Residual Impacts

Issue 6: Lack of Details on Follow-up and Monitoring

Reference: Valentine Gold EIS, Section 11.9, pg. 11.76, Section 11.4, pg. 11.49

Comments: The information provided in the EIS outlines Marathon’s commitment to working with regulators, Indigenous groups and stakeholders to develop a robust monitoring program, and that they are currently engaging with the provincial government on baseline and adaptive monitoring programs. The EIS states that some of the follow-up and monitoring activities are likely to include:

- “Deployment of telemetry collars on Buchans caribou and resident (Grey River) caribou in the ZOI
- Assessment of the effects of the Project on migration to identify changes in patterns of migration (e.g., timing, duration, location, stop-overs)
- Monitoring of effects on resident caribou within the ZOI during construction and operation
- Aerial post-calving surveys of the Buchans herd and resident caribou within the ZOI
- Continuation of remote camera deployment and analysis of migration in spring and fall” (pg. 11.76)

These activities are primarily focused on testing impact predictions. No details are provided in the EIS on how mitigation effectiveness will be examined. The EIS states that “[p]roject planning and design, and **the application of proven mitigation measures**, will be used to reduce adverse effects on habitat movement and mortality risk for caribou.” (Section 11.4, pg. 11.49, **emphasis added**) No evidence is provided to ‘prove’ any of the proposed mitigation measures are effective.

Further, the lack of a draft follow-up and monitoring plan makes it difficult to clearly understand what monitoring targets or triggers for management action will be employed in the future.

Requests/Recommendations:

- a) **Please provide evidence from peer-reviewed literature, or monitoring reports from other developments that ‘prove’ the proposed mitigations will be effective.**
- b) **Please identify monitoring targets that will be used to confirm mitigation effectiveness and triggers for invoking adaptive management action.**

2.2.4 Additional Comments

Issue 7: Landscape Disturbance Not Quantified in Cumulative Effects Analysis

Reference: Valentine Gold EIS, Section 20.8

Comments: The cumulative effects analysis provided in the EIS is almost entirely a qualitative discussion of past, current and future effects on caribou. No quantitative analysis of total landscape disturbance levels is provided; only a qualitative description of the different projects that exist or are proposed in the Regional Assessment Area (RAA) is provided. The woodland caribou recovery strategy establishes a threshold, of 65% undisturbed habitat in a range, that is meant to provide a measurable probability (i.e., 60%) for a local population to continue to be self-sustaining (Environment Canada, 2012). We were unable to locate this information in the cumulative effects analysis for the caribou herds potentially impacted by the Project. This information is important to guide decision making around caribou conservation and management, and would be informative to regulators, Indigenous groups, and other stakeholders trying to manage cumulative effects on caribou in the region, which by its nature is a multi-stakeholder task.

Requests/Recommendations:

- a) **Please complete a landscape disturbance analysis that quantifies the existing, and proposed future, levels of linear and non-linear anthropogenic disturbance in the RAA. At a minimum, all disturbances should be buffered by 500 m when calculating disturbance levels for each caribou herd range potentially impacted by the Project.**

3.0 Conclusion/Closure

Caribou populations on the island of Newfoundland have been declining for decades. Recent data suggests the population decline has slowed, but remains in a precarious state (Weir et al., 2014). The reasons for the decline are hypothesized to be the result of a complex set of interactions that include competition for forage resources and calf predation rates. It is possible that any impact on caribou energy budgets could worsen the observed population decline. This makes it imperative that existing and future developments are the subject of rigorous, scientifically based assessments. The Valentine Gold EIS benefits from the availability of a wide range of data on caribou to inform the assessment, but gaps in the analysis remain that would inform the predictions about some of the more significant potential impacts such as those on migration pathways of the Buchans caribou herd. Other gaps, such as the lack of a quantitative analysis of

landscape disturbance by caribou range, are necessary to understand the current level of cumulative effects and to inform future regional-scale management efforts. The comments, questions, and recommendations in this memo are aimed at ensuring the analysis and assessment of potential impacts of the Project are scientifically rigorous, and that the testing of impact predictions and assessment of mitigation effectiveness are accounted for in follow-up and monitoring plans.

