Developing and Monitoring the Efficacy of Functional Restoration of Linear Features for Boreal Woodland Caribou– 2017 Image Analysis Report

Prepared for:
BC Oil and Gas Research and Innovation Society

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

December 2017

DEVELOPING AND MONITORING THE EFFICACY OF FUNCTIONAL RESTORATION OF LINEAR FEATURES FOR BOREAL WOODLAND CARIBOU - 2017 IMAGE ANALYSIS REPORT PARKER CARIBOU RANGE

Report prepared for BC Oil and Gas Research and Innovation Society, December 2017

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EXECUTIVE SUMMARY

Environment Canada and the British Columbia Ministry of Environment have identified that habitat restoration is required to sustain woodland caribou populations in northeast British Columbia. However, woodland caribou habitats require decades to recover to pre-disturbance conditions. Functional restoration is therefore needed as an interim strategy to mitigate impacts while caribou habitats recover. The functional restoration of linear disturbances may benefit woodland caribou by reducing predator movement rates and enforcing spatial separation between caribou and predators.

The overarching goals of our research program are to develop (1) a non-invasive mitigation strategy that facilitates the functional restoration of linear disturbances at scales relevant to caribou demography; and (2) a monitoring design to measure the merit of mitigation strategies based on animal response data. The study follows a before after control impact design that measures how predators use a caribou range in both space and time. This entails monitoring the spatiotemporal patterns of large mammal use across an entire caribou range for 1 year, under both disturbed and undisturbed conditions, deploying functional restoration treatments on linear feature disturbances, and then monitoring the rates of animal use following treatment deployment.

We developed a sampling design and deployed 85 motion-sensing monitoring cameras to monitor large mammal use on disturbed (linear features) and undisturbed (game trails) conditions across the Parker Caribou Range. Motion-sensing cameras collected continuous data from November 2015 to November 2016 to measure rates of large mammal use prior to the implementation of functional restoration mitigations (January to March 2017). The cameras currently remain in place, collecting data over the winter of 2017 - 2018. This 2017 report provides a tally of the photographic record from November 2016 to June 2017. The ongoing continuous monitoring extending into 2018 will measure the efficacy of functional restoration treatments that were recently applied in the Parker Caribou Range.

In June 2017, Matrix conducted a field survey to download images from each motion-sensing monitoring camera, and ensure that the cameras were operational to monitor post-mitigation conditions. In addition, Matrix installed 15 new cameras to improve the monitoring coverage of the study area. Data collected during the June 2017 field program represented large mammal and human use data collected across 18,516 camera monitoring days between November 2016 and June 2017. The 2017 project scope did not include data evaluation relative to the study questions. This activity is more appropriately completed once a full year post-functional restoration mitigation monitoring data are available, including the data from the 2017 - 2018 winter months.

ACKNOWLEDGEMENTS

We would like to thank the BC Oil and Gas Research and Innovation Society (BC OGRIS) for funding this research program, and the Research and Effectiveness Monitoring Board (REMB) for providing feedback on the research program. This program has particularly benefited from the support and guidance of Brian Thomson and Steven Wilson.

We are grateful to Jonah Keim, Philip DeWitt, and Subhash Lele, who were integral to the project's conception, design, and implementation, and for Jonah Keim's contribution in the 2017 field year in reviewing the design strategy for the 15 new camera placements.