4.0 References

- Benítez-López, A., Alkemade, R. and P.A. Verweij. 2010. The impacts of roads and other infrastructure on mammal and bird populations: A meta-analysis. *Biological Conservation* 143: 1307-1316.
- Environment Canada. 2012. Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. xi + 138pp.
- Stantec Consulting Limited. 2020a. Valentine Gold Project Environmental Impact Statement: Final Report. Prepared for Marathon Gold Corporation.
- Stantec Consulting Limited. 2020b. Valentine Gold Project Environmental Impact Statement Baseline Study Appendix 2: Woodland Caribou. Prepared for Marathon Gold Corporation. 167 pp.
- Weir, J. N., S. F. Morrison, J. G. Luther, and S. P. Mahoney. 2014. Caribou Data Synthesis – Progress Report #2. Status of the Newfoundland population of woodland caribou. Technical Bulletin No. 008, Sustainable Development and Strategic Science, Government of Newfoundland and Labrador, St. John's, NL.

Appendix A - CV

Brian Kopach, Ph.D.

Spatial & Quantitative Ecology

Overview

Dr. Kopach is a broadly trained ecologist with twenty years of academic research, resource management, and environmental assessment experience in ecosystems across Canada. He has extensive experience designing ecological field studies, and in the collection and analysis of data for both vegetation and wildlife studies. He has led, or assisted with, research and conservation related projects for public and private sector organizations in Canada and the United States, including the Canadian Wildlife Service, the US National Oceanic and Atmospheric Administration, and Ducks Unlimited. Dr. Kopach's research has focused on understanding the determinants of species' distributions at a range of spatial scales. He earned a Master's degree in Biogeography from the University of Victoria (Canada) where his research examined habitat structure and selection in large mammals, and has completed a PhD at the University of Calgary (Canada) examining the ecological and evolutionary consequences of species interactions among alpine plants. Dr. Kopach has reviewed environmental impact assessments for projects across Canada, and provided scientific advisory services to municipal governments, First Nations, as well as provincial and federal regulatory panels. Recently, he has been at the forefront of efforts to utilize Indigenous Knowledge and western scientific data simultaneously to understand the potential impacts of industrial developments and cumulative effects on traditional land and resources (e.g. wood bison, *Bison bison athabascae*), and to support environmental decision-making at the community, regulatory, and governmental levels. Dr. Kopach is a member of the Alberta Oil Sands Monitoring Biodiversity Technical Advisory Committee.

Areas of specialization

Terrestrial ecology, ecological statistics, habitat modelling, connectivity modelling, cumulative effects assessment, environmental assessment/ management/ monitoring, project management, third-party scientific reviews, science communication.

Key Experience

- Designed, managed, and written over 30 multi-disciplinary third-party reviews of provincial and federal Terms of Reference, Environmental Assessments, Approval Conditions, and Follow-up Plans for large energy, mining and infrastructure projects on behalf of Indigenous groups across Canada; reports are written to be accessible, and supported by both scientific and Indigenous knowledge.
- Prepared hearing submissions, presentations, and provided expert witness testimony for regulatory hearings (e.g. Teck Frontier; BC Hydro's Site C Hydroelectric Generation Project; Nova Gas Transmission's North Montney Pipeline Project).
- Conducted technical audits of and revisions to government policies and resource management frameworks in Alberta including the Lower Athabasca Regional Plan (LARP) and Caribou Range Plans on behalf of local Indigenous groups.
- Assessed wildlife management plans and monitoring reports, including Caribou Protection Plans and Imminent Threat Assessments under the Species-at-Risk Act, on behalf of Indigenous communities.
- Assisted with community impact identification, capacity building and authored plain-language written materials and visual media for engagement with Indigenous communities.
- Contributed insight and leverage to clients' legal and negotiating teams by providing credible, defensible, and constructive scientific information.