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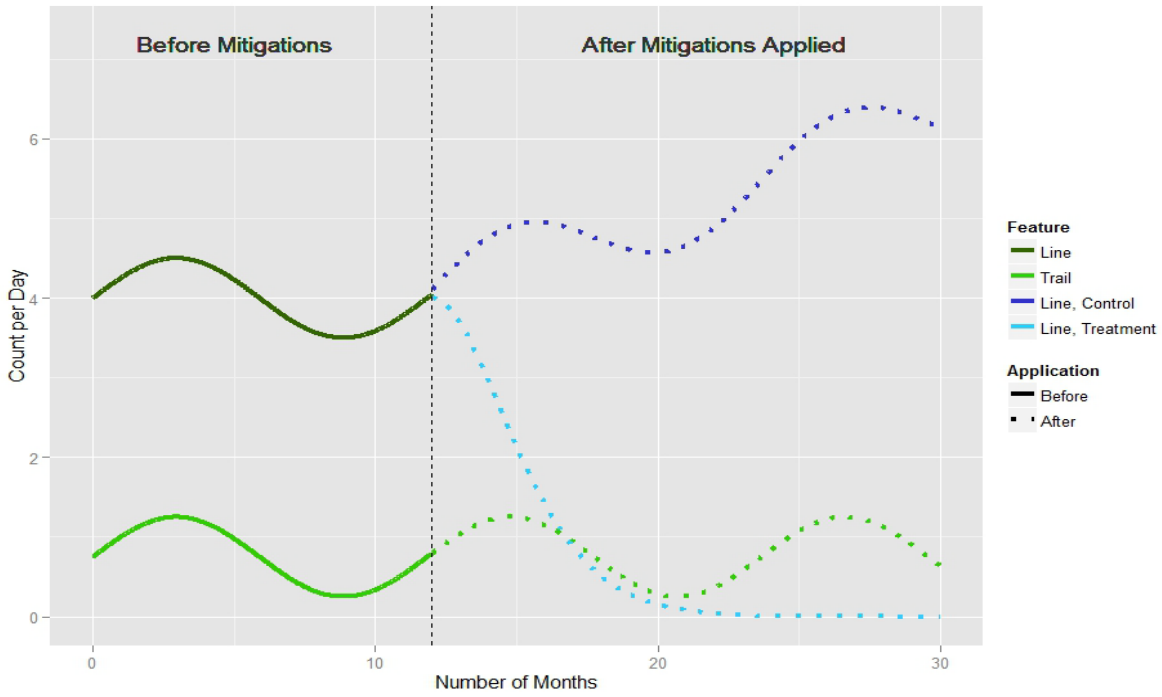
1 BACKGROUND

In 2015, Matrix collaborated with BC OGRIS to develop a wildlife monitoring program with the objectives to: (1) inform the development of mitigation strategies that facilitate the functional restoration of linear disturbances in the Parker Caribou Range; and (2) measure the success of the mitigation strategies using animal data. Specifically, the study was designed to answer the questions "how well does the restoration treatment reduce predator use?" and "are predators leaving treatment areas?" These questions are key to measuring how successful functional restoration is at reducing predator use and predator-caribou overlap. A schematic showing how predator use is hypothesized to change across time, mitigation treatment, and feature type is provided below. Success will be measured if the rate of predator use: (1) on linear features is lower in the treatment area than in similar control areas; (2) on linear features in the treatment area approaches the rate of use on game trails; and (3) on game trails within the treatment area remains constant or declines.

FIGURE 1 Predicted Response of Wolf Use before Mitigations and after Mitigations on Linear Features (Line) and Animal Trails (Trail)



In November 2015, Matrix deployed 85 motion-sensing monitoring cameras to monitor large mammal use on disturbed (linear features) and undisturbed (game trails) conditions across the Parker Caribou Range. Wildlife use data were collected on pre-mitigation conditions from November 2015 – November 2016. A report summarizing pre-mitigation data, containing detailed objectives, methods, and results was delivered to BC OGRIS in April 2017 (Matrix 2017a). Functional restoration mitigations were applied to Zone 1 of the study area in early 2017 (Golder 2017). In June 2017, Matrix conducted a field survey to download images from each motion-sensing monitoring camera, and ensure that the cameras were

operational to continue monitoring post-mitigation conditions. In addition, Matrix deployed 15 motion-sensing monitoring cameras at new monitoring locations within Zone 1 in order to increase data capture on Zone 1 mitigation effects. Further details on camera locations were documented in a separate report (Matrix 2017b).

Photographic data collected during the June 2017 field program represents monitoring data from November 2016 - June 2017, overlapping both the pre- and post-mitigation treatment conditions in the Parker Caribou Range. This report summarizes the photographic data collected during the June 2017 field program, and outlines next steps for the project. The 2017 project scope did not include data evaluation relative to the study questions. This activity is more appropriately completed once a full year post-functional restoration mitigation monitoring data are available, including the data from the 2017 - 2018 winter months.