Key Projects

- *Lead Researcher and Project Manager* (2014 - present) for studies that bring together First Nations traditional knowledge and western scientific information to better understand the quality, quantity and distribution of habitat, and movement corridors for the Ronald Lake bison herd in northeastern Alberta. The purpose of this work was to study potential impacts of a large-scale energy development on the availability and connectivity of habitat for the herd.
- *Environmental and Consultation Advisor* (2013 - present) to the First Nations Independent Technical Review group of the Saulteau First Nations, West Moberly First Nations and McLeod Lake Indian Band. Provided strategic technical support and guidance through all phases of the regulatory process for renewable and non-renewable energy developments in northeastern British Columbia. Led teams of scientists for independent technical reviews, prepared comprehensive Community Impact Assessment reports, identified mitigation and accommodation measures, assisted with consultation and capacity building, participated in negotiations, and developed community-based environmental monitoring programs.
- *Expert Witness Testimony* (2013 - present) preparation of hearing submissions and provision of expert witness testimony for Joint Review Panels, National Energy Board, and Alberta Utility Commission regulatory hearings.
- *Ecology Advisor* to the Wolastoqey Nation in New Brunswick (2017-present). Supported WNNB as they engaged with the Department of Fisheries and Oceans on the development of a Marine Protected Area Network in Atlantic Canada. Prepared a key report utilizing Indigenous Knowledge to identify impacts of the proposed MPA Network on WNNB use of marine resources.
- *Ecology Advisor* to the Lac Ste. Anne Métis for the Pembina Fox Creek to Namao Pipeline Expansion (2015). Supported client through an Alternative Dispute Resolution process with the Alberta Energy Regulator and Pembina.
- *Lead Researcher* for landscape disturbance analysis and land-use planning reports for Indigenous communities in Alberta and British Columbia (2012- present).
- *Conservation Program Management* for the Meewasin Valley Authority. The aim of the program was to obtain easements from local landowners to protect remnant patches of native grassland in a network that follows the South Saskatchewan River through Saskatoon, SK (1999-2000).

Employment Experience

Aug 2012 – present	Management and Solutions in Environmental Science Inc.: Ecologist
Jan 2007 – April 2012	University of Calgary, AB: Teaching Assistant
April – August 2006	Ducks Unlimited: Research Technician
May 2002 – Oct 2003	NOAA Marine Mammal Lab, Seattle, WA, USA: Research Contractor
Sept 2000 – April 2003	University of Victoria, BC: Teaching Assistant
July 1999 – Jan 2000	Meewasin Valley Authority, Saskatoon, SK: Conservation Associate
April – August 1998	Canadian Wildlife Service, Banks Island, NWT: Field Technician

Education

2014	Doctor of Philosophy in Ecology, University of Calgary
2004	M.Sc. in Biogeography, University of Victoria
1999	B.Sc. (Honours) in Physical Geography, University of Saskatchewan

Affiliations

Member Canadian Society for Ecology and Evolution
Member Alberta Chapter of The Wildlife Society

Select Publications and Presentations (*indicates Peer Reviewed)

- *Campbell, M., Kopach, B., Komers, P. and A. Ford. 2020. **Quantifying the impacts of oil sands development on wildlife: perspectives from impact assessments.** *Environmental Reviews* <https://doi.org/10.1139/er-2018-0118>
- Kopach, B. 2020. **Lower Silvertip Wildlife Corridor Study.** Prepared for the Town of Canmore.
- Kopach, B., Ford, A.T. and P.E. Komers. 2018. **Utilizing Athabasca Chipewyan First Nation Traditional Knowledge and western scientific approaches to study habitat availability and connectivity for the Ronald Lake Bison Herd.** Prepared for the Athabasca Chipewyan First Nation.
- Kopach, B. and The Wolastoqey Nation in New Brunswick. 2018. **Utilizing Wolastoqey Knowledge in Marine Protected Area Planning in Atlantic Canada.**
- Kopach, B. and A. Dersch. 2017. **Maliseet Nation of New Brunswick: Energy East Community Impact Assessment** Prepared for the Saulteau and West Moberly First Nations, and the McLeod Lake Indian Band.
- Kopach, B., Ford, A.T. and P.E. Komers. 2016. **Using Indigenous Knowledge of the Mikisew Cree First Nation and Western Science to Estimate Habitat Availability and Population Viability of the Ronald Lake Bison Herd.** Prepared for the Mikisew Cree First Nation.
- Komers, P.E, B. Kopach, S. Hechtenthal, A. Stewart, and N. Modeland. 2016. **Encroaching Ecological Degradation Surrounding Wood Buffalo National Park: External Threats to the Park's UNESCO Outstanding Universal Value.** Prepared for Mikisew Cree First Nation and joint WHC/IUCN Reactive Monitoring mission to WBNP.
- Kopach, B. and J.W. Fox. 2010. **Examining the role of neighbours as agents of selection in alpine plant communities: A case study using *Potentilla diversifolia*.** 5th Annual Canadian Society for Ecology and Evolution Conference. Quebec City, Quebec.
- *Kopach, B. and J.W. Fox. 2009. **Facilitation and natural selection along altitudinal gradients.** British Ecological Society Symposium, Aberdeen, Scotland. *Invited Presentation.*
- Kopach, B. and J.W. Fox. 2009. **Facilitation and phenotypic selection along altitudinal gradients.** Society for the Study of Evolution Annual Meeting. Moscow, Idaho.
- *Kopach, B. and J.W. Fox. 2008. **Facilitation and species' range margins: Can positive-neighbour interactions generate a stable evolutionary range limit?** 93rd Annual Ecological Society of America Conference. Milwaukee, WI.
- *Kopach, B. and Fox, J.W. *In prep.* **Ecological consequences of facilitation for the alpine perennial *Potentilla diversifolia* along elevation gradients.**

Select Co-Authored Reports

Third-Party Technical Reviews of Environmental Assessments

- MSES. 2020. **Technical Review of the Environmental Impact Statement: 3rd Avenue South Land.** Prepared for the Town of Canmore.
- MSES. 2020. **Technical Review of the Environmental Impact Statement: Smith Creek Area Structure Plan.** Prepared for the Town of Canmore.
- MSES. 2020. **Technical Review of the Environmental Impact Statement: Three Sisters Village Area Structure Plan.** Prepared for the Town of Canmore.
- MSES. 2017. **Independent Review of Spectra Energy Transmission (Westcoast) Wyndwood Pipeline Expansion Project Impact Assessment and Proposed Mitigation Measures.** Prepared for the Saulteau First Nations.
- MSES. 2016. **Technical Review of the Energy East Pipeline Project Environmental and Socio-economic Assessment.** Prepared for the Maliseet Nation of New Brunswick.
- MSES. 2016. **Technical Review of the Natural Forces Wind Energy Zonnebeke and Sukunka Project Development Plans.** Prepared for the Saulteau and West Moberly First Nations, and the McLeod Lake Indian Band.
- MSES. 2015. **Technical Review of the Value Creation Inc. TriStar Pilot Project Amendment Application and Landscape Disturbance Analysis.** Prepared for the Chipewyan Prairie Dene First Nation, Mikisew Cree First Nation, and Fort McMurray 468 First Nation.
- MSES. 2015. **Technical Review of the Energy East Pipeline Project Environmental and Socio-economic Assessment.** Prepared for the Maliseet Nation of New Brunswick.
- MSES. 2014. **Technical Review of the Application for the Meikle Wind Energy Project.** Prepared for the Saulteau and West Moberly First Nations, and the McLeod Lake Indian Band.
- MSES. 2014. **Review of the Joint Review Panel Decision Report for the Enbridge Northern Gateway Project.** Prepared for the Saulteau First Nations.
- MSES. 2014. **Review of the Alberta Energy Regulator Application and Environmental Material for the Grand Rapids Pipeline Project.** Prepared for the Athabasca Chipewyan and Mikisew Cree First Nation.
- MSES. 2013. **Technical Review of the Stewart Creek Resort Accommodation Biophysical Impact Assessment.** Prepared for the Town of Canmore.
- MSES. 2013. **Analysis of Changes in Landscape Disturbance near the Proposed AltaLink Transmission Line and Vista Coal Mine Development.** Prepared for the Alexis Nakota Sioux Nation.
- MSES. 2013. **Review and Information Requests for AltaLink Management Ltd.'s Vista Coal Transmission Development Application.** Prepared for the Alexis Nakota Sioux Nation.
- MSES. 2013. **Ungulate Information Gaps: The Keeyask Generation Project.** Prepared for the Manitoba Metis Federation. Cumulative Effects Assessment Reviewer.
- MSES. 2013. **Technical Review of the EIA Report for the Northcliff Resources Ltd. Sisson Project.** Prepared for St. Mary's First Nation, Woodstock First Nation, and the Assembly of First Nations Chiefs of New Brunswick. Wildlife Technical Reviewer.