2 METHODS

Motion-sensing cameras often record multiple photographs of individuals walking in front of the cameras' field of view. Since the count of photographs by species is of no value for our monitoring program, data was interpreted on an event-by-event basis. One count event is defined as an individual, or group of individuals of the same species, detected across a discrete time-period in front of a camera. Defining a count event is important to avoid inflating counts, as animals often trigger a camera multiple times by moving back and forth in front of the monitoring station. A data set of multiple photographs collected continuously of a single animal that remains in front of a camera (e.g., feeding or standing) is considered one count event. When multiple individuals of the same species (e.g., a pack of wolves) trigger a camera, we consider this a single, multiple-individual count event. If an individual animal triggered a camera, left the monitoring station, and then returned more than 10 minutes after the original trigger, we considered this two count events. For each individual event, data were recorded on species, sex, age class, time, date, and the number of animals or humans counted.

3 SUMMARY OF PHOTOGRAPHIC DATA

Motion-sensing cameras collected continuous data on large mammals and humans between November 2016 and June 2017. Three of 85 motion-sensing cameras deployed were lost due to hardware/software malfunctions. The remaining cameras collected data across 18,516 camera monitoring days. A summary of large mammal and human counts detected on linear features and game trails is provided in Table 1.

TABLE 1 Summary of Large Mammal and Human Detections on Linear Features and Game Trails

Species	Count of Individuals Detected		
	Linear Features	Game Trails	Total
Caribou	282	90	372
Black Bears	129	206	335

Species	Count of Individuals Detected		
	Linear Features	Game Trails	Total
Humans	852	0	852
Moose	187	99	286
Wolves	185	52	237
Elk	1	58	59
Bison	12	0	12
White-Tailed Deer	1	1	2
Grizzly Bears	2	6	8
Total Camera Monitoring Days	**11,966**	**6,550**	**18,516**

In addition to the species listed in Table 1, the motion-sensing cameras detected a number of additional species as listed below:

- American beaver (*Castor canadensis*)
- American marten (*Martes americana*)
- Canada goose (*Branta canadensis*)
- Canada lynx (*Lynx canadensis*)
- Common raven (*Corvus corax*)
- Coyote (*Canis latrans*)
- Gray jay (*Perisoreus canadensis*)
- Northern Flying Squirrel (*Glaucomys sabrinus*)
- Red fox (*Vulpes vulpes*)
- Red squirrel (*Tamiasciurus hudsonicus*)
- Ruffed grouse (*Bonasa umbellus*)
- Sandhill crane (*Grus canadensis*)
- Sharp-tailed grouse (*Tympanuchus phasianellus*)
- Snowshoe hare (*Lepus americanus*)
- Spruce grouse (*Falcipennis canadensis*)
- Wolverine (*Gulo gulo)*

4 NEXT STEPS

Results from the first year of monitoring (2015 - 2016) increased our understanding of wildlife and human use in the Parker Range. In the first half of 2017, functional restoration treatments were installed, camera download and maintenance were conducted, and 15 new cameras were installed for improved study area coverage. Continued monitoring through the winter of 2017 - 2018 is necessary to understand the effects of functional restoration mitigations applied to Zone 1 in 2017. A field program is scheduled for June 2018 to collect post-mitigation motion-sensing monitoring camera data.

Data collected during the June 2018 field program will represent greater than one year of post-mitigation monitoring. Interpretation and analysis of this data will measure the success of the mitigation strategies using animal data.

5 REFERENCES

Golder Associates (Golder). 2017. *Pilot Boreal Caribou Habitat Restoration Program Year 1 (2017) Implementation Report*. Report prepared for BC OGRIS REMB. April 2017. http://www.bcogris.ca/sites/default/files/bcip-2017-01-final-implementation-report-may-117.pdf

Matrix Solutions Inc. (Matrix). 2017a. *Developing and Monitoring the Efficacy of Functional Restoration of Linear Features for Boreal Woodland Caribou - 1-Year Summary of Monitoring Data*. Report prepared for BC OGRIS. April 2017. http://www.bcogris.ca/sites/default/files/bcip-2016-17-final-report-may-117.pdf

Matrix Solutions Inc. (Matrix). 2017b. June 2017 Wildlife Camera Maintenance Field Survey Summary. Letter report prepared for BC OGRIS. August 23, 2017.