- MSES. 2013. **Review of the Alberta Energy Regulator Application and Environmental Material for TransCanada Pipelines Limited Northern Courier Project.** Prepared for the Athabasca Chipewyan and Mikisew Cree First Nation.
- MSES. 2013. **Technical Review of the Grizzly Oil Sands Thickwood Thermal Project Application.** Prepared for the Athabasca Chipewyan and Mikisew Cree First Nation. Wildlife and Habitat Technical Reviewer.
- MSES. 2013. **Response Review of Marathon Oil Canada Corporation's Birchwood SAGD Demonstration Project Application.** Prepared for the Athabasca Chipewyan and Mikisew Cree First Nation
- MSES. 2013. **Suncor Energy Operating Inc. Fort Hills Oil Sands Project EPEA Renewal Application Review.** Prepared for the Athabasca Chipewyan and Mikisew Cree First Nation.
- MSES. 2012. **Review of Shell's September 2012 Draft No Net Loss Plan for the Muskeg River Mine Expansion Project.** Prepared for the Athabasca Chipewyan First Nation.
- MSES. 2012. **Review of the Marathon Oil Canada Application for the Birchwood SAGD Demonstration Project.** Prepared for the Athabasca Chipewyan and Mikisew Cree First Nation.
- Calambokidis, J., R. Lumper, M. Gosho, P. Gearin, J.D. Darling, W. Megill, D. Goley, B. Gisborne, and B. Kopach. 2003. **Gray whale photographic identification in 2002: Collaborative research in the Pacific Northwest.** Report to the National Marine Mammal Laboratory, Seattle, WA. 19 pp.

Regulatory Hearing Participation

- Kopach, B. 2018. **Using Indigenous Knowledge of the Mikisew Cree First Nation and Western Science to Estimate Habitat Availability and Population Viability of the Ronald Lake Bison Herd.** Prepared for the Mikisew Cree First Nation. Provided expert testimony as part of the Teck Frontier Joint Review Panel proceedings in Fort Chipewyan, AB.
- Kopach, B. 2014. **Third Party Review of the Nova Gas Transmission Ltd.'s (NGTL) North Montney Project Impact Assessment and Proposed Mitigation Measures for Moose (*Alces alces*).** Prepared for the Saulteau First Nations. Provided expert testimony before the National Energy Board.
- Kopach, B. 2014. **Third Party Review of the BC Hydro Site C Impact Assessment and Follow-up Planning for Moose (*Alces alces*).** Prepared for the Saulteau First Nations. Provided expert testimony before the Joint Review Panel.

Land-Use Planning

- Kopach, B. 2018. **Review of the Alberta Government's DRAFT Provincial Woodland Caribou Range Plan.** Prepared for the Fort McKay First Nation.
- Kopach, B. 2016. **Peace Region Electric Supply (PRES) Project: McLeod Lake Indian Band Community Impact Report.**
- Saulteau First Nations and B. Kopach. 2015. **Peace Region Electric Supply (PRES) Project: Saulteau First Nations Community Impact Report.**

Kopach, Brian

MSES. 2013. **Final Review of the Three Sisters Mountain Village Environmental Impact Statement for a Comprehensive Area Structure Plan, Land Use Zoning and Block Subdivision.** Prepared for the Town of Canmore.

Environmental Monitoring and Management

MSES. 2017. **Review of Teck Resources Limited's Quintette Legacy Closure & Reclamation Plan.** Prepared for the Saulteau and West Moberly First Nations, and the McLeod Lake Indian Band.

MSES. 2017. **Environmental Management Workplans for the Natural Forces Wind Energy Zonnebeke and Sukunka Projects.** Prepared for the Saulteau and West Moberly First Nations, and the McLeod Lake Indian Band.

MSES. 2012. **Ungulate Mitigation Measures for Manitoba Hydro's Bipole III Transmission Project.** Prepared for the Manitoba Metis Federation